CITY OF MIDLAND, TEXAS
AGENDA FOR CITY COUNCIL MEETING
September 9, 2025 - 10:00 AM
300 North Loraine
Midland, Texas
Council Chamber - City Hall

A quorum of the City Council intends to be physically present at the aforementioned location.

The City Council may discuss, consider, and take action on any item listed on this agenda.

OPENING ITEMS

1. Invocation – Pastor Luke McNeely, Stonegate Fellowship

2. Pledge of Allegiance

PROCLAMATIONS AND RECOGNITIONS

3. Presentation of special events, organizations, individuals, periods of time, or reports, including, but not limited to:

   3a. Presentation of Proclamation for “The American Legion Day”

CONSENT AGENDA

4. MOTION APPROVING THE FOLLOWING MINUTES:

   4a. REGULAR SESSION OF AUGUST 13, 2025

5. 2025-122 – RESOLUTION AUTHORIZING THE EXECUTION OF AN AMENDMENT TO THAT CERTAIN PROFESSIONAL SERVICES AGREEMENT WITH DUNAWAY ASSOCIATES LLC, FOR PROFESSIONAL SERVICES RELATED TO THE CONSTRUCTION OF PHASES 2 AND 3 OF THE BEAL PARK RENOVATION PROJECT; SAID AMENDMENT PROVIDING FOR ADDITIONAL SERVICES ASSOCIATED WITH THE INCREASED PROJECT SCOPE AND A NEW TOTAL COST OF $2,660,750.00 AND AUTHORIZING PAYMENT THEREFOR **(DISTRICT 4) (GENERAL SERVICES) (STRENGTHEN AND SUSTAIN OUR INFRASTRUCTURE)**

6. 2025-123 – RESOLUTION AWARDING A CONTRACT FOR THE BRIARWOOD AVENUE PHASE II PROJECT TO REECE ALBERT, INC. OF SAN ANGELO, TEXAS, AT A TOTAL COST OF $9,020,270.27; APPROVING $1,804,052.73 FOR CONTINGENCIES;

APPROPRIATING FUNDS; AND AUTHORIZING PAYMENT **(DISTRICT 4) (GENERAL SERVICES) (STRENGTHEN AND SUSTAIN OUR INFRASTRUCTURE)**

7. 2025-124 – RESOLUTION AUTHORIZING THE EXECUTION OF A CONTRACT WITH CERRIS BUILDERS, INC., IN THE AMOUNT OF $38,577,000.00 FOR THE TERMINAL MODERNIZATION AND EXPANSION PROJECT AT MIDLAND INTERNATIONAL AIR & SPACE PORT; APPROVING $3,857,700.00 FOR CONTINGENCIES; APPROPRIATING FUNDS; AND AUTHORIZING PAYMENT FOR SAID PROJECT **(DISTRICT 4) (AIRPORTS) (TRANSPARENT & CONSISTENT COMMUNICATION)**

8. 092-2025 – MOTION APPROVING, WITH STAFF'S RECOMMENDED CONDITIONS, A PRELIMINARY PLAT OF DAHLIA WAREHOUSE DISTRICT, BEING A PLAT OF A 131.00-ACRE TRACT OF LAND OUT OF SECTIONS 25 AND 36, BLOCK 41, T-1-S, T&P RR CO. SURVEY, MIDLAND COUNTY, TEXAS (GENERALLY LOCATED ON THE WEST SIDE OF NORTH FARM-TO-MARKET ROAD 1788, APPROXIMATELY 200 FEET SOUTH OF WEST COUNTY ROAD 60) **(EXTRATERRITORIAL JURISDICTION) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)**

9. 093-2025 – MOTION APPROVING, WITH STAFF'S RECOMMENDED CONDITIONS, A PRELIMINARY PLAT OF LIMESTONE ADDITION, SECTION 1, BEING A PLAT OF A 54.49-ACRE TRACT OF LAND OUT OF SECTIONS 11 AND 14, BLOCK 40, T-2-S, T&P RR CO. SURVEY, MIDLAND COUNTY, TEXAS. (GENERALLY LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF SOUTH COUNTY ROAD 1250 AND WEST INTERSTATE 20) **(DISTRICT: EXTRATERRITORIAL JURISDICTION) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)**

10. 094-2025 – MOTION AUTHORIZING THE EXECUTION OF AN AMENDMENT TO THAT CERTAIN MAY 15, 1975, SURFACE LEASE AND RIGHT-OF-WAY AGREEMENT WITH MRC TORO, LLC, SUCCESSOR-IN-INTEREST TO ATLANTIC RICHFIELD COMPANY; SAID AMENDMENT PROVIDING FOR THE EXTENSION OF THE TERM FOR AN ADDITIONAL PERIOD OF FOUR (4) MONTHS **(DISTRICT: NONE) (UTILITIES) (PROVIDE SOUND GOVERNANCE & FISCAL MANAGEMENT)**

SECOND READINGS

11. 10660 – AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO GRANT A SPECIFIC USE DESIGNATION WITH TERM FOR LOT 2, BLOCK 6, CLAYDESTA PLAZA, SECTION 5, CITY AND COUNTY OF MIDLAND, TEXAS (GENERALLY LOCATED AT THE NORTHEAST CORNER OF THE INTERSECTION OF DESTA DRIVE AND WEST WADLEY AVENUE), WHICH IS PRESENTLY ZONED PD, PLANNED DEVELOPMENT DISTRICT FOR AN OFFICE AND RETAIL DEVELOPMENT, ALLOWING SAID PROPERTY TO BE USED FOR THE SALE OF ALL ALCOHOLIC BEVERAGES IN A RESTAURANT FOR ON-PREMISES CONSUMPTION; MAKING SAID DESIGNATION SUBJECT TO CERTAIN CONDITIONS AND RESTRICTIONS CONTAINED HEREIN; CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR

FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION (FIRST READING HELD AUGUST 26, 2025) **(DISTRICT 3) (DEVELOPMENT SERVICES) (QUALITY OF LIFE & PLACE)**

12. 10661 – AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO REZONE A 302.39-ACRE TRACT OF LAND OUT OF SECTION 18, BLOCK 38, T-1-S, T&P RR CO. SURVEY, CITY AND COUNTY OF MIDLAND, TEXAS, FROM PD, PLANNED DEVELOPMENT DISTRICT FOR A HOUSING DEVELOPMENT TO AN AMENDED PD, PLANNED DEVELOPMENT DISTRICT FOR A HOUSING DEVELOPMENT (GENERALLY LOCATED AT THE NORTHEAST CORNER OF THE INTERSECTION OF NORTH FAIRGROUNDS ROAD AND FIREWHEEL ROAD); CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION (FIRST READING HELD AUGUST 26, 2025) **(DISTRICT 1) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)**

PUBLIC HEARINGS

The City Council will hold public hearings on the following items:

13. 10657 – AN ORDINANCE GRANTING A SPECIAL EXCEPTION FOR A 1.0-ACRE TRACT OF LAND OUT OF SECTION 23, BLOCK 40, T-1-S, T&P RR CO. SURVEY, CITY AND COUNTY OF MIDLAND, TEXAS (GENERALLY LOCATED ON THE NORTH SIDE OF GLADIOLA AVENUE, APPROXIMATELY 465 FEET EAST OF GOLDEN GATE DRIVE), BY PERMITTING A REDUCED MINIMUM LOT AREA; CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); ORDERING RECORDATION BY THE CITY SECRETARY IN THE DEED RECORDS OF MIDLAND COUNTY, TEXAS; AND ORDERING PUBLICATION (DEFERRED FROM 08-12-2025) **(DISTRICT 4) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)**

14. 10662 – GATHER PUBLIC INPUT ON THE PROPOSED 2025-2026 BUDGET; AND CONSIDER AN ORDINANCE OF THE CITY OF MIDLAND PROVIDING FUNDS FOR THE FISCAL YEAR BEGINNING OCTOBER 1, 2025, AND ENDING SEPTEMBER 30, 2026, BY APPROVING THE BUDGET FOR SAID PERIOD AND APPROPRIATING AND SETTING ASIDE THE NECESSARY FUNDS OUT OF THE GENERAL AND OTHER REVENUES AND UNAPPROPRIATED FUND BALANCE OF THE CITY OF MIDLAND FOR SAID FISCAL YEAR FOR THE MAINTENANCE AND OPERATION OF THE VARIOUS DEPARTMENTS AND FOR VARIOUS ACTIVITIES AND IMPROVEMENTS TO THE CITY; AND ORDERING PUBLICATION:
TAXPAYER IMPACT STATEMENT:
A. FOR THE FISCAL YEAR 2024-2025 MEDIAN-VALUED HOMESTEAD PROPERTY IN THE CITY OF MIDLAND, (1) THE CITY PROPERTY TAX BILL FOR THE CURRENT FISCAL YEAR ($0.348662 PER $100 OF TAXABLE VALUE) IS $907.49, (2) THE ESTIMATED CITY PROPERTY TAX BILL FOR THE UPCOMING FISCAL YEAR IF THE PROPOSED BUDGET IS ADOPTED ($0.347999 PER $100 OF TAXABLE VALUE) IS

$909.22, AND (3) THE ESTIMATED CITY PROPERTY TAX BILL FOR THE UPCOMING FISCAL YEAR IF A BALANCED BUDGET FUNDED AT THE NO-NEW-REVENUE TAX RATE AS CALCULATED UNDER CHAPTER 26, TAX CODE, IS ADOPTED ($0.336458 PER $100 OF TAXABLE VALUE) IS $877.40

B. FOR THE FISCAL YEAR 2025-2026 MEDIAN-VALUED HOMESTEAD PROPERTY IN THE CITY OF MIDLAND, (1) THE CITY PROPERTY TAX BILL FOR THE CURRENT FISCAL YEAR ($0.348662 PER $100 OF TAXABLE VALUE) IS $922.41, (2) THE ESTIMATED CITY PROPERTY TAX BILL FOR THE UPCOMING FISCAL YEAR IF THE PROPOSED BUDGET IS ADOPTED ($0.347999 PER $100 OF TAXABLE VALUE) IS $924.16, AND (3) THE ESTIMATED CITY PROPERTY TAX BILL FOR THE UPCOMING FISCAL YEAR IF A BALANCED BUDGET FUNDED AT THE NO-NEW-REVENUE TAX RATE AS CALCULATED UNDER CHAPTER 26, TAX CODE, IS ADOPTED ($0.336458 PER $100 OF TAXABLE VALUE) IS $891.82 **(DISTRICT: ALL) (FINANCE) (PROVIDE SOUND GOVERNANCE & FISCAL MANAGEMENT)**

15. 10663 – TAX RATE INCREASE FOR FISCAL YEAR 2025-2026; AN ORDINANCE FIXING THE TAX LEVY FOR THE CITY OF MIDLAND, TEXAS, FOR THE FISCAL YEAR BEGINNING ON OCTOBER 1, 2025, AND ENDING ON SEPTEMBER 30, 2026 **(DISTRICT: ALL) (FINANCE) (PROVIDE SOUND GOVERNANCE & FISCAL MANAGEMENT)**

16. 095-2025 – THE PROPOSED GRANTING OF OIL AND GAS WELL PERMITS TO PIONEER NATURAL RESOURCES, USA, INC. (“OPERATOR”) FOR THE DRILLING OF THE FOLLOWING OIL AND GAS WELLS: NAIL-TILLMAN E1G 507H; NAIL-TILLMAN E1H 508H; NAIL-TILLMAN E1I 509H; NAIL-TILLMAN E1J 510H; AND NAIL-TILLMAN E1K 511H; SAID WELLS BEING GENERALLY LOCATED 7,122 FEET NORTH OF OCCIDENTAL PARKWAY AND BETWEEN 1,182 FEET AND 1,262 FEET EAST OF STATE HIGHWAY 349 (PUBLIC HEARING ONLY) **(DISTRICT 1) (DEVELOPMENT SERVICES) (SET THE STANDARD FOR A SAFE AND SECURE CITY)**

17. 096-2025 – THE PROPOSED GRANTING OF OIL AND GAS WELL PERMITS TO PIONEER NATURAL RESOURCES, USA, INC. (“OPERATOR”) FOR THE DRILLING OF THE FOLLOWING OIL AND GAS WELLS: NAIL-BURLEY 6L 712H; NAIL-BURLEY 6M 713H; NAIL-BURLEY 6N 714H; NAIL-BURLEY 6O 715H; NAIL -BURLEY 6P 716H; AND NAIL-BURLEY 6Q 717H; SAID WELLS BEING GENERALLY LOCATED BETWEEN 6,660 FEET AND 6,669 FEET NORTH OF OCCIDENTAL PARKWAY AND BETWEEN 6,627 FEET AND 6,727 FEET EAST OF STATE HIGHWAY 349 (PUBLIC HEARING ONLY) **(DISTRICT 1) (DEVELOPMENT SERVICES) (SET THE STANDARD FOR A SAFE AND SECURE CITY)**

18. 10664 – AN ORDINANCE AMENDING THE CONDITIONS AND RESTRICTIONS OF ORDINANCE NO. 10619, WHICH GRANTED A SPECIFIC USE DESIGNATION WITH TERM FOR THE EAST 50 FEET OF LOTS 10 THROUGH 12, BLOCK 61, ORIGINAL TOWN ADDITION, CITY AND COUNTY OF MIDLAND, TEXAS (GENERALLY LOCATED ON THE SOUTH SIDE OF WEST WALL STREET, APPROXIMATELY 110 FEET EAST OF SOUTH CARRIZO STREET), WHICH IS PRESENTLY ZONED CB, CENTRAL BUSINESS DISTRICT, ALLOWING SAID PROPERTY TO BE USED FOR THE SALE OF

ALL ALCOHOLIC BEVERAGES IN A LOUNGE FOR ON-PREMISES CONSUMPTION; REQUIRING THE OPERATOR OF THE LOUNGE TO PROVIDE A MINIMUM OF TWO SECURITY GUARDS WHO ARE LEVEL II CERTIFIED ON THE PREMISES ON TUESDAY THROUGH SATURDAY FROM 9:00 P.M. TO 2:30 A.M. OF THE FOLLOWING DAY; CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; AND PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION **(DISTRICT 3) (DEVELOPMENT SERVICES) (QUALITY OF LIFE & PLACE)**

19. 10665 – AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO GRANT A SPECIFIC USE DESIGNATION WITH TERM FOR LOT 3, BLOCK 45, FAIRMONT PARK ADDITION, SECTION 13, CITY AND COUNTY OF MIDLAND, TEXAS (GENERALLY LOCATED ON THE EAST SIDE OF WEST LOOP 250 NORTH, APPROXIMATELY 450 FEET SOUTH OF HENRY KOONTZ BOULEVARD), WHICH IS PRESENTLY ZONED RR, REGIONAL RETAIL DISTRICT, ALLOWING SAID PROPERTY TO BE USED FOR THE SALE OF ALL ALCOHOLIC BEVERAGES IN A MOVIE THEATER FOR ON-PREMISES CONSUMPTION; MAKING SAID DESIGNATION SUBJECT TO CERTAIN CONDITIONS AND RESTRICTIONS CONTAINED HEREIN; CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION **(DISTRICT 3) (DEVELOPMENT SERVICES) (QUALITY OF LIFE & PLACE)**

20. 10666 – AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO REZONE LOT 8A, BLOCK 28, GREENWOOD ADDITION, SECTION 12, CITY AND COUNTY OF MIDLAND, TEXAS, FROM MF-22, MULTIPLE-FAMILY DWELLING DISTRICT TO SF-3, SINGLE-FAMILY DWELLING DISTRICT (GENERALLY LOCATED ON THE EAST SIDE OF SOUTH WEBSTER STREET, APPROXIMATELY 70 FEET SOUTH OF EAST NEW YORK AVENUE); CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION **(DISTRICT 2) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)**

21. 10667 – AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO REZONE LOTS 1 THROUGH 6, BLOCK 6, QUAIL RIDGE ADDITION, SECTION 5, CITY AND COUNTY OF MIDLAND, TEXAS, FROM PD, PLANNED DEVELOPMENT DISTRICT FOR A HOUSING DEVELOPMENT TO AN AMENDED PD, PLANNED DEVELOPMENT DISTRICT FOR A HOUSING DEVELOPMENT (GENERALLY LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF BEACHWOOD STREET AND CHAPARRAL STREET); CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION **(DISTRICT 2) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)**

22. 10668 – AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF

MIDLAND TO REZONE LOT 4, BLOCK 62, PARK AVENUE HEIGHTS ADDITION, SECTION 2, CITY AND COUNTY OF MIDLAND, TEXAS, FROM MF-22, MULTIPLE-FAMILY DWELLING DISTRICT TO SF-3, SINGLE-FAMILY DWELLING DISTRICT (GENERALLY LOCATED ON THE WEST SIDE OF SOUTH MADISON STREET, APPROXIMATELY 190 FEET SOUTH OF EAST CALIFORNIA AVENUE); CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION **(DISTRICT 2) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)**

MISCELLANEOUS

23. 10669 – AN ORDINANCE ADOPTING A FEE SCHEDULE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING AN APPEAL PROCESS; ESTABLISHING AN EFFECTIVE DATE OF OCTOBER 1, 2025; AND ORDERING PUBLICATION **(DISTRICT: ALL) (FINANCE) (PROVIDE SOUND GOVERNANCE & FISCAL MANAGEMENT)**

24. MOTION MAKING APPOINTMENTS TO VARIOUS BOARDS AND COMMISSIONS

PUBLIC COMMENT

25. Receive public comments where individuals may address the City Council on City related issues and projects not on the present agenda. Any deliberation of or decision by the City Council regarding the item being discussed shall be limited to a motion to place the item on the agenda for a subsequent meeting. (Please limit comments to three minutes or less.)

STAFF PRESENTATIONS

26. "Targeted Safety Action Plan”

27. “Closing the Gap with Savings and Efficiencies”

28. Training Session: AMMS - CivicPlus for City Council Members

EXECUTIVE SESSION

29. Pursuant to Texas Government Code § 551.101, the City Council will hold an Executive Session, which is closed to the public, to discuss the following matters as permitted under the following sections of the Texas Government Code:

    a. Section 551.071, Consultation with Attorney

    a.1. Discuss matters in which the duty of the attorney(s) to the governmental body under the Texas Disciplinary Rules of Professional Conduct of the State Bar of Texas clearly conflicts with Chapter 551 of the Texas Government Code

a.2. Discuss pending or contemplated litigation.

b. Section 551.072, Deliberation Regarding Real Property

b.1. Discuss the purchase, exchange, lease or value of real property.

c. Section 551.074, Personnel Matters

c.1. Deliberate the employment, evaluation, and duties of the City Manager, Interim City Attorney, City Secretary, Municipal Court Presiding Judge, and Municipal Court Associate Judge.

c.2. Deliberate the appointment of members to the Midland Development Corporation Board of Directors and the Planning and Zoning Commission.

d. Section 551.087, Deliberate Economic Development Negotiations

d.1. Discuss business prospects that the City seeks to have locate, stay, or expand in or near the City of Midland, Texas, and discuss possible incentives.

Respectfully Submitted,

Tommy Gonzalez
City Manager

MEETING ASSISTANCE INFORMATION: The Midland City Hall and Council Chamber are wheelchair accessible. If you need special assistance to participate in this meeting, please contact the City Secretary's Office at (432) 685-7430. Notification 48 hours prior to the meeting will enable the City to make reasonable arrangements to ensure accessibility to this meeting.

MIDLAND CITY COUNCIL
MINUTES
August 13, 2025

The City Council convened in regular session in the Council Chamber, City Hall, Midland, Texas, at 9:00 a.m., August 13, 2025.

Council Members present:	John Burkholder, Amy Stretcher Burkes, Robin Poole, Lori Blong, Brian Stubbs, Jack Ladd, John Norman
Council Members absent:	None
Staff members present:	City Manager Tommy Gonzalez, Deputy City Manager Morris Williams Jr., Deputy City Manager Jose Ortiz, City Governance Officer/City Secretary Marcia Bentley-German, Interim City Attorney Nicholas Toulet-Crump

The meeting was called to order at 9:10 a.m.

MISCELLANEOUS

1. 2025-115 – RESOLUTION RECORDING A VOTE ON A PROPOSAL TO CONSIDER AN AD VALOREM TAX RATE FOR THE FISCAL YEAR 2025-2026 AND TO ESTABLISH A DATE TO HOLD A PUBLIC HEARING ON THE PROPOSED TAX RATE; ESTABLISHING DATES WHEN THERE WILL BE A RECORD VOTE ON THE TAX RATE; AND AUTHORIZING AND DIRECTING THE CITY MANAGER TO POST ALL APPROPRIATE NOTICES **(DISTRICT: NONE) (FINANCE) (PROVIDE SOUND GOVERNANCE & FISCAL MANAGEMENT)**

   City Manager Tommy Gonzalez gave a brief overview of the budget meeting and what to expect with regard to the budget process.

   Mayor Pro Tem Poole spoke about the annual percentage increase outpacing inflation and not being sustainable. City Manager Tommy Gonzalez reported he has consulted with staff and is doing something about it.

   Chief Financial Officer Christy Weakland provided a detailed presentation of the City of Midland budget.

   Planning & Development Officer Elizabeth Triggs provided a presentation on Goal One (Strong Economy with More Quality Jobs). Mrs. Triggs reviewed vision block connections, strategic alignment and covered Airports & Development Services.

DRAFT

Managing Director of Public Safety Chuck Blumenauer and Police Chief Greg Snow reviewed Goal Two (Set the Standard for a Safe and Secure City). They reported on the High Intensity Drug Traffic Area (HIDTA), Texas Anti-Gang (TAG) Center, Animal Shelter, Health Department and Code Enforcement.

Planning & Development Officer Elizabeth Triggs reported on Goal Three (Quality of Life and Place for Recruitment and Retention). Mrs. Triggs reported on the Parks and Recreation general fund, golf course, sports complex and parks oil and gas.

Chief of Staff Taylor Novak & Chief Information Officer Gorgees Eskander reported on Goal Four (Transparent & Consistent Communication). They reviewed the Vision Block Connections, Strategic/Organizational Alignment, Information Technology Services and FY 2026 Priorities, public-facing dashboards, use of AI to support long-term urban planning, creating a digital twin of Midland, upgrade of the fire dispatch alerting system and updating IT policies.

Ms. Novack, reported on Strategic Communications, social media growth and reach, Alert Midland (geofencing), improved ratings on external platforms, more proactive and deliberate messaging, video production, public service announcements and proactive communication.

Deputy City Manager Morris Williams Jr., Chief Financial Officer Christy Weakland and Assistant Human Relations and Development Manager, Nicole Weaverling reported on Goal Five; Provide Sound Governance and Fiscal Management, Zero Findings on audit, Human Relations and Development, creation of the in-house CDL program, City-wide awards, recognitions, recruiting and retaining a skilled and diverse workforce.

Utilities Director Carl Craigo and Engineering Services Director Gabriel McClelland reported on Goal Six; (Strengthen and Sustain our Infrastructure). Mr. Craigo reported on the need to provide reliable and sustainable utilities, secured long-term water supply flexibility and cost savings. Mr. Craigo reported on the leak detection program for system longevity, the expansion of the pressure monitoring network, delivering services timely and efficiently and environmental compliance. Mr. Craigo also reported that water main breaks are decreasing and repairs are down from 206 to 150.

Engineering Services Director Gabriel McClelland reported that Solid Waste litter and large item collection increased; collecting 360 tons of litter.

City Manager Tommy Gonzalez reported the current tax rate is .348662 and they are recommending .347999 for the tax rate ceiling.

The entire presentation may be heard at www.midlandtexas.gov.

DRAFT

John Norman moved to approve Resolution No. 2025-115; seconded by Jack Ladd.

The motion passed by the following vote:
AYE: Burkholder, Stretcher Burkes, Poole, Blong, Stubbs, Ladd, Norman
NAY: None
ABSTAIN: None
ABSENT: None

All the business at hand having been completed, the meeting adjourned at 1:41 p.m.

PASSED AND APPROVED September 9, 2025.

_____
Lori Blong, Mayor

ATTEST:

_____
Marcia Bentley-German
City Governance Officer/City Secretary

DRAFT

City Council Meeting

Item Number: 5

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Erika Martinez, Manager, Purchasing

Subject: **RESOLUTION AUTHORIZING THE EXECUTION OF AN AMENDMENT TO THAT CERTAIN PROFESSIONAL SERVICES AGREEMENT WITH DUNAWAY ASSOCIATES LLC, FOR PROFESSIONAL SERVICES RELATED TO THE CONSTRUCTION OF PHASES 2 AND 3 OF THE BEAL PARK RENOVATION PROJECT; SAID AMENDMENT PROVIDING FOR ADDITIONAL SERVICES ASSOCIATED WITH THE INCREASED PROJECT SCOPE AND A NEW TOTAL COST OF $2,660,750.00 AND AUTHORIZING PAYMENT THEREFOR (DISTRICT 4) (GENERAL SERVICES) (STRENGTHEN AND SUSTAIN OUR INFRASTRUCTURE)**

Purpose:

Resolution authorizing the execution of an amendment to that certain Professional Services Agreement with Dunaway Associates LLC, for Professional Services related to the construction of Phases 2 and 3 of the Beal Park Renovation Project; said amendment providing for additional services associated with the increased project scope and a new total cost of $2,660,750.00 and authorizing payment therefor.

Recommended City Council Action:

Approve

Fiscal Impact:

Funding is available in the Beal Park Renovation Project.

Strategic Priority:

(Strengthen and Sustain our Infrastructure)

Discussion:

Resolution 2024-086 authorized a professional services agreement for Landscape Architectural/Engineering Services for the Plans, Specifications and Estimate for Beal Park Phase 2 and 3 Renovation and Construction services from Dunaway Associates LCC. Dunaway Associates LLC was selected through the RFQ process to develop the Beal Park Phased Master Plan, and is currently managing Phase I construction and preparing Plans, Specifications, and Estimates for Phases 2 and 3, with $7.5 million in private donations recently secured to enhance Phase 2 amenities. To support this elevated scope, Dunaway has proposed an additional services fee of $1,484,000 to bring on specialized consultants, with Phase 2 still expected to be completed by the end of 2027. Please see the attached memo from Laurie Williams, Parks and Recreation Director, for additional information.

Therefore, please consider a resolution authorizing the execution of an amendment to that certain Professional Services Agreement with Dunaway Associates LLC, for Professional Services related to the construction of Phases 2 and 3 for Beal Park Renovation Project; said amendment providing for additional services associated with the increased project scope and a new total cost of $2,660,750.00 and authorizing payment therefor.

City Manager's Office

Parks Divisions
Interoffice Memorandum

Date: Aug 26, 2025
To: Jose Ortiz, Deputy City Manager
From: Laurie M. Williams, Parks and Recreation Director
Subject: Professional Services Agreement for Landscape Architectural/Engineering Additional Services for the Plans, Specifications and Estimates for Beal Park Phase 2 Construction

Through the Request for Qualifications process, Dunaway was selected to develop the Beal Park Phased Master Plan. They are currently overseeing Phase I Construction as well as Plans, Specifications, and Estimates for Phases 2 and 3. The Professional Services Agreement for Phases 2 and 3 was approved by City Council in May 2024. Since that time, an additional $7,500,000 in private donations has been acquired to elevate the amenities in Phase 2. The splash park, restrooms, amphitheater, and playground are all being custom designed to provide outstanding additions to the park with the completion of Phase 2.

In order to elevate these amenities, specialized consultants are required to partner in the customization needed to provide the plans. The Professional Services Agreement states that if additional consultants are needed to do the design work, additional fees will be negotiated with the City to provide the necessary expertise. Dunaway has submitted an additional services quote in the amount of $1,484,000. The consultants they will add to the design team include architects, structural and electrical engineers, water feature designers, and lighting designers. Additional work by the Dunaway team's landscape architects and civil engineers will also be required.

The time frame for the completion of Phase 2 has not been changed. Completion is still expected by the end of 2027.

Funds for the additional design work and preparation of plans is available in the Beal Park Renovation Project (900464-097).

RESOLUTION NO. _____

RESOLUTION AUTHORIZING THE EXECUTION OF AN AMENDMENT TO THAT CERTAIN PROFESSIONAL SERVICES AGREEMENT WITH DUNAWAY ASSOCIATES LLC FOR PROFESSIONAL SERVICES RELATED TO THE CONSTRUCTION OF PHASES 2 AND 3 OF THE BEAL PARK RENOVATION PROJECT; SAID AMENDMENT PROVIDING FOR ADDITIONAL SERVICES ASSOCIATED WITH THE INCREASED PROJECT SCOPE AND A NEW TOTAL COST OF $2,660,750.00; AND AUTHORIZING PAYMENT THEREFOR

WHEREAS, the City of Midland, Texas, and Dunaway Associates LLC entered into that certain Professional Services Agreement effective as of May 28, 2024, for professional services related to the construction of Phases 2 and 3 of the Beal Park Renovation Project (the "Project"); and

WHEREAS, the scope of the Project has increased since the execution of the Professional Services Agreement due to an influx of certain grant funds from generous community members and organizations, which are dedicated to the Project; and

WHEREAS, the increased Project scope requires that certain amendments be made to the Professional Services Agreement to provide for additional professional services to be rendered by Dunaway Associates LLC and a new total cost of $2,660,750.00; and

WHEREAS, the City Council finds that the professional fees proposed by Dunaway Associates LLC are consistent with and not higher than the recommended practices and fees published by the applicable professional associations and do not exceed any maximum provided by law; and

WHEREAS, the City Council finds that Dunaway Associates LLC provides professional services for a fair and reasonable price; and

WHEREAS, the City Council finds it to be in the public interest to execute an amendment to the Professional Services Agreement with Dunaway Associates LLC to provide for additional professional services to be rendered by Dunaway Associates LLC related to the increased Project scope and a new total cost of $2,660,750.00;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That the City Manager and City Secretary are hereby authorized and directed to execute and attest, respectively, on behalf of the City of Midland, an amendment to the Professional Services Agreement with Dunaway Associates LLC for professional services associated with the construction of Phases 2 and 3 of the Project; said amendment providing for additional professional services to be rendered by Dunaway Associates LLC related to the increased Project scope and a new total cost of $2,660,750.00. Said amendment to be kept on file in the office of the City Secretary and referenced by the date and number of this resolution.

SECTION TWO. That the City Comptroller is hereby authorized and directed to pay Dunaway Associates LLC in accordance with the terms of the Professional Services Agreement, as amended, from funds available in the project established by Beal Park Renovation Project upon receipt of proper invoices or statements approved by the City Manager or his designee.

On motion of Council member _____, seconded by Council member _____, the above and foregoing resolution was adopted by the City Council of the City of Midland at a regular meeting on the _____ day of _____, A.D., 2025, by the following vote:

Council members voting "AYE":

Council members voting "NAY":

_____
Lori Merritt Blong, Mayor

ATTEST:

_____
Marcia Bentley-German, City Secretary

RECOMMENDED AND APPROVED:

_____
Tommy Gonzalez, City Manager

S:\Resolutions\Purchase\2025\Contracts\Approve Amendment to PSA - Beal Park Phases 2 & 3.docx

APPROVED AS TO CONTENT
AND COMPLETENESS:

_____
Regina Stephenson, General Services Director

APPROVED AS TO FORM ONLY:

_____
Nicholas Toulet, Interim City Attorney

City Council Meeting

Item Number: 6

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Erika Martinez, Manager, Purchasing

Subject: **RESOLUTION AWARDING A CONTRACT FOR THE BRIARWOOD AVENUE PHASE II PROJECT TO REECE ALBERT, INC. OF SAN ANGELO, TEXAS, AT A TOTAL COST OF $9,020,270.27; APPROVING $1,804,052.73 FOR CONTINGENCIES; APPROPRIATING FUNDS; AND AUTHORIZING PAYMENT (DISTRICT 4) (GENERAL SERVICES) (STRENGTHEN AND SUSTAIN OUR INFRASTRUCTURE)**

Purpose:

Resolution awarding a contract for Briarwood Ave Phase II Project to Reece Albert, Inc. of San Angelo, Texas, for a cost of $9,020,270.27 plus $1,804,052.73 in contingences, for a project cost of $10,824,323.00; and authorizing payment.

Recommended City Council Action:

Approve

Fiscal Impact:

Funding of $6,748,163.27 is available in the Paving of Briarwood Ave Project. $2,272,106.48 is available in the Impact Fee NW Fund, with remaining $1,804,053.95 provided from the 2017 Road Bond, which will be appropriated to a project/s for this purpose.

Strategic Priority:

(Strengthen and Sustain our Infrastructure)

Discussion:

Requests for bids were sent to three hundred twenty-five (325) contractors, and sixty (60) contractors viewed the bid. We received three (3) bids. Staff recommends awarding the Briarwood Paving Phase II Project, including the traffic signal at Briarwood and Avalon, to Reece Albert, Inc. of San Angelo, Texas, the lowest responsible bidder with a proven track record on similar city projects. Please see the attached memo from Gabe McClelland, Engineering Services Director, for more information.

Therefore, please consider a resolution awarding a contract for Briarwood Ave Phase II Project to Reece Albert, Inc. of San Angelo, Texas, for a cost of $9,020,270.27 plus $1,804,052.73 in contingences, for a project cost of $10,824,323.00; and authorizing payment.

Morris Williams Jr.

City Manager's Office

INTEROFFICE MEMORANDUM

TO: Erika Martinez; City of Midland, Purchasing Manager

FROM: Gabe McClelland; City of Midland, Director – Engineering Services

SUBJECT: Briarwood Paving Phase II ♦ Recommend to Award ♦ Eng. Project No. P21-06

DATE: September 09, 2025

Staff recommends awarding the Briarwood Paving Phase II Project, including the additive alternate for the traffic signal at the Briarwood and Avalon intersection, to the lowest responsible bidder, Reece Albert, Inc. of Midland, Texas.

Engineering staff have reviewed the bid tabulation for the Briarwood Paving Phase II project. Reece Albert, Inc. submitted the apparent lowest bid and has a proven track record with the City of Midland, successfully completing projects of similar scale and scope.

Funding of $6,748,163.27 is available in the Paving of Briarwood Ave Project. $2,272,106.48 is available in the Impact Fee NW Fund, with remaining $1,804,053.95 provided from the 2017 Road Bond, which will be appropriated to a project/s for this purpose..

The apparent successful bidder was selected based on the base bid amount of **$9,020,270.27** as outlined in the bidding documents. In addition, we would like to request that a 20% contingency in the amount of **$1,804,052.73** be allowed for value added changes to the project during construction. The total amount made available for the project would be **$10,824,323.00**.

Gabe McClelland
Director – Engineering Services

Cc: Kirby Jones
Regina Stephenson

RESOLUTION NO. _____

RESOLUTION AWARDING A CONTRACT FOR THE BRIARWOOD AVENUE PHASE II PROJECT TO REECE ALBERT, INC. OF SAN ANGELO, TEXAS, AT A TOTAL COST OF $9,020,270.27; APPROVING $1,804,052.73 FOR CONTINGENCIES; APPROPRIATING FUNDS; AND AUTHORIZING PAYMENT

WHEREAS, the City Manager approved the plans and specifications and advertised for competitive bids for the Briarwood Avenue Phase II Project (the "Project"); and

WHEREAS, Bid No. 25006037 was opened on August 15, 2025, with the lowest responsible bidder being Reece Albert, Inc. of San Angelo, Texas ("Contractor"), having submitted a bid of $9,020,270.27 for the base bid and additive alternate, as shown on the bid tabulation attached hereto as Exhibit A and incorporated herein for all legal purposes; and

WHEREAS, the total cost of the work to be completed, according to the previously advertised plans and specifications and the unit prices in Exhibit A, shall not exceed $9,020,270.27; and

WHEREAS, the City Council finds it to be in the public interest to execute a contract with Contractor for said Project;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That the Mayor and City Secretary are hereby authorized and directed to execute and attest, respectively, on behalf of the City of Midland, a contract with Contractor for said Project at a total cost of $9,020,270.27, said contract being on file in the office of the City Secretary, referenced by the date and number of this resolution.

SECTION TWO. That the City Manager is hereby authorized and directed to execute, on behalf of the City of Midland, change orders to said contract if (1) each change order involves a decrease or an increase of $50,000.00 or less and (2) the change orders, in total, do not increase the original contract price by more than $1,804,052.73. The sum of $1,804,052.73 is approved for such contract contingencies.

SECTION THREE. That the sum of $6,748,163.27 is available in the Paving of Briarwood Ave Project, the sum of $2,272,106.48 is available in the Impact Fee NW Fund, and the sum of $1,804,053.95 is available in the 2017 Road Bond, which shall be appropriated to a project account for said Project.

SECTION FOUR. That the City Comptroller is hereby authorized and directed to pay Contractor pursuant to the terms of said contract and change orders executed in accordance with this resolution in an amount not to exceed $10,824,323.00 from funds available or appropriated as provided in Section Three hereof upon receipt of proper invoices or statements approved by the City Manager.

On motion of Council member _____, seconded by Council member _____, the above and foregoing resolution was adopted by the City Council of the City of Midland at a regular meeting on the _____ day of _____, A.D., 2025, by the following vote:

Council members voting "AYE":

Council members voting "NAY":

_____
Lori Merritt Blong, Mayor

ATTEST:

_____
Marcia Bentley-German, City Secretary

RECOMMENDED AND APPROVED:

_____
Tommy Gonzalez, City Manager

APPROVED AS TO CONTENT
AND COMPLETENESS:

_____
Regina Stephenson, General Services Director

_____
Gabe McClelland, Engineering Services Director

APPROVED ONLY AS TO FORM:

_____
Nicholas Toulet, Interim City Attorney

EXHIBIT A
PART 1

25006037 P21-06 Briarwood Ave Phase II
Bid Opening: August 15, 2025

					Ragle, Inc.		Reece Albert, Inc.		Jones Bros. Dirt & Paving Contractors, Inc.	
				Total Cost	$12,621,697.12		$8,605,855.75		$10,009,517.97	
		Quantity	Unit	PayNote	UnitPrice	TotalCost	UnitPrice	TotalCost	Unit Price	Total Cost
	Miscellaneous Items									
#1-1	Mobilization, furnished, installed, complete and in place.	1	LS	M1	$1,200,000.00	$1,200,000.00	$836,951.39	$836,951.39	$377,710.00	$377,710.00
#1-2	Line Item Removed	0	NA	NA	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
#1-3	3" PVC Pipe Conduit (Schedule 40 Electric), furnished, installed, complete and in place.	501	LF	M3	$55.00	$27,555.00	$65.20	$32,665.20	$122.10	$61,172.10
#1-4	Erosion/Sediment Control, furnished, installed, complete and in place.	1	LS	M4	$1,100,000.00	$1,100,000.00	$19,888.63	$19,888.63	$108,000.00	$108,000.00
#1-5	Traffic Control, furnished, installed, complete and in place.	1	LS	M5	$1,100,000.00	$1,100,000.00	$53,351.15	$53,351.15	$105,000.00	$105,000.00
#1-6	Job Site Safety, furnished, installed, complete and in place.	1	LS	M6	$100,000.00	$100,000.00	$2,430.77	$2,430.77	$8,750.00	$8,750.00
#1-7	Seeded Erosion Control Mats, furnished, installed, complete and in place.	10577	SY	M7	$1.00	$10,577.00	$4.74	$50,134.98	$2.81	$29,721.37
#1-8	Seeding & Stabilization, furnished, installed, complete and in place.	10000	SY	M8	$0.50	$5,000.00	$0.24	$2,400.00	$1.38	$13,800.00
#1-9	Spray Watering, furnished, installed, complete and in place.	1	LS	M9	$25,000.00	$25,000.00	$5,016.04	$5,016.04	$29,500.00	$29,500.00
				Basket Total	**$3,568,132.00**		**$1,002,838.16**		**$733,653.47**	
	Demolition Items									
#2-1	Preparation of Right-of-Way, furnished, installed, complete and in place.	30	ACRE	D1	$21,000.00	$630,000.00	$1,943.11	$58,293.30	$1,500.00	$45,000.00
#2-2	Unclassified Roadway Excavation (Base Removal, Depth ≤ 14"), complete and in place.	45890	SY	D2	$2.00	$91,780.00	$2.24	$102,793.60	$10.50	$481,845.00
#2-3	Unclassified Roadway Excavation (Non Pavement & Base Removal), complete and in place.	37500	SY	D3	$11.00	$412,500.00	$3.84	$144,000.00	$8.75	$328,125.00
#2-4	Unclassified Basin & Channel Excavation, complete and in place.	4300	CY	D4	$25.00	$107,500.00	$11.83	$50,869.00	$16.30	$70,090.00
#2-5	Removal & Dispose of Existing Unclassified Pavement, complete and in place.	45890	Sy	D5	$2.00	$91,780.00	$2.67	$122,526.30	$6.20	$284,518.00
#2-6	Removal & Disposal of Existing Miscellaneous Concrete, complete and in place.	1095	SY	D6	$21.00	$22,995.00	$25.12	$27,506.40	$19.10	$20,914.50
#2-7	Removal & Disposal of Existing Fence And Gate, complete and in place.	10854	LF	D7	$4.10	$44,501.40	$0.49	$5,318.46	$3.20	$34,732.80
				Basket Total	**$1,401,056.40**		**$511,307.06**		**$1,265,225.30**	
	Storm Drain Items									
#3-1	3'x2' Reinforced Concrete Box Culvert furnished, installed, complete and in place.	502	LF	SD1	$447.00	$224,394.00	$269.64	$135,359.28	$280.50	$140,811.00
#3-2	24" Reinforced Concrete Pipe (RCP), furnished, installed, complete and in place.	55	LF	SD2	$126.00	$6,930.00	$198.89	$10,938.95	$170.50	$9,377.50
#3-3	Reinforced Concrete Headwall (Wingwall, PW-1, HW=4', furnished, installed, complete and in place.	4	EA	SD3	$26,000.00	$104,000.00	$34,624.13	$138,496.52	$17,875.00	$71,500.00
#3-4	Reinforced Concrete Headwall (Wingwall, PW-1, HW=5'), furnished, installed, complete and in place.	1	EA	SD3	$23,400.00	$23,400.00	$39,879.82	$39,879.82	$25,850.00	$25,850.00
#3-5	Headwall Safety End Treatment (Type I), furnished, installed, complete and in place.	1	EA	SD4	$12,200.00	$12,200.00	$18,025.90	$18,025.90	$10,450.00	$10,450.00
#3-6	Headwall Safety End Treatment (Type 2), furnished, installed, complete and in place.	2	EA	SD4	$2,500.00	$5,000.00	$1,793.50	$3,587.00	$2,821.50	$5,643.00
#3-7	Open Trenching of Storm Drain, furnished, installed, complete and in place.	557	LF	SD5	$7.00	$3,899.00	$1.28	$712.96	$8.80	$4,901.60
#3-8	5" Concrete Rip-Rap, furnished, installed, complete and in place.	1300	SY	SD6	$78.00	$101,400.00	$110.79	$144,027.00	$110.00	$143,000.00
				Basket Total	**$481,223.00**		**$491,027.43**		**$411,533.10**	
	Structural Items									
#4-1	Barbed-Wire Fence, furnished, installed, complete and in place.	200	LF	LT1	$12.50	$2,500.00	$84.06	$16,812.00	$78.00	$15,600.00
#4-2	Swing Gate, furnished, installed, complete and in place.	1	EA	ST1	$2,500.00	$2,500.00	$4,812.00	$4,812.00	$4,465.03	$4,465.03
#4-3	24' Cattle Guard Relocation, furnished complete and in place	3	EA	ST4	$10,000.00	$30,000.00	$11,672.44	$35,017.32	$10,830.82	$32,492.46
#4-4	Knox Lock, furnished, installed, complete and in place.	1	EA	ST5	$923	$923	$1,094.19	$1,094.19	$4,581.50	$4,581.50
#4-5	Relocate Mailbox Foundation, furnished, installed, complete and in place.	4	EA	ST5	$425	$1,700.00	$503.83	$2,015.32	$467.50	$1,870.00
				Basket Total	**$37,623**		**$59,750.83**		**$59,008.99**	
	Paving Items									
#5-1	Subgrade Preparation (Depth ≤ 6"), furnished, installed, complete and in place.	86159	SY	P1	$1.00	$86,159.00	$2.03	$174,902.77	$2.71	$233,490.89
#5-2	Unclassified Embankment (Density Controlled), furnished, installed, complete and in place.	11500	CY	P2	$25.68	$295,320.00	$5.10	$58,650.00	$7.85	$90,275.00
#5-3	8" Jointed Concrete Pavement, furnished, installed, complete and in place.	2276	SY	P3	$99.00	$225,324.00	$111.07	$252,795.32	$126.50	$287,914.00
#5-4	2" Type D HMAC Asphalt Pavement Surface Course (PG70-22, 110 LBS / SY @ 1" Thick), furnished, installed, complete and in place.	65536	SY	P4	$15.00	$983,040.00	$16.09	$1,054,474.24	$13.10	$858,521.60
#5-5	3" Type C HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick), furnished, installed, complete and in place.	65536	SY	P5	$22.00	$1,441,792.00	$23.84	$1,562,378.24	$20.00	$1,310,720.00
#5-6	6" Temporary Type B HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick), furnished, installed, complete and in place.	3427	SY	P6	$59.00	$202,193.00	$43.15	$147,875.05	$51.75	$177,347.25
#5-7	10" Flexible Base (Type A, Grade 4), furnished, installed, complete and in place.	82732	SY	P7	$19.00	$1,571,908.00	$13.33	$1,102,817.56	$16.20	$1,340,258.40
#5-8	Bituminous Prime Coat (MC-30, 0.20 Gal / SY), furnished, installed, complete and in place.	22421	GAL	P8	$5.20	$116,589.20	$5.37	$120,400.77	$5.65	$126,678.65
#5-9	Tack Coat (MC-30, 0.10 Gal / SY), furnished, installed, complete and in place.	6554	GAL	P9	$6.20	$40,634.80	$2.80	$18,351.20	$5.30	$34,736.20
#5-10	4" Stamped Concrete Median, furnished, installed, complete and in place.	10633	SY	P10	$71.00	$754,943.00	$66.48	$706,881.84	$132.00	$1,403,556.00
#5-11	4" Concrete Median, furnished, installed, complete and in place.	995	SY	P11	$70.00	$69,650.00	$12.83	$12,765.85	$104.50	$103,977.50
#5-12	8" Concrete Fillet, furnished, installed, complete and in place.	815	SY	P12	$77.00	$62,755.00	$97.62	$79,560.30	$126.50	$103,097.50
#5-13	8" Concrete Valley Gutter, furnished, installed, complete and in place.	641	SY	P13	$79.00	$50,639.00	$96.90	$62,112.90	$126.50	$81,086.50
#5-14	6" Concrete Driveway Approach, furnished, installed, complete and in place.	1700	SY	P14	$73.00	$124,100.00	$64.15	$109,055.00	$104.50	$177,650.00
#5-15	Type A Concrete Curb & Gutter, furnished, installed, complete and in place.	18154	LF	P15	$21.00	$381,234.00	$18.74	$340,205.96	$22.00	$399,388.00
#5-16	Type C Concrete Curb & Gutter, furnished, installed, complete and in place.	15784	LF	P15	$21.00	$331,464.00	$19.47	$307,314.48	$22.00	$347,248.00
#5-17	Type I Concrete Curb & Gutter, furnished, installed, complete and in place.	629	LF	P15	$31.00	$19,499.00	$31.94	$20,090.26	$38.50	$24,216.50
#5-18	Concrete Pedestrian Access Ramp, furnished, installed, complete and in place.	327	SY	P16	$164.00	$53,628.00	$109.34	$35,754.18	$165.00	$53,955.00
#5-19	Manhole Ring & Cover Adjustment, furnished, installed, complete and in place.	18	EA	P17	$1,783.00	$32,094.00	$1,467.74	$26,419.32	$1,980.00	$35,640.00
#5-20	Water Valve Box Ring & Cover Adjustment, furnished, installed, complete and in place.	28	EA	P17	$900.00	$25,200.00	$830.15	$23,244.20	$660.00	$18,480.00
#5-21	Teporary Flexible Base (Type A, Grade 4) furnished, installed, complete and in place	356	SY	P7	$31.00	$11,036.00	$19.96	$7,105.76	$15.00	$5,340.00
				Basket Total	**$6,879,202.00**		**$6,223,155.20**		**$7,213,576.99**	
	Traffic Control Items									
#6-1	Eliminate Existing Pavement Markings and Markers (Line Markings), furnished, installed, complete and in place.	66995	LF	T1	$0.75	$50,246.25	$0.89	$59,625.55	$0.83	$55,605.85
#6-2	Retroreflectorized Pavement Markings, TxDOT Item 666 (24" White, Solid), furnished, installed, complete and in place.	318	LF	T2	$15.00	$4,770.00	$17.78	$5,654.04	$16.50	$5,247.00
#6-3	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, Solid), furnished, installed, complete and in place.	2813	LF	T2	$1.25	$3,516.25	$1.48	$4,163.24	$1.38	$3,881.94
#6-4	Retroreflectorized Pavement Markings, TxDOT Item 666 (12" Yellow, Solid), furnished, installed, complete and in place.	112	LF	T2	$10.00	$1,120.00	$11.85	$1,327.20	$11.00	$1,232.00
#6-5	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, LNDP), furnished, installed, complete and in place.	250	LF	T2	$2.00	$500.00	$2.37	$592.50	$2.20	$550.00
#6-6	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Solid), furnished, installed, complete and in place.	17857	LF	T3	$0.98	$17,499.86	$1.16	$20,714.12	$1.08	$19,285.56
#6-7	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Broken), furnished, installed, complete and in place.	4630	LF	T3	$0.98	$4,537.40	$1.16	$5,370.80	$1.08	$5,000.40
#6-8	Thermoplastic Pavement Markings, TxDOT Item 666 (6" Yellow, Solid), furnished, installed, complete and in place.	2027	LF	T3	$0.98	$1,986.46	$1.16	$2,351.32	$1.08	$2,189.16
#6-9	Prefabricated Pavement Markings, TxDOT Item 666 (White, Arrow Symbol), furnished, installed, complete and in place.	27	EA	T4	$375.00	$10,125.00	$444.55	$12,002.85	$412.50	$11,137.50

#6-10	Prefabricated Pavement Markings, TxDOT Item 666 (White, Bike Lane Symbol), furnished, installed, complete and in place.	36	EA	T4	$300.00	$10,800.00	$355.64	$12,803.04	$3.30	$118.80
#6-11	In Road Sign Assembly (SUP&AM [Type S80(1)SB(p)]), furnished, installed, complete and in place.	45	SF	T5	$863.00	$38,835.00	$1,023.07	$46,038.15	$949.00	$42,705.00
#6-12	Remove Sign Assembly, furnished, installed, complete and in place.	12	EA	T6	$500.00	$6,000.00	$88.91	$1,066.92	$102.68	$1,232.16
#6-13	Retroreflective Raised Pavement Marker (Type II-C-R), furnished, installed, complete and in place.	463	EA	T7	$7.50	$3,472.50	$8.89	$4,116.07	$8.25	$3,819.75
#6-14	Utility Duct Bank, furnished, installed, complete and in place.	288	LF	T8	$100.00	$28,800.00	$195.48	$56,298.24	$330.00	$95,040.00
#6-15	Type C Ground Box (162911) With Apron, furnished, installed, complete and in place.	4	EA	T9	$2,250.00	$9,000.00	$2,667.32	$10,669.28	$2,475.00	$9,900.00
#6-16	Delineator Assembly (OM-2Y)(WC)GND(BI), furnished, installed, complete and in place.	10	EA	T10	$57.00	$570.00	$67.57	$675.70	$62.70	$627.00
#6-17	Delineator Assembly (8' Permenant Type III Barricade), furnished, installed, complete and in place.	6	EA	T10	$632.00	$3,792.00	$749.22	$4,495.32	$695.20	$4,171.20
#6-18	Temporary Workzone Pavement Markings, furnished, installed, complete and in place.	1	LS	T11	$58,890.00	$58,890.00	$69,812.73	$69,812.73	$64,776.80	$64,776.80
				Basket Total	**$254,460.72**		**$317,777.07**		**$326,520.12**	

Bid Summary
325 Bids Sent Out
60 Bid Request
3 Listed Above
0 No Bids were received
57 Bidders did not respond

EXHIBIT A
PART 2

25006037 P21-06 Briarwood Ave. Phase II- Additive Alternate Bid Opening: August 15, 2025										
					Ragle, Inc.		Reece Albert, Inc.		Jones Bros.Dirt & Paving Constractors, Inc.	
				Total Cost	$349,576.25		$414,414.52		$384,533.88	
#	Items	QuantityRequired	Unit	PayNote	UnitPrice	TotalCost	UnitPrice	TotalCost	UnitPrice	TotalCost
#1-1	Intersection Signals & Electrical (Briarwood Drive & Avalon Drive), furnished, installed, complete and in place	1	LS	T11	349,576.25	349,576.25	414,414.52	414,414.52	384,533.88	384,533.88

25006037 P21-06 Briarwood Ave Phase II
Bid Opening: August 15, 2025

					Ragle, Inc.		Reece Albert, Inc.		Jones Bros. Dirt & Paving Contractors, Inc.	
				Total Cost	$12,621,697.12		$8,605,855.75		$10,009,517.97	
		Quantity	Unit	PayNote	UnitPrice	TotalCost	UnitPrice	TotalCost	Unit Price	Total Cost
	Miscellaneous Items									
#1-1	Mobilization, furnished, installed, complete and in place.	1	LS	M1	$1,200,000.00	$1,200,000.00	$836,951.39	$836,951.39	$377,710.00	$377,710.00
#1-2	Line Item Removed	0	NA	NA	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
#1-3	3" PVC Pipe Conduit (Schedule 40 Electric), furnished, installed, complete and in place.	501	LF	M3	$55.00	$27,555.00	$65.20	$32,665.20	$122.10	$61,172.10
#1-4	Erosion/Sediment Control, furnished, installed, complete and in place.	1	LS	M4	$1,100,000.00	$1,100,000.00	$19,888.63	$19,888.63	$108,000.00	$108,000.00
#1-5	Traffic Control, furnished, installed, complete and in place.	1	LS	M5	$1,100,000.00	$1,100,000.00	$53,351.15	$53,351.15	$105,000.00	$105,000.00
#1-6	Job Site Safety, furnished, installed, complete and in place.	1	LS	M6	$100,000.00	$100,000.00	$2,430.77	$2,430.77	$8,750.00	$8,750.00
#1-7	Seeded Erosion Control Mats, furnished, installed, complete and in place.	10577	SY	M7	$1.00	$10,577.00	$4.74	$50,134.98	$2.81	$29,721.37
#1-8	Seeding & Stabilization, furnished, installed, complete and in place.	10000	SY	M8	$0.50	$5,000.00	$0.24	$2,400.00	$1.38	$13,800.00
#1-9	Spray Watering, furnished, installed, complete and in place.	1	LS	M9	$25,000.00	$25,000.00	$5,016.04	$5,016.04	$29,500.00	$29,500.00
				Basket Total	**$3,568,132.00**		**$1,002,838.16**		**$733,653.47**	
	Demolition Items									
#2-1	Preparation of Right-of-Way, furnished, installed, complete and in place.	30	ACRE	D1	$21,000.00	$630,000.00	$1,943.11	$58,293.30	$1,500.00	$45,000.00
#2-2	Unclassified Roadway Excavation (Base Removal, Depth ≤ 14"), complete and in place.	45890	SY	D2	$2.00	$91,780.00	$2.24	$102,793.60	$10.50	$481,845.00
#2-3	Unclassified Roadway Excavation (Non Pavement & Base Removal), complete and in place.	37500	SY	D3	$11.00	$412,500.00	$3.84	$144,000.00	$8.75	$328,125.00
#2-4	Unclassified Basin & Channel Excavation, complete and in place.	4300	CY	D4	$25.00	$107,500.00	$11.83	$50,869.00	$16.30	$70,090.00
#2-5	Removal & Dispose of Existing Unclassified Pavement, complete and in place.	45890	Sy	D5	$2.00	$91,780.00	$2.67	$122,526.30	$6.20	$284,518.00
#2-6	Removal & Disposal of Existing Miscellaneous Concrete, complete and in place.	1095	SY	D6	$21.00	$22,995.00	$25.12	$27,506.40	$19.10	$20,914.50
#2-7	Removal & Disposal of Existing Fence And Gate, complete and in place.	10854	LF	D7	$4.10	$44,501.40	$0.49	$5,318.46	$3.20	$34,732.80
				Basket Total	**$1,401,056.40**		**$511,307.06**		**$1,265,225.30**	
	Storm Drain Items									
#3-1	3'x2' Reinforced Concrete Box Culvert furnished, installed, complete and in place.	502	LF	SD1	$447.00	$224,394.00	$269.64	$135,359.28	$280.50	$140,811.00
#3-2	24" Reinforced Concrete Pipe (RCP), furnished, installed, complete and in place.	55	LF	SD2	$126.00	$6,930.00	$198.89	$10,938.95	$170.50	$9,377.50
#3-3	Reinforced Concrete Headwall (Wingwall, PW-1, HW=4', furnished, installed, complete and in place.	4	EA	SD3	$26,000.00	$104,000.00	$34,624.13	$138,496.52	$17,875.00	$71,500.00
#3-4	Reinforced Concrete Headwall (Wingwall, PW-1, HW=5'), furnished, installed, complete and in place.	1	EA	SD3	$23,400.00	$23,400.00	$39,879.82	$39,879.82	$25,850.00	$25,850.00
#3-5	Headwall Safety End Treatment (Type I), furnished, installed, complete and in place.	1	EA	SD4	$12,200.00	$12,200.00	$18,025.90	$18,025.90	$10,450.00	$10,450.00
#3-6	Headwall Safety End Treatment (Type 2), furnished, installed, complete and in place.	2	EA	SD4	$2,500.00	$5,000.00	$1,793.50	$3,587.00	$2,821.50	$5,643.00
#3-7	Open Trenching of Storm Drain, furnished, installed, complete and in place.	557	LF	SD5	$7.00	$3,899.00	$1.28	$712.96	$8.80	$4,901.60
#3-8	5" Concrete Rip-Rap, furnished, installed, complete and in place.	1300	SY	SD6	$78.00	$101,400.00	$110.79	$144,027.00	$110.00	$143,000.00
				Basket Total	**$481,223.00**		**$491,027.43**		**$411,533.10**	
	Structural Items									
#4-1	Barbed-Wire Fence, furnished, installed, complete and in place.	200	LF	LT1	$12.50	$2,500.00	$84.06	$16,812.00	$78.00	$15,600.00
#4-2	Swing Gate, furnished, installed, complete and in place.	1	EA	ST1	$2,500.00	$2,500.00	$4,812.00	$4,812.00	$4,465.03	$4,465.03
#4-3	24' Cattle Guard Relocation, furnished complete and in place	3	EA	ST4	$10,000.00	$30,000.00	$11,672.44	$35,017.32	$10,830.82	$32,492.46
#4-4	Knox Lock, furnished, installed, complete and in place.	1	EA	ST5	$923	$923	$1,094.19	$1,094.19	$4,581.50	$4,581.50
#4-5	Relocate Mailbox Foundation, furnished, installed, complete and in place.	4	EA	ST5	$425	$1,700.00	$503.83	$2,015.32	$467.50	$1,870.00
				Basket Total	**$37,623**		**$59,750.83**		**$59,008.99**	
	Paving Items									
#5-1	Subgrade Preparation (Depth ≤ 6"), furnished, installed, complete and in place.	86159	SY	P1	$1.00	$86,159.00	$2.03	$174,902.77	$2.71	$233,490.89
#5-2	Unclassified Embankment (Density Controlled), furnished, installed, complete and in place.	11500	CY	P2	$25.68	$295,320.00	$5.10	$58,650.00	$7.85	$90,275.00
#5-3	8" Jointed Concrete Pavement, furnished, installed, complete and in place.	2276	SY	P3	$99.00	$225,324.00	$111.07	$252,795.32	$126.50	$287,914.00
#5-4	2" Type D HMAC Asphalt Pavement Surface Course (PG70-22, 110 LBS / SY @ 1" Thick), furnished, installed, complete and in place.	65536	SY	P4	$15.00	$983,040.00	$16.09	$1,054,474.24	$13.10	$858,521.60
#5-5	3" Type C HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick), furnished, installed, complete and in place.	65536	SY	P5	$22.00	$1,441,792.00	$23.84	$1,562,378.24	$20.00	$1,310,720.00
#5-6	6" Temporary Type B HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick), furnished, installed, complete and in place.	3427	SY	P6	$59.00	$202,193.00	$43.15	$147,875.05	$51.75	$177,347.25
#5-7	10" Flexible Base (Type A, Grade 4), furnished, installed, complete and in place.	82732	SY	P7	$19.00	$1,571,908.00	$13.33	$1,102,817.56	$16.20	$1,340,258.40
#5-8	Bituminous Prime Coat (MC-30, 0.20 Gal / SY), furnished, installed, complete and in place.	22421	GAL	P8	$5.20	$116,589.20	$5.37	$120,400.77	$5.65	$126,678.65
#5-9	Tack Coat (MC-30, 0.10 Gal / SY), furnished, installed, complete and in place.	6554	GAL	P9	$6.20	$40,634.80	$2.80	$18,351.20	$5.30	$34,736.20
#5-10	4" Stamped Concrete Median, furnished, installed, complete and in place.	10633	SY	P10	$71.00	$754,943.00	$66.48	$706,881.84	$132.00	$1,403,556.00
#5-11	4" Concrete Median, furnished, installed, complete and in place.	995	SY	P11	$70.00	$69,650.00	$12.83	$12,765.85	$104.50	$103,977.50
#5-12	8" Concrete Fillet, furnished, installed, complete and in place.	815	SY	P12	$77.00	$62,755.00	$97.62	$79,560.30	$126.50	$103,097.50
#5-13	8" Concrete Valley Gutter, furnished, installed, complete and in place.	641	SY	P13	$79.00	$50,639.00	$96.90	$62,112.90	$126.50	$81,086.50
#5-14	6" Concrete Driveway Approach, furnished, installed, complete and in place.	1700	SY	P14	$73.00	$124,100.00	$64.15	$109,055.00	$104.50	$177,650.00
#5-15	Type A Concrete Curb & Gutter, furnished, installed, complete and in place.	18154	LF	P15	$21.00	$381,234.00	$18.74	$340,205.96	$22.00	$399,388.00
#5-16	Type C Concrete Curb & Gutter, furnished, installed, complete and in place.	15784	LF	P15	$21.00	$331,464.00	$19.47	$307,314.48	$22.00	$347,248.00
#5-17	Type I Concrete Curb & Gutter, furnished, installed, complete and in place.	629	LF	P15	$31.00	$19,499.00	$31.94	$20,090.26	$38.50	$24,216.50
#5-18	Concrete Pedestrian Access Ramp, furnished, installed, complete and in place.	327	SY	P16	$164.00	$53,628.00	$109.34	$35,754.18	$165.00	$53,955.00
#5-19	Manhole Ring & Cover Adjustment, furnished, installed, complete and in place.	18	EA	P17	$1,783.00	$32,094.00	$1,467.74	$26,419.32	$1,980.00	$35,640.00
#5-20	Water Valve Box Ring & Cover Adjustment, furnished, installed, complete and in place.	28	EA	P17	$900.00	$25,200.00	$830.15	$23,244.20	$660.00	$18,480.00
#5-21	Teporary Flexible Base (Type A, Grade 4) furnished, installed, complete and in place	356	SY	P7	$31.00	$11,036.00	$19.96	$7,105.76	$15.00	$5,340.00
				Basket Total	**$6,879,202.00**		**$6,223,155.20**		**$7,213,576.99**	
	Traffic Control Items									
#6-1	Eliminate Existing Pavement Markings and Markers (Line Markings), furnished, installed, complete and in place.	66995	LF	T1	$0.75	$50,246.25	$0.89	$59,625.55	$0.83	$55,605.85
#6-2	Retroreflectorized Pavement Markings, TxDOT Item 666 (24" White, Solid), furnished, installed, complete and in place.	318	LF	T2	$15.00	$4,770.00	$17.78	$5,654.04	$16.50	$5,247.00
#6-3	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, Solid), furnished, installed, complete and in place.	2813	LF	T2	$1.25	$3,516.25	$1.48	$4,163.24	$1.38	$3,881.94
#6-4	Retroreflectorized Pavement Markings, TxDOT Item 666 (12" Yellow, Solid), furnished, installed, complete and in place.	112	LF	T2	$10.00	$1,120.00	$11.85	$1,327.20	$11.00	$1,232.00
#6-5	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, LNDP), furnished, installed, complete and in place.	250	LF	T2	$2.00	$500.00	$2.37	$592.50	$2.20	$550.00
#6-6	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Solid), furnished, installed, complete and in place.	17857	LF	T3	$0.98	$17,499.86	$1.16	$20,714.12	$1.08	$19,285.56
#6-7	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Broken), furnished, installed, complete and in place.	4630	LF	T3	$0.98	$4,537.40	$1.16	$5,370.80	$1.08	$5,000.40
#6-8	Thermoplastic Pavement Markings, TxDOT Item 666 (6" Yellow, Solid), furnished, installed, complete and in place.	2027	LF	T3	$0.98	$1,986.46	$1.16	$2,351.32	$1.08	$2,189.16
#6-9	Prefabricated Pavement Markings, TxDOT Item 666 (White, Arrow Symbol), furnished, installed, complete and in place.	27	EA	T4	$375.00	$10,125.00	$444.55	$12,002.85	$412.50	$11,137.50

#6-10	Prefabricated Pavement Markings, TxDOT Item 666 (White, Bike Lane Symbol), furnished, installed, complete and in place.	36	EA	T4	$300.00	$10,800.00	$355.64	$12,803.04	$3.30	$118.80
#6-11	In Road Sign Assembly (SUP&AM [Type S80(1)SB(p)]), furnished, installed, complete and in place.	45	SF	T5	$863.00	$38,835.00	$1,023.07	$46,038.15	$949.00	$42,705.00
#6-12	Remove Sign Assembly, furnished, installed, complete and in place.	12	EA	T6	$500.00	$6,000.00	$88.91	$1,066.92	$102.68	$1,232.16
#6-13	Retroreflective Raised Pavement Marker (Type II-C-R), furnished, installed, complete and in place.	463	EA	T7	$7.50	$3,472.50	$8.89	$4,116.07	$8.25	$3,819.75
#6-14	Utility Duct Bank, furnished, installed, complete and in place.	288	LF	T8	$100.00	$28,800.00	$195.48	$56,298.24	$330.00	$95,040.00
#6-15	Type C Ground Box (162911) With Apron, furnished, installed, complete and in place.	4	EA	T9	$2,250.00	$9,000.00	$2,667.32	$10,669.28	$2,475.00	$9,900.00
#6-16	Delineator Assembly (OM-2Y)(WC)GND(BI), furnished, installed, complete and in place.	10	EA	T10	$57.00	$570.00	$67.57	$675.70	$62.70	$627.00
#6-17	Delineator Assembly (8' Permenant Type III Barricade), furnished, installed, complete and in place.	6	EA	T10	$632.00	$3,792.00	$749.22	$4,495.32	$695.20	$4,171.20
#6-18	Temporary Workzone Pavement Markings, furnished, installed, complete and in place.	1	LS	T11	$58,890.00	$58,890.00	$69,812.73	$69,812.73	$64,776.80	$64,776.80
				Basket Total	**$254,460.72**		**$317,777.07**		**$326,520.12**	

Bid Summary
325 Bids Sent Out
60 Bid Request
3 Listed Above
0 No Bids were received
57 Bidders did not respond

25006037 P21-06 Briarwood Ave. Phase II- Additive Alternate Bid Opening: August 15, 2025										
					Ragle, Inc.		Reece Albert, Inc.		Jones Bros.Dirt & Paving Constractors, Inc.	
				Total Cost	$349,576.25		$414,414.52		$384,533.88	
#	Items	QuantityRequired	Unit	PayNote	UnitPrice	TotalCost	UnitPrice	TotalCost	UnitPrice	TotalCost
#1-1	Intersection Signals & Electrical (Briarwood Drive & Avalon Drive), furnished, installed, complete and in place	1	LS	T11	349,576.25	349,576.25	414,414.52	414,414.52	384,533.88	384,533.88

PROJECT MANUAL

Project Name: BRIARWOOD AVE PHASE II
Project Number: P21-06

MAYOR

Lori Blong

COUNCIL MEMBERS

District 1	Brian Stubbs	District 3	Jack Ladd
District 2	John Norman	District 4	Amy Stretcher Burkes
At-Large	Robin Poole	At Large	John Burkholder

ASSISTANT CITY ENGINEER

Joshua C. Ferguson, P.E.



CONTENTS

PROCUREMENT AND CONTRACT DOCUMENTS

Cover Page.....001

Contents.....002

A Message for Our Vendors.....003

Bid Notice.....005

Instructions & Information For Bidders.....008

Notice to Bidders.....012

Affidavit of Eligibility.....014

Proposal.....015

Bid Items (Base Bid).....017

Pay Notes (Base Bid).....024

Bid Items (Additive Alternate Bid 01).....031

Pay Notes (Additive Alternate Bid 01).....032

Bid Bond.....033

Contract.....037

Performance Bond.....043

Payment Bond.....045

Certificate of Payment.....047

General Conditions And Provisions.....049

Conflict of Interest Reporting Requirements.....073

Conflict of Interest Questionnaire – Form CIQ.....074

Special Provisions.....076

SPECIFICATIONS

City of Midland Standard Specifications.....084

A Message for Our Vendors

The City of Midland, Texas has developed a strategic plan with long-term objectives, new mission and vision statements, and a course of action to carry out goals established by and for our community. This includes strategic priorities that will address our economy, infrastructure, quality of life, standards for a safe and secure city, plus much more that's detailed below. We hope you join us on this exciting journey and to be part of the energy toward a successful and prosperous Midland!

Vision Statement

The City of Midland will be the premier and safest city in West Texas by providing world-class municipal services through operational excellence and a culture of innovation.

Mission Statement

Deliver exceptional services and promote a high quality of life and place for ALL our citizens.

Guiding Principles: I-FORCE

Integrity
Financial Stewardship
Outstanding Service
Respect
Collaboration
Excellence

City Council Key Focus Areas

Communication • Customer Service
Economic Development
Fiscal Responsibility & Accountability
High-Performing City Team • Legislation
Quality of Place • Technology Improvements

Core Values

Commitment: Duty to the public good.
Engagement: Foster partnerships and collaboration.
Excellence: Practice continuous improvement.
Innovation: Embrace creativity and cutting-edge solutions.
Integrity: Operate with transparency and accountability.
Inclusivity: Ensure all voices are heard and valued.

Strategic Goals

1. Strong Economy with More Quality Jobs

1.1 Increase the Midland Sales Tax Base: Develop strategies to expand the tax base by attracting businesses and supporting local commerce.
1.2 Enhance Visitor Revenue Opportunities: Boost tourism through marketing and infrastructure improvements.
1.3 Continue Downtown and West Midland Redevelopment: Promote revitalization efforts for a vibrant downtown.
1.4 Nurture Development Districts: Establish key action plans honed to enhance Development Districts.
1.5 Grow the Core Business of Air Transportation: Develop and transform the Midland airport system.
1.6 Diversify Midland's Economy: Support initiatives that diversify the local economy and enhance resilience.
1.7 Expand Opportunities and Programming for General and Small Business: Foster the growth, retention, and expansion of local small businesses as well as business in general.
1.8 Improve Speed to Market for Citizens, Builders, Developers, and Contractors: Reduce wait times for permit review/approval and inspection process of permitted work.
1.9 Establish Our Community as a Premier Destination for Retail and Entertainment: Offer unique and compelling experiences that draw visitors, ultimately driving economic growth and community vibrancy, while increasing tourism and business development.

2. **Set the Standard for a safe and secure City**
   2.1 Enhance public safety programs.
   2.2 Improve Pedestrian and Motorist Safety: Invest in traffic management and infrastructure.
   2.3 Implement Effective Code Enforcement Strategies: Address nuisances to improve overall health and safety.
   2.4 Revitalize Neighborhoods: Utilize best practices to support the redevelopment of neighborhoods.
   2.5 Enhance Animal Services: Ensure the welfare of pets and wildlife in the city.
   2.6 Grow and Retain Public Safety Resources: Expand law enforcement presence as well as fire reduction and prevention programs while reducing attrition.
3. **Quality of Life and Place**
   3.1 Enhance Community Engagement: Champion innovative recreational, educational, and cultural programs that enrich residents' lives in partnership with the business community.
   3.2 Foster Relationships with Foundations and Outside Businesses: Collaborate to create world-class facilities and amenities.
   3.3 Create an Attractive and Inclusive Living Environment: Develop and enhance live, work, and play opportunities for our citizens.
   3.4 Establish Beautification Programs: Implement initiatives to make the community clean and bright.
   3.5 Nurture and Promote a Healthy Community: Increase healthy community living and education opportunities for citizens of all ages.
   3.6 Build the Best Parks System in Our Region: Offer diverse, accessible, and enjoyable green spaces, tournament-ready ball fields, safe playgrounds, and unique recreational opportunities that enhance the quality of life/quality of place for our community.
4. **Transparent and Consistent Communication**
   4.1 Set a Climate of Respect, Collaboration, and Team Spirit: Cultivate a culture of openness and respect.
   4.2 Enhance Communication Efficiency and Effectiveness: Leverage and expand the use of technology to facilitate the exchange of information.
   4.3 Elevate Internal Communication and Employee Engagement: Strengthen information flow and collaboration among city staff.
   4.4 Advance Two-Way Communication of Key Messages: Engage effectively with external stakeholders; foster community engagement.
   4.5 Strengthen Messaging Opportunities Through Various Media Outlets: Communicate the city's achievements and initiatives.
5. **Provide Sound Governance and Fiscal Management**
   5.1 Recruit and Retain a Skilled and Diverse Workforce: Invest in talent and diversity; grow our local pipeline of skilled employees.
   5.2 Enhance Citizen Experience: Improve employee working conditions to better serve citizens.
   5.3 Hone Public Servant Proficiency: Cultivate a culture of professional growth, skilled mastery, and information exchange.
   5.4 Implement Cutting-Edge Practices: Harness automation and Artificial Intelligence technology for efficient resource utilization.
   5.5 Promote a Well-Balanced Customer Service Philosophy: Consistently deliver excellent service to residents.
   5.6 Deliver Services Timely and Efficiently: Prioritize continuous improvement.
   5.7 Ensure Continued Financial Stability and Accountability: Maintain financial transparency.
   5.8 Deliver Effective and Efficient Processes: Maximize value in procurement.
   5.9 Ensure Reliability and Safety: Maintain existing assets and develop new city asset opportunities, including parks and other facilities, with a standard of excellence.
   5.10 Create a Work Environment that Supports Bleeding-Edge Practices: Encourage bleeding-edge practice that then cultivates an environment where employees can learn from their experiences and improve processes; thus, becoming a learning organization.
6. **Strengthen and Sustain Our Infrastructure**
   6.1 Provide Reliable and Sustainable Utilities: Guarantee water supply and distribution systems security and longevity.
   6.2 Enhance Infrastructure for Economic Growth: Improve competitiveness through infrastructure investments that includes collaboration with neighboring jurisdictions and exemplary peer agencies.
   6.3 Streamline and Consolidate City Facilities: Create synergy for improved services.
   6.4Standardize Infrastructure Processes Across the City: Ensure consistency, timeliness, and accountability in infrastructure development.
   6.5 Implement a Funding Stream for Infrastructure: Establish reliable funding for continual improvements.
   6.6 Strategize for and Monitor City Growth: Develop proactive responses to growth rather than reactive.
   6.7 Develop and Implement Comprehensive Road Planning and Maintenance Initiatives: Ensure safe and maintained roads for existing and new developing areas and main thoroughfares.

BID NOTICE

ATTENTION: All bidders who choose to submit bids digitally for this project must submit their bids through the City of Midland's online procurement portal. The City of Midland's online procurement portal can be accessed at:

https://midlandtexas.bonfirehub.com/

ATTENTION: All bidders who choose to mail bid packets must address them to one of the addresses below:

USPS Mailing Address:		***Physical Address for mail carriers other than USPS:***
City of Midland, Texas		**City of Midland, Texas**
Attn: City Secretary's Office	**OR**	**Attn: City Secretary's Office**
P O Box 1152		**300 North Loraine St, Suite 330**
Midland, TX 79702		**Midland, TX 79701**

ATTENTION: All bidders who choose to deliver bid packets in person must drop the bid packets off at the first-floor front desk of City Hall before the bid opening deadline.

Sealed proposals, addressed to the Mayor and City Council of the City of Midland, Texas, for the furnishing of materials and labor together with other miscellaneous and appurtenant work will be received at the office of the City Secretary, City Hall, Midland, Texas, until 2:00 p.m. on the 16th day of July 2025, and publicly opened and read aloud at that time.

Delivery of Submittals

Bid packets must be received in the City Secretary's Office no later than July 16, 2025, at 2:00 p.m. Bidders are responsible for the means of timely delivering the bid packet. Delays due to any instrumentality used to transmit the bid packet (e.g., delay occasioned by a bidder, City's internal mailing system, etc.) are the sole responsibility of the bidder. **Late bid packets will not be accepted under any circumstances.**

ATTENTION: The public bid opening will be in the City Council Meeting Chambers.

The Proposed Work provides for the furnishing of materials and labor for BRIARWOOD PAVING PHASE II together with other miscellaneous and appurtenant work.

ATTENTION: A NON-MANDATORY PRE-BID MEETING will be held at 3:00 p.m. on Tuesday, July 9th, 2025, in the basement conference room of City Hall, 300 N. Loraine Street, Midland, Texas.

ATTENTION: All questions submitted before or after the Non-Mandatory Pre-Bid Meeting must be submitted via email to the following email address:

purchasing@midlandtexas.gov

The deadline for submitting additional questions after the Non-Mandatory Pre-Bid Meeting is Noon on Friday, July 11, 2025. Questions submitted before the Noon deadline will be included in the Addendum that will go

out that same day along with all discussion items, questions, answers, and any new information resulting from the Non-Mandatory Pre-Bid Meeting. Questions submitted after the Noon deadline will not receive any additional information and will instead only be directed to the information already provided.

Bids will be received on a unit price basis.

No Bid may be withdrawn within a period of 60 days after the date fixed for opening Bids.

"FAX" or telephone bids or modifications will not be accepted.

Bid Envelopes shall be plainly marked "Proposal for City of Midland".

ATTENTION: Information for bidders, proposal forms, specifications, and plans may be obtained by emailing purchasing@midlandtexas.gov.

A bid bond or proposal guaranty is to accompany the bid, thereby guaranteeing the good faith of the bidder and that the bidder will enter into the written contract. The guaranty is to amount to five percent (5%) of the total bid and must be in the form of cash or certified check, issued by a bank satisfactory to the City of Midland, or bid bond. If in the form of cash or certified check, it is expressly understood and agreed that the City of Midland is given the right to retain such as liquidated damages if such bidder withdraws its bid anytime after such bid is opened and before official rejection of such bid, or if successful in securing the awarded thereof, such bidder fails to enter into the contract and furnish satisfactory performance and payment bonds. If a bid bond is submitted, it shall be executed on forms contained in these contract documents by a corporate surety authorized to do business in the State of Texas and acceptable to the City of Midland.

WAIVER OF ATTORNEY FEES

BY SUBMITTING A BID, BIDDER AGREES TO WAIVE AND DOES HEREBY KNOWINGLY, CONCLUSIVELY, VOLUNTARILY AND INTENTIONALLY WAIVE ANY CLAIM IT HAS OR MAY HAVE IN THE FUTURE AGAINST THE OWNER, REGARDING THE AWARD OF ATTORNEY'S FEES, WHICH ARE IN ANY WAY RELATED TO THE CONTRACT, OR THE CONSTRUCTION, INTERPRETATION OR BREACH OF THE CONTRACT. THE BIDDER SPECIFICALLY AGREES THAT IF THE BIDDER BRINGS OR COMMENCES ANY LEGAL ACTION OR PROCEEDING RELATED TO THIS CONTRACT, THE CONSTRUCTION, INTERPRETATION, VALIDITY OR BREACH OF THIS CONTRACT, INCLUDING BUT NOT LIMITED TO ANY ACTION PURSUANT TO THE PROVISIONS OF THE TEXAS UNIFORM DECLARATORY JUDGMENTS ACT (TEXAS CIVIL PRACTICE AND REMEDIES CODE SECTION 37.001, ET. SEQ., AS AMENDED), OR CHAPTER 271 OF THE TEXAS LOCAL GOVERNMENT CODE, THE BIDDER AGREES TO ABANDON, WAIVE AND RELINQUISH ANY AND ALL RIGHTS TO THE RECOVERY OF ATTORNEY'S FEES TO WHICH BIDDER MIGHT OTHERWISE BE ENTITLED.

BIDDER AGREES THAT THIS IS THE VOLUNTARY AND INTENTIONAL RELINQUISHMENT AND ABANDONMENT OF A PRESENTLY EXISTING KNOWN RIGHT. THE BIDDER ACKNOWLEDGES THAT IT UNDERSTANDS ALL TERMS AND CONDITIONS OF THE CONTRACT. THE BIDDER FURTHER ACKNOWLEDGES AND AGREES THAT THERE WAS AND IS NO DISPARITY OF BARGAINING POWER BETWEEN THE OWNER AND THE BIDDER. THIS SECTION SHALL NOT BE CONSTRUED OR INTERPRETED AS A WAIVER OF SOVEREIGN IMMUNITY.

THE BIDDER AND OWNER ARE RELYING ON THEIR OWN JUDGMENT. EACH PARTY HAD THE OPPORTUNITY TO DISCUSS THIS CONTRACT WITH COMPETENT LEGAL COUNSEL PRIOR TO ITS EXECUTION.

WAIVER

BIDDER'S WAIVER:

BY SUBMITTING A BID, THE BIDDER AGREES TO WAIVE AND DOES HEREBY VOLUNTARILY AND INTENTIONALLY WAIVE, ABANDON AND RELINQUISH ANY CLAIM THE BIDDER HAS OR MAY HAVE IN THE FUTURE AGAINST THE CITY OF MIDLAND, TEXAS, AND THE CITY'S EMPLOYEES, AGENTS AND OFFICERS, ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE FOLLOWING:

1. **THE ADMINISTRATION, EVALUATION OR RECOMMENDATION OF ANY BID;**

2. **WAIVER OR DELETION OF ANY OF THE REQUIREMENTS UNDER THE BID DOCUMENTS OR THE CONTRACT DOCUMENTS;**

3. **ACCEPTANCE OR REJECTION OF ANY BIDS; OR**

4. **AWARD OF THE CONTRACT**

BY SUBMITTING A BID, THE BIDDER ACKNOWLEDGES THAT THE BIDDER UNDERSTANDS ALL OF THE TERMS OF THE BIDDING DOCUMENTS AND CONSENTS TO THE BIDDING PROCESS AND THE POSSIBILITY OF A NEGATIVE ASSESSMENT. BY SUBMITTING A BID, THE BIDDER ACKNOWLEDGES AND AGREES THAT THERE WAS AND IS NO DISPARITY OF BARGAINING POWER BETWEEN THE BIDDER AND THE CITY OF MIDLAND, TEXAS. THE BIDDER AGREES THAT THIS IS THE INTENTIONAL RELINQUISHMENT OF A PRESENTLY EXISTING KNOWN RIGHT. BY SIGNING THE REQUEST FOR BID AND/OR BELOW, YOUR COMPANY AGREES TO THE ABOVE WAIVER(S).

City of Midland

Marcia Bentley-German
City Secretary

Revised June 2025

INSTRUCTION AND INFORMATION FOR BIDDERS

1. LOCATION AND EXTENT OF WORK

The work and construction contemplated to be accomplished under this Contract is located in the City of Midland, Texas, and consists of municipal public works projects as set forth in the proposal.

The location and details for the construction and related work are shown on a set of drawings named Briarwood Ave Phase II set dated 06/16/2025 and numbered from 001 (1) through 183 (187) inclusive, and a set of drawings named Avalon Drive & Briarwood Ave. Traffic Signal Project set dated 05/19/25 and numbered C100 (1) through C223 (32) inclusive. These drawings and plans, together with the specifications, form a part of the Contract. Where figures are shown on the drawings, they shall take precedence over scaled distances and dimensions.

2. TIME AND PLACE OF RECEIVING BIDS

All bids shall be sealed, addressed to the Mayor and City Council of the City of Midland, Texas, and will be received by the City Secretary in her office at City Hall, 300 N. Loraine Street, Midland, Texas, mailing address is P.O. Box 1152, Midland, Texas 79702, until time stated on the Advertisement for Bids.

3. PREPARATION OF BID FORM

Bids shall be submitted only on the forms provided therefore in the Contract Documents, and must not be submitted in letter form or in any other form. They shall be filled out in ink in both script and figures. The Proposal form provided in the Contract Documents sets forth in detail the various items and approximate quantities thereof contained in the Project. Bids submitted in any other form will be considered irregular and will be returned to the Bidder without receiving consideration by the Owner.

All bids must be submitted in sealed envelopes bearing on the outside the name of the Bidder, his address, and the name of the Project for which the bid is submitted. It is the sole responsibility of the Bidder to see that his bid is received in proper time. Any bid received after the scheduled closing time for receipt of bids will be returned to the Bidder unopened.

The bid must be signed in the name of the Bidder and must bear the signature in longhand of the persons duly authorized to sign the bid.

Changes in or additions to the bid form, recapitulations of the work bid upon, alternative proposals, or any other modification of the bid form which is not specifically called for in the Contract Documents may result in the Owner's rejection of the bid as not being responsive to the invitation. No oral or telephonic modification of any bid submitted will be considered and a telegraphic modification may be considered only if the postmark evidences that a confirmation of the telegram duly signed by the Bidder was placed in the mail prior to the opening of bids.

The bid submitted must not contain any erasures, interlineations or other corrections unless each such correction is suitably authenticated by affixing in the margin immediately opposite the correction the surnames of the person or persons signing the bid.

4. EXAMINATION OF SITE, DRAWINGS, ETC

Each Bidder is requested to visit the site of the proposed work and fully acquaint himself with the conditions relating to the construction and labor so that he may fully understand the facilities, difficulties and restrictions attending the execution of the work under the Contract. Bidders shall thoroughly examine and be familiar with the Plans and the Specifications. The failure or omission of any Bidder to receive or examine any form, instrument, addendum or other document or to visit the site and acquaint himself with conditions there existing shall in no way relieve any Bidder from obligations with respect to his bid or to the Contract. The submission of a bid shall be taken as prima-facie evidence of compliance with this section.

5. WITHDRAWAL OF BIDS

Any Bidder may withdraw his bid, either personally, by written request, or by telegraphic request confirmed in the manner specified above, at any time prior to the scheduled closing time for receipt of bids.

6. AGREEMENT AND BONDS

The successful Bidder will be required to furnish a Performance Bond, and a Payment Bond, in an amount equal to one hundred percent (100%) of the total Contract price, such bond to be executed in five (5) original counterparts by a Corporate Surety authorized to do business in the State of Texas, and acceptable to the City of Midland. All Bonds must be executed on forms contained in these Contract Documents. The form of Agreement which the successful Bidder, and Contractor will be required to execute is also included herewith. The form of Agreement and the form of the Bonds should be carefully examined by the Bidder.

7. INTERPRETATION OF PLANS AND DOCUMENTS

If any person contemplating submitting a bid for the proposed Contract is in doubt as to the true meaning of any part of the Plans, Specifications, or other Contract Documents or finds discrepancies in, or omissions from the Plans or Specifications, he may submit to the Owner written request for an interpretation or correction thereof. The person submitting the request will be responsible for its prompt delivery. Any interpretation or correction of the Contract Documents will be made only by Addendum duly issued and a copy of such addendum will be mailed or delivered to each person receiving a set of such Contract Documents. The Owner will not be responsible for any other explanations or interpretations of the Contract Documents. No oral interpretations of any provision in the Contract Documents will be made to any Bidder.

8. BIDDERS INTERESTED IN MORE THAN ONE BID

No person, firm or corporation shall be allowed to make, or file more than one bid for the same work unless alternate bids are specifically called for. A person, firm or corporation that has submitted a sub-proposal to a Bidder, or that has quoted prices of materials to a Bidder is not thereby disqualified from submitting a sub-proposal or quoting prices to other Bidders or making a prime proposal.

9. AWARD OF CONTRACT

The Owner reserves the right to reject any or all bids submitted and not make an award. The Owner also reserves the privilege of accepting any item as a separate contract or the combination of items of a contract. The Owner and Bidder agree that, if the Contract is awarded, that it will be awarded to either the lowest responsible bidder/proposer, or to the bidder/proposer who provides goods or services at the best value for the

City of Midland. In determining the best value for the City of Midland, the City of Midland may consider the criteria enumerated in Section 252.043 of the Texas Local Government Code. Further, the Owner reserves all rights granted by Section 271.027 of the Texas Local Government Code. The Owner reserves the right to award the bid to the lowest responsible bidder.

10. OPENING OF BIDS

Bidders are invited to be present at the opening of the Proposals. All Proposals shall be made and received with the understanding that the Bidder accepts the terms and conditions contained in the Contract Documents.

11. COMPARISON OF BIDS

All bids will be compared on the basis of the Proposal.

12. BID GUARANTY

A Certified Check, Bank Money Order, issued by a bank satisfactory to the Owner, or a Bidder's Bond on the form provided and approved by the City Attorney, in the amount of five percent (5%) of the largest possible lump sum bid submitted, payable without recourse to the Owner, must accompany the Bidder's Proposal, as a guaranty that the Bidder will enter into a Contract and execute the required Performance Bond and Guaranty in the forms provided within fifteen (15) days after notice of award of Contract to him. Bids or Proposals without the required Bid Guaranty will not be considered. All Proposals shall remain in effect for a period of thirty (30) days after date of bid opening.

13. CONTRACT DOCUMENTS

The complete Contract Documents may include the following: (1) Notice to Bidders, (2) Instructions and Information for Bidders, (3) Proposal, (4) Experience Record, (5) Bid Bond, (6) Contract Agreement, (7) Performance Bond, (8) Payment Bond, (9) Insurance Certificate, (10) General Conditions, (11) Special Conditions, (12) Detailed Specifications all of which are bound together, and/or (13) Certificate of Payment. The Contract Documents shall also include Drawings or Detailed Plans for the proposed work. A complete set of the Contract Documents and the detailed plans are on file in the Office of the City Secretary.

14. TIME ELEMENT

The work to be done under this Contract shall be commenced within fifteen (15) days from the date of the notice from the City to the Contractor to commence work. The Contractor shall commence performance of the Contract on the date stated in the City's notice to the Contractor to proceed and shall complete the performance of the Contract without delay.

15. PAYMENTS

Payments to the Contractor will be based upon the prices stated in the proposal and upon basis of the work performed as determined by the Engineer. The Engineer's determination shall be considered as final unless changes are authorized by the City in writing which shall affect the work. Upon issuance of the Certificate of Completion, the Engineer shall proceed to take final measurements and prepare a final statement of the value of all work performed and materials furnished under the terms of the agreement and shall certify same to the Owner who shall pay to the Contractor on or after the 30th day, and before the 35th day, after the date of the

Certificate of Completion, the balance due the Contractor under the terms of this agreement, provided he has fully performed his contractual obligations under the terms of this Contract, and said payment shall become due in any event upon said performance by the Contractor. Notwithstanding any provision of these Contract documents to the contrary, it is expressly understood and agreed by the parties hereto that neither the Certificate of Acceptance, nor the final or any other payment hereunder, nor any partial or total occupancy or possession of the project by the Owner, shall relieve the Contractor of his responsibility for completion of the entire project in a good workmanlike manner and in full compliance with the plans and specifications and the fulfillment of any warranties which may be required in the Contract documents.

Revised June 2025

NOTICE TO BIDDERS

IF THIS PURCHASE REQUIRES A CONTRACT, THE ATTACHED **CONTRACT AND INSURANCE REQUIREMENTS ARE NON-NEGOTIABLE**. MODIFICATIONS BY BIDDER/CONTRACTOR OF ANY MATERIAL TERM(S) TO THE CONTRACT DOCUMENTS WILL BE DEEMED A NON-RESPONSIVE BID. NON-RESPONSIVE BIDS WILL BE REJECTED. BIDDER/CONTRACTOR MUST BE WILLING TO SIGN THE CONTRACT AS IS AND WITHOUT MODIFICATIONS, PROVIDE PROPERLY EXECUTED BONDS (IF APPLICABLE) AND PROVIDE INSURANCE SPECIFICALLY AS REQUIRED WITHIN THE CONTRACT DOCUMENTS **WITHIN 21 DAYS** OF THE DATE OF THE TRANSMITTAL LETTER.

IF THE SELECTED BIDDER/CONTRACTOR CANNOT MEET THE ABOVE REQUIREMENTS, THEN **THE CITY RESERVES THE RIGHT TO AWARD THIS PURCHASE TO ANOTHER BIDDER**.

IMPORTANT NOTICE – IF THE CONTRACT DOCUMENTS REQUIRE WORKER'S COMPENSATION INSURANCE, BIDDER/CONTRACTOR MUST CARRY WORKER'S COMPENSATION INSURANCE TO BE ELIGIBLE FOR THIS CONTRACT. IF YOU CANNOT PROVIDE WORKER'S COMPENSATION INSURANCE AS REQUIRED BY STATE OF TEXAS STATUTE, WE RESPECTFULLY REQUEST THAT YOU "NO BID" THIS WORK.

COMPLIANCE: Company agrees that it shall comply with Texas Government Code Section 2252.908, *et seq.*, as amended. Company agrees that it shall comply with Texas Local Government Code Section 176.006, *et seq.*, as amended. For further instructions on how to comply with Texas Government Code Section 2252.908 and Texas Local Government Code Section 176.006,

please go to https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm and https://www.ethics.state.tx.us/filinginfo/conflict_forms.htm.

ANY VENDOR WHO FAILS TO COMPLY WITH THE TERMS OF THE AWARD **MAY BE DECLARED AN IRRESPONSIBLE VENDOR**. BIDS SUBMITTED BY SAID VENDOR SHALL NOT BE CONSIDERED AGAIN FOR A MINIMUM PERIOD OF SIX MONTHS AS DETERMINED BY THE CITY MANAGER.

CITY OF MIDLAND

Consideration of Location of Bidder's Principal Place of Business
For Bids of $50,000 up to $100,000 for Services and $500,000 for Commodities
Affidavit of Eligibility

Pursuant to Texas Local Government Code 271.9051, in purchasing real property, personal property that is not affixed to real property, or services, if the City receives one or more bids from a bidder whose principal place of business is in the City of Midland and whose bid is within five percent (5%) of the lowest bid price received by the City from a bidder who is not a resident of the City of Midland, the City may enter into a contract with:

(1) the lowest bidder; or

(2) the bidder whose principal place of business is in the City of Midland if the City Council determines, in writing, that the local bidder offers the City the best combination of contract price and additional economic development opportunities for the City of Midland created by the contract award, including the employment of residents of the City of Midland and increased tax revenues to the City of Midland.

In order to receive consideration, bidders must submit this affidavit to:

Erika Martinez
Purchasing Manager
City of Midland
300 N. Loraine St.,
PO BOX 1152
Midland, TX 79702-1152

Complete all areas below. Incomplete affidavits may be rejected.

Local Business Name: REECE ALBERT, INC.

Local Address (must be within the City limits): NOT APPLICABLE - OFFICE IS OUT OF CITY LIMITS

1. Is the above address the principal place of business for the business named above? ☐ Yes ☐ No
2. How many residents of the City of Midland are employed at the above business location? _____
3. Year your business was established in the City of Midland: _____
4. If you collect sales tax for ANY class of customer, provide the following Reseller information:

   Reseller Permit Number: _____

   Company Name and Address (as it appears on permit):

   _____

   _____

   _____

5. Does your business have more than one office in the State of Texas? ☐ Yes ☐ No
   If Yes, identify the office location considered as the point-of-sale for the purpose of sales tax calculation:

   _____

   _____

6. Was the local business required to pay business and/or real property tax for the most recent tax year?

   ☐ Yes ☐ No

   If Yes, did the local business pay any of this tax to the City of Midland? ☐ Yes ☐ No

Under penalty of perjury, the undersigned states that the foregoing statements are true and correct. It is further acknowledged that any person, firm, corporation or entity intentionally submitting false information to the City in an attempt to qualify for eligibility shall be prohibited from bidding on City of Midland products and services for a period of one (1) year.

Authorized Signature: Mike Schmidt Date: 8-15-25

Printed Name and Title: MIKE SCHMIDT, VICE PRESIDENT

PROPOSAL

Project Name: BRIARWOOD AVE PHASE II
Project Number: P21-06

TO: Honorable Mayor and City Council
City of Midland
Midland, Texas

Gentlemen: The undersigned bidder, having examined the drawings, specifications, and contract documents, the location of the proposed work, and being fully advised as to the extent and character of the work, proposes to furnish all material, equipment, and to perform all labor and work necessary for the completion of the construction of the work described by and in accordance with the attached drawings, specifications, and contract, for the following prices, to wit:

(See Bid Items sheets for Proposal's item breakdowns, descriptions, quantities, units, unit prices, total amounts, and Pay Notes references.)

For the sum of Nine Million Twenty Thousand Two Hundred Seventy _____ dollars
and Twenty Seven _____ cents total.

The undersigned bidder hereby declares that he has visited the site of the work and has carefully examined the contract documents pertaining to the work covered by the above bid. The selected contractor will receive written notice to proceed.

Bidders agree to substantially complete all work within 540 calendar days after reciept of notice to proceed.

PUBLIC INFORMATION

To the extent that Bidder is submitting a bid for a contract described by Section 552.371 of the Texas Government Code, Bidder agrees as follows in accordance with Section 552.372(b) of the Texas Government Code: The requirements of Subchapter J, Chapter 552, Government Code, may apply to this this bid, and the contractor or vendor agrees that the contract can be terminated if the contractor or vendor knowingly or intentionally fails to comply with a requirement of that subchapter.

Enclosed herewith in this proposal is a cashier's check, cash or bid bond on a form approved by the City Attorney, for Five percent (5%) of the Largest Possible Lump Sum Bid Submitted _____ dollars
and _____ cents total. ($ 5% of Largest Lump Sum bid) which it is agreed shall be collected and retained by the owner as liquidated damages in the event this proposal is accepted by the Owner within thirty days (30) after the date advertised for the reception of bids and the undersigned fails to execute the contract and required bonds with the owner, under the conditions thereof, within (15) days after the date said proposal is accepted; otherwise said check or bond shall be returned to the undersigned on demand.

REECE ALBERT, INC.
Name of Contractor

Mike Schmidt MIKE SCHMIDT, VICE PRESIDENT
Submitted By Print Name and Title

3001 FOSTER ST.
Mailing Address

SAN ANGELO, TX. 76903
City State Zip

BID ITEMS

(See Proposal sheet for additional information.)

Project Name: BRIARWOOD AVE PHASE II
Project Number: P21-06 BASE BID

Miscellaneous Items

Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Mobilization, furnished, installed, complete and in place.	1	LS	M1	$836,951.39	$836,951.39
2)	Line Item Removed					
3)	3" PVC Pipe Conduit (Schedule 40 Electric), furnished, installed, complete and in place.	501	LF	M3	$65.20	$32,665.20
4)	Erosion/Sediment Control, furnished, installed, complete and in place.	1	LS	M4	$19,888.63	$19,888.63
5)	Traffic Control, furnished, installed, complete and in place.	1	LS	M5	$53,351.15	$53,351.15
6)	Job Site Safety, furnished, installed, complete and in place.	1	LS	M6	$2,430.77	$2,430.77
7)	Seeded Erosion Control Mats, furnished, installed, complete and in place.	10577	SY	M7	$4.74	$50,134.98
8)	Seeding & Stabilization, furnished, installed, complete and in place.	10000	SY	M8	$0.24	$2,400.00
9)	Spray Watering, furnished, installed, complete and in place.	1	LS	M9	$5,016.04	$5,016.04
Total Miscellaneous Items 1 - 9		$1,002,838.16				

Demolition Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Preparation of Right-of-Way, furnished, installed, complete and in place.	30	ACRE	D1	$1,943.11	$58,293.30
2)	Unclassified Roadway Excavation (Base Removal, Depth :: 14"), complete and in place.	45890	SY	D2	$2.24	$102,793.60
3)	Unclassified Roadway Excavation (Non Pavement & Base Removal), complete and in place.	37500	SY	D3	$3.84	$144,000.00
4)	Unclassified Basin & Channel Excavation, complete and in place.	4300	CY	D4	$11.83	$50,869.00
5)	Removal & Dispose of Existing Unclassified Pavement, complete and in place.	45890	SY	D5	$2.67	$122,526.30
6)	Removal & Disposal of Existing Miscellaneous Concrete, complete and in place.	1095	SY	D6	$25.12	$27,506.40
7)	Removal & Disposal of Existing Fence And Gate, complete and in place.	10854	LF	D7	$0.49	$5,318.46
Total Demolition Items 1 - 7		$511,307.06				

Storm Drain Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	3'x2' Reinforced Concrete Box Culvert furnished, installed, complete and in place.	502	LF	SD1	$269.64	$135,359.28
2)	24" Reinforced Concrete Pipe (RCP), furnished, installed, complete and in place.	55	LF	SD2	$198.89	$10,938.95
3)	Reinforced Concrete Headwall (Wingwall, PW-1, HW=4', furnished, installed, complete and in place.	4	EA	SD3	$34,624.13	$138,496.52
4)	Reinforced Concrete Headwall (Wingwall, PW-1, HW=5'), furnished, installed, complete and in place.	1	EA	SD3	$39,879.82	$39,879.82
5)	Headwall Safety End Treatment (Type I), furnished, installed, complete and in place.	1	EA	SD4	$18,025.90	$18,025.90
6)	Headwall Safety End Treatment (Type 2), furnished, installed, complete and in place.	2	EA	SD4	$1,793.50	$3,587.00
7)	Open Trenching of Storm Drain, furnished, installed, complete and in place.	557	LF	SD5	$1.28	$712.96
8)	5" Concrete Rip-Rap, furnished, installed, complete and in place.	1300	SY	SD6	$110.79	$144,027.00
Total Storm Drain Items 1 - 8		$491,027.43				

Structural Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Barbed-Wire Fence, furnished, installed, complete and in place.	200	LF	ST1	$84.06	$16,812.00
2)	Swing Gate, furnished, installed, complete and in place.	1	EA	ST2	$4,812.00	$4,812.00
3)	Line Item Removed					
4)	24' Cattle Guard Relocation, furnished, complete and in place.	3	EA	ST4	$11,672.44	$35,017.32
5)	Knox Lock, furnished, installed, complete and in place.	1	EA	ST5	$1,094.19	$1,094.19
6)	Relocate Mailbox Foundation, furnished, installed, complete and in place.	4	EA	ST6	$503.83	$2,015.32
Total Structural Items 1 - 6		$59,750.83				

Paving Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Subgrade Preparation (Depth :: 6"), furnished, installed, complete and in place.	86159	SY	P1	$2.03	$174,902.77
2)	Unclassified Embankment (Density Controlled), furnished, installed, complete and in place.	11500	CY	P2	$5.10	$58,650.00
3)	8" Jointed Concrete Pavement, furnished, installed, complete and in place.	2276	SY	P3	$111.07	$252,795.32
4)	2" Type D HMAC Asphalt Pavement Surface Course (PG70-22, 110 LBS / SY @ 1" Thick), furnished, installed, complete and in place.	65536	SY	P4	$16.09	$1,054,474.24
5)	3" Type C HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick), furnished, installed, complete and in place.	65536	SY	P5	$23.84	$1,562,378.24
6)	6" Temporary Type B HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick), furnished, installed, complete and in place.	3427	SY	P6	$43.15	$147,875.05
7)	10" Flexible Base (Type A, Grade 4), furnished, installed, complete and in place.	82732	SY	P7	$13.33	$1,102,817.56
8)	Bituminous Prime Coat (MC-30, 0.20 Gal / SY), furnished, installed, complete and in place.	22421	GAL	P8	$5.37	$120,400.77
9)	Tack Coat (MC-30, 0.10 Gal / SY), furnished, installed, complete and in place.	6554	GAL	P9	$2.80	$18,351.20
10)	4" Stamped Concrete Median, furnished, installed, complete and in place.	10633	SY	P10	$66.48	$706,881.84
11)	4" Concrete Median, furnished, installed, complete and in place.	995	SY	P11	$12.83	$12,765.85
12)	8" Concrete Fillet, furnished, installed, complete and in place.	815	SY	P12	$97.62	$79,560.30
13)	8" Concrete Valley Gutter, furnished, installed, complete and in place.	641	SY	P13	$96.90	$62,112.90
14)	6" Concrete Driveway Approach, furnished, installed, complete and in place.	1700	SY	P14	$64.15	$109,055.00
15)	Type A Concrete Curb & Gutter, furnished, installed, complete and in place.	18154	LF	P15	$18.74	$340,205.96
16)	Type C Concrete Curb & Gutter, furnished, installed, complete and in place.	15784	LF	P15	$19.47	$307,314.48
17)	Type I Concrete Curb & Gutter, furnished, installed, complete and in place.	629	LF	P15	$31.94	$20,090.26
18)	Concrete Pedestrian Access Ramp, furnished, installed, complete and in place.	327	SY	P16	$109.34	$35,754.18
19)	Manhole Ring & Cover Adjustment, furnished, installed, complete and in place.	18	EA	P17	$1,467.74	$26,419.32
20)	Water Valve Box Ring & Cover Adjustment, furnished, installed, complete and in place.	28	EA	P17	$830.15	$23,244.20
21)	6" Temporary Flexible Base (Type A, Grade 4), furnished, installed, complete and in place.	356	SY	P7	$19.96	$7,105.76
Total Paving Items 1 - 21		$6,223,155.20				

Traffic Control Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Eliminate Existing Pavement Markings and Markers (Line Markings), furnished, installed, complete and in place.	66995	LF	T1	$0.89	$59,625.55
2)	Retroreflectorized Pavement Markings, TxDOT Item 666 (24" White, Solid), furnished, installed, complete and in place.	318	LF	T2	$17.78	$5,654.04
3)	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, Solid), furnished, installed, complete and in place.	2813	LF	T2	$1.48	$4,163.24
4)	Retroreflectorized Pavement Markings, TxDOT Item 666 (12" Yellow, Solid), furnished, installed, complete and in place.	112	LF	T2	$11.85	$1,327.20
5)	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, LNDP), furnished, installed, complete and in place.	250	LF	T2	$2.37	$592.50
6)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Solid), furnished, installed, complete and in place.	17857	LF	T3	$1.16	$20,714.12
7)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Broken), furnished, installed, complete and in place.	4630	LF	T3	$1.16	$5,370.80
8)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" Yellow, Solid), furnished, installed, complete and in place.	2027	LF	T3	$1.16	$2,351.32
9)	Prefabricated Pavement Markings, TxDOT Item 666 (White, Arrow Symbol), furnished, installed, complete and in place.	27	EA	T4	$444.55	$12,002.85
10)	Prefabricated Pavement Markings, TxDOT Item 666 (White, Bike Lane Symbol), furnished, installed, complete and in place.	36	EA	T4	$355.64	$12,803.04
11)	In Road Sign Assembly (SUP&AM [Type S80(1)SB(p)]), furnished, installed, complete and in place.	45	EA	T5	$1,023.07	$46,038.15
12)	Remove Sign Assembly, furnished, installed, complete and in place.	12	EA	T6	$88.91	$1,066.92
13)	Retroreflective Raised Pavement Marker (Type II-C-R), furnished, installed, complete and in place.	463	EA	T7	$8.89	$4,116.07
14)	Utility Duct Bank, furnished, installed, complete and in place.	288	LF	T8	$195.48	$56,298.24
15)	Type C Ground Box (162911) With Apron, furnished, installed, complete and in place.	4	EA	T9	$2,667.32	$10,669.28
16)	Delineator Assembly (OM-2Y)(WC)GND(BI), furnished, installed, complete and in place.	10	EA	T10	$67.57	$675.70
17)	Delineator Assembly (8' Permenant Type III Barricade), furnished, installed, complete and in place.	6	EA	T10	$749.22	$4,495.32
18)	Temporary Workzone Pavement Markings, furnished, installed, complete and in place.	1	LS	T11	$69,812.73	$69,812.73
Total Traffic Control Items 1 - 18		$317,777.07				

Price For:	
1. Miscellaneous Items	$1,002,838.16
2. Demolition Items	$511,307.06
3. Storm Drain Items	$491,027.43
4. Structural Items	$59,750.83
5. Paving Items	$6,223,155.20
6. Traffic Control Items	$317,777.07
Total Price	$8,605,855.75

PAY NOTES

P21-06

BRIARWOOD AVE PHASE II

BASE BID

Bid Item		Pay Quantity Note
Miscellaneous Items		
1	Mobilization	M1
2	Pay Note Removed	
3	3" PVC Pipe Conduit (Schedule 40 Electric)	M3
4	Erosion/Sediment Control	M4
5	Traffic Control	M5
6	Job Site Safety	M6
7	Seeded Erosion Control Mats	M7
8	Seeding & Stabilization	M8
9	Spray Watering	M9
Demolition Items		
1	Preparation of Right-of-Way	D1
2	Unclassified Roadway Excavation (Base Removal, Depth ≤ 14")	D2
3	Unclassified Roadway Excavation (Non Pavement & Base Removal)	D3
4	Unclassified Excavation (Basin & Channel)	D4
5	Removal & Disposal of Existing Unclassified Pavement	D5
6	Removal & Disposal of Existing Miscellaneous Concrete	D6
7	Removal & Disposal of Existing Fence And Gate	D7
Storm Drain Items		
1	3'x2' Reinforced Concrete Box Culvert	SD1
2	24" Reinforced Concrete Pipe (RCP)	SD2
3	Reinforced Concrete Headwall (Wingwall, PW-1, HW=4')	SD3
4	Reinforced Concrete Headwall (Wingwall, PW-1, HW=5')	SD3
5	Headwall Safety End Treatment (Type I)	SD4
6	Headwall Safety End Treatment (Type II)	SD4
7	Open Trenching of Storm Drain	SD5
8	5" Concrete Rip-Rap	SD6
Structural Items		
1	Barbed-Wire Fence	ST1
2	Swing Gate	ST2
3	Pay Note Removed	
4	24' Cattle Guard Relocation	ST4
5	Knox Lock	ST5
6	Relocate Mailbox Foundation	ST6

Paving Items

1	Subgrade Preparation (Depth ≤ 6")	P1
2	Unclassified Embankment (Density Controlled)	P2
3	8" Jointed Concrete Pavement	P3
4	2" Type D HMAC Asphalt Pavement Surface Course (PG70-22, 110 LBS / SY @ 1" Thick)	P4
5	3" Type C HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick)	P5
6	6" Temporary Type B HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick)	P6
7	10" Flexible Base (Type A, Grade 4)	P7
8	Bituminous Prime Coat (MC-30, 0.20 Gal / SY)	P8
9	Tack Coat (MC-30, 0.10 Gal / SY)	P9
10	4" Stamped Concrete Median	P10
11	4" Concrete Median	P11
12	8" Concrete Fillet	P12
13	8" Concrete Valley Gutter	P13
14	6" Concrete Driveway Approach	P14
15	Type A Concrete Curb & Gutter	P15
16	Type C Concrete Curb & Gutter	P15
17	Type I Concrete Curb & Gutter	P15
18	Concrete Pedestrian Access Ramp	P16
19	Manhole Ring & Cover Adjustment	P17
20	Water Valve Box Ring & Cover Adjustment	P17
21	6" Temporary Flexible Base (Type A, Grade 4)	P7

Traffic Items

1	Eliminate Existing Pavement Markings and Markers (Line Markings)	T1
2	Retroreflectorized Pavement Markings, TxDOT Item 666 (24" White, Solid)	T2
3	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, Solid)	T2
4	Retroreflectorized Pavement Markings, TxDOT Item 666 (12" Yellow, Solid)	T2
5	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, LNDP)	T2
6	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Solid)	T3
7	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Broken)	T3
8	Thermoplastic Pavement Markings, TxDOT Item 666 (6" Yellow, Solid)	T3
9	Prefabricated Pavement Markings (White, Arrow Symbol)	T4
10	Prefabricated Pavement Markings (White, Bike Lane Symbol)	T4
11	In Road Sign Assembly (SUP&AM [Type S80(1)SB(p)])	T5
12	Remove Sign Assembly	T6
13	Retroreflective Raised Pavement Marker (Type II-C-R)	T7
14	Utility Duct Bank	T8
15	Type C Ground Box (162911) With Apron	T9
16	Delineator Assembly (OM-2Y)(WC)GND(BI)	T10
17	Delineator Assembly (8' Permenant Type III Barricade)	T10
18	Temporary Workzone Pavement Markings	T11

PAY QUANTITY NOTES

M1 Includes the necessary equipment, labor, materials, and incidentals for all Mobilization to the job site complete and in place. Measurement and payment to be made per lump sum.

M2

Pay Note Removed

M3 Includes the necessary equipment, labor, materials, and incidentals for the installation of Pipe Conduit per the construction drawings and City of Midland standards and specifications, including all trenching, embedment, backfill, and appurtenances. Measurement and payment to be per linear foot measured along the ground surface following the pipe centerline through all boxes, fittings, structures, and appurtenances.

M4 Includes the necessary equipment, labor, materials, and incidentals to implement the Erosion Control Plan per the construction drawings and City of Midland standards and specifications. Measurement and payment to be made per lump sum.

M5 Includes the necessary equipment, labor, materials, and incidentals to implement the Traffic Control per the approved Traffic Control Plan. Any required traffic control devices are to meet the City of Midland Traffic Division Standards. Measurement and payment to be made per lump sum.

M6 Includes the necessary equipment, labor, materials, and incidentals to implement Job Site Safety and to provide a safe work environment for the project work area (including all personal protection equipment, trench safety, etc.) per the construction drawings and in compliance with all applicable Federal, State, and Local requirements or regulations including those of OSHA and the City of Midland. JOB SITE SAFETY IS THE RESPONSABILITY OF THE CONTRACTOR. Measurement and payment to be made per lump sum.

M7 Includes the necessary equipment, labor, materials, and incidentals for Seeded Erosion Control Mats per the construction drawings and City of Midland standards and specifications, including all removal, storage, and replacement of existing topsoil as well as all mats, seeding, staking, and appurtenances. Watering is addressed in a separate pay note. Measurement and payment to be made per square yard measured along the ground surface.

M8 Includes the necessary equipment, labor, materials, and incidentals for Seeding & Stabilization per the construction drawings and City of Midland standards and specifications, including all removal, storage, and replacement of existing topsoil as well as all seeding and appurtenances. Watering is addressed in a separate pay note. Measurement and payment to be made per square yard measured along the ground surface.

M9 Includes the necessary equipment, labor, materials, and incidentals for Spray Watering per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per lump sum.

D1 Includes the necessary equipment, labor, materials, and incidentals for Preparation of Right-of-Way per the construction drawings and City of Midland standards and specifications including removal and disposal of all obstructions from the right-of-way and easements where removal of such obstructions is not indicated in the consturction drawings, all scraping and preservation of top soil, and including all clearing, grubbing, and appurtenances. Measurement and payment to be made per acre measured along the ground surface.

D2 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per square yard measured along the ground surface.

D3 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per square yard of material removed.

D4 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing pavement and sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per cubic yard of material removed.

D5 Includes the necessary equipment, labor, materials, and incidentals for the Removal & Disposal of Existing Unclassified Pavement per the construction drawings and City of Midland standards and specifications including all pavement removal, saw-cutting, and appurtenances. Depths given are approximate and pavement material is to be removed in its entirety. No additional compensation will be made for increased pavement depth removal. Measurement and payment to be made per square yard measured along the ground surface.

D6 Includes the necessary equipment, labor, materials, and incidentals for the Removal & Disposal of Existing Miscellaneous Concrete per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

D7 Includes the necessary equipment, labor, materials, and incidentals to Remove & Dispose of Existing Fence And Gate per the construction drawings and City of Midland standards and specifications, including removal of all, columns, posts, foundations, anchors, gates, frames, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per linear foot measures along the ground surface following the fence centerline through all structures and appurtenances.

SD1 Includes the necessary equipment, labor, materials, and incidentals for the installation of Reinforced Concrete Box Culvert per the construction drawings and City of Midland standards and specifications, including all embedment, detector wire, tracer tape, necessary testing, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the box culvert centerline through all structures and appurtenances.

SD2 Includes the necessary equipment, labor, materials, and incidentals for the installation of Storm Drains per the construction drawings and City of Midland standards and specifications, including all embedment, detector wire, tracer tape, necessary testing, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the pipe centerline through all structures and appurtenances.

SD3 Includes the necessary equipment, labor, materials, and incidentals for the installation of a Reinforced Concrete Headwall per the construction drawings and City of Midland standards and specifications, including all forms, reinforcment, placement, sealing, finishing, and appurtenances. Measurement and payment to be made per each concrete headwall installed.

SD4 Includes the necessary equipment, labor, materials, and incidentals for the installation of a Headwall Safety End Treatment per the construction drawings and City of Midland standards and specifications, including all forms, reinforcment, placement, sealing, finishing, and appurtenances. Measurement and payment to be made per each headwall safety end treatment installed.

SD5 Includes the necessary equipment, labor, materials, and incidentals for Open Trenching of Storm Drain per the construction drawings and City of Midland standards and specifications, including all unclassified excavation, backfill not including flowable fill backfill, providing trench safety and protection for workers to install pipe, structures, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the pipe centerline through all structures, fittings, and appurtenances.

SD6 Includes the necessary equipment, labor, materials, and incidentals for the installation of Concrete Rip-Rap per the consturction drawings and City of Midland standards and specifications, including all excavation, forms, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

ST1 Includes the necessary equipment, labor, materials, and incidentals to install a Fence per the construction drawings and City of Midland standards and specifications, including all columns, posts, foundations, anchors, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the fence centerline through all structures and appurtenances.

ST2 Includes the necessary equipment, labor, materials, and incidentals to install a Fence Gate per the construction drawings and City of Midland standards and specifications, including all columns, posts, foundations, anchors, frames, attachments, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per each gate installed.

ST3

Pay Note Removed

ST4 Includes the necessary equipment, labor, materials, and incidentals to relocate a Cattle Guard per the construction drawings and City of Midland standards and specifications, including all beams, foundations, anchors, frames, attachments, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per each cattle guard installed.

ST5 Includes the necessary equipment, labor, materials, and incidentals to install a Knox Lock per the construction drawings and City of Midland standards and specifications, including all posts, foundations, anchors, frames, safe or box, attachments, and structures as well as all appurtenances. Measurement and payment to be made per each knox lock installed.

ST6 Includes the necessary equipment, labor, materials, and incidentals to Relocate Mailbox Foundation per the construction drawings and City of Midland standards and specifications, including all structure removal, foundation placement, and appurtenances. Measurement and payment to be made per each existing mailbox foundation removed and new mailbox foundation set.

P1 Includes the necessary equipment, labor, materials, and incidentals for Subgrade Preparation per the construction drawings and City of Midland standards and specifications, including all proof-rollling, sub-grade reworking, scarifying, compaction, and appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

P2 Includes the necessary equipment, labor, materials, and incidentals for placement of Unclassified Embankment per the construction drawings and City of Midland standards and specifications, including all sprinkling, rolling, correction of soft spots, grading, sloping, compaction, and appurtenances. Measurement and payment to be made per each cubic yard placed.

P3 Includes the necessary equipment, labor, materials, and incidentals for placement of Jointed Concrete Pavement per the construction drawings and City of Midland standards and specifications, including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P4 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "D" HMAC Asphalt Pavement Surface Course (PG 70-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P5 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "C" HMAC Asphalt Pavement Surface Course (PG 64-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P6 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "B" HMAC Asphalt Pavement Surface Course (PG 64-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P7 Includes the necessary equipment, labor, materials, and incidentals for placement of Flexible Base compacted to 95% Density, ASTM D1557, per the construction drawings and City of Midland standards and specifications including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P8 Includes the necessary equipment, labor, materials, and incidentals for application of Bituminous Prime Coat (MC-30, 0.20 GAL / SY) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per gallon of material applied at the designated rate.

P9 Includes the necessary equipment, labor, materials, and incidentals for application of Tack Coat (MC-30, 0.10 GAL / SY) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per gallon of material applied at the designated rate.

P10 Includes the necessary equipment, labor, materials, and incidentals for placement of Stamped Concrete Median per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P11 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Median per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P12 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Fillet per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Curb section is formed and poured monolithically with fillet and is not a separate bid item. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P13 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Valley Gutter per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P14 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Driveway Approach per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Pedestrian access ramps at the driveway approach are considered part of the approach and are not a separate bid item. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P15 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Curb & Gutter per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, finishing, and appurtenances. Measurement and payment to be made per linear foot of material placed measured along the back-of-curb.

P16 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Pedestrian Access Ramp per the construction drawings and City of Midland standards and specifications, including all forming, reinforcement, placement, jointing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P17 Includes the necessary equipment, labor, materials, and incidentals for Ring & Cover Adjustment per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, flowable fill, jointing, sealing, finishing, and appurtenances. This includes a minimum 1.0' wide concrete collar whose width is measured from the outer edge of the cover to the outer edge of the concrete ring. Measurement and payment to be made per each adjustment made.

T1 Includes the necessary equipment, labor, materials, and incidentals to Eliminate Existing Pavement Markings and Markers (Line Marking) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot eliminated.

T2 Includes the necessary equipment, labor, materials, and incidentals for the placement of Retroreflectorized Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed.

T3 Includes the necessary equipment, labor, materials, and incidentals for the placement of Thermoplastic Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed.

T4 Includes the necessary equipment, labor, materials, and incidentals for the placement of Prefabricated Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each marking placed.

T5 Includes the necessary equipment, labor, materials, and incidentals for In Road Sign Assembly per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each sign assembled.

T6 Includes the necessary equipment, labor, materials, and incidentals to Remove Sign Assembly per the construction drawings and City of Midland standards and specifications, including all excavation, backfill, stabilization, foundations, bases, and appurtenances. Measurement and payment to be made per each existing sign assembly removed.

T7 Includes the necessary equipment, labor, materials, and incidentals for the placement of Retroreflective Raised Pavement Markers per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each marker placed.

T8 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Utility Duct Bank improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed measured along the ground surface.

T9 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Ground Box With Apron improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each ground box with apron placed.

T10 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Delineator Assembly improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each delineator assembly placed.

T11 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Temporary Workzone Pavement Markings improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per lump sum.

BID ITEMS

(See Proposal sheet for additional information.)

Project Name: BRIARWOOD AVE PHASE II
Project Number: P21-06 ADDITIVE ALTERNATE BID 01

Traffic Control Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Intersection Signals & Electrical (Briarwood Drive & Avalon Drive), furnished, installed, complete and in place.	1	LS	T11	$414,414.52	$414,414.52
Total Traffic Control Items 1 - 1		$414,414.52				

Price For:
6. Traffic Control Items $ 414,414.52
Total Price $ 414,414.52

PAY NOTES

P21-06

BRIARWOOD AVE PHASE II

ADDITIVE ALTERNATE BID 01

Bid Item		Pay Quantity Note
Traffic Items		
1	Intersection Signals & Electrical (Briarwood Drive & Avalon Drive)	T11

PAY QUANTITY NOTES

T11 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of all Intersection Signals & Electrical improvements per the construction drawings and City of Midland standards and specifications, including all lights, heads, fixtures, arms, poles, buttons, pedestals, foundations, wiring, cables, boxes, cabinets, and appurtenances. Measurement and payment to be made per lump sum for each street intersection where signal and electrical improvements are made.

BID BOND

THE STATE OF TEXAS §

COUNTY OF MIDLAND §

SURETY NO BID BOND

KNOW ALL MEN BY THESE PRESENTS, THAT Rocco Albert, Inc. (Hereinafter called the Principal), as Principal, and Continental Casualty Company (Hereinafter called the Surety, as Surety, are held and firmly bound unto the City of Midland, Texas a home rule municipal corporation of Midland County, Texas, (hereinafter called the Obligee), in the amount of Five Percent Total Amount Bid Dollars ($ 5%) for the payment whereof the said Principal and surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a Bid or Proposal to enter into a certain written contract for the construction of BRIARWOOD AVE PHASE II.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall faithfully, enter into such written Contract, then this obligation shall be void; otherwise to remain in full force and effect.

IT IS EXPRESSLY UNDERSTOOD AND AGREE that if said Principal should withdraw its Bid anytime after such Bid is opened and before official rejection to such Bid or, if successful in securing the award thereof, said Principal should fail to enter into the Contract and furnish satisfactory Performance Bond and Payment Bond, the Obligee, in either of such events, shall be entitled and is hereby given the right to collect the full amount of this Bid Bond as liquidated damage.

BidB 1

PROVIDED, further that if any legal action be filed upon this Bond venue shall lie in Midland County, Texas.

IN WITNESS WHEREOF, the said Principal and surety do sign and seal this instrument, this 16th day of July, 2025.

Reece Albert, Inc.
Principal

By Mike Schmidt
MIKE SCHMIDT, VICE PRESIDENT

Address 3001 Foster St., San Angelo, Texas 76903

Continental Casualty Company
Surety

By
Alyson Carmichael, Attorney-in-Fact

Address 151 N. Franklin St., Chicago, Illinois 60606

APPROVED AS TO FORM:

City Attorney

NOTE: Attach Power of Attorney

Form Revised June 2025

POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

Know All Men By These Presents, That Continental Casualty Company, an Illinois insurance company, National Fire Insurance Company of Hartford, an Illinois insurance company, and American Casualty Company of Reading, Pennsylvania, a Pennsylvania insurance company (herein called "the CNA Companies"), are duly organized and existing insurance companies having their principal offices in the City of Chicago, and State of Illinois, and that they do by virtue of the signatures and seals herein affixed hereby make, constitute and appoint

John A Martinez, Paul Michael Messenger, Alyson Carmichael, Individually

of The Woodlands, TX, their true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on their behalf bonds, undertakings and other obligatory instruments of similar nature

- In Unlimited Amounts -

and to bind them thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of their insurance companies and all the acts of said Attorney, pursuant to the authority hereby given is hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the By-Laws and Resolutions, printed below, duly adopted, as indicated, by the Boards of Directors of the insurance companies.

In Witness Whereof, the CNA Companies have caused these presents to be signed by their Vice President and their corporate seals to be hereto affixed on this 9th day of January, 2025.

Continental Casualty Company
National Fire Insurance Company of Hartford
American Casualty Company of Reading, Pennsylvania

Larry Kasten — Vice President

State of South Dakota, County of Minnehaha, ss:

On this 9th day of January, 2025, before me personally came Larry Kasten to me known, who, being by me duly sworn, did depose and say: that he resides in the City of Sioux Falls, State of South Dakota; that he is a Vice President of Continental Casualty Company, an Illinois insurance company, National Fire Insurance Company of Hartford, an Illinois insurance company, and American Casualty Company of Reading, Pennsylvania, a Pennsylvania insurance company described in and which executed the above instrument; that he knows the seals of said insurance companies; that the seals affixed to the said instrument are such corporate seals; that they were so affixed pursuant to authority given by the Boards of Directors of said insurance companies and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said insurance companies.

My commission expires

March 2, 2026

M. BENT
NOTARY PUBLIC
SOUTH DAKOTA

M. Bent — Notary Public

CERTIFICATE

I, Paula Kolsrud, Assistant Secretary of Continental Casualty Company, an Illinois insurance company, National Fire Insurance Company of Hartford, an Illinois insurance company, and American Casualty Company of Reading, Pennsylvania, a Pennsylvania insurance company do hereby certify that the Power of Attorney herein above set forth is still in force, and further certify that the By-Laws and Resolutions of the Board of Directors of the insurance companies printed below are still in force. In testimony whereof I have hereunto subscribed my name and affixed the seal of the said insurance companies this 16th day of July , 2025 .

Continental Casualty Company
National Fire Insurance Company of Hartford
American Casualty Company of Reading, Pennsylvania

Paula Kolsrud — Assistant Secretary

Authorizing By-Laws and Resolutions

ADOPTED BY THE BOARD OF DIRECTORS OF EACH OF CONTINENTAL CASUALTY COMPANY, NATIONAL FIRE INSURANCE COMPANY OF HARTFORD, and AMERICAN CASUALTY COMPANY OF READING, PENNSYLVANIA (as defined above, the "CNA Companies"):

This Power of Attorney is made and executed pursuant to and by authority of the following resolution duly adopted by the Board of Directors of each of the above CNA Companies at a meeting held on May 12, 1995:

"RESOLVED: That any Senior or Group Vice President may authorize an officer to sign specific documents, agreements and instruments on behalf of the Company provided that the name of such authorized officer and a description of the documents, agreements or instruments that such officer may sign will be provided in writing by the Senior or Group Vice President to the Secretary of the Company prior to such execution becoming effective."

This Power of Attorney is signed by Larry Kasten, Vice President, who has been authorized pursuant to the above resolution to execute power of attorneys on behalf of each of the CNA Companies.

This Power of Attorney is signed and sealed by facsimile under and by the authority of the following Resolution adopted by the Board of Directors of each of the above Companies by unanimous written consent dated the 25th day of April, 2012:

"Whereas, the bylaws of the Company or specific resolution of the Board of Directors has authorized various officers (the "Authorized Officers") to execute various policies, bonds, undertakings and other obligatory instruments of like nature; and

Whereas, from time to time, the signature of the Authorized Officers, in addition to being provided in original, hard copy format, may be provided via facsimile or otherwise in an electronic format (collectively, "Electronic Signatures"); Now therefore be it resolved: that the Electronic Signature of any Authorized Officer shall be valid and binding on the Company."

This Power of Attorney may be signed by digital signature and sealed by a digital or otherwise electronic-formatted corporate seal under and by the authority of the following Resolution adopted by the Board of Directors of each of the above CNA Companies by unanimous written consent dated the 27th day of April, 2022:

"RESOLVED: That it is in the best interest of the Company to periodically ratify and confirm any corporate documents signed by digital signatures and to ratify and confirm the use of a digital or otherwise electronic-formatted corporate seal, each to be considered the act and deed of the Company."

Go to www.cnasurety.com > Owner / Obligee Services > Validate Bond Coverage, if you want to verify bond authenticity.

Figure: 28 TAC §1.601(a)(2)(B)

Have a complaint or need help?

If you have a problem with a claim or your premium, call your insurance company or HMO first. If you can't work out the issue, the Texas Department of Insurance may be able to help.

Even if you file a complaint with the Texas Department of Insurance, you should also file a complaint or appeal through your insurance company or HMO. If you don't, you may lose your right to appeal.

Continental Casualty Company, National Fire Insurance Company of Hartford, American Casualty Company of Reading, PA and Continental Insurance Company
To get information or file a complaint with your insurance company or HMO:

Call: Customer Service at **1-312-822-5000**
Toll-free: **1-877-672-6115**

Email: legclm@cnasurety.com
Mail: CNA Surety, 151 North Franklin, 17th Floor, Chicago, IL 60606

The Texas Department of Insurance
To get help with an insurance question or file a complaint with the state:
Call with a question: 1-800-252-3439
File a complaint: www.tdi.texas.gov
Email: ConsumerProtection@tdi.texas.gov
Mail: Consumer Protection, MC: CO-CP, Texas Department of Insurance, P.O. Box 12030, Austin, TX 78711-2030

Tiene una queja o necesita ayuda?

Si tiene un problema con una reclamación o con su prima de seguro, llame primero a su compañía de seguros o HMO. Si no puede resolver el problema, es posible que el Departamento de Seguros de Texas (Texas Department of Insurance, por su nombre en inglés) pueda ayudar.

Aun si usted presenta una queja ante el Departamento de Seguros de Texas, también debe presentar una queja a través del proceso de quejas o de apelaciones de su compañía de seguros o HMO. Si no lo hace, podría perder su derecho para apelar.

Continental Casualty Company, National Fire Insurance Company of Hartford, American Casualty Company of Reading, PA and Continental Insurance Company
Para obtener información o para presentar una queja ante su compañía de seguros o HMO:

Llame a: Servicio al Cliente al **1-312-822-5000**
Teléfono gratuito: **1-877-672-6115**

Correo electrónico: legclm@cnasurety.com
Dirección postal: CNA Surety, 151 North Franklin, 17th Floor, Chicago, IL 60606

El Departamento de Seguros de Texas
Para obtener ayuda con una pregunta relacionada con los seguros o para presentar una queja ante el estado:
Llame con sus preguntas al: 1-800-252-3439
Presente una queja en: www.tdi.texas.gov

Correo electrónico: ConsumerProtection@tdi.texas.gov
Dirección postal: Consumer Protection, MC: CO-CP, Texas Department of Insurance, P.O. Box 12030, Austin, TX 78711-2030

Form FB277-9-2023

CONTRACT

THE STATE OF TEXAS §

COUNTY OF MIDLAND §

THIS CONTRACT, made and entered into this 10 day of September, 20 25, by and between the City of Midland of the County of Midland and State of Texas, acting through its Mayor thereunto duly authorized so to do, Party of the First Part, hereinafter termed OWNER, and Reece Albert, Inc. of the City San Angelo, County of Tom Green, State of TX, Party of the Second Part, herein-after termed CONTRACTOR.

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the Party of the first Part (OWNER), and under the conditions expressed in the bond bearing even date herewith, the said Party of the Second Part (CONTRACTOR), hereby agrees with the said Party of the First Part (OWNER) to commence and complete the construction of certain improvements described as follows: BRIARWOOD AVE PHASE II together with appurtenances and incidentals.

Conditions of the Contract and at his (or their) own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendent, labor, insurance and other accessories and services necessary to complete the said construction in accordance with the conditions and prices stated in the Proposal attached hereto, and in accordance with the Notice to the Contractors, General and Special Conditions of Agreement, Plans and other drawings and printed or written explanatory matter thereof, and the Specifications and addenda therefore as prepared by Engineering and Transportation Department of the City of Midland, Texas, herein entitled the ENGINEER, together with the CONTRACTOR'S written Proposal, the General Conditions of the Contract, and the Performance and Payment Bonds hereto attached; all of which are made a part hereof and collectively evidence and constitute the entire Contract.

The CONTRACTOR hereby agrees to commence work within fifteen (15) calendar days after the written notice to do so and to substantially complete the same within 540 calendar days after receipt of notice to proceed, subject to such extensions of time as are provided by the General and Special Conditions.

The OWNER agrees to pay the CONTRACTOR in current funds the price or prices shown in the proposal, which forms a part of this Contract, such payments to be subject to the General and Special Conditions of the Contract.

The SUM TOTAL of this Contract shall be: $9,020,270.27.

INSURANCE

Contractor shall at all times during the term of this Contract maintain and keep in full force and effect insurance in the following types and minimum amounts with companies authorized to do business in the State of Texas:

Commercial General Liability (including Contractual liability):		
	— Personal Injury:	$1,000,000.00 per person
		$1,000,000.00 per occurrence
	— Property Damage:	$500,000.00 per occurrence
Business Automobile Liability:		$250,000.00 combined single limit - Personal Injury and Property Damage
Workers' Compensation:		Statutory limits
Employers' Liability:		$500,000.00 per accident or occurrence

The Commercial General Liability shall be on a per project aggregate, including completed operations, and shall be on an occurrence basis. This insurance shall name the City as an additional insured and waive subrogation in favor of the City.

The Business Automobile Liability insurance provided by Contractor shall cover any auto for bodily injury and property damage, including owned vehicles, hired and non-city vehicles, and employee non-ownership, and the amount of such policy shall be a minimum of $250,000.00 covering any vehicle used for the execution of the work that is the subject of this Contract. The insurance shall name the City as an additional insured and waive subrogation in favor of the City.

The Workers' Compensation coverage provided by Contractor shall inure to the benefit of employees injured during the course and scope of their employment by Contractor pursuant to this Contract. The Workers' Compensation shall waive all rights of subrogation in favor of the City.

All insurance required pursuant to this Contract shall provide for a waiver of subrogation in favor of the City. All insurance required pursuant to this Contract, except for Workers' Compensation Insurance, shall name the City as an additional insured on a claims occurred basis. City shall be provided the notice by Contractor's insurance provider not later than thirty (30) days prior to any reduction or termination of such coverage.

Contractor shall contractually require all contractors, subcontractors, and sub-subcontractors that work on any portion of the work that is the subject of this Contract to obtain insurance coverage that meets or exceeds the policy requirements and minimum amounts specified herein. All contractors, subcontractors, and sub-subcontractors shall obtain insurance policies that provide blanket waivers of subrogation in favor of the City of Midland and policies that name the City of Midland as an additional insured on a claims occurred basis (except workers' compensation).

The parties agree that, prior to the execution of the Contract, Contractor shall provide one or more certificates of insurance specifically stating that these requirements have been met and subject to the approval of the City. The City shall not be required to provide any insurance whatsoever pursuant to this Contract.

The Contractor certifies that the certificate of insurance provided as required herein complies with the requirements of Senate Bill 425, passed during the 82nd regular session of the Texas Legislature, and effective January 1, 2012. The Contractor shall not use an unapproved certificate of insurance or insert inappropriate language on a certificate. Compliance with state law is the sole responsibility of the Contractor.

WAIVER OF ATTORNEY FEES

WAIVER OF ATTORNEY FEES: BY EXECUTING THIS CONTRACT, CONTRACTOR AGREES TO WAIVE AND DOES HEREBY KNOWINGLY, CONCLUSIVELY, VOLUNTARILY AND INTENTIONALLY WAIVE ANY CLAIM IT HAS OR MAY HAVE IN THE FUTURE AGAINST THE OWNER, REGARDING THE AWARD OF ATTORNEY'S FEES, WHICH ARE IN ANY WAY RELATED TO THE CONTRACT, OR THE CONSTRUCTION, INTERPRETATION OR BREACH OF THE CONTRACT. THE CONTRACTOR SPECIFICALLY AGREES THAT IF THE CONTRACTOR BRINGS OR COMMENCES ANY LEGAL ACTION OR PROCEEDING RELATED TO THIS CONTRACT, THE CONSTRUCTION, INTERPRETATION, VALIDITY OR BREACH OF THIS CONTRACT, INCLUDING BUT NOT LIMITED TO ANY ACTION PURSUANT TO THE PROVISIONS OF THE TEXAS UNIFORM DECLARATORY JUDGMENTS ACT (TEXAS CIVIL PRACTICE AND REMEDIES CODE SECTION 37.001, ET. SEQ., AS AMEDED), OR CHAPTER 271 OF THE TEXAS LOCAL GOVERNMENT CODE, THE CONTRACTOR AGREES TO ABANDON, WAIVE AND RELINQUISH ANY AND ALL RIGHTS TO THE RECOVERY OF ATTORNEY'S FEES TO WHICH CONTRACTOR MIGHT OTHERWISE BE ENTITLED.

CONTRACTOR AGREES THAT THIS IS THE VOLUNTARY AND INTENTIONAL RELINQUISHMENT AND ABANDONMENT OF A PRESENTLY EXISTING KNOWN RIGHT. THE CONTRACTOR ACKNOWLEDGES THAT IT UNDERSTANDS ALL TERMS AND CONDITIONS OF THE CONTRACT. THE CONTRACTOR FURTHER ACKNOWLEDGES AND AGREES THAT THERE WAS AND IS NO DISPARITY OF BARGAINING POWER BETWEEN THE OWNER AND THE CONTRACTOR. THIS SECTION SHALL NOT BE CONSTRUED OR INTERPRETED AS A WAIVER OF SOVEREIGN IMMUNITY.

THE CONTRACTOR AND OWNER ARE RELYING ON THEIR OWN JUDGMENT. EACH PARTY HAD THE OPPORTUNITY TO DISCUSS THIS CONTRACT WITH COMPETENT LEGAL COUNSEL PRIOR TO ITS EXECUTION.

SOVEREIGN IMMUNITY

By executing this Contract, the City is not waiving its right of sovereign immunity. The City is retaining its immunity from suit. The City is not granting consent to be sued by legislative resolution or action.

THERE IS NO WAIVER OF SOVEREIGN IMMUNITY.

GOVERNING LAW AND VENUE

This Contract shall be governed by the laws of the State of Texas. All performance and payment made pursuant to this Contract shall be deemed to have occurred in Midland County, Texas. Exclusive venue for any claims, suits or any other action arising from or connected in any way to this Contract or the performance of this Contract shall be in Midland County, Texas. The obligations and undertakings of each of the parties to this Contract shall be deemed to have occurred in Midland County, Texas.

COMPLIANCE – Contractor agrees that it shall comply with Texas Government Code Section 2252.908, *et seq.*, as amended. Contractor agrees that it shall comply with Texas Local Government Code Section 176.006, *et seq.*, as amended.

VERIFICATION

To the extent that Sections 2271.002, 2274.002, and 2276.002 of the Texas Government Code (collectively, the "Anti-Boycott Statutes") apply to this Contract, Contractor hereby verifies:

- that Contractor does not boycott Israel and will not boycott Israel during the term of this Contract;
- that Contractor does not boycott energy companies and will not boycott energy companies during the term of this Contract; and
- that Contractor does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association and will not discriminate during the term of this Contract against a firearm entity or firearm trade association.

To the extent that the Anti-Boycott Statutes do not apply to this Contract, such verification is not required, and Contractor shall be deemed to have not made such verification.

RECORDS RETENTION AND PRODUCTION OF INFORMATION

To the extent that this Contract is a contract described by Section 552.371 of the Texas Government Code, Contractor shall (1) preserve all contracting information related to the Contract as provided by the records retention requirements applicable to the City of Midland for the duration of the contract, (2) promptly provide to the City of Midland any contracting information related to the Contract that is in the custody or possession of Contractor on request of the City of Midland, and (3) on completion of the Contract, either (i) provide at no cost to the City of Midland all contracting information related to the Contract that is in the custody or possession of Contractor, or (ii) preserve the contracting information related to the Contract as provided by the records retention requirements applicable to the City of Midland.

PUBLIC INFORMATION

To the extent that this Contract is a contract described by Section 552.371 of the Texas Government Code, Contractor agrees as follows in accordance with Section 552.372(b) of the Texas Government Code: The requirements of Subchapter J, Chapter 552, Government Code, may apply to this contract, and the contractor or vendor agrees that the contract can be terminated if the contractor or vendor knowingly or intentionally fails to comply with a requirement of that subchapter.

IN WITNESS WHEREOF, the parties to these presents have executed this Agreement in the year and day first above written.

Parties of the First Part (Owner)

By: _____
Lori Merritt Blong, Mayor

ATTEST:

_____
Marcia Bentley-German, City Secretary

APPROVED ONLY AS TO FORM:

By: _____
John Ohnemiller, City Attorney

By: _____
Party of the Second Part (CONTRACTOR)

By: _____
Title

THE STATE OF _____ §

COUNTY OF _____ §

BEFORE ME, the undersigned authority, on this _____ day of _____, 20__ personally appeared _____, an officer of Reece Albert, Inc., known to me to be the person and official whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same as an act and deed of said corporation, for the purposes and consideration therein expressed, and in the capacity therein stated.

GIVEN UNDER MY HAND AND SEAL OF OFFICE this _____ day of _____, 20_____

_____
Notary Public

Form Revised June 2025

PERFORMANCE BOND

THE STATE OF TEXAS §

COUNTY OF MIDLAND § SURETY NO _____

KNOW ALL MEN BY THESE PRESENTS, THAT _____ (Hereinafter called the Principal[s]), as Principal(s), and _____ (Hereinafter called the Surety), as Surety, are held and firmly bound unto the City of Midland, Texas a home rule municipal corporation of Midland County, Texas, (hereinafter called the Obligee), in the amount of _____ DOLLARS ($ _____) for the payment whereof the said Principal and surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the _____day of _____, 20___ , for the furnishing of materials and equipment to perform all labor and work necessary for the construction of _____BRIARWOOD AVE PHASE II_____, specifically including in the scope of this work and bond, the additional maintenance guaranty provisions set forth in the contract conditions, which contract is hereby referred to and made a part hereof as fully and to the same extent as if copies at length herein, as well as the Principal's primary obligation to perform according to plans and specifications.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall faithfully perform the work in accordance with the plans, specifications, instructions to bidder, general and special conditions and other contract documents, including any addendum thereto, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED further that if any legal action be filed upon this Bond venue shall lie in Midland County, State of Texas.

Surety, for value received, stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract, or to the work performed thereunder, or the plans, specifications or drawings accompanying the same, or any assignment of the contract as may be provided for in the instructions to bidders, shall in anywise affect its obligation on this Bond, and it does waive notice of any such change, extension of time, alteration or addition to the terms of the contract, assignment thereof, or the work to be performed thereunder.

IN WITNESS WHEREOF, the said Principal and surety do sign and seal this instrument, this _____ day of _____ , 20___.

_____	_____
Principal	Surety
By _____	By _____
Address _____	Address _____
_____	_____
_____	_____

APPROVED AS TO FORM:

_____

City Attorney

NOTE: Attach Power of Attorney

Form Revised June 2025

PAYMENT BOND

THE STATE OF TEXAS §

COUNTY OF MIDLAND § SURETY NO _____

KNOW ALL MEN BY THESE PRESENTS, THAT _____ of the City of _____ of the County of _____ and State of Texas as Principal, and _____, as Surety, are held and firmly bound unto the City of Midland, Texas, as Obligee, in the amount of _____ DOLLARS ($ _____) for the payment whereof the said Principal and Surety bind themselves, their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the _____ day of _____, 20__, for the furnishing of materials, equipment to perform all labor and work necessary for BRIARWOOD AVE PHASE II, hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, the condition of the obligation is that if the said Principal shall pay all claimants supplying labor and material to him or a subcontractor in the prosecution of the work provided for in said contract, then this obligation shall be null and void; otherwise, it is to remain in full force and effect.

Surety, for value received, stipulates and agrees that no change, extension of time alteration or addition to the terms of the contract, or to the work performed there under, or the plans, specifications of drawings accompanying the same, or any assignment of the contract as may be provided for in the instructions to bidders, shall in anywise affect its obligation on this Bond, and it does waive notice of any such change, extension of

time, alteration or addition to the terms of the contract, assignment thereof, or to the work to be performed there under.

IN WITNESS WHEREOF the said Principal and Surety have signed and sealed this instrument, this _____ day of _____ , 20__ .

_____	_____
Principal	Surety
By _____	By _____
Address _____	Address _____
_____	_____
_____	_____

APPROVED AS TO FORM:

_____

City Attorney

NOTE: Attach Power of Attorney

Form Revised June 2025

CERTIFICATE OF PAYMENT

THE STATE OF TEXAS §

COUNTY OF MIDLAND §

BRIARWOOD AVE PHASE II

The undersigned states that all debts, bills, and expenses that were incurred by the undersigned, his agents, or subcontractors employed by him, for labor, wages, materials and other purposes furnished for the above project have been paid and satisfied in full.

The undersigned, as general contractor for the above described project agrees to indemnify, hold harmless and defend the City, its officers, agents, and employees, from and against all claims and suits for damages, expenses, including court costs and attorney fees, arising out of or resulting from the undersigned contractor, his agents or subcontractors employed by him for expenses, warranties for items furnished, or labor performed and for any party that has supplied materials in connection with the repair or construction of the above referenced premises.

The undersigned contractor agrees to waive any and all claims it may have against the City, associated with, resulting from or arising out of the work performed at the above premises.

Further, the undersigned states that all labor performed by the undersigned, his agents, and subcontractors employed by him, has been completed in the usual and customary workmanlike manner and all work performed is accompanied with the usual and appropriate warranties for such work or repair, absent any disclaimer previously approved by the City of Midland.

I, the undersigned, release and relinquish unto the City of Midland, and their assigns the above described lien upon the above referenced property and hereby certify that all debts, bills, and expenses incurred by the undersigned, his agents, or subcontractors employed by him in connection with work done at the above

premises have been fully paid, in exchange for payment in full to be made by the City of Midland for the performance on the above described premises.

WITNESS MY HAND on this _____ day of _____, 20_____.

_____
Signature

_____
Typed or Printed Name

_____
Title

_____
Name of Company

SUBSCRIBED AND SWORN to before me on the _____ day of _____, 20_____.

_____
Notary Public, State of Texas

_____
Typed or printed name

_____
My Commission expires:

Form Revised June 2025

GENERAL CONDITIONS AND PROVISIONS

1. DEFINITIONS

The following terms as used in this contract shall be defined and interpreted as follows:

(a) “Contract” or “This Contract” or “Agreement”: The particular Contract executed by the Contractor and the Owner of which these general conditions are integral parts.

(b) “Contractor”: The person, firm or corporation to whom this Contract is awarded by the Owner and who is a party thereto.

(c) “Owner”, “City”, or pronouns instead: The entity that is a party to this Contract, contracting under the official name of the City of Midland, Texas or the City Council of the City of Midland.

(d) The words "as directed", "as required", "as permitted", "acceptable to", "satisfactory", and the words of like import, shall mean that the direction, requirement or permission of the Engineer is intended.

(e) “Engineer”: The word “Engineer” used in these specifications or in this Contract means the duly authorized representative or agent of the Owner supervising the performance of the Contract and representing the Owner in his Contractual relations and negotiations with the Contractor during the period of construction. The Engineer will be represented by assistants and inspectors authorized to act for him. On all questions concerning the acceptability of material or equipment, the classifications of material, the execution of the work, conflicting interest of Contractors performing related work and the determination of costs, the decision of the Engineer shall be final, but shall not relieve the Contractor of his responsibility for completion of the entire work in a good and workmanlike manner and in full compliance with the plans and specifications.

Inspectors are required to see that all the provisions of the Contract specifications are faithfully adhered to. Any inspector may, if authorized by the Engineer, stop the work entirely if there is not sufficient quantity of suitable and approved material on the ground to carry it on properly, or for any other good and sufficient cause. Any work done in the absence of an inspector may be ordered opened up for thorough examination, and must be rebuilt or replaced at the Contractors sole expense if found to be deficient or not in accordance with the plans and specifications. But no approval by an inspector shall be construed as an acceptance of defective or improper work or material, which must be rebuilt or properly replaced whenever discovered. Inspectors have not the power to give orders or directions under any possible circumstances, except as herein defined and provided, and on authority of the Engineer

(f) "Subcontractor": Any person, firm or corporation other than an employee of the contractor, supplying, for and under agreement either with the Contractor or any subcontractor of the Contractor, labor or material, or both, at the site of the project in connection with this Contract.

(g) "Project": The structure or improvement to be constructed in whole or in part through the performance of this Contract.

(h) "Work on the Project": Such work as is performed or ordinarily would be performed at the site of the project.

(i) "Surety": Any firm or corporation executing a Surety Bond or Bonds payable to the Owner securing the performance of the Contract either in whole or in part.

(j) Whenever certain articles are specifically mentioned, by brand name or name of the manufacturer, such materials shall be taken as standard and guide for quality, operation, capacity, etc. The term "or equal" shall mean that articles of equal characteristics as required, but of different brand or manufacturer, may be substituted and accepted, subject in all instances to the approval of the Engineer.

(k) "Special Provisions", "Special Conditions", "Project Specific Specification" or "Job Specific Specifications" are included as amendment of and/or additions to the General Conditions and/or Standard Specifications for the particular project in which they are included and will take precedence over the General Conditions and Standard Specifications only in so far as the amendments and/or additions. All other provisions in the General Conditions and/or Standard Specifications will not be affected.

(l) "Drawings" "Contract Drawings", "Plans" "Detail Drawings" "Detail Sheets" or "Plans and Details" refers to the set of drawings which show the details for the construction and related work anticipated on this project and upon which bids are being solicited.

2. CONFLICT OF PROVISIONS

Unless it is specifically provided otherwise, any provision in any other part of this Contract which may be in conflict or inconsistent with any provision in the General Conditions and Provisions shall be void to the extent only of such conflict or inconsistency.

3. DUTIES AND RESPONSIBILITIES OF THE CONTRACTOR

The Contractor shall have charge of and shall be responsible for the entire work under this Contract until its completion and acceptance by the city. A competent superintendent, foreman or other representative, invested with sufficient authority to conduct the work properly, shall be maintained on the work at all times.

It is expressly agreed and understood that no decision of the Engineer or any certificate issued nor payment made to the Contractor nor partial or entire use or occupancy of the work by the Owner, shall be an acceptance of any work or materials not in accordance with this Contract, nor constitute a waiver of the Contractor's responsibility to perform the entire work in a good and workmanlike manner and in accordance with the plans and specifications.

4. TIME ELEMENT

The work shall be commenced and finished within the time set out in the Form of Contract.

The time of completion of this Contract is an essential element and consideration. Since, therefore, time is of the essence thereof, and in the event of delay in the completion of the entire work required hereunder beyond the period prescribed, or beyond the period for which time may be extended by authority of the Owner for good cause shown, the Owner shall be paid damages for such delay. Inasmuch as the amount of such damages is difficult to ascertain, it is hereby stipulated and agreed that such damages shall be liquidated and the Owner shall be paid damages at the rate as set forth in the Special Provisions, said damages to be paid to the Owner for each and every day that the Contractor be in default in completing the entire work required under this Contract. The Owner shall have the right to deduct such amounts from any monies due, or which may become due, under

this Contract. In the event that no amount for such damages is shown in the Special Provisions of these specifications, it is agreed that the amount of damages shall be Five Hundred dollars ($500.00) per day.

If during the progress of the work weather conditions, or other circumstances beyond the control of the Contractor should prevail to the extent that the work cannot be prosecuted and completed within the time specified in the Contract, the Contractor shall file with the Engineer within one week of the occurrence of such delay a request for a credit on the time of completion. Unless the Contractor files such request, the liquidated damages specified above will be enforced.

5. PAYMENT TO CONTRACTOR

ESTIMATED QUANTITIES:

This Contract, including the specifications, plans and estimate, is intended to show clearly all work to be done and material to be furnished hereunder. Where the estimated quantities are shown for the various classes of work to be done and material to be furnished under this Contract, they are approximate and are to be used only as a basis for estimating the probable cost of the work and for comparing the proposals offered for the work. It is understood and agreed that the actual amount of work to be done and material to be furnished under this Contract may differ somewhat from these estimates, and that where the basis for payment under this Contract is the unit price method, payment shall be for the actual amount of such work done and the material furnished.

Where payment is based on the unit price method, the Contractor agrees that he will make no claim for damages, anticipated profits or otherwise on account of any differences which may be found between the quantities of work actually done, the material actually furnished under this Contract and the estimated quantities contemplated and contained in the proposal provided, however, that in case the actual quantity of any major item should become as much as twenty percent (20%) more than, or twenty percent (20%) less than the estimated or contemplated quantity for such items, then either party of this agreement, upon demand, shall be entitled to a revised consideration upon the portion of the work above or below twenty percent (20%) of the estimated quantity.

A "Major Item" shall be construed to be any individual item incurred in the proposal that has a total cost equal to or greater than five percent (5%) of the total Contract cost, computed on the basis of the proposal quantities and the Contract unit price.

Any revised consideration is to be determined by agreement between the parties, otherwise by the terms of this Contract, as provided under "Extra Work".

PAYMENT; RETAINAGE:

On or before the 1st day of each month the Contractor shall prepare an itemized statement showing the total value of the work completed by the Contractor up to and including the 25th day of the preceding month; said statement shall also include the value of all sound materials delivered on the site of the work that are to be fabricated into the work. NO ESTIMATE WILL BE MADE ON UNCOMPLETED PORTIONS OF THE WORK.

After all work is completed by Contractor, including all Change Orders altering the original scope and amount of the contract are completed, and the City has inspected and approved that the work is completed and in compliance with the contract and all subsequent Change Orders, the City may thereafter issue payment to Contractor in the amount of the contract and all Change Orders. The City shall be the final judge of when the

work is completed by Contractor. The City, in its sole discretion, shall determine if the work under the contract and under any Change Orders has been done to the City's requirements.

The City may make periodic payments to Contractor; provided, however, such periodic payments may only be made pursuant to this section, and only after all work and all Change Orders are completed by Contractor and approved by the City. The approval shall be in the City's sole discretion. Requests for progress payments may be made to the extent of the materials and labor completed at the end of each month. Upon approval by the City or the City's representative, the request and invoice shall be forwarded for payment less 5% retainage. The total of these payments shall not exceed 95% of the total contract amount.

FINAL COMPLETION AND ACCEPTANCE:

Within ten (10) days after the Contractor has given the Engineer written notice that the work has been completed, or substantially completed, the Engineer and the Owner shall inspect the work and within said time, if the work be found to be completed or substantially completed in accordance with the Contract documents, the Engineer shall issue to the Owner and the Contractor his Certificate of Completion.

FINAL PAYMENT:

Upon the issuance of the Certificate of Completion, the Engineer shall proceed to make final measurements and prepare final statement of the value of all work performed and materials furnished under the terms of the Contract and shall certify same to the Owner, who shall pay to the Contractor the balance due the Contractor under the terms of this Contract, provided he has fully performed his obligations under the terms of this Contract. Notwithstanding any provision of these Contract Documents to the contrary, it is expressly understood and agreed by the parties hereto that neither the certificate of acceptance, nor the final or any other payment hereunder, nor any partial or total occupancy or possession of the project by the Owner, shall relieve the Contractor of his responsibility for completion of the entire project in a good and workmanlike manner and a full compliance with the plans and specifications and the fulfillment of any warranties which may be required in the Contract Documents.

6. OWNER'S RIGHT TO WITHHOLD CERTAIN AMOUNTS AND MAKE APPLICATION THEREOF

In addition to the amount which the Owner may otherwise retain under the Contract, the Owner may withhold a sufficient amount or amounts of any payment or payment otherwise due to the Contractor, as in this judgment may be necessary to cover:

(a) Payments which may be past due and payable for just claims against the Contractor or any subcontractor for labor or materials furnished for the performance of this Contract.

(b) For defective work not remedied.

(c) For failure of the Contractor to make proper payments to his subcontractors.

7. CERTIFICATE OF PAYMENT

Contractor shall, prior to issuance of final payment pursuant to the terms herein stated, provide proof satisfactory to the owner that all debts, bills and expenses incurred by the Contractor, his agents, employees or subcontractors employed by him, for labor, wages, materials and other purposes, in the furtherance of this

project, have been paid and satisfied in full. Satisfactory proof shall consist of an executed Certificate of Payment.

8. EXTRA, ADDITIONAL OR OMITTED WORK PAYMENT

The Owner, upon proper action by its governing body, may require changes in this Contract, or additions to, or deductions from the work to be performed or the materials to be furnished pursuant to this Contract. No employee, agent or representative of the Owner, with the exception of the governing body authorized to award this Contract, has any power to approve any change in this Contract and it is the responsibility of the Contractor before proceeding with any change to satisfy himself that the change has been properly authorized on behalf of the Owner. No charge for any extra work or other change in the Contract will be allowed unless the extra work or change has been authorized in writing by the Owner, or its duly authorized representative, and the price therefore is stated in such written authority.

Adjustments, if any, in the amounts to be paid the Contractor where such adjustments are made by reason of additions to or deductions from the quantities of units or items bid upon in the proposal schedules, shall be paid for in accordance with the provisions of the Specifications, at the unit and/or lump sum prices bid in such proposal schedules.

Adjustments, if any, in the amounts to be paid the Contractor where such adjustments are made by reason of additions of items not appearing in the proposal schedules, or addition of work of such a nature that unit and/or lumps sum prices contained in the proposal schedules cannot reasonably or equitably be applied to provide proper payment therefore, the payment to the Contractor for such work shall be determined by one or more of the following methods:

(a) By an acceptable lump sum proposal from the Contractor.

(b) By unit prices contained in the Contractor's proposal and incorporated in the Contract or fixed by subsequent agreement between the Owner and the Contractor.

(c) By a cost method pursuant to which the Contractor shall be paid the costs of the change or addition. He shall be required to keep and present in such form as the Owner may direct, a correct account of the cost of the change or addition, together with all vouchers therefore. The cost may include an allowance for overhead and profit not to exceed fifteen percent (15%) of the net cost.

In computing the cost, there shall be considered reasonable and proper net expenditures for labor, materials, power tools and equipment, pro rata charges for foremen, deductions for social security, old age and unemployment benefits and workmen's compensation insurance and surety bond premium. In computing cost of machinery and equipment involved in additional work, the amount to be paid shall be not more than one hundred percent (100%) of the latest schedule of "Equipment Ownership Expense" adopted by Associated General Contractors of America. No overhead and profit shall be allowed on the deductions for Social Security, old age and unemployment benefits. All other expenditures shall be treated as overhead costs.

No extra work shall be performed or change made unless in pursuance of a written order from the Owner stating that the extra work or change is authorized and no claim for an addition to the Contract sum shall be valid unless so ordered; provided, however, that nothing in this Article shall excuse the Contractor from proceeding with the prosecution of the work so changed.

The Contractor shall, when required by the Owner, furnish an itemized breakdown of the quantities and prices used in computing the value of any change, addition or deduction that might be ordered.

If the Contractor should claim that any instruction, request, drawing, specification, action, condition, omission, default, or other situation obligated or may obligate the Owner to pay additional compensation to the Contract, or constitutes a waiver of any provision in the Contract, he shall notify the Owner in writing of such claim within ten (10) days from the date he has actual or constructive notice of the factual basis supporting the claim. The Contractor's failure to notify the Owner within such ten (10) days period shall be deemed a waiver and relinquishment of any such claim against the Owner. The procedure for consideration of such claims shall be as stated in this Article.

9. ASSIGNMENT OF CONTRACT

The Contractor shall not assign this Contract or any part thereof, nor any monies due or to become due thereunder without the prior written consent of the Owner. No assignment of this Contract shall be valid unless it shall contain a provision that the funds to be paid to the assignee under the assignment are subject to a prior lien for services rendered or material supplied for performance of the work called for under this Contract in favor of all persons, firms, or corporations rendering such services or supplying such materials.

10. SUBCONTRACTORS

Specialty subcontractors may be utilized for the performance of such parts of the work under this Contract as, under normal practices, are performed by Specialty subcontractors, unless the Owner determines that the Contractor has heretofore customarily performed such specialty work with his own organization and is equipped to do so, or unless the Owner determines that performance of the specialty work by Specialty subcontractors will result in increased costs or inordinate delays.

The Contractor shall not subcontract any work to be performed or any materials to be furnished in the performance of this Contract without the prior written consent of the Owner. If the Contractor shall subcontract any part of this Contract, the Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractor and of the persons either directly or indirectly employed by the subcontractor as he is for the acts and omissions of persons directly employed by himself. Nothing contained in this Contract shall create any Contractual relations between any subcontractor and the Owner. The Contractor shall ensure that the sub contractor has the insurance coverage required by this contract.

The Owner's consent to or approval of any subcontract under this Contract shall not in any way relieve the Contractor of his obligations under this Contract and no such consent or approval shall be deemed to waive any provisions of this Contract.

11. SUSPENSION OF WORK

Pending settlement of disputes on any point of controversy, the Engineer may suspend action on all or any part of the work. The Contractor shall not be entitled to any claim for loss or damage by reason of such, nor shall he be entitled to extension of time, although such extension of time may be granted by the Engineer if he deems it in the interest of the work.

12. RIGHT OF OWNER TO TERMINATE CONTRACT

If, in the opinion of the Engineer, the Contractor shall be improperly performing the work under this Contract, or shall neglect or refuse to take out or rebuild such work as shall have been rejected by the Engineer as being defective or unsuitable, or if, any time, the Engineer shall be of the opinion that the work is unnecessarily delayed and will not be finished within the prescribed time, or if the Contractor shall abandon the work, or shall neglect or refuse to comply with the instructions of the Engineer relative thereto, or shall fail in any manner to comply with the Specifications or Stipulations herein contained, the Engineer shall notify the Contractor to that effect in writing, and if the Contractor shall not within five (5) days thereafter take such measures as will, in the judgment of the Engineer, insure the satisfactory performance or construction of the work, the City may annul and cancel the Contract, in which event it shall notify the Contractor to discontinue all work under this Contract, and the Contractor shall immediately respect such notice and stop work and cease to have any rights to the possession of the ground and shall forfeit his Contract. Such annulment shall not entitle the Contractor to any claim for damages on account thereof, nor shall it affect the right of the City of Midland to recover damages on account of such failure. The City Council may thereupon advertise and re-let a new Contract for the uncompleted work without further ordinance, in the same manner as was followed in the letting of this Contract, and any excess of cost arising there from over and above what would have resulted from the prices set forth in this Contract will be charged against the Contractor and his surety or sureties hereto, who shall be liable therefore.

13. RIGHT OF CONTRACTOR TO TERMINATE CONTRACT

If the work should be stopped under an order of any court or other public authority for a period of three (3) months, through no act or fault of the Contractor or of anyone employed by him, or if the City should fail to make payment to the Contractor within thirty (30) days after such payment is due, as set out in the Contract, then the Contractor may, upon seven (7) days written notice to the City and the Engineer, stop work or terminate his Contract and recover from the City payment for all work executed and for any loss sustained upon any plant or materials and reasonable profit and damages.

14. INCIDENTAL WORK

Any and all minor details of the work not specifically mentioned in the Specifications but obviously necessary for the proper completion of the work, such as the proper connection of new work to old, shall be considered as incidental to and a part of and included with the work for which the prices are named in the Contract Documents. The Contractor will not be entitled to any extra or additional compensation therefore, unless specifically stated otherwise.

15. PERMITS – COMPLIANCE WITH LAW

The Contractor shall, at his expense, obtain all permits and licenses necessary for the performance of this Contract, and give all necessary notices, pay all fees required by law, and comply with all laws, ordinances, rules and regulations governing the Contractor's performance of the Contract.

Portions of this contract qualify for exemption pursuant to the provisions of the Texas Limited Sales, Excise and Use Tax Act. The Contractor shall obtain a sales tax exemption certificate from the City. All labor performed on the project and all materials incorporated into the project qualify for such tax exemption. However, equipment and parts for equipment purchased to be used on the project, but are not incorporated into the project; do not qualify for said tax exemption. Contractor shall issue a resale certificate in lieu of paying such sales tax for all

materials incorporated into the project. Further Contractor shall separate the charges for materials incorporated into the project from the charges for labor.

16. INSPECTION BY OWNER

The Owner and its representatives shall at all times have access to all parts of the work and to the shops wherein the work is in preparation for the purpose of inspection, and the Contractor shall at all times maintain proper facilities and provide safe access for such inspection.

The Owner shall have the right to reject materials and workmanship which are defective, or to require their correction. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the premises without charge to the Owner. If the Contractor does not correct such rejected work within a reasonable time, fixed by written notice, the Owner may correct same and charge the expense to the Contractor. No inspector shall have the power to waive the obligation resting upon the Contractor to furnish good material or do work as herein prescribed, and any failure or omission of any inspector or the Engineer to condemn any defective material or work shall not release the Contractor from the obligation to at once tear out, remove and properly rebuild the same at any time upon discovery of the defect and upon receipt of notice of the Engineer to do so.

Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire work to make an examination of work already completed by removing or tearing out any portion thereof, the Contractor shall on request promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any respect due to the fault of the Contractor or his subcontractor, he shall defray all the expenses of such examinations and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the additional cost of labor and materials necessarily involved in such examination and replacement, plus fifteen percent (15%) for overhead and profit, shall be allowed the Contractor.

Where the Specifications require work to be specifically tested or approved, it shall not be tested or covered up without timely notice to the Owner of its readiness for inspection and without the approval or consent thereto by the Owner. Should any such work be covered up without such notice, approval or consent, it must, if required by the Owner, be uncovered for examination at the Contractor's expense.

17. PATENTS

The Contractor shall hold and save the Owner and its officers, agents, servants, and employees harmless from liability of any nature or kind, including all costs and legal expenses, for or on account of, any patented or unpatented invention, process, article or appliance, manufactured for or used in the performance of the Contract, including its use by the Owner, unless otherwise specifically stipulated in the Contract.

18. MUTUAL RESPONSIBILITY OF CONTRACTORS

If, through acts of neglect on the part of the Contractor, any other Contractor or any subcontractor shall suffer loss or damage on the work, the Contractor agrees to settle with such other Contractor or subcontractor by agreement or arbitration, if such other Contractor or subcontractor will so settle. If such other Contractor or subcontractor shall assert any claim against the Owner on account of any damage alleged to have been so sustained, the Owner shall notify the Contractor, who shall indemnify and save harmless the Owner against any such claim.

The Contractor must ascertain to his own satisfaction the scope of the project and the nature of any other Contracts that have been or may be awarded by the Owner in the prosecution of the project to the end that the Contractor may perform this Contract in the light of such other Contract, if any.

Nothing herein contained shall be interpreted as granting the Contractor exclusive occupancy of the site of the project. The Contractor shall not cause any unnecessary hindrance or delay to any other Contractor working on the project. If the performance of any Contract for the project is likely to be interfered with by the simultaneous execution of some other Contract or Contracts, the Owner shall decide which Contractor shall cease work temporarily and which shall continue, or whether the work under the Contracts can be coordinated so that the Contractors may proceed simultaneously. The Owner shall not be responsible for any damages suffered or extra costs incurred by the Contractor, resulting directly or indirectly from the award or performance or attempted performance of any other Contract or Contracts on the project, or caused by any decision or omission of the Owner respective to the order of precedence in the performance of Contracts.

19. NOTICE AND SERVICE THEREOF

Any notice from one party to another under the Contract shall be in writing and shall be dated and signed by the party giving such notice or by duly authorized representative of such party. Any such notice shall not be effective for any purpose whatsoever unless served in the following manner; namely, if the notice is given to the Owner, (a) by personal delivery thereof to the individual duly authorized to direct and supervise the project of the Owner, or (b) by depositing the same in the United States Mail, enclosed in a sealed envelope, addressed to the City of Midland, 300 North Loraine Street, Midland, Texas, 79701, postage prepaid and certified; or if the notice is given to the contractor (a) by personal delivery thereof to the project superintendent or other person authorized to act for the contractor, or (b) by depositing the same in the United States Mail, enclosed in a sealed envelope, addressed to the Contractor at his regular place of business or at such other address as may have been established for the conduct of the work under this Contract, postage prepaid and certified; or (c) if the notice is given to the Surety or any other person by personal delivery to such Surety or other person, or by depositing the same in the United States Mail, enclosed in a sealed envelope addressed to such Surety or other person, at the address of such surety or other person last communicated by him to the party giving the notice, postage prepaid and certified.

20. QUALITY OF MATERIALS AND WORKMANSHIP

It is the intention of this Contract to have only first class materials and the best workmanship throughout, and the methods and appliances adopted by the Contractor must be such as will secure a satisfactory quality of work and will enable him to complete the work in the time agreed upon. If at any time such methods and appliances appear inadequate, the Engineer may order the Contractor to improve their character or increase their efficiency, and the Contractor must conform to such order; but the failure of the Engineer to order such improvement of methods or increase of efficiency will not relieve the Contractor from his obligations to perform good work or finish it in the time agreed upon. The Contractor shall submit samples or specimens of any and all materials proposed to be used in the work when required to do so by the Engineer. All materials must be of specified quality and fully equal to approved samples. All work must be done and completed in a thorough and workmanlike manner. All materials furnished and all work done must be satisfactory to the Engineer and will be subject to rigid inspection, and if not in accordance with the Specifications in the opinion of the Engineer, shall be made to conform thereto.

It is understood that except as otherwise specifically stated in the Contract, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence of temporary

construction of every nature, and all other services and facilities required for the completion of the Contract within the specified time.

21. SPECIAL METHODS

The Engineer may consent to special methods for carrying out the work in difficult cases, but the Contractor will not be relieved of responsibility for the result. The Contractor shall be responsible for the result of all work performed by him whether directed by the Engineer or not.

22. REMOVAL OR REPLACEMENT OF WORK DONE WITHOUT LINES OR GRADES

Any work done without lines or grades given by the Engineer or under his direction or without the supervision of an inspector, may be ordered removed and replaced by the Engineer at the Contractor's expense.

23. COVERING WORK

No work shall be covered until it has been examined and approved by the Engineer.

24. UNFAVORABLE WEATHER

During unfavorable weather and other adverse conditions, only such portions of the work may be done which will not be damaged thereby, unless by special means or precautions approved by the Engineer.

25. ALL WORK SUBJECT TO FINAL INSPECTION

Failure to neglect on the part of the Engineer or his inspectors to condemn or reject bad or inferior work or materials shall not be construed to imply his acceptance of such work or materials if it becomes evident at any time prior to the final acceptance of the work and the release of the Contractor.

26. PUBLIC CONVENIENCE

When materials for construction are brought on the work site they shall be neatly piled so as to cause as little obstruction to travel as possible, and so that they may be conveniently inspected.

No material or other obstruction shall be placed within five (5) feet of fire hydrants, which must at all times be readily accessible to the fire department, nor shall any material be piled within two (2) feet of any trees.

The Contractor shall be responsible for all damages to persons or property that occur as a result of his fault or negligence in connection with the prosecution of the Contract and shall be responsible for the proper care and protection of all materials delivered and work performed until completion, and final acceptance by the Owner.

The Contractor shall provide such heat, covering and enclosures as are necessary to protect all work and materials against damage by weather conditions.

The Contractor shall take adequate precautions to protect existing sidewalks, curbs, pavement, utilities, adjoining property, and structures, and avoid damage thereto, and he shall at his own expense completely repair any damage thereto caused by his operations.

If required by the Engineer, the Contractor shall shore up, brace, underpin, and protect as may be necessary, all foundations, and other parts of all existing structures adjacent and adjoining the site of the Project, which are in any way affected by the excavations or other operations connected with the completion of the work under this Contract. Whenever any notice is required to be given by the Owner or the Contractor to any adjoining or adjacent landowner or other party before commencement of any work under this Contract, such notice shall be given by the Contractor. The Contractor shall indemnify the Owner and save it harmless from any damages on account of settlement or the loss of lateral support of adjoining property and from all loss or expense and all damages for which the Owner may become liable in consequence of such injury or damage to adjoining and adjacent structures and their premises.

During the progress of the work the convenience of the public and of the residents along streets must be provided as far as practicable. Convenient access to driveways, houses and buildings along streets must be maintained whenever possible.

Temporary approaches and crossings of streets and sidewalks must be provided and kept in good condition whenever practicable.

The Contractor shall provide and maintain such fences, barriers, "Street Closed" signs, red lights and watchmen as may be necessary to prevent avoidable accidents to residents and to the public.

The Contractor alone shall be held responsible for all injuries to persons, and for all damages to property of the City or others, caused by or resulting from the negligence of himself, his employees or agents during the progress of or connected with the prosecution of the work, whether within the limits of the work or elsewhere. He must restore all injured public or private property to a condition as good as it was when he entered upon the work, purchasing new materials to replace all that which is injured or destroyed during the course of the work.

In an emergency affecting the safety of life or property, including adjoining property, the Contractor, without special instructions or authorization from the Owner is authorized to act at his discretion to prevent such threatened loss or injury and he shall so act.

27. TRAFFIC CONTROL

It is the policy of the City of Midland to keep at least two travel lanes open to traffic at all times and where possible to have three travel lanes between 7:30 a.m. and 9:00 a.m. and 4 p.m. and 6 p.m. (Two (2) lanes in the direction of peak travel).

At least 48 hours before beginning work the contractor shall present a traffic control and/or barricade plan prepared as per the approved Barricading Standards to the Traffic Engineering Division for review and approval. When approved and barricades are in place, they shall be inspected by the Traffic Engineering Division prior to beginning work.

Traffic control signs, such as stop signs, yield signs, etc., are placed in various intersections for the safety and protection of the traveling public. The contractor shall not move, alter or damage said signs for any reason. If said signs must be removed for construction purposes, contractor shall notify the City of Midland, Traffic Division Operations Superintendent at least 48 hours (not including weekends) before construction activities are scheduled to begin. All construction barricading, warning signs, and other construction traffic control devices shall be in place and shall be in accordance with the Texas Manual on Uniform Traffic Control Devices and approved Barricading Standards included in plans before traffic signs can be removed. The contractor shall notify the Traffic Division Operations Superintendent at least 72 hours (not including weekends) before

scheduled removal of construction barricades, warning signs, and traffic control devices. But in all cases the contractor shall not remove said barricades, warning signs, and traffic control devices until the City of Midland's Traffic Department has replaced stop signs, yield signs, etc., in their proper location. The Contractor shall notify Traffic Engineering Division at least 24 hours in advance of any Traffic Signal modification due to construction (i.e. eliminating left turn phases). Notice shall also be given to the Traffic Engineering Division at least 24 hours prior to removing barricades at signalized intersections.

28. PROTECTION OF NEW WORK

All new work shall be carefully protected by the Contractor, and any work injured from any cause before the completion of the whole project must be rebuilt by the Contractor at his own expense.

29. MONUMENTS OR STAKES

The Contractor must carefully protect from disturbance or injury all monuments, stakes and bench marks, of City County, State or Federal Government and shall not excavate nearer than five (5) feet to any of them without the permission of the Engineer, or until they have been removed, witnessed or otherwise disposed of by the Engineer.

30. USE OF COMPLETED PORTIONS

The City shall have the right to take possession of and use any completed or partially completed portions of the work notwithstanding the time for completing the entire work on such portions may not have expired; but such taking possession and use shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents. If such prior use increases the cost of, or delays the work, the Contractor shall be entitled to such extra compensation or extension of time, or both as the Engineer may determine.

The Owner, in taking possession of completed portions, shall agree to accept the decision of the Engineer on matters relating to responsibility for damages that may occur to any portions of the work during the period of possession preceding acceptance and final payment.

31. USE OF PREMISES

The Contractor shall confine his apparatus, storage of materials and construction operations to such limits as may be directed by the Owner, and shall not unreasonably encumber the premises with his materials.

The Contractor shall enforce any instructions of the Owner regarding advertising, fires, danger signals, barricades and smoking, and shall require all persons employed on the work to comply with all building, post or institutional regulations while on the premises.

32. SAFETY RESTRICTIONS

The following procedures will be followed regarding the subject item on this contract:

A warning sign painted yellow with black letters that are legible at twelve feet shall be placed inside and outside vehicles such as cranes, cranes, derricks, power shovels, drilling rigs, pile drivers, hoisting equipment or similar apparatus. The warning sign shall read as follows:

"WARNING - UNLAWFUL TO OPERATE THIS EQUIPMENT WITHIN SIX FEET OF HIGH VOLTAGE LINES."

Equipment that may be operated within ten feet of high voltage lines shall have an insulating cage type of guard about the boom or arm, except back hoes or dippers, and insulator links on the lift hook connections.

When necessary to work within six feet of high voltage electric lines, notification shall be given to the power company who will erect temporary mechanical barriers, de – energize the line, or raise or lower the line. The notifying department

The Contractor is required to make arrangements with the Power Company for the temporary relocation or raising of high voltage lines at the Contractor's sole cost and expense.

No person shall work within six feet of high voltage line without precautions having been taken and protection provided as outlined in Paragraph (3) above.

33. INSURANCE REQUIREMENTS AND WORKERS COMPENSATION

INSURANCE REQUIREMENTS

Contractor shall at all times during the term of this Contract maintain and keep in full force and effect insurance in the following types and minimum amounts with companies authorized to do business in the State of Texas:

Commercial General Liability (including Contractual liability):	
— Personal Injury:	$1,000,000.00 per person
	$1,000,000.00 per occurrence
— Property Damage:	$500,000.00 per occurrence
Business Automobile Liability:	$250,000.00 combined single limit -
	Personal Injury and Property Damage
Workers' Compensation:	Statutory limits
Employers' Liability:	$500,000.00 per accident or occurrence

The Commercial General Liability shall be on a per project aggregate, including completed operations, and shall be on an occurrence basis. This insurance shall name the City as an additional insured and waive subrogation in favor of the City.

The Business Automobile Liability insurance provided by Contractor shall cover any auto for bodily injury and property damage, including owned vehicles, hired and non-city vehicles, and employee non-ownership, and the amount of such policy shall be a minimum of $250,000.00 covering any vehicle used for the execution of the

work that is the subject of this Contract. This insurance shall name the City as an additional insured and waive subrogation in favor of the City.

The Workers' Compensation coverage provided by Contractor shall inure to the benefit of employees injured during the course and scope of their employment by Contractor pursuant to this Contract. The Workers' Compensation shall waive all rights of subrogation in favor of the City.

All insurance required pursuant to this Contract shall provide for a waiver of subrogation in favor of the City. All insurance required pursuant to this Contract, except for Workers' Compensation Insurance, shall name the City as an additional insured on a claims occurred basis. City shall be provided the notice by Contractor's insurance provider not later than thirty (30) days prior to any reduction or termination of such coverage.

Contractor shall contractually require all contractors, subcontractors, and sub-subcontractors that work on any portion of the work that is the subject of this Contract to obtain insurance coverage that meets or exceeds the policy requirements and minimum amounts specified herein. All contractors, subcontractors, and sub-subcontractors shall obtain insurance policies that provide blanket waivers of subrogation in favor of the City of Midland and policies that name the City of Midland as an additional insured on a claims occurred basis (except workers' compensation).

The parties agree that, prior to the execution of the Contract, Contractor shall provide one or more certificates of insurance specifically stating that these requirements have been met and subject to the approval of the City. The City shall not be required to provide any insurance whatsoever pursuant to this Contract.

The Contractor certifies that the certificate of insurance provided as required herein complies with the requirements of Senate Bill 425, passed during the 82nd regular session of the Texas Legislature, and effective January 1, 2012. The Contractor shall not use an unapproved certificate of insurance or insert inappropriate language on a certificate. Compliance with state law is the sole responsibility of the Contractor.

34. INDEMNIFICATION

INDEMNITY: THE CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS AND DEFEND THE OWNER AND ALL OF THE OWNER'S OFFICERS, AGENTS AND EMPLOYEES FROM ALL SUITS, ACTIONS, CLAIMS, DAMAGES, PERSONAL INJURIES, LOSSES, PROPERTY DAMAGE AND EXPENSES OF ANY CHARACTER WHATSOEVER, INCLUDING ATTORNEY'S FEES, BROUGHT FOR OR ON ACCOUNT OF ANY INJURIES OR DAMAGES RECEIVED OR SUSTAINED BY ANY PERSON OR PERSONS OR PROPERTY, ON ACCOUNT OF ANY NEGLIGENT ACT OF THE CONTRACTOR, THEIR AGENTS OR EMPLOYEES, OR ANY SUBCONTRACTOR, IN THE EXECUTION, SUPERVISION AND OPERATIONS GROWING OUT OF OR IN ANY WAY CONNECTED WITH THE PERFORMANCE OF THIS

CONTRACT, AND CONTRACTOR WILL BE REQUIRED TO PAY ANY JUDGMENT WITH COSTS WHICH MAY BE OBTAINED AGAINST THE OWNER OR ANY OF ITS OFFICERS, AGENTS OR EMPLOYEES, INCLUDING ATTORNEY'S FEES.

THE CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS AND DEFEND THE OWNER AND ALL OF THE OWNER'S OFFICERS, AGENTS AND EMPLOYEES FROM ALL SUITS, ACTIONS, CLAIMS, DAMAGES, PERSONAL INJURIES, ACCIDENTAL DEATH, PROPERTY DAMAGE, LOSSES, AND EXPENSES OF ANY CHARACTER WHATSOEVER INCLUDING ATTORNEY'S FEES, BROUGHT FOR OR ON ACCOUNT OF ANY INJURIES OR DAMAGES RECEIVED OR SUSTAINED BY ANY PERSON OR PERSONS OR PROPERTY, ON ACCOUNT OF ANY NEGLIGENT ACT OF THE OWNER, THE OWNER'S OFFICERS, AGENTS AND EMPLOYEES, WHETHER SUCH NEGLIGENT ACT WAS THE SOLE PROXIMATE CAUSE OF THE INJURY OR DAMAGE OR A PROXIMATE CAUSE JOINTLY AND CONCURRENTLY WITH THE CONTRACTOR OR THE CONTRACTOR'S EMPLOYEES, AGENTS OR SUBCONTRACTORS NEGLIGENCE IN THE EXECUTION, SUPERVISION AND OPERATIONS GROWING OUT OF OR IN ANY WAY CONNECTED WITH THE PERFORMANCE OF THIS CONTRACT, AND CONTRACTOR WILL BE REQUIRED TO PAY ANY JUDGMENT WITH COSTS WHICH MAY BE OBTAINED AGAINST THE OWNER OR ANY OF ITS OFFICERS, AGENTS OR EMPLOYEES, INCLUDING ATTORNEY'S FEES.

THE CONTRACTOR AGREES THAT HE WILL INDEMNIFY AND SAVE THE OWNER HARMLESS FROM ALL CLAIMS GROWING OUT OF ANY DEMANDS OF SUBCONTRACTORS, LABORERS, WORKMEN, MECHANICS, MATERIALMEN, AND FURNISHERS OF MACHINERY AND PARTS THEREOF, EQUIPMENT, POWER TOOLS, ALL SUPPLIES, INCLUDING COMMISSARY INCURRED IN THE FURTHERANCE OF THE PERFORMANCE OF THIS CONTRACT. WHEN OWNER SO DESIRES, THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE THAT ALL OBLIGATIONS OF THE NATURE HEREINABOVE DESIGNATED HAVE BEEN PAID, DISCHARGED OR WAIVED. THE CONTRACTOR, ITS SURETIES AND INSURANCE CARRIERS SHALL DEFEND, INDEMNIFY AND SAVE HARMLESS THE OWNER AND ALL OF ITS OFFICERS, AGENTS AND EMPLOYEES FROM ALL SUITS, ACTIONS, OR CLAIMS OF ANY CHARACTER WHATSOEVER, BROUGHT FOR OR ON ACCOUNT OF ANY INJURIES OR DAMAGES RECEIVED OR SUSTAINED BY ANY PERSON OR PERSONS OR PROPERTY, ARISING FROM ANY ACT OF THE CONTRACTOR OR ANY SUBCONTRACTOR, THEIR AGENTS OR EMPLOYEES, IN THE EXECUTION AND SUPERVISION OF THIS CONTRACT, AND WILL BE REQUIRED TO PAY ANY JUDGMENT WITH COSTS WHICH MAY BE OBTAINED AGAINST THE OWNER OR ANY OF ITS OFFICERS, AGENTS, OR EMPLOYEES INCLUDING ATTORNEY'S FEES.

35. RELEASE

NOTWITHSTANDING ANY OTHER PROVISION, CONTRACTOR HEREBY RELEASES, ACQUITS, RELINQUISHES AND FOREVER DISCHARGES OWNER, OWNER'S EMPLOYEES AND OFFICERS, FROM ANY AND ALL DEMANDS, CLAIMS, DAMAGES OR CAUSES OF ACTION OF ANY KIND WHATSOEVER WHICH CONTRACTOR HAS OR MIGHT HAVE IN THE FUTURE, INCLUDING BUT NOT LIMITED TO BREACH OF CONTRACT, QUANTUM MERUIT, CLAIMS UNDER THE DUE PROCESS AND TAKING CLAUSES OF THE TEXAS AND UNITED STATES CONSTITUTIONS, TORT CLAIMS OR OWNER'S NEGLIGENCE.

36. INDEPENDENT CONTRACTOR

It is expressly understood and agreed that Contractor shall perform all work and services described herein as an independent contractor and not as an officer, agent, servant or employee of the Owner; that Contractor shall have exclusive control of and the exclusive right to control the details of the services and work performed hereunder, and all persons performing the same; and shall be solely responsible for the acts and omissions of its officers, agents, employees, contractors and subcontractors; that the doctrine of respondent superior shall not apply as between Owner and Contractor, its officers, agents, employees, contractors and subcontractors; and

that nothing herein shall be construed as creating a partnership or joint enterprise between Owner and Contractor. No person performing any of the work and services described hereunder by Contractor shall be considered an officer, agent, servant or employee of the Owner. Further, it is specifically understood and agreed that nothing in this Contract is intended or shall be construed as creating a "Community of Pecuniary Interest" or "An Equal Right of Control" which would give rise to vicarious liability. Contractor shall be an independent contractor under this Contract and shall assume all of the rights, obligations and liabilities, applicable to it as such independent contractor hereunder. The Owner does not have the power to direct the order in which the work is done. The Owner shall not have the right to control the means, methods or details of the Contractor's work. Contractor shall assume exclusive responsibility for the work. Contractor is entirely free to do the work in its own way.

37. QUALIFICATIONS FOR EMPLOYMENT

Preference shall be given to qualified local residents in the employment of laborers and mechanics for work on the Project under this Contract. No person under the age of sixteen (16) years shall be employed on the project under this Contract. No person whose age or physical condition is such as to make his employment dangerous to his health or safety or to the health or safety of others shall be employed on the Project under this Contract: Provided, that this shall not operate against the employment of physically handicapped persons, otherwise employable, where such persons may be safely assigned to work which they can ably perform. No person currently serving sentence in a penal or correctional institution and no inmate of an institution for mentally defective shall be employed on the project under this contract.

38. PAYROLLS OF CONTRACTOR AND SUBCONTRACTORS

The Contractor and each of his subcontractors shall prepare payrolls for the workers on the Project. Not later than the seventh (7th) day following the payment of wages, the Contractor shall transmit to the Owner, if requested, a certified legible copy and two confirmed copies of such payroll.

Such copies of payrolls shall be accompanied by substantial proof that all bills for services rendered and materials supplied have been duly paid and by such other data as the Owner may require.

39. POSTING WAGE RATES

The Contractor shall post at appropriate conspicuous points at the site of the Project a schedule showing the wage rates for the various classes of laborers and mechanics to be engaged in work on the Project under this Contract and all deductions, if any, required by law to be made from unpaid wages actually earned by the laborers and mechanics so engaged.

40. PAYMENT OF EMPLOYEES

The Contractor shall post at appropriate conspicuous points at the site of the Project a schedule showing the wage rates for the various classes of laborers and mechanics to be engaged in work on the Project under this Contract and all deductions, if any, required by law to be made from unpaid wages actually earned by the laborers and mechanics so engaged.

41. WAGE UNDERPAYMENT AND ADJUSTMENTS

The Contractor agrees that, in case of underpayment of wages to any worker on the project under this Contract by the Contractor or any subcontractor, the Owner shall withhold from the Contractor out of payments due, an amount sufficient to pay such worker the difference between the wages required to be paid under this Contract and the wages actually paid such worker for the total number of hours worked and that the Owner may disburse such amount so withheld by it for and on account of the Contractor to the employee to whom such amount is due. The Contractor further agrees that the amounts to be withheld pursuant to this Article may be in addition to other amounts that may be retained by the Owner pursuant to other provisions of this Contract.

42. COMPUTATION OF WAGES ON 8 – HOUR DAY

The wages of each laborer and mechanic engaged in work on the project under this Contract shall be computed on a basis of eight (8) hours per day, eight (8) hours continuous employment except for lunch periods, constituting a day's work.

Legal holiday work shall be paid for at the regular governing per diem wage rates.

Work in excess of 40 hours per week shall be paid for at 1 ½ times the basic rate of pay.

43. OVERTIME WORK AND WORK ON SUNDAYS AND LEGAL HOLIDAYS

The Contractor will not be permitted to work on Sundays or legal holidays except in an emergency and then only upon written permission of the Engineer.

Any work necessary to be performed after regular working hours and when permitted on Sundays or legal holidays, shall be performed without additional expense to the Owner.

No work on any Contract item will be permitted before daylight or later than one hour after sundown.

44. CONTRACT SECURITY

The Contractor shall furnish a performance bond and payment bond in an amount equal to one hundred percent (l00%) of the amount of the Contract as security for the faithful performance of the Contract, including the payment of all persons performing labor on the project and furnishing of materials in connection with this Contract. All Bonds must be executed in five (5) original counterparts by a corporate surety authorized to do business in the State of Texas. Bonds executed by individuals or any other than recognized and authorized corporate surety companies will not be acceptable.

45. DELAYS

The Contractor shall receive no compensation for delays or hindrances to the work, except when, in the judgment of the Engineer, direct or unavoidable extra cost to the Contractor is caused by such hindrances or delays. When such extra compensation is claimed, a written statement thereof shall be presented by the Contractor, as provided in Paragraph 18 hereof. Such claim, if found correct, will be approved, and the decision of the Engineer whether extra cost has been incurred and the amount thereof, shall be final. If delays are caused by specific orders to stop work, given by the Engineer, or by the performance of extra work, or by unforeseen causes beyond the control of the Contractor, or by the failure of the Owner to provide materials or necessary instructions for carrying on the work, or to provide the necessary right-of-way or site for installation,

then delay will entitle the Contractor to an equivalent extension of time. Application for extension of time must be approved by the Owner and, shall not release the Sureties from their obligations, which shall remain in full force until the discharge of the Contract.

LATE COMPLETION; LIQUIDATED DAMAGES:

It is hereby understood and mutually agreed, by and between Contractor and the City, that the date of beginning and the time for completion as specified in the contract of the work to be done hereunder are ESSENTIAL CONDITIONS of this contract; and it is further mutually understood and agreed that the work embraced in this contract shall be commenced on a date to be specified in the "Notice to Proceed." Contractor agrees that said work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between Contractor and the City, that the time for the completion of the work described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

In the event Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the City, then Contractor and Contractor's surety, if any, shall be liable for and does hereby agree, as a part consideration for the awarding of this contract, to pay to the City $500.00, not as a penalty but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day that Contractor shall be in default after the time stipulated in the contract for completing the work. Further, the City shall have the right to cancel this contract for such delay. In the event the City cancels this contract pursuant to the terms of this section, the City shall pay to Contractor only those monies deemed appropriate by the City, in its sole discretion, to compensate Contractor for any work actually performed, less any liquidated damages Contractor owes the City.

The said amount is fixed and agreed upon by and between Contractor and the City because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the City would in such event sustain, and said amount is agreed to be the amount of damages which the City would sustain and said amount shall be retained from time to time by the City from current periodical estimates.

It is further agreed that time is of the essence of each and every portion of this contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this contract. Provided, that Contractor shall not be charged with liquidated damages or any excess cost when the City determines, in its sole discretion, that Contractor is without fault and Contractor's reasons for the time extension are acceptable to the City. Provided, further, that Contractor shall not be charged with liquidated damages of any excess cost when the delay in completion of the work is due:

a. To any preference, priority or allocation order duly issued by the Government;

b. To unforeseeable cause beyond the control and without the fault or negligence of Contractor, including, but not restricted to, acts of God, or of the public enemy, acts of the City, acts of another contractor in the performance of a contract with the City, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and severe weather; and

c. To any delays of subcontractors or suppliers occasioned by any of the causes specified in subsections (a) and (b) of this article.

Provided, further, that Contractor shall, within ten (10) calendar days from the beginning of such delay, unless the City shall, in its sole discretion grant a further period of time prior to the date of final settlement of the contract, notify the City, in writing, of the causes of the delay, who shall ascertain the facts and extent of the delay and notify Contractor within a reasonable time of its decision in the matter.

CONTRACTOR AGREES THAT THE PAYMENT OF SUCH LIQUIDATED DAMAGES MAY BE RECOVERED BY THE CITY FROM RETAINAGE HELD BY THE CITY. NOTWITHSTANDING ANY OTHER PROVISION HEREOF, CONTRACTOR HEREBY RELEASES, ACQUITS, RELINQUISHES AND FOREVER DISCHARGES CITY, CITY'S EMPLOYEES AND OFFICERS FROM ANY AND ALL DEMANDS, CLAIMS, DAMAGES, OR CAUSES OF ACTION OF ANY KIND WHATSOEVER ARISING FROM THE CITY WITHHOLDING PAYMENT FROM CONTRACTOR AS LIQUIDATED DAMAGES FOR CONTRACTOR'S FAILURE TO COMPLETE THE WORK WITHIN THE TIME SPECIFIED HEREIN, INCLUDING BUT NOT LIMITED TO BREACH OF CONTRACT, QUANTUM MERUIT, CLAIMS UNDER THE DUE PROCESS AND TAKINGS CLAUSES OF THE TEXAS AND UNITED STATES CONSTITUTIONS, TORT CLAIMS, OR CITY'S NEGLIGENCE.

CONTRACTOR SHALL RECEIVE NO FINANCIAL COMPENSATION FOR DELAY OR HINDRANCE TO THE WORK. IN NO EVENT SHALL THE CITY BE LIABLE TO CONTRACTOR OR ANY SUBCONTRACTOR OR SUPPLIER, ANY OTHER PERSON OR ANY SURETY FOR OR ANY EMPLOYEE OR AGENT OF ANY OF THEM, FOR ANY DAMAGES ARISING OUT OF OR ASSOCIATED WITH ANY DELAY OR HINDRANCE TO THE WORK, REGARDLESS OF THE SOURCE OF THE DELAY OR HINDRANCE, INCLUDING EVENTS OF FORCE MAJEURE, AND EVEN IF SUCH DELAY OR HINDRANCE RESULTS FROM, ARISES OUT OF OR IS DUE, IN WHOLE OR IN PART, TO THE NEGLIGENCE OF THE CITY. CONTRACTOR'S SOLE REMEDY IN ANY SUCH CASE SHALL BE AN EXTENSION OF TIME.

46. ERRORS AND OMISSIONS

The Contractor will not be permitted to take advantage of any error or omission in these specifications. Suitable instructions will be given by the Engineer when such error or omission is discovered.

47. SPECIFICATIONS AND DRAWINGS

The Contractor shall keep on the work a copy of the Specifications and Drawings, and shall at all times give the Engineer access thereto. Any drawings or plans listed in the detailed specifications shall be regarded as part thereof and of the Contract. Anything mentioned in these specifications and not mentioned or shown in the drawings, or shown in the drawings and not mentioned in these specifications, shall be done as though shown or mentioned in both. The Engineer will furnish from time to time, such detailed drawings, plans, profiles and information as he may consider necessary for the Contractor's guidance.

In the event of any discrepancy between the plans and these specifications, the decisions of the Engineer will be decisive thereon. The written dimensions on the plans are to be taken as correct, but the Contractor is required to check carefully all dimensions before beginning work thereon. Should any errors or omissions be discovered, the Engineer's attention shall be called to the same, and the proper corrections made. All notes on the plans shall be carefully observed by the Contractor and are a part of the Contract.

48. CONSTRUCTION STAKING

The Engineer will furnish a complete set of plans and profiles and set control stakes at fifty foot (50') intervals along the entire length of the project and at such control points he deems necessary for proper execution of the work. The Contractor will thereafter be required to lay out the work accurately and furnish at his own expense, all lines, levels, and dimensions necessary to the proper and correct execution of the entire work and be responsible for any errors resulting from his own work.

The Contractor shall give the Engineer at least 36 hours notice in writing before requiring stakes to be set on any new portion of the work, and he shall state clearly in such notice the exact locality or localities where such stakes are needed for immediate use.

The Contractor must satisfy himself, before commencing work, as to the meaning or correctness of all stakes or marks, and no claim will be entertained by the Owner for or on account of any alleged inaccuracies, or for the alterations subsequently rendered necessary on account of such alleged inaccuracies unless the Contractor notifies the Engineer thereof in writing before commencing to work thereon.

The Contractor will at all times conduct the work in such a manner as to prevent damage to construction stakes set by the Engineer. When construction stakes are damaged to such extent that they must be reset, as a result of carelessness or negligence on the part of the Contractor or his workmen, the costs thereof shall be kept by the Engineer and shall be deducted from the moneys due or to become due the Contractor under the terms of his contract.

Benchmark and survey stakes shall be preserved by the Contractor, and in case of their destruction or removal by him or his employees, they will be replaced by the Engineer at the Contractor's expense.

49. SANITATION

The Contractor shall provide suitable drinking water receptacles or containers equipped with dust-tight covers and spigots or faucets. A supply of sanitary paper drinking cups shall be kept on hand for general use near the drinking water containers. The use of common drinking cups or tin cups will not be permitted.

The Contractor shall furnish "Porta-Johns" or other approved sanitary facilities for use by all workers on the Project. Such facilities shall be placed and kept in close proximity of the site where work is being performed. Such facilities shall be properly serviced and maintained.

The Engineer may establish such other sanitary rules and regulations as may seem necessary and desirable to the safe prosecution of the work, such rules and regulations to apply to all forces employed under this Contract, and if, the Contractor fails to observe and enforce these rules, the Engineer may enforce them at the expense of the Contractor.

50. WATER FOR CONSTRUCTION

The Contractor may obtain all water necessary for construction purposes from the Municipal Waterworks System at the regular customer service rate, but the Contractor must make all necessary arrangements with the Director of Utilities for necessary connections and meters. The Contractor must make his own provisions and provide such equipment as is necessary for conveying water from point of service to point of use. No extra compensation will be allowed and the Contractor shall anticipate the expense connected herewith and absorb said expense in the prices bid for the various bid items.

51. SEQUENCE AND SPEED OF WORK

The Engineer shall direct the order and sequence of the work. If at any time before the commencement or during the progress of the work, the materials and appliances used appear to the Engineer as insufficient and improper for securing the quality of work required or the required rate of progress, he may order the Contractor to increase their efficiency or to improve their character and the Contractor shall conform to such order. The

failure of the Engineer to demand any increase of such efficiency or improvement shall not release the Contractor from his obligations to secure the quality of work or the rate of progress specified.

52. INSPECTION AND TESTING OF MATERIAL

The sampling and testing of materials used or proposed to be used in the construction of this project will be made by the Engineer, his designated representative or certified testing laboratory personnel in accordance with methods prescribed by the American Society of Testing Materials and/or the American Association of State Highway Officials, with subsequent approved revisions made prior to the date of the Proposal. The selection of the method of test shall be designated by the Engineer. The Contractor shall bear the cost of all tests required before a material or a method is approved for use on the job, unless the Owner specifically agrees to bear the cost of these tests.

All tests required by the Owner after materials and/or methods have been approved and after they have been incorporated or used in the job will be paid for by the Owner, except if the Owner's tests reveal non-conformance with the specifications, subsequent tests on that part of the work required to determine if the replaced or reworked material meets the specifications, will be paid for by the Contractor. The City will pay only one time for any required testing.

The following is a summary of test required for the approval of materials or methods:

Material	**Test**
Subgrade	Maximum density, optimum moisture
Caliche Base:	Maximum density, optimum moisture, hardness, gradation, liquid limit, plasticity index, Texas Triaxial Classification
Aggregates for hot-mix:	Gradation, unit weight, abrasion, soundness, liquid limit, plasticity index, density
Asphalt, emulsions and tars:	Certified plant test and certificates of compliance with each shipment
Hot- Mix asphaltic concrete:	Design mix, swell test, stripping test
Portland cement concrete pavement:	Design mix with test cylinders

Any materials shipped by the Contractor from the factory prior to having satisfactorily passed such testing and inspection by the Owner’s representative or prior to the receipt of notice from said representative that such testing and inspection will not be required, shall not be incorporated in the work.

The Owner may, at its discretion, approve materials and/or methods for use on this project without testing when they are from sources previously tested and approved for City of Midland projects.

53. CONSTRUCTION SCHEDULE

It shall be the responsibility of the Contractor to furnish the Construction Engineer prior to construction a schedule out – lining the anticipated time each phase of construction will begin and be completed, including sufficient time being allowed for clean – up.

54. PROFILES AND ELEVATIONS

Profiles and elevations of the ground are shown on the plans hereto attached. These profiles and elevations are believed to be reasonably correct, but are not guaranteed to be absolutely so, and are represented only as an approximation. Elevations are referred to datum given by the Engineer.

55. CLEANUP

During the progress of the work, the Contractor shall maintain the work area in a reasonably clean and safe condition. Dirt, debris, excess excavation and other objectionable materials shall be removed from the site and disposed of on a daily basis.

After completion of all the work contemplated to be done in accordance with the detailed plans and these specifications, the premises and area along the entire line of the work shall be thoroughly cleaned up and all remaining structural materials, excess or surplus excavation and debris of any nature shall be removed and disposed of in a satisfactory manner and as directed by the Engineer. The site of all work shall appear neat and finished. All portions of the project when completed shall be ready for use or occupancy.

No compensation or payment shall be made for any cleanup work. The price for such cleanup work shall be absorbed in the items covered in the proposal.

56. GUARANTEE

The contractor shall and hereby does guarantee: (1) all work performed by him directly and all work performed by his subcontractors; (2) that all material specified; and (3) that any defect due to improper workmanship or material discovered and made known to him within one year (1) f the date of final acceptance of the improvements shall be repaired, replaced, corrected or otherwise made good by him without additional expense to the Owner. The Contractor shall, in case of work performed by his subcontractors and where guarantees are required, secure guarantees from said subcontractors and deliver copies of same to the Engineer upon completion of the work.

57. WAIVER OF ATTORNEY FEES:

BY EXECUTING THIS CONTRACT, CONTRACTOR AGREES TO WAIVE AND DOES HEREBY KNOWINGLY, CONCLUSIVELY, VOLUNTARILY AND INTENTIONALLY WAIVE ANY CLAIM IT HAS OR MAY HAVE IN THE FUTURE AGAINST THE OWNER, REGARDING THE AWARD OF ATTORNEY'S FEES, WHICH ARE IN ANY WAY RELATED TO THE CONTRACT, OR THE CONSTRUCTION, INTERPRETATION OR BREACH OF THE CONTRACT. THE CONTRACTOR SPECIFICALLY AGREES THAT IF THE CONTRACTOR BRINGS OR COMMENCES ANY LEGAL ACTION OR PROCEEDING RELATED TO THIS CONTRACT, THE CONSTRUCTION, INTERPRETATION, VALIDITY OR BREACH OF THIS CONTRACT, INCLUDING BUT NOT LIMITED TO ANY ACTION PURSUANT TO THE PROVISIONS OF THE TEXAS UNIFORM DECLARATORY JUDGMENTS ACT (TEXAS CIVIL PRACTICE AND REMEDIES CODE SECTION 37.001, ET. SEQ., AS AMENDED), OR CHAPTER 271 OF THE TEXAS LOCAL GOVERNMENT CODE, THE CONTRACTOR AGREES TO ABANDON, WAIVE AND RELINQUISH ANY AND ALL RIGHTS TO THE RECOVERY OF ATTORNEY'S FEES TO WHICH CONTRACTOR MIGHT OTHERWISE BE ENTITLED.

CONTRACTOR AGREES THAT THIS IS THE VOLUNTARY AND INTENTIONAL RELINQUISHMENT AND ABANDONMENT OF A PRESENTLY EXISTING KNOWN RIGHT. THE CONTRACTOR ACKNOWLEDGES THAT IT UNDERSTANDS ALL TERMS AND CONDITIONS OF THE CONTRACT. THE CONTRACTOR FURTHER ACKNOWLEDGES AND AGREES THAT THERE WAS AND IS NO DISPARITY OF BARGAINING POWER BETWEEN

THE OWNER AND THE CONTRACTOR. THIS SECTION SHALL NOT BE CONSTRUED OR INTERPRETED AS A WAIVER OF SOVEREIGN IMMUNITY.

THE CONTRACTOR AND OWNER ARE RELYING ON THEIR OWN JUDGMENT. EACH PARTY HAD THE OPPORTUNITY TO DISCUSS THIS CONTRACT WITH COMPETENT LEGAL COUNSEL PRIOR TO ITS EXECUTION.

58. GOVERNING LAW AND VENUE

This Contract shall be governed by the laws of the State of Texas. All performance and payment made pursuant to this Contract shall be deemed to have occurred in Midland County, Texas. Exclusive venue for any claims, suits or any other action arising from or connected in any way to this Contract or the performance of this Contract shall be in Midland County, Texas. The obligations and undertakings of each of the parties to this Contract shall be deemed to have occurred in Midland County, Texas. This Contract shall be governed by, interpreted, enforced and construed under the law of the State of Texas. The laws of the State of Texas shall govern, construe and enforce all the rights and duties of the parties, including but not limited to tort claims and any and all contractual claims or disputes, arising from or relating in any way that would direct application of the laws of another jurisdiction.

59. SOVEREIGN IMMUNITY

By executing this Contract, the City is not waiving its right of sovereign immunity. The City is retaining its immunity from suit. The City is not granting consent to be sued by legislative resolution or action.

THERE IS NO WAIVER OF SOVEREIGN IMMUNITY.

60. NO THIRD – PARTY BENEFICIARY

The City's approval of this contract does not create a third party beneficiary. There is no third party beneficiary to this contract. No person or entity who is not a party to this contract shall have any third party beneficiary or other rights hereunder.

61. NOTICE OF ALLEGED BREACH; STATUTORY PREREQUISITES

As a condition precedent to filing suit for alleged damages incurred by an alleged breach of an express or implied provision of this agreement, Contractor or his legal representative, shall give the City Manager or any other reasonable official of the City, notice in writing (consisting of one original and seven copies of notice attached to a copy of this agreement) of such damages, duly verified, within one hundred and twenty (120) days after the same has been sustained. The discovery rule does not apply to the giving of this notice. The notice shall include when, where and how the damages occurred, the apparent extent thereof, the amount of damages sustained, the amount for which the Contractor will settle, the physical and mailing addresses of Contractor at the time and date the claim was presented and the physical and mailing addresses of Contractor for the six months immediately preceding the occurrence of such damages, and the names and addresses of the witnesses upon whom the Contractor relies to establish its claim; and a failure to so notify the City Manager within the time and manner provided herein shall exonerate, excuse and except the City from any liability whatsoever. The City is under no obligation to provide notice to Contractor that Contractor's notice is insufficient. City reserves the right to request additional information regarding the claim. Said additional information shall be supplied within thirty (30) days after receipt of notice.

The statutory prerequisites outlined herein constitute jurisdictional requirements pursuant to Section 271.154 of the Texas Local Government Code and Section 311.034 of the Texas Government Code. Notwithstanding any other provision, Contractor's failure to comply with the requirements herein shall perpetually bar Contractor's claim for damages under Chapter 271 of the Texas Local Government Code, and Section 311.034 of the Texas Government Code, regardless if City has actual or constructive notice or knowledge of said claim or alleged damages. Contractor agrees that the requirements of this entire Agreement are reasonable.

62. ASSIGNMENT

Contractor shall not, either directly or indirectly, assign all or any part of this contract or any interest, right or privilege herein, without the prior written consent of the owner. The issue on whether or not to grant consent to an assignment is in the sole discretion of the owner.

63. FEDERAL WAGE REQUIREMENTS

If applicable, the Davis-Bacon Act, 29 CFR 5.5, and any related acts or regulations are hereby incorporated by reference and made a part of this Contract, and all terms and requirements under said laws, by such incorporation, are made terms and requirements of this Contract, to which the parties to this Contract have agreed to be bound.

64. PROMPT PAY ACT

The owner and contractor agree that Texas Government Code, Chapter 2251, Payment for Goods and Services (the "Prompt Pay Act") does not waive governmental immunity.

65. OTHER FEDERAL REQUIREMENTS

Company agrees that all iron or steel products produced through a manufacturing process and used in the project that is the subject of this Contract shall be produced in the United States in accordance with Government Code § 2252.202, et seq., as amended.

Updated June 2025

IMPORTANT NOTICE

Conflict Of Interest Reporting Requirements

Compliance with LOCAL GOVERNMENT CODE TITLE 5. MATTERS AFFECTING PUBLIC OFFICERS AND EMPLOYEES SUBTITLE C. MATTERS AFFECTING PUBLIC OFFICERS AND EMPLOYEES OF MORE THAN ONE TYPE OF LOCAL GOVERNMENT CHAPTER 176. DISCLOSURE OF CERTAIN RELATIONSHIPS WITH LOCAL GOVERNMENT OFFICERS; PROVIDING PUBLIC ACCESS TO CERTAIN INFORMATION.

Form CIQ: This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session. This questionnaire shall be filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a). By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. See Section 176.006(a-1), Local Government Code. A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

Bidders are responsible for filing Conflict of Interest form "CIQ" in accordance with the above referenced statute. Failure to do so is a class C Misdemeanor. Contracts or Purchase Orders awarded to a vendor that has violated this law is subject to termination at such time that the violation is discovered with no recourse to the City of Midland. The bidder will be subsequently removed from the bidders list for a minimum of one year.

When there is no known conflict of interest as defined by the statute, it is not necessary to file/submit the Form CIQ. The form must be submitted if a conflict is subsequently discovered.

By submitting a response to this request, vendor represents that it complies with the requirements of Chapter 176 of the Texas Local Government Code.

For a current list of the local government officers go to: http://www.midlandtexas.gov/

Upon completion of the form, sign and submit with bid or mail to:

City of Midland
Attn: City Secretary
PO Box 1152
Midland, Texas 79702

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor doing business with local governmental entity

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. *See* Section 176.006(a-1), Local Government Code.

A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

OFFICE USE ONLY

Date Received

1 **Name of vendor who has a business relationship with local governmental entity.**

NOT APPLICABLE

2 ☐ **Check this box if you are filing an update to a previously filed questionnaire.** (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

3 **Name of local government officer about whom the information is being disclosed.**

_____

Name of Officer

4 **Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.**

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

☐ Yes ☐ No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

☐ Yes ☐ No

5 **Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.**

6 ☐ Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).

7 REECE ALBERT, INC.
Mike Schmidt, VICE PRESIDENT — 7-22-25

Signature of vendor doing business with the governmental entity — Date

CONFLICT OF INTEREST QUESTIONNAIRE
For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm. For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

(A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;

(B) a transaction conducted at a price and subject to terms available to the public; or

(C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

(a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

***

(2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds $2,500 during the 12-month period preceding the date that the officer becomes aware that

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than $100 in the 12-month period preceding the date the officer becomes aware that:

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

(a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

(1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);

(2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or

(3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

(1) the date that the vendor:

(A) begins discussions or negotiations to enter into a contract with the local governmental entity; or

(B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

(2) the date the vendor becomes aware:

(A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);

(B) that the vendor has given one or more gifts described by Subsection (a); or

(C) of a family relationship with a local government officer.

Form provided by Texas Ethics Commission www.ethics.state.tx.us Revised 11/30/2015

SPECIAL PROVISIONS

ATTENTION: All Bidders are directed to pay special attention to the NOTICE TO BIDDERS section of the bid packet. Bidders have sole responsibility for complying with the current bid process requirements. Bidders also have sole responsibility for verifying that any bid submitted is completed correctly and includes all of the required documentation, including addendums.

1. SCOPE OF WORK:

This project includes the BRIARWOOD AVE PHASE II project to be performed as outlined in the Plans and Specifications, which are necessary to satisfactorily complete the work.

The project will include the removal, replacement, relocation, placement, and installation of existing and proposed paving, sidewalk, and appurtenances including all necessary mobilization, saw-cutting, pavement removal, excavation, embankment, embedment, backfill, compaction, form work, pavement repair, pavement placement, sidewalk repair, sidewalk placement, concrete joint sealing, erosion control, traffic control, stabilization, utility cover adjustments, as well as coordination with City of Midland staff and organizations such as OSHA, franchise utilities, etc. as needed, One Call (Texas 811) notifications for pending work, notifications to adjacent property owners as directed by City of Midland Staff, and all other work to be performed as outlined in the Construction Drawings and Specifications, to satisfactorily complete the work.

The Owner reserves the right to abandon, without obligation to the Contractor, any part of the project, or the entire project, at any time before the Contractor begins any construction work authorized by the Owner.

Standard Specifications for Construction of the City of Midland will govern all construction, except as modified by these Special Provisions.

2. ORDER OF PRECEDENCE:

The Special Provisions take precedence over the General Conditions in this bid packet anywhere these two sections are not in agreement.

The Special Provisions take precedence over the City of Midland Specifications in this bid packet anywhere these two sections are not in agreement.

The Contractor is to bid the quantities in the Proposal section of the bid packet even if there is a discrepancy between the Proposal quantities and those noted or measured in the construction drawing set.

In the Proposal the long-hand dollar amount written in the Description column for each bid item will take precedence over the numerical dollar amount listed in the Unit Price column if there is a discrepancy between the two.

In the construction drawing set any written or noted dimension takes precedence over dimensions measured based on the drawing scale unless otherwise directed by the Engineer.

Any changes or revisions made as part of an Addendum for this project take precedence over the original bid packet and construction drawing set where the documents are in conflict.

3. EXAMINATION OF SITE:

Prospective bidders are to make a careful examination of the entire site of the project and are to make such explorations as may be necessary to determine the subsoil and/or water conditions to be encountered; improvements and obstructions which may be encountered; methods of providing ingress-egress to private as well as public property; methods of handling traffic during construction and maintenance of the entire project as well as any section thereof, protection of all existing structures both above and below ground; and how the plans fit the proposed project and especially if any discrepancies exist.

4. PAYMENT:

Payment and retainage (five percent, 5%) shall be per the General Conditions.

Payment will be made for material installed, not for material delivery.

5. SAFETY REQUIREMENTS:

It is the responsibility of the Contractor to follow and comply at all times with Occupational Safety and Health Administration (OSHA) and all other applicable safety regulations and requirements throughout the course of the project's work. The City of Midland reserves the right to require additional safety measures on the project site at any time if they are needed in the opinion of the Engineer for the safety of the work crews or public.

6. SAFETY RESTRICTIONS – WORK NEAR HIGH VOLTAGE LINES:

The following procedure will be followed regarding the subject item on this contract:

1) A warning sign painted yellow with black letters that are legible at twelve feet shall be placed inside and outside vehicles such as cranes, derricks, power shovels, drilling rigs, pile drivers, hoisting equipment or similar apparatus. The warning sign shall read as follows:

   "**WARNING – UNLAWFUL TO OPERATE THIS EQUIPMENT WITHIN SIX FEET OF HIGH VOLTAGE LINES"**

2) Equipment that may be operated within ten feet of high voltage lines shall have an insulation cage-type of guard about the boom or arm, except back hoes or dippers, and insulator links on the lift hook connections.

3) When necessary to work within six feet of high voltage electric lines, notification shall be given to the power company of who will erect temporary mechanical barriers, de-energize the line, or raise or lower the line. The notifying department shall maintain an accurate log of all such calls to the Power Company, and shall record action taken in each case.

4) The Contractor is required to make arrangements with the Power Company for the temporary relocation or raising of high voltage lines at the Contractor's sole cost and expense.

5) No person shall work within six feet of a high voltage line without protection having been taken as outlined in Paragraph (3).

7. TRAFFIC CONTROL:

All proposed traffic control shall be approved by the City where applicable. All traffic control plans must be submitted to and approved by the Construction Manager no less than two (2) business days prior to starting the construction work. Traffic control for each phase of work must be approved prior to starting that work.

Generic traffic control plans or typical details may be submitted for shoulder work on any class of roadway, or for work on local or collector streets that does not require the closure of any travel lanes (i.e., all lanes are open to traffic on striped roadways, or adequate width remains available for two-way traffic on unstriped roadways). Once a generic traffic control plan or typical detail for a certain type of setup has been approved one time, the Contractor shall only be responsible for notifying the Construction Manager of the location, type of setup, and dates on which they intend to utilize the pre-approved traffic control for the duration of the contract. No additional plan submittals will be required in these cases, except that the City reserves the right to suspend this exception at its discretion. For any work not fitting the above exception, or in the event that the exception is suspended by the City, a site-specific traffic control plan will be required for each work location and time period.

1. All temporary traffic control shall be in general conformance with the *Texas Manual on Uniform Traffic Control Devices* (TMUTCD) (latest edition as adopted by the Texas Department of Transportation), except as specifically directed by the City Engineer or City Traffic Engineer.
2. All temporary traffic control shall be designed, installed, and maintained by competent and qualified personnel with adequate experience in traffic control.
3. All temporary traffic control involving multiple lane closures or traffic shifts, full closures of collector or arterial streets, traffic control extending through a railroad crossing, or any setup reasonably determined by the City to be "complex", shall be implemented only by a contractor with specific experience and expertise in the field of traffic control (i.e., a qualified "barricade company").
4. A Traffic Control Plan (TCP) shall be submitted to the Engineering Services Department, Construction Manager, in advance of any work in the right-of-way that impacts traffic. No work shall occur until an approved TCP has been returned to the Contractor.
5. A copy of the approved TCP shall be kept in the possession of the person responsible for supervising the traffic control at all times while working in the right-of-way. The approved TCP shall be presented to City staff or law enforcement upon demand at any time.
6. Depending on site conditions and the nature of the work, temporary traffic control may be approved by the City for either of the following:
    a. All Times – All traffic control, including closures, may remain in place 24 hours per day until expiration of the approved TCP.
    b. Off-Peak Only – Lane or road closures are NOT permitted from 6:00-9:00 AM and 4:00-7:00 PM on weekdays (Monday through Friday). Other traffic control not related to lane or road closures may remain in place 24 hours per day until expiration of the approved TCP.
7. The contractor setting the temporary traffic control shall be responsible for the maintenance and upkeep of all signs, barricades, and other devices, at all times.
    a. All temporary traffic control setups shall be maintained at least one time per day, including weekends and holidays.
    b. More frequent maintenance shall be performed as needed, with particular emphasis to following up after severe weather events or during times of high winds.

c. Maintenance shall include:
    i. Verifying and correcting the location and orientation of all signs, barricades, and other devices;
    ii. Keeping signs and reflective areas of barricades and other devices clean and free of dirt buildup so as to maintain appropriate visibility and legibility; and
    iii. Ensuring the proper location, orientation, and operation of arrow boards or message boards, if present.

8. Arrow boards shall be required for lane closures under the following conditions:
    a. On roadways with a posted speed limit of 55 MPH or greater, for closures lasting more than one (1) hour;
    b. On roadways with a posted speed limit of 45 MPH or greater, for closures lasting more than four (4) hours;
    c. On any roadway if lanes will remain open to traffic travelling in the same direction on both sides of a closed lane during any overnight hours (from 7:00 PM to 6:00 AM); and

At other times as shown on the approved TCP, or as otherwise directed by the City.

8. DETOURS:

The Contractor is to prosecute his work in such a manner as to create a minimum of interruption to traffic and pedestrian facilities and to the flow of vehicular and pedestrian traffic within the project area.

9. PROPERTY AND RIGHT-OF-WAY ACCESS:

Access to adjacent properties must be maintained at all times unless otherwise directed by the Engineer. If the contractor will not be working in an area for a period of one week or more, special care is to be taken to address any unsafe conditions such as excavated areas or obstructions outside the worked area that could be tripping hazards, etc. Contractor must notify affected properties no less than two (2) business days prior to any planned access interruptions.

Contractor must coordinate with the City of Midland regarding any planned access interruptions for public Right-of-Way, or to restore any public infrastructure damaged during construction activities.

No equipment or construction materials are to be stored within the State Highway 158 Right-of-Way.

10. PROPERTY AND RIGHT-OF-WAY SERVICE:

Service to adjacent properties must be maintained at all times unless otherwise directed by the Engineer. Such services include water, wastewater, fiber, cable, electric, and gas. Contractor must notify affected properties no less than two (2) business days prior to any planned service interruption.

Contractor must coordinate with the City of Midland regarding any planned service interruptions for public water or wastewater, or to restore any public infrastructure damaged during construction activities.

Contractor must coordinate with private service providers for any necessary service interruptions to their infrastructure or to restore service to their infrastructure in the event that a private service is disrupted, damaged, etc. during construction.

11. CONSTRUCTION SCHEDULE:

It is the responsibility of the Contractor to furnish the Construction Engineer, prior to construction, with a schedule outlining the anticipated time each phase of construction will begin and be completed, including sufficient time being allowed for clean-up.

12. CONSTRUCTION STAKING:

It is the responsibility of the Contractor to provide the project construction staking at fifty-foot (50’) intervals along the entire length of the project as well as at such control points as the Contractor deems necessary for proper execution of the work. Construction staking is to include grading and cuts as well as horizontal alignments and construction control points. Cut sheets are to be provided to the Engineer by the Contractor for review and approval.

13. SURVEY:

The Contractor is to provide GPS survey shots for all meters replaced to the City of Midland with each completed work order submittal. Survey data is to be shot in Texas Central Zone with 1983 NAD at 1.0' accuracy or better. Survey data is to be provided in Excel csv. file format with all rounding functions turned off.

14. CONSTRUCTION MATERIALS:

The Contractor is to only provide new materials for permanent installation in any and all parts of this project, and all such materials must comply with the General Conditions, the Bid Packet Specifications, and all applicable City of Midland Standards and Specifications.

For this project, the Standard Specification is hereby amended to read:

> Qualifications of Material Sources – Contractor is only to use pavement mixtures that have a proven record of acceptance by the City of Midland, or another Texas municipality, or have a proven record of meeting similar standards for state highway projects.

Concrete is only to be placed when the ambient temperature is between 40 degrees and 95 degrees Fahrenheit and the ambient temperature in the shade is higher than 40 degrees Fahrenheit or is 40 degrees Fahrenheit and rising.

All concrete pavement joints are to be sealed with Texas Department of Transportation (TxDOT) DMS-6310 SL-2 sealant, an American Society for Testing and Materials (ASTM) D 1190 Hot-Applied Single Component Joint Sealant, or a City of Midland approved equal. This will not apply to curb or sidewalk joints.

No construction materials are to be placed or installed during rain events unless they are necessary to resolve an emergency situation or to facilitate the project site erosion control measures.

15. EROSION CONTROL:

Erosion control is the responsibility of the Contractor and erosion control measures are to be implemented so as to prevent sediment erosion from wind, rain, and other elements from the project site. Should the Owner feel that supplementary erosion control measures are required in addition to those implemented by the Contractor

then the Contractor will include additional erosion control measures within reason to the Owner's satisfaction and/or TCEQ requirements.

Reasonable erosion control measures include but are not limited to: construction entrance(s), concrete washout(s), perimeter silt fence or fiber wattle, rock rip-rap dams for concentrated runoff control, gutter and inlet protection measures such as sand bags, and stabilization of the construction area surfaces when construction work is not actively occurring by means of vegetative cover or seeded erosion control blankets.

Supplemental erosion control measures are ancillary to the project and not paid as a separate item, unless otherwise noted in the Proposal or Pay Notes.

Site cleanup work is to be done for this project as soon as possible as per the General Conditions and will be ancillary to the project and not paid as a separate item, unless otherwise noted in the Proposal or Pay Notes. Site cleanup is to take place throughout the project's construction as needed to maintain a clean and professional looking work area. No more than three calendar days are to elapse after completion of construction before the final roadway and right-of-way cleanup has been completed to the satisfaction of the Engineer.

16. WASTE MATERIAL:

Excess material from excavation and other construction or demolition activity will become the property of the Contractor. Excess excavation will be disposed of at locations secured by the Contractor and if necessary, approved by the Engineer. No material is to be placed on private property or City property without the approval of the Engineer and the property owner. Removal of excess material, excavation, and waste material are ancillary to the project and not paid as a separate item, unless otherwise noted in the Proposal or Pay Notes.

Excess concrete material must be washed out in a concrete washout within the project's job site area, or else any and all other concrete material washout must occur away from the job site area in the Contractor's or concrete Supplier's own operation yards or properties. Under no circumstances are concrete trucks allowed to washout in any job site excavations, channels, public right-of-way, or on private property.

17. TESTING:

It is the Contractor's responsibility to perform all required testing for any and all materials and workmanship performed or installed as part of the project's work. The cost of all such testing is to be borne solely by the Contractor unless required by the Engineer for work or materials that had previously been tested and approved and had not experienced any change in condition since that time as a result of the Contractor's work or actions; or unless additional testing outside of the project scope is performed at the request of the Engineer.

Required testing includes:

Concrete Pavement – A Slump Test is required for every cylinder set (3 test cylinders) taken, and no less than 1 cylinder set per day is to be taken for testing when concrete is placed. Test results are to be given to the engineer upon completion of each test, with 1 cylinder set taken for:

A. Every 50 cubic yards of concrete placed for concrete pavement between street intersections.

B. Every 50 cubic yards of concrete placed for concrete pavement at a street intersection.

C. Every 2 sets of fillets and valley gutters at street approaches. (1 set = 2 fillets and 1 valley gutter)

D. Every 4 alley approaches or driveway approaches.

E. There will be no testing for curb, ramps, and sidewalks.

Asphalt Hot-Mix Pavement – A Nuclear Gauge Density Test is required for either each day that asphalt hot-mix is placed or for every 250 linear feet of asphalt hot-mix pass, whichever results in more frequent testing. The laboratory density limits will be a minimum limit of 96%, a maximum limit of 98%, and an optimum limit of 97%. The acceptable field density range for construction of this project is 93% - 98% with a target density of 95%. Test results are to be given to the Engineer upon completion of each test.

18. COMPLIANCE:

The said Contractor further agrees to comply with all applicable provisions of the laws and building and construction codes of the City of Midland and the State of Texas, and with any regulations for the protection of workers which may be promulgated by the Government, and will protect such work with all necessary lights, barriers, safeguards, and warnings as provided for in said specifications and the Ordinance regulations.

Contractor is to comply with all accepted industry standards for means, methods, and details of work to be performed, as well as with any specific requirements of the City of Midland.

Contractor is to comply with any specific order of construction as directed by the City of Midland, but is otherwise free to conduct the work in the order which the Contractor sees fit.

Contractor agrees to comply with any specific direction or requirement of the City of Midland for the construction of this project, but is otherwise free to perform the work in its own way.

19. PERSONNEL:

It is the Contractor's responsibility to have a supervising representative of the Contractor on the construction site any time that construction work is taking place. The Contractor's representative must be on the Contractor's direct payroll. Sub-contractors or paid consultants will not satisfy this requirement.

It is also the Contractor's responsibility to provide the City with a reliable contact for issue escalation coordination. Such contacts would include the Contractor's site foreman, the Contractor's construction project manager, etc.

20. INTENT OF THE PROPOSAL:

The intent of the proposal is to determine the lowest responsible bidder based on the total of the quantities and unit prices. Once the lowest responsible bidder is selected, the project will be awarded based on the terms and requirements of the contract outlined in the bid packet and construction drawings.

21. CONTRACT DEADLINE:

The deadline for substantial completion of this project is _540_ calendar days total starting from the Notice to Proceed date.

Extensions of the project deadline may be requested by the Contractor for documented excepting conditions such as weather days, delays due to conflicts with existing franchise lines, etc. which are reasonably beyond the

Contractor's control. Any and all deadline extensions must be submitted by the Contractor in writing to Engineer for review, and the approval or denial of the request rests solely with the Engineer.

Unless specifically granted in writing by the Engineer, there will be no suspension of project time between phases of construction.

22. WARRANTY PERIOD:

There is a one (1) year calendar warranty period on this project for all work performed or materials installed effective immediately upon acceptance of the improvements by the Owner. The warranty period will be based on the acceptance date of the project as a whole, and not any individual phases of the project.

23. BID PACKET COMPLETION ITEMS OF NOTE:

Bidders must be willing to sign the Contract as is if a bid is submitted. Revisions, alterations, deletions, additions, or any other changes of any kind by the bidder to the bid packet or other bid documents (such as the construction drawing set, addendums, etc.) will result in the bid submittal being deemed 'Non-Responsive' and the bid will not be accepted.

Bidders are reminded to make sure that the Conflict of Interest forms are completed if applicable before submitting a bid.

All bid items in the Proposal section must be completed for a bid submittal to be considered complete. Any bid item left blank, only partially completed, or that the bidder indicates they chose to not provide a bid for will be considered incomplete, and the entire bid submittal will also be deemed incomplete, the bid submittal will be deemed 'Non-Responsive', and the bid will not be accepted. Bidders bear sole responsibility for making sure that the Proposal is complete and in accordance with the instructions provided to bidders in the bid packet.

All acknowledgement forms for all addendums that are issued during the bid process for this project must be filled out and be included with any bid submittal for that bid submittal to be considered complete. Any bid submittal lacking these completed addendum acknowledgement forms will be deemed 'Non-Responsive' and the bid will not be accepted. Bidders bear sole responsibility for making sure that they have obtained all addendums issued prior to submitting their bid.

Refer to
City of Midland
Specifications

PREPARATION OF RIGHT OF WAY

1. GENERAL

Includes the preparation of right-of-way for construction by clearing, grubbing, removing and disposing of all obstructions and objectionable material from the right-of-way and designated easements, which is not specifically provided for on the plans.

Obstructions and objectionable material refer to all objects or material that do not meet the quality of standards for the courses of pavement to be constructed or which protrude into the excavation for slopes.

Measurement and Payment - Measurement and payment will be at the units and prices for the applicable bid item in the proposal.

When no specific bid items are included in the bid proposal for work specified under this section this work shall be considered as incidental to other items of work and the cost shall be included in the bid for these items. No separate payment will be made.

2. CONSTRUCTION METHODS

Removal - Obstructions and objectionable material to be removed by blading, plowing, bulldozing, or other methods approved in writing by the Engineer. The use of explosives will not be permitted. Solid objects must be removed to a depth of at least one (1) foot below the finished slope or subgrade elevation. Hollow objects must be removed entirely.

Disposal - Material to be removed from the right-of-way becomes the property of the Contractor. If disposal areas are available, they will be indicated on the plans.

Preservation of Trees and Shrubs - Trees and shrubs to be preserved in the right of way are shown on the plans and must be protected from injury during construction.

Removal of Concrete - Cut concrete at the right-of-way line straight and vertical by sawing or other approved methods prior to the removal of concrete in the right-of-way.

EXCAVATION, EMBANKMENT AND PREPARATION OF SUBGRADE 1
1. GENERAL 2
2. CONSTRUCTION METHODS 2

EXCAVATION, EMBANKMENT AND PREPARATION OF SUBGRADE

1. GENERAL

Includes the excavation, embankment and preparation of subgrade determined by the lines, grades and sections shown on the plans and in accordance with the provisions of the specifications.

Excavation - Includes excavation to planned grade, disposal of the material, removal of unsuitable subgrade material and borrow material when required in the construction. All excavation to be classified as common.

Embankment - Consists of excavated or borrow materials placed and compacted in horizontal layers in accordance with the specifications.

Subgrade - The upper eight inches (8") of embankment or the upper eight inches (8") below the roadway excavation finished grade. The subgrade shall extend from six inches (6") back of curb to six inches (6") back of curb where curb and gutter is to be constructed.

Measurement and Payment - Measurement and payment to be at the units and prices for the applicable bid items in the proposal.

2. CONSTRUCTION METHODS

Excavation - Made at the location and to the lines and grades shown on the plans in areas previously prepared in accordance with provisions of Section 2A. Dispose of excess material not required in the embankment and material that is unsuitable for subgrade. Excavation tolerance to be plus or minus 1/10 foot from the plan grade.

The area between the curb and property line shall be excavated or filled, whichever is necessary, to curb height at back of curb and finished to a straight even surface to the property line. The minimum elevation at the property line shall be the elevation of the top of the curb. The maximum elevation at the property line shall be equal to a rise of 1/4 inch per foot from the back of the curb to the property line.

During the excavation of this project, it will be required that all parkways be excavated and shaped at the same time the roadway is excavated. Excess excavation will be disposed of at locations approved by the Engineer.

Embankment shall be constructed at the locations and to the lines and grades shown on the plans in areas previously prepared in accordance with Section 2A of these specifications. Top eight inches (8") of natural ground to be compacted

to embankment density requirements. Embankment shall be constructed from suitable material obtained from the excavation or borrow free of roots, rocks in excess of three inches (3"), debris and other objectionable material. Excavation deficiencies shall be supplemented from a borrow source approved by the Engineer. Embankment shall be constructed in uniform horizontal layers not to exceed eight inches (8") of loose depth and compact with suitable equipment to a minimum of ninety percent (90%) AASHTO T180. The materials shall be processed by aeration or watering to bring the material to the approximate optimum moisture. Dry layers will not be permitted. Soft spots that develop in the embankment shall be removed and replaced with suitable material. No payment will be made for removal of soft spots. Tolerance for embankment grading shall be one-half foot (1/2) plus or minus the plan grade.

Preparation of Subgrade - Eight inches (8") of the upper portion of the embankment or excavation shall be shaped and compacted to a minimum density of 95 percent (95%) AASHTO T180 and finished within a tolerance of one-half inch (1/2") in ten feet (10'). The finished subgrade shall be protected and maintained in a satisfactory condition until covered by succeeding construction.

Compaction Tests - Field density tests will be made by the Owner or by a laboratory selected by the Owner. The Contractor shall notify the Engineer when compaction has been achieved. The Contractor shall allow 24 hours for scheduling of test. Prior to the taking of subgrade density test, the entire subgrade will be tested by proof-rolling using a pneumatic roller weighing not less than 50,000 lbs. gross with tire pressure being not less than 110 psi. Any soft spots, pumping, or other evidence of weakness shall be remedied before density tests are made. Proof rolling shall be in the presence of the Engineer or his duly authorized representative.

The City will pay the cost of initial density tests made on the subgrade. If the subgrade fails to meet the density requirements on the first test, the contractor will be required to have subsequent density tests made by the commercial lab selected by owner. The cost of all subsequent density tests will be born by the contractor.

08/07

CONCRETE CURB AND GUTTER, SIDEWALKS AND DRIVEWAYS,

VALLEY GUTTERS, CENTER DRAINS AND RIP RAP

1. GENERAL

Includes the construction of concrete curb and gutter, sidewalks, driveways, valley gutters, center drains and rip rap in accordance with lines, grades and the sections shown on the plans and constructed in full compliance with provisions of the specifications.

A proven performance record by the Texas Highway Department shall be supplied by material producers for all materials supplied by them.

2. MATERIALS

Concrete - All concrete other than rip rap shall be Class "A" concrete in accordance with Texas Highway Department specifications Item No. 421. Concrete for rip rap shall be the class as shown on the plans and detail drawings. When no concrete class is shown the plans concrete for rip rap shall be Class "B" concrete.

Concrete batch designs shall be furnished for each project and shall include all classes of concrete proposed for use on the project.

Reinforcing Steel - Reinforcing steel shall be deformed bars or wire mesh fabric conforming to the requirements of "Texas State Department of Highways and Public Transportation 1982 Standard Specifications for Construction of Highways, Streets and Bridges" Item No. 440 and shall be of the sizes and grades as shown on the plans.

The contractor, at his option, may use fiber reinforcing in lieu of the wire mesh for all concrete slab on grade. When fiber reinforcing is used, it shall be "Fiber Mesh" or "Caprolan RC" or approved equal. The material and rate of application shall be approved by the Engineer prior to its use.

Expansion Joints - Bituminous pre-molded joint filler shall be composed of top grade fiber, treated by special impregnation system with water repellent bituminous materials. It shall be a non-extruding type, resilient, expanding on release of compression, preventing open joint crevices. The pre-molded joint filler shall be of such character, that it will not be deformed by handling during hot weather, nor shall it become brittle in cold weather. It shall be free from visible external defects such as holes, ragged or untrue edges, breaks, cracks or tears. It may be covered on both sides with paper to facilitate handling.

The joint filler shall be accurately cut to the dimensions and shapes required. It shall be of the thickness required by the plans, or as specified elsewhere.

3. CONSTRUCTION METHODS

GENERAL

No concrete shall be placed when, in the Engineers opinion, weather or other conditions would be detrimental to the structure placed. No concrete shall be placed on grade when the ground temperature is 35^{o} F or lower. Concrete may be placed when the ground temperature is rising from 35^{o} F. Concrete placed in cold weather shall be protected from freezing for 72 hours after being placed.

CURB AND GUTTER

EXCAVATION AND SUBGRADE - Excavation for curb, gutter, and combined curb and gutter shall be done with the subgrade excavation for the street. Street subgrade shall extend from six inches (6") back of curb to (6") back of curb and shall be compacted for a full width to a minimum of 95% AASHTO T180-61. Where subgrade is more than three inches (3") below bottom of curb, fill shall be compacted caliche base constructed from six inches (6") back of curb to six inches (6") back of curb as specified for base course.

Whenever subgrade or base is dry or dusty, it shall be thoroughly moistened, not made muddy, before the concrete is placed.

Forms - Forms shall be of steel, of a type to be approved by the Engineer, except that curves may be formed with wood sections built up or laminated, upon prior approval by the Engineer.

The forms shall be attached securely to stakes, shall be set true to line and grade, and braced sufficiently to remain true during the placing and tamping of the concrete. Forms shall be thoroughly cleaned and oiled before each use.

Curves - All changes in direction of the curbs shall be by means of true circular curves of the radii as shown on the plans.

Expansion Joints - Expansion joints shall be placed between curb and gutter sections at the tangent points of all curves, at each side of the inlet boxes, drives, alleyways, and at intervals of not more than forty feet (40') in straight runs. The expansion material shall be pre-molded three-fourths inch (3/4") in thickness, and shall conform to the requirements of expansion material as specified herein. It shall be cut to the full size and shape or the cross section of the curb and gutter, less one-half inch (1/2") from the finished surface thereof. The edges of sections against the joint shall be finished with an edging tool and the joint raked clean of concrete.

Finishing - There shall be provided on the job a metal screed or mule designed to give proper shape to the curb and gutter. It shall be bent to the exact shape of the finished curb and gutter and the forward edge turned up slightly to prevent disturbing the mortar. It shall be designed to ride on the forms and when properly manipulated shall leave the curb and gutter in its proper shaped condition. An "S" trowel shall be used to finish the surface and minor imperfections shall be corrected with a mason's trowel. Care shall be taken to finish

the gutter flow line to a true, uniform grade. All edges shall be finished with an edging tool, and joints marked with a jointer. Joint marks shall coincide with actual joints and shall be straight and true.

Curing - The completed curb and gutter, shall be cured in accordance with the requirements of the item "Membrane Curing", Texas Highway Department Item 531.

DRIVEWAYS AND ALLEY RETURNS

Driveways and alley returns shall be constructed of Class "A" concrete to the lines and grades as shown on the plans and detail sheets. All driveways and alley returns shall be reinforced as shown on the detail drawings.

Excavation and Subgrade - Excavation shall be accomplished in the same manner as for streets and curbs. The subgrade for all driveways and alley returns shall be compacted to 95% modified proctor density for 8 inches depth.

Driveways for single family residences and property used for two family residential purposes (duplexes) may be placed on the compacted subgrade. All other driveways shall be considered as commercial driveways and shall be constructed on 6 inches compacted flexible base.

Flexible Base - Commercial driveways and alley returns shall be constructed on 6 inches of flexible base conforming to Section 2-C- Flexible Base, Caliche.

Forms - Forms shall be constructed of steel or, when approved by the engineer, wood conforming to the requirements for curb and gutter forms.

Expansion Joints - Expansion joints shall be placed at the ends of abutting curb and gutter at the end of radii for all driveways and alley returns. In addition, expansion joints shall be placed at the ends of abutting sidewalk sections and at any point where the driveway or alley return abuts another concrete structure. Expansion joint material shall be pre-molded three fourths inch (3/4") in thickness, cut to the shape and dimensions required and shall extend the full depth of the concrete.

Finishing - Shaping and finishing of driveways and alley returns shall be accomplished by using a screed to shape the driveway or alley return to the lines and grade required. Finishing shall be accomplished by use of wooden floats and stiff bristled brushes or brooms. The last finish shall be by brushing or brooming in
A direction transverse to the direction of traffic.

During the entire finishing process care shall be taken to maintain the true gutter invert in line with the street curb and gutter.

Curing - Finished driveways and alley returns shall be cured in accordance with the requirements "membrane curing" "Texas Department of Highways and Public Transportation, 1982 Standard Specifications for Highways, Streets and Bridges", Item Number 531.

CONCRETE VALLEY GUTTERS, CENTER DRAINS AND DRAINWAYS

Concrete slab type street drainage structures with or without curbs, shall be constructed of Class "A" concrete to the lines and grades as shown on the plans and detail sheets or as may be established in the field by the engineer.

Subgrade excavation preparation and compaction and flexible base shall be the same as specified for street construction. All drainage structures within the roadway shall be constructed on a flexible caliche base so that the thickness of the concrete slab plus base is equal to the thickness of the hot mix asphaltic concrete surface plus base.

Forms - Forms shall be as specified for curb and gutter.

Reinforcing - All slab type drainage structures shall be reinforced as shown on the plans and detail drawings. Care shall be taken to maintain all reinforcing in good condition and at its proper location within the slab.

Expansion Joints - Expansion joint material shall be as specified for curb and gutter and for driveways and alley returns.

Expansion joints for valley gutter shall be placed at the ends of radii and at the juncture between the fillet and the cross valley as shown on the detail sheet.

For center drains, expansion joints shall be placed at the ends of widened or transition sections and at each end of a section containing a manhole or other structure and at intervals of sixty feet (60') measured along the center line of the drain.

Additional expansion joints shall be placed where drainage slabs abut backs of curbs, sidewalks and at contact points with other concrete structures.

Contraction Joints - Contraction joints shall be spaced at 15' intervals along the center line of center drains. These contraction joints shall be saw cut 3/8" wide minimum and 1/4 the depth of the slab using an approved concrete saw.

Saw cut contraction joints shall be made after the concrete has set sufficiently to prevent excessive raveling during sawing and shall be completed before the concrete is 48 hours old.

Finishing - Finishing shall be the same as for alley returns and driveways with the last finishing operation for structures subject to vehicular traffic being by broom or stiff brush in a direction transverse to the direction of traffic.

Curing - Curing shall be the same as for curb and gutter and driveways and alley returns.

SIDEWALKS

Sidewalks shall be constructed of Class A" concrete to the lines and grades as shown on the plans and detail drawings or as may be established in the field by the engineer. Sidewalks shall be constructed parallel to the back of the curb and on a grade parallel to

the top of curb grade. The minimum thickness for any sidewalk is 4 inches. The minimum width of any sidewalk is 4 feet.

Excavation and Subgrade - Excavation for sidewalk shall be made with street excavation where applicable. Care shall be exercised in excavating for sidewalks. Any over excavation or any fill required for sidewalk must be brought to grade in lifts not to exceed two inches (2") and thoroughly tamped. Subgrade for sidewalks shall be compacted to at least the density of the adjacent soil or to 85% modified proctor whichever is greater.

When a sidewalk is to be constructed on an embankment the fill must extend at least 3 feet beyond the edge of the sidewalk.

If the subgrade is dry or dusty it must be thoroughly moistened but not made muddy before concrete is placed.

Forms - Forms for sidewalks may be either steel or wood. Forms must be in good shape and true to line and grade. If nominal 2" x 4" lumber is used the subgrade must be finished one half inch (1/2") below the bottom of the form to provide the required 4 inch thickness.

Expansion Joints - Expansion joint material shall be pre-molded conforming to these specifications and shall be one half inch (1/2") thick. The expansion joint shall extend the full depth of the sidewalk.

Expansion joints shall be placed at points where the sidewalk contacts the back of curb, at all junctures between sidewalks all directions, and at all points where the sidewalk abuts a driveway, alley return or other concrete structure including fence foundations.

Transverse expansion joints shall be constructed in the sidewalk at intervals not exceeding twenty eight feet (28') as measured along the centerline of the walk except for sidewalks that are constructed wider than four feet (4') in which case expansion joints may be placed at intervals that are multiples of the width but not exceeding thirty feet (30').

Contraction Joints - Contraction joints consisting of trowel cuts one and one half inches (1-1/2") deep shall be spaced at four foot (4') intervals along the sidewalk. Contraction joints shall be edged using an edging tool with a 1/4 inch or 3/8 inch radius.

For sidewalks wider than four feet (4') contraction joints may be placed at intervals equal to the width of the walk up to but not exceeding ten feet (10').

Finishing - Sidewalks shall be "struck off" with a screed to provide an even surface and float finished using a wooden float.

The final finish on the sidewalk shall be accomplished by brooming or brushing using a stiff bristled brush or broom with the final strokes being in the transverse direction.

Curing - Curing shall be as specified for curb and gutter and driveways and alley returns.

CONCRETE RIP RAP

Concrete rip rap shall be constructed of concrete of the class and to the line and grades as shown on the plans.

Excavation and Subgrade - Care shall be taken not to over excavate for rip rap. The subgrade for rip rap shall be compacted to at least the density of the adjacent undisturbed soil or 85% modified proctor whichever is higher.

Forms - Forms, where required, may be either steel or wood. Forms must be in good condition and true to line and grade.

Expansion Joints - Expansion joints, where required, will meet the requirements of expansion joints materials as specified herein and will be placed as shown on the plans or directed by the engineer.

Finishing - Finishing shall be by screed and wooden float to produce true uniform surface.

Curing - Curing shall be as specified for other concrete herein.

Slope Paving - Slope paving may be required behind the curb or behind sidewalks where street paving requires deeper cuts in developed areas. Slope paving shall be constructed of Class "A" concrete and shall be constructed to the lines and grades as shown on the plans or as established in the field. Slope pavement shall be four inches (4") thick and shall be constructed in accord with the specifications for sidewalks.

When no slope grade is given on the plans the slope gradient shall be l:l.

Unless listed separately on the bid proposal, slope pavement shall be measured and paid for as sidewalk.

4. BACKFILL AND CLEANUP

GENERAL

Backfill and clean up are an integral part of the various items covered by this specification and must be completed for each item before that item will be considered for payment.

CONCRETE STRUCTURES WITHIN THE PAVED AREA OF STREETS

Backfill and clean up for concrete structures within the paved areas of streets, alleys, etc. shall receive special attention to assure the integrity of the street pavement.

Structures constructed in previously paved areas shall have sufficient surface removed along with base and subgrade where necessary to set full face forms for the concrete. As soon as the forms are removed all loose material shall be removed from the form trench and the trench filled to the base level with Portland cement stabilized backfill material

consisting of two (2) sacks Portland cement to one (l) cubic yard of caliche base material or one (l) cubic yard "blow sand". When the cement stabilized backfill has cured the pavement edge shall be saw cut to provide true and straight lines and the pavement restored to its original or revised grade using Hot mix asphaltic concrete conforming to the requirements of Section 2-F of these specifications.

For structures constructed on previously prepared subgrade or base course, clean up and backfill shall be considered complete when the subgrade or base course has been made ready to receive the next course.

When a structure is constructed on a finished base course and it is necessary to remove base material to set forms, backfill and cleanup shall be as described for previously paved areas and shall be considered complete when the base course is made ready to receive the surface course or courses.

BACKFILL BEHIND CURBS AND ALONG SIDEWALKS

Backfill behind curbs and along sidewalks that is to be grassed shall be made using good top soil. Top soil shall be free of caliche, rocks, clods, lumps, debris and other objectionable material. This backfill shall be compacted to at least the density of undisturbed adjacent soil but not less than 85% modified proctor.

Backfill behind curbs and along sidewalks that is to receive paving shall be constructed to conform to the base and subgrade of the adjacent paving and shall be compacted to 95% modified proctor. Or the contractor may elect to backfill to the top of the base with two (2) sack cement stabilized backfill.

In undeveloped areas and in areas where no sidewalks exist the contractor shall slope from the back of the curb to a maximum height of 1/4 inch per foot rise from the top of the curb to the property line on a straight line grade. The minimum elevation at the property lines shall be top of curb elevation.

In deeper cut areas slope paving may be required. When slope paving is required it shall be constructed to the lines and grades shown on the plans. Backfill and shaping beyond the slope paving shall be in accord with the applicable portions of this specification.

08/07

CONCRETE CURB AND GUTTER, SIDEWALKS AND DRIVEWAYS **1**

VALLEY GUTTERS, CENTER DRAINS AND RIP RAP **1**

1. GENERAL 1
2. MATERIALS 1
3. CONSTRUCTION METHODS 2

GENERAL *2*
CURB AND GUTTER *2*
DRIVEWAYS AND ALLEY RETURNS *3*
CONCRETE VALLEY GUTTERS, CENTER DRAINS AND DRAINWAYS *4*
SIDEWALKS *4*
CONCRETE RIP RAP *6*

4. BACKFILL AND CLEANUP 6

GENERAL *6*
CONCRETE STRUCTURES WITHIN THE PAVED AREA OF STREETS *6*
BACKFILL BEHIND CURBS AND ALONG SIDEWALKS *7*

Updated 3/06

CONCRETE STRUCTURES

1. GENERAL

This specification covers concrete structures including but not limited to junction boxes, culverts, head walls, cast in place manholes, valve vaults, meter vaults and retaining walls.

2. MATERIALS

CONCRETE

Concrete for cast in place manholes, junction boxes, storm sewer inlet boxes, valve vaults and direct traffic culvert and bridge decks shall be a modified class "C" concrete using a minimum of 6 sacks cement per cubic yard with a maximum water content of 5 gallons per sack of cement and producing a concrete with 4000 psi 28 day compressive strength.

Concrete for other structures shall be class "A" as specified in "Texas State Department of Highways and Public Transportation 1982 Standard Specifications for Construction of Highways, Streets and Bridges" item number 421. Concrete for riprap shall be class "B".

Reinforcing steel shall conform to the requirements of item number 440 or "Texas State Department of Highways and Public Transportation 1982 Standard Specifications for Construction of Highways, Streets and Bridges" and shall be of the sizes and grades as shown on the plans.

3. CONSTRUCTION

Construction of concrete structures shall be in accordance with the provisions of item 420 "Texas State Department of Highways and Public Transportation 1982 Standard Specifications for Construction of Highways, Streets and Bridges".

8/07

FLEXIBLE BASE, CALICHE 1
1. GENERAL 2
2. MATERIALS 2
3. CONSTRUCTION 3
4. TESTING 3

FLEXIBLE BASE, CALICHE

1. GENERAL

This item consists of the construction of a caliche flexible base course to the lines, grades and thickness shown on the plans and in accordance with the provisions of the specifications.

Qualification of Material Source - There will be no designated material sources, but the source proposed by the Contractor must be approved by the Engineer. The contractor shall furnish evidence of capability to crush and screen the material with suitable equipment.

Measurement and Payment - Measurement and payment to be at the units and price for the applicable bid item in the proposal.

2. MATERIALS

Material from the approved source shall meet the following requirements when tested in accordance with the referenced testing standards:

Gradation - Tested by ASTM C 136-67 to meet the following gradation limits:

Sieve Size	Percent Passing
1-3/4"	100.0
7/8"	65-90
3/8"	50-70
No. 4	30-60
No. 40	15-35

Liquid Limit and Plasticity Index **-** Tested by ASTM D423-66 and D 424-59.

Liquid Limit - 30.0 Maximum
Plasticity Index - 10.0 Maximum
Triaxial Classification - Tested by Texas Highway Department Method TEX 117-E, Part II - minimum class 3.0.

Source Quality Control - The contractor shall exercise caution in the operation of the material source to prevent the inclusion of inferior materials.

3. CONSTRUCTION

A. The subgrade shall be finished true to the lines and grades as shown on the plans or as established by the Engineer and finished within specified tolerances and properly maintained to prevent drying and/or loosening of the surface.

No base material may be dumped on any subgrade until it has been tested and approved by the Engineer.

B. Flexible caliche base material shall be placed in uniform courses and processed to provide a uniformly mixed base course of the proper moisture content for compaction. The processing and compaction procedure used shall provide a uniform base course compacted to ninety-five percent (95%) modified proctor density (YACHT T180) minimum. The minimum thickness of any one compacted course shall be three inches (3"). The maximum thickness of any one compacted course shall be eight inches (8").

Any soft or segregated spots that appear in the base shall be removed, replaced or reprocessed and recompacted prior to final finishing of the base. The finished base shall conform to the lines and grades as shown on the plans or established by the Engineer. Finished tolerances shall not exceed one half inch (1/2") in ten feet (10').

The finished base shall be primed as soon after finishing as practical and shall be protected until the hot mix asphaltic concrete surface is applied. In no case will prime be applied until the finished base has been approved by the Engineer.

4. TESTING

A. All test for approval of the source shall be performed by a commercial lab selected by the owner and shall be paid for by the contractor.

B. Gradation and soil constants tests (ASTM C-136, D423 and D424) and THD Triaxial Test (THD TEX117-E Part II) will be performed for source approval. Should the appearance, workability or other visual checks indicate a possible change in the material being furnished, the Engineer may require the contractor to retest the material for source approval.

C. Field quality control test will consist of the finish tolerance test and density test.

The finish tolerance test will be performed by the contractor at his expense using a 10' rolling straight edge. This test shall be performed at the direction of the Engineer or his representative. When required, the test shall consist of checking one path in each lane with the rolling straight edge.

Density test will be made by the City or a commercial laboratory chosen by the City using Troxler 3411-B nuclear density gauges or approved equal at the minimum rate of one test for each 1000 square yards of base. In no case shall less than three tests be run on any one area processed as a unit. The City will bear the cost of the first test or set of tests only. If the base fails the first test the contractor, at his own expense, will be required to have all subsequent tests performed by the commercial laboratory chosen by the city.

8/07

BITUMINOUS PRIME

1. GENERAL

This item consists of the application of a bituminous prime coat to the finished caliche base in accordance with the provisions of the Specifications.

Qualification of Material Source - Material shall be supplied by a producer with a proven performance record of acceptance by the Texas Highway Department.

Measurement and Payment - Measurement and payment will be at the units and price for the applicable bid item in the proposal.

2. MATERIALS

Cut-back asphalt grade MC-30, Texas Highway Department Item 300.

Source Quality Control - Certificates of compliance to be furnished by the producer to the Engineer.

3. CONSTRUCTION METHODS

Condition of Base - The surface of the base shall be tightly compacted to the line and grade shown on the plans and within the tolerances of the specifications. The surface shall be clean and the base shall contain sufficient moisture to assure the proper penetration of the prime.

The prime shall be applied with an approved distributor to the surface of the base at a rate of between 0.15 and 0.40 gallon per square yard. The application rate shall be varied to meet field conditions and to obtain uniform coverage, and adequate penetration. Properly applied prime coat should penetrate from 3/8" to 1/2" into the base and should cure in approximately 72 hours with ambient temperatures at or near 70 degrees F. The prime shall be applied at a temperature within the range of temperatures recommended in Item 300 of Texas Highway Department Standard Specifications. The temperature shall be varied within this range to provide a viscosity that will assure even spreading and penetration of the base. Air Temperatures at the time of application shall be above 50'F.

BITUMINOUS TACK

1. GENERAL

This item consists of the application of a bituminous tack coat to the primed base or existing asphaltic concrete or Portland cement concrete pavement in accordance with the provisions of the specification.

Qualification of Material Source - Material shall be supplied by producer with a proven performance record of acceptance by the Texas Highway Department.

Measurement and Payment - Measurement and payment will be at the units and price for the applicable bid item in the proposal.

2. MATERIALS

Cut-back asphalt grade RC-250, Texas Highway Department Item 300.

3. CONSTRUCTION METHODS

Conditions of Surface - Prior to application of tack to the base course the prime must be completely penetrated into the base and the surface cleaned of foreign objects.

The tack shall be applied with an approved distributor at a rate of between 0.05 and 0.10 gallons per square yard. The temperature of application shall be within the range recommended by the Texas Highway Department in Item 300. The surface temperature to which tack is being applied shall be above 50 degrees F. at the time of application.

When the asphaltic concrete surface is being placed on primed caliche base, use of the tack coat may be waived by the Engineer if the contractor can show that adequate adhesion of the surface being placed to the base course is achieved without it.

Tack coat shall be placed on all asphaltic concrete or portland cement concrete surfaces on which an additional course of asphaltic concrete surfacing is to be placed. The tack coat shall be rolled with a pneumatic roller to assure even distribution over the entire surface and to achieve proper penetration into and adhesion to the surface being overlayed.

HOT MIX ASPHALTIC CONCRETE

I. GENERAL

Includes the construction of the hot mix asphaltic concrete surface in accordance with lines, grades and the sections shown on the plans and with the provisions of the specifications.

Qualification of Material Sources - Producers of oil asphaltic concrete mixture to have a proven record of acceptance by the Texas Highway Department.

Measurement and Payment - Measurement and payment to be at the units and price for the applicable bid item in the proposal.

2. MATERIALS

Oil Asphalt - Oil asphalt grade AC-l0 or AC-20, Texas Highway Department Item 300. When no asphalt grade is shown on the plans, and unless directed otherwise by the Engineer, asphalt for this project shall be grade AC-10.

Coarse Aggregate - Crushed stone or crushed gravel with a minimum of 75 percent of the aggregates having two or more crushed faces. Additional requirements:

(a) Los Angeles Abrasion: ASTM C l3l, Wear not to exceed 40.

(b) Decantation: Maximum 2.0 percent by weight

Fine Aggregates - Natural sand and screenings crushed from the same or similar material meeting the requirements of the course aggregates. Additional requirements.

(a) Plasticity Index: Maximum of 6.

(b) Sand Equivalents: Minimum of 50 for each individual fine aggregate.

Paving Mixtures - The paving mixture(s) shall be as shown on the plans and details. If no mixtures are shown on the plans surface or wearing courses up to l-3/4 inches thick shall be Type D, base courses up to 2 inches thick shall be Type C and base courses over 2 inches thick shall be Type B or Type A.

(a) Gradation: The master gradations for the paving mixtures are:

TYPE "A" (Coarse Graded Base Course):	Percent Aggregate by weight or volume
Passing 2" sieve	100
Passing l-3/4" sieve	95 to 100
Passing l-3/4" sieve, retained on 7/8" sieve	16 to 42
Passing 7/8" sieve, retained on 3/8" sieve	16 to 42
Passing 3/8" sieve, retained on No. 4 sieve	10 to 26
Passing No. 4 sieve, retained on No. l0 sieve	5 to 21
Total retained on No. l0 sieve	68 to 84
Passing No. l0 sieve, retained on No. 40 sieve	5 to 21
Passing No. 40 sieve, retained on No. 80 sieve	3 to 16
Passing No. 80 sieve, retained on No. 200 sieve	2 to 16
Passing No. 200 sieve	1 to 8

The asphaltic material shall form from 3.5 to 7 percent of the mixture by weight.

TYPE "B" (Fine graded Base or Leveling-up course)	Percent Aggregate by Weight or Volume
Passing l" sieve	100
Passing 78" sieve	95 to 100
Passing 7/8" sieve, retained on 3/8" sieve	21 to 53
Passing 3/8" sieve, retained on No. 4 sieve	11 to 42
Passing No. 4 sieve, retained on No. l0 sieve	5 to 26
Total retained on No. l0 sieve	58 to 74
Passing No. l0 sieve, retained on No. 40 sieve	6 to 32
Passing No. 40 sieve, retained on No. 80 sieve	4 to 21
Passing No. 80 sieve, retained on No. 200 sieve	3 to 21
Passing No. 200 sieve	1 to 8

The asphaltic material shall form from 3.5 to 7 percent of the mixture by weight.

Type "C" (Coarse Graded Surface Course):	Percent Aggregate by Weight or Volume
Passing 7/8" sieve	100
Passing 5/8" sieve	95 to 100
Passing 5/8" sieve, retained on 3/8" sieve	16 to 42
Passing No. 4 sieve, retained on No. l0 sieve	11 to 37
Total retained on No. l0 sieve	54 to 74
Passing No. l0 sieve, retained on No. 40 sieve	6 to 32
Passing No. 40 sieve, retained on No. 80 sieve	4 to 27
Passing No. 80 sieve, retained on No. 200 Sieve	3 to 27
Passing No. 200 sieve	1 to 8

The asphaltic material shall form from 3.5 to 7 percent of the mixture by weight.

TYPE "D" (Fine Graded Surface Course):	Percent Aggregate by Weight or Volume
Passing l/2" sieve	100
Passing 3/8" sieve	85 to 100
Passing 3/8" sieve, retained on 4" sieve	21 to 53
Passing No. 4 sieve, retained on No. l0 sieve	54 to 74
Total retained on No. l0 sieve	54 to 74
Passing No. l0 sieve, retained on No. 40 sieve	6 to 32
Passing No. 40 sieve, retained on No. 80 sieve	4 to 27
Passing No. 80 sieve, retained on No. 200 sieve	3 to 27
Passing No. 200 sieve	1 to 8

The asphaltic material shall form from 4 to 8 percent of the mixture by weight.

TYPE "F" (Fine Graded Surface Course):	Percent Aggregate by Weight or Volume
Passing 3/8" sieve	100
Passing No. 4 sieve	95 to 100
Passing No. 4 sieve, retained on No. l0 sieve	58 to 73
Passing No. l0 sieve, retained on No. 40 sieve	6 to 26
Passing No. 40 sieve, retained on No. 80 sieve	3 to 13
Passing No. 80 sieve, retained on No. 200 sieve	2 to 11
Passing No. 200 sieve	1 to 8

The asphaltic material shall form from 3.5 to 6.5 percent of the mixture by weight.

(b) Tolerances: Deviations from job mix formula limited to:

(l) Sizes larger than the l0 sieve- Plus or Minus 4 percent.

(2) No. l0 sieve and smaller - Plus or Minus 3 percent.

(3) The deviation from the job mix formula shall be further limited in that the total deviation from the job mix formula between any two adjacent aggregate grades shall not exceed the allowable deviation for either one.

(4) Asphalt - Plus or Minus 0.3 percent.

(c) Density - The mixture shall be designed to produce an acceptable mixture within tolerance, at or near optimum density. The mixture molded in the laboratory should have the following percent of maximum theoretical density:

Minimum	Maximum	Optimum
96	98	97

(d) Stability: Minimum of 35 Hveem

Source Quality Control - Paving mixture and plant tests to be performed by laboratory selected and paid by the Owner, except as noted.

Job Mix Formula - The contractor shall submit a job mix formula, prepared by laboratory chosen by the owner, at least l0 days in advance of laying operations to allow time for review by the engineer. Substitution of one or more materials will require a new job mix formula and must be approved by the engineer.

The design of job mix formula whether for original submittal or revisions shall be paid for by the contractor.

Plant Tests - Check of raw material uniformity, quality and flow, hot bin gradations, temperature of mixture, mixture tests for density, stability and percent asphalt and other necessary tests to be performed bythe laboratory selected by the owner for each day's production.

Oil Asphalt - Producer to furnish certificates of compliance to the Engineer.

3. CONSTRUCTION METHODS

A. GENERAL

Condition of Base - The surface of the base shall be tight and free of debris. The prime coat shall be uniformly distributed, well penetrated and completely cured prior to application of the tack coat. If the mixture will adhere to the surface of the base without the application of a tack coat, the tack coat can be eliminated. If the surface of the base is one half (l/2") inch or more lower than the proposed bottom of the asphaltic concrete it shall be corrected by placing and compacting a level up course of the asphaltic concrete before the mat is placed on it.

Stockpiling, Storage, Batching and Mixing - Shall meet the requirements of Item 340, "Texas Highway Department l982 Standard Specifications for Road and Bridge Construction.

Weather Limitations - Shall be the requirements of Item 340,"Texas Highway Department l982 Standard Specifications for Road and Bridge Construction." With the added provision that no asphaltic concrete shall be placed when the surface on which the mat is to be placed is below 50 degrees F.

Thickness - Shall be as shown on plans. Unless shown otherwise on the plans, the maximum compacted thickness of any one course of asphaltic concrete shall be two and one-half (2-l/2) times the maximum aggregate size of the mixture being placed. The minimum shall be one (l) inch or one and one fourth (1-1/4) times the maximum particle size which ever is greater.

B. PLACING

Placing of Asphaltic Concrete shall be accomplished using an approved self propelled spreading and finishing machine with a heated vibrating screed capable of producing a surface that will meet the requirements of the typical cross section and the surface test, and when the mixture is dumped directly into the finishing machine shall have adequate power to propel the delivery vehicles in a satisfactory manner. The finishing machine shall be equipped with a flexible spring and/or hydraulic type hitch sufficient in design and capacity to maintain contact between the rear wheels of the hauling equipment and the pusher rollers of the finishing machine while the mixture is being unloaded.

The use of any vehicle which requires dumping directly into the finishing machine and which the finishing machine cannot push or propel in such a manner as to obtain the desired lines and grades without resorting to hand finishing will not be allowed. Vehicles dumping directly or indirectly into the finishing machine shall be so designed and equipped that unloading into the finishing machine can be mechanically and/or automatically operated in such a manner that overloading the finishing machine being used cannot occur and the required lines and grades shall be obtained without resorting to hand finishing.

Automatic screed controls will be required and shall meet the requirements item, 528 "automatic screed controls for asphaltic concrete spreading and finishing machines "Texas Department of Highways and Public Transportation 1982 Specifications for Construction of Highways, Streets and Bridges".

The screed shall be ski controlled using a ski of not less than l8' in length. Curb shoe control will not be allowed.

The spreading and finishing machine shall be maintained in good working order and operated by competent trained personnel.

The Engineer may require the contractor to place a test strip to prove the capability of the machine and the competency of the operating personnel to produce a satisfactory finished surface.

In dips and on curved surfaces where the ski control cannot be used, the surface will be controlled using a l0' straight edge.

Fillet areas, turn outs and other areas not accessible to the spreading machine may be hand laid provided a satisfactory surface is produced.

C. COMPACTION AND FINISHING

Compaction Requirements - The asphaltic concrete surface shall be compacted so that the compacted mixture will contain not more than seven percent (7%) nor less than three percent (3%) air voids.

The surface of the pavement, after compaction, shall be smooth and true to the established line, grade and cross section, and when tested with a l0 foot rolling straightedge, except as provided herein, the maximum deviation shall not exceed l/8 inch in l0 feet, and any surface not meeting this requirement shall be corrected as directed by the engineer.

Raking and Leveling - Minor leveling may be accomplished using asphalt rakes prior to compacting the surface. The surface shall be leveled by loosening the surface of the asphaltic concrete using an asphalt rake then adding or removing material and smoothing the surface. Any large aggregate worked to the surface in this process shall be removed before compaction. The large aggregate shall not be spread over the new asphaltic concrete surface.

Edges and joints with compacted asphalt or concrete gutters shall be carefully squared and excess material removed before compaction. Care shall be taken to see that NO excess material laps over onto the surface of existing asphaltic concrete paving or concrete gutters. Large aggregate worked to the surface in this process shall be removed. It shall not be spread over the new asphaltic concrete surface.

Rolling - In general rolling shall conform to the requirements of item 340 of the Texas Department of Highways and Transportation 1982 Specifications for Construction of Highways, Streets an Bridges except as modified herein.

It shall be the responsibility of the contractor to have rolling equipment available on the job to properly compact the paving mixture in place as required without delay to the lay down operation. Rollers provided shall meet the qualifications for their type as follows:

PNEUMATIC TIRE ROLLERS: The rollers shall be acceptable medium pneumatic tire rollers conforming to the requirements of the item, "Rolling (pneumatic tire)", Type B, unless otherwise specified on plans.

TWO AXLE TANDEM ROLLER: This roller shall be an acceptable power driven tandem roller weighing not less than 8 tons.

THREE WHEEL ROLLER: This roller shall be an acceptable power driven three wheel roller weighing not less than l0 tons.

THREE AXLE TANDEM ROLLER: This roller shall be an acceptable power driven three axle roller weighing not less than l0 tons.

Vibrating rollers will not be used without prior written approval of the engineer. Written approval will be granted only upon demonstration by the contractor that the roller and operator can produce a satisfactory surface within the tolerances of these specifications. Only the operator or operators thus approved will be allowed to operate the vibrating roller on this project.

Areas not accessible to standard rollers shall be compacted using trench rollers, impact tampers, hand tamps or other approved means that will produce the density and surface required.

JOINTS- Shall be carefully rolled to provide compaction of the asphalt against the existing surface or face of the concrete gutter. Joints between concrete gutters and Hot Mix Asphaltic Concrete shall be placed so that the HMAC will be approximately l/2 inch higher than the concrete when compaction is completed. At transverse joints such as valley gutters and fillet areas where finishing asphalt paving 1/2 inch above the edge of concrete will adversely affect ride quality the asphalt shall be finished 1/4 inch above the edge of the concrete.

Transverse joints shall be rolled in the transverse direction with the first pass extending approximately six (6") inches onto the new asphalt each additional pass shall extend approximately twelve (12") inches further onto the new asphalt until the full width of the roller is on the new asphalt. Longitudinal rolling may begin then.

All transverse joints shall be checked with a l0" straight edge while the material is

still hot enough to roll. Any corrections shall be made by loosening the material using an asphalt rake and adding or removing material and recompacting the surface. The surface shall be rechecked and when the joint is acceptable the asphalt spreading machine may proceed with the pass.

Final or finish rolling shall be accomplished using a two axle tandem roller to remove roller marks. This rolling shall be accomplished after the surface has cooled sufficient to minimize further marking but before it is too cool to respond to rolling.

STRAIGHTEDGES AND TEMPLATES - The contractor shall provide acceptable l0 foot straightedge for surface testing. Satisfactory templates shall be provided as required by the Engineer.

4. FIELD QUALITY CONTROL

Test Lots - Field Quality Control Tests shall be made by lot with a lot being the amount of contiguous surface laid in one day. No lot shall exceed l0,000 S.Y. If a days laying exceeds l0,000 S.Y., that days laying shall be divided into two approximately equal lots. The same lot divisions shall be used for all Quality Control Tests. Each separate block or combination of contingeous (blocks) of paving shall be considered as a separate lot even though they may be placed in a single day and do not comprise l0,000 S.Y. of surface.

Surface Tests - Surface tolerance tests will be performed in both longitudinal and transverse directions. The test for longitudinal surface tolerance will be performed with a ten-foot rolling straightedge furnished by the contractor, and calibrated and used in accordance with the manufacturer's recommendation or other approved method.

The maximum allowable deviation in surface shall be 1/8 inch in 10 feet. Tests for longitudinal surface tolerance will be performed by the contractor, accompanied by the engineer within 24 hours of the completion of a lot. One path in each lane for the length of the entire lot will be tested. The location of the test path (Distance from centerline or pavement edge) will be determined by the engineer through the use of random numbers. Any deviations in the surface finish of a roadway wearing course which exceeds l/4 inch must be corrected. After corrections have been made, the entire lot must meet the l/8 inch surface tolerance.

Thin course "scab on" patching will NOT be permitted. Corrections may be made by planning, milling and patching or by removing and replacing affected surface area.

When milling and patching is used to correct surface defects the minimum depth of removal shall be l".

For milling and patching or surface removal the area removed or milled shall be sufficiently large to avoid the appearance of patching.

When planning is used to correct defects the thickness of the remaining paving shall meet the thickness requirements as shown on the plans.

Surface tolerance test will be performed on the last or wearing course only.

Asphaltic concrete pavement constructed under these specifications that does not meet the surface tolerance requirements and is allowed to remain in place will be paid for at a reduced rate determined by multiplying the price bid for the wearing surface course by a surface tolerance quality factor. This rate shall apply to the entire lot.

Lower courses will not be affected by this quality factor but will be paid for at the price bid or such price as it may be affected by other quality factors.

The surface tolerance quality factor will be determined according to the following schedule:

Linear % of pavement exceeding 1/8 inch surface tolerance			Surface tolerance quality factor
0.0	to	1.0	1.0
1.1	to	1.5	0.9
1.6	to	2.5	0.8
over		2.5	0.5

Roadway surface requirements will not be applied for paved drives, aprons, turnouts, and other irregular sections, however, asphaltic concrete shall be placed in such a manner as to provide a neat and uniform appearance and shall be compacted by methods satisfactory to the engineer.

The contractor may request permission to reconstruct a portion of the pavement when, in his opinion, the surface tolerance quality factor can be improved. Upon approval of the engineer, the contractor shall take sufficient tests to isolate the portion or portions of pavement to be pre- constructed and remove and reconstruct the pavement. All costs in connection with this reconstruction are to be born by the contractor. The minimum width of this reconstruction shall be l/2 the street width unless approved otherwise in writing by the engineer. The portions reconstructed shall be re-tested and the surface tolerance quality factor recomputed using the new information along with the test from the area within the portion of the lot not reconstructed.

When other quality factor reductions are provided for on the plans or in the specifications the effect shall be cumulative ie: QFl x QF2 x QF3 x ....x QFn x unit price.

No payment will be made for pavement with a combined quality factor of less than 0.5.

Thickness Test - Thickness test will be made by the engineer on each course of asphaltic concrete laid. Test specimens shall be made by a commercial laboratory selected by the owner. Test specimens shall be cores having a minimum nominal diameter of 6". These cores shall be made in the presence of the inspector at locations designated by the inspector using an approved power operated coring machine.

For thickness and compaction test, each lot shall be divided into approximately equal sublots corresponding in width to each pass of the lay down machine and containing up to but not exceeding 2,000 square yards each. If a lot contains less than 2,000 square yards the engineer may, at his option, divide the lot into two equal sublots, or, if the contractor has a record of satisfactory workmanship, the engineer may waive tests on said lots.

The engineer will locate one test spot for each l,000 S.Y. and/or fraction thereof in each sub-lot using random numbers. If a spot thus located falls within one foot of a longitudinal joint or lip of gutter or within two feet of an unsupported edge or within l5 feet of the beginning or ending edge of a pass, the engineer will relocate the spot using random numbers. The commercial laboratory chosen by the owner will remove the test specimen from each designated spot, mark the specimen and the adjacent pavement for future reference and perform the required tests. Test specimens shall be removed with special caliper type tongs having circular jaws of the diameter of the specimen being removed. These jaws shall grip at least 1/2 of the circumference of the specimen. Screw drivers or other type of prying instruments shall not be used to remove the specimens.

The thickness of a specimen shall be determined by averaging four (4) measurements made at ninety degree (90) intervals around the specimen. Any thickness less than design thickness shall be considered as deficient.

For hot mix asphaltic concrete pavement less than 2 inches thick the maximum allowable deficiency in any one test specimen is l/8 inch provided that no more than twenty five percent (25%) of the specimens tested show a deficiency. For pavement in excess of 2 inches in thickness the maximum allowable deficiency in any one specimen shall be l/8 inch plus l/l6 inch for each additional inch of thickness provided that no more than twenty five percent (25%) of the test specimens show a deficiency.

When a test specimen has a greater deficiency and less than (25%) of the test specimens show a deficiency the contractor shall, at his own expense, determine the extent of the deficiency and correct it by removing and replacing the surface. The minimum width for such correction will be the full width of the pass or passes of the lay down machine in which the deficiency occurs.

The minimum length of such correction shall be three times the width removed. When more than (25%) of the test specimens show a deficiency the surface may at

the engineers option be declared uniformly deficient and the contractor shall correct the deficiency by removing and reconstructing the surface or by constructing an overlay of not less than l inch thickness over the deficient area. The construction of an overlay will require milling at lip lines and dips.

The corrected surface shall meet all the requirements of these specifications.

Asphaltic concrete pavement constructed under these specifications that is less than design thickness, if allowed to remain in place, will be paid for at a reduced rate determined by multiplying the unit price bid in the bid proposal by a thickness quality factor. This rate shall apply to the entire lot in which the deficiency is found.

The thickness quality factor for hot mix asphaltic concrete pavement less than 2 inches in thickness shall be:

Thickness Deficiency	Quality Factor
Maximum l/8" for any one specimen with no more than 25% of the specimens showing a deficiency.	l.0
Pavement not meeting the 25% limitation with an average specimen deficiency up to l/8 inch.	0.75
Average specimen deficiency of l/8 inch to l/4 inch	.55
Average deficiency of more than l/4 inch	0.0

The thickness quality factor for hot mix asphaltic concrete more than 2 inches thick will be l.0 if the maximum deficiency for any one specimen is l/8 inch plus l/l6 inch for each additional inch of thickness over 2 inches and not more than twenty five percent (25%) of the test specimens in the lot are deficient. For thickness test that fall outside this area either by single specimen thickness deficiency or more than twenty five percent (25%) of the specimens showing deficiency the thickness quality factor shall be computed as follows:

$$\text{Thickness Quality Factor} = \frac{1}{\left(\frac{1}{\text{Thickness Ratio}}\right)^2}$$

The thickness ratio for a lot is the average specimen thickness for that lot, with no allowance for thickness in excess of design, divided by the design thickness. For determining the average specimen thickness, those specimens in excess of design thickness shall be considered at design thickness.

The minimum thickness quality factor for which payment will be allowed is .55. Any pavement with a thickness quality factor below .55 will be considered as having a thickness quality factor of 0. This shall apply only if the contractor requests, in writing, to have this paving remain in place and this request is approved in writing by the engineer.

When the deficient area is in a lower course of a multi-course paving structure the contractor may reduce or correct the deficiency by increasing the thickness of the subsequent course or courses as follows:

When subsequent course is	Maximum increase in course thickness
Type B	1/2"
Type C	3/8"
Type D	1/4"

When corrected in this manner the thickness quality factor shall be determined using the combined thickness of the corrected courses and shall apply to all unit prices applicable to this lot.

The contractor may request permission to reconstruct a portion of the pavement when, in his opinion, the thickness quality factor can be improved. Upon approval of the engineer, the contractor shall take sufficient tests to isolate the portion or portions of pavement to be reconstructed and remove and reconstruct the pavement. All cost in connection with this reconstruction are to be born by the contractor. The minimum width of this reconstruction shall be l/2 the street width unless approved otherwise in writing by the engineer. The portions reconstructed shall be retested and the thickness quality factor recomputed using the new information along with the test from the area within the portion of the lot not reconstructed.

When other quality factor reductions are provided for on the plans or in the specifications the effect shall be cumulative ie: QFl x QF2 x QF3 x....x QFn x unit price.

No payment will be made for pavement with a combined quality factor of less than 0.5.

Compaction Test: Compaction test will be made by the commercial laboratory chosen by the owner on the core samples removed from the paving for thickness testing.

The percent air voids will be calculated using maximum theoretical specific gravity of the mixture.

The contractor may attempt to correct deficiencies in compaction by additional pneumatic rolling upon written permission of the engineer. Requests for permission to conduct additional rolling shall be submitted, in writing, to the engineer no later than three days following notification of the deficiency by the commercial laboratory and the additional rolling shall be completed within ten (l0) days following said notification weather permitting.

In no case shall the additional rolling be delayed beyond thirty (30) days from the date the surface was laid. All cost for additional rolling and additional coring and testing of the re-rolled surface shall be born by the contractor.

Asphaltic concrete pavement not meeting this specification and that is allowed to remain in place shall be paid for at a reduced rate determined by multiplying the price bid in the bid proposal by a compaction quality factor determined according to the following schedule:

Percent air voids (average of all specimens for the lot)	Compaction Quality factor	
less than 3	0	
3.0 to 8.0	1.0	
8.1 to 9.0	0.9	
9.1 to 10.0	0.7	
10.1 to 11.0	0.5	and the engineer may require a chip seal to be applied at the contractor's expense
More than 11		0 and the engineer may require a chip seal to be applied at the contractor's expense.

NOTE: HMAC surfacing with between 11% and 15% air voids may, upon written request by the Contractor, be reviewed by the Engineer to determine if it may be left in place. The Engineer's review will consider the type of street and expected traffic conditions among other factors and a written determination will be issued. If the surface is allowed to remain in place, a chip seal will be required at the Contractor's expense. The quality factor for this paving will remain at 0.

The reduced rate shall apply to the entire lot.

The effect of compaction quality factors shall be cumulative and shall be applied as described for surface quality factors and thickness quality factors.

Cost for Field Quality Control - The surface tolerance test shall be made by the contractor at his expense.

The initial thickness and compaction test will be made at no cost to the contractor except for the cost of materials and labor to repair the holes left when cores are removed.

The cost of all thickness test to isolate a deficient area and the cost of retesting the corrected area shall be born by the contractor.

The cost of all retesting of compaction after additional rolling to correct compaction deficiencies shall be born by the contractor.

Areas reconstructed to remedy deficiencies shall meet all the requirements of these specifications and shall be tested in the same manner as original construction. The cost of all tests on reconstructed areas shall be born by the contractor.

5. ADDITIVES

Anti-stripping: An approved liquid anti-stripping agent shall be added to the asphalt used in the hot mix asphaltic concrete. The rate of application shall be in accordance with the manufacturer's recommendation. The minimum anti-stripping agent added shall be one-half (l/2) of l%.

The anti-stripping agent used shall have a proven record when used with similar aggregate and shall be approved by the engineer in writing prior to the date set for reception of bids.

08/07

P.V.C. PIPE CASINGS

1. SCOPE

   This item consists of furnishing and installing PVC pipe for casing for future water and electric lines at locations shown on the plans or as directed by the Engineer.

2. MATERIAL

   Pipe shall be ASTM D 1785 schedule 40 PVC pipe or ASTM D 2241 PVC SDR 32.5 pressure pipe. The ASTM designation and schedule or SDR shall be clearly marked on the outside of the pipe.

3. CONSTRUCTION

   Pipe shall be laid in straight alignment and grade in trenches as narrow as the diameter of the pipe can be laid. Pipe shall be placed after the sub grade is prepared but before base material is placed. Bedding under the pipe shall be a minimum of 2 inches in thickness and shall be carefully graded and leveled before pipe is placed. Joints shall be water tight. They may be solvent cement welded using approved materials, or may be made using a gasketed collars or push on gasketed bell and spigot. When collars are used care shall be exercised to assure that the collar is centered over the joint. All joints shall be made in accord with the manufacturer's recommendations. After pipe has been joined and inspected the pipe shall be encased in bedding/encasement material to a thickness of 3 inches above the pipe. Care shall be exercised to be sure the encasement material is worked in under the haunches of the pipe and compacted along the side of the pipe to assure adequate lateral support. The balance of the trench shall be back filled using cement stabilized backfill consisting of 2 sacks of Portland cement to 1 cubic yard of blow sand or crushed caliche mixed with sufficient water to form a stiff place able mixture that can be consolidated in the trench by rodding or vibrating. The back fill shall be "struck off" at the finished sub grade level using square point shovels or suitable screeds. The ends of the pipe shall be tightly plugged to prevent the entrance of water debris or other foreign material. These plugs shall be PVC or rubber stoppers designed to endure until the water lines and/ or electric lines are places.

4. MEASUREMENT AND PAYMENT

   Casing pipe shall be measured by the linear foot along the center of the pipe and shall be paid for at the unit price in the bid proposal.

WATER LINE SPECIFICATIONS

1. SCOPE OF WORK

The work covered by this section consists of all water pipe lines and piping, including valves, valve boxes, tapping sleeves, fire hydrants and other accessories, required to complete the project. The contractor shall furnish all materials, labor, superintendence, tools, equipment and incidentals necessary for the complete construction of this work in accordance with the drawings and these specifications.

2. PIPE AND MATERIAL

2.1 General

Pipe shall be polyvinyl chloride (PVC) AWWA C900, ductile iron AWWA C-151 or steel cylinder concrete pipe AWWA C-303.

2.2 Polyvinyl Chloride (PVC) Pipe

A. PVC pipe furnished for use on this project shall conform to the requirements of AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for water distribution pressure class 150, DR18. and shall be NSF approved for potable water supply.

B. The pipe furnished shall have an integral bell designed for joint assembly using elastomeric seals.

C. Markings for the pipe shall include all the requirements of AWWA C900 and the MSF approval stamp.

D. Elastomeric seals shall be furnished by the pipe manufacturer. Seals shall be manufactured to conform with the requirements of ASTM F4 77 and shall be specifically designed for use with the pipe furnished.

E. Lubricants intended for use with PVC pipe and seals (gaskets) shall be compatible with both PVC and the seal material. Lubricant shall not support growth of bacteria and shall not adversely affect the potable quality of the water that is to be transported.

F. Pipe laying lengths shall be 20'.

G. Service taps on PVC water lines shall be made using hinged type or double strap type saddles. Tapping saddles shall support the full circumference of the pipe and shall have a bearing area of sufficient width along the axis of the pipe to prevent distortion of the pipe when saddle is tightened.

No direct taps into the wall of PVC pipe will be permitted.

Seals for tapping saddles shall be recessed into the body of the saddle and shall be

a rubber - compound conforming to the requirements of ASTM F477.

Tapping saddles shall be SMITH-BLAIR Taper Seal Style 313 or DMD Dresser style 194 or approved equal.

H. Tapped connections for water mains and fire lines made on PVC water mains shall be accomplished using full bodied ductile iron tapping sleeves of a pressure rating equal to or greater than the pressure rating of the pipe specified.

I. Bedding for AWWA C900 PVC water pipe shall extend from a minimum depth of 4 inches below the outside of the water line to a minimum cover of 6 inches over the top outside of the water line.

J. AWWA C900 PVC water pipe shall be installed in accord with the applicable requirements for installing ductile iron pipe.

Care shall be taken to install each joint of PVC water pipe to, but not beyond the factory insertion mark on the pipe.

When a joint of PVC water pipe must be cut, the end of the pipe shall be carefully beveled to match the factory bevel on the uncut pipe. An insertion mark matching the factory insertion mark on the uncut pipe must be made before the pipe is inserted into the bell.

When PVC water pipe is to be inserted into a ductile iron fitting or valve, the factory bevel must be removed to form a square plain end pipe.

2.2 (a) Metallic Marking Tape (For PVC Water Pipe)

2.2(a).1 General

When non-metallic pipelines are to be installed, then the Contractor shall furnish and lay, above the pipeline, a continuous strip of metallic identification tape.

2.2 (a).2 Tape Material

The metallic identification tape shall be at least two inches (2”) in width and shall be of corrosive resistant metal of sufficient thickness to be stable and reflect electronic signals to electronic pipeline detector when buried to a dept of twenty-four (24”) below normal ground level.

The metallic tape shall be painted blue on one side and shall have 1-inch high letters painted continuously on the same side of the tape which read, “CAUTION: BURIED WATER LINE BELOW” or other words to this effect.

The marking tape shall be “Detectable Warning Tape”, as manufactured by the Omega Marking Company, or equal approved by the Engineer.

2.2(a).3 Construction Methods

The Contractor shall backfill over non-metallic pipelines to a depth which is less than twenty-four (24”) and not more than twelve inches (12) from the top of the cut of the ditch section in which the pipeline is laid. Contractor shall stop the backfilling material to a generally uniform level. All machine tamping, jetting and other compaction activities shall be accomplished up to this point of height in the backfilling the marking tape is placed in the trench.

The Contractor shall then lay the marking tape in the pipe trench and shall be held in position by the spot placement of backfill materials over it to keep it from sliding t the sides and/or from being blown about in the ditch by the wind. The tape shall be lid with the painted side, which shall also be the side with the identification lettering on it, in the “up” position. The tape shall be laid in the flat position and kept there until backfill is accomplished.

The Contractor shall then complete the backfilling operation in such a manner that the marking tape is not cut, crimped, ruptured or separated by the backfilling work.

2.2(a).4 Measurement and Payment

No separate pay item will be provided for furnish and placing the marking tape. This item shall be considered subsidiary to the non-metallic pipe being placed.

2.3 Ductile Iron Pipe

A. All ductile iron pipe used in the construction of water works improvements shall be Cement Lined and shall be manufactured in accordance with and shall meet the requirements of AWWA Specification C-l5l.

B. Pipe shall be cast in lengths of not less than l2 feet and shall be designed for a working pressure of l50 pounds per square inch. Thickness of ductile iron pipe shall be as shown on the plans and bid proposal or shall be computed in accordance with AWWA Specification C-l50, based on l50 pounds per square inch working pressure for 10 feet of cover and laying condition 2.

C. All ductile iron pipe shall have an exterior, bituminous coating and an inside cement-mortar lining in accordance with the requirements of AWWA Specification C-l04.

2.4 Polyethylene Plastic Tubing

Service lines shall be constructed with polyethylene plastic tubing as specified in ASTM D 2737 with a rating of l60 psi.

2.5 Ductile Iron Pipe Fittings

All fittings for ductile iron pipe and PVC pipe shall be ductile iron and shall be mechanical joint all connections except tees for fire hydrant leads unless shown otherwise on the plans. Tees for connecting fire hydrant leads shall be MJ- with a flange outlet.

All ductile iron fittings shall conform to AWWA Specification C-110, designed for a working pressure of 250 psi. All ductile iron fittings shall have an external coating and shall be cement lined in accordance with the specifications for coating and lining the pipe.

2.6 Pretensioned Concrete Cylinder Pipe

A. The contractor shall furnish and install all concrete cylinder pipe and fittings, including connections and appurtenances complete as shown on the plans and specified herein.

B. The contractor shall submit six (6) sets of full and complete shop drawings on the concrete cylinder pipe and fittings. All of the drawings and data shall be complete and shall include a complete description of the pipe offered, including cuts, tabulated layout and all pertinent engineering data required for a complete evaluation of the submittal. Submittal data shall be in such form and so presented that the Engineer may readily review the data.

C. Prior to delivery of the pipe to the project site, the manufacturer shall furnish an affidavit certifying that all pipe, fittings, and specials, and other products and materials furnished, comply with the applicable provisions of this specification.

D. The pipe manufacturer shall furnish a factory trained, job experienced field representative who shall visit the project periodically during the course of installation. He shall also be subject to call by the contractor and/or engineer to advise and assist with the solution of field problems.

During visits, the representative shall observe all phases of the project including location and condition of pipe strung ahead of the contractor, trench width, if applicable, bedding and backfill, assembly of pipe joints and protection of steel. If, in the opinion of the representative any phase of the installation is unsatisfactory, he shall so advise the contractor's superintendent and also advise the owner or engineer's representative on the job site.

E. All closure sections shall be the jack on type and "field welding" will not be permitted without the written permission of the engineer.

F. Pipe manufacturer will install all necessary taps for the contractor to disinfect and field hydrostatic test the pipe.

G. Pretensioned concrete cylinder pipe, fittings and specials shall be designed, fabricated and tested in accordance with the latest requirements of AWWA C-303, "Reinforced Concrete Pressure Pipe Steel Cylinder Type, Pretensioned, for Water and Other Liquids" with additional requirements or modifications as described herein.

H. Pretensioned concrete cylinder pressure pipe shall be designed for l50 psi, working pressure and manufactured in 32 foot nominal lengths in accordance with the provisions of AWWA Standard C-303.

I. Inspection and Testing

(1) The owner reserves the option to have an independent testing laboratory, at the owner's expense, inspect pipe and fittings at the pipe manufacturer's plant to ensure compliance with the applicable specifications. The owner's testing laboratory and Engineer shall have free access to those parts of the manufacturer's plant that are necessary to ensure compliance with the governing standard. The pipe manufacturer shall notify the owner, in writing, at least two weeks ahead of pipe fabrication as to start of fabrication and fabricating schedule so that the owner can advise the manufacturer as to owners' decision regarding tests to be performed by an independent testing laboratory. In event the owner elects to retain an independent testing laboratory to make material tests and weld test, it is the intent that the tests be limited to one spot testing of each category unless the tests do not show compliance with the standard. If these tests do not show compliance, the owner reserves the right to have the laboratory make additional tests and observations to ensure compliance of the finished product with the standard.

(2) In any event, the manufacturer shall perform the tests described in AWWA C 303, and furnish the owner with a copy of the test reports, if requested, at the expense of the pipe manufacturer. The pipe manufacturer shall furnish the owner with affidavit of compliance as outlined in the standard.

(3) All welds for water tightness in special pipe and fittings that have not been hydrostatically tested may be examined by use of visible dye penetrant system meeting requirement of ASTM El65; however, collar reinforcement and all other lap welds shall be tested by introducing air under l0 psi pressure between the collar and cylinder and checking for leaks around and through the welds with soap solution.

The area to receive the dye penetrant shall be cleaned free from contaminants that might interfere with the penetrant process. The temperature of the steel in the weld area shall be between 60 and l25 degrees F. when the penetrant is applied. Dwell time of six hours shall be allowed after application of the penetrant and developer before interpreting the results.

Defects that are found shall be repaired and the test repeated until all defects

are eliminated. Colored penetrant shall be removed before fittings are lined.

2.7 Casing Pipe

Casing pipe to be installed in bore or open cut may be limited service pipe, corrugated galvanized steel pipe or new straight seam or spiral welded steel pipe. Casing pipe shall be furnished in thickness or gage as shown on the plans.

Limited service pipe proposed for use on this project must be approved a minimum of four (4) working days prior to the time of opening bids and shall be in good condition and shall meet the same service requirements as the corrugated galvanized steel or welded steel pipe.

Welded steel casing pipe shall be coated inside and out using a coal tar epoxy or shall be bituminous coated in side and out by the hot dip method.

2.8 Bedding Materials

A. All water pipelines placed on this project shall be bedded with crushed stone bedding materials to the minimum as shown on the plans and in the Detail Drawings.

B. Granular material furnished for foundation, bedding, encasement, backfill, or other purposes as may be specified, shall consist of any natural or synthetic mineral aggregate such as, crushed gravel, crushed rock, crushed stone, or slag, and shall conform to the following specifications and/or gradation.

Note, all materials used for these purposes shall be crushed and shall have at least two broken faces. Pea gravel will NOT be allowed.

	Foundation	Bedding	Encasement	Backfill
ASTM c33 Grade #57	X			
ASTM C33 Grade #67	X			
ASTM C33 Grade #8		X	X	
THD 1982 ITEM 302 Type "D" Grade #4		X	X	
THD 1982 Item 302 Type "D" Grade #5			X	
Crusher Fines**			*X	X

* 100 percent of crusher fines that are to be used within 12 inches of the top of pipe must pass the 3/4" sieve.

** Approximate Gradation for Crusher Fines

Sieve Size	% Passing
2 inch	100
#4	35 - 100
#10	20 - 100
#40	5 - 35
#200	4 - 10

Crushed stone material proposed as an alternate for use on this project and not meeting the above specifications must be approved in writing at least 48 hours prior to the time scheduled for opening bids.

C. Granular materials provided for Foundation, Bedding, Encasement, or backfill use as required by the contract, either as part of the pipe item work unit or as a separate contract item, shall be classified as to use in accordance with the following:

MATERIAL USE DESIGNATION	ZONE DESIGNATION
Granular Foundation	Placed below the bottom of pipe grade as replacement for unsuitable or unstable soils, to achieve better foundation support.
Granular Bedding	Placed below the midpoint of the pipe prior to pipe installation, to facilitate proper shaping and achieve uniform pipe support. Also for Class B Bedding where specified.
Granular Encasement	Placed below an elevation one half (6") foot above the top of pipe, after pipe installation, for protection of the pipe and to assure proper filling of voids and thorough consolidation of backfill.
Granular Backfill	Placed below the surface base course, if any, as the second stage of backfill, to minimize trench settlement and provide support for surface improvements.

In each case above, unless otherwise indicated, the lower limits of any particular zone shall be the top surface of the next lower course as constructed. The upper limits of each zone are established to define variable needs for material gradation and compaction or void content, taking into consideration the sequence of construction and other conditions. The material use and zone designations described above shall only serve to fulfill the objectives and shall not be construed to restrict the use of any particular material in other zones where the gradation requirements are met.

3. **VALVES AND VALVE BOXES**

3.1 General

A. Valves 4" through l2" shall be resilient seated gate valves with non-rising stems and shall open by turning to the left (counter clock wise).

B. Valves l4" and larger shall be resilient seated butterfly valves and have operators suitable for direct burial and shall open by turning to the left (counter clock wise).

All valves except valves for use in fire hydrant leads shall have mechanical joint ends unless shown otherwise on the plans. Valves for use in fire hydrant leads shall be flange by mechanical joint.

C. All valves and fire hydrants shall be spray coated with a two component thermal setting epoxy to cover all interior wetted ferrous surfaces. Finished coating shall have a minimum thickness of 4 mils. The coating shall conform to the coating section of these specifications.

D. All valves for buried service shall be equipped with 2" square AWWA operating nuts.

3.2 Gate Valves

A. Gate valves shall be iron body, resilient **wedge gate** and shall be in compliance with AWWA Standard C-509-80 or latest revision thereof and shall have the following design features:

B. All valves shall have a working pressure of 200 psi and shall be bottle tight tested at this pressure from both directions. The gate body shall also be hydrostatically tested at 400 psi. Zero leakage will be required in all tests. The body, bonnet, and stuffing box shall be flange together with ASTM A-307 Grade B bolts and nuts to insure repairability.

C. Stems shall be machined from modified manganese bronze rod with an integral forged thrust collar machined to size.

D. Stem seals shall be dual "O" ring type.

E. Valve discs shall be rubber encapsulated or have disc seat rings molded of natural rubber, internally steel reinforced retained to the disc by self-locking type 304 stainless steel screws. Valve gates shall seat against a machined epoxy coated mating surface in the body of the valve.

F. All internal ferrous metal surfaces (machined or cast) shall be factory spray coated with a two component thermosetting epoxy to a nominal thickness of 4 mils and the exterior shall be coated with asphalt varnish as specified for coating of the pipe. (See Sec. 3.4 of these specifications for epoxy coating).

G. Valves shall be Mueller A-**2360** or Dresser-M&H **4067** or approved equal. Any alternate (approved equal) to these specifications **shall have completely interchangeable parts with either of the specified valves.**

3.3 Butterfly Valves

A. General - All butterfly valves shall be of the rubber seated tight-closing type. They shall meet or exceed AWWA Standard C-504, Class l50B. Both valve ends shall be mechanical-joint per AWWA Standard C-lll. Accessories (bolts, glands, and gaskets) shall be supplied by the valve manufacturer.

B. All valves must use full AWWA C-504 Class l50 B valve shaft diameter, and full Class l50 B underground service operator torque rating throughout entire travel, to provide capability for operation in emergency service.

C. Valve body shall be high strength cast iron ASTM A 126 Class B with l8-8 type 304 stainless steel body seat. Valve vane shall be high strength cast iron ASTM A 48 Class 40 or ASTM A 536, Grade 65-45-l2 ductile iron having rubber seat mechanically secured with an integral l8-8 stainless steel clamp ring and l8-8 stainless steel self locking screws.

D. Rubber seat shall be a full circle 360^{o} seat not penetrated by the valve shaft. Valve shall have permanently set two way thrust bearing. Packing shall be designed for permanent duty in underground service.

E. Valve operator shall be of the traveling nut type, sealed, gasketed and lubricated for underground service. It shall be capable of withstanding an overload input torque of 450 ft. lbs. at full open or closed position without damage to the valve or valve operator. It shall be designed to resist submergence in water to 25 ft. head pressure. Number of turns to operate valve shall be as listed below in order to closely resemble conventional distribution valve practices and to minimize water hammer:

Pipe and Valve Size	Turns to close	Pipe and Valve Size	Turns to Close
4" - 6"	16-1/2	14" - 16"	48"
8"	24	18" - 20"	72
10" - 12"	36	24"	90

F. Valves shall be capable of easy closure by one man using standard valve key, even under emergency line-break conditions as severe as those that would - cause a valve maximum opening torque requirement of as much as two times AWWA Class l50 B.

G. All valves shall be tested bottle-tight at rated working pressure by the manufacturer as follows:

l4" up. . . . . l50 psi

In addition a hydrostatic test with vane partially open shall be given to the assembled valve as follow:

l4" up. . . . . 300 psi

H. Valve shafts shall be l8-8 type 304 stainless steel. Shaft bearings shall be of the self lubricating sleeve type.

I. Valve discs or vanes for valves 30" and larger shall be the flow through (bridge or truss) type.

J. Butterfly valves shall be Dresser-M&H Model "450", "4500" or "l450" or Mueller line seal III or approved equal. Alternates (approved equal) to these specifications must be approved in writing 48 hours prior to time bids are received.

3.4 Coating

A. The coating shall be a two part thermosetting epoxy protective coating and shall function as a physical, chemical and electrical barrier between the base metal to which it is applied and the surroundings.

B. The coating shall be non-toxic and shall not impart taste to water. The coating must be formulated from materials deemed acceptable per the FOOD AND DRUG ADMINISTRATION DOCUMENT TITLE 2l of the FEDERAL REGULATIONS ON FOOD ADDITIVES SECTION l2l.25l4 entitled, RESINS AND POLYMERIC COATINGS.

C. The coating shall have a satin finish and shall be suitable for field over coating and touchup with same coating material without sanding or special surface preparation, or application of heat in excess of room temperature.

D. The coating shall have a successful record of performance in valves, pipe or other allied equipment for a minimum of two years.

E. The coating adhesion to the substrate shall exceed cohesion of the coating film as demonstrated by the following test:

(1) Prepare test panel and apply coating per manufacturer's recommendation.

(2) After sample has properly cured per manufacturer's recommendation, scribe an "X" using a sharp knife or scalpel through the coating to the metal substrate.

(3) Then with the point of the knife at the juncture of two scribes, attempt to lift off coating. Coating should not lift off substrate or between coats readily, but should break up leaving coating material on the substrate of this damaged area.

(4) No disbandment of the film shall be noted as tested above after immersion in tap water for l500 hours at l00`F.

F. A falling sand abrasion test using ASTM D968 shall produce an abrasion coefficient of 25-30 liters/mil. As an alternative, a Taber Abrader Test should find 3.5 - 3.7 milligrams coating loss per l00 cycles when using a CSF l0 Wheel (l000 gram weight).

3.5 Valve Boxes

All valves to be used in buried service shall be enclosed in cast iron valve boxes. Care shall be taken to place and maintain the 2" square operating nut in the center of the valve box. The valve box shall be two piece cast iron suitable for use with PVC pipe box risers. The 6 inch diameter cover shall be marked " Water". The PVC riser pipe shall be furnished in lengths as required (minimum pipe cover 42") PVC pipe for valve box riser may be ASTM C-900, ASTM D1785 schedule 40, ASTM D2241 pressure class 125 or ASTM D3034 DR 35. Valve boxes shall have a concrete ring 8" thick and having a radius equal to the radius of the valve box plus one foot (1') cast around them. Valve boxes placed in unpaved areas shall be set level with or slightly higher than the finished ground elevation. Valve boxes set in paved areas shall match the finished pavement surface.

3.6 Fire Hydrants

A. Fire hydrants shall conform to the requirements of AWWA C 502 dry barrel type. The fire hydrants shall be designed for a depth of bury of 4.5 feet, however the depth of bury may vary according to field conditions and extensions or shorter bury depth may be required.

B. The hydrants shall have a 5-l/4 inch valve opening, two 2-l/2 inch hose nozzles and one 4-l/2 inch pumper nozzle.

C. Hose threads shall be National Standard threads.

D. The hydrants shall be sized for 6-inch mains and shall have an inlet connection compatible with the type pipe used. All gaskets, nuts, bolts and other jointing materials shall be considered part of the fire hydrant installation.

E. Operating nut shall be standard l-l/2 inch pentagon opening counter-clockwise. The hydrant shall close with the pressure.

F. Hydrants shall be painted Federal Safety Yellow.

G. Fire hydrants shall have all interior wetted ferrous surfaces epoxy coated as required in the general and coating section of this item.

H. The hydrants shall have a minimum of two (2) drain holes located on opposite sides of the hydrant. The entire drainage channel must be made of non-corrosive material and sealed by acceptable resilient material (metal and/or leather seals are not acceptable).

I. The hydrants shall have a breakable safety flange and breakable stem coupling which breaks cleanly upon impact.

J. The hydrants shall be AWWA improved type hydrants and shall have self-oiling reservoirs.

K. Fire hydrants shall be the Mueller Centurion, the Dresser -M & H 929 Reliant, or The American Darling.

4. EXCAVATION, TRENCHING BEDDING AND BACKFILLING

4.l Trenching

A. The trench shall be excavated to the lines and grades as established by the engineer and as shown on the plans. The depth of cover for all main lines on which the grades and elevations are not shown on the plans, shall in general be Forty-two (42) inches. The amount of cover may vary over or under 42 inches as directed by the engineer but in no case will the amount of cover be less than thirty-six (36) inches. Depth of cover for service lines shall be as shown on the detail drawings.

B. Water lines constructed in proposed streets and service drives shall have the depth of cover measured from the finished grade. The contractor is hereby cautioned that proposed street finished grades are sometimes cut below the existing ground elevation.

C. The minimum width of the trench shall be the outside diameter of the pipe plus twelve (l2) inches for pipe diameter through l8", the outside diameter of the pipe plus eighteen (l8) inches for pipe diameters over l8". The trenching equipment shall be maintained on a sufficiently level road bed to provide substantially vertical trench walls. The maximum horizontal offset of the trench wall from bottom of trench to the top of the trench (under-cutting) shall be four (4) inches.

D. The trench shall be over excavated to an even grade to the depth of required bedding so that the bottom of the pipe will rest on a uniform thickness of bedding material on the bottom of trench throughout the entire length of the pipe. In order to obtain a true even grade, the bedding material shall be fine graded by hand. On lines that are to be laid to established grades batter boards shall be set at fifty foot intervals and the trench graded to the established grade.

E. Any part of the trench excavated below grade shall be corrected by filling with bedding material. The bedding material shall be thoroughly compacted.

E. If large rock, rock fragments or other unyielding materials are encountered in the bottom of the trench they shall be removed to a depth of six inches below grade, and the void filled with thoroughly compacted approved bedding material.

G. Bell holes of ample dimensions shall be dug at each joint to permit the jointing of pipe to be made properly and of sufficient depth to prevent the bell of the pipe from resting on undisturbed materials.

H. Wherever necessary to prevent caving, the trench shall be adequately braced and sheeted. Trench safety shall be in accordance with item l4 "Shoring and Sheeting of this specification.

I. Trench digging machinery may be used to make the trench excavations except in places where operation of same would cause damages to trees, buildings or other existing structures either above or below ground. In such instances hand trenching methods shall be employed.

J. All excavated material shall be stockpiled in a manner that will not endanger the work or existing structures and that will cause the least amount of obstructions to walks and driveways.

K. There will be no classification of the excavated materials and the term excavation shall include all materials encountered in excavating the trenches or structural excavations.

L. The contractor shall take all necessary precautions for protecting paved areas from being damaged by the trenching and backfilling equipment. Any damage done to any paved area, outside of the area set forth in the plans, as a result of the construction work shall be repaired by the contractor at his own expense.

M. Where the lines are located behind curbs, the contractor shall take special precautions to protect trees and shrubs. Care shall be exercised to cause as little damage to lawns as possible.

Where lines cross under curbs, gutters or curbs and gutters, tunneling will be required.

N. Blasting for excavation of solid rock will be permitted only after securing the

approval of the Director of Engineering and Transportation and the engineer and only when proper precautions are taken for protection of persons and property. The hours of blasting will be fixed by the engineer. Any damage caused by blasting shall be paid for by the contractor. The method or procedure relative to blasting shall conform to all state laws and local ordinances.

O. The contractor will be required to locate all known utility lines, including consumer service lines, far enough in advance of the trenching to make proper provisions for protecting the lines and to allow for any deviations that may be required from the established lines and grades.

P. The contractor shall not be allowed to disrupt the service on any utility lines except consumers service lines, which may be taken out of service for short periods of time, if the contractor obtains permission from the engineer and from the owner of the premises being served by the utility.

Q. The contractor shall immediately notify the proper utility company of any damage to utility lines, in order that service may be reestablished with the least possible delay. Repair of any damage to existing lines and the repair of consumer lines which are authorized to be cut or temporarily taken out of service shall be made by the contractor at his own expense, and as directed by an official representative of the utility company involved.

R. All utility lines shall be properly supported to prevent settlement or damage to the line both during and after construction.

S. Any permanent relocations of existing utility lines shall be done by the proper utility company without expense to the contractor.

4.2 Backfill General

A. All pipeline excavations shall be backfilled in a manner that will restore pre-existing conditions as the minimum requirement and fulfill all supplementary requirements indicated in the Plans and Specifications. The backfilling operations shall be started as soon as conditions will permit on each section of pipeline to provide continuity in subsequent operations and restore normal public service as soon as practicable on a section-by- section basis. All operations shall be pursued diligently, with proper and adequate equipment, to assure acceptable results.

B. Depositing of the backfill shall be done so the shock of falling material will not injure the structure. Grading over and around all parts of the work shall be done as directed by the Engineer.

C. Whenever soil types which are determined by the Inspector to be undesirable for backfill are excavated from the trench, such material shall be hauled away and deposited where directed by the Inspector at no additional compensation.

D. In the absence of special work item requirements the backfilling shall be accomplished with the use of suitable materials selected from the excavated

materials to the extent available and practical. Should the materials available from the trench section be unsuitable or insufficient, the required additional materials shall be furnished from outside sources at the Owners expense.

E. Suitable material shall be defined as a mineral soil reasonable free of foreign materials (rubbish, debris, etc.) frozen clumps, oversize stone, rock, concrete or bituminous chunks and other unsuitable materials, that may damage the pipe installation, prevent thorough compaction, or increase the risks of after settlement unnecessarily. Material selection shall be such as to make the best and fullest utilization of what is available, taking into consideration particular needs of different backfill zones. Material containing stone, rock, or chunks of any sort shall only be utilized where and to the extent there will be no detrimental effects.

F. Backfill materials shall be carefully placed in relatively uniform depth layers spread over the full width and length of the trench section in a manner and/or sequence that will provide simultaneous support on both sides of the pipeline. Each layer shall be compacted effectively, by approved mechanical of hand methods, until there is no further visual evidence of increased consolidation. Compaction of the in place layer shall be completed acceptably before placing material for a succeeding layer thereon. The manner of placement, layer thickness, compaction equipment, and procedure effectiveness shall be subject to approval of the Engineer. Water jetting or flooding shall NOT be used to compact trench backfill.

G. Within the pipe bedding and encasement zones described as that portion of the trench which is below an elevation one foot above the top of the pipe, the materials placed shall be limited in particular size to 3/4 inch maximum. For larger pipe in access of 18 inches in diameter the Engineer may allow particle sizes up to 2 inches maximum if it can be shown that the backfill can be satisfactorily compacted without leaving voids or damaging pipe or joints. Above these zones, the placement of material containing stones, boulders, chunks, etc. shall be governed by the layer thickness and compaction equipment capabilities.

H. Compaction of materials placed within the pipe bedding and encasement zones shall be accomplished with portable or hand equipment methods to achieve thorough consolidation under and around the pipe and avoid damage to the pipe. Above the pipe zone material, the use of heavy roller type compaction equipment shall be limited to safe pipe loading.

I. The maximum loose thickness of each backfill layer shall be l2 inches, except that l6 inches will be permitted for Granular Materials placed above an elevation one foot above the top of pipe, and with the provision that, by authority of the Engineer in consideration of the demonstrated capability of special type vibratory compactors, these maximums may be increased at his discretion. "Hydro tamps" or "vibra tamp: or other heavy vibrating equipment shall not be used until the backfill has reached a depth of four (4) feet above the top of the pipe.

J. All surplus or waste materials remaining after completion of the backfilling operations shall be disposed of in an acceptable manner within 24 hours after

completing the backfill work on each particular pipeline section. Disposal at any location within the project limits shall be as specified, or as approved by the Engineer; otherwise, disposal shall be accomplished outside the project limits at the Contractor's discretion. The backfilling and surplus or waste disposal operations shall be a part of the work required under the pipeline installation items, not as work that may be delayed until final cleanup.

K. Until final acceptance of the project, the Contractor shall assume full Responsibility and expense for all backfill settlement and shall refill and restore the work as directed to maintain an acceptable surface condition. All additional materials required shall be furnished without additional cost to the Owner.

4.3 Backfill Procedure above Pipe Zone, in Public Rights-of-way and other areas where settlement is important.

A. Backfill above the pipe zone shall be made using Portland cement stabilized backfill or crushed stone screening (crusher fines).

B. Backfill around structures such as manholes, junction boxes, transformer boxes and valve boxes shall be made using portland cement stabilized backfill material or crushed stone screening (crusher fines).

C. The minimum depth of stabilized backfill or crusher fines shall be twelve (12") inches.

When utilities are being constructed under existing paving, the stabilized backfill or crusher fines shall extend from top of the pipe zone to the top of the base course.

When utilities are being constructed under existing unpaved streets that are not scheduled for immediate pavement construction, the stabilized backfill or crusher fines shall extend from the top of the pipe zone to the existing roadway surface.

When utilities are being constructed in new streets that are scheduled for immediate paving or in streets in a new subdivision for which a paving contract with the property developer has been approved the stabilized backfill or crusher fines shall extend from the top of the pipe zone to the bottom edge of the eight (8") inches of subgrade, or, if the paving contractor has constructed a portion of the roadway prior to the construction of the utilities stabilized backfill shall extend to the top of the course the contractor has finished. In no case shall the backfill extend above the top of the base course.

If the final course of asphaltic concrete has been placed, the street or alley surface shall **NOT** be cut for utility installation.

In new streets where stabilized backfill is required only to the bottom of the subgrade course, the minimum depth of stabilized backfill may be reduced to six (6") inches in which case the maximum depth of the "pipe zone" shall be limited to six (6") inches above the top of the utility line or conduit.

D. Backfill Materials

(1) Portland cement stabilized backfill shall consist of caliche base material, blow sand or native soil stabilized by the addition of Portland cement. Crushed stone or concrete aggregate shall **NOT** be used.

The Contractor shall submit a mix design prepared by an approved Commercial Laboratory that will produce a minimum 7 day compressive strength of 150 psi. In no case shall the minimum cement content of the mix be less than 1 sack per cubic yard.

(2) Cement used in Portland cement stabilized backfill shall be Type I or Type II conforming to the requirements of ASTM Designation C150.

(3) Caliche used for Portland cement stabilized backfill shall be crushed material con-forming to Texas State Department of Highways and Transportation 1982Standard Specifications for Construction of Highways, Streets and Bridges Item 248 Type F, Grade 2.

(4) Blow sand used for Portland cement stabilized backfill shall be clean, free from organic matter, clay lumps, rock and other deleterious matter.

(5) Native soil used for Portland cement stabilized backfill shall be clean, free from clods and organic matter, and rock in excess of 2".

(6) Crushed stone screening (crusher fines) used for back fill shall be sharp grained particles of crushed stone conforming to the following gradation

Sieve Size	% Passing
2"	100
#4	35-100
#10	20-100
#40	5-35
#200	4-10

and may be the by product of crushing stone for other purposes or may be stone specifically crushed for use in backfill. Crusher fines not meeting these specifications may be approved for backfill upon demonstration that the desired results will be obtained.

E. Backfill Construction

(1) Portland cement stabilized caliche backfill or Portland cement stabilized native soil backfill may be constructed using either the "dry" method or the "wet" method.

(a) The dry method of stabilized backfill construction consists of dry mixing of the cement and caliche, sand or soil to produce a homogenous mixture then adding and mixing sufficient water for proper compaction and hydration of the cement. The water content of the mixture will be approximately one to two percent above the optimum moisture for soil compaction. The mixing may be accomplished by using batch mixers or on the job site by "blade Mixing" or other suitable method to produce the desired backfill material. The mixed material shall be placed in lifts of up to a maximum of 12 inches and compacted to ninety five (95%) modified proctor density by use of suitable compacting equipment.

(b) In the "wet" method of cement stabilized backfill construction, the materials shall be mixed in an approved concrete batching plant or mixer to the consistency of concrete and placed as concrete would be placed. The slump of the backfill material shall be such that all voids will be filled, approximately four (4") to six (6") inches. The backfill shall be consolidated by rodding or by the use of mechanical vibrators.

(c) The mix design used must be for the method of placement chosen.

(2) Portland cement stabilized blow sand backfill shall be mixed and placed by the "wet" method as described above.

(3) Crushed stone screening (crusher fines) shall be wetted uniformly throughout with sufficient moisture to assure proper compaction before being placed in the trench.

The moistened crushed stone screening (crusher fines) shall be placed in maximum lifts of twelve (12") inches and consolidated using vibratory type compaction equipment except when it has been demonstrated that the compaction equipment employed will adequately compact deeper lifts in which case the maximum depth of a lift shall be limited by the capabilities of the equipment used.

Tests to determine the compacted density of the backfill shall be ordered by the Engineer if in his opinion the compaction is not adequate. Test showing a minimum compacted density of 90% modified proctor will be deemed adequate compaction.

5. INSTALLATION OF DUCTILE IRON PIPE

5.1 Pipe Laying - General

A. All pipe and accessories shall be unloaded, handled, laid, jointed, tested for defects and for leakage and chlorinated in the manner herein specified.

B. The pipe, fittings, valves, and accessories shall be inspected upon delivery and during the progress of the work and any material found to be defective will be rejected by the engineer and the contractor shall remove such defective material from the site of the work.

C. The contractor shall be responsible for all material furnished by him and he shall replace at his own expense all such material that is found to be defective in manufacturer or has become damaged in handling after delivery.

D. All pipe, fittings, valves, and other accessories shall, unless otherwise directed, be unloaded at the point of delivery, hauled to and distributed at the site of the work by the contractor. Loading and unloading, of pipe and fittings shall be by hoisting or by sliding, or rolling on skidways in such a manner as to avoid shock or damage to the material. Under no circumstances shall pipe or fittings be dropped. Pipe handled on skidways must not be skidded or rolled against pipe already on the ground.

The pipe, fittings and accessories shall be placed along the site in such a manner as to be kept as free as possible from dirt, sand, mud, and other foreign matter.

E. All pipe shall be laid and maintained to the lines and grades shown on the plans
or as established on the ground by the engineer.

F. Wherever it is necessary to deflect pipe from a straight line either in a vertical or horizontal plane to avoid obstructions, to plumb valves and hydrants, or where vertical or horizontal curves are shown or permitted, the degree of deflection at each joint shall not exceed the maximum deflection recommended by the manufacturer of the particular kind of pipe being laid and the degree of deflection shall be approved by the engineer.

G. After the trench grade has been completed and all bell holes dug and the grade inspected, the pipes and accessories my be placed in the trench. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench piece by piece by means of derricks, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to the material in any way. Under no circumstances shall pipe or accessories be dropped or dumped in the trench.

H. Before lowering into trench the pipe shall be again inspected for defects and the pipe while suspended shall be lightly hammered to detect cracks. Any defective, damaged or unsound pipe and materials shall be rejected.

I. All foreign matter or dirt shall be removed from the inside of the pipe and from all bells, spigots or parts of the pipe used in forming the joint, before the pipe is lowered into the trench, and it shall be kept clean by approved means during and after laying.

5.2 Laying and Jointing Ductile Iron Pipe

A. Unless otherwise directed, pipe shall be laid with bells facing in direction of laying; and for lines on appreciable slopes, bells shall, at the discretion of the engineer, face up grade. Cutting of pipe for inserting valves, fittings or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or the cement lining.

B. The jointing shall be completed for all pipe laid each day. No open joints will be left in the trench overnight. At times when pipe laying is not in progress, the open ends of pipe shall be closed by approved means. No trench water shall be permitted to enter the pipe.

C. No pipe shall be laid in water, or when the trench conditions or weather is unsuitable for such work, except by written permission of the engineer.

D. Rubber Gasket joints for cast iron or ductile iron pressure pipe and fittings shall conform to AWWA Standard C-lll.

E. Before laying the pipes, all lumps, blisters and excess coal tar coating shall be removed from the bell and spigot ends of each pipe; the outside of the spigot and the inside of the bell shall be wire brushed and wiped clean and dry. Pipe ends shall be kept clean until joints are made.

F. The pipe and fittings shall be properly aligned and free to move in any direction while bolting, and the bolts shall be gradually tightened at a uniform rate around the entire flange.

G. Flange joints where used shall be bolted with flange bolts of best quality mild steel and of the size and length required by AWWA C-ll5: Bolts and nuts shall be provided with standard hexagonal heads. Gasket rings shall be used and shall be made of best quality rubber composition sheet packing one-eighth (l/8) inch thick, of a brand and quality approved by the engineer.

H. Standard plugs shall be inserted into the bells of all dead end pipes, tees, or crosses and spigot ends shall be capped. Plugs or caps shall be jointed to the pipe or fittings in the same manner used in joining the pipe.

6. SPECIFICATIONS FOR INSTALLING PRETENSIONED CONCRETE CYLINDER PIPE

6.l General

The applicable portions of the specifications for installing ductile iron pipe shall apply except as amended or supplemented herein.

6.2 Pipe Laying

A. Pipe and fittings shall be handled with care at all times to avoid damage. They shall be lifted by hoists or slide or rolled on skid-ways in such manner as to avoid shock. Under no circumstances shall they be dropped. Pipe must not be skidded or rolled against other pipe or object.

B. Just before making the joint, the bell and spigot rings shall be thoroughly cleaned by wire-brushing until clean and dry. The gasket and the inside surface of the bell shall be lubricated with a light film or soft vegetable soap compound (flax soap) to facilitate telescoping the joint. The rubber gasket shall be stretched uniformly as it is placed in the spigot groove to insure a uniform volume of rubber around the circumference of the groove.

C. The joint shall be telescoped by pulling directly along the centerline of the pipe so that the spigot enters squarely into the bell. After the spigot has been telescoped into the bell, the bell end of the pipe being laid shall be moved in accordance with the plans to secure proper grade and alignment. After the joint is in place, a thin metal feeler gauge shall be used to check the position of the rubber gasket around the circumference of the joint.

D. The inside joint recess shall be filled immediately prior to placing the pipe together by buttering the bell end with mortar. After the joint is engaged, the joint mortar of pipe l8" in diameter and larger shall be finished off smooth by hand. The mortar in pipe smaller than l8" in diameter shall be smoothed and cleaned with a swab.

E. After the spigot has been telescoped into the bell, the joint checked and found satisfactory, a canvas wrapper shall be placed around the pipe, covering the joint. The canvas type wrapper shall be of the quality manufactured by the Mar-Mac Manufacturing Company or approved equal burlap type, and shall be hemmed at each edge to allow threading with a steel strap to securely fasten the wrapper around the pipe by means of a stretcher and sealer.

The wrapper shall have a minimum width of 7" and sufficient length to encircle the pipe leaving enough space between the ends at the top to allow the cement mortar to be poured. The entire joint shall be poured with cement mortar and rodded or agitated to eliminate voids and settlement. Prior to pouring the cement mortar the joint shall be thoroughly cleaned and saturated with clean water. Any joint showing shrinkage or excessive cracking shall be cleaned and remade. In hot weather,

additional measures may be required to obtain the best quality of joint, such as additional wet burlap, curing membrane, or immediate careful and well controlled backfilling of the joint with damp earth.

F. The mortar used at the exterior joint shall consist of one part Portland cement to 2-l/2 parts fine, sharp, clean sand and mixed with water to the consistency of thick cream. Mortar required at the joint shall not be placed in freezing weather unless adequately protected from freezing.

G. The joints for pipe to be installed in casing shall be made as for pipe laid in trench except that the outside portion of the joint shall be wrapped in a special polyurethane wrap impregnated with unhydrated cement manufactured for this purpose, prior to being jacked into the casing pipe. The wrap shall be "Flex-Protex" as manufactured by Mar-Mag Mfg. Corporation or approved equal. The interior of the joints shall be mortared after the pipe to be installed in casing has been jacked into place. The pipe shall not be moved after interior mortaring is completed. After the water line has been installed in the casing the ends of the casing shall be sealed using concrete or cement mortar.

H. Steel cylinder reinforced concrete pipe shall not be pressure tested until it has been in place a minimum of l4 days.

I. The contractor shall fill the steel cylinder reinforced concrete pipe under slight pressure and allow approximately 24 hours for water absorption by concrete lining before performing pressure test.

7. SETTING VALVES, VALVE BOXES, FIRE HYDRANTS AND FITTINGS

7.1 General

Valves and fittings shall be set at the locations shown on the plans or at locations as established by the engineer, and shall be set and jointed to the pipe in the manner heretofore specified for pipe installation. All valves buried in the ground shall have a cast iron valve box set over the valve and set to grade. All valves shall be set vertical, unless otherwise specified, and shall be thoroughly inspected and checked for operation before installation.

7.2 Valve Boxes

Cast Iron valve boxes shall be firmly supported and maintained centered and plumb over the wrench nut of the valve, with box cover flush with the surface of the ground or street paving.

Valve boxes shall be supported by a ring of concrete as shown on the plans and Detail Drawings. This ring shall be Class "A" concrete having a minimum thickness of six (6") inches and shall extend a minimum of twelve (12") inches in all directions from the outside diameter of the valve box and shall be supported on thoroughly compacted backfill.

7.3 Setting Fire Hydrants

A. Fire hydrants shall be located at points shown on the plans, the exact location of the hydrant to be established by the engineer. All hydrants shall be set plumb, to the grade as established by the engineer, and shall have their nozzles parallel with and/or at right angles to the curb, with the pumper nozzle facing the curb. The hydrants shall be supported in such a manner as not to cause a strain on the fire hydrant lead or branch.

The bowl of the hydrant shall be well braced against unexcavated earth at the end of the trench with concrete blocking. The concrete blocking shall be placed so as not to interfere with the hydrant drains and so that the joints or flanges are accessible.

B. Each hydrant shall be connected to the main with a six (6) inch ductile iron branch controlled by an independent six (6) inch gate valve. Each hydrant shall be set upon a stone or concrete slab not less than four (4) inches thick and not less than one square foot of surface area. Where solid rock exists in the bottom of the trench and same is excavated to the proper depth to form a foundation for the hydrant, the slab of stone or concrete may be omitted.

C. There shall be placed around the base of the hydrant not less than seven (7) cubic feet of sound broken stone or clean gravel, or other suitable material to provide reservoir capacity so that the hydrant will completely drain when closed. The gravel or broken stone shall reach from the bottom of the trench to at least six (6) inches above the waste opening in the hydrant. Each hydrant shall be operated by the contractor to prove to the inspector that the drain hole has not been plugged with concrete or other material.

8. **ANCHORAGE OF BENDS, TEES AND PLUGS, ETC.**

Reaction or thrust blocking shall be applied to all pipe lines at all tees, plugs, caps, valves, fire hydrants, and at bends deflecting ll-1/4 degrees or more. Concrete shall be used for blocking the pipe and fittings. Concrete for thrust block shall have a minimum compressive strength of 3,000 psi and shall conform to Texas Highway Department Class "A" concrete. Before thrust blocking is placed the element to be blocked shall be carefully wrapped in polyethylene sheeting having a minimum thickness of 3 mils. The blocking shall be placed between solid ground and the fitting to be anchored; the area of bearing on pipe and on the ground in each instance shall be that required by the engineer. The blocking shall be so placed that the pipe and fitting joints will be accessible for repair.

9. DISINFECTION OF PIPE LINES

The contractor shall furnish all labor, equipment, and materials necessary to the disinfecting of the new pipe lines which shall be disinfected before being placed in service. The lines shall be disinfected by the application of a chlorinating agent. The chlorinating agent may be a liquid chlorine, liquid chlorine gas water mixture, or a calcium hypochlorite solution, which shall be fed into the lines through a suitable solution feed device, or other methods approved by the engineer. The chlorinating agent shall be readily dissolvable and of a type that will rapidly mix with the water as it is loaded into the water line. Tablets or other solid form shall not be used unless they are dissolved before being placed into the line. The chlorinating agent shall be applied at or near the point from which the line is being filled, and through a corporation stop or other approved connection inserted in the horizontal axis of the newly laid pipe. The water being used to fill the line shall be controlled to flow into the section to be disinfected very slowly, and the rate of application of the chlorinating agent shall be in such proportion to the rate of water entering the pipe that the chlorine dose applied to the water entering the line shall be at least 50 parts per million. The treated water shall be retained in the pipe lines for a period of not less than twenty four (24) hours. At the end of the retention period all treated water shall be thoroughly flushed from the lines until the replacement water in the lines shall have a chlorine residual of not more than 0.2 parts per million. Where it is necessary to place the new lines in service in less than 24 hours, the concentration of chlorine may be increased to 300 ppm and the lines flushed and placed in service in 3 hours. Disinfecting procedures shall conform to AWWA C 60l.

l0. HYDROSTATIC TESTS

All pipe lines constructed under this contract before being accepted, shall be tested at l20% design pressure as described in the following paragraphs. This test shall apply to all newly laid pipe or any valved sections thereof.

The required test pressure (l80 pounds per square inch) shall be maintained over a continuous period of not less than eight (8) hours.

Each valved section of pipe shall be slowly filled with water, being certain that all air is expelled from the pipe by using hydrants, blow-offs or taps at points of highest elevation in the line. The specified pressure shall be applied by means of a pump and flow meter (gpm and amount) connected to the pipe in a manner satisfactory to the engineer. The contractor shall furnish all necessary equipment, materials and labor to satisfactorily make the hydrostatic tests.

After the line section to be tested has been brought to pressure, a visual inspection shall be made of all joints, fittings, valves, and appurtenance. Any leaks thus located shall be corrected before continuing with the test.

If the test indicates a leakage in excess of a rate equal to twenty-five (25) gallons per inch of nominal diameter of pipe line per mile per day (maximum 600 gallon per mile per day total leakage) the cause of such leaks shall be determined and corrected and the line retested until satisfactory results are obtained.

11. **REMOVING AND REPLACING PAVEMENT**

A. When it is necessary to cut existing paving to install utilities the paving shall be repaired as soon after the backfill is consolidated or the cement stabilized backfill has reached sufficient strength as practical. The repair shall be made using Texas Highway Department Type "D" Hot Mix Asphaltic Concrete and shall have a minimum thickness equal to the thickness of the existing surface.

B. Edges along the trenches and around pits shall be saw cut to remove damaged edges and/or surface. Saw cuts shall be straight and parallel to or at right angles to the street or alley center line in so far as practical. Meandering, zig-zag or notched saw lines will not be permitted. The saw cuts shall be such that a minimum of 6" of surface is removed beyond the edges of the trench.

C. The edges of the saw cut and surface of the backfill material shall be tack coated prior to the placing of hot mix asphaltic concrete. The tack coat shall be either RC-250 cut back asphalt or RS2h emulsified asphalt or approved equal. When emulsified asphalt is used for tack coat the asphaltic concrete shall not be placed until the break of the emulsion is complete and all free water has evaporated or has been removed.

D. After the tack coat is cured the hot mix asphaltic concrete shall be placed uniformly throughout the repair area. The edges of the repair shall be squared up and the hot mix asphaltic concrete thoroughly compacted. Any large aggregate that is separated from the mix during the leveling process shall be removed from the surface and disposed of off the project. Care shall be taken that none of the mix over laps the old paving. Any mix that has "scabbed" onto the paving shall be removed before the section is reopened to traffic.

Sufficient mix shall be placed so that the finished repair is from one eight (1/8") inch to one quarter (1/4") inch above the old paving surface to allow for further consolidation by traffic.

12. **TUNNELING UNDER UTILITY LINES, ETC**.

Where pipes, conduits or concrete curbs, gutters or other obstructions are encountered in the construction, the cost of tunneling under such obstructions shall be included as a part of the cost of the pipe line, or other pay items, complete in place.

13. **HIGHWAY CROSSING**

A. The City of Midland will obtain any required permits from the State Highway Department for installation of the water line along and across the highway right-of-way. It shall be the contractor's duty and responsibility to coordinate the time of making the crossing and the manner of handling traffic.

B. Installations of the casing pipe shall be accomplished by boring or open cut trench as indicated on the drawings and in accordance with the Texas Department of Transportation permit and requirements. Equipment used shall be of such size and capacity as to allow the placement of the casing to proceed in a safe and expeditions manner. Installation of the casing and the excavation and removal of the materials

within the casing shall proceed simultaneously.

The boring shall proceed from a pit provided for the boring equipment and workmen. Excavation and location of the pit shall be approved by the Engineer. Boring without the concurrent installation of the casing pipe will not be permitted. The use of water or other fluids in connection with the boring operation will be permitted only to the extent of lubricating cuttings. Jetting will not be permitted. Overcutting in excess of one inch shall be remedied by concrete pressure grouting the entire length of the installation. All joints for casing pipe installed in bore shall be welded. Care shall be taken to keep the casing pipe on the proper line and grade.

C. After the casing pipe has been installed and is accepted by the Engineer, the pipe shall be shoved through the casing. The pipe shall be pushed or pulled through the casing by exerting pressure on the barrel of the pipe and not on the bell, and shall be done in such a manner that the joint is always in compression during the shoving operation. Hardwood, or other suitable material skids shall be banded with stainless steel bands to each joint of pipe In accordance with the pipe manufacturers recommendation. The hardwood skids shall be of sufficient dimensions to allow the bell of the pipe to clear the casing pipe by at least one-half inch. The length of the skid shall be in accordance with the pipe manufacturers recommendations. A minimum of three bands shall be used to secure the skids to the pipe. The skids shall be such that the carrier pipe will be centered in the casing pipe. The design of skids and bonding techniques shall be submitted to the Engineer for approval prior to use.

In general waterline installation in the casing pipe shall conform to AWWA C 600-Section 6 requirements.

After completion of pipe installation in casing, the ends of the casing shall be sealed off by use of concrete grout. The minimum compressive strength of the grout shall be 2,000 psi in 28 days.

14. **SHORING & SHEETING**

14.1 Description

This item shall govern for the Trench Safety Systems required for the construction of all trench excavation to be utilized in the project and including all additional excavation and backfill necessitated by the safety system. A trench shall be defined as a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet. The depth is five feet or more.

Trench Safety Systems include but are not limited to sloping, sheeting, trench boxes or trench shields, sheet piling, cribbing, bracing, shoring, dewatering or diversion of water to provide adequate drainage.

l4.2 Construction Methods

Trench safety systems shall be accomplished in accordance with the detailed specifications set out in the provisions of Excavation, Trench, and Shoring, Federal Occupational Safety and Health Administration (OSHA) Standards, 29CFR, Part 1926, Subpart P, as amended, including Proposed Rules published in the Federal Register (Vol. 52, No. 72) on Tuesday, October 31, l989. The sections that are incorporated into these specifications by reference include Sections 1926-650 through 1926-652. Legislation that has been enacted by the Texas Legislature, being Tex. Rev. Civ. Stat. Ann. arts. 1015q, 2368a.6 (Vernon Supp. 1988) with regard to Trench Safety Systems, is hereby incorporated, by reference into these specifications.

A reproduction of the OSHA Publication 2226 is attached for the convenience of the Contractor. The City assumes no responsibility for the accuracy of the reproduction or that it reflects current law. The Contractor is responsible for obtaining a copy of this section of the Federal Register for his use.

If the contractor elects to use a trench protective system that, in the Proposed Rules, requires "Design by a qualified person or a qualified engineer," [For example see 1926.652(b) (3) and 1926.652(c) (4)], "a qualified person or qualified engineer" shall be a Professional Engineer registered in the State of Texas. The Contractor is responsible for obtaining boring and soil analysis as required for the planned design. The trench excavation is to be designed in conformance with OSHA standards and regulations.

14.3 Safety Program

The Contractor shall submit a safety program specifically for the construction of trench excavation. The trench safety program shall be in accordance with OSHA standards governing the presence and activities of individuals working in and around trench excavation.

14.4 Inspection

The Contractor shall make daily inspections of the Trench Safety Systems to ensure that the systems meet OSHA requirements. Daily inspection is to be made by a "competent person" provided by the Contractor. If evidence of possible cave-ins, or slides, is apparent, all work in the trench shall cease until the necessary precautions have been taken by the Contractor to safeguard personnel entering the trench. It is the sole duty, responsibility and prerogative of the Contractor, not the owner or the Engineer, to determine the specific applicability of the designed trench safety systems to each field condition encountered on the project. The Contractor shall maintain a permanent record of daily inspections.

14.5. Safety Restrictions - work near high voltage lines

The following procedures will be followed regarding the subject item on this contract:

A. Warning signs painted yellow with black letters that are legible at twelve feet shall be placed inside and outside vehicles such as cranes, derricks, power shovels, drilling rigs, pile drivers, hoisting equipment or similar apparatus. The warning sign shall read as follows:

"WARNING - UNLAWFUL TO OPERATE THIS EQUIPMENT WITHIN SIX FEET OF HIGH VOLTAGE LINES."

B. All equipment except back hoes or dippers that may be operated within ten feet of high voltage lines shall have an insulating cage-type of guard about the boom or arm and insulator links on the lift hook connections.

C. When necessary to work within six feet of high voltage electric lines, notification shall be given the power company who will erect temporary mechanical barriers, de-energize the line, or raise or lower the line. The notifying department shall maintain an accurate log of all such calls to the Power Company, and shall record action taken in each case.

D. The Contractor is required to make arrangements with the Power Company for the temporary relocation or raising of high voltage lines at the Contractor's sole cost and expense.

l5. MEASUREMENT AND PAYMENT

l5.l General

The unit price or lump sum price bid on each item, as stated in the proposal, shall include furnishing all labor, superintendence, machinery, equipment, and materials necessary to complete the various items of work in accordance with the plans and specifications. Cost of work or materials shown on the plans and called for in the specifications and on which no separate payment is made shall be included in the bid price on the various pay items.

l5.2 Water Lines

A. Measurement

The length of pipe lines for the various sizes, classes and types to be paid for will be determined by measurement along the center lines of the pipe installed, measurement being made from the center of fitting to center of fitting or end of pipe, without any deduction for the length of intermediate fittings or valves including pipe installed in casing.

B. Payment

Furnishing and installing approved type pipe of the various sizes and classes shown on the plans or as required will be paid for at the unit price bid per linear foot for furnishing and installing the various sizes and classes of approved pipe complete in place. The unit price bid shall be complete compensation for furnishing and installing the pipe complete in place including all excavation, backfilling, testing and disinfection of lines and shall include any and all incidental work not otherwise included in the bid items or otherwise provided for in the specifications.

l5.3 Solid Rock Excavation

All excavation for pipe trenches shall be unclassified and no extra compensation will be made for solid rock excavation. The contractor is expected to make boring of his own and satisfy himself to the character of material which will be encountered.

l5.4 Gate Valves or Butterfly Valves

A. Measurement

Gate valves or butterfly valves will be counted in the field after installation by the size and type specified and actually installed.

B. Payment

The unit price bid for each type and size valve shall be complete compensation for furnishing and installing the valves, complete in place, including the furnishing and installation of cast iron valve boxes on all valves to the finished grade of the adjacent surface. All valves in paved areas shall be set to finish pavement grades

l5.5 Fire Hydrants

A. Measurement

Fire hydrants will be counted in the field after installation in accordance with the plans and specifications.

B. Payment

The unit price bid shall be complete compensation for furnishing and installing the fire hydrants, complete in place, each, including lead pipe the gravel drain, concrete blocking, extension or additional bury depth as required for a complete installation.

I5.6 Service Connections

A. Measurement

The number of service connections of the type and size specified to be paid for will be counted in the field after complete installation.

B. Payment

The unit price bid shall be complete compensation for furnishing and installing the service connections, complete in place, including the meter box and lid, service line, corporation stop, meter stop and incidentals required for a complete installation.

I5.7 Ductile Iron Fittings

A. Measurement

The weight of the various ductile iron fittings and specials were estimated by using the standard weights for cast iron fittings as established by the American Water Works Association or American Standard Association. Measurement of ductile iron fittings will be made by counting the actual number of fittings installed and multiplying the number of fittings by the catalog weights for those types of fittings actually installed. Allowance will be made for glands and bolts.

B. Payment

The ductile iron fittings or specials required in the construction of the various size pipe lines as shown on the plans or as required will be paid for at the unit price bid per ton for furnishing and installing the ductile iron fittings complete in place. The unit price shall also include all materials, excavation, backfilling, concrete blocking and other incidental work required for the complete installation.

I5.8 Steel Cylinder Concrete Pipe Fittings

A. Measurement

No separate measurement or count of fittings and specials for steel cylinder concrete pipe will be made.

B. Payment

No separate payment will be made for fittings or specials for steel cylinder concrete pipe used on this project, but the cost of same shall be included in the price bid per linear foot for the various classes and sizes of pipe in the bid proposal.

l5.9 Casing Pipe In Bored Hole Or Open Cut

A. Measurement

Measurement of the casing pipe, of the type and size specified, shall be made by the linear foot of casing installed complete in bored hole or installed complete in open cut.

B. Payment

The unit price bid per linear foot for casing in bored hole or for casing in open cut shall be complete compensation for furnishing and installing the casing, complete in place, including all pits, boring equipment, materials and labor required for a complete installation. Payment for carrier pipe installed in the casing will be made as stated under Waterlines above.

l5.l0 Paving Cut and Repair

A. Measurement

Measurement of paving cut and repair will be made by the square yard for replacing pavement of the type specified. The area of the pavement replaced shall be determined by actual measurements on the ground; however, measurement will be limited to areas within widths of cuts as shown on the plans unless additional widths are authorized by the engineer. Any pavement removed or damaged outside of the aforementioned limits shall be replaced as prescribed with these specifications, but will not be measured for payment.

B. Payment

The unit price bid, per square yard, shall be complete compensation for cutting and removing the pavement, and constructing the concrete base and surfacing of the type specified, all as specified herein and as shown on the plans.

15.ll Trench Safety Systems, Sheeting and Shoring

A. Measurement

Trench Safety Systems shall be measured by the linear foot along the centerline of trench including manholes and other line structures.

B. Payment

Payment for Trench Safety Systems, measured as prescribed above, shall be made at the unit price bid per linear foot of "Trench Safety Systems: Payment of all work prescribed under this item shall be full compensation for the Trench Safety Systems including all Engineering cost and any additional excavation and backfill required, for furnishing, placing, maintaining and removing all shoring, sheeting, or bracing; for dewatering or diversion of water; for all jacking and jack removal; and for all other labor, materials, tools, equipment and incidentals necessary to complete the work.

Revised 08/07

GRAVITY FLOW PIPE SEWERS AND FITTINGS
FOR WASTE WATER AND STORM WATER

PART I – GENERAL

1.01 SCOPE

A. The work covered by this specification shall include the furnishing of all material, labor and equipment to construct, complete in place, all Gravity sewers including jointing, gaskets, fittings, castings, mortar, concrete, the placing of sewer pipe, and the construction of manholes and other appurtenance, all in accordance with the details shown on the plans and these specifications for the drainage of sanitary and/or storm sewage.

B. Sanitary and storm sewer lines constructed under these specifications shall be straight in grade and alignment between manholes. Manholes shall be constructed at any change in grade and at any change in alignment. In general manholes are to be constructed at 300 feet intervals or less with the maximum distance between manholes being 350 feet when approved by the Engineer.

1.02 QUALITY ASSURANCE

A. The Contractor, at the Engineer's request, shall furnish a certificate from the manufacturer of the pipe and fittings that the manufacturer is fully competent and capable of manufacturing sewer pipe, fittings, and accessories of the type, size and grade proposed for use in this project that are of uniform texture and strength that will fully comply with these specifications and have so manufactured this class of pipe in sufficient quantities to be certain that it will meet all normal field conditions of usage. The manufacturer must have adequate equipment and quality control facilities to be sure that each extrusion casting or run of pipe is uniform in texture, dimensions, and strength.

B. All PVC, HDPE, or plastic resin based pipe and fittings shall be covered during storage to protect them from excessive heat and direct sunlight.

C. All pipe and accessories shall be stored above ground and fully supported so that they will not bend or deflect excessively under their own weight.

D. Pipe in any way damaged or deformed during storage shall not be incorporated into this project, but at the direction of the Engineer, shall be permanently removed from the job site and project area.

1.03 TYPE OF PIPE

A. Pipe for sanitary sewers 15 inches in diameter and less shall be PVC. Pipe for storm drains 15 inches in diameter and less may be corrugated steel pipe when called for on the plans and in the bid proposal. Pipe 18 inches in diameter and larger shall be of the type shown on the plans and bid proposal.

B. The contractor may be allowed to bid a choice of two or more of the pipe materials when pipe 18 inches in diameter and larger are proposed for use on a project. When such choice is allowed the permissible choices will be clearly stated on the plans and/or bid proposal and a blank space will be provided for the contractor to write in the type of pipe proposed for use on the project. When such blank spaces are provided, the contractor must choose one of the permitted pipe materials as specified in part 2 “Materials” of these specifications and write in the type of pipe bid. Failure to write in the type of pipe bid may be reason to disqualify the bid. One or more types of pipe 18 inches in diameter and larger may be excluded from consideration on any given project by notes on the plans and/or the bid proposal.

PART 2 – MATERIALS

2.01 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS FOR SANITARY AND STORM SEWERS

A. GRAVITY SEWERS

(1) Pipe and fittings in nominal diameters from 4-inch through 15-inch shall be manufactured in accordance with ASTM D3034, “Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings” and pipe and fittings in diameter 18” through 36” shall be manufactured in accordance with ASTM F-679 or ASTM F-794, closed profile, subject to the modifications and limitations below.

B. MODIFICATIONS AND LIMITATIONS

(1) The concrete slab manhole tops shall be reinforced with number 4 steel reinforcing bars spaced at 12 inches on center each way. Additional diagonal bars shall be placed on 4 sides around the manway opening. The diagonal bars shall be number 4 rebar with a minimum length equal to the diameter of the manway opening plus 4 inches. The steel reinforcing mat shall be placed in the bottom of the slab with 1-1/2 inches protective covering.

(2) The term Dimension Ratio (DR) or standard dimension ratio (SDR) is the ratio of the average outside pipe diameter to the minimum wall thickness rounded to the nearest 0.5. The maximum DR for PVC sewer pipe shall be 35. PVC pipe sewers that will have less than 4 feet of cover shall be DR26.

(3) PVC pipe manufactured under ASTM F679 or F794 shall have a wall thickness that will meet or exceed the D.R. and stiffness specified herein. The minimum pipe stiffness for pipe having a DR of 26 shall be 115 psi. The minimum pipe stiffness for DR 35 pipe shall be 46 psi.

(4) Where DR 26 pipe is specified, all necessary fittings shall be the same as for SDR 35 PVC pipe.

(5) Minimum wall thickness for ASTM D-3034 PVC pipe shall be as follows:

Nominal Size (in.)	Min. Wall Thickness (in.)	
	DR 26	DR 35
4	0.162	0.120
6	0.241	0.180
8	0.323	0.240
10	0.404	0.300
12	0.481	0.360
15	0.588	0.437

The minimum wall thickness for PVC pipe meeting ASTM F-679 or F-794 requirements shall be the thickness as set forth in said ASTM specification that will meet or exceed the pipe stiffness and DR required.

(5) The identification markings as shown in Section 12 of ASTM 3034 shall note the specified DR of 26 where applicable.

(6) All pipe and fittings shall have the dimensions for inside diameter, outside diameter, etc. as shown in ASTM D3034 and/or ASTM F-679 except that the inside diameter DR 26 may be reduced by the added wall thickness.

(7) The pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions, or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density, and other physical properties.

(8) The Contractor shall provide wyes, tees, bends, adapters, and any other fittings called for in the specifications and/or shown on the plans or directed by the Engineer.

(9) The standard length of ASTM, D-3034 SDR 35 or SDR 26 PVC pipe under this specification shall be 20 feet with a minimum of 10 feet, except that all pipe used in service lines shall not exceed 10 feet in length unless otherwise approved by the Engineer. The standard laying length for ASTM F-679 PVC pipe shall be 13 feet. The Engineer must approve other laying lengths.

C. SEWER LATERALS AND CONNECTIONS

Pipe and fittings for service lines shall be the same material and thickness class as required for the main sewer. Schedule 40 PVC pipe may be used for 4” service lines when PVC pipe meeting requirements of ASTM 3034, SDR 35 is required.

D. JOINING SYSTEMS

(1) PIPE JOINTS

The pipe shall be joined with an integral bell, bell and spigot type rubber gasket joint. Each integral bell joint shall consist of a formed bell complete with a single rubber o-ring gasket. Gaskets shall be manufactured in accordance with ASTM F477 and shall be installed in accordance with the pipe manufacturer's instructions using all the necessary materials, lubricants and equipment recommended by the manufacturer.

For pipe 18" through 36" gaskets shall be factory installed and chemically bonded to the bell end of the pipe.

Lubricant shall be water soluble, non-toxic and have no deteriorating effects on gasket or pipe materials and shall not support the growth of bacteria. Lubricant shall be suitable for use at temperatures from 5^{o} to 120^{o} F (-15^{o} to 50^{o} C). Containers shall be labeled with the manufacturer's name and identified as PVC pipe joint lubricant. Each lubricant container shall have printed instructions for usage and joint assembly.

Field welded joints will not be allowed.

(2) FITTING JOINTS

All fittings shall utilize rubber gasket joints of the same type design and specifications as pipe joints.

(3) PIPE SPIGOT

The pipe spigot shall have a bevel and an insertion stop mark. The assembled joint shall be designed so the gasket shall be radially compressed to assure a positive water-tight seal for all installation conditions recommended by the manufacturer and under all combinations of production tolerances for the joint components. Each size joint shall be qualified to no leakage under various test conditions in conformance with ASTM Specification D-3212, "Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals."

E. INSPECTION AND TESTING

(1) INSPECTION REQUIREMENTS

Certification: as the basis of the acceptance of the material, the manufacturer will furnish a certificate of conformance to these specifications. The manufacturer will furnish other conformance certification in the form of affidavit of conformances, test results, and copies of test reports.

(2) PHYSICAL TEST REQUIREMENTS

For each 4,000 linear feet of pipe manufactured of each class and size of pipe, the following certified test data shall be required:

1. The basic dimensions shall be measured.
2. The allowable crush load (lbs/ft ^{2}) shall be calculated.
3. Impact resistance, fusion quality and ductility shall be tested.

F. MARKING AND DELIVERY

Each pipe shall be identified with the name of manufacturer, nominal size, cell classification, ASTM designation F794, Uni-Bell Plastic Pipe Association designation Uni-B-9, the pipe stiffness designation “PS-46 psi” and manufacturer’s date code.

1. MANHOLE CONNECTIONS

The Contractor shall provide smooth pieces of pipe for connecting sewer line into manholes. The Contractor shall be required to assist the manhole gasket supplier with the nominal outside diameter of these smooth pieces of pipe, as manufactured. There shall be only one plain end thickness for each diameter of pipe specified for the project.

2. DELIVERY

All pipe couplings and fittings shall be prepared for standard commercial shipment.

The pipe shall be inspected upon delivery to the job site for final acceptance. The contractor shall be responsible for all material furnished by him and he shall replace, at his own expense, all such material that is found to be defective in manufacture or which has become damaged in handling until final acceptance has been made. Pipe, which exhibits excessive ovalty or curvature, shall be rejected.

PVC pipe and fittings shall be covered during storage to protect them from excessive heat and direct sunlight.

All pipe and accessories shall be stored above ground and fully supported so as not to bend or deflect excessively under its own weight.

2.01(a) Metallic Marking Tape (For PVC Sewer Pipe)

2.01 (a).1 General

When non-metallic pipelines are to be installed, then the Contractor shall furnish and lay, above the pipeline, a continuous strip of metallic identification tape.

2.01 (a).2 Tape Material

The metallic identification tape shall be at least two inches (2”) in width and shall be of corrosive resistant metal of sufficient thickness to be stable and reflect electronic signals to electronic pipeline detector when buried to a dept of twenty-four (24”) below normal ground level.

The metallic tape shall be painted green on one side and shall have 1-inch high letters painted continuously on the same side of the tape which read, “CAUTION: BURIED SEWER LINE BELOW” or other words to this effect.

The marking tape shall be “Detectable Marking Tape”, as manufactured by the Omega Marking Company, or equal approved by the Engineer.

2.01(a).3 Construction Methods

The Contractor shall backfill over non-metallic pipelines to a depth which is less than twenty-four (24”) and not more than twelve inches (12) from the top of the cut of the ditch section in which the pipeline is laid. Contractor shall stop the backfilling material to a generally uniform level. All machine tamping, jetting and other compaction activities shall be accomplished up to this point of height in the backfilling the marking tape is placed in the trench.

The Contractor shall then lay the marking tape in the pipe trench and shall be held in position by the spot placement of backfill materials over it to keep it from sliding t the sides and/or from being blown about in the ditch by the wind. The tape shall be lid with the painted side, which shall also be the side with the identification lettering on it, in the “up” position. The tape shall be laid in the flat position and kept there until backfill is accomplished.

The Contractor shall then complete the backfilling operation in such a manner that the marking tape is not cut, crimped, ruptured or separated by the backfilling work.

2.01(a).4 Measurement and Payment

No separate pay item will be provided for furnish and placing the marking tape. This item shall be considered subsidiary to the non-metallic pipe being placed.

2.02 CORRUGATED STEEL PIPE (CSP) FOR STORM SEWERS AND CULVERTS ONLY

1. PIPE

A. STEEL SHEET STOCK

(1) Corrugated steel pipe shall be manufactured using galvanized steel sheet AASHTO M 218 or aluminized steel sheet AASHTO M 274.

(2) The lining for smooth lined corrugated steel pipe shall be polymer coated on both sides. The minimum thickness of the polymer coating shall be 10 mils.

B. PIPE DESIGNATION

(1) Pipe furnished shall be manufactured in accordance with AASHTO Specification M 36.

(2) Corrugated steel pipe shall be one or more of the following type as designated in AASHTO M 36.

Type I - Full circular cross section having helical corrugations.

Type IA - Full circular smooth lined pipe constructed of an outer shell having helical corrugations with a smooth sheet lining attached to the outer shell at helical lock seams.

Type IR - Full circular cross section with helical rib protruding outward.

Type II - Type I pipe formed into a pipe arch.

Type IIA - Type IA pipe formed into a pipe arch.

The type of pipe furnished on this project will be as shown on the plans and in the bid proposal.

When no type of pipe is called for on the plans or in the bid proposal helically corrugated circular single wall pipe (Type I or Type IR) shall be furnished.

C. MANUFACTURERS CERTIFICATION

(1) The pipe manufacturer will be required to certify the adequacy of the pipe furnished for the application and design life of the project.

(2) The design life for storm sewers constructed under this specification is 50 years.

(3) The pipe manufacturer will be required to run soil pH, soil resistivity and such other test as they deem necessary to design pipe thickness and protective coatings required to assure the adequacy of the pipe supplied.

D. CORRUGATION AND MINIMUM THICKNESS

(1) Thickness used in this specification refers to the bare steel thickness before coating is applied. The minimum thickness for any single wall corrugated steel pipe furnished under this specification is 16 gage.

(2) All corrugated steel pipe furnished under these specifications shall have helical corrugations.

(3) Circular corrugated steel pipe 48” in diameter and smaller shall have 2-2/3” x ½” corrugation and shall be a minimum of 16 gage in thickness.

Circular corrugated steel pipe larger than 48” in diameter may have either 2-2/3 x ½” or 3” x 1” corrugations. The minimum thickness for corrugated steel pipe larger than 48” in diameter and having 2-2/3 x ½” corrugation shall be as follows:

54” Diameter - 12 gage
60” Diameter - 10 gage
66” through 90” Diameter - 8 gage

The minimum thickness for circular corrugated steel pipe having 3” x 1” corrugation and diameters of 54” through 90” shall be 14 gage.

(4) For smooth lined corrugated steel pipe the minimum thickness for the lining shall be 20 gage and the minimum thickness for the outer shell shall be 18 gage.

The corrugations for the outer shell shall be 2-2/3” x ½” for pipe 48” diameter and smaller. Larger diameter pipe may use 3” x 1” corrugations in the outer shell. The sum of the thickness for the outer shell and the liner shall be a minimum of one thickness unit greater than the thickness that would be required for single wall pipe of the same diameter or span.

(5) Spiral rib steel pipe (Type IR) shall have outward projecting spiral corrugations of ¾” x 1” at 11-1/2” on center in accord with AASHTO specification M 36 or ¾” x ¾” at 7-1/2” on center as described in AASHTO specification M 196.

The minimum thickness for spiral rib pipe 48” in diameter and smaller shall be 16 gage.

The minimum thickness for spiral rib pipe 54” and 60” in diameter shall be 14 gage.

The minimum thickness for spiral rib pipe 66” and 72” in diameter shall be 12 gage.

The minimum thickness for spiral rib pipe larger than 72” in diameter shall be as shown on the plans.

(6) The corrugations and minimum thickness of corrugated steel pipe arch shall be in accord with the following table:

EQUIV. Dia. (in.)	2-2/3" x ½" Corrugations Span (in.)	Rise (in.)	Gage	3" x 1" Nominal Size Span (in.)	Rise (in.)	Gage
15"	17	13	14			
18"	21	15	14			
24"	28	20	14			
30"	35	24	14			
36"	42	29	14	40	31	16
42"	49	33	12	40	36	14
48"	57	38	10	53	41	12
54"	64	43	10	60	46	12
60"	71	47	8	66	51	12
66"	77	52	8	73	55	12
72"	83	57	8	81	59	12
78"				87	63	12
84"				95	67	12
90"				103	71	12

When 2-2/3" x ½" corrugations are called for on the plans and/or on the bid schedule the substitution of 3" x 1" corrugations will be allowed only upon the demonstration by the contractor that there is sufficient head room to accommodate the higher rise for arch pipe of this cross section.

E. END TREATMENT AND JOINING

(1) The ends of all corrugated steel pipe furnished for this project shall be rolled to provide circumferential corrugations for coupling. The end corrugations for all pipe 48" in diameter and less shall be 2-2/3 x ½". The end corrugations for single wall helically corrugated steel pipe or for smooth lined corrugated steel pipe 54" in diameter and larger shall be the same pitch as the pipe furnished and may be either 2-2/3" x ½" or 3" x 1". The end corrugations for spiral rib (Type IR) corrugated steel pipe shall be 2-2/3" x ½" or 3" x 1" for pipe 54" and larger in diameter.

(2) Coupling bands shall be made of the same material as the pipe and shall be not more than 3 nominal sheet thicknesses lighter than the pipe joined and in no case less than .052 inch.

Jointing devices for joining corrugated steel pipe shall have a gasket and shall produce a joint meeting the infiltration/exfiltration requirements of these specifications.

If it should be necessary to cut a joint of Helically corrugated pipe and join the unreformed end to another section of pipe or fitting extra width bands will be required and special care must be taken to insure a water tight connection.

Locking bands shall be corrugated and shall securely fit into at least one full annular corrugation. The corrugations on the locking band must match the corrugations on the pipe being joined.
The minimum width for locking bands is as follows:

for 2-2/3 x ½ inch corrugations	10-1/2 inches
3 x 1 inch corrugation	12 inches

For helical corrugations that have not been reformed the coupling bands must be at least 2 inches wider than the widths listed above.

Unless shown otherwise on the plans all bolts for coupling or locking bands shall be ½ inch in diameter. Bands 12 inches wide or less shall have a minimum of 2 bolts. Bands wider than 12 inches shall have a minimum of 3 bolts.

Bolts must be galvanized in accordance with AASHTO Designation M232 or ASTM A164 Type RS.

(3) Gaskets for corrugated steel pipe shall be closed cell expanded rubber and shall be formed into a continuous band. Gaskets may be either “O” ring or flat band as recommended by the pipe manufacturer. Flat band gaskets shall be a minimum of 7” wide and 3/8” thick. “O” ring gaskets shall be 13/16” diameter minimum for pipe 36” in diameter or less and 7/8” for pipe larger than 36” diameter and having ½” deep corrugations. “O” ring gaskets shall be a minimum of 1-3/8” diameter for pipe having 1” deep corrugations. When “O” ring gaskets are furnished, an additional flat gasket shall be furnished and placed between the overlapping ends of the coupling band. This flat gasket shall completely fill the gap between the “O” rings. All gasket materials shall be capable of producing a water tight joint that will meet the leakage requirements of these specifications.

2. CORRUGATED STEEL MANHOLE FITTINGS, AND CLEAN OUTS

A. FABRICATION

(1) Corrugated steel manholes and fittings shall be constructed of the same material and type of pipe furnished for the storm sewer line with the exception that manhole risers shall be helical corrugated single wall circular pipe when used with pipe arch sewers or smooth lined corrugated steel pipe. The thickness of the manhole riser shall be the same as would be required for the same type and diameter pipe if it were used for the storm sewer.

(2) Cleanouts for use on shallow storm sewer and inlet leads shall be manufactured from pipe meeting the requirements of these specifications. Cleanouts shall be constructed to the dimensions and in accord with the details shown on the plans.

B. CONNECTION TO MANHOLES AND CLEANOUTS

(1) Stub outs from manholes and cleanouts for connection to storm sewers and inlet leads shall have annular corrugations and shall be compatible with the type and size of pipe being connected. Stub outs provided for connection to PVC pipe storm sewers and inlet leads shall be sized so that the PVC pipe can be inserted into the stub leaving the least amount of annular space between the PVC pipe and the CSP practical. The PVC pipe shall be connected using an approved molded rubber or PVC sleeve connector clamped to both pipes with stainless steel straps.

The connector shall be a flexible coupling as manufactured by Fernco, 300 S. Dayton St., Davison, MI., or approved equal.

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C. LEAKAGE

Manholes, fittings and cleanouts shall meet the leakage requirements of these specifications.

D. SHOP DRAWINGS

The contractor shall submit shop drawings of all manholes, fittings and cleanouts for approval prior to their fabrication. A minimum of 5 sets of drawings for each manhole, each fitting and each cleanout shall be submitted.

E. CONCRETE SLAB TOPS

A reinforced concrete slab top shall be constructed for each manhole and cleanout. The slab shall extend to one foot (1') outside the riser section on all sides and shall have an eccentric 2' diameter opening for the manway located at the outside edge of the riser section. For manholes and cleanouts designated for standard manhole rings and covers the concrete top shall be 8 inches thick and shall be finished smooth to receive the manhole ring.

For manholes designated to receive pressure type manhole rings and covers the concrete slab top shall be a minimum of 12 inches thick and shall have L bolts imbedded in the concrete to fit the requirements of the manhole ring furnished. The slab shall be finished smooth to receive the manhole ring. The manhole ring shall be securely bolted to the slab and sealed using "Ram Nek" or an approved equal bitumastic sealer between the manhole ring and the concrete slab.

The concrete slab manhole tops shall be reinforced with number 4 steel reinforcing bars spaced at 12 inches on center each way. Additional diagonal bars shall be placed on 4 sides around the manway opening. The diagonal bars shall be number 4 rebar with a minimum length equal to the diameter of the manway opening plus 4 inches. The steel reinforcing mat shall be placed in the bottom of the slab with 1-1/2 inches protective covering.

F. PRESSURE MANHOLE RING AND COVER

(1) Pressure type manhole rings and covers shall be Western Iron Works No. 380-24P or approved equal. The manhole cover shall be sealed with an “O” ring gasket in a ring groove and shall be secured to the ring by six (6) 5/8-inch stainless steel bolts.

(2) The ring shall have six (6) 1-1/4 inch bolt holes in the flange for securing the ring to the concrete slab top on the manhole.

3. CORRUGATED STEEL PIPE SLOTTED DRAIN

(1) Corrugated steel pipe slotted drains shall be fabricated from full circle corrugated steel pipe conforming to these specifications.

(2) C.S.P. Slotted drains shall be of a type as manufactured by “Contech Construction Products, Inc.”, “Texas Corrugators”, “Caldwell Culvert Company” or approved equal.

(3) The upstream end of CSP slotted drains shall be equipped with a bend and a ring and cover of the some size as the pipe from which the slotted drain was fabricated to allow cleaning equipment to be inserted into the slotted drain. The ring and cover shall be Nenah Foundry Co. R-5901 open grate or R-5900 solid lid or approved equal. Unless shown otherwise on the plans the open grate shall be furnished.

(4) When slotted drain is to be connected to PVC leads, molded rubber or PVC flexible connector as specified for connections to manholes and cleanouts shall be furnished.

4. DAMAGED COATING

A. PROTECTION OF PIPE

(1) Pipe fittings and specials shall be handled and stored in a manner that will minimize damage to the coating.

(2) The fabrication process shall be designed to minimize the burning of coatings during welding.

(3) Pipe and/or fittings showing excessive abuse or damage will be rejected.

B. REPAIRING DAMAGE

(1) Pipe on which the metallic coating has been burned by welding or has been otherwise damaged in fabricating or handling, shall be repaired. The repair shall be done so that the completed pipe shall show careful finished workmanship in all particulars.

(2) The damaged area shall be cleaned to bright metal by blast cleaning, power disk sanding, or wire brushing. The cleaned area shall extend at least ½ inch into the undamaged section of the coating. The cleaned area shall be coated within 24 hours and before any rusting or soiling.

(3) Zinc-rich paint shall be applied to a dry film thickness of at least 0.005 inches over the damaged section and surrounding cleaned area. Zinc-rich paint shall be used for repair of damage to all types of metallic coating -zinc, aluminum, and aluminum-zinc alloy.

2.03 CAST-IN-PLACE CONCRETE SEWER PIPE (NON-REINFORCED) FOR STORM SEWERS ONLY

1. DESCRIPTION

This item shall cover machine cast-in-place monolithic non-reinforced concrete pipe, which shall consist of Portland cement concrete placed in a prepared trench at such locations and grades shown on the plans and intended to be used for the conveyance of storm water. Items and item numbers referred to in this specification are the items as given in the "Texas State Department of Highways and Public Transportation 1982 Standard Specifications for Construction of Highways, Streets and Bridges."

2. MATERIALS

The cast-in-place pipe shall be constructed of Class "C" concrete. The concrete shall meet the requirements of Item 421, "Concrete for Structures," and Special Provision thereto, except as otherwise noted herein or on the plans. Type III Portland Cement shall be used.

The minimum compressive strength for concrete used in this item is 4000 psi. Backfilling operations may proceed when the concrete has reached 2000 psi compressive strength.

The coarse aggregate grading for pipe diameters 48 inches or less shall conform to that of Aggregate Grade No. 3, one inch (1") maximum size aggregate under Item 421. For pipe diameters over 48 inches, Coarse Aggregate No. 2, one and one third inch (1-1/3") maximum size aggregate shall be used.

No concrete having a slump in excess of 2" will be permitted for use in pipes with diameters of 48 inches and over. For pipes with diameters less than 48 inches, no concrete having a slump in excess of 3" will be permitted for use. At the option of the Contractor, sections of precast reinforced concrete pipe (D-load) may be substituted for cast-in-place concrete pipe. Pipe and installation shall conform to the requirements of Item 465, "Pipe Sewers." Backfill shall be in accordance with the requirements for other storm sewers in these specifications using crusher fines (chat).

3. PIPE MAKING EQUIPMENT

The pipe shall be constructed with equipment specially designed for constructing cast-in-place monolithic concrete pipe. The equipment shall be acceptable to the Engineer and the Contractor may be required to furnish evidence of successful operation in other work of the equipment he proposes to use. Equipment not suitable to produce the quality of work required for the pipeline will not be permitted to operate on the project.

4. DIMENSIONS AND TOLERANCES

The design shell thickness shall be as specified in Table 1.

TABLE I

Internal Diameter inches	Min. Shell Thickness inches
18	2
24	2-1/2
30	3
36	3-1/2
42	4
48	5
54	5-1/2
60	6
66	6-1/2
72	7
84	8
96	9
108	10
120	11

Variation in the internal diameter shall not exceed plus or minus 3 percent. The maximum allowable deviation form the true grade of the design invert of the pipe shall not exceed ½ inch either side of true grade. Where deviation from true grade occurs, true grade shall be re-established at a maximum departure of one-eighth inch per foot.

5. EXCAVATION AND BACKFILL

Excavation shall be in accordance with the requirement for other types of storm drains, except as modified herein. The trench shall be excavated in the lines and grades shown on the plans or as directed by the Engineer. The width of the trench shall be sufficient to accommodate travel of the pipe machine only. The bottom of the trench shall be shaped to the nominal outside circumference of the pipe. Excavation shall be performed from the outlet to the inlet. If the trench is over-excavated for the bottom 210 degrees of the pipe the excess area shall be filled with concrete. If rock is encountered, it will be removed at least 6 inches below the bottom of the pipe and the trench refilled with material sufficiently compacted to

allow operation of the machine and provide a smooth firm surface. The sidewall of the pipe shall be placed against undisturbed material.

Backfill material will be a crusher fine (chat) as described elsewhere in these Specifications. No backfill other than permitted for curing purposes shall be placed until the line has been inspected and approved by the Engineer. The trench may be completely backfilled after the pipe has been in place at least 24 hours and concrete strength requirements have been reached. Light traffic, axle load less than 6,000 pounds, may be routed over the pipe after backfill has been completed for twenty-four (24) hours. Unrestricted traffic may be permitted over the pipe after the backfill has been in place for forty-eight (48) hours.

All backfill material shall be mechanically compacted to 95% modified proctor or as directed by the Engineer.

6. CONSTRUCTION

All surfaces against which concrete are to be placed shall be free from standing water, mud, and debris. Absorptive surfaces against which concrete are to be placed shall be moistened thoroughly so that moisture will not be drawn from the freshly placed concrete.

The concrete shall be placed in one operation around the full circumference of the pipe by means of a traveling form. The forms shall be of sufficient strength to withstand vibrating or tamping the concrete and to permit workmen to walk on the forms without causing springing or bulging at any point.

As the traveling form moves forward, forms shall be placed inside the newly formed pipe to support a minimum of 230 degrees of the upper portion of the pipe.

The concrete shall be vibrated, rammed, tamped or worked with suitable appliances until the concrete has been consolidated to the maximum practicable density, free of rock pockets, and closes snugly against all surfaces or forms and provides a bond between the pipe shell and supporting earth.

When placing operations cease for any reason, the end of the pipe shall be left rough with a slope of approximately 45 degrees. The ends of the pipeline shall be covered with canvas or other suitable cover material to prevent excessive loss of moisture from the interior of the pipe already placed.

When starting pipe laying operation from a previously laid cast-in-place pipe or section of pre-cast pipe, a construction joint shall be made by excavating a “bell” completely around the end of the existing pipe and constructing a concrete collar to extend at least one foot either side of the joint with a minimum thickness equal to that of the wall of the pipe. The end of the existing pipe shall be clean and damp before continuing pipe making operations. Cleaning of the construction joint shall consist of removing all latency, loose or defective concrete, coatings, and any other deleterious materials.

All forms shall be clean and shall be placed at the trench side at the location of their proposed use for inspection by the Engineer. Forms, which are defective in any way, will not be used, and upon condemnation they shall be removed from the site of the work. The forms shall not vary more than ½ inch from the lower edge of a straightedge laid parallel to the centerline of the form, and shall be free of any holes larger than 5/8 inch in greatest dimension. The pipe machine shall be thoroughly clean and serviced prior to the placing of the concrete. Particular attention will be given to all parts of the machine with which concrete comes into contact.

Concrete chutes or trunks shall be provided to reach within 1 foot of the pipe machine hopper. The end of the chute or trunk shall discharge the concrete at the center of the hopper. Provisions shall be maintained to minimize segregation of the concrete mix in all phases of the operation.

Delays in placing shall be handled as follows or as otherwise directed. The concrete hopper on the pipe laying machine shall be kept ½ full at all times, provided, however, that when placing operations cease or are delayed for any reason for more than 20 minutes, the pipe machine shall be pulled forward until all the concrete is exhausted and until the top troweling skirt is clear of the concrete. If the pipe laying operation proceeds within one hour of the time of the last placement, no further steps need to be taken. However, if longer than one hour has elapsed, then a construction joint must be made as previously described. The end of the pipe shall be left rough and at the natural slope when the machine is moved forward.

All junctions of pipe shall be provided for at the time the cast-in-place pipe is placed.

Inside forms shall be removed from the pipe not sooner than 4 hours nor longer than 24 hours after placement of the concrete. Care shall be taken when removing forms to prevent damage to the pipe. The inside of the pipe shall be carefully inspected for imperfections in placement, and any required repairs or smoothing shall be made immediately to provide a uniform interior surface. No wash, mortar or concrete shall be applied to a surface not properly moistened or cleaned. Visible cracks shall be brushed with cement paste or chipped out and pointed up with cement mortar. Any cracks that appear to go through the shell shall be grooved and filled with mortar. All construction operations and methods for providing a watertight pipeline shall be the responsibility of the Contractor. Mortar shall consist of one part cement; two parts well graded sand passing 1/8-inch sieve. Wash shall consist of four parts cement, one part fire clay. The finished surface of the concrete pipe shall be substantially free of fractures, cracks and surface roughness.

7. CURING CONCRETE

Immediately after the concrete is placed the exposed surface of the concrete shall be cured by covering the top with a sheet of polyethylene film sealed with dirt along the edges. During the curing period following the placement of the concrete, the ends of the pipeline and all other openings into the pipeline shall be covered with canvas or other suitable material, except at locations where work is actually in progress. The inside surface of the pipeline shall not be cured.

8. MANHOLES AND BENDS

Manhole bases shall be hand formed on top of the pipe as soon as the pipe-placing machine has passed. Where required, the extra width for manholes shall be excavated ahead of the pipe placing operation. The base for the manhole shall be formed to receive a standard precast concrete barrel section and shall be shaped and smoothed so that the joint can be sealed water tight by use of “Ram Nek” or other approved joint sealing material.

Bends may be formed and cast in place or fabricated using precast reinforced concrete pipe (load D). Design and shop drawings shall be submitted to and approved by the Engineer before the bends are fabricated or cast.

9. MEASUREMENT

Measurement of manholes shall be as specified elsewhere in these specifications. Measurement of bends shall be as for other storm sewer pipe. The method of pipe measurement shall conform to that for other types of storm drainpipe in the section or storm drains in these specifications.

10. PAYMENT

Payment for cast-in-place non-reinforced pipe sewers, measured as prescribed above, will be made at the unit price bid per linear foot for the various sizes of “Pipe Sewers (Cast-in-Place)” complete in place. Payment for manholes shall be as specified elsewhere in these specifications.

Such payment shall be full compensation for furnishing all concrete materials, precast reinforced concrete pipe used in place of cast-in-place pipe, and for all other materials, tools, labor, equipment, and incidentals required to perform the applicable work prescribed herein.

When precast reinforced concrete pipe at the Contractor’s option is used in a line of cast-in-place pipe the additional excavation for the pipe will be subsidiary.

2.04 CENTRIFUGALLY CAST FIBERGLASS REINFORCED RESIN PIPE SEWERS

A. DIRECT BURY PIPES

1. GENERAL

All pipes, joints and fittings shall be manufactured in accordance with the requirements of the applicable standard given below except as noted herein:

Service	Standard
Non pressure Sanitary Sewer	ASTM D3262
Sewer Force Main and Effluent Lines	ASTM D3754

Pipes shall be centrifugally cast, fiberglass-reinforced polyester resin as manufactured by Hobas USA, Inc. or approved equal.

Minimum pipe stiffness when tested in accordance with ASTM D2412 shall be 46 psi.

2. MATERIALS

The manufacturer shall use only approved polyester resin systems for which he can provide a proven history of performance in these particular applications. The historical data shall have been acquired from a composite material of similar construction and composition as the proposed product.

The reinforcing glass fibers used to manufacture the components shall be of highest quality commercial grade of E-glass filaments with binder and sizing compatible with impregnating resins. Sand shall be minimum 98% silica with a maximum moisture content of 0.2%

3. DIMENSIONS

Pipe outside diameters shall be in accordance with AWWA Standard C151 and C950. For diameters larger than covered in those documents, OD's shall be as shown in Table 1.

TABLE I

*WP/s		0/46		50/46		100/46		150/46		200/46	
Nomin Pipe Sz. (in.)	Pipe OD (in.)	Min. wall (in.)	Wgt. (lb/ ft)	Min. Wall (in.)	Wgt. (lb/ ft)	Min. Wall (in.)	Wgt. (lb/ ft)	Min. Wall (in.)	Wgt. (lb/ ft)	Min. Wall (in.)	Wgt (lb/ ft.)
18	19.50	.42	20	.41	20	.40	19	.38	18	.37	18
20	21.60	.46	25	.45	24	.43	23	.42	22	.40	21
24	25.80	.54	35	.53	34	.51	33	.49	31	.47	30
30	32.00	.66	54	.65	53	.62	51	.60	49	.57	47
36	38.30	.78	77	.77	76	.74	73	.71	70	.68	67
42	44.50	.90	104	.88	101	.85	98	.82	94	.78	89
48	50.80	1.02	134	1.00	131	.96	126	.93	122	.88	115
54	57.10	1.14	169	1.12	166	1.08	160	1.04	155	.99	147
60	62.90	1.26	209	1.23	204	1.19	197	1.14	188	1.09	180
66	69.20	1.38	249	1.35	243	1.30	234	1.25	228		
72	75.40	1.50	298	1.47	292	1.41	280	1.36	270		
78	81.60	1.62	352	1.58	343	1.52	331	1.47	320		
84	88.00	1.74	409	1.70	399	1.64	385				
90	94.30	1.86	468	1.82	458	1.75	440				
96	100.6	1.98	531	1.94	520	1.87	501				

- **Maximum nominal working pressure in psi/pipe stiffness in psi**

Pipe shall be supplied in nominal lengths of 20 feet. Actual laying length shall be the nominal plus or minus 2 inches. At least 90% of the total footage of each size and class of pipe, excluding special order lengths, shall be furnished in nominal length sections.

4. **PRESSURE CLASS & TESTING FOR SEWER FORCE MAINS AND EFFLUENT LINES**

The pipe nominal pressure class (PN) shall be equal to or greater than the maximum sustained operating pressure of the line. The minimum pressure rating for non-pressure pipe shall be 15 psi.

The maximum transient (operating plus surge) pressure of the line shall not exceed the pipe nominal pressure class by more than 40%.

Pipe hoop tensile strength for pressure pipe shall be verified as specified in the applicable standard (D3754 or C950) or by random burst testing at the same sampling frequency. All pipes shall be capable of withstanding a test pressure of 2 times the maximum sustained operating pressure of the line without leaking or cracking. This performance shall be periodically verified at the factory for pressure pipe at least once per lot as defined in D3754, section 7.1.

A. JOINTS

Unless otherwise specified, the pipe shall be field connected with fiberglass sleeve couplings that utilize elastomeric sealing gaskets made of EPDM rubber compound as the sole means to maintain joint water tightness. The joints must meet the performance requirements of ASTM D4161.

B. FITTINGS

Flanges, elbows, reducers, tees, wyes, laterals and other fittings shall, when installed, be capable of withstanding all operating conditions. Acceptable configurations include contact molded or metered fiberglass or properly protected standard ductile iron.

Unbalanced thrust forces shall be restrained with thrust blocks or other approved suitable methods. Fiberglass tees, wyes, laterals, or other similar fittings shall be fully encased in reinforced concrete designed to withstand the pressure forces.

2.05 POLYETHYLENE SEWER PIPE

A. SCOPE

(1) This specification covers Polyethylene (PE) pipe with a corrugated outer wall and a smooth interior wall, for use with non-pressure sanitary sewer systems. The PVC fittings and joints are included in the specification.

B. MATERIAL AND MANUFACTURING

1. PIPE MATERIALS

The pipe shall be made from clean virgin Polyethylene compounds having a cell classification of 324420C as defined by ASTM D-3350.

2. FITTING MATERIALS

The fittings shall be made from clean virgin polyvinyl chloride (PVC) compounds having a cell classification of 12454B, 1245C or 13343C as defined by ASTM D-1784.

Pipe shall be manufactured by simultaneous extrusion of the corrugated and smooth walls with the smooth inner wall fused to the outer corrugated wall.

Fittings shall be molded or fabricated.

3. JOINING MATERIALS

a. Gaskets
b. Elastomeric gaskets shall meet the requirements of ASTM F-477.
c. Lubricants

The lubricants used for assembly shall have no detrimental effect on the gasket or the pipe, and shall be per published recommendations of the pipe manufacture.

4. MATERIAL CERTIFICATION

A manufacture's or an independent laboratory certification shall be furnished to the purchaser/engineer that the products were manufactured, sampled, tested, and inspected at the time of manufacture in accordance with this specification.

C. PIPE DIMENSIONS

Pipe dimensions shall meet the following requirements when tested in accordance with ASTM D-2122.

Nominal Size	Avg. O.D.	Avg. I.D.
4	4.790 (121.7)	4.00 (101.6)
6	6.930 (176.0)	6.00 (152.4)
8	9.145 (232.2)	8.00 (203.2)
10	11.405 (289.7)	10.00 (254.0)
12	14.450 (367.0)	12.00 (304.8)
15	17.530 (445.3)	15.00 (381.0)
18	21/150 (537.2)	18.00 (457.2)

D. INSTALLATION

1. Joint Tightness

Minimum joint performance shall show no leakage when tested in accordance with ASTM D-3212.

2. Supplier Assistance

A manufacturers representative of the above referenced pipe material shall be present at the beginning of the installation as required by the Design Engineer or Contractor and shall remain on site until released by the Design Engineer or Field Inspector/Engineer.

2.06 INLETS FOR STORM SEWERS

A. CURB TYPE INLETS

(1) Curb inlets shall be constructed at the locations and to the lines and grades or shown on the plans or as directed by the Engineer.

(2) Curb inlets shall be constructed of reinforced class “C” concrete in accordance with Section 1-B “Concrete Structures” and the plans and detail drawings.

(3) The curb section and the curb inlet shall conform to the curb and gutter section in which it is placed in so far as it is possible.

B. GRATE TYPE INLETS

(1) Grate inlets shall be constructed at the locations and the lines and grades as shown on the plans or as directed by the Engineer.

(2) Concrete boxes for grate inlets shall be constructed of reinforced Class “C” concrete in accordance with Section 1-B “concrete Structures” and the plans and detail drawings.

(3) Grates shall be constructed of ASTM A-48 gray iron having minimum tensile strength of 35,000 psi or ductile iron having a minimum tensile strength of 60,000 psi and a yield strength of 40,000 psi.

The size, style, shape, type, weight and class shall be as shown on the plans.

Grate frames shall be as manufactured for the grate by the grate fabricator. If more than one type or style or frame is available, the type and/or style shall be as indicated on the plans.

C. COMBINATION INLETS

(1) Combination curb and grate inlets shall be constructed at the locations and to the lines and grades as shown on the plans or as directed by the Engineer.

(2) Combination inlets shall be constructed in accordance with the applicable requirements for “Curb type inlets” and “Grate type inlets” above.

D. INLET LEADS

(1) Inlet leads may be PVC pipe or CSP as shown on the plans and called for in the bid proposal.

(2) Inlet leads shall be constructed in accordance with the specifications for type of material used and the plans and detail drawings.

(3) Where two or more leads are joined together to form a single lead to the storm sewer they shall be joined at a cleanout unless shown otherwise on the plans.

(4) Inlet leads shall be connected to the storm sewer at a manhole. The leads shall enter the manhole at a point that will match the .8 points of the two pipes as near as practical.

E. CLEANOUT FOR STORM SEWER INLET LEADS

Cleanouts at the juncture of inlet leads shall be constructed in accordance with the dimensions and requirements shown on the plans and detail drawings.

F. CORRUGATED STEEL SLOTTED DRAINS

(1) Corrugated steel slotted drains shall be as specified in section 2.02-3 of these specifications and shall be furnished in the lengths and diameters as shown on the drawings and in the bid proposal.

(2) Corrugated steel slotted drains are approved for nuisance water inlets only and are sized to allow for considerable clogging before they will cease to function in this capacity.

2.07 MANHOLES

1. GENERAL

A. **CONCRETE MANHOLES ARE NOT TO BE USED FOR SANITARY SEWERS AFTER DECEMBER 31, 2002. FIBERGLASS MANHOLES ARE TO BE USED FOR ALL SANITARY SEWERS**. Concrete manholes can be used for storm water sewers.

All manholes furnished for this project shall be precast unless noted otherwise on the plans and or bid proposal.

Precast manholes shall conform to the requirements of ASTM Specification C-478 with the modifications given in this article.

Concrete used for precast manholes shall have a minimum 28-day compressive strength of 4,000 psi and shall have a minimum cement content of 7 sacks per cubic yards.

All manhole sections shall be furnished with tongue and groove type joints suitable for sealing water tight with rubber or bituminous joint sealer or gaskets.

B. When cast in place components for manholes are called for on the plans the concrete used shall have a minimum 28 day compressive strength of 4,000 psi and a minimum cement content of 7 sacks per cubic yard and shall conform to the requirements of ASTM Specification C-478 with wall thickness as shown on the plans and detail drawings.

Aggregate for the concrete shall meet the sodium sulfate and magnesium sulfate test as required in ASTM Specification C-33.

C. Mortar for filling and shaping the inverts in precast manhole bases and for mortaring precast grade rings and cast iron rings and covers shall consist of one part Portland cement ASTM C150 Type 1 to 3 parts washed sand mixed with just enough water to make a workable mix.

D. Manholes for corrugated steel pipe may be precast concrete or corrugated steel as described in Article 2.02. The type and material shall be as shown on the plans and called for on the bid proposal.

2. PRECAST MANHOLES

A. Manhole base sections shall be cast with an integral floor and shall be constructed in accordance with the details shown on the plans.

B. Manhole riser sections shall be constructed in accordance with the plans and details and these specifications. When pipe openings are required in manhole riser sections they shall be of the same type and meet the same requirements as the pipe openings in the precast bases.

Manhole riser sections for each manhole shall be furnished in the proper combination of lengths to construct the manhole in conjunction with the other components to the finished grade shown on the plans.

C Eccentric cone sections shall be constructed in the same manner as other components except the top of the cone will have a flat surface to accommodate the manhole ring and cover or grade adjusting rings instead of a tongue or groove.

Generally openings will not be required in the wall of the cone section of the manhole.

D. Manhole grade rings shall comply with all the requirements for manhole riser sections except they shall be cast smooth both sides without tongues and/or grooves.

Manhole grade rings shall be sized to fit the smooth small end of the cone section and shall be cast in heights of 2", 4" or 6".

E. Joint seals for precast concrete manholes shall be a bitumastic sealer such as Ram-Nek or approved equal, a soft rubber sealer such as Butyl-Lok or approved equal or an approved "O" ring gasket or a combination of the above if required to achieve a water tight joint.

F. All water tight Storm Sewer Manholes constructed on this project shall have Neenah R-1755-C watertight manhole rings and covers or approved equal.

No separate payment will be made for the protective plastic manhole linings or for the water tight manhole rings and covers but the cost of these items shall be included in the price bid for water tight Storm Sewer Manholes.

In addition to the markings required by ASTM Specification C-478, all components of each manhole shall be, marked with location identifying information such as manhole number or line number and station value where manhole is to be installed. If the manhole has openings for installation of branch lines above the base section, each manhole section shall be clearly marked with the sequence of installation to assure the branch opening will be at the correct elevation.

3. FIBERGLASS MANHOLES

A. SCOPE

Fiberglass reinforced polyester manholes shall be manufactured from commercial grade polyester resin or other suitable polyester or vinyl resins, with fiberglass reinforcements and in accordance with the latest edition of ASTM D 3 753 (Standard Specification for Glass-Fiber Reinforced Polyester Manholes). Fiberglass manholes shall be used with fiberglass or plastic sewer pipe.

B. MATERIALS

1. **Resin:** The resins used shall be a commercial grade unsaturated polyester resin.

2. **Reinforcing Materials**: The reinforcing materials shall be commercial Grade "E" type glass in the form of mat, continuous roving, chopped roving, roving fabric, or a combination of the above, having a coupling agent that will provide a suitable bond with the resin and leave a resin rich surface.

3. **Surfacing Materials**: If reinforcing materials are used on the surface exposed to the contained substance, they shall be a commercial grade chemical-resistant glass organic surfacing mat having a coupling agent that will provide a suitable bond with the resin and leave a resin rich surface.

4. **Fillers and Additives**: Fillers, when used, shall be inert to the environment and wet well construction. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used. The resulting reinforced plastic material must meet the requirement of this specification.

C. FABRICATION

1. **Exterior Surface**: The exterior surface shall be relatively smooth with no sharp projections. Handwork finish is acceptable if enough resin is present to eliminate fiber show. The exterior surface shall be free of blisters larger than ½ inch in diameter, de-lamination and fiber show.

2. **Interior Surface**: The interior surface shall be resin rich with no exposed fibers. The surface shall be free of crazing, de-lamination, blisters larger than ½ inch in diameter, and wrinkles of 1/8 inch or greater in depth. Surface pits shall be permitted up to 6 per square foot if they are less than ¾ inch in diameter and less than 1/16 inch deep.

3. **Defects not permitted**:

Exposed fibers: glass fibers not wet out with resin.
Resin runs: runs of resin and sand on the surface
Dry areas: areas with glass not wet out with resin.
De-lamination: separation in the laminate.
Blisters: light colored areas larger than ½ inch in diameter.
Crazing: cracks caused by sharp objects
Pits or Voids: air pockets.
Wrinkles: smooth irregularities in the surface.
Sharp projection: fiber or resin projection necessitation gloves for handling.

D. PHYSICAL REQUIREMENTS

1. **Load Rating**: The complete manholes shall have a minimum dynamic-load rating of 16,000 ft-lbs. when tested in accordance with this standard. In order to establish this rating, the complete manhole shall not leak, crack, or suffer other damage when load

tested to 40,000 ft-lbs. and shall not deflect vertically downward more than ¼ inch at the point of load application when loaded to 24,000 lbs.

2. **Stiffness**: The manhole cylinder shall have a minimum pipe stiffness value as shown below when tested in accordance with A.S.T.M. 3753 8.5 (note 1)

Depth Ft.	F/dy.psi
3 – 6.5	0.75
7 – 12.5	1.26
13 – 20.5	2.01
21 – 25.5	3.02
26 – 35	5.24

3. **Soundness:** In order to determine soundness, apply an air or water pressure test to the manhole test sample. Test pressure shall not be less than 3 psig or greater than 5 psig. While holding at the established pressure, inspect the entire manhole for leaks. Any leakage through the laminate is cause for failure of the test. Refer to A.S.T.M. 3753 8.6.

4. **Chemical Resistance**: The fiberglass manhole and all related components shall be fabricated from corrosion proof material suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with the wastewater collection.

5. **Physical Properties**:

	Hoop Direction	Axial Direction
a. Tensile Strength (pi)	18,000	5,000
b. Tensile Modulus (pi)	0.6×10^6	0.7×10^6
c. Flexural Strength (psi)	26,000	4,500
d. Flexural Modulus (psi)	1.4×10^6	0.7×10^6
e. Compressive (psi)	18,000	10,000

6. **Minimum Wall Thickness**: Shall be 0.48” nominal at all depths of the manholes.

E. TEST METHODS: All tests shall be performed as specified in A.S.T.M 3753 latest edition, section 8. Test method D-790 (see note 5) and test method D-695.

F. QUALITY CONTROL: Each completed manhole shall be examined for dimensional requirements, hardness, and workmanship. All required A.S.T.M 3753 testing shall be completed and records of all testing shall be kept and copies of test records shall be presented to customer upon formal written request within a reasonable time period.

G. CERTIFICATIONS: As a basis of acceptance the manufacturer shall provide a independent certification which consist of a copy of the manufacturer’s test report and accompanied by a copy of the test results that the manhole has been sampled, tested,

and inspected in accordance with the provisions of this specification and meets all requirements.

H. SHIPPING AND HANDLING: Do not drop or impact the fiberglass manhole. Fiberglass manhole may be lifted by inserting a 4" x 4" x 30" timber into the top of manhole with cable attached or by a sling or "choker" connection around center of manhole, lift as required. Use of chains or cables in contact with the manhole surface is prohibited.

I. CONCRETE:

1. **Fiberglass Bottom**: Manholes may have fiberglass bottoms that are a minimum of 6" below the OD of the pipe invert when concrete is used to form the invert. Manufactured fiberglass inverts and bench areas are allowed, or concrete may be used to form bench area and invert. Concrete is to be used on top of anti-flotation ring and around the reducer section as required for buoyancy.

2. **Concrete Bottom**: Lower manhole into wet concrete until it rests at the proper elevation, with a minimum of 4 inches of fiberglass manhole inserted into the wet concrete below flow line, then move manhole to plumb. The concrete shall extend a minimum of one foot from the outside wall of the manhole and a minimum of 6 inches above incoming lines. On the inside concrete shall form the bench and invert area and rise a minimum of 4 inches above incoming lines. If required by Engineer concrete may be used around reducer section for buoyancy control.

BACKFILL:

1. **Backfill Material**: Unless shown otherwise on drawings and approved by the Engineer, sand, crushed stone, or crushed gravel shall be used for backfill around the manhole for a minimum distance of one foot from the outside surface and extending from the bottom of the excavation to the top of the reducer section. Suitable material chosen from the excavation may be used for the remainder of the backfill. The material chosen shall be free of large lumps or clods, which will not readily break down under compaction. This material will be subject to approval by Engineer.

2. **Backfill Procedure**: Backfill shall be placed in layers of not more than 12 loose measure inches and mechanically tamped to 95% Modified Proctor Density, unless otherwise approved by Engineer. Backfill shall be placed in such a manner as to prevent any wedging action against the fiberglass manhole structure.

K. MARKING and IDENTIFICATION: Each manhole shall be marked on the inside and outside with the following information:

Manufacturer's name or trademark
Manufacturer's factory location
Manufacturer's serial number
Total length

4. MANHOLE RINGS AND COVERS

A. Manhole rings and covers furnished for this project shall be pattern No. 300-24 as produced by Western Iron Works, Inc., 21 E. 6th St., San Angelo, Texas 76903-5493 or Bass and Hays Foundry, Inc., 238 South Bagdad Rd., Grand Prairie, Texas 75050, or approved equal.

B. WATER TIGHT MANHOLE COVERS

(1) Water tight manhole rings and covers furnished for this project shall be number R-1755-C as manufactured by Neenah Foundry Company, P.O. Box 729, Neenah, Wisconsin 54957, or approved equal.

(2) When watertight replacement sanitary sewer manhole rings and covers are called for on the plans and in the bid proposal they shall be Neenah Foundry Co. No. R-1755-C or approved equal.

No separate payment will be made for adjusting to grade of the replacement watertight manhole rings and covers. The contractor shall schedule this work to coincide with other manhole and water valve adjustments and any costs that might be involved shall be included in the price bid for replacement water tight manhole rings and covers.

(3) Manhole vents shall be used in conjunction with watertight rings and covers spaced every third manhole or as indicated on the plans. Vents shall be constructed as indicated on City design and construction standards.

C. Pressure type manhole rings and covers may be required for certain storm sewer applications. When pressure type manhole rings and covers are called for on the plans and/or bid schedule they shall be Western Iron Works Pattern #380-24P or approved equal. The manhole cover shall be sealed with an “O” ring gasket in a ring groove and shall be secured to the ring by six (6) five-eighths inch (5/8”) stainless steel bolts. The ring shall have six (6) one and one quarter inch (1-1/4”) bolt holes in the flanges for securing the ring to the concrete slab top on the manhole.

D. All manhole covers except grate type shall have two blind pick holes or pick bar cast into them. The blind pick holes or pick bars shall be placed on opposite sides of the cover.

E. All manhole covers except grate type shall have cast into their tops in letters 2 inches high minimum one of the following:

CITY OF MIDLAND
SANITARY SEWER
OR
CITY OF MIDLAND
STORM DRAIN

which ever is applicable.

2.08 GRANULAR MATERIALS

A. GRANULAR MATERIAL GRADATION CLASSIFICATIONS:

Granular materials furnished for foundation, bedding, encasement, backfill, or other purposes as may be specified, shall consist of any natural or synthetic mineral aggregate such as sharp grained sand, crushed gravel, crushed rock, crushed stone, or slag, and shall conform to the following specifications and/or gradation.

Note all materials used for these purposes shall be crushed and shall have at least two broken faces. Pea gravel will NOT be allowed.

	Foundation	Bedding	Encasement	Backfill
ASTM C33 Grade #57	x			
ASTM C33 Grade #67	x			
ASTM C33 Grade #8		x	x	
THD 1982 Item 302 Type D Grade 4		x	x	
THD 1982 Item 302 Type D Grade 5			x	
Crusher fines**			*x	x

*100 percent of crusher fines that are to be used within 12 inches of the top of pipe must pass the ¾" sieve.

** Approximate Gradation for Crusher Fines.

Sieve Size	% Passing
2 inch	100
# 4	35 - 100
# 10	20 - 100
# 40	5 - 35
#200	4 - 10

Crushed stone material proposed as an alternate for use on this project and not meeting the above specifications must be approved in writing at least 48 hours prior to the time scheduled for opening bids.

B. GRANULAR MATERIAL USE DESIGNATIONS:

Granular materials provided for Foundation, Bedding, Encasement, or Backfill use as required by the contract, either as part of the pipe item work unit or as a separate contract item, shall be classified as to use in accordance with the following:

MATERIAL USE DESIGNATION	ZONE DESIGNATION
Granular Foundation	Placed below the bottom of pipe grade as replacement for unsuitable or unstable soils, to achieve better foundation support.
Granular Bedding	Placed below the midpoint of the pipe prior to pipe installation, to facilitate proper shaping and achieve uniform pipe support. Also for Class B bedding where specified.
Granular Encasement	Placed below an elevation one half foot (6") above the top of pipe, after pipe installation, for protection of the pipe and to assure proper filling of voids and thorough consolidation of backfill.

In each case above, unless otherwise indicated, the lower limits of any particular zone shall be the top surface of the next lower course as constructed. The upper limits of each zone are established to define variable needs for material gradation and compaction or void content, taking into consideration the sequence of construction and other conditions. The material use and zone designations described above shall only serve to fulfill the objectives and shall not be construed to restrict the use of any particular material in other zones where the gradation requirements are met.

PART 3 – EXECUTION

3.01 LOCATION OF WORK

A. The work will be located as shown on the plans.

B. It may be necessary for the Engineer to shift lines as reasonable amount to avoid an obstruction to the construction or to reduce right of way difficulties. The Contractor will not be allowed any additional compensation due to shift of lines. Additional compensation will be allowed only for lengthening of lines.

3.02 PROTECTION OF SURFACE STRUCTURES

A. All surface structures and features located outside the permissible excavation limits for underground installations, together with those within the construction areas which are indicated in the Plans as being saved, shall be properly protected against damage and shall not be disturbed or removed without approval by the Engineer.

B. Obstructions such as street signs, guard posts, mail boxes and other items of prefabricated construction may be temporarily removed during construction provided that essential service is maintained in a relocated setting as

approved by the Engineer and that non-essential items are properly stored for the duration of construction. Upon completion of the underground work, all such items shall be replaced in their proper setting. This removal, relocation and replacement shall be at the sole expense of the Contractor.

In the event of damage to any surface structures or improvements, either privately or publicly owned, in the absence of construction necessity, the Contractor will be required to replace or repair the damaged property to the satisfaction of the Engineer and without cost to the Owner.

3.03 INTERFERENCE OF UNDERGROUND STRUCTURES

A. When any underground structure interferes with the planned placement of the pipeline or appurtenances to such an extent that alterations in the work are necessary to eliminate the conflict or avoid endangering effects on either the existing or proposed facilities, the Contractor shall immediately notify the Engineer and the Owner of the affected structure. When any existing facilities are endangered by the Contractor's operations, he shall cease his operations at the site and take such precautions as may be necessary to protect the in place structures until a decision is made as to how the conflict will be resolved.

B. Without specific authorization from the Engineer, no essential utility service shall be disrupted, nor shall any change be made in either the existing structures or the planned installations to overcome the interference. Alterations in existing facilities will be allowed only to the extent that service will not be curtailed unavoidably and then only when the encroachment or relocation will satisfy all applicable regulations and conditions.

C. Wherever alterations are required as a result of unforeseen underground interference not due to any fault or negligence of the Contractor, the Engineer will issue a written order covering any additional or extra work involved and specifying the revised basis of payment, if any. Any alterations made strictly for the convenience of the Contractor shall be subject to prior approval and shall be at the Contractor's expense.

D. No extra compensation will be allowed for delays caused by the interference of underground structures.

3.04 SEPARATION BETWEEN SANITARY SEWERS AND WATER MAINS

A. Sanitary sewers and service lines shall be installed so that the separation between the sewer and water mains is not less than 9 feet in all directions. The 9 feet shall be measured between the nearest outside edges of the pipe.

B. When the required 9 foot minimum separation cannot be maintained and a sanitary sewer must be constructed parallel to a water main, the sanitary sewer shall be constructed of ductile iron or PVC pipe meeting AWWA specification or having NSF approval for potable water pipe, with a pressure rating of 100 psi for both the pipe and the joint. The sanitary sewer line shall

be installed in a separate trench and may be placed no closer than 2 feet vertically and 4 feet horizontally from the water main, with the separation being measured from the nearest outside walls of the pipes. The sanitary sewer shall be constructed lower than the water main.

C. When a sanitary sewer must cross a water main and the 9 feet required separation cannot be maintained, the sanitary sewer may be constructed with a minimum clear separation between the outside diameters of the two pipes of 6 inches if that part of the sanitary sewer within 9 feet of the water main is constructed of ductile iron pipe or PVC pipe meeting AWWA specifications, having a 150 psi pressure rating and equipped with pressure type joints. One length of the sewer pipe must be centered on the water main and where possible, the sanitary sewer should pass under the water line.

D. When the 9 foot required separation cannot be maintained and a sanitary sewer force main must be constructed parallel to a water main, the sanitary sewer force main shall be constructed of ductile iron or PVC pipe meeting AWWA specifications and having a pressure rating of 150 psi and equipped with pressure type joints. The force main must be constructed with a minimum vertical separation of 2 feet and a minimum horizontal separation of 4 feet measured between the outside diameters of the pipes. The force main must be constructed lower than water main.

Table I showing separation of water and sewer lines and construction materials allowed:

TABLE 1
SEPARATION OF WATER AND SEWER LINES

Condition	Location	Material		Separation (Min.)		Comments
		Water	Sewer	Vert.	Horiz.	
NEW WATER AND NEW SEWER SYSTEM						
New Water & New Sewer Gravity Sanitary Sewer Parallel to Water Main	Water above Sewer	Std.	CI DI PVC 150 PSI	2’	4’	Separate Trenches
Gravity Sanitary Sewer Crossing Water Main	Water above Sewer or Sewer above Water	Std	CI DI PVC. 150 PSI	6”	NA	Center one joint of sewer pipe on water main
Gravity Sewer Crossing Water Main	Water above Sewer	Std	ABS, Clay Conc. composite	2’	NA	Cement stabilize sand initial backfill zone each side of crossing. Center of sewer for 9 ft one joint of sewer pipe on water Main
NEW WATER AND EXISTING SANITARY SEWER						
New Water Parallel Existing Sewer	Water above Sewer	Std.	Clay, Conc. ABS CI DI PVC	2’	4’	If sewer shows no sign of leakage, then leave sewer alone. If Sewer shows signs of leakage, then repair or replace.
New Water Crossing Existing Sewer	Water above Sewer	Std	Clay, ABS Conc. composite	2”	NA	If sewer shows no sign of leakage, then leave sewer alone if sewer shows signs of leakage then repair or replace.
New Water Crossing Existing Sewer	Sewer above Water	Std	Clay, ABS Conc. composite	2’	NA	Replace existing sewer with one joint CI,DI,PVC-150 Centering over waterline
New Water Parallel to Existing Sewer	Sewer above Water	Std	Clay, ABS Conc. composite	2’	4’	Replace existing sewer with CI, DI, PVC – 150 PSI or Cement Stabilized sand back- fill initial Backfill none of sewer where parallel closer than 9 ft., or Encase the water in 150 PSI Pipe two nominal sizes larger.

EXISTING WATER AND NEW SANITARY SEWER						
New Sewer parallel Existing Water	Water above Sewer Or Sewer above Water	Std	CI DI PVC 150 PSI	2'	4'	Separate trenches
New Sewer crossing Existing Water	Water above Sewer or Sewer above water	Std	CI DI PVC 150 PSI	6"	NA	Center one joint of sewer pipe on water main.
New Sewer crossing Existing Water	Water Above Sewer	Std	Clay, ABS Conc. composite	2'	NA	Cement Stabilize sand initial backfill zone of sewer for 9 ft each side of crossing. Center one joint of sewer pipe on water main.

3.05 EXCAVATION

A. Excavation of every description and of whatever materials encountered shall be made to the alignment and depth shown on the plans or as directed by the Engineer. Excavation shall be made by open cut. Sides of trenches shall be kept as nearly vertical as possible and the trench shall be so braced, sheeted and drained that workmen may work safely and efficiently therein. The trenches shall be sufficiently straight between designated angle points to permit the pipe to be laid true to line in the approximate center of the trench.

B. The trench width may vary with and depend upon the depth of trench, the diameter of pipe to be laid and the nature of the material to be excavated; but in any case shall be of ample width to permit the pipe to be laid and jointed properly and the backfill to be placed and compacted properly. The minimum width of unsheeted trench shall be 18 inches. The maximum clear width of trench at the top of the pipe shall be not more than two (2) feet greater than the outside diameter of the pipe for pipes up to 33" diameter except by consent of the Engineer. Whenever, for any reason, the maximum trench width is exceeded, the Contractor shall provide, at his own expense, pipe of higher class and/or bedding adequate to sustain the increased soil load as calculated by the Engineer.

C. Trenches shall be undercut to provide for the class bedding specified and/or shown on the plans. Bell holes shall be excavated to insure the pipe resting for its entire length upon the bedding material. Where trenches are under-cut beyond the depth required for bedding the trench shall be brought to grade by using crushed aggregate as specified for foundation herein. The use of loose native soil will NOT be permitted for this purpose.

D. No pipe shall be laid in water. Where the ground water table is at or above trench bottom, the Contractor shall de-water the trench to permit the pipe to be laid on a solid foundation.

   Costs for de-watering by whatever method selected shall be considered incidental to the price bid per foot of pipe.

   The Contractor shall discharge pumps to the natural drainage channels, or if permitted, to other sewer or drains.

Where sewer pipelines are located in or across streambeds or drainage ditches, the Contractor shall divert the stream flow and de-water each section as the work progresses.

E. Temporary support, adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the work shall be furnished by the Contractor at his own expense under the direction of the Engineer.

F. Whenever wet, soft or unstable soil, incapable of properly supporting the pipe, manholes or other structure is encountered in the trench, a further depth and/or width shall be excavated and refilled to trench bottom grade with gravel or other approved suitable material thoroughly compacted to assure a firm foundation for the pipe.

G. Rock, boulders and large stones shall be removed to provide a clearance of at least six (6) inches below the outside barrel of the pipes, valves, or fittings and to a clear width of six (6) inches on each side of all pipe and appurtenances for pipe 15 inches in diameter or less, and a clear width of nine (9) inches on each side of all pipe and appurtenances for pipe larger than 15 inches in diameter. Adequate clearance for properly joining pipe laid in rock trenches shall be provided at bell holes. The space between the rock at the bottom of the trench and the bottom of the pipe barrel shall be filled with compacted bedding material.

H. The Engineer shall be notified of any need for blasting to remove materials which cannot be broken up mechanically, and there shall be no blasting operations conducted until the Engineer's approval has been secured. Blasting operations will be allowed only when proper precautions are taken to protect life and property, and then shall be restricted as the Engineer directs. The Contractor shall assume full responsibility for any damage caused by blasting, regardless of the requirements for notification and approval. The Contractor shall secure any required permits for blasting and shall conduct blasting operations in conformance with all applicable State and local laws, regulations and ordinances.

I. In the event the Contractor desires to employ tunneling in locations other than as shown on the Plans in order to avoid replacement of sidewalks, etc., he shall do so only upon receipt of specific permission from the Engineer. Tunneling of this nature shall be considered incidental.

J. Excavated materials will be classified for reuse as being either suitable or unsuitable for backfill or other specified use.

3.06 SPECIAL SAFETY PROVISIONS

1. TRENCH SAFETY SYSTEMS

A. DESCRIPTION

This item shall govern for the Trench Safety Systems required for the construction of all trench excavation to be utilized in the project and including all additional excavation and backfill necessitated by the safety system. A trench shall be defined as a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet. The depth is five feet or more. Trench Safety Systems include but are not limited to sloping, sheeting, trench boxes or trench shields, sheet piling, cribbing, bracing, shoring, de-watering or diversion of water to provide adequate drainage.

B. CONSTRUCTION METHODS

Trench safety systems shall be accomplished in accordance with the detailed specifications set out in the provisions of Excavation, Trench, and Shoring, Federal Occupational Safety and Health Administration (OSHA) Standards, 29CFR, Part 1926, Subpart P, as amended, including Proposed Rules published in the Federal Register (Vol. 52, No. 72) on Tuesday, October 31, 1989. The sections that are incorporated into these specifications by reference include Sections 1926-650 through 1926-652. Legislation that has been enacted by the Texas Legislature, being Tex. Rev. Civ. Stat. Ann. Arts. 1015q, 2368a.6 (Vernon Supp. 1988) with regard to Trench Safety Systems, is hereby incorporated, by reference into these specifications.

A reproduction of the OSHA Publication 2226 is attached for the convenience of the Contractor. The City assumes no responsibility for the accuracy of the reproduction or that it reflects current law. The Contractor is responsible for obtaining a copy of this section of the Federal Register for his use.

If the contractor elects to use a trench protective system that, in the Proposed Rules, requires “Design by a qualified person or a qualified engineer,” [For example see 1926.652 (b) (3) and 1926.652 (c) (4)], a “qualified person or qualified engineer” shall be a Professional Engineer registered in the State of Texas. The Contractor is responsible for obtaining boring and soil analysis as required for the planned design. The trench excavation is to be designed in conformance with OSHA standards and regulations.

C. TRENCH SAFETY PROGRAM

The Contractor shall submit a safety program specifically for the construction of trench excavation. The trench safety program shall be in accordance with OSHA standards governing the presence and activities of individuals working in and around trench excavation.

D. INSPECTION

The Contractor shall make daily inspections of the Trench Safety Systems to ensure that the systems meet OSHA requirements. Daily inspection is to be made by a "competent person" provided by the Contractor. If evidence of possible cave-ins, or slides, is apparent, all work in the trench shall cease until the necessary precautions have been taken by the Contractor to safeguard personnel entering the trench. It is the sole duty, responsibility and prerogative of the Contractor, not the owner or the Engineer, to determine the specific applicability of the designed trench safety systems to each field condition encountered on the project. The Contractor shall maintain a permanent record of daily inspections.

2. SAFETY RESTRICTIONS - work near high voltage lines

The following procedures will be followed regarding the subject item on this contract:

A. Warning signs painted yellow with black letters that are legible at twelve feet shall be placed inside and outside vehicles such as cranes, derricks, power shovels, drilling rigs, pile drivers, hoisting equipment or similar apparatus. The warning sign shall read as follows:

"WARNING - UNLAWFUL TO OPERATE THIS EQUIPMENT WITHIN SIX FEET OF HIGH VOLTAGE LINES."

B. All equipment except back hoes or dippers that may be operated within ten feet of high voltage lines shall have an insulating cage-type of guard about the boom or arm and insulator links on the lift hook connections.

C. When necessary to work within six feet of high voltage electric lines, notification shall be given the power company who will erect temporary mechanical barriers, de-energize the line, or raise or lower the line. The notifying department shall maintain an accurate log of all such calls to the Power Company, and shall record action taken in each case.

D. The Contractor is required to make arrangements with the Power Company for the temporary relocation or raising of high voltage lines at the Contractor's sole cost and expense.

3.07 PIPE LAYING

A. All gravity pipe shall be laid using approved grade boards, furnished and set by the Contractor at no additional cost to the Owner, according to the grade stakes established by the Engineer. The maximum spacing of grade boards shall be fifty (50) feet. No sewer shall be laid unless there is a minimum of three grade boards set to check the proper grade and alignment ahead. The Contractor shall provide and use a suitable grade rod to insure the proper grade of the pipe.

B. The Contractor may use the laser beam method of setting a line and grade for the sewer by using the laser beam coaxially through the center of the sewer being laid. The laser beam projector is to be rigidly mounted to its support platforms, with a two-point suspension, or equivalent, assuring that all ground and equipment vibrations are kept to an absolute minimum. The Contractor shall furnish all equipment including equipment necessary to control atmospheric conditions in the pipe to keep line and grade to acceptable standards of accuracy. Competent experienced people who have been properly trained to operate the equipment used must operate the laser beam system.

C. The Contractor shall stake check pegs at all manholes throughout the job. Check pegs midway between manholes and any other checkpoints deemed necessary to assure accuracy of the equipment shall be provided by the contractor.

D. Each piece of pipe and special fitting shall be carefully inspected before it is placed and no defective pipe shall be laid in the trench. Pipe laying shall proceed upgrade, starting at the lower end of the grade and with the bells uphill. No pipe shall be laid except in the presence of an inspector representing the Engineer. Any pipe laid except in the presence of an inspector representing the Engineer shall be subject, at the contractor's expense, to a television camera inspection and survey by the city. Trench bottoms found to be unsuitable for foundations after pipe laying operations have started shall be corrected and brought to exact line and grade with approved compacted granular material as specified for foundation in Item 2.07 A. of these specifications.

E. Pipe laying shall proceed up-grade with spigot or tongue ends pointing in the direction of flow. The spigot shall be centered in the bell, and pipe shoved into position, and brought into true alignment. It shall be secured there with bedding material carefully tamped under and on each side of it, excepting at bell holes. Care shall be taken to prevent dirt from entering the joint space.

F. Any defective or damaged pipe discovered after the line is laid or any gravity pipe, which has had its grade or joint, disturbed after laying shall be removed and replaced or relayed. The section of line in which such damaged or displaced section is discovered shall be retested after corrections are made.

G. Where excavation for buildings or other portions of the work have been carried below the line and grades of the pipe, thorough tamping of approved crushed stone backfill and the use of adequate bracing and blocking under the pipe will be required to insure against settling and shearing of the pipe. In areas where noted on plans, Portland cement stabilized material or concrete shall be used for backfill to provide adequate bracing for pipe and protection of structures.

H. All manhole connections for PVC or other Polymer based pipe shall be made using "A Lok Gaskets" or "Kor-N-Seal" boots or other approved water stop devices. Only Portland cement grout that expands upon curing or approved non-shrink grout will be incorporated into any manhole connection.

I. Connections to manholes for other types of pipe shall be in accord with the pipe manufacturers specifications and other applicable requirements of these specifications. The resulting joint shall meet the leakage test requirements of these specifications.

J. The exposed end of all pipes shall be fully protected with a stopper or bulkhead at the end of each day's work to prevent earth, debris, small animals, or other substances from entering the pipe. The interior of the sewer shall be carefully freed from all dirt, jointing compound, or superfluous material of every description as the work progresses.

3.08 CONNECTION AND ASSEMBLY OF JOINTS

1. JOINING PVC OR OTHER POLYMER BASED PIPE

A. The type of joint and the material to be used shall be as shown on the plans or specified herein. Factory cast compression joints shall be free of dirt and lubricated before inserting the barrel into the bell. After the spigot is centered in the bell, the pipe shall be shoved home solidly by using a wood block and bar. The Contractor shall keep the ends of the pipe closed to prevent dirt and other material from entering the pipe during placement. All joints must be water tight, and any leaks or defects discovered must be repaired immediately. Any pipe, which has been disturbed after being laid, must be taken up, the joint cleaned and properly relayed as directed by the Engineer.

Lubricant used shall be as recommended by the pipe manufacturer.

B. Field-cut pipe must be beveled for insertion into the gasketed bell or coupling. Bevels can be made with a hand or power tool. Bevels shall be made to pipe manufacturer's specifications. If pipe manufacturers specifications are not available the bevel may be made at 15 degrees to the longitudinal axis of the pipe through one half (l/2) the wall thickness.

C. After pipe has been cut and beveled, a new full insertion mark located as recommended by the pipe manufacture shall be made using a felt tip pen. The contractor may determine the location of the insertion mark by measuring the mark location on a factory marked joint of pipe if manufacturer's specifications are not available.

2. JOINTING CORRUGATED STEEL PIPE

A. Gaskets for corrugated steel pipe shall be "O" Ring or sleeve types. Sleeve gasket shall be carefully placed on one joint of pipe. When the pipe is aligned and brought end to end the gasket shall be carefully centered over the joint between the ends of the pipe. "O" ring gasket shall be installed in accordance with the manufacturer's recommendation.

B. When "O" ring gaskets are furnished a flat gasket shall be furnished and placed between the overlapping portions of the band. The gasket shall extend the full width of the band and shall be of sufficient depth to assure a watertight joint.

C. The coupling band shall be carefully centered over the joints and tightened to the pipe manufacturer specifications. Care shall be taken during the tightening process to assure a snug uniform fit for the entire circumference of the pipe.

3. PROTECTING AND COVERING JOINTS

A. The contractor shall keep the ends of the pipe closed during the time of construction to prevent the entry of dirt, debris, small animals and other foreign objects.

B. Joints shall not be covered until approved by Engineer or his representative. Connections, which are for future use, shall be properly capped.

3.09 CONNECTIONS TO EXISTING STRUCTURES

A. Where shown on the plans, the contractor shall connect the new sewer to existing manholes. If no stub out is present in the existing manhole for such connection, the contractor shall construct such connection by making a hole in the side of the existing manhole using a coring machine or other approved method and installing a “KOR N Seal” boot as manufactured by N.P.C. Systems, Inc. or other approved water tight manhole connector.

The contractor shall use caution in constructing the connection to the existing manhole. Damage to the manhole that, in the opinion of the Engineer, would impair the use and/or function of the manhole shall be just cause to require the contractor to reconstruct the manhole at contractor’s expense. Such damage shall include but not be limited to cracking of the manhole riser section, spalling around the connection significantly reducing manhole wall thickness or excessive oversize in the opening for the new connection requiring any filler other than the manhole connector and/or non-shrink grout specified.

The contractor shall make such changes in the invert of the manhole as may be necessary to provide a smooth flow of the water through the manhole. Any connection to existing structures required in the Plans shall be accomplished by the Contractor and shall be incidental item with no direct compensation being made unless listed as a pay item in the bid proposal.

B. If the work consists of the construction of a sewer that is to replace an existing sewer, all of the existing service lines shall be kept in operation and connected to the new line.

C. Connections shall be made to all existing sewer lines in the vicinity of the work by removing a section of the sewer for the existing line and inserting in the space a tee branch of proper size, or by the construction of a manhole, regulator chamber of other structure as shown on the Drawings.

D. Connections to building services shall be made in a neat and workman like manner. Clean out plugs shall be installed wherever feasible, by making the connections with a standard wye or tee-wye. When clean out plugs are installed they should be located as near the right of way line as practical.

3.10 BACKFILL OPERATIONS

1. GENERAL

A. All pipeline excavations shall be backfilled in a manner that will restore pre-existing conditions as the minimum requirement and fulfill all supplementary requirements indicated in the Plans and Specifications. The backfilling operations shall be started as soon as conditions will permit on each section of pipeline, so as to provide continuity in subsequent operations and restore normal public service as soon as practicable on a section-by-section basis. All operations shall be pursued diligently, with proper and adequate equipment, to assure acceptable results.

B. For this specification backfill is defined as any material placed in the trench above the bedding zone other than the pipe or conduit and appurtenance.

For flexible pipe the backfill between the bedding material and the crown of the pipe shall be crushed stone suitable for encasement as specified in article 2.07 of the specifications. When Portland cement stabilized backfill is used above the pipe zone; the crushed stone encasement shall extend to 1' above the crown of the pipe.

C. Depositing of the backfill shall be done so the shock of falling material will not injure the structure. Grading over and around all parts of the work shall be done as directed by the Engineer.

D. Whenever soil types which are determined by the Inspector to be undesirable for backfill are excavated from the trench, such material shall be hauled away and deposited at locations shown on the plans or as directed by the Engineer at no additional compensation.

E. Backfill materials placed in the pipe zone shall be carefully placed in relatively uniform depth layers spread over the full width and length of the trench section in a manner and/or sequence that will provide simultaneous support on both sides of the pipeline. Each layer shall be compacted effectively, by approved mechanical of hand methods, until there is no further visual evidence of increased consolidation. Above the pipe zone the backfill material shall be placed uniformly across and along the trench in depth suitable for the compaction method used and compacted to a minimum of the density specified for the material used and the trench location. Compaction of the in place layer shall be completed acceptably before placing material for a succeeding layer thereon.

The manner of placement, layer thickness, compaction equipment, and procedure effectiveness shall be subject to approval of the Engineer. Water jetting or flooding shall NOT be used to compact trench backfill.

F. Compaction of materials placed within the pipe bedding and encasement zones shall be accomplished with portable or hand equipment methods, so as to achieve thorough consolidation under and around the pipe and avoid damage to the pipe. Above the pipe zone, the use of heavy roller type compaction equipment shall be limited to safe pipe loading.

G. The maximum loose thickness of each backfill layer placed above the pipe zone shall be 12 inches, except that 16 inches will be permitted for Granular Materials placed above an elevation one foot above the top of pipe, and with the provision that, by authority of the Engineer and in consideration of the demonstrated capability of special type vibratory compactors, these maximums may be increased at his discretion. “Hydro tamps”, “vibra tamps” or other heavy compacting equipment shall not be used until the backfill has reached a depth of four (4) feet above the top of the pipe.

H. All surplus or waste materials remaining after completion of the backfilling operations shall be disposed of in an acceptable manner within 24 hours after completing the backfill work on each particular pipeline section. Disposal at any location within the project limits shall be as specified, or as approved by the Engineer; otherwise, disposal shall be accomplished outside the project limits at the Contractor’s discretion. The backfilling and surplus or waste disposal operations shall be a part of the work required under the pipeline installation items, not as work that may be delayed until final cleanup.

I. For the duration of the warranty period of the project, the Contractor shall assume full responsibility and expense for all backfill settlement and shall refill and restore the work as directed to maintain an acceptable surface condition. All additional materials required shall be furnished without additional cost to the Owner.

2. BACKFILL IN PUBLIC RIGHTS-OF-WAY AND OTHER AREAS WHERE SETTLEMENT IS CRITICAL

A. GENERAL REQUIREMENTS

(1). Backfill above the pipe zone in public rights-of-way and under paved parking lots, near structures or other utilities where settlement can cause damage shall be made using Portland cement stabilized backfill or crushed stone screenings (crusher fines).

The pipe zone is defined as that portion of the trench extending from the bottom of the trench to 12” above the crown of the pipe or conduit.

(2) Backfill around structures such as manholes, junction boxes, transformer boxes and valve boxes shall be made using Portland cement stabilized backfill material or crushed stone screening (crusher fines).

(3) The minimum depth of stabilized backfill or crusher fines shall be twelve (12”) inches.

When utilities are being constructed under existing paving, the stabilized backfill or crusher fines shall extend from top of the pipe zone to the top of the base course.
When utilities are being constructed under existing unpaved streets that are not scheduled for immediate pavement construction, the stabilized backfill or crusher fines shall extend from the top of the pipe zone to the existing roadway surface.

When utilities are being constructed in streets that are scheduled for immediate paving, the stabilized backfill or crusher fines shall extend from the top of the pipe zone to the bottom edge of the eight (8”) inches of subgrade, or, if the paving contractor has constructed a portion of the roadway prior to the construction of the utilities the backfill shall extend to the top of the course the contractor has finished, or the top of the base course, which ever is lower.

If the final course of asphaltic concrete has been placed, the street or alley surface shall not be cut for utility installation.

In streets where stabilized backfill is required only to the bottom of the subgrade course, the minimum depth of stabilized backfill may be reduced to six (6”) inches in which case the maximum depth of the “pipe zone” shall be limited to six (6”) inches above the top of the utility line or conduit.

B. BACKFILL MATERIALS

(1) Portland cement stabilized backfill shall consist of caliche base material, blow sand or native soil stabilized by the addition of Portland cement. Crushed stone or concrete aggregate shall NOT be used.

When Portland cement stabilized backfill is to be used, the contractor shall submit a mix design prepared by an approved commercial laboratory for approval before the trenching operation is begun. When native soil is to be used samples may be taken along the proposed route by boring or other approved means. Samples must be representative of the full trench depth.

The mix design shall be such that the minimum 7-day compressive strength is 150 psi when tested according to test method Tex 418-A.

The minimum cement content for Portland cement stabilized backfill shall be 1 sack per cubic yard.

Cement used in Portland cement stabilized backfill shall be Type I or Type II conforming to the requirements of ASTM Designation C150.

Caliche used for Portland cement stabilized backfill shall be crushed material conforming to Texas State Department of Highways and Transportation 1982 Standard Specifications for Construction of Highways, Streets and Bridges Item 248 Type F, Grade 2.

Blow sand used for Portland cement stabilized backfill shall be clean, free from organic matter, clay lumps, rock and other deleterious matter.

Native soil used for Portland cement stabilized backfill shall be clean, free of clods and organic matter, and free of rock in excess of 2”.

(2) Crushed stone screening (crusher fines) used for back fill shall be sharp grained particles of crushed stone conforming to the requirements of Article 2.07 of these specifications.

(3) Trencher excavated rock material shall be screened so that the largest diameter material is less than 2". The screened rock material used for backfill shall have sufficient moisture added so that the backfill will bind with the fines. The rock material backfill shall be tamped or compacted in two (2) foot lifts. A sheeps foot roller shall not be used unless there is two (2) feet or more compacted backfill above the pipe bedding.

C. BACKFILL CONSTRUCTION

(1) Portland cement stabilized caliche backfill or Portland cement stabilized native soil backfill may be constructed using either the "dry" method or the "wet" method.

(a) The dry method of stabilized backfill construction consists of dry mixing of the cement and caliche or soil to produce a homogenous mixture then adding and mixing sufficient water for proper compaction and hydration of the cement. The water content of the mixture will be approximately one to two percent above the optimum moisture for soil compaction. The mixing may be accomplished by using batch mixers or on the job site by "blade mixing" or other suitable method to produce the desired backfill material. The mixed material shall be placed in lifts of up to a maximum of 12 inches and compacted to ninety-five (95%) modified proctor densities by use of suitable compacting equipment.

(b) In the "wet" method of cement stabilized backfill construction, the materials shall be mixed in an approved concrete batching plant or mixer to the consistency of concrete and placed as concrete would be placed. The slump of the backfill material shall be such that all voids will be filled, approximately four (4") to six (6") inches. The backfill shall be consolidated by rodding or by the use of mechanical vibrators.

Portland cement stabilized blow sand backfill shall be mixed and placed by the "wet" method as described above.

Crushed stone screening (crusher fines) shall be wetted uniformly throughout with sufficient moisture to assure proper compaction before being placed in the trench. The moistened crushed stone screening (crusher fines) shall be placed in maximum lifts of twelve inches and consolidated using vibratory type compaction equipment except when it has been demonstrated that the compaction equipment employed will adequately compact deeper lifts in which case the maximum depth of a lift shall be limited by the capabilities of the equipment used.

Tests to determine the compacted density of the backfill shall be ordered by the Engineer if in his opinion the compaction is not adequate. Test showing a minimum compacted density of 90%-modified proctor will be deemed adequate.

3. BACKFILL OUTSIDE OF PUBLIC RIGHTS-OF-WAY WHERE SETTLEMENT IS NOT CRITICAL

A. In areas outside of public rights-of-way and in the absence of special work item requirements the backfilling shall be accomplished with the use of suitable materials selected from the excavated materials to the extent available and practical. Should the materials available from the trench section be unsuitable or insufficient, the required additional materials shall be furnished from outside sources at the Owners expense.

B. Suitable material shall be defined as a mineral soil reasonably free of foreign materials (rubbish, debris, etc.) frozen clumps, oversize stone, rock, concrete or bituminous chunks and other unsuitable materials, that may damage the pipe installation, prevent thorough compaction, or increase the risks of after settlement unnecessarily. Material selection shall be such as to make the best and fullest utilization of what is available, taking into consideration particular needs of different backfill zones. Material containing stone, rock, or chunks of any sort shall only be utilized where and to the extent there will be no detrimental effects.

C. The backfill material placed in this area shall be compacted by suitable means to a minimum density equal to the density of the undisturbed surrounding soil. City Engineer MUST approve water flooding as a means of compaction.

4. TRENCH BACKFILL BEHIND CURB AND GUTTER

A. When utilities are placed behind the curb in paved streets and other landscaped areas the backfill shall be the same as elsewhere in the right-of-way or other applicable location except that in grassed areas and in flower beds the top six (6”) inches of backfill shall be good quality top soil. When utilities are placed behind the curb in grassed or landscaped areas where no sidewalk is to be constructed and the edge of the trench is a minimum of 2 feet from the back of curb or where sidewalk is to be constructed and the minimum distance from both the back of curb and the edge of the sidewalk to the edge of the trench is 2 feet the contractor may elect to use suitable native soil for backfill. The native soil backfill shall be compacted to 95% modified proctor density to within 6” of the top of curb height. The top 6” of backfill shall be good topsoil and shall be compacted to the density of the adjacent soil.

B. Sidewalks shall be repaired by removing and replacing the complete section or sections that have been damaged. Strip patching through sidewalks will not be permitted.

The replacement sidewalk shall be of the same design and section as the walk removed and shall be of equal or better workmanship.

C. When utilities are placed in paved areas behind curbs the pavement shall be repaired as specified for street pavement.

D. Grassed areas and flowerbeds shall be restored as nearly as possible to the original condition. Care shall be taken to avoid damage to sprinkler systems.

Mail boxes and other appurtenance in the construction area. Any damage to said items shall be repaired immediately.

E. All repairs made behind the curb shall be to the satisfaction of the property owner responsible for their maintenance and/or to the satisfaction to the City Engineer.

3.11 INLET STRUCTURES AND LEADS AND CLEANOUTS FOR STORM SEWERS

A. Corrugated Galvanized Steel Slotted Drains for Nuisance water inlets only.

(1) Slotted drains shall be the sizes and lengths as shown on the plans and constructed at the locations as shown on the plans or at locations to be established on the job site.

(2) Slotted drains shall not be installed under asphalt pavement but shall have a section of concrete gutter constructed around it as shown on the detail drawings.

Slotted drains shall be protected from the entrance of debris, concrete or HMAC by closing the slot with one or two layers of heavy duct tape or similar material. In addition, the slot for slotted drain shall have a 2-½ inch or ¾ inch board attached to use as a guide for placing and edging the concrete.

Unless otherwise approved or directed by the Engineer the removal of tape and planking from the slotted drain should be accomplished as part of the final clean up.

B. Curb inlets, grate inlets and combination inlets

(1) General

Curb inlets, grate inlets and combination inlets may be pre-cast or cast-in-place at the contractor's option unless specifically shown otherwise on the plans and bid proposal.

(2) Pre-cast inlet boxes

(a) Construction and finish for pre-cast inlet boxes shall conform to details shown on the plans and all applicable requirements for pre-cast manholes.

(b) Tops for curb inlets and combination inlets may be cast in place or pre-cast. Extra care will be required in setting pre-cast tops to assure curb and gutter match.

(c) Pipe connections, bedding, setting and backfill for pre-cast inlets shall be in accord with the applicable requirements for pre-cast manholes article 3.12 of these specifications.

(3) Cast in place inlets

(a) Cast in place inlets shall be constructed of class "C" reinforced concrete as specified in item 1-B "Concrete for Structure" in these specifications.

(b) Forms for cast in place inlets shall be straight, clean and in good condition. Forms shall be properly cleaned and oiled before concrete is placed.

(c) Construction joints may be placed in cast in place inlets at locations shown on the plans. When construction joints are used, extra care will be required to assure that the joints are watertight.

(d) Cast in place inlets may be cast without outside forms if the soil conditions are such that true vertical walls can be cut and will stand during construction without sloughing or otherwise incorporation foreign materials into the concrete.

(e) When inlets are cast without outside forms, a plastic sheet lining may be required to prevent excessive loss of moisture from the concrete and/or to prevent incorporation of foreign material into the concrete.

A. Inlet Leads

(1) Inlet leads shall be constructed of corrugated steel pipe, PVC pipe or other material as called for on the plans and in the bid proposal.

(2) Construction of inlet leads shall be in accord with the applicable requirements for the type of pipe used.

(3) Junctions where two or more inlet leads are joined shall be made at clean outs or manholes.

B. Cleanouts

(1) Clean outs shall be constructed in accord with the plans and detail drawings.

(2) Construction and connections shall be in accord with the applicable specifications for construction of corrugated steel pipe manholes.

3.12 SANITARY SEWER SERVICES AND PLUGGED STUBS

A. Sanitary Sewer Services:

(1) On new sewer main construction all sewer laterals shall be constructed as part of the initial installation. Sewer wye fittings for sewer laterals in new construction shall be molded or fabricated with all gasketed connections. Four (4”) inch laterals shall be installed at all single-family residences and duplex. Laterals installed for apartment complexes, commercial and industrial areas shall be a minimum of six (6”) inches. Depth of laterals will be determined by depth of sewer main and applicable building codes. Laterals shall be installed using tee wyes or wyes and bends so that they will be at 90 degrees to the sewer main. Laterals shall extend to 3’ minimum beyond the property line of the served lot or tract. The contractor shall install sewer laterals according to the typical sewer lateral detail and the most current revisions of the Plumbing Code.

(2) Taps into existing lines shall use a gasketed fitting in conjunction with a full circle repair sleeve coupling, except that taps into existing ductile iron sewer may be made using the Genco Model DF sewer pipe saddle (The General Engineering Co., Frederic, MD Drawing No. R-3220-D dated 12/29/82) or approved equal.

(3) Cemented mitered connections without socket reinforcement shall not be permitted. The contractor will be permitted to use fittings, which are prefabricated, using pipe sections, molded saddles and PVC solvent cement, provided the solvent cement used in fabrication has cured for at least 24 hours prior to the installation. All solvent cement fittings shall e manufactured in the shop under controlled conditions.

(4) All caps and plugs shall be braced, staked, anchored, wired on or otherwise secured to the pipe to prevent leakage under maximum anticipated thrust from internal abnormal operating conditions or test pressures from water or air.

(5) It shall be the duty of the Contractor to keep a record of sewer service wye locations with respect to the nearest downstream manhole, but the Engineer will record ties on the end of all sewer services at the property line. When installing sewer services the Contractor shall, before backfilling, contact the Engineer or his representatives, and assist him in making ties to the end of the service in the open trench. At least two ties shall be made for each service, and if backfilling proceeds before such ties are made, the Contractor shall dig up the end of all such services, with no additional compensation, for the purpose of making ties. During backfilling the Contractor shall furnish and place a vertical steel post or 2 inch by 2 inch wooden stake set flush with finished ground surface, and extending down to the end of the sewer service, a nail shall be placed in the top of the stake to allow location of the service by metal finder.

(6) The main sewer service connection shall consist of installing an in-line wye section in the main sewer line at designated locations. Saddle wye installations will be permitted only when specifically called for. Orientation of service connection fittings shall be as shown in the standard drawings unless otherwise directed by the Engineer.

(7) Where the depth of cover over the main sewer invert is greater than 8 feet (or such other maximum as may be indicated), the service connection shall be extended outward then upward by use of bends to prevent excess loading on the sewer main in accordance with the details shown in the drawings.

(8) The Contractor shall provide the necessary wyes, tees and bends to bring the service to the proper place at the property line.

(9) Wherever service line connections to the main sewer are permitted or required to be made by the open cutout method in the absence of a built-in tee or wye fitting, the connection shall be made by using an approved type coring machine or by other approved methods producing a uniform, smooth circular cut-out as required for proper fit. The cutout discs shall be retrieved and shall not be allowed to remain within the main sewer pipe. The saddle tee shall be securely fastened to the main sewer pipe by means of epoxy resin or other approved adhesive. The entire connection fitting shall be encased in concrete to a minimum thickness of six inches and as may be shown in the standard drawings.

(10)Wherever service line connections to the main sewer are required to be made by means of built-in branch tee or wye fittings, the Contractor shall, in the absence of such fitting, remove a section of the main sewer pipe and replace it with the required branch tee wye or wye section connected by means of an approved sleeve coupling.

(11)Connections of service lines to the main sewer are required to be made by means of built-in branch tee or wye fittings, the Contractor shall, in the absence of such fitting, remove a section of the main sewer pipe and replace it with the required branch tee wye or wye section connected by means of an approved sleeve coupling.

(12)The end of all service connections shall be plugged with PVC plug and sealed with plastic joint material.

(13)Crushed stone bedding and backfill material, concrete encasement and protection, etc., for service line installation shall be the same as for the sewer lines.

(14)No service connections or laterals shall be covered until they have been inspected and located by the Engineer.

B. INSTALLATION OF PLUGGED STUBS ON SANITARY SEWERS

Plugged pipe stubs for future connections to manholes and sewerage structures shall be installed where shown on the Drawings or directed by the Engineer. The pipe stubs shall be installed in accordance with the specifications and details shown on the Drawings for connecting the type of pipe used to manholes.

3.13 MANHOLES

1. General

The manholes shall be constructed at the locations shown on the plans or as directed by the Engineer and in accordance with the details shown on the plans and as specified herein. After the excavation has been completed, the subgrade for the manhole base shall be graded and leveled. A crushed stone foundation having a minimum thickness of 6 inches shall then be placed on the subgrade. The crushed stone foundation shall be leveled and consolidated before the section of the manhole is placed. Pre-cast base sections shall sit in place level and plumb and to the lines and grade as shown on the plans. Cast in place bases shall be placed around the existing sewer line in accord with the plans and detail sheet. When pre-cast manhole bases are used, riser construction may proceed when the base is set on line and grade. When cast in place manhole bases are used, riser construction may proceed when the base has set sufficiently to support the weight of the riser.

Manholes shall be of the type and material shown on the plans and called for in the bid proposal and shall conform to these specifications.

All lift holes shall be filled with approved non shrink grout and bituminous material before final acceptance. Use of bituminous material or other flowable material alone to plug lift holes will not be permitted. Voids in the invert around the sewer pipe on the

inside wall of the manhole shall be grouted with cement rich grout, to conform to the rest of the wash, in accordance with the standard manhole details.

The backfill around the manhole shall be done in accordance with the details shown on the plans and trench backfill specifications.

The Contractor shall take whatever precautions necessary to protect the manholes that are under construction. At the end of the day or at such time as the Contractor deems necessary, all manholes not completed shall be covered, sealed, plugged, etc. to prevent the inflow of storm water or other objectionable material, and to prevent animals and humans from getting into the manhole.

2. PRE-CAST CONCRETE

A. Pre-cast tub bottom sections of manholes shall be set on a crushed stone foundation or bedding according to the details shown on the plans. Care shall be exercised to assure true alignment and grade for the pipe openings.

The invert of the manhole shall be constructed of cement rich grout and shall be formed to true lines; grades and curvature to assure smooth flow through the manhole. The invert shall have a steel trowel finish.

Joints for pre-cast concrete manhole riser sections shall be made Watertight by use of bitumastic or rubber sealers or “O” ring gaskets. Both sides of the tongue and groove joint shall be painted with a bitumastic primer before assembly.

The bitumastic or rubber sealer shall be clean and pliable and shall deform under the pressure of joint closure to assure a complete water tight seal. Care shall be exercised to assure proper alignment of the joint. The walls of the completed manhole shall be straight and vertical.

B. Pre-cast eccentric cone sections and precast slab manhole tops with eccentrically located manway shall be set with the manway adjacent to the up stream side of the manhole. The joints between the cone or slab top and the manhole riser shall be sealed in the same manner as the joints between the riser section. Care shall be taken in placing the cone and or slab tops to assure the manhole ring and cover can be set to match the finished paving.

C. Pre-cast grade rings will be used, when required, to bring the manhole ring and cover up to the finished grade. Grade rings may be set using cement rich grout or bitumastic seal and such as Ram-Nek or approved equal. When cement rich grout is used, care shall be taken that the space between the cone or slab top and the first grade ring and between the grade rings are completely filled without voids.

When bitumastic sealer is used the joints shall be constructed in the same manner as the joints between the riser sections.

When pre-cast manholes with PVC or other approved polymer lining are called for on the plans and bid proposal and are furnished under this contract they shall be constructed as other pre-cast concrete manholes.

In addition the joints in the lining shall be sealed by hot air welding, use of epoxy coating, or other approved means.

3. CAST IN PLACE MANHOLE BASES

A. Cast in place manhole bases shall be used only where shown on the plans or as directed by the Engineer and shall be constructed in accord with the details shown on the plans.

B. Special care shall be taken in casting the surfaces that will mate with the first risersection to assure a smooth even fit and a watertight joint.

C. The first riser section to be used with cast in place manhole bases shall be castwithout tongue or groove. The joint between the riser section and the cast in place base shall be sealed with a bitumastic or rubber sealant in the same manner as the joints in the pre-cast riser sections.

D. Care shall be taken in forming the invert of the manhole around existing sewers to assure adequate opening for the insertion of a “go – no go” mandrel or other testing equipment and cleaning tools.

4. MANHOLE RING AND COVER

A. The tops of the manhole frame and cover (ring) shall be built to the grade shown on the plans. The cast iron frame shall be firmly embedded in mortar.

B. When pressure type manhole rings and cover are specified on storm sewer manholes they shall be bolted to the concrete slab top using the “L” bolts cast into the slab for this purpose. The joint between the ring and the concrete slab top shall be made watertight using a bitumastic or rubber seal and conforming to the requirements of these specifications.

5. CORRUGATED STEEL MANHOLES

A. Corrugated steel manholes shall be constructed in accord with the details shown on the plans and in accord with the applicable requirements for the construction of corrugated steel pipe sewers.

B. Care shall be taken during the placing of backfill around corrugated steel pipe manholes to maintain the horizontal and vertical alignment of the manhole.

C. Since full contact of the flat top slab with the cement stabilized backfill is critical the backfill shall be finished smooth and to the proper grade. A thin layer of cement rich grout shall be placed on the cement stabilized backfill immediately prior to placing the concrete slab top. The grout shall be sufficient t fill all voids between the backfill and the slab and of a consistency to be forced into the voids under the weight of the slab.

3.14 TESTING GRAVITY SEWER MAINS AND MANHOLES

A. Upon completion of the sewer construction including all wyes and service laterals and before any house drains or services are connected, all sewers shall be cleaned and lamped. All runs of sewer between manholes shall be straight and true. Leakage tests shall be made to determine the amount of ground water infiltration into the sewers. Infiltration tests shall be made when groundwater level is 18 inches or more above the top of the outside of the pipe. Measurement will be taken by means of a weir placed in the lines. The maximum allowable rate of leakage shall be 25 gallons per inch diameter per mile of pipe per 24 hours, for any section of pipe with a maximum total leakage of 200 gallons per mile per 24 hours for sanitary sewers with the exception that the maximum leakage for storm drains shall be 200 gallons per inch of diameter per mile per 24 hours with a total maximum leakage of 6,000 gallons per mile per 24 hours.

When the groundwater is not at sufficient height for infiltration testing the Contractor shall use exfiltration to test the sewer lines.

B. In lieu of the infiltration or exfiltration tests the Contractor may perform air tests on the sewers.

C. If the infiltration, exfiltration, or air tests fail to meet requirements specified herein, the Engineer reserves the right to request television work to be done to locate leaks. The Contractor shall furnish all materials and equipment necessary to accomplish all infiltration, exfiltration, air or television testing.

The Contractor shall receive no additional compensation for this testing or inspection work or for repairs of corrective work required to be done to the sewers. The exfiltration tests shall be used in areas where no ground water is present.

D. Test Procedure Hydrostatic (Exfiltration)

(1) The test section shall be bulk headed and the pipe subject to a hydrostatic pressure produced by a head of water at a depth of three (3) feet above the invert of the sewer at the upper manhole under test. In areas where ground water exists, this head of water shall be three feet above the existing water table.

(2) This head of water shall be maintained for a period of one hour during which it is presumed that full absorption of the concrete manhole body has taken place and thereafter for a further period of one (1) hour for the actual test of leakage. Fiber glass manholes are exempt from the one hour absorption requirement. During this one (1) hour test period, the measured maximum allowable rate of exfiltration for any section of sewer shall be the same as allowed for the infiltration test.

E. TEST PROCEDURE AIR

(1) Where the Contractor elects to air test, he shall perform these tests with equipment similar to Air-Loc equipment manufactured by Cherne Industrial, Inc. Hopkins, Minnesota.

(2) The air test shall be made when the sewer is clean. The line shall be plugged at each manhole with pneumatic balls. Low pressure air shall be introduced into the plugged line until the internal air pressure reaches 4.0 psig greater than the average

back pressure of any ground water pressure that may submerge the pipe. At least two (2) minutes shall be allowed for the air temperature to stabilize before readings are taken and the timing started.

(3) When testing pipes 14 inches and less in diameter between consecutive manholes, the portion being tested shall pass if it does not lose air at a rate to cause the pressure to drop from 4.0 to 3.0 psig (greater than the average back pressure of any groundwater that may submerge the pipe) in less time than listed as calculated from Table 1.

When testing pipes greater than 15 inches in diameter between consecutive manholes the portion being tested shall pass if it does not lose air at a rate to cause the pressure to drop from 3.5 psig 3.0 psig (greater than the average back pressure of any groundwater that may submerge the pipe) in less time than that shown in or calculated from Table II.

TABLE I
Specification Time Required for a 1.0 PSIG Pressure Drop for Size and Length of Pipe indicated for Q = 0.0015

Specification Time for Length (L) Shown (min: sec)											
1	2	3	4 (xL)	100 ft.	150 ft.	200 ft.	250 ft.	300 ft.	350 ft.	400 ft.	450 ft.
4	3:46	597	.380	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854	5:40	5:40	5:40	5:40	5:40	5:40	5:42	5:42
8	7:34	298	1.520	7:34	7:34	7:34	7:34:	7:36	8:52	10:08	11:24
10	9:26	239	2.374	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768	51:17	75:55	102.34	128:12	153:50	179:29	205:07	230:46

1. Pipe Diameter (in.)
Minimum Time (min:sec)
Length for Minimum Time (ft.)
Time for Longer Length (sec)

NOTE: When using column 4 multiply the number in column 4 opposite the pipe diameter by the length of pipe of that diameter and sum the times for the various pipe size in the run being tested. Computations shall include lengths for service connection laterals.

Table II
Specification Time Required for 0.5 PSIG Pressure Drop for Size and Length of Pipe Indicated for Q + 0.0015

Specification Time for Length (L) Shown (min: sec)											
1	2	3	4 (xL)	100 ft.	150 ft.	200 ft.	250 ft.	300 ft.	350 ft.	400 ft.	450 ft.
4	1:53	597	.190	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	.760	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187	4:43	4:43	4:43	4:57	5:56	6:55	7;54	8:54
12	5:40	199	1.709	5:40	5:40	5:40	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653	14:25	21:38	28:51	36:04	43:16	50:30	57:42	46:54

30 33 36	14:10 15:35 17:00	80 72 66	10.683 12.926 15:384	17:48 21:33 25:39	26:43 32:19 38:28	35:37 43:56 51:17	44:31 53:52 64:06	53:25 64:38 75:55	62:19 75:24 89:44	71:13 86:10 102:34	80:07 96:57 115:23

1 Pipe Diameter (in.)
2 Minimum Time (min:sec)
3 Length for Minimum Time (ft.)
4 Time for Longer Length (sec)

NOTE: When using column 4 multiply the number in column 4 opposite the pipe diameter by the length of pipe of that diameter and sum the times for the various pipe size in the run being tested. Computations shall include lengths for service connection laterals. All service plugs shall be secured in place to prevent displacement during testing operation.

F: DEFLECTION TEST

Deflection tests shall be performed on all flexible pipe, the tests shall be conducted after the backfill has been in place at least 30 days. No pipe shall exceed a deflection of 5 percent. The deflection tests shall be run using a Go-No-Go mandrel having a diameter equal to 95 percent of the inside diameter of the pipe. The tests shall be performed without mechanical pulling device, any pipe not meeting the deflection test shall be excavated and re-bedded at no cost to the owner.

The Contractor at no additional cost to the owner shall furnish the Go-No-GO Mandrel.

Upon completion of all tests, the Contractor shall provide personnel to remove each manhole cover in the presence of the Engineer's representative for inspection and depth measurement.

G. TESTING SANITARY SEWER MANHOLES

All sanitary sewer manholes shall be tested for water tightness by one of the following methods.

Manholes, except those in streets scheduled for immediate paving, shall be complete, having all adjusting rings and cover rings in place and shall be backfilled prior to testing.

Manholes in streets scheduled for immediate paving shall be complete as described above except those acceptance tests shall be made at the top of the cone section.

(1.) Vacuum Test

a. General

This item will govern the testing of all sanitary sewer manholes. All connections to manholes including drop connections shall be in place before testing.

b. Equipment

Equipment for vacuum testing manholes shall be:
MANHOLE VACUUM TESTER as manufactured by:

P.A. Glazier, Inc.
P.O. Box 1002
Worcester, MA. 01613

Or

THE CHERNE AIR-LOC MANHOLE TESTER as manufactured by:

Cherne Industries, Inc.
5700 Lincoln Dr.
Minneapolis, MN 55436-1695

Or approved equal.

c. Preparation for Testing

All connections to the manhole; except plugged stubs for future line extensions, shall be plugged using suitable pneumatic plugs. Line plugs shall be placed at a point outside of the manhole wall (approximately 8" to 10" into the sewer pipe). Drop connections shall be plugged at a point up stream from the drop.
All plugs, pipe connections and plugged stub outs shall be adequately braced to prevent them being drawn into the manhole when vacuum is applied.

d. Testing

The contractor shall set the test equipment in place and operate it in accord with the manufacturer instructions. A copy of these instructions shall be kept on the job site and shall be available to the inspector when tests are performed. When equipment is properly set up a vacuum of 10" of mercury (Hg) shall be drawn and the vacuum line valve closed. After the vacuum pump is shut off the hose shall be disconnected before the test is started.

Note: Vacuum must be at 10" Hg when test is started. The contractor may wish to draw up to 10.5" Hg vacuum and then bleed back to 10" Hg before starting the test. The test shall pass when the minimum time for the vacuum to drop from 10" Hg to 9" Hg is greater than the time shown in the following table:

TABLE 1: Minimum test times for various manhole diameters.

	DIAMETER		
Depth Feet	48"	60"	72"
8'	0:20	0:26	0:33
10'	0:25	0:33	0:41
12'	0:30	0:39	0:49
14'	0:35	0:46	0:57
16'	0:40	0:52	1:05
18'	0:45	0:59	1:13
20'	0:50	1:05	1:21
* ADD	0:05	0:06.5	0:08

Any manhole that fails the test shall be repaired and retested until it passes the test.

e. Contractors Optional Test

The contractor, at his option may wish to test manholes before they are backfilled to assure himself that the manhole is sound.
Manholes that fail the test prior to being backfilled may be repaired under vacuum by coating the area of the leak with a liquid quick setting grout allowing the grout to be drawn into the opening until the leak is stopped.

Manholes will not be accepted on the bases of this test.

f. Fiberglass Manholes

Fiberglass manholes may be tested in the same manner as concrete manholes except that all repairs to the fiberglass body of the manhole shall be made using materials furnished by the manufacturer. Repairs shall be made in accord with the manufacturer instructions.

g. No separate payment will be made for vacuum testing of manholes, but the cost shall be considered incidental to furnishing and construction of manholes as bid in the bid proposal.

2. HYDROSTATIC TESTING

a. General

This item shall govern the hydrostatic testing of manholes and may be used as an alternative to vacuum testing by the contractor.

All connections to manholes including drop connections shall be in place prior to testing manholes.

b. Testing

All connections to the manhole, except plugged stubs installed for future line extensions, shall be plugged upstream from the drop.

Plugs in pipe connections must be placed outside the manhole wall (approximately 8” to 10” into the pipe).

The manhole shall then be filled to the top of the cast iron ring (or top of the cone section for manholes in streets scheduled for immediate paving) and allowed to stand for a minimum of one hour to allow for absorption by the components of the manhole. The inspector may extend the absorption period if it appears that the manhole has not reached a stable state.

The manhole shall then be refilled to the top of the ring (or cone) and allowed to stand for up to 24 hours.

The manhole shall be checked at the end of 4 hours and will be deemed to have passed if no perceptible loss has occurred – if loss has occurred the manhole will be checked after the 24 hour period and will be considered to have passed if loss does not exceed the following schedule

Depth Ft.	Loss Inches
0 - 10’	.2
10 – 20’	.4
20 - 30’	.6

c. No separate payment will be made for Hydrostatic Testing of manholes but the cost shall be considered as incidental to furnishing and constructing manholes as bid in the bid proposal.

H. TELEVISING NEW SEWER LINES

It is the city’s intention to televise all new sanitary sewer lines for record purposes.

Immediately after the contractor completes all testing of sanitary sewer lines and manholes he shall leave all manholes accessible for televising and make allowances for the city’s camera crews working on the project site.

The contractor at his own expense before final acceptance must correct any defects discovered during the televising of sanitary sewers.

3.15 RESTORATION

A. Whenever any surface improvements such as pavement, curbing, pedestrian walks, fencing, or turf have been removed, damaged or otherwise disturbed by the Contractor’s operations, they shall be repaired or replaced to the Engineers satisfaction, to restore the improvement in kind and structure to the pre-existing condition. Each item of restoration work shall be done as soon as practicable after completion of installation and backfilling operations on each section of pipeline.

B. In absence of specific payment provisions, as separate Contract Items, the restoration work shall be compensated for as part of the work required under those Contract Items, which necessitated the destruction and replacement or repair, and there will be no separate payment therefor. If separate pay items are provided for restoration work, only that portion of the repair or reconstruction, which was necessitated by the contract, will be measured for payment. Any improvements removed or damaged unnecessarily shall be replaced or repaired at the Contractor’s expense.

C. Turf restoration shall be accomplished by sod replacement except where seeding is specifically allowed or required.

Caliche or gravel surfaced streets and driveway shall be restored to their original condition by salvaging and replacing the pre-existing caliche or gravel. If the Contractor does not salvage sufficient material during excavation operation, he will be required to furnish material to restore the surface to the depth of the original section. This caliche or gravel restoration shall be considered a part of excavation and backfill and no extra compensation will be made.

E. Bituminous and concrete surfaced streets and driveways will be restored to equal or better condition than existed prior to sewer construction. Measurement will be made of the actual quantities required to be replaced by the sewer construction and paid for at the price bid in the appropriate bid items in the proposal.

No measurement or payment will be made for work done outside the lines considered necessary for sewer construction. The Contractor will be required to replace damage outside these lines at his own expense.

F. Reconstruction of caliche base courses and concrete or bituminous surface courses shall be in substantial compliance with all applicable City of Midland Specifications pertaining to the item being restored.

3.16 CLEANUP

After completing each section of the sewer line, the Contractor shall remove all debris, construction materials, and equipment from the site of the work, grade and smooth over the surface on both sides of the line and leave the entire right-of-way in a clean, neat, and serviceable condition. No separate compensation shall be made for clean up.

3.17 PAYMENT

A. General

Payment in accordance with the following items, at the unit price bid for the work, shall constitute full and complete payment for the entire project including all incidental terms necessary for the complete and successful prosecution of the work in accordance with the intent of the plans and specifications.

Materials and work required to complete the project for which there is no bid item in the bid proposal shall be considered as incidental and the cost shall be included in the prices bid for the various items in the bid proposal.

Where payment is to be made on a unit price basis, it shall be made on the actual measured quantities as constructed in the work.

B. Sewer Pipe in Place

Unit prices bid shall cover furnishing and installation of pipe and jointing materials, including tests and all other necessary work and material to install the pipe complete in place at the depth specified. The unit of work shall be the lineal foot of the various types and sizes as shown in the proposal form. The pipe installation shall be measured

along the centerline of the sewer from center to center of manholes with no deduction in footage for manholes, wye branches, riser bases or other structure.

C. Foundation Corrections Materials

Payment for foundation correction materials shall be made at the unit price bid per cubic yard for material furnished and placed to pro vide adequate pipe base in unstable soil. The unit price shall include extra excavation below pipe grade, the material, placing and tamping.

Additional material required to backfill excess depth of excavation caused by neglect or error on the part of the Contractor or wet conditions, shall be furnished and placed at his own expense.

Removal of Street Surfacing

The Contractor shall receive no extra compensation for the removal of street surfacing including cutting of a straight edge.

E. Trench Safety Systems, Sheeting and Shoring

Measurement: Trench Safety Systems shall be measured by the linear foot of "Trench Safety Systems": Payment for work prescribed under this item shall be full compensation for the Trench Safety Systems including any Engineering and/or consulting fees and any additional excavation and backfill required, for furnishing, placing, maintaining and removing all shoring, sheeting, or bracing; for de-watering or diversion of water; for all jacking and jack removal; and for all other labor, materials, tools, equipment and incidentals necessary to complete the work.

F. Manholes

Payment will be made for the various types of manholes at the unit prices bid for the various types of manholes 0 to 6' deep which price shall include excavation, furnishing and installing all materials pumping where necessary, and backfilling and all incidentals for the complete manhole in place. Measurement for manholes over 6 feet in depth shall be made of the depth of manhole in excess of six (6) feet. Manholes will be measured from the invert to the top of the casting as set.

Payment will be made for the manhole depth in excess of 6 feet at the vertical foot price bid in the bid proposal for extra depth of manhole over 6 feet for each type of manhole furnished.

G. Drop Connections to Manholes

Payment shall be made for drop connections to manhole for each drop connection made as counted in the field at the price bid in the proposal.

Said payment shall be complete compensation for furnishing all materials and fittings and making all connections to the manhole including 2' of vertical depth as measured from the invert of the incoming line to the invert of the manhole.

H. Drop Section for Manholes

Drop sections shall be paid for on a vertical footage basis as measured from the invert of the incoming line to the invert of the manhole less 2 feet and shall be paid for at the price bid per vertical foot for the various size drop connections in the bid proposal.

The price bid per vertical foot includes all fittings, granular material, if used and concrete and shall be full compensation for the complete in service drop connection.

I. Service Lines

Service lines will be measured from centerline of the sewer main to the plug end and paid for at the unit price bid per linear foot of each type of pipe as specified and as shown on the typical details.

J. Barricading and Traffic Control

The lump sum price bid in the bid proposal shall be full compensation for furnishing flag persons when required and all barricades, signs and other barricading and traffic control devices and for furnishing barricading plans and erecting and maintaining all such devices and signs as required for the duration of the period.

Updated
08/07

ADDENDUM #01
Project Number P21-06

TO ALL BIDDERS ON THE SUBJECT BID: Briarwood Paving Phase II

ADDENDUM #01

DATE: July 9, 2025

1. The Bid Opening has been moved to Wednesday, July 23, 2025, at 2:00 PM in the City Hall Council Chamber located on the 1st Floor of Midland's City Hall.
2. The deadline to submit questions has been moved to Wednesday, July 16, 2025, by noon.

Clarification: All addendum acknowledgement forms must be included with the bid for the bid to be considered complete. Bidders have sole responsibility for making sure they have and acknowledge all addendums provided for this project bid.

PLEASE RETURN THIS ADDENDUM WITH YOUR BID BY THE CLOSING DATE.

All other terms and conditions shall remain the same.

REECE ALBERT, INC.
Company Name

Mike Schmidt — 7-22-25
Bidder Authorized Signature — Date

MIKE SCHMIDT, VICE PRESIDENT — 327-653-1241
Please Print Above Name — Phone

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_____
Company Name

_____ _____
Bidder Authorized Signature Date

_____ _____
Please Print Above Name Phone

ADDENDUM 02
Project Number PD21-06

TO ALL BIDDERS ON THE SUBJECT BID: Briarwood Paving Phase II

ADDENDUM 02

DATE: July 21, 2025

1. Q/A and Clarification
2. Revised Bid Items
3. Revised Pay Notes
4. Additional Pavement Cross-Section Information
5. Revised 'Enlarged Median Detail'
6. Knox Bock Lock Spec Sheet
7. Cattle Guard Detail
8. Non-Mandatory Pre-Bid Meeting Agenda
9. Non-Mandatory Pre-Bid Meeting Attendance

PLEASE RETURN THIS ADDENDUM WITH YOUR BID BY THE CLOSING DATE.

All other terms and conditions shall remain the same.

REECE ALBERT, INC.
Company Name

Mike Schmidt
Bidder Authorized Signature

7-22-25
Date

MIKE SCHMIDT, VICE PRESIDENT
Please Print Above Name

325-653-1241
Phone

ADDENDUM 02

Project Number PD21-06

TO ALL BIDDERS ON THE SUBJECT BID: Briarwood Paving Phase II

ADDENDUM 02

DATE: July 21, 2025

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2. Revised Bid Items
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4. Additional Pavement Cross-Section Information
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All other terms and conditions shall remain the same.

_____
Company Name

_____ _____
Bidder Authorized Signature Date

_____ _____
Please Print Above Name Phone

Briarwood Paving Phase II
Project Number PD21-06

Q/A and Clarification

During the Pre-Bid Meeting, the following questions were raised by one or more bidders. Below is a list of the questions along with the answers and clarifications.

1. Is it possible to push the bid date at least a week? Yes. See Addendum 01
2. The bid item for Tack Coat shows MC-30. This product won't work for tack. The plans specify a trackless tack. Can the bid item be shown as Tack Coat (Trackless Tack)? We want MC-30
3. Shouldn't the Flowable Fill bid item (item 5-21) be by the CY and not SY? This bid item has been removed and is now considered subsidiary to the bid items for "Manhole Ring & Cover Adjustment" and the bid item for "Water Valve Box Ring & Cover Adjustment". The corresponding Pay Note for the manhole and water valve cover adjustments has been revised to account for this change.
4. Item 400 in the General Notes states that flowable fill will be subsidiary, yet there's a bid item for flowable fill? See response to Question 3.
5. The proposed typical sections show a one-course surface treatment but there are no bid items for the one course? Has been removed
6. Can the City provide the stamped concrete pattern, color, and whether the dye is cast on top or monolithic? The stamped concrete will be colored, with a Herringbone pattern and the Butterfield U31 Weathered Terra Cotta integral color with a dark grey release.
7. Will the award of the project be based on the base bid or the base bid and the alternate? Base bid
8. What Knox Lock make, and model will be required? See attached Knox Box Spec Sheet
9. Where are the locations to stockpile the excavated base and paving (Per item 105 in the General Notes)? The only city ROW is in the easement on the NE corner of Avalon and Briarwood. Possible work something out with the bus barn like TEC did.
10. Please verify that the only bid documents required to be turned in with the Bid are the following documents listed as such on the City's Bonfire site:
    - Excel Bid Table- Required
    - Proposal form pdf- Required
    - PreAfft form pdf- Optional
    - Bid Items from pdf- Required
    - Additive Alternate Bid item form pdf- Required
    - Bid Bond pdf- Required
    - Certificate of Payment pdf- Not Required
    - Form CIQ pdf- Required
11. Why is the Certificate of Payment form required to be submitted with the bid? This form is applicable for when the project is completed. The Certificate of Payment has been removed as a required document.
12. Why is the PreAfft form Required to be submitted with the bid? This form should be an Optional submittal, if the bidder qualifies for the Preferred Consideration. The document has been changed to optional.
13. What type of fiber is required in concrete? See general notes 531

14. Cattle Guard: I see 3 locations on the plans that say to remove and relocate the cattle guard. The bid item says furnish and install 4 each. How many are there? Are existing cattle guards reused and are there any new ones? Is there a detail for installation and/or new fabrication? The cattle guard bid item description has been revised to read "24' Cattle Guard Relocation, furnished, complete and in place." There are no new cattle guard installations as part of this project. The corresponding Pay Note has been revised to reflect this change.
15. Median Nose: How is the median nose paid? Is the 8" concrete paving underneath the median nose paid as concrete paving? There are 3 large median noses at Trobaugh, Tumbleweed, and Roadrunner that conflict with the median nose detail. Can you provide a detail for these 3 large noses? P11. Yes. See attached revised enlarged median detail
16. Does there need to be irrigation sleeves going to the median if they are filled with stamped concrete? No
17. Does the stamped concrete fill up the entirety of the medians except for the median noses? Yes
18. How are the 2 drainage flumes at RSP Playa and the 2 at 1248 paid? Is the detail the same for all 4? These are paid under the Storm Drain Bid Item for "5" Concrete Riprap". Cross-Section details for the flumes and other concrete rip-rap structures can be found on Sheets 124, 125, 126, 129, 130, and 131 of the design drawing set.
19. How is the sidewalk paid? If it is in the riprap quantity, will it be reinforced the same? No sidewalk in plans
20. Storm drain Item 6 is for 24" SET and it should be 2 each for the quantity instead of 3 each. Correct
21. Would you consider allowing precast SETs on item 6 and include the SETP-PD Precast detail? Precast SETs will be allowed if the contractor chooses to use them. Details for the SETs can be found on Sheets 138 – 140 of the design drawing set.
22. Structure #3 shows 6:1 slope on the BCS but 7:1 on the culvert layout. Which is correct? 6:1
23. What is the purpose of the 6" mow strip adjacent to the 8" concrete paving at Coyote Trail and Golden Gate? There is no mow strip on Tumbleweed. To add stabilization b/c of grade elevation
24. Where does paving item 21- flowfill go and how is it calculated? See response to Question 3.
25. What is Storm Drain Item 7 – Open Trenching of Storm Drain, where is it located and how is it measured? This is the trenching quantity for the culverts and is based on the total length of all culverts being installed.
26. Please check Storm Drain Item 8-5" Riprap Quantity and confirm if it includes 5" riprap, Curbed Drainage Flumes, and sidewalk. There is no sidewalk in this project. The concrete rip-rap quantity includes all quantities for 5" rip-rap and flumes. Can you please provide a detail for the cattle guard and electrical gate required? Cattle guards will be relocated, and electrical gate has been removed.
27. Can you please provide a detail for the cattle guard and electrical gate required? The cattle guard bid item description has been revised to read "24' Cattle Guard Relocation, furnished, complete and in place." There are no new cattle guard installations as part of this project. The corresponding Pay Note has been revised to reflect this change. The electrical gate item has been removed.
28. How are the 6" temporary base drives paid for in Phase 2? A new bid item has been added to address this.
29. Do the HMAC portions of the CR 1255 and N CR 1250 get the same pavement structure as Briarwood? Yes
30. Can we get cross sections or electronic data to figure the earthwork quantities? Yes. See attached cross sections.

31. On previous projects the contractor only paid for concrete testing. The Pre-Bid meeting documents states the contractor will pay for all testing. Is this correct? Yes, correct
32. Would it be possible to have the work zone pavement markings as separate bid items like the permanent pavement markings? That way they would get paid as they are installed. Bid item has been added and corresponding pay note
33. It appears there is a bust in the 5" concrete riprap quantity (14,515 SY) (Actually about 10% of this quantity)? The quantity for this bid item has been corrected to be 1,300 SY.
34. The quantity for drive approaches is about double what it should be. The quantity has been corrected to 1,700 S
35. Bid item 6-11 Road Sign Assembly should be 45 EA in lieu of SF per Sheet 148. Correct
36. Can you provide what type of mailbox foundation (sheet 94) is required for bid item 4-6? Type II – TXDOT Spec 94
37. Which median nose should we figure (Type 1 or 2)(Sheet 91)? How are these paid for? Type 1 & Item P11
38. The standard for the drives only includes fiber reinforcement (I'm assuming 3# per CY). Does the city want rebar as well? No Rebar
39. It appears from the proposed typical sections that all the concrete median is colored and stamped. Where does the 995 SY of 4" plain concrete median (bid item 5-11) go? Median Nose Qty
40. Is the 4" concrete median (stamped or plain) get reinforcement (rebar and/or fiber)? No rebar, yes fiber
41. There's a bid item for new cattle guards (4 EA)(bid item 4-4). There's also three to be relocated (no bid item). Should the bid item be for relocating the cattle guards at 3 each? The cattle guard bid item description has been revised to read "24' Cattle Guard Relocation, furnished, complete and in place." There are no new cattle guard installations as part of this project. The corresponding Pay Note has been revised to reflect this change.
42. Bid item SET (Ty-2) (Bid item 3-6) should be 2 EA. They go on driveway 10 that has a single barrel 24" culvert. The quantity for this bid item has been corrected to be 2 EA.

Clarification: The Bid Opening has been moved to Friday, July 25, 2025, at 2:00 PM in the City Hall Council Chamber located on the 1st Floor of Midland's City Hall.

Clarification: All sections listed as revised in this addendum should be removed from all previous versions of the project manual and replaced with the revised versions attached to this addendum.

Clarification: All information provided in Addendum 01 for this project remains in effect unless specifically addressed in Addendum 02.

Clarification: All addendum acknowledgement forms must be included with the bid for the bid to be considered complete. Bidders have sole responsibility for making sure they have and acknowledge all addendums provided for this project bid.

Clarification: Contractor must be willing to sign contract as is.

Clarification: Check that all insurance forms are in order when submitting bids.

Clarification: Check that all conflict-of-interest forms are completed if applicable.

Clarification: Contractor must fill out all bid items in the Proposal for the bid to be considered complete.

Clarification: Contractor is responsible for all traffic control during this project.

BID ITEMS

(See Proposal sheet for additional information.)

Project Name: BRIARWOOD AVE PHASE II
Project Number: P21-06
BASE BID

Miscellaneous Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Mobilization, furnished, installed, complete and in place.	1	LS	M1	$_____	$_____
2)	4" PVC Pipe Casing (Irrigation Sleeve, SDR 26 ASTM), furnished, installed, complete and in place.	252	LF	M2	$_____	$_____
3)	3" PVC Pipe Conduit (Schedule 40 Electric), furnished, installed, complete and in place.	501	LF	M3	$_____	$_____
4)	Erosion/Sediment Control, furnished, installed, complete and in place.	1	LS	M4	$_____	$_____
5)	Traffic Control, furnished, installed, complete and in place.	1	LS	M5	$_____	$_____
6)	Job Site Safety, furnished, installed, complete and in place.	1	LS	M6	$_____	$_____
7)	Seeded Erosion Control Mats, furnished, installed, complete and in place.	10577	SY	M7	$_____	$_____
8)	Seeding & Stabilization, furnished, installed, complete and in place.	10000	SY	M8	$_____	$_____
9)	Spray Watering, furnished, installed, complete and in place.	1	LS	M9	$_____	$_____
Total Miscellaneous Items 1 - 9		$_____				

Demolition Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Preparation of Right-of-Way, furnished, installed, complete and in place.	30	ACRE	D1	$_____	$_____
2)	Unclassified Roadway Excavation (Base Removal, Depth ≤ 14”), complete and in place.	45890	SY	D2	$_____	$_____
3)	Unclassified Roadway Excavation (Non Pavement & Base Removal), complete and in place.	37500	SY	D3	$_____	$_____
4)	Unclassified Basin & Channel Excavation, complete and in place.	4300	CY	D4	$_____	$_____
5)	Removal & Dispose of Existing Unclassified Pavement, complete and in place.	45890	SY	D5	$_____	$_____
6)	Removal & Disposal of Existing Miscellaneous Concrete, complete and in place.	1095	SY	D6	$_____	$_____
7)	Removal & Disposal of Existing Fence And Gate, complete and in place.	10854	LF	D7	$_____	$_____
Total Demolition Items 1 - 7		$_____				

Storm Drain Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	3'x2' Reinforced Concrete Box Culvert furnished, installed, complete and in place.	502	LF	SD1	$_____	$_____
2)	24" Reinforced Concrete Pipe (RCP), furnished, installed, complete and in place.	55	LF	SD2	$_____	$_____
3)	Reinforced Concrete Headwall (Wingwall, PW-1, HW=4', furnished, installed, complete and in place.	4	EA	SD3	$_____	$_____
4)	Reinforced Concrete Headwall (Wingwall, PW-1, HW=5'), furnished, installed, complete and in place.	1	EA	SD3	$_____	$_____
5)	Headwall Safety End Treatment (Type I), furnished, installed, complete and in place.	1	EA	SD4	$_____	$_____
6)	Headwall Safety End Treatment (Type 2), furnished, installed, complete and in place.	2	EA	SD4	$_____	$_____
7)	Open Trenching of Storm Drain, furnished, installed, complete and in place.	557	LF	SD5	$_____	$_____
8)	5" Concrete Rip-Rap, furnished, installed, complete and in place.	1300	SY	SD6	$_____	$_____
Total Storm Drain Items 1 - 8		$_____				

Structural Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Barbed-Wire Fence, furnished, installed, complete and in place.	200	LF	ST1	$_____	$_____
2)	Swing Gate, furnished, installed, complete and in place.	1	EA	ST2	$_____	$_____
3)	Electric Gate, furnished, installed, complete and in place.	0	EA	ST3	$_____	$_____
4)	24' Cattle Guard Relocation, furnished, complete and in place.	3	EA	ST4	$_____	$_____
5)	Knox Lock, furnished, installed, complete and in place.	1	EA	ST5	$_____	$_____
6)	Relocate Mailbox Foundation, furnished, installed, complete and in place.	3	EA	ST6	$_____	$_____
Total Structural Items 1 - 6		$_____				

Paving Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Subgrade Preparation (Depth ≤ 6”), furnished, installed, complete and in place.	86159	SY	P1	$_____	$_____
2)	Unclassified Embankment (Density Controlled), furnished, installed, complete and in place.	11500	CY	P2	$_____	$_____
3)	8” Jointed Concrete Pavement, furnished, installed, complete and in place.	2276	SY	P3	$_____	$_____
4)	2” Type D HMAC Asphalt Pavement Surface Course (PG70-22, 110 LBS / SY @ 1” Thick), furnished, installed, complete and in place.	65536	SY	P4	$_____	$_____
5)	3” Type C HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1” Thick), furnished, installed, complete and in place.	65536	SY	P5	$_____	$_____
6)	6” Temporary Type B HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1” Thick), furnished, installed, complete and in place.	3427	SY	P6	$_____	$_____
7)	10” Flexible Base (Type A, Grade 4), furnished, installed, complete and in place.	82732	SY	P7	$_____	$_____
8)	Bituminous Prime Coat (MC-30, 0.20 Gal / SY), furnished, installed, complete and in place.	22421	GAL	P8	$_____	$_____
9)	Tack Coat (MC-30, 0.10 Gal / SY), furnished, installed, complete and in place.	6554	GAL	P9	$_____	$_____
10)	4” Stamped Concrete Median, furnished, installed, complete and in place.	10633	SY	P10	$_____	$_____
11)	4” Concrete Median, furnished, installed, complete and in place.	995	SY	P11	$_____	$_____
12)	8” Concrete Fillet, furnished, installed, complete and in place.	815	SY	P12	$_____	$_____
13)	8” Concrete Valley Gutter, furnished, installed, complete and in place.	641	SY	P13	$_____	$_____
14)	6” Concrete Driveway Approach, furnished, installed, complete and in place.	1700	SY	P14	$_____	$_____
15)	Type A Concrete Curb & Gutter, furnished, installed, complete and in place.	18154	LF	P15	$_____	$_____
16)	Type C Concrete Curb & Gutter, furnished, installed, complete and in place.	15784	LF	P15	$_____	$_____
17)	Type I Concrete Curb & Gutter, furnished, installed, complete and in place.	629	LF	P15	$_____	$_____

18)	Concrete Pedestrian Access Ramp, furnished, installed, complete and in place.	327	SY	P16	$_____	$_____
19)	Manhole Ring & Cover Adjustment, furnished, installed, complete and in place.	18	EA	P17	$_____	$_____
20)	Water Valve Box Ring & Cover Adjustment, furnished, installed, complete and in place.	28	EA	P17	$_____	$_____
21)	6" Temporary Flexible Base (Type A, Grade 4), furnished, installed, complete and in place.	356	SY	P7	$_____	$_____
Total Paving Items 1 - 21		$_____				

Traffic Control Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Eliminate Existing Pavement Markings and Markers (Line Markings), furnished, installed, complete and in place.	66995	LF	T1	$	$
2)	Retroreflectorized Pavement Markings, TxDOT Item 666 (24" White, Solid), furnished, installed, complete and in place.	318	LF	T2	$	$
3)	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, Solid), furnished, installed, complete and in place.	2813	LF	T2	$	$
4)	Retroreflectorized Pavement Markings, TxDOT Item 666 (12" Yellow, Solid), furnished, installed, complete and in place.	112	LF	T2	$	$
5)	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, LNDP), furnished, installed, complete and in place.	250	LF	T2	$	$
6)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Solid), furnished, installed, complete and in place.	17857	LF	T3	$	$
7)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Broken), furnished, installed, complete and in place.	4630	LF	T3	$	$
8)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" Yellow, Solid), furnished, installed, complete and in place.	2027	LF	T3	$	$
9)	Prefabricated Pavement Markings, TxDOT Item 666 (White, Arrow Symbol), furnished, installed, complete and in place.	27	EA	T4	$	$
10)	Prefabricated Pavement Markings, TxDOT Item 666 (White, Bike Lane Symbol), furnished, installed, complete and in place.	36	EA	T4	$	$
11)	In Road Sign Assembly (SUP&AM [Type S80(1)SB(p)]), furnished, installed, complete and in place.	45	SF	T5	$	$
12)	Remove Sign Assembly, furnished, installed, complete and in place.	12	EA	T6	$	$
13)	Retroreflective Raised Pavement Marker (Type II-C-R), furnished, installed, complete and in place.	463	EA	T7	$	$
14)	Utility Duct Bank, furnished, installed, complete and in place.	288	LF	T8	$	$
15)	Type C Ground Box (162911) With Apron, furnished, installed, complete and in place.	4	EA	T9	$	$
16)	Delineator Assembly (OM-2Y)(WC)GND(BI), furnished, installed, complete and in place.	10	EA	T10	$	$
17)	Delineator Assembly (8' Permenant Type III Barricade), furnished, installed, complete and in place.	6	EA	T10	$	$
18)	Temporary Workzone Pavement Markings, furnished, installed, complete and in place.	1	LS	T11	$	$
Total Traffic Control Items 1 - 18		$				

Price For:	
1. Miscellaneous Items	$_____
2. Demolition Items	$_____
3. Storm Drain Items	$_____
4. Structural Items	$_____
5. Paving Items	$_____
6. Traffic Control Items	$_____
Total Price	$_____

PAY NOTES

P21-06

BRIARWOOD AVE PHASE II

BASE BID

	Bid Item	Pay Quantity Note
Miscellaneous Items		
1	Mobilization	M1
2	4" PVC Pipe Casing, (Irrigation Sleeve, SDR 26 ASTM D2241)	M2
3	3" PVC Pipe Conduit (Schedule 40 Electric)	M3
4	Erosion/Sediment Control	M4
5	Traffic Control	M5
6	Job Site Safety	M6
7	Seeded Erosion Control Mats	M7
8	Seeding & Stabilization	M8
9	Spray Watering	M9
Demolition Items		
1	Preparation of Right-of-Way	D1
2	Unclassified Roadway Excavation (Base Removal, Depth ≤ 14")	D2
3	Unclassified Roadway Excavation (Non Pavement & Base Removal)	D3
4	Unclassified Excavation (Basin & Channel)	D4
5	Removal & Disposal of Existing Unclassified Pavement	D5
6	Removal & Disposal of Existing Miscellaneous Concrete	D6
7	Removal & Disposal of Existing Fence And Gate	D7
Storm Drain Items		
1	3'x2' Reinforced Concrete Box Culvert	SD1
2	24" Reinforced Concrete Pipe (RCP)	SD2
3	Reinforced Concrete Headwall (Wingwall, PW-1, HW=4')	SD3
4	Reinforced Concrete Headwall (Wingwall, PW-1, HW=5')	SD3
5	Headwall Safety End Treatment (Type I)	SD4
6	Headwall Safety End Treatment (Type II)	SD4
7	Open Trenching of Storm Drain	SD5
8	5" Concrete Rip-Rap	SD6
Structural Items		
1	Barbed-Wire Fence	ST1
2	Swing Gate	ST2
3	Electric Gate	ST3
4	24' Cattle Guard Relocation	ST4
5	Knox Lock	ST5
6	Relocate Mailbox Foundation	ST6

Paving Items

1	Subgrade Preparation (Depth ≤ 6")	P1
2	Unclassified Embankment (Density Controlled)	P2
3	8" Jointed Concrete Pavement	P3
4	2" Type D HMAC Asphalt Pavement Surface Course (PG70-22, 110 LBS / SY @ 1" Thick)	P4
5	3" Type C HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick)	P5
6	6" Temporary Type B HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick)	P6
7	10" Flexible Base (Type A, Grade 4)	P7
8	Bituminous Prime Coat (MC-30, 0.20 Gal / SY)	P8
9	Tack Coat (MC-30, 0.10 Gal / SY)	P9
10	4" Stamped Concrete Median	P10
11	4" Concrete Median	P11
12	8" Concrete Fillet	P12
13	8" Concrete Valley Gutter	P13
14	6" Concrete Driveway Approach	P14
15	Type A Concrete Curb & Gutter	P15
16	Type C Concrete Curb & Gutter	P15
17	Type I Concrete Curb & Gutter	P15
18	Concrete Pedestrian Access Ramp	P16
19	Manhole Ring & Cover Adjustment	P17
20	Water Valve Box Ring & Cover Adjustment	P17
21	6" Temporary Flexible Base (Type A, Grade 4)	P7

Traffic Items

1	Eliminate Existing Pavement Markings and Markers (Line Markings)	T1
2	Retroreflectorized Pavement Markings, TxDOT Item 666 (24" White, Solid)	T2
3	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, Solid)	T2
4	Retroreflectorized Pavement Markings, TxDOT Item 666 (12" Yellow, Solid)	T2
5	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, LNDP)	T2
6	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Solid)	T3
7	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Broken)	T3
8	Thermoplastic Pavement Markings, TxDOT Item 666 (6" Yellow, Solid)	T3
9	Prefabricated Pavement Markings (White, Arrow Symbol)	T4
10	Prefabricated Pavement Markings (White, Bike Lane Symbol)	T4
11	In Road Sign Assembly (SUP&AM [Type S80(1)SB(p)])	T5
12	Remove Sign Assembly	T6
13	Retroreflective Raised Pavement Marker (Type II-C-R)	T7
14	Utility Duct Bank	T8
15	Type C Ground Box (162911) With Apron	T9
16	Delineator Assembly (OM-2Y)(WC)GND(BI)	T10
17	Delineator Assembly (8' Permenant Type III Barricade)	T10
18	Temporary Workzone Pavement Markings	T11

PAY QUANTITY NOTES

M1 Includes the necessary equipment, labor, materials, and incidentals for all Mobilization to the job site complete and in place. Measurement and payment to be made per lump sum.

M2 Includes the necessary equipment, labor, materials, and incidentals for the installation of Pipe Casing per the construction drawings and City of Midland standards and specifications, including all spacers, grout, embedment, detector wire, tracer tape, and appurtenances. Measurement and payment to be per linear foot measured along the ground surface following the pipe centerline through all valves, fittings, structures, and appurtenances.

M3 Includes the necessary equipment, labor, materials, and incidentals for the installation of Pipe Conduit per the construction drawings and City of Midland standards and specifications, including all trenching, embedment, backfill, and appurtenances. Measurement and payment to be per linear foot measured along the ground surface following the pipe centerline through all boxes, fittings, structures, and appurtenances.

M4 Includes the necessary equipment, labor, materials, and incidentals to implement the Erosion Control Plan per the construction drawings and City of Midland standards and specifications. Measurement and payment to be made per lump sum.

M5 Includes the necessary equipment, labor, materials, and incidentals to implement the Traffic Control per the approved Traffic Control Plan. Any required traffic control devices are to meet the City of Midland Traffic Division Standards. Measurement and payment to be made per lump sum.

M6 Includes the necessary equipment, labor, materials, and incidentals to implement Job Site Safety and to provide a safe work environment for the project work area (including all personal protection equipment, trench safety, etc.) per the construction drawings and in compliance with all applicable Federal, State, and Local requirements or regulations including those of OSHA and the City of Midland. JOB SITE SAFETY IS THE RESPONSABILITY OF THE CONTRACTOR. Measurement and payment to be made per lump sum.

M7 Includes the necessary equipment, labor, materials, and incidentals for Seeded Erosion Control Mats per the construction drawings and City of Midland standards and specifications, including all removal, storage, and replacement of existing topsoil as well as all mats, seeding, staking, and appurtenances. Watering is addressed in a separate pay note. Measurement and payment to be made per square yard measured along the ground surface.

M8 Includes the necessary equipment, labor, materials, and incidentals for Seeding & Stabilization per the construction drawings and City of Midland standards and specifications, including all removal, storage, and replacement of existing topsoil as well as all seeding and appurtenances. Watering is addressed in a separate pay note. Measurement and payment to be made per square yard measured along the ground surface.

M9 Includes the necessary equipment, labor, materials, and incidentals for Spray Watering per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per lump sum.

D1 Includes the necessary equipment, labor, materials, and incidentals for Preparation of Right-of-Way per the construction drawings and City of Midland standards and specifications including removal and disposal of all obstructions from the right-of-way and easements where removal of such obstructions is not indicated in the consturction drawings, all scraping and preservation of top soil, and including all clearing, grubbing, and appurtenances. Measurement and payment to be made per acre measured along the ground surface.

D2 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per square yard measured along the ground surface.

D3 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per cubic yard of material removed.

D4 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing pavement and sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per cubic yard of material removed.

D5 Includes the necessary equipment, labor, materials, and incidentals for the Removal & Disposal of Existing Unclassified Pavement per the construction drawings and City of Midland standards and specifications including all pavement removal, saw-cutting, and appurtenances. Depths given are approximate and pavement material is to be removed in its entirety. No additional compensation will be made for increased pavement depth removal. Measurement and payment to be made per square yard measured along the ground surface.

D6 Includes the necessary equipment, labor, materials, and incidentals for the Removal & Disposal of Existing Miscellaneous Concrete per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

D7 Includes the necessary equipment, labor, materials, and incidentals to Remove & Dispose of Existing Fence And Gate per the construction drawings and City of Midland standards and specifications, including removal of all, columns, posts, foundations, anchors, gates, frames, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per linear foot measures along the ground surface following the fence centerline through all structures and appurtenances.

SD1 Includes the necessary equipment, labor, materials, and incidentals for the installation of Reinforced Concrete Box Culvert per the construction drawings and City of Midland standards and specifications, including all embedment, detector wire, tracer tape, necessary testing, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the box culvert centerline through all structures and appurtenances.

SD2 Includes the necessary equipment, labor, materials, and incidentals for the installation of Storm Drains per the construction drawings and City of Midland standards and specifications, including all embedment, detector wire, tracer tape, necessary testing, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the pipe centerline through all structures and appurtenances.

SD3 Includes the necessary equipment, labor, materials, and incidentals for the installation of a Reinforced Concrete Headwall per the construction drawings and City of Midland standards and specifications, including all forms, reinforcment, placement, sealing, finishing, and appurtenances. Measurement and payment to be made per each concrete headwall installed.

SD4 Includes the necessary equipment, labor, materials, and incidentals for the installation of a Headwall Safety End Treatment per the construction drawings and City of Midland standards and specifications, including all forms, reinforcment, placement, sealing, finishing, and appurtenances. Measurement and payment to be made per each headwall safety end treatment installed.

SD5 Includes the necessary equipment, labor, materials, and incidentals for Open Trenching of Storm Drain per the construction drawings and City of Midland standards and specifications, including all unclassified excavation, backfill not including flowable fill backfill, providing trench safety and protection for workers to install pipe, structures, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the pipe centerline through all structures, fittings, and appurtenances.

SD6 Includes the necessary equipment, labor, materials, and incidentals for the installation of Concrete Rip-Rap per the consturction drawings and City of Midland standards and specifications, including all excavation, forms, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

ST1 Includes the necessary equipment, labor, materials, and incidentals to install a Fence per the construction drawings and City of Midland standards and specifications, including all columns, posts, foundations, anchors, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the fence centerline through all structures and appurtenances.

ST2 Includes the necessary equipment, labor, materials, and incidentals to install a Fence Gate per the construction drawings and City of Midland standards and specifications, including all columns, posts, foundations, anchors, frames, attachments, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per each gate installed.

ST3 Includes the necessary equipment, labor, materials, and incidentals to install an Electric Gate per the construction drawings and City of Midland standards and specifications, including all columns, posts, foundations, anchors, frames, attachments, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per each gate installed.

ST4 Includes the necessary equipment, labor, materials, and incidentals to relocate a Cattle Guard per the construction drawings and City of Midland standards and specifications, including all beams, foundations, anchors, frames, attachments, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per each cattle guard installed.

ST5 Includes the necessary equipment, labor, materials, and incidentals to install a Knox Lock per the construction drawings and City of Midland standards and specifications, including all posts, foundations, anchors, frames, safe or box, attachments, and structures as well as all appurtenances. Measurement and payment to be made per each knox lock installed.

ST6 Includes the necessary equipment, labor, materials, and incidentals to Relocate Mailbox Foundation per the construction drawings and City of Midland standards and specifications, including all structure removal, foundation placement, and appurtenances. Measurement and payment to be made per each existing mailbox foundation removed and new mailbox foundation set.

P1 Includes the necessary equipment, labor, materials, and incidentals for Subgrade Preparation per the construction drawings and City of Midland standards and specifications, including all proof-rollling, sub-grade reworking, scarifying, compaction, and appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

P2 Includes the necessary equipment, labor, materials, and incidentals for placement of Unclassified Embankment per the construction drawings and City of Midland standards and specifications, including all sprinkling, rolling, correction of soft spots, grading, sloping, compaction, and appurtenances. Measurement and payment to be made per each cubic yard placed.

P3 Includes the necessary equipment, labor, materials, and incidentals for placement of Jointed Concrete Pavement per the construction drawings and City of Midland standards and specifications, including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P4 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "D" HMAC Asphalt Pavement Surface Course (PG 70-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P5 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "C" HMAC Asphalt Pavement Surface Course (PG 64-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P6 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "B" HMAC Asphalt Pavement Surface Course (PG 64-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P7 Includes the necessary equipment, labor, materials, and incidentals for placement of Flexible Base compacted to 95% Density, ASTM D1557, per the construction drawings and City of Midland standards and specifications including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P8 Includes the necessary equipment, labor, materials, and incidentals for application of Bituminous Prime Coat (MC-30, 0.20 GAL / SY) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per gallon of material applied at the designated rate.

P9 Includes the necessary equipment, labor, materials, and incidentals for application of Tack Coat (MC-30, 0.10 GAL / SY) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per gallon of material applied at the designated rate.

P10 Includes the necessary equipment, labor, materials, and incidentals for placement of Stamped Concrete Median per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P11 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Median per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P12 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Fillet per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Curb section is formed and poured monolithically with fillet and is not a separate bid item. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P13 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Valley Gutter per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P14 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Driveway Approach per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Pedestrian access ramps at the driveway approach are considered part of the approach and are not a separate bid item. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P15 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Curb & Gutter per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, finishing, and appurtenances. Measurement and payment to be made per linear foot of material placed measured along the back-of-curb.

P16 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Pedestrian Access Ramp per the construction drawings and City of Midland standards and specifications, including all forming, reinforcement, placement, jointing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P17 Includes the necessary equipment, labor, materials, and incidentals for Ring & Cover Adjustment per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, flowable fill, jointing, sealing, finishing, and appurtenances. This includes a minimum 1.0' wide concrete collar whose width is measured from the outer edge of the cover to the outer edge of the concrete ring. Measurement and payment to be made per each adjustment made.

T1 Includes the necessary equipment, labor, materials, and incidentals to Eliminate Existing Pavement Markings and Markers (Line Marking) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot eliminated.

T2 Includes the necessary equipment, labor, materials, and incidentals for the placement of Retroreflectorized Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed.

T3 Includes the necessary equipment, labor, materials, and incidentals for the placement of Thermoplastic Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed.

T4 Includes the necessary equipment, labor, materials, and incidentals for the placement of Prefabricated Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each marking placed.

T5 Includes the necessary equipment, labor, materials, and incidentals for In Road Sign Assembly per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each sign assembled.

T6 Includes the necessary equipment, labor, materials, and incidentals to Remove Sign Assembly per the construction drawings and City of Midland standards and specifications, including all excavation, backfill, stabilization, foundations, bases, and appurtenances. Measurement and payment to be made per each existing sign assembly removed.

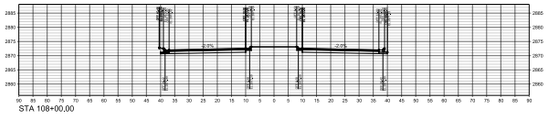
T7 Includes the necessary equipment, labor, materials, and incidentals for the placement of Retroreflective Raised Pavement Markers per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each marker placed.

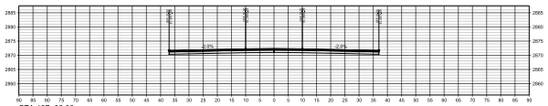
T8 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Utility Duct Bank improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed measured along the ground surface.

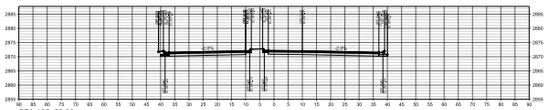
T9 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Ground Box With Apron improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each ground box with apron placed.

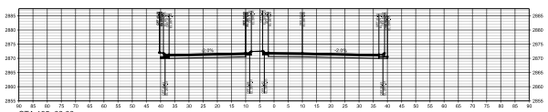
T10 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Delineator Assembly improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each delineator assembly placed.

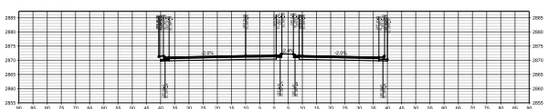
T11 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Temporary Workzone Pavement Markings improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per lump sum.

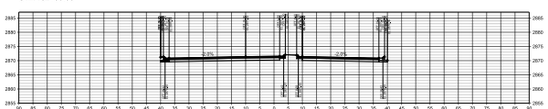

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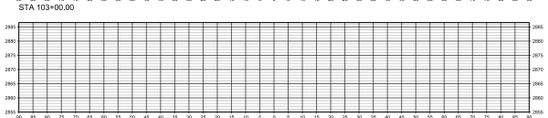

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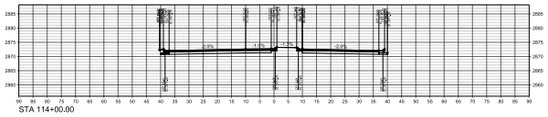

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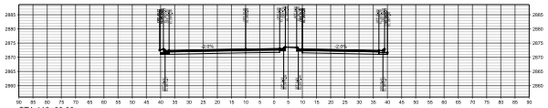

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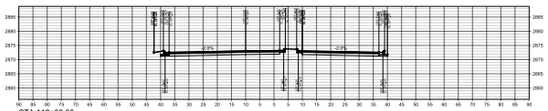

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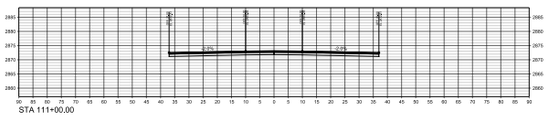

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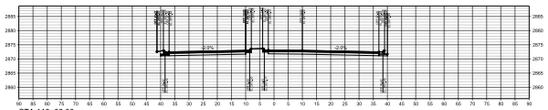
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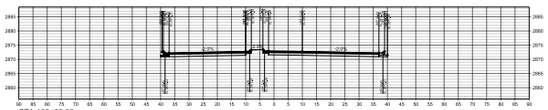

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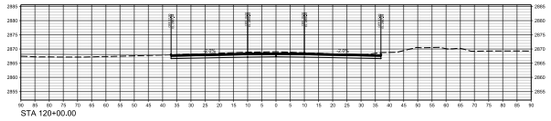

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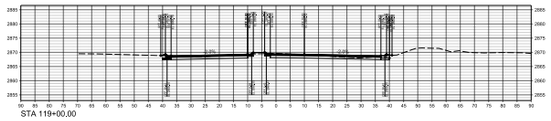

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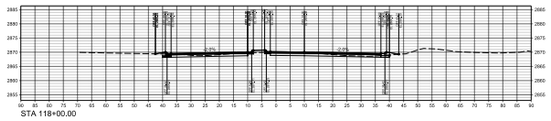

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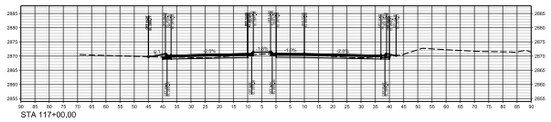

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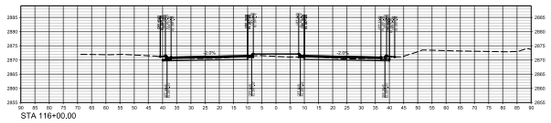
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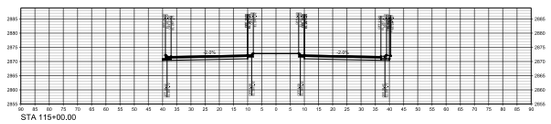

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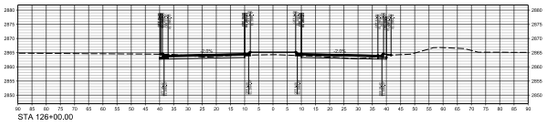

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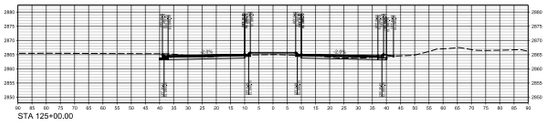

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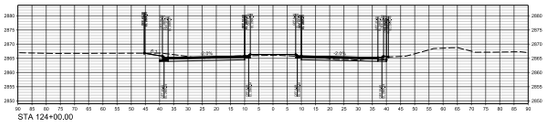

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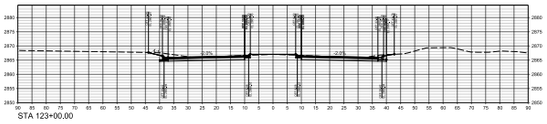

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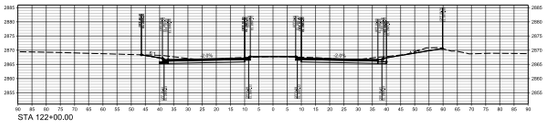
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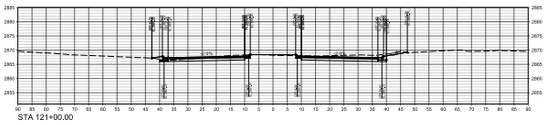

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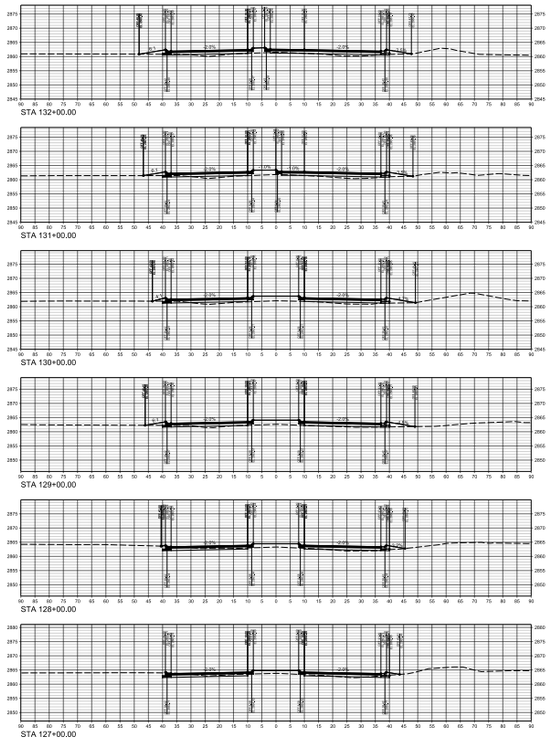

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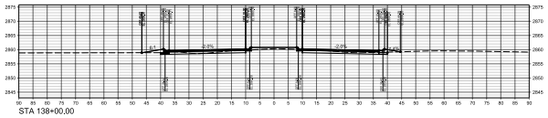

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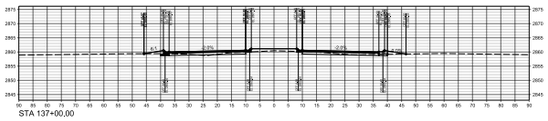

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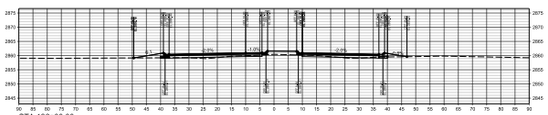
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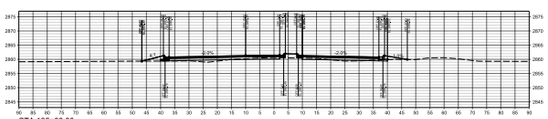

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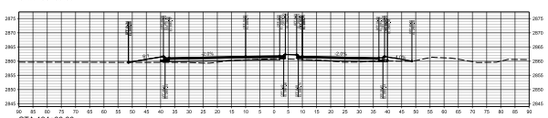
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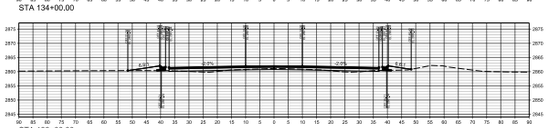

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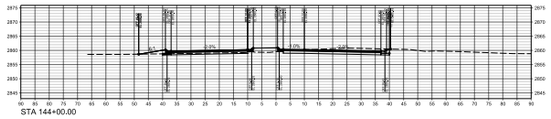

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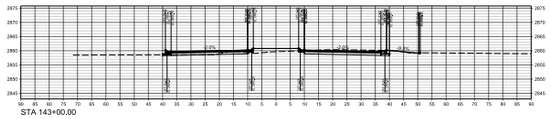

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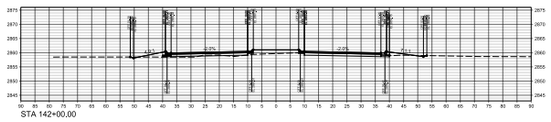

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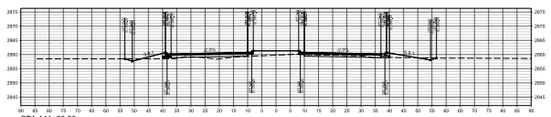

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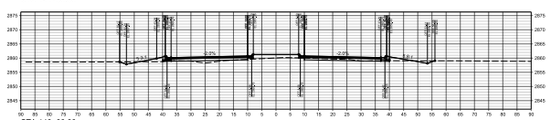
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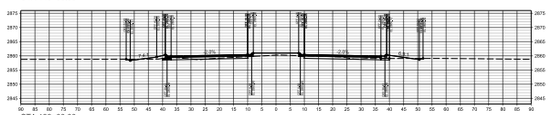

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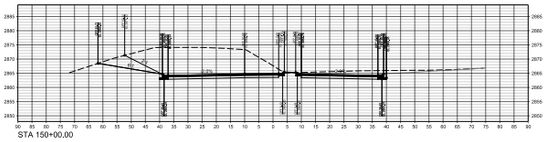

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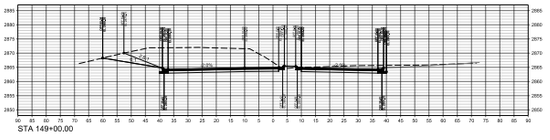

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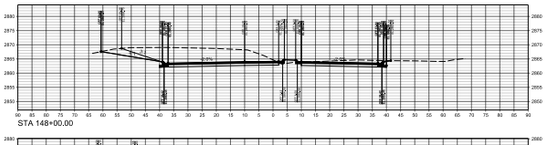

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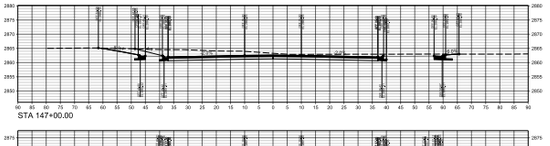

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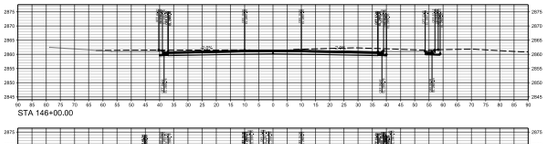
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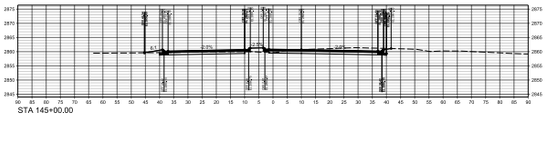

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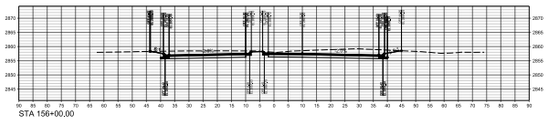

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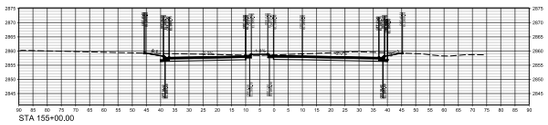

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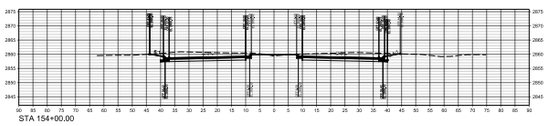

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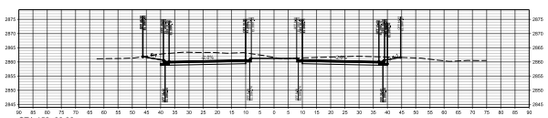

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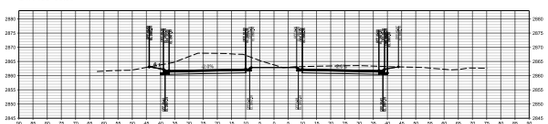
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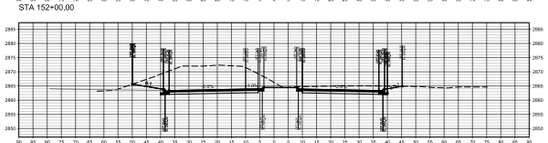

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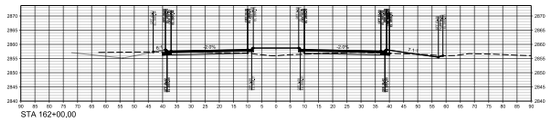

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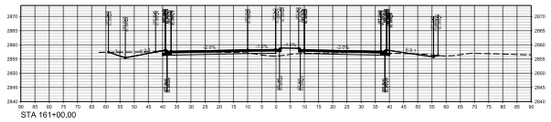

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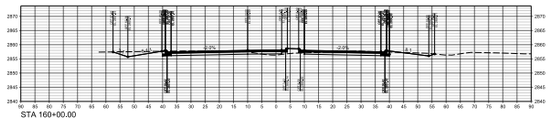

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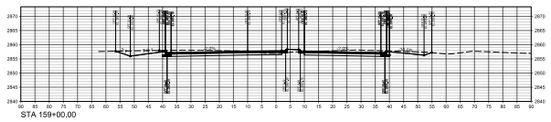

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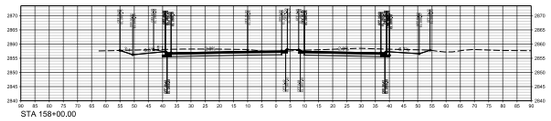
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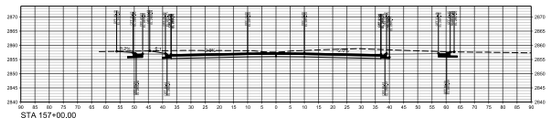

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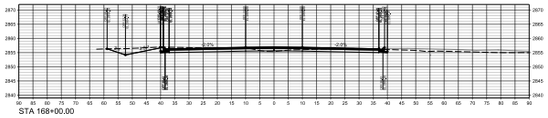

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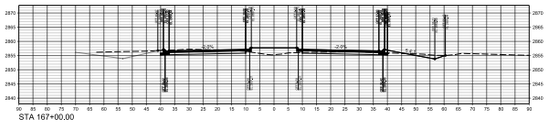

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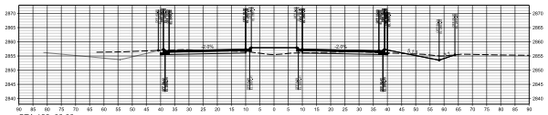

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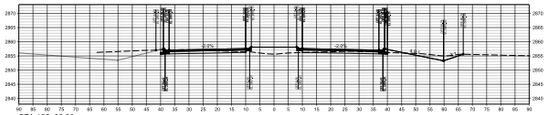

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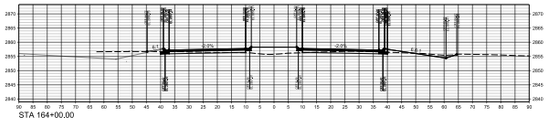
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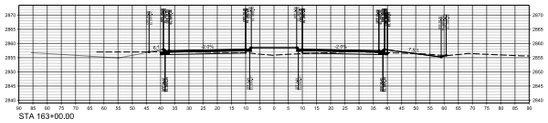

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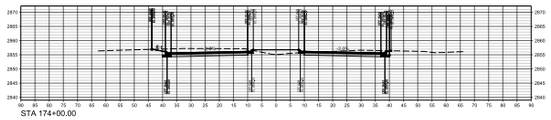

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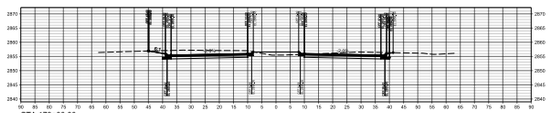

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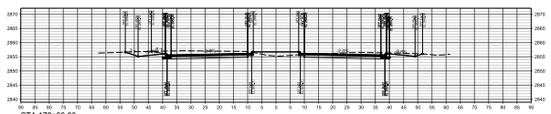

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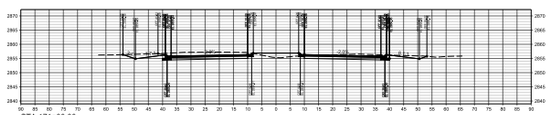

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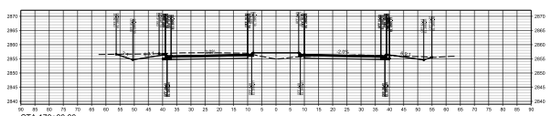
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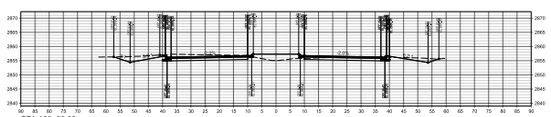

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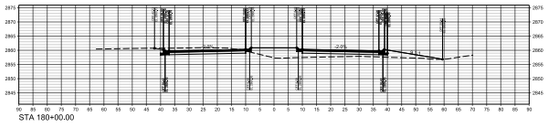

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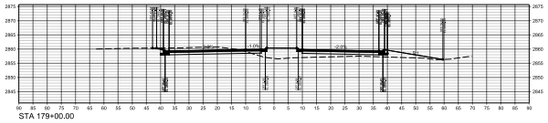

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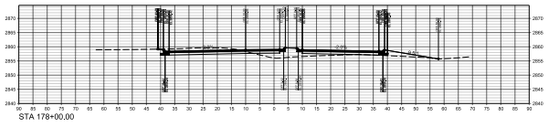

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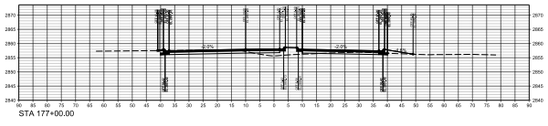

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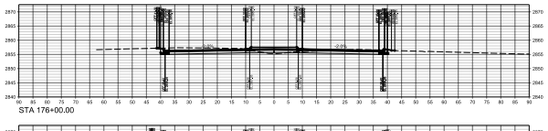
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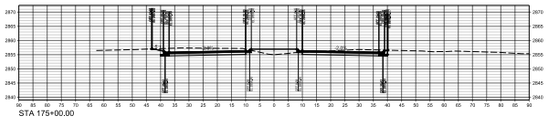

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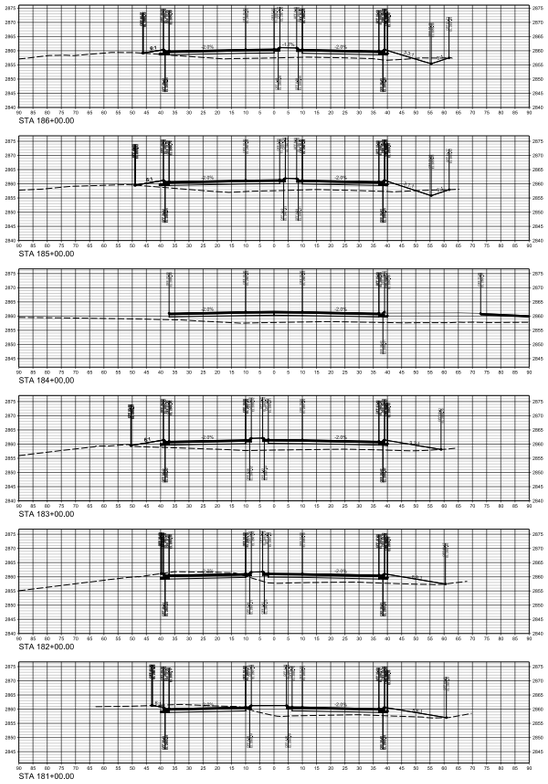

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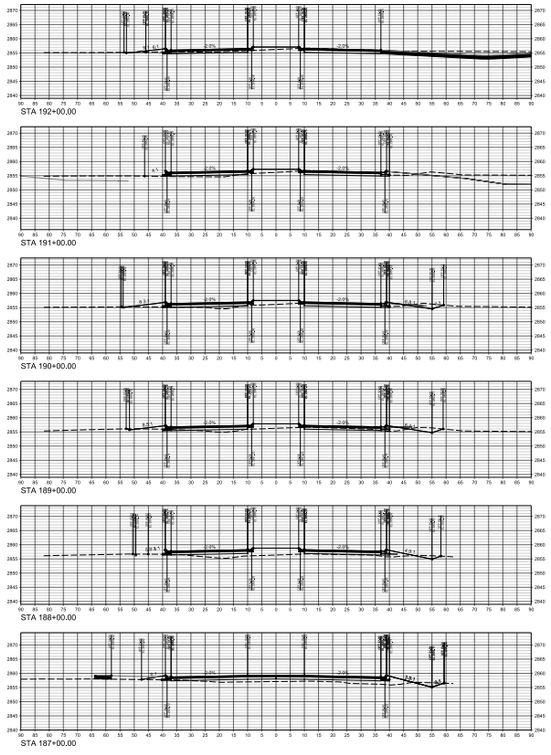

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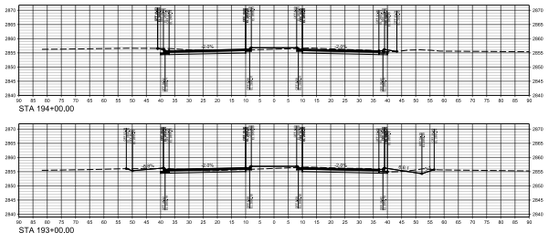
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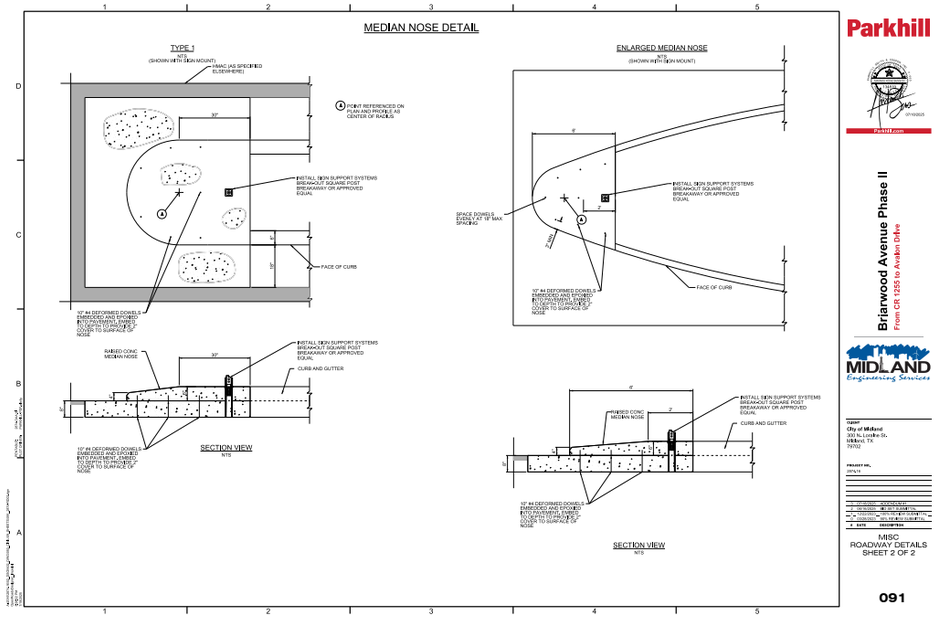
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Parkhill

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CLIENT
City of Midland
300 N. Loraine St.
Midland, TX
79702

PROJECT NO.
0976.13

#	DATE	DESCRIPTION
1	10/20/2025	ADDENDUM #1
2	10/30/2025	BID SET SUBMITTAL
3	11/07/2025	BID SET SUBMITTAL
4	11/24/2025	BID SET SUBMITTAL

MISC
ROADWAY DETAILS
SHEET 2 OF 2

091

KNOXBOX® 3200

The KnoxBox 3200 is the number one high-security key lock box trusted by first responders and property owners. Store up to 10 keys to quickly gain rapid access to commercial properties.



Available in 3 colors:

Black | Aluminum | Dark Bronze

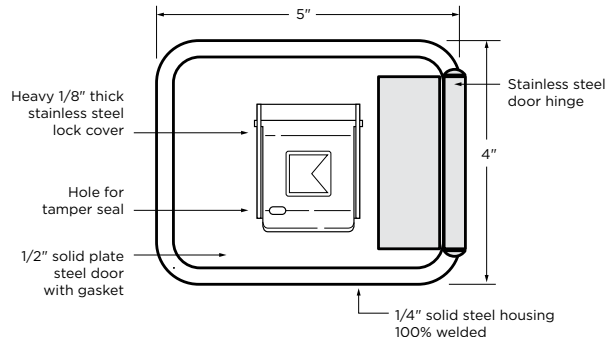
WEIGHT:

Surface Mount - 8 lb
Recessed Mount - 9 lb

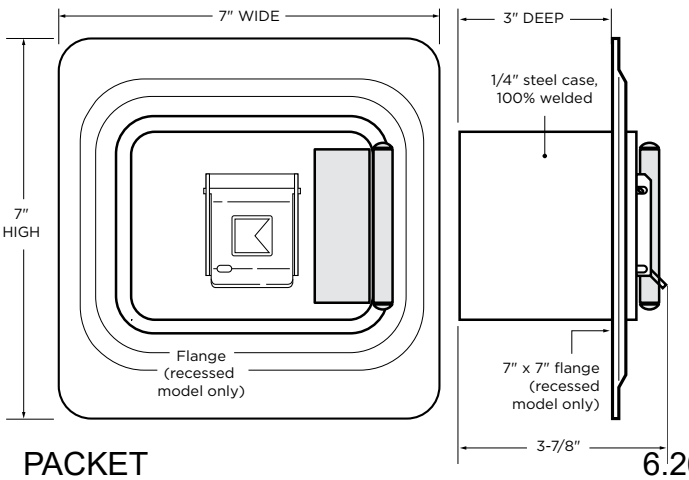
DIMENSIONS:

Surface Mount Body - 4"H x 5"W x 3-7/8"D
Recessed Mount Flange - 7"H x 7"W

SURFACE MOUNT - FRONT VIEW



RECESS MOUNT - FRONT VIEW **SIDE VIEW**



FEATURES

- Stores maximum 10 keys. Access cards and small entry items may also fit in interior compartment but will reduce max key quantity.
- Built Knox-Rugged and secure: UL 1037, UL 1610, UL 1332, UL 437
- Finished with Knox-Coat® to protect four times better than standard powder coat
- Weather-resistant door gasket
- Hinged door

BENEFITS

- Allows rapid property access
- Reduces property damage
- Prevents forced entry into buildings
- Minimizes first responder injury
- Compliant to National Fire Code (NFPA, IFC, IBC)

OPTIONS

- Knox Tamper Alert connects to building's alarm system for extra security
- Mount types: Recessed and Surface
- 3 color options: Black, Aluminum, Dark Bronze

ACCESSORIES

- Multi-Purpose Switch for use on electrical doors, gates and other electrical equipment
- Recess Mounting Kit for new concrete or masonry construction
- Public Safety Labels
- Tag-Out Tamper Seals
- Key Tags
- Key Rings

ORDERING SPECIFICATIONS

To insure procurement and delivery of the KnoxBox 3200, it is suggested that following specification paragraph is used:

KnoxBox surface/recessed mount with hinged door, with/without UL Listed Knox Tamper Alert. 1/4" plate steel housing, 1/2" thick steel door with interior gasket seal and stainless steel door hinge. Box and lock UL Listed. Lock has 1/8" thick stainless steel dust cover with tamper seal mounting capability.

Exterior Dimensions: Surface Mount Body - 4"H x 5"W x 3-7/8"D Recessed Mount Flange - 7"H x 7"W

Lock: UL Listed. Double-action rotating tumblers and hardened steel pins accessed by a biased cut key.

Finish: Knox-Coat proprietary finishing process

Color: Black, Dark Bronze or Aluminum

P/N: KnoxBox 3200 (mfr's cat. ID)

Mfr's Name: KNOX COMPANY

1601 W. DEER VALLEY RD. PHOENIX, AZ 85027 | T. 800-704-0889 | TECHSUPPORT@KNOXBOX.COM | KNOXBOX.COM

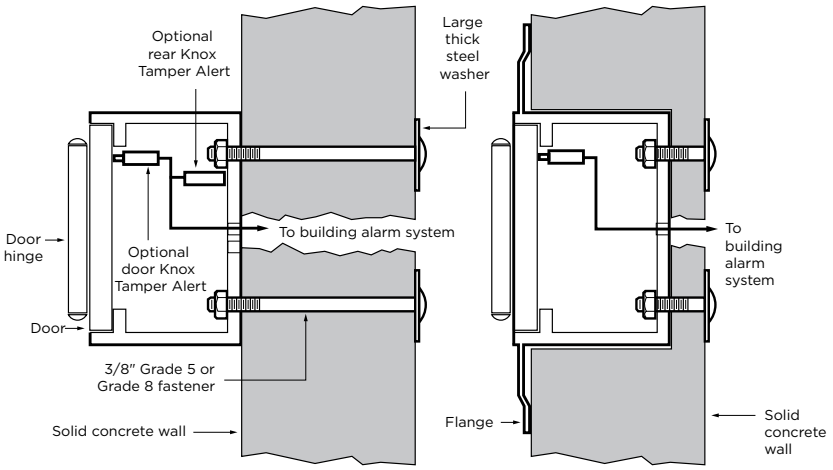
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KNOXBOX® 3200

GENERAL MOUNTING INSTRUCTIONS

Suggested minimum mounting height, 6 feet above ground.

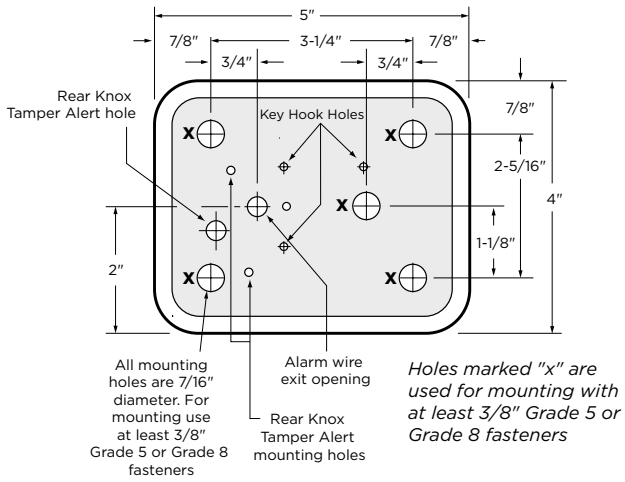
ATTENTION: KnoxBox is a very strong device that MUST be mounted properly to ensure maximum security and resist physical attack.



KnoxBox 3200 Hinged Door Surface Mount

KnoxBox 3200 Hinged Door Recess Mount

Inside View



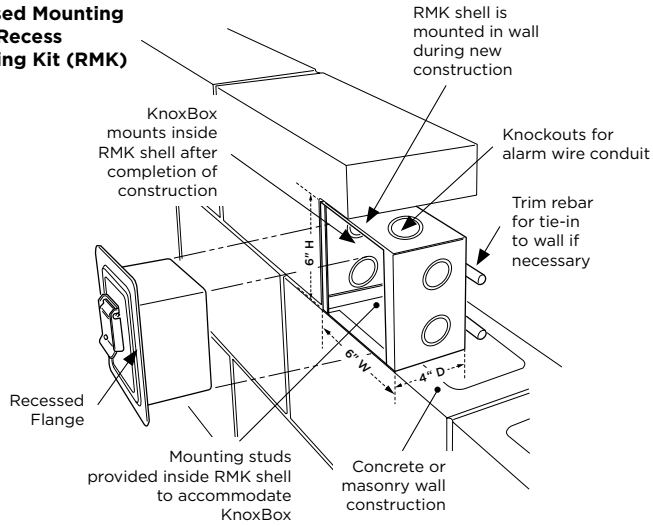
RECESS MOUNTING KIT AND INSTALLATION INSTRUCTIONS

The Recess Mounting Kit (RMK) includes shell housing and mounting hardware, which may only be used for recessed models to cast-in-place within new concrete or masonry construction. The KnoxBox is mounted into the shell housing after construction is completed.

RECESS MOUNTING KIT DIMENSIONS

Rough-in Dimensions:
6-1/2"H x 6-1/2"W x 5"D

Recessed Mounting Using Recess Mounting Kit (RMK)



IMPORTANT:

Care should be taken to ensure the front of the Recess Mounting Kit (RMK) shell housing, including the cover plate and screw heads, is flush with the wall. The RMK must be plumbed to ensure vertical alignment of the box.

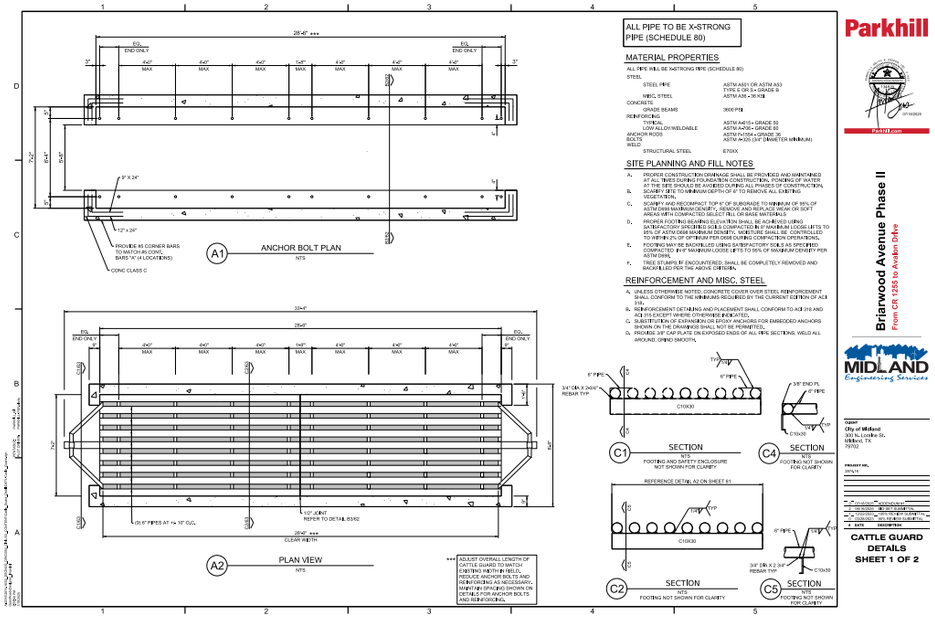
ABOUT THE KNOX COMPANY

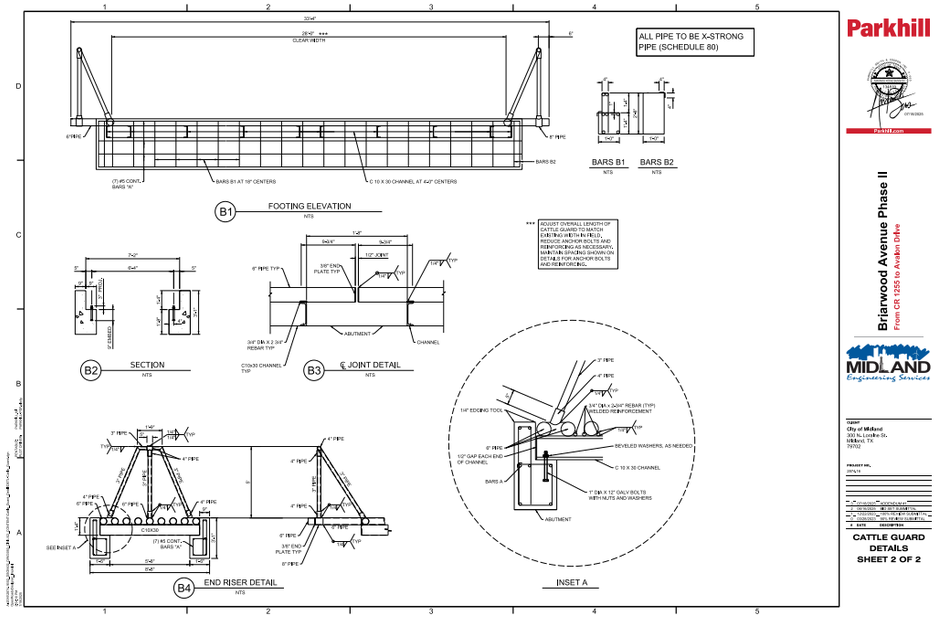
Since 1975, the Knox Company has successfully developed innovative rapid access solutions for first responders with products that provide fast, safe, and secure entry into commercial, industrial, and residential properties, while minimizing damage and maximizing safety. Today, more than 15,000 fire, EMS and law enforcement departments/agencies depend on Knox products to gain access into over one million buildings/properties.

KNOX COMPANY
1601 W. DEER VALLEY RD
PHOENIX, AZ 85027

T. 800-566-9269

KNOXBOX.COM
INFO@KNOXBOX.COM


ALL PIPE TO BE X-STRONG PIPE (SCHEDULE 80)
MATERIAL PROPERTIES
ALL PIPE WILL BE X-STRONG PIPE (SCHEDULE 80)
STEEL
STEEL PIPE ASTM A501 OR ASTM A53 TYPE E OR S+ GRADE B ASTM A53 + 30 KSI
W/EC, STEEL
CONCRETE
GRADE BEAMS 3600 PSI
REINFORCING
TYPICAL ASTM A615 = GRADE 50
LOW ALLOY WELDABLE ASTM A706 = GRADE 60
ANCHOR RODS ASTM F1554 = GRADE 36
BASE PLATES ASTM A529 (3/4" DIAMETER MINIMUM)
WELD
STRUCTURAL STEEL E70XX
SITE PLANNING AND FILL NOTES
A. PROPER CONSTRUCTION DRAINAGE SHALL BE PROVIDED AND MAINTAINED DURING ALL PHASES OF CONSTRUCTION. PONDING OF WATER AT THE SITE SHOULD BE AVOIDED DURING ALL PHASES OF CONSTRUCTION.
B. SCARIFY UP TO 12" TO MINIMUM DEPTH OF 6" TO REMOVE ALL EXISTING VEGETATION.
C. SCARIFY AND RECOMPACT TOP 6" OF SUBGRADE TO MINIMUM OF 95% OF ASTM D698 MAXIMUM DENSITY. FILL ANY LOW AREAS OR SOFT AREAS WITH COMPACTED SELECT FILL OR BASE MATERIALS.
D. PROPER FOOTING BEARING ELEVATION SHALL BE ACHIEVED USING SATISFACTORY SPECIFIED SOILS COMPACTED IN 8" MAXIMUM LOOSE LIFTS TO 95% OF ASTM D698 MAXIMUM DENSITY. MOISTURE SHALL BE CONTROLLED TO WITHIN 2% OF OPTIMUM PER DOB DURING COMPACTION OPERATIONS.
E. FOOTING MAY BE BACKFILLED USING SATISFACTORY SOILS AS SPECIFIED ABOVE IN 8" MAXIMUM LIFT MAXIMUM LOOSE LIFTS TO 95% OF MAXIMUM DENSITY PER ASTM D698.
F. TREE STUMPS BY ENCOUNTERED, SHALL BE COMPLETELY REMOVED AND BACKFILLED PER THE ABOVE CRITERIA.
REINFORCEMENT AND MISC. STEEL
A. UNLESS OTHERWISE NOTED, CONCRETE COVER OVER STEEL REINFORCEMENT SHALL CONFORM TO THE MINIMUMS REQUIRED BY THE CURRENT EDITION OF ACI 318.
B. REINFORCEMENT DETAILING AND PLACEMENT SHALL CONFORM TO ACI 318 AND ACI 315 EXCEPT WHERE OTHERWISE INDICATED.
C. FIELD BENDING OF REINFORCING BARS PROJECTING FOR EMBEDDED ANCHORS SHOWN ON THE DRAWINGS SHALL NOT BE PERMITTED.
D. PROVIDE 3/8" CAP PLATE ON EXPOSED ENDS OF ALL PIPE SECTIONS, WELD ALL AROUND, GRIND SMOOTH.
ANCHOR BOLT PLAN
NTS
PLAN VIEW
NTS
SECTION
NTS
FOOTING AND SAFETY ENCLOSURE NOT SHOWN FOR CLARITY
SECTION
NTS
FOOTING NOT SHOWN FOR CLARITY
SECTION
NTS
FOOTING NOT SHOWN FOR CLARITY
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
CATTLE GUARD DETAILS
SHEET 1 OF 2



Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CATTLE GUARD DETAILS SHEET 2 OF 2

BRIARWOOD PAVING - PHASE II
Non-Mandatory Pre-Bid Meeting Agenda
Project No. (P21-06)
July 09, 2025

Discussion Items

1. Sign-In Sheet

2. Personnel Overview
   - Gabe McClelland – Director Engineering Services
   - Bobby Wojciechowski – Assistant Director Engineering Services
   - Josh Ferguson – Assistant City Engineer
   - Kirby Jones – Project Manager
   - Taha Sakrani – City Traffic Engineer
   - Clint Harmon – Construction Inspector - Roadway Inspector
   - Stephen Lamb – Franchise Utility Coordinator
   - Michael Williams – Stormwater Administrator
   - Alexis Torres – Administrative Assistant

3. Project Overview and Scope
   - Briarwood from Avalon to SH158; reconstruction to a 4-lane cross-section with medians and drainage updates. Alternate additional scope; signal at Avalon.
   - The location and details for the construction and related work are shown on a set of drawings named Briarwood Ave Phase II set dated 06/16/2025 and numbered from 001 (1) through 183 (187) inclusive, and a set of drawings named Avalon Drive & Briarwood Ave. Traffic Signal Project set dated 05/19/25 and numbered C100 (1) through C223 (32) inclusive. These drawings and plans, together with the specifications, form a part of the Contract. Where figures are shown on the drawings, they shall take precedence over scaled distances and dimensions.

4. Bid Process
   - Pre-Bid meeting attendance is non-mandatory to bid on this project.
   - ATTENTION: All questions submitted before or after the Non-Mandatory Pre-Bid Meeting must be submitted via Bonfire portal or to the following email address:

     purchasing@midlandtexas.gov

   - Addendum distributed by Bonfire notification (Friday) afternoon following the Pre-Bid Meeting.
     - The deadline to ask or send questions for the addendum is this Friday, July 11, 2025, at Noon.
     - Questions asked after the Noon deadline will be directed to the information already provided in the bid documents or included in the Addendum.

   - ATTENTION: All bidders who choose to submit bids digitally for this project must submit their bids through the City of Midland's online procurement portal. The City of Midland's online procurement portal can be accessed at:

- ATTENTION: Bidders are to submit bids either by mail or in person. If bidders choose to mail their bid packets in, then they are to mail the bid packet to one of the addresses listed below:

  USPS Mailing Address:
  City of Midland, Texas
  Attn: City Secretary's Office
  P.O. Box 1152
  Midland, TX 79702

  – OR –

  Physical Address for mail carriers other than USPS:
  City of Midland, Texas
  Attn: City Secretary's Office
  300 North Loraine St., Suite 330
  Midland, TX 79701

  If bid packets are delivered in person then bidders must drop the bid packets off at the first-floor front desk of City Hall before the bid opening deadline.

- **Bid Opening is Wednesday, July 16, 2025 at 2:00 PM** in the City Hall Council Chamber located on the 1st Floor of Midland's City Hall.
  - The Bid Opening will be open to the public.
  - No late bids will be accepted.
  - Bidders must be willing to sign the contract as is.
  - Bidders must complete the conflict of interest forms if applicable.
  - Bidders must fill out all bid items in the Proposal. If bid items are left blank then the bid will be considered non-responsive.
  - Bidders have sole responsibility for making sure they have and acknowledge all addendums provided. If all acknowledgement forms are not included with the bid packet submittal then the bid will be considered non-responsive.
  - Bidders must provide proof that they possess active licenses equal to or a higher class than a Water Operator D license and either a Wastewater D license or a Class 1 Collections license.

Not Required!

5. Notice to Proceed
   - Date of Notice to Proceed to be determined at the Pre-Construction Meeting.
   - Pre-Construction Meeting date will be set after the project bid is awarded.

6. Payment
   - Invoices should be submitted on or before the 1st day of each month and cover work completed up to the 25th day of the preceding month.
   - Invoice submittals are to be itemized and match the bid items listed in the bid packet Proposal.
   - Payment based on portion of work completed only. No payment for material delivery.
   - Payment will be made for material installed, not for material delivery, for all Proposal Bid Items except those specifically listed in the Bid Packet's Special Provisions section, sub-section 4. Payment.
   - 5% retainage until project completion, acceptance, and final payment.
   - Recommended that invoices state "Invoice Due Upon Receipt", or have a due date that is two (2) weeks after the date the invoice is submitted.

Check & final direction w/addendum. ?

7. Project Schedule
   - City Inspector must be notified of all work occurring and be able to perform inspections on any construction or installation that occurs.
   - Typically work times are Monday – Friday from 8:00 AM – 5:00 PM. No work earlier than 7:00 AM or later than 8:00 PM without City permission unless for emergency conditions.
   - Work is not to occur on Sundays or legal holidays unless required for emergency situations.

- Work is not to occur on Saturdays unless requested by Contractor in writing at least 48-hours in advance and approved by the City Engineer.

8. Project Specifics
   - Comply with all OSHA and other applicable safety requirements and regulations at all times.
   - Construction staking is solely the responsibility of the Contractor.
   - Construction testing is solely the responsibility of the Contractor.
   - Contractor is responsible for all Erosion Control for this project.
     - The winning contractor must submit all TCEQ documentation etc., large or small site notice for linear projects. Please read all requirements in the Construction General Permit regarding linear projects and proper documentation. This is to be submitted to the City of Midland at least 2 days before ground is disturbed for small sites or 7 days before ground is disturbed for large sites.
     - Contractor is required to place erosion control BMPs as needed and to regularly maintain any BMPs placed. Project site is to be kept reasonably clean, and any piles of spoils, backfill material, etc. are to include sand bag BMPs or similar temporary erosion protection emplacements at all times.
     - Contractor is required to remove all temporary BMPs placed at the end of the project. This is considered subsidiary to the overall project.
   - Contractor is responsible for all Traffic Control for this project.
     - Contractor is responsible for coordinating with the City.
     - Contractor is responsible for maintaining access to all adjacent properties during this project.
       - Contractor is responsible for notifying affected property owners at least two (2) business days in advance of any planned access interruptions.
       - Contractor is directed to use steel plates or other means to enable access to adjacent properties when work is not actively occurring at an otherwise blocked point of access so long as this does not conflict with the approved traffic control plan.
     - Contractor is responsible for coordinating with City Transportation to have any traffic control signs removed or relocated as needed by the City.
     - Contractor is to take particular care when working in the vicinity of the following sites, and to take every precaution to protect the public and secure the project site when working in or around these locations.
       - (Site description & physical location.) ?
   - Contractor is responsible for maintaining service to adjacent lots during this project.
     - Contractor mist notify affected properties at least two (2) business days prior to any planned service interruption.
     - Contractor is to take particular care when working in the vicinity of the following sites, to minimize service interruptions as much as possible, and whenever possible to coordinate planned service interruptions to minimize the impact to the sites listed.
       - MISD Bus Barn - 4400 N County Rd 1248, Midland, TX 79707
       - Fire Station #11 - 6600 Briarwood Ave, Midland, TX 79707
       - Any residential street, maintain local access
   - Material stored on the project site must be properly stored and protected from damage and weather.
   - There is a one (1) calendar year warranty period on this project. This includes all infrastructure installed.

9. Additional Information, Clarifications, and Corrections
   - Bidders are directed to bid the item quantities listed in the Bid Packet's Proposal.
   - Contractor is remined that this project is located in an urban environment. Structures, trees, and overhead lines are common, and contractor is to provide proper equipment to complete all work required for this project in an urban environment.

10. Any Additional Questions

- Can't get a responsible bid in the timeline asked for.
  [redacted]
  > Maybe start Sept. 1 -ish.
  > Will push back 1 week, have to hit August Council. (August 12 to award.)
  - still not enough time, but better. Hell of a project. A lot of parts to this. Pages are full of subsidiary elements in pages as we go through this.
  > Please provide questions & we'll get answers.
- Chart for work zone striping.
  > striping subsidiary
- Questions [redacted] submitted. Temp B has to be removed.
- Traffic control, cover striping or not. Work zone stripes on temp pavement, not permanent.
- Erosion control placed as needed, not each month.

Please direct all questions or comments following the Pre-Bid Meeting to the Bonfire portal with the City of Midland.

Engineering Services Contacts:

Bobby Wojciechowski
Phone: (432) 685-7287
Email: bwojciechowski@midlandtexas.gov

Kirby Jones
Phone: (432) 685-7287
Email: kjones@midlandtexas.gov

- Which Knox lock do you want. Have to key the bat to Fire Departments
- Excavations quantities seems hard to verify. • Will check.
- Flowable fill? • Pung Item 21 for rings & cover. Will clarify others.
- Rip-Rap seems like a huge quantity for 5".
- Seal coat mentioned, not listed in quantities. • Will check.
- Stockpile location? • Will follow-up & verify if available or not.
- Taking down a ton of fence, putting 200' back? > Yes. A lot not being put back. • 200' fence really just if you need extra fence to tie 4 cattle guards back in.
- Utilities out of way? No ROW issues? > Correct.
  > At some point TCP will blend w/TxDOT @ 158 when their project starts.
- A lot of stamped concrete. Pattern & color not stated, would help to know, big cost difference.
- Median curb called in phase 3, [redacted] final lift, if move to [redacted] would help.
  • Addendum.

Non-Mandatory Pre-Bid Meeting Attendance

P21-06

Briarwood Paving Phase II Project

Date: 07/09/2025 - 3:00 PM

PACKET

☑	Name *(Please Print)*	Company Name *(Please Print)*	Phone Number	Fax Number	Email
☑	Kirby Jones	City of Midland	432-685-7287		kjones@midlandtexas.gov
☑	Bobby Wojciechowski	City of Midland	432-685-7287		bwojciechowski@midlandtexas.gov
☑	Josh Ferguson	City of Midland	432-685-7287		jferguson@midlandtexas.gov
	Greg Boler	Boler	432-559-3403		greg @ boler.net
	Kenneth Ford	Jones Bros	432 332 072		k.ford@jonesdp.net com
	Tyler Ray	City of Midland	432-265-8615		tray@midlandtexas.gov
	Cody Chitty	Jones Bros	432-349-3603		c.chitty@jonesdp.com
	AMANDA BENSON	PARKHILL	432-681-6136		ABENSON@PARKHILL.COM
	Skip Klement	Reece Albert, Inc	325-653-1241		skip@reecealbert,inc.com
	Rob McNew	" " "	432.570.0481		robm@ " " " .com
	Carolina Jimenez	City of Midland	432.685-7419		cjimenez@midlandtexas.gov

6.271

September 9, 2025

ADDENDUM 03
Project Number PD21-06

TO ALL BIDDERS ON THE SUBJECT BID: Briarwood Paving Phase II

ADDENDUM 03

DATE: July 22, 2025

1. Clarification

PLEASE RETURN THIS ADDENDUM WITH YOUR BID BY THE CLOSING DATE.

All other terms and conditions shall remain the same.

REECE ALBERT, INC
Company Name

Mike Schmidt
Bidder Authorized Signature

7-22-25
Date

MIKE SCHMIDT, VICE PRESIDENT
Please Print Above Name

325-653-1241
Phone

ADDENDUM 03

Project Number PD21-06

TO ALL BIDDERS ON THE SUBJECT BID: Briarwood Paving Phase II

ADDENDUM 03

DATE: July 22, 2025

1. Clarification

PLEASE RETURN THIS ADDENDUM WITH YOUR BID BY THE CLOSING DATE.

All other terms and conditions shall remain the same.

_____
Company Name

_____ _____
Bidder Authorized Signature Date

_____ _____
Please Print Above Name Phone

Briarwood Paving Phase II
Project Number PD21-06

Q/A and Clarification

During the Pre-Bid Meeting, the following questions were raised by one or more bidders. Below is a list of the questions along with the answers and clarifications.

Clarification: All information provided in Addendum 01 and Addendum 02 for this project remains in effect unless specifically addressed in this Addendum 03.

Clarification: The Bid Opening is being moved back to Friday, August 1, 2025, at 2:00 PM in the City Hall Council Chamber located on the 1st Floor of Midland's City Hall.

Clarification: The deadline for questions is being moved back to Friday, July 25, 2025, at Noon. All questions must be submitted either through the City of Midland's online procurement portal, or by email to the email address listed below, to be considered valid questions for this bid process.

purchasing@midlandtexas.gov

Questions that are not submitted through the City of Midland's online procurement portal or emailed to the email address listed above will not be considered valid and will not be addressed.

Clarification: The previous deadline for questions was July 16, 2025, at Noon per Addendum 01. Questions submitted after that deadline and before this Addendum 03 was issued are not considered valid, and will need to be re-submitted per the previously described process in this Addendum 03 to be considered valid questions for this bid process.

Clarification: A fourth addendum for this project will be issued Wednesday, July 30, 2025.

Clarification: All addendum acknowledgement forms must be included with the bid for the bid to be considered complete. Bidders have sole responsibility for making sure they have and acknowledge all addendums provided for this project bid.

ADDENDUM 04
Project Number PD21-06

TO ALL BIDDERS ON THE SUBJECT BID: Briarwood Paving Phase II

ADDENDUM 04

DATE: July 30, 2025

1. Clarification

PLEASE RETURN THIS ADDENDUM WITH YOUR BID BY THE CLOSING DATE.

All other terms and conditions shall remain the same.

REECE ALBERT, INC.
Company Name

Mike Schmidt
Bidder Authorized Signature

7-30-25
Date

MIKE SCHMIDT, VICE PRESIDENT
Please Print Above Name

325-653-1241
Phone

ADDENDUM 04

Project Number PD21-06

TO ALL BIDDERS ON THE SUBJECT BID: Briarwood Paving Phase II

ADDENDUM 04

DATE: July 30, 2025

1. Clarification

PLEASE RETURN THIS ADDENDUM WITH YOUR BID BY THE CLOSING DATE.

All other terms and conditions shall remain the same.

_____
Company Name

_____ _____
Bidder Authorized Signature Date

_____ _____
Please Print Above Name Phone

Briarwood Paving Phase II
Project Number PD21-06

Q/A and Clarification

During the Pre-Bid Meeting, the following questions were raised by one or more bidders. Below is a list of the questions along with the answers and clarifications.

Clarification: All information provided in Addendum 01, Addendum 02, and Addendum 03 for this project remains in effect unless specifically addressed in this Addendum 04.

Clarification: The Bid Opening is being moved back to Friday, August 15, 2025, at 2:00 PM in the City Hall Council Chamber located on the 1st Floor of Midland's City Hall.

Clarification: The deadline for questions is being moved back to Friday, August 8, 2025, at Noon. All questions must be submitted either through the City of Midland's online procurement portal, or by email to the email address listed below, to be considered valid questions for this bid process.

purchasing@midlandtexas.gov

Questions that are not submitted through the City of Midland's online procurement portal or emailed to the email address listed above will not be considered valid and will not be addressed.

Clarification: The second deadline for questions was July 25, 2025, at Noon per Addendum 03. Questions submitted after the second deadline and before this Addendum 04 was issued are not considered valid, and will need to be re-submitted per the previously described process in this Addendum 04 to be considered valid questions for this bid process.

Clarification: A fifth addendum for this project will be issued Monday, August 4, 2025.

Clarification: All addendum acknowledgement forms must be included with the bid for the bid to be considered complete. Bidders have sole responsibility for making sure they have and acknowledge all addendums provided for this project bid.

ADDENDUM 05
Project Number PD21-06

TO ALL BIDDERS ON THE SUBJECT BID: Briarwood Paving Phase II

ADDENDUM 05

DATE: August 4, 2025

1. Clarification

PLEASE RETURN THIS ADDENDUM WITH YOUR BID BY THE CLOSING DATE.

All other terms and conditions shall remain the same.

REECE ALBERT, INC.
Company Name

Mike Schmidt
Bidder Authorized Signature

8-4-25
Date

MIKE SCHMIDT, VICE PRESIDENT
Please Print Above Name

325-653-1241
Phone

ADDENDUM 05

Project Number PD21-06

TO ALL BIDDERS ON THE SUBJECT BID: Briarwood Paving Phase II

ADDENDUM 05

DATE: August 4, 2025

1. Clarification

PLEASE RETURN THIS ADDENDUM WITH YOUR BID BY THE CLOSING DATE.

All other terms and conditions shall remain the same.

_____
Company Name

_____ _____
Bidder Authorized Signature Date

_____ _____
Please Print Above Name Phone

Briarwood Paving Phase II
Project Number PD21-06

Q/A and Clarification

During the Pre-Bid Meeting, the following questions were raised by one or more bidders. Below is a list of the questions along with the answers and clarifications.

Clarification: All information provided in Addendum 01, Addendum 02, Addendum 03, and Addendum 04 for this project remains in effect unless specifically addressed in this Addendum 05.

Clarification: Addendum 05 was originally supposed to include additional information for bidders. However, to ensure that the new information provided is as correct and accurate as possible, the new information will instead be provided by Wednesday, August 6, 2025 as part of Addendum 06.

Clarification: The deadline for questions and the date and time of the bid opening remain as stated in Addendum 04.

Clarification: All addendum acknowledgement forms must be included with the bid for the bid to be considered complete. Bidders have sole responsibility for making sure they have and acknowledge all addendums provided for this project bid.

ADDENDUM 06
Project Number PD21-06

TO ALL BIDDERS ON THE SUBJECT BID: Briarwood Paving Phase II

ADDENDUM 06

DATE: August 6, 2025

1. Q/A and Clarification
2. Revised Base Bid Drawings & Additive Alternate 01 Drawing Set
3. Revised Additive Alternate 02 Drawing Set
4. Revised Bid Item – Base Bid
5. Revised Bid Item – Additive Alternate Bid 01
6. Revised Bid Item – Additive Alternate Bid 02
7. Revised Pay Notes – Base Bid
8. Revised Pay Notes – Additive Alternate Bid 01
9. Revised Pay Notes – Additive Alternate Bid 02

PLEASE RETURN THIS ADDENDUM WITH YOUR BID BY THE CLOSING DATE.

All other terms and conditions shall remain the same.

REECE ALBERT, INC.
Company Name

Mike Schmidt
Bidder Authorized Signature

8-6-25
Date

MIKE SCHMIDT, VICE PRESIDENT
Please Print Above Name

325-653-1241
Phone

ADDENDUM 06

Project Number PD21-06

TO ALL BIDDERS ON THE SUBJECT BID: Briarwood Paving Phase II

ADDENDUM 06

DATE: August 6, 2025

1. Q/A and Clarification
2. Revised Base Bid Drawings & Additive Alternate 01 Drawing Set
3. Revised Additive Alternate 02 Drawing Set
4. Revised Bid Item – Base Bid
5. Revised Bid Item – Additive Alternate Bid 01
6. Revised Bid Item – Additive Alternate Bid 02
7. Revised Pay Notes – Base Bid
8. Revised Pay Notes – Additive Alternate Bid 01
9. Revised Pay Notes – Additive Alternate Bid 02

PLEASE RETURN THIS ADDENDUM WITH YOUR BID BY THE CLOSING DATE.

All other terms and conditions shall remain the same.

_____
Company Name

_____ _____
Bidder Authorized Signature Date

_____ _____
Please Print Above Name Phone

Briarwood Paving Phase II
Project Number PD21-06

Q/A and Clarification

During the Pre-Bid Meeting, the following questions were raised by one or more bidders. Below is a list of the questions along with the answers and clarifications.

Clarification: All information provided in Addendum 01, Addendum 02, Addendum 03, Addendum 04, and Addendum 05 for this project remains in effect unless specifically addressed in this Addendum 06.

Clarification: The deadline for questions and the date and time of the bid opening remain as stated in Addendum 04.

Clarification: All addendum acknowledgement forms must be included with the bid for the bid to be considered complete. Bidders have sole responsibility for making sure they have and acknowledge all addendums provided for this project bid.

Clarification: Private infrastructure conflicts have been discovered in the Briarwood Paving Phase II project area. The City of Midland is coordinating with the private utility owners to have these issues addressed, however the westernmost portion of the project site from the Trobaugh Boulevard intersection and west to the end of the proposed project limits has a number of conflicts still actively being worked on. For this reason, the City of Midland is dividing the project just west of the Trobaugh Boulevard intersection at Briarwood Avenue, and the portion of the project east of this point will be considered the new Base Bid portion of the project, and the portion west of this point will be considered the new Additive Alternative Bid 01. The traffic signal portion of the project that was originally designated Additive Alternate 01 is now designated Additive Alternative 02, but is otherwise unchanged.

Clarification: Bidders are to disregard all previous versions of design drawings, bid items, and pay notes previously provided for this project, and are instead to replace them with the new, revised versions provided with and described by this Addendum 06 when submitting a bid for this project.

Clarification: The base bid drawing set has been revised and labeled to distinguish between portions of the project design that remain past of the BASE BID, and portions of the project design that are now considered part of ADDITIVE ALTERNATE 01.

BASE BID – This will include all improvements from Station 119+67.24 to the east as indicated in the revised design drawing set provided, or basically everything along Briarwood Avenue from (and including) the Trobaugh Boulevard intersecting to the east limit of the project design.

ADDITIVE ALTERNATE 01 – This will include all improvements from Station 119+67.24 to the west as indicated in the revised design drawing set provided, or

basically along Briarwood Avenue from Trobaugh Boulevard to the west limit of the project design.

Clarification: The additive alternate drawing set addressing the traffic signal improvements portion of this project has been revised to include "ADDITIVE ALTERNATE 02 DRAWING SET" on the cover sheet. No other changes were made to this additive alternate.

Clarification: The Base Bid previously including all bid items for the proposed improvements along Briarwood Avenue for this project except for those related to the traffic signal improvements has now been split into a revised Base Bid and a new Additive Alternate 01 Bid. The Pay Notes related to the previous Base Bid have been revised to include separate Pay Notes for the new Base Bid and Additive Alternate Bid 01 as described in this Addendum 06.

Clarification: The Additive Alternate Bid including the bid items addressing the traffic signal improvements portion of this project has been renamed from 'Additive Alternate Bid' to 'Additive Alternate Bid 02'. No other changes were made to this additive alternate bid. The Pay Notes previously related to this additive alternate have been revised to reference the renamed Additive Alternate Bid 02.

Clarification: Some questions that have been asked are listed and addressed as part of this Addendum 06 below. All remaining questions that have already been asked but that are not addressed in this Addendum 06 will be addressed in the addendum issued after the deadline for new questions as stated in Addendum 04, along with all other questions asked between now and that same deadline.

Question: Bid item 3-8 (5" Concrete Riprap) is still showing 14,515 SY on the Excel spreadsheet. It should be 1,300 SY.

Answer: This bid item has been corrected and revised per the previously listed clarifications in this Addendum 06.

Question: Bit item 6-11 (Road Sign Assembly) on the Traffic Control Items should be EA and not SF. This should be changed on the Excel spreadsheet and the pdf sheet per the answer to question 35 on addendum 2.

Answer: This bid item has been corrected and revised per the previously listed clarifications in this Addendum 06.

Question: Question 35 on addendum 2 stated that bid item 6-11 Road Sign Assembly had the wrong unit of measure (shows SF but should be EA). The answer was that it should be EA. The unit has not been changed on either the Excel spread sheet or the Bid Item pdf file.

Answer: This bid item has been corrected and revised per the previously listed clarifications in this Addendum 06.

Question: The unit Pay Item D3 in the pay notes says it will be paid for by CY, but the unit of measure in the pay item schedule is in SY. Can you confirm if this quantity is in CY or SY?

Answer: The payment quantity is in square yards for this bid item. This bid item has been corrected and revised per the previously listed clarifications in this Addendum 06.

BRIARWOOD AVE PHASE II
FROM 190' WEST OF SH 158 TO 500' WEST OF AVALON DRIVE
PROJECT NUMBER : P21-06

JUNE 2025

NET LENGTH OF ROADWAY = 9,245 LF

MAYOR

LORI BLONG

COUNCIL MEMBERS

BRIAN STUBBS	**DISTRICT 1**
JOHN NORMAN	**DISTRICT 2**
JACK LADD	**DISTRICT 3**
AMY STRETCHER BURKES	**DISTRICT 4**
JOHN BURKHOLDER	**AT LARGE**
ROBIN POOLE	**AT LARGE**

CITY MANAGER

TOMMY GONZALEZ

ASSISTANT CITY MANAGER

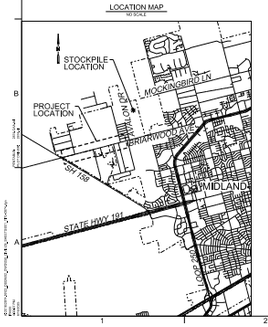
JOSE ORTIZ, P.E.

ENGINEERING SERVICES DIRECTOR

GABE McCLELLAND
OFFICE: (432)685-7983

REGISTERED ACCESSIBILITY SPECIALIST (RAS) INSPECTION
TDLR NO. EAB _____

LOCATION MAP



CITY OF MIDLAND, 300 N. LORAINE ST., MIDLAND TX 79702

MIDLAND Engineering Services

811 Know what's below. Call before you dig.

Parkhill

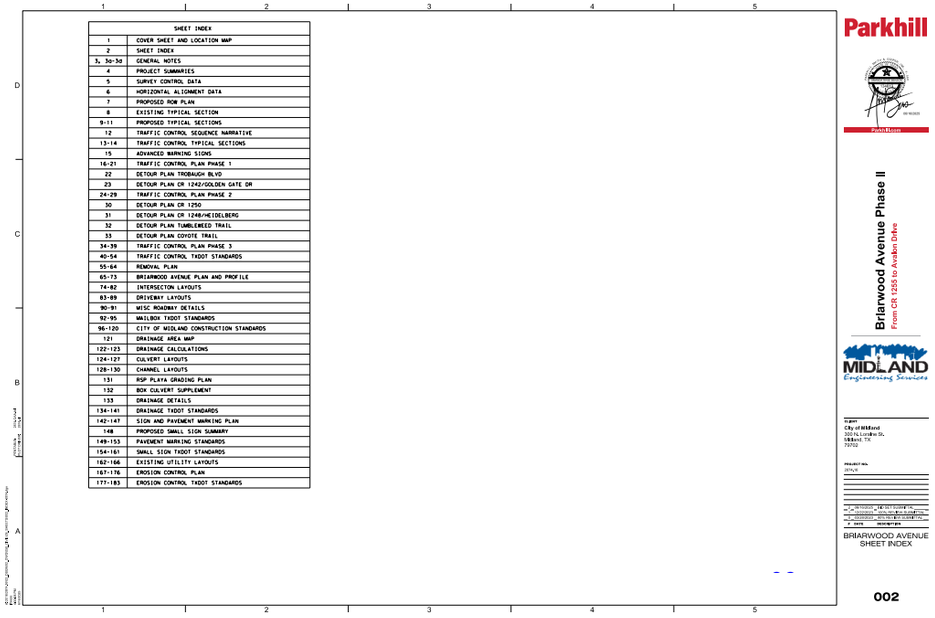
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

COVER SHEET AND LOCATION MAP

001



SHEET INDEX	
1	COVER SHEET AND LOCATION MAP
2	SHEET INDEX
3, 3a-3d	GENERAL NOTES
4	PROJECT SUMMARIES
5	SURVEY CONTROL DATA
6	HORIZONTAL ALIGNMENT DATA
7	PROPOSED ROW PLAN
8	EXISTING TYPICAL SECTION
9-11	PROPOSED TYPICAL SECTIONS
12	TRAFFIC CONTROL SEQUENCE NARRATIVE
13-14	TRAFFIC CONTROL TYPICAL SECTIONS
15	ADVANCED WARNING SIGNS
16-21	TRAFFIC CONTROL PLAN PHASE 1
22	DETOUR PLAN TROBAUGH BLVD
23	DETOUR PLAN CR 1242/GOLDEN GATE DR
24-29	TRAFFIC CONTROL PLAN PHASE 2
30	DETOUR PLAN CR 1250
31	DETOUR PLAN CR 1248/HEIDELBERG
32	DETOUR PLAN TUMBLEWEED TRAIL
33	DETOUR PLAN COYOTE TRAIL
34-39	TRAFFIC CONTROL PLAN PHASE 3
40-54	TRAFFIC CONTROL TXDOT STANDARDS
55-64	REMOVAL PLAN
65-73	BRIARWOOD AVENUE PLAN AND PROFILE
74-82	INTERSECTON LAYOUTS
83-89	DRIVEWAY LAYOUTS
90-91	MISC ROADWAY DETAILS
92-95	MAILBOX TXDOT STANDARDS
96-120	CITY OF MIDLAND CONSTRUCTION STANDARDS
121	DRAINAGE AREA MAP
122-123	DRAINAGE CALCULATIONS
124-127	CULVERT LAYOUTS
128-130	CHANNEL LAYOUTS
131	RSP PLAYA GRADING PLAN
132	BOX CULVERT SUPPLEMENT
133	DRAINAGE DETAILS
134-141	DRAINAGE TXDOT STANDARDS
142-147	SIGN AND PAVEMENT MARKING PLAN
148	PROPOSED SMALL SIGN SUMMARY
149-153	PAVEMENT MARKING STANDARDS
154-161	SMALL SIGN TXDOT STANDARDS
162-166	EXISTING UTILITY LAYOUTS
167-176	EROSION CONTROL PLAN
177-183	EROSION CONTROL TXDOT STANDARDS

Parkhill

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND
Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007419

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
SHEET INDEX

002

BRIARWOOD AVENUE
GENERAL NOTES:

The technical specifications adopted by the Texas Department of Transportation (TxDOT) November 1, 2014, and titled "Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges" shall govern this project, except where superseded in the Plans and Contract Documents. This specification book may be purchased from the TxDOT or downloaded at:
http://www.txdot.gov/business/resources/txdot-specifications.html

For this project, any reference within the specification book to "Department," "Engineer," or "Owner" should be interpreted as the City of Midland Engineering staff, or their representatives.

General

All Bearings, Dimensions, and Topographic features shown in this Construction Drawing set are related the Texas State Plane Coordinate System, Texas Central Zone, North American Datum 1983. All elevations are related to North American Vertical Datum 1988.

Any issues, conflicts, or discrepancies encountered during construction that conflict with this Construction Drawing set shall be brought to the attention of the Engineer prior to making any design changes in the field.

Repair damage to the Right of Way to the satisfaction of the Owner. Restore all disturbed areas due to trenching or any construction activity to a condition equivalent to the original condition within 14 working days from the time work began in the area including all necessary seeding.

Coordinate street closures with the local fire, police, other emergency personnel, and transportation.

Maintain access to adjacent property at all times.

Notify, in writing, each residence and business 7 days prior to beginning construction of the phase/phases that are expected to affect their ingress and egress or any planned interruptions. This notice may be hand delivered or mailed.

OSHA requirements and all other applicable Federal, State, or City of Midland safety requirements shall be followed and complied with at all times.

Provide a lidded dumpster to be used by Contractor's personnel on the job site. This shall be considered subsidiary to the various bid items.

Dispose of all waste materials in compliance with local, state, and federal regulations.

Do not begin work before 7:00 A.M. or end work after 7:00 P.M. unless authorized by the Engineer and remove all equipment from the roadway prior to end of workday.

Perform any erosion control measures such as seeding or sodding before beginning the next phase, unless otherwise authorized by the Engineer.

All demolition dimensions are approximate based on the most reliable data available. Contractor shall field verify actual dimensions and notify Engineer of quantity increase or discrepancies.

Contractor shall notify Engineer of any conflicts or discrepancies before removal of any items not noted in Construction Drawings.

Hot Mix Basis of Estimate

ITEM	DESCRIPTION	*RATE (approx.)
3076	Dense-Graded HMA (TY C) (PG64-22)	345 LBS/SY
3076	Dense-Graded HMA (TY D) (PG70-22)	230 LBS/SY
508	HMAC for detour (TY B)	690 LBS/SY

*Actual rates will be determined by Engineer in Field

Surface Treatment Basis of Estimate

DESCRIPTION	PRIME	QCST
ASPH TYPE & GRADE	MC-30	CRS-1P OR CRS-2P (COOL) AC-20-5TR (WARM)
ASPH RATE (GAL/SY)	0.20	0.42
AGGR TYPE		PB
AGGR GRADE		4
AGGR RATE (CY/SY)		1/100

Utilities
Overhead and underground utility installations do exist within the project limits. Surface features, such as manholes and valve boxes, were identified in the topographic survey and may be used as an approximate location of where some utilities exist. Some utilities were potholed and are identified on the plans. These identified features should not be considered a thorough or exact marking of all existing utilities. The Contractor is responsible for following all location services protocol and for repairing any damages to utilities caused by the Contractor.

Contractor is to take all necessary precautions to protect all existing facilities that are encountered regardless of whether they appear in this Construction Drawing set.

All new or existing valve, manholes, and meter covers must be adjusted to finished grade regardless of whether the surface is paved or unpaved. Concrete collars shall be placed around all public infrastructure utility covers.

Item 100 – Preparing Right Of Way
Sprinkler systems shall be cut at the right-of-way line and restored to operating conditions using a licensed irrigator. Payment for this work shall be considered subsidiary.

Fence and gate removal not specifically identified on the Plans as a pay item shall be subsidiary to Preparing Right Of Way. Fence and gate materials shown to be removed shall be neatly stockpiled at a location designated by the landowner.

Item 105 – Removing Stabilized Treated and Untreated Base and Asphalt Pavement
Store salvaged material in stockpile(s), location(s) as directed by the Engineer.

All saw-cuts for pavement removal shall be cut in clean, straight lines.

Item 110 – Excavation
Broom the existing base or subgrade to remove any loose material dropped during excavation operations. This work is considered subsidiary to this item.

Item 160 - Topsoil
Salvage, windrow and stockpile topsoil from existing areas within the ROW. Maximum salvage depth is 6 inches, unless approved by the Engineer. Place a 6-inch layer of loosely compacted Topsoil in areas

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Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

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#	DATE	DESCRIPTION

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 1 OF 5

003

designated on the plans. An adequate quantity of topsoil is available within the project limits. Payment for topsoil work is included in the embankment quantities and no separate payment will be made for this work.

If additional topsoil is determined to be required, provide material of equal quality to achieve a 6-inch minimum thickness throughout. The topsoil and its source will be approved by the Engineer.

Contractor may use stockpiled topsoil for areas where drainage dikes are called in Construction Drawings.

Item 164 – Seeding For Erosion Control
Provide seed according to Table 2 for the Odessa District, urban seed mix for sandy soils. Furnish seed tags from the seed supplier to the Engineer for verification of quantity and type. Submit an available substitution to the Engineer, for approval, if a grass variety is not available.

Notify the Engineer of scheduled seeding operations 24 hours prior to seeding applications. Do not begin seeding operations until the Engineer has approved seedbed preparations. Locate and flag all irrigation heads, valve covers, utility facility covers, etc. prior to commencing seed application operations.

Drill seed according to specifications. Use a pasture or rangeland type drill seed. Mulch is not required.

Do not disturb or drive on newly seeded areas. Repair any damage to the seeded areas to the satisfaction of the Engineer.

Revegetate all areas and surfaces disturbed by any construction activity outside of paved or other impervious areas.

Item 169 – Vegetative Watering
Water newly seeded grass areas evenly with a minimum of two-tenths (2/10) of an inch per day for 15 consecutive days or until 70% coverage has been achieved
Water from a tanked, spray-equipped vehicle capable of spraying water to all areas without driving of trailering the vehicle on said areas.

Vegetative Watering will not be paid for separately and will be considered subsidiary to Item 164.

Item 216 – Proof Rolling
Provide a 25-ton roller, or other equipment approved by the Engineer for proof rolling. Proof Roll all subgrade in the presence of the engineer, or as directed, prior to acceptance.

All subgrade and base courses shall be Proof Rolled in accordance with City of Midland Standards. No separate payment will be made for proof rolling.

Item 247 – Flexible Base
Use Flexible Base Ty A or B, Grade 4, with a minimum Plasticity Index of 6.

No salvaged base may be reused in the construction of new base but may be incorporated into the subgrade or embankment.

Item 302 – Aggregates for Surface Treatments
Use a Grade 4, Surface Aggregate Class B aggregate. Use an unmodified asphalt with a minimum performance grade of 64-16 (PG 64-16) or better for aggregate pre-coating. Precoat aggregate with 1.0 percent by weight of asphalt.

Use a liquid asphalt anti-stripping agent of a type and at a rate approved by the Engineer. The use of flux oil is not permitted.

Cure precoated aggregate a minimum of 72 hours before applying the aggregate to the roadway surface.

Item 310 – Prime Coat
Apply an MC-30 or AE-P prime coat to all finished treated base, new flexible base and salvage base due to receive asphaltic concrete pavement or surface treatments. Remove all loose and scabbed material from the surface prior to prime coat application.

Allow prime coat to penetrate and dry for a minimum of 72 hours before placing any asphaltic material on the primed surface, unless otherwise authorized by the Engineer.

Item 316 – Seal Coat
AC-20-5TR will be used during warm weather placement. CRS-1P or CRS-2P will be used for cool weather placement as directed by the Engineer.

Use medium pneumatic tire rollers, as directed by the Engineer. Do not use flat wheel rollers.

Item 341 – Dense-Graded Hot-Mix Asphalt
Binder:
Provide a binder with a Performance Grade of 64-22 (PG 64-22) for the Type C subsurface course.

Provide a binder with a Performance Grade of 70-22 (PG 70-22) for the Type D surface course.

Aggregate quality:
Provide coarse aggregate for all surface hotmix and overlays meeting a minimum Surface Aggregate Classification (SAC) of **B** as published in TxDOT's *AGGREGATE QUALITY MONITORING PROGRAM RATED SOURCE QUALITY CATALOG*.

Mixture design:
The target laboratory molded density for mix will be 96.5 percent.

Test method Tex-530-C (Boil Test) will not be required.

Placement:
Semi-trailer type vehicles are prohibited from dumping directly into the finishing machine for the finished surface unless the trailer is equipped with an auger slatted chain or another approved conveyor.

No RAP will be allowed.

No RAS will be allowed.

Mineral filler will not be allowed.

Lime will not be allowed as an anti-stripping agent.

Provide trackless asphalt for tack coat at a rate of 0.10-0.13 gal/sy. Adjustments to the rate may be made in the field at the direction of the engineer. Apply tack coat uniformly to all intermediate asphalt pavement surfaces and all joints, including cold joints with mats previously laid and joints adjacent to concrete pavements.

Item 400 – Excavation and Backfill for Structures
Structural Excavation is subsidiary to the structures being installed. Where flowable fill is chosen to be used as backfill material by the Contractor's and for the Contractor's convenience, no additional payment will be made.

Construct fill over structures to plan grade before hauling with heavy equipment over structures.

Compact backfill used for structures, other than flowable backfill, to a minimum density of 95 percent. Use a template to secure reasonably accurate Class C shaping of the foundation material outside of cement stabilized areas.

Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007478

#	DATE	DESCRIPTION
1	08/15/2025	AS BUILT CORRECTIONS
2	03/20/2025	100% SUBMITTAL
3	02/28/2025	90% SUBMITTAL

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 2 OF 5

003a

Contact the utility company and properly secure the utility poles prior to excavating next to the utility poles. The work and material used to secure the utility poles are subsidiary to the pertinent items.
All trenching and backfill is subsidiary to the various culvert and headwall items.

Item 421 – Hydraulic Cement Concrete
All concrete shall be Class "C" (3600 psi) and maintain fiber reinforcement throughout, in addition to any steel reinforcement shown.

Use polypropylene fiber reinforcing at a minimum rate of 3 lbs/cy.

Furnish mix designs to the Engineer at least 48 hours prior to placing concrete. Provide an approved Private Laboratory Contractor to perform the needed concrete testing for mix design approval.

Fly ash will not be allowed in any mix design.

Engineer will provide quality assurance testing.

Provide air entrainment in all concrete except for concrete used in precast concrete members. Target an entrained air content of 4.0% for concrete pavement and 5.5% for all other concrete requiring air entrainment. Ensure the minimum entrained air content is at least 3.0% for all classes of concrete.

Place concrete pavement within 45 minutes of batching and use vibratory equipment to consolidate concrete. Do not use vibratory equipment to distribute concrete pavement. Segregated concrete is subject to rejection.

For this project, consider all concrete for culverts, culvert extensions, headwalls and wingwalls to be non-structural concrete.

All concrete pavement joints shall be sealed in compliances with City of Midland standards. This requirement does not apply to pedestrian access ramps, sidewalk, or curb joints.

Item 432 – Riprap
Provide 5-inch-thick concrete riprap, unless otherwise indicated in the plans.

In large areas of riprap, provide one-half (1/2)-inch thick expansion joint material at approximately 15-foot intervals, or as directed by the Engineer.

Use City of Midland approved expansion joint material and place between the proposed riprap and curb and gutter.

Reinforce all riprap on this project with No. 3 bars spaced 12 inches O.C.B.W. or No. 4 bars spaced at 18 inches O.C.B.W.

Broom-finish all riprap on this project unless otherwise directed.

In addition to reinforcing steel, polypropylene fiber is required at a rate of 3 lbs./cy. Polypropylene fiber may not be used in lieu of reinforcing steel.

Items 462 and 464 – Concrete Box Culvert and Reinforced Concrete Pipe
Join all concrete culverts with a cold-applied plastic joint gasket such as RAM-NEK or approved equal.

Maintain trench protection to protect Owner's representatives, inspectors, and Contractors during testing operations.

OSHA approved trench safety systems are required for all trenches 5.0' deep or greater.

All trenching and backfill is subsidiary to the various culvert and headwall items.

Item 466 – Headwalls and Wingwalls
Install reinforced concrete aprons on all headwalls and wingwalls, using reinforcing composed of #4 bars at 12-inch spacings, center-to-center, or as shown on the detail sheet.

Item 467 – Safety End Treatment
Provide shop drawings for pipe runners.

Item 479 – Adjusting Manholes and Inlets
Raise the manholes and water valves up to finished roadway elevation, matching the finish cross-slope.

Item 502 – Barricades, Signs and Traffic Handling
The work required for Item 502 will be paid for as a lump sum.

Prior to beginning construction, the Engineer shall approve the routing of traffic and sequence of work.

In addition to the Traffic Contro Plan (TCP) and the latest WZ standard plan sheets, install barricades and warning signs, as appropriate, to adequately warn motorists. Permanent signs may be installed when construction in an area is complete, anc they will not be in conflict with the traffic control plan for the remainder of the job.

This project has a regulatory work zone speed reduction within the project limits. The work zone speed limit is reduced from 60 mph to 35 mph. Placement of speed reduction zone signs shall comply with BC (3)-14. Speed resumption sign(s) is required atthe end of a speed reduction zone. Existing signs may remain in place durng the TCP period if they do not interfere with construction, and they do not conflict with the TCP plan.

Additional signs and barricades may be required, as directed by the Engineer, and shall be considered subsidiary to TCP.

Cover or remove any work zone signs when work or condition referenced is not occurring.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets. Provide access to all driveways during all phases of construction, unless otherwise directed on the plans.

All locations used for storing construction equipment and materials of any type within the right of way shall be approved by the Engineer. Use of the Right-of-Way for these purposes will be restricted to those locations where driver sight distance to businesses and side street intersections is not obstructed, public safety is not risked and at other locations where an unsightly appearance, as determined by the Engineer, will not exist.

No work will be permitted to commence on the road before 7:00 A.M. and shall be arranged so that all machinery and/or equipment shall be away from the roadway near the Right-of-Way line after 7:00 P.M.

Remove any obstructions to existing drainage due to the Contractor's operations as required, at the Contractors expense.

Wash the channelizing devices and barricades following each rainfall or snowfall event and at times deemed necessary by the Engineer.

To ensure the safety and convenience of traffic, flaggers may be required when construction machinery is being operated along, across, or adjacent to lanes carrying traffic. If considered necessary by the Engineer, supplemental signs and barricades may be required.

Fill any holes left by barricade or sign supports and restore the area to its original condition.

Barricades, Signs and Traffic Handling is a plan quantity item. If time is suspended, no additiona compensation will be made.

Parkhill

John Rowe

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND
Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007419

No.	Description	Date

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 3 OF 5

003b

Traffic switches will not be permitted on Fridays or any working day preceding a holiday unless authorized by the Engineer.

Construct temporary ramps to maintain access to driveways and city streets as directed by the Engineer. Temporary ramp construction is subsidiary to TCP, unless otherwise shown on the plans.

The Contractor shall bid on the traffic control plan shown in the plans. Any proposed alterations to the TCP (combining work areas / phasing / etc.) shall be submitted to the Engineer at least 10 days prior to anticipated changes.

Square tubing sign supports may be used for temporary construction signs. Aluminum and wood signs may be mounted if the vertical supports are embedded into the ground. Square tubing supports on skids which are typically held in place with sandbags can only support signs made of light weight fluted plastic.

Any trench or drop off over 2" will require a safety slope of at least 3:1 and can be constructed out of RAP, embankment or other material approved by the Engineer. The placement, maintenance, and removal are the responsibility of the Contractor and is subsidiary to the various items.

Item 506 – Temporary Erosion, Sedimentation, and Environmental Controls
All erosion control measures shown in plans and required by the Engineer, including installation and removal upon completion of construction activity, will not be paid for separately and will be included under Item 506 on a lump sum basis.

Install erosion control measures prior to beginning any construction activity on project site.

Contractor shall maintain erosion control measures at all times. Repairs to existing measures shall be made immediately upon discovery.

All erosion control measures shall be inspected immediately following any storm event. Implement additional erosion control measures during storm events as needed or directed by the Engineer.

Contractor is to maintain a reasonable clean project site at all times. Any sediment, debris, etc. outside project site area shall be removed promptly.
All stockpiles will be surrounded by silt fence or equivalent measures as approved by the Engineer to properly control sediment runoff.

Contractor shall provide a concrete washout device meeting City of Midland specifications for all concrete washout activities. Contractor may not use any other areas within the project site for concrete washout activities under any circumstance.

Contractor is required to mitigate any damages to adjacent property or to receiving waters caused by improperly installed or poorly maintained erosion control measures.

Item 508 – Constructing Detours
Any drainage pipe or SETs required for detours are subsidiary to this Item. The minimum pipe size is 18 inches.

Item 529 – Concrete Curb, Gutter and Combined Curb and Gutter
Place one-half (1/2)-inch of approved, pre-molded expansion joint material at 40-foot intervals and at the beginning and end of all radii. Place 3/25-inch grooved or sawed construction joints, as directed by the Engineer, spaced equally, with the spacing not to exceed ten feet and no less than two feet between joints.

All concrete fillets are to be placed monolithically with adjacent concrete curb.

Item 531 – Curb Ramps
The curb ramp locations shown in the plans have considered the geometric features of the intersection, traffic signals, and the pavement markings. When field conditions, such as lack of right of way width or obstructions require, the ramp may be relocated within the right of way with the approval of the Engineer. In any case, construct curb ramps in conformance with the Texas Accessibility Standards (TAS) and the Americans with Disabilities Act Accessibility Guicelines (ADAAG). All deficient ramps will be removed and replaced at the Contractor's expense.

Use polypropylene fiber reinforcing at a minimum rate of 3 lbs./cy in lieu of wire reinforcing.
Form tooled joints on each side of the fire-foot wide ramp section, and at each break in ramp slope or geometry, and at five-foot intervals as if it were sidewalk. Place asphalt expansion joint material between proposed ramps and existing concrete.

Place asphalt expansion joint material between proposed sidewalk and utility poles, guy wires, vent pipes, standpipes and as directed.

All curbs on curb ramps will not be paid for directly but are considered subsidiary to the various bid items.

Item 585 – Ride Quality for Pavement Surfaces
Use Surface Test Type A to evaluate ride quality of travel lanes in accordance with item 585, "Ride Quality for Pavement Surfaces".

Corrective action, when required, shall be diamond grinding, as approved and directed by the Engineer. No Bonus Pay Adjustments will be made for low IRI results.

This item will be considered subsidiary to the various items.

Item 618 – Conduit
Do not place boring pits closer than 2 feet from the edge of the pavement unless otherwise directed. Do not use water jetting. When boring is used for under pavement conduit installations, the maximum allowable over-cut is 1" in diameter. When conduits are bored, do not exceed 18 inches in the vertical and horizontal tolerances as measured from the intendd target point.

Do not use a pneumatically driven devce for punching holes beneath the pavement (commony known as a "missile").

Use a colored cleaner-primer on all PVC-to-PVC joints before application of PVC cement.

Seal all conduit ends with a permanently soft, non-toxic duct seal. Use a duct seal that does not adversely affect other plastic materials or corrode metals.

Furnish and install non-metallic pull ropes in conduit installed for future use and cap using standard weather-tight conduit caps, as approved.

The locations of conduit and ground boxes are diagrammatic only and may be shifted to accommodate field conditions as directed by the Engineer.

Item 620 – Electrical Conductors
Terminate all electrical conductors from the controller at the termination block in the traffic signal pole hand hole whether in use or not.

All wiring not covered by the plans anc specifications shall be in accordance with the National Electric Code (NEC).

When the specifications for electrical items require UL listed products, it will be construed to mean UL listed or CSA listed.

Parkhill

Briarwood Avenue Phase II
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MIDLAND
Engineering Services

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City of Midland
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Project No.
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No.	Description	Date
1	90% SUBMITTAL	04/30/2025
2	100% SUBMITTAL	06/30/2025
3	BID SET	07/30/2025

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 4 OF 5

003c

Bond together any grounding conductors that share the same conduit, junction box, ground box, or structure, at every accessible point in accordance with the National Electrical Code (NEC).

Item 624 – Ground Boxes
Locations of ground boxes are approximate. Final locations will be as approved by Engineer. Provide an apron for ground boxes as shown on TxDOT Standard ED (4)-14.

Concrete removal required for installation of ground boxes will be subsidiary to Ground Boxes. Seal ground boxes with polyurethane foam that will not adversely affect other plastic materials or corrode metals (Froth-Pak 115 2.75 density 157833 or approved equal).

Item 644 – Small Roadside Sign Assemblies
All new sign supports for stop and yield signs will have a 12" red strip of Type C High Specific Intensity Reflective tape. Place the top of the tape 4' above the edge of the roadway. This work will not be paid for directly and will be subsidiary to the pertinent bid item.

For standard small sign details and dimensions, refer to the "Standard Highway Sign Designs for Texas (SHSD)"; a supplement to the Texas Manual on Uniform Traffic Control Devices (TMUTCD)".

Stake all sign locations, and receive approval from the Engineer, prior to sign placement.

Item 658 – Delineator and Object Marker Assemblies
Delineator and object marker assembly posts shall be composed of post-consumer recycled materials. Embedded stub shall be perforated square tubing.

Item 662 – Work Zone Pavement Markings
Materials used for non-removable work zone pavement markings will be paint and beads or other approved materials.

All removable work zone pavement markings placed on final surfaces shall consist of ceramic buttons and RPMs as shown on standard sheet BC (11). These shall be applied with a thermoplastic adhesive, unless otherwise directed by the Engineer. Buttons will be paid for by the linear foot of striping for which they represent.

Contractor is responsible for the removal of ceramic buttons, RPMs, and Adhesives as directed by the Engineer and before permanent striping is installed. Payment for this work will be paid for under Item 677.

Do not place guide markers on a finished surface unless they fall on a proposed lane line. Remove Stick-down markings prior to final marking. Remove tabs after the standard pavement markings have been placed.

The deviation rate in alignment shall not exceed one inch per 200 feet of roadway. The maximum deviation shall not exceed 2 inches, nor shall any deviation be abrupt. Striping not in conformance shall be removed and replaced at the Contractor's expense.

Item 666 – Reflectorized Pavement Markings
Type I markings shall meet the minimum retroreflectivity values defined by Article 4.4 Retroreflectivity Requirements.

Permanent pavement markings are to be thermoplastic in accordance with TxDOT Item 666 Type I specifications for long-line markings. Short-line and symbol markings will meet either TxDOT Item 666 Type I or Item 668 specifications.

Do not paint any pavement markings.

Item 677 – Eliminating Existing Pavement Markings and Markers
Submit eliminating plan for approval br the Engineer in accordance with Item 677.

Item 678 – Pavement Surface Preparation for Markings
Use dry sandblasting for pavement surface preparation for markings. This work will be considered subsidiary to the various items.

Item 734 – Litter Removal
Perform litter removal as necessary ard before mowing. This work will be considered subsidiary to the various items.

Item 738 – Cleaning and Sweeping
Clean and sweep existing pavements as necessary and as directed by the Engineer. This work will be considered subsidiary to the various items.

Item 6001 - Portable Changeable Message Sign
Provide solar powered changeable message boards for this project. Modify the message as directed by the Engineer.

PCMS shall be placed in operation a minimum of one (1) week prior to construction. Location(s) and duration for PCMS shall be as directed by the Engineer.

Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

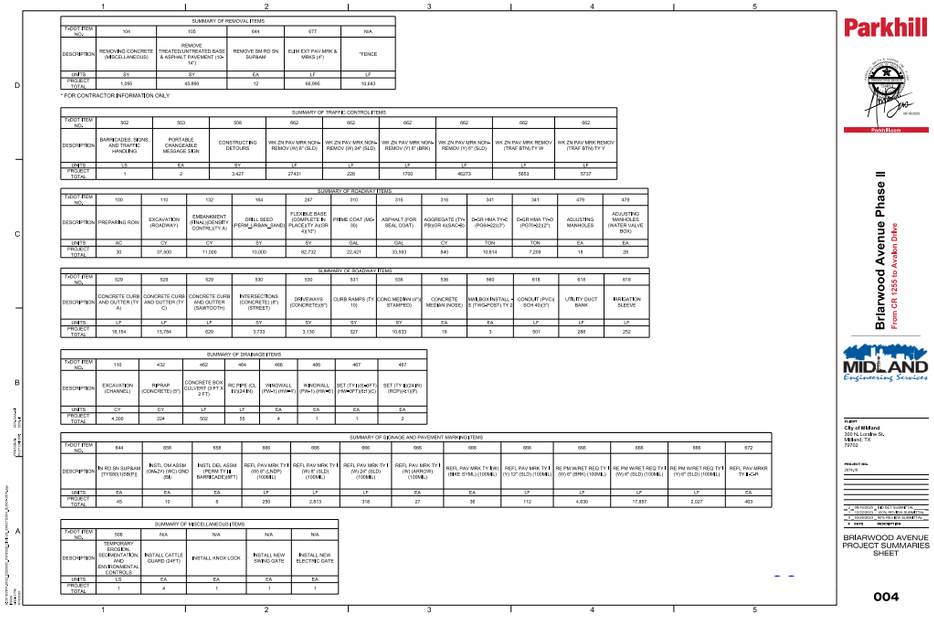
Client
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#	DATE	DESCRIPTION

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 5 OF 5

003d



SUMMARY OF REMOVAL ITEMS

TxDOT ITEM NO.	104	105	644	677	N/A
DESCRIPTION	REMOVING CONCRETE (MISCELLANEOUS)	REMOVE TREATED/UNTREATED BASE & ASPHALT PAVEMENT (10-14")	REMOVE SM RD SN SUPAM	ELIM EXT PAV MRK & MRKG (4")	*FENCE
UNITS	SY	SY	EA	LF	LF
PROJECT TOTAL	1,095	45,690	12	66,666	10,643

* FOR CONTRACTOR INFORMATION ONLY

SUMMARY OF TRAFFIC CONTROL ITEMS

TxDOT ITEM NO.	502	503	506	662	662	662	662	662	662
DESCRIPTION	BARRICADES, SIGNS AND TRAFFIC HANDLING	PORTABLE CHANGEABLE MESSAGE SIGN	CONSTRUCTING DETOURS	WK ZN PAV MRK NON-REMOV (W) 6" (SLD)	WK ZN PAV MRK NON-REMOV (W) 24" (SLD)	WK ZN PAV MRK NON-REMOV (Y) 6" (BRK)	WK ZN PAV MRK NON-REMOV (Y) 6" (SLD)	WK ZN PAV MRK REMOV (TRAF BTN) TY III	WK ZN PAV MRK REMOV (TRAF BTN) TY Y
UNITS	LS	EA	SY	LF	LF	LF	LF	LF	LF
PROJECT TOTAL	1	2	3,427	27431	228	1700	46273	5853	5737

SUMMARY OF ROADWAY ITEMS

TxDOT ITEM NO.	100	110	132	164	247	310	316	316	341	341	479	479
DESCRIPTION	PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENSITY CONTROL)(TY A)	DRILL SEED (PERM_URBAN_SAND)	FLEXIBLE BASE (COMPLETE & PLACE)(TY A)(GR 4)(10")	PRIME COAT (MAT)	ASPHALT (FOR SEAL COAT)	AGGREGATE (TY-PB)(GR A)(SAC-A)	D-GR HMA TY-C (PG64-22)(F)	D-GR HMA TY-D (PG70-22)(F)	ADJUSTING MANHOLES	ADJUSTING MANHOLES (WATER VALVE BOX)
UNITS	AC	CY	CY	SY	SY	GAL	GAL	CY	TON	TON	EA	EA
PROJECT TOTAL	30	37,900	11,000	10,000	82,732	22,421	33,593	840	10,814	7,209	18	29

SUMMARY OF ROADWAY ITEMS

TxDOT ITEM NO.	529	529	529	530	530	531	536	536	560	618	618	618
DESCRIPTION	CONCRETE CURB AND GUTTER (TY A)	CONCRETE CURB AND GUTTER (TY C)	CONCRETE CURB AND GUTTER (SAWTOOTH)	INTERSECTIONS (CONCRETE) (8") (STREET)	DRIVEWAYS (CONCRETE)(8")	CURB RAMPS (TY 10)	CONC MEDIAN (4") STAMPED	CONCRETE MEDIAN (NOSE)	MAILBOX INSTALL-S (TWG4*DS5T) TY C	CONDUIT (PVC) SCH 40(2")	UTILITY DUCT BANK	IRRIGATION SLEEVE
UNITS	LF	LF	LF	SY	SY	EA	SY	EA	EA	LF	LF	LF
PROJECT TOTAL	18,154	15,784	629	3,733	3,139	327	10,633	16	3	501	286	252

SUMMARY OF DRAINAGE ITEMS

TxDOT ITEM NO.	110	432	462	464	466	466	467	467
DESCRIPTION	EXCAVATION (CHANNEL)	RIPRAP (CONCRETE) (24")	CONCRETE BOX CULVERT (3 FT X 2 FT)	RC PIPE (CL III)(18")	HDWALL (TY=I)(SW=*)(18")	REMOVAL (TY=I)(18")	SET (TY II)(18"W)(FT)(SW=FT SET)(SC)	SET (TY II)(18") (RCP)(S=%)(F)
UNITS	CY	CY	LF	LF	EA	EA	EA	EA
PROJECT TOTAL	4,300	224	502	55	4	1	1	2

SUMMARY OF SIGNAGE AND PAVEMENT MARKING ITEMS

TxDOT ITEM NO.	644	658	658	666	666	666	666	666	666	666	666	672
DESCRIPTION	IN RO SN SUP&AM (TY10)(10SQFT)	INSTL OM ASSM (CRASH) (WO GND SN)	INSTL DEL ASSM (PERM TY III BARRICADE)(SFT)	REFL PAV MRK TY I (W) 8" (SLD)(P) (100MIL)	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	REFL PAV MRK TY I (W) (ARROW) (100MIL)	REFL PAV MRK TY I(W)(WORD)(100MIL)	REFL PAV MRK TY I (Y) 12" (SLD) (100MIL)	RE PM W/RET REQ TY I (W) 6" (BRK) (100MIL)	RE PM W/RET REQ TY I (W) 8" (SLD) (100MIL)	RE PM W/RET REQ TY I (Y) 6" (SLD) (100MIL)	RE PM W/RET REQ TY I (Y) 8" (SLD) (100MIL)	REFL PAV MRKR TY II-C-R
UNITS	EA	EA	EA	LF	LF	LF	EA	EA	LF	LF	LF	LF	LF	EA
PROJECT TOTAL	45	15	6	250	2,613	318	27	36	112	4,630	17,857	2,027	463	

SUMMARY OF MISCELLANEOUS ITEMS

TxDOT ITEM NO.	506	N/A	N/A	N/A	N/A
DESCRIPTION	TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS	INSTALL CATTLE GUARD (SIFT)	INSTALL KNOX LOCK	INSTALL NEW SWING GATE	INSTALL NEW ELECTRIC GATE
UNITS	LS	EA	EA	EA	EA
PROJECT TOTAL	1	4	1	1	1

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Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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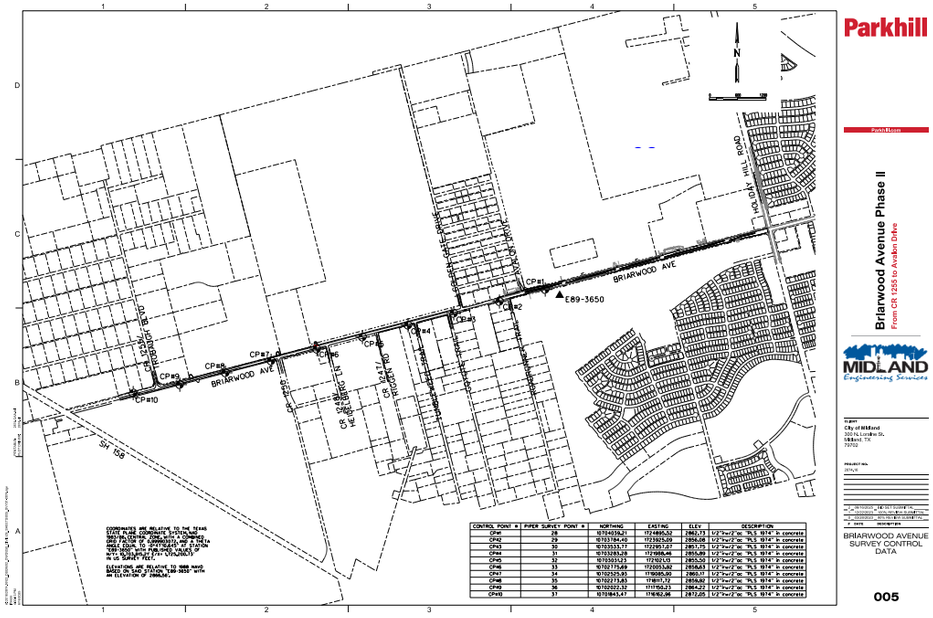
client
City of Midland
300 N. Loraine St.
Midland, TX
79702

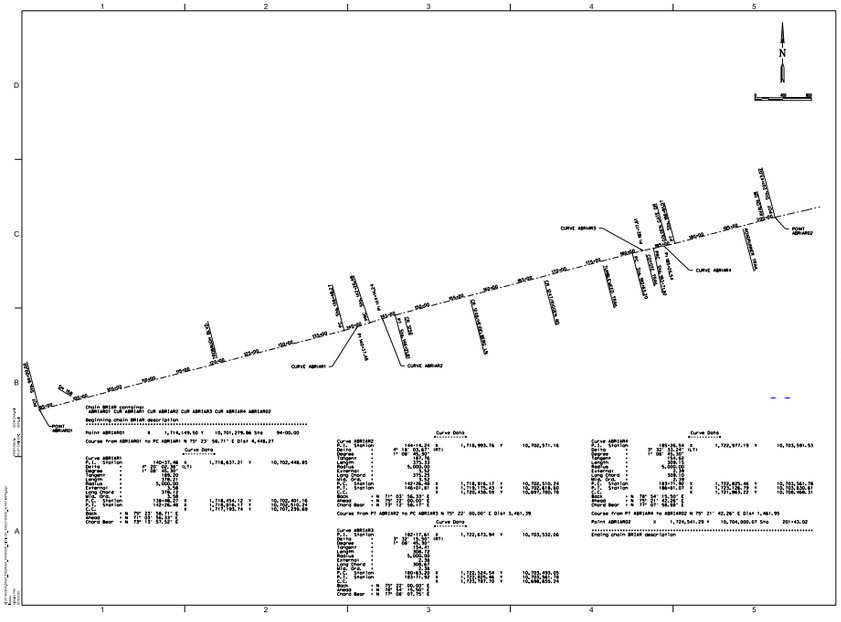
project no.
(825) 9

#	DATE	DESCRIPTION
1	08/15/2025	AE SET COMPLETE
2	08/29/2025	FINAL SET BEFORE BID
3	09/08/2025	ADDENDUM #1

BRIARWOOD AVENUE
PROJECT SUMMARIES
SHEET

004


BRIARWOOD AVE
CP#1
E89-3650
CP#2
CP#3
CP#4
CP#5
CP#6
CP#7
CP#8
CP#9
CP#10
HOLIDAY HILL ROAD
SH 158
CONTROL POINT #
PIPER SURVEY POINT #
NORTHING
EASTING
ELEV
DESCRIPTION
CP#1 28 10704039.21 1724885.52 2862.73 1/2"rw/2"sc "PLS 5174" in concrete
CP#2 29 10703784.40 1723925.09 2856.06 1/2"rw/2"sc "PLS 5174" in concrete
CP#3 30 10703533.17 1722951.27 2851.75 1/2"rw/2"sc "PLS 5174" in concrete
CP#4 31 10703283.28 1721958.46 2855.90 1/2"rw/2"sc "PLS 5174" in concrete
CP#5 32 10703051.73 1721021.13 2855.56 1/2"rw/2"sc "PLS 5174" in concrete
CP#6 33 10702775.69 1720053.82 2858.53 1/2"rw/2"sc "PLS 5174" in concrete
CP#7 34 10702575.93 1719085.50 2860.17 1/2"rw/2"sc "PLS 5174" in concrete
CP#8 35 10702273.83 1718117.72 2858.32 1/2"rw/2"sc "PLS 5174" in concrete
CP#9 36 10702057.32 1717150.23 2864.42 1/2"rw/2"sc "PLS 5174" in concrete
CP#10 37 10701843.47 1716182.96 2872.05 1/2"rw/2"sc "PLS 5174" in concrete
COORDINATES ARE RELATIVE TO THE NAD83 STATE PLANE COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203). ALL DISTANCES ARE SHOWN AS GRID DISTANCES. TO OBTAIN GROUND DISTANCES, DIVIDE GRID DISTANCES BY A COMBINED SCALE FACTOR OF 0.99987. ALL BEARINGS ARE GRID BEARINGS AS SHOWN HEREON.
ELEVATIONS ARE RELATIVE TO NAVD 1988, GEOID 12B. BENCHMARK USED "2025" WITH AN ELEVATION OF 2866.84'.
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Midland, TX
79701
BRIARWOOD AVENUE
SURVEY CONTROL
DATA
005



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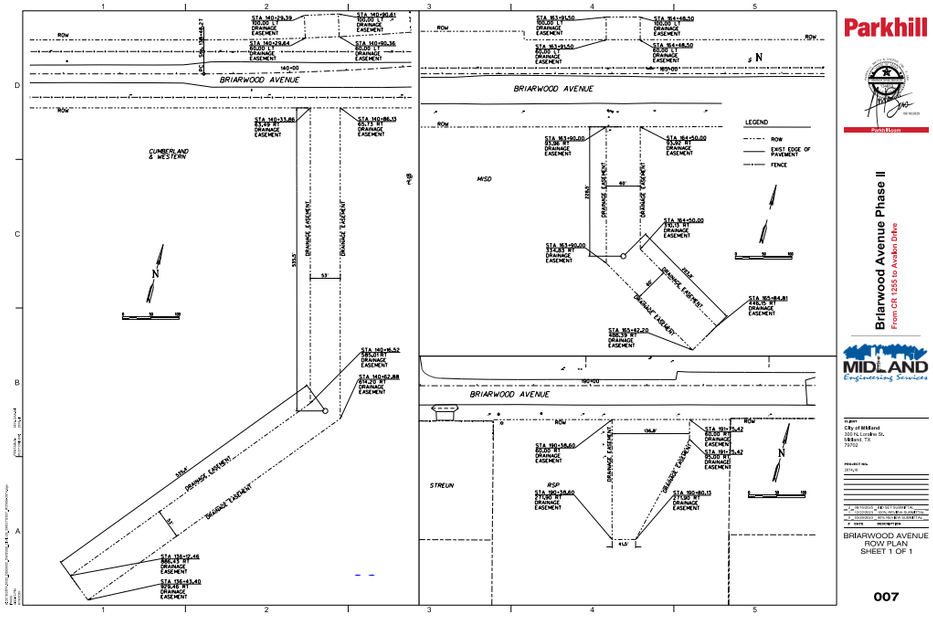
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From CR 1250 to Avalon Drive

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BRIARWOOD AVENUE HORIZONTAL ALIGNMENT DATA

006



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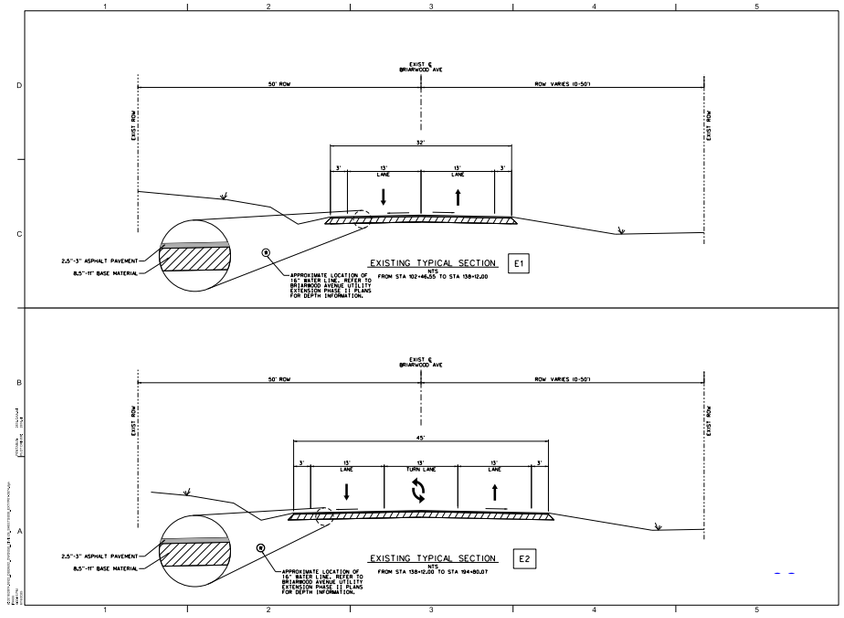
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BRIARWOOD AVENUE
ROW PLAN
SHEET 1 OF 1

007



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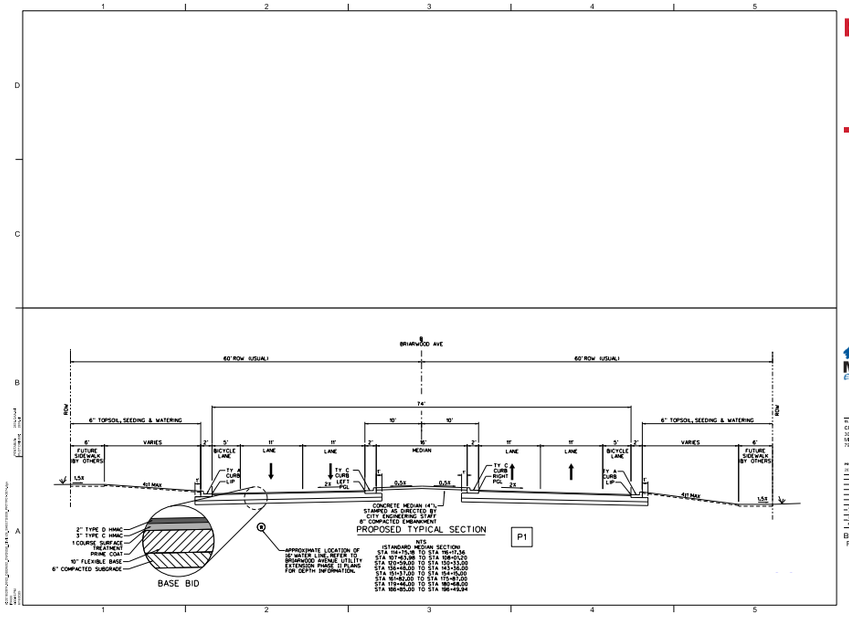
From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
EXISTING TYPICAL
SECTION
SHEET 1 OF 1

008



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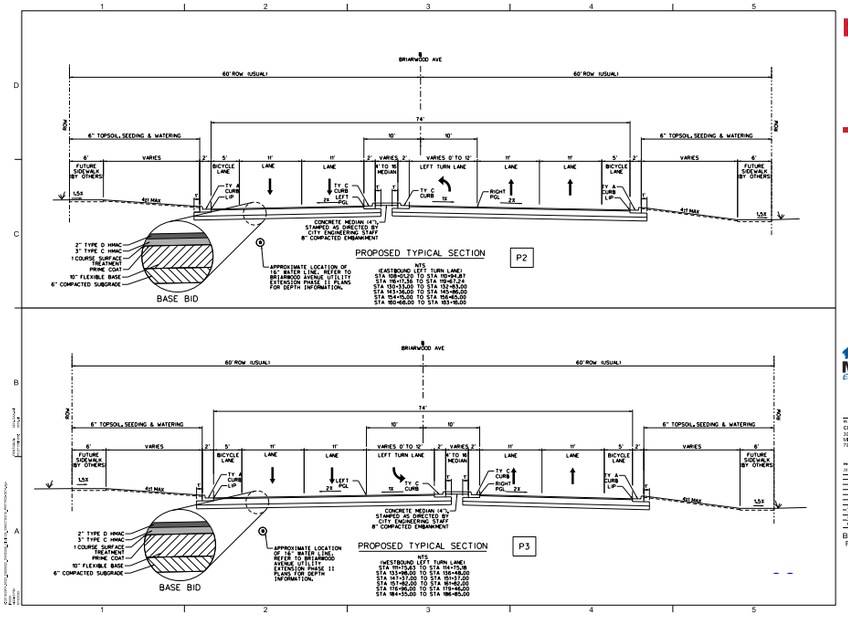
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BRIARWOOD AVENUE
PROPOSED TYPICAL SECTIONS
SHEET 1 OF 3

009



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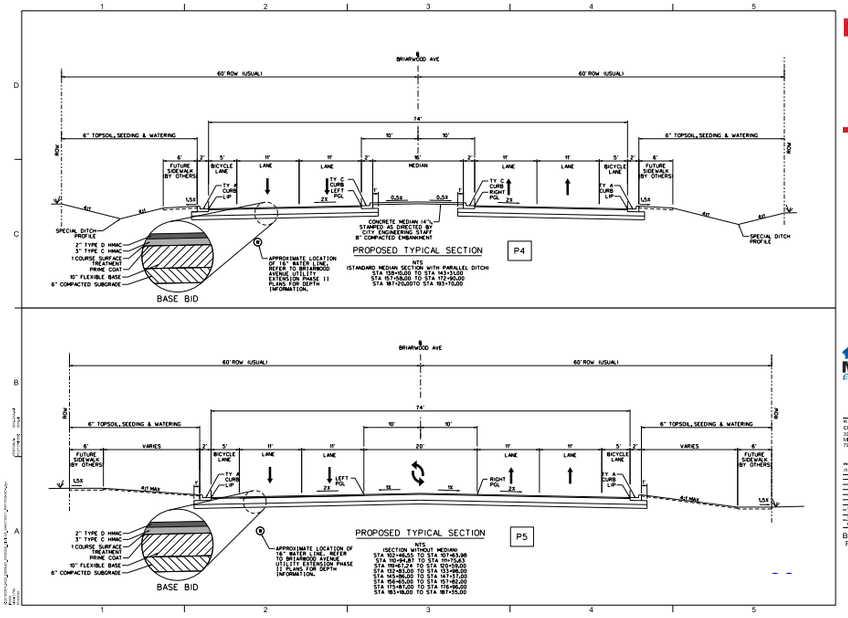
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BRIARWOOD AVENUE
PROPOSED TYPICAL SECTIONS
SHEET 2 OF 3

010



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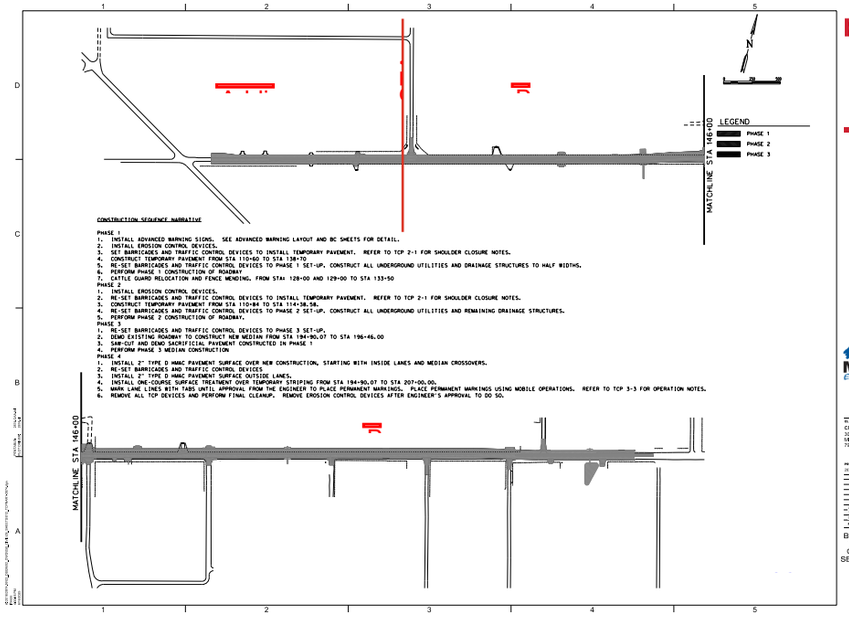
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

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BRIARWOOD AVENUE
PROPOSED TYPICAL SECTIONS
SHEET 3 OF 3

011



CONSTRUCTION SEQUENCE NARRATIVE

PHASE 1
1. INSTALL ADVANCED WARNING SIGNS. SEE ADVANCED WARNING LAYOUT AND BC SHEETS FOR DETAIL.
2. INSTALL EROSION CONTROL DEVICES.
3. SET BARRICADES AND TRAFFIC CONTROL DEVICES TO INSTALL TEMPORARY PAVEMENT. REFER TO TCP 2-1 FOR SHOULDER CLOSURE NOTES.
4. CONSTRUCT TEMPORARY PAVEMENT FROM STA 110+60 TO STA 138+70
5. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES TO PHASE 1 SET-UP. CONSTRUCT ALL UNDERGROUND UTILITIES AND DRAINAGE STRUCTURES TO HALF WIDTHS.
6. PERFORM PHASE 1 CONSTRUCTION OF ROADWAY
7. CATTLE GUARD RELOCATION AND FENCE MENDING. FROM STA+ 128+00 AND 129+00 TO STA 133+50

PHASE 2
1. INSTALL EROSION CONTROL DEVICES.
2. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES TO INSTALL TEMPORARY PAVEMENT. REFER TO TCP 2-1 FOR SHOULDER CLOSURE NOTES.
3. CONSTRUCT TEMPORARY PAVEMENT FROM STA 110+84 TO STA 114+38.56.
4. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES TO PHASE 2 SET-UP. CONSTRUCT ALL UNDERGROUND UTILITIES AND REMAINING DRAINAGE STRUCTURES.
5. PERFORM PHASE 2 CONSTRUCTION OF ROADWAY.

PHASE 3
1. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES TO PHASE 3 SET-UP.
2. DEMO EXISTING ROADWAY TO CONSTRUCT NEW MEDIAN FROM STA 194+90.07 TO STA 196+46.00
3. SAW-CUT AND DEMO SACRIFICIAL PAVEMENT CONSTRUCTED IN PHASE 1
4. PERFORM PHASE 3 MEDIAN CONSTRUCTION

PHASE 4
1. INSTALL 2" TYPE D HMAC PAVEMENT SURFACE OVER NEW CONSTRUCTION, STARTING WITH INSIDE LANES AND MEDIAN CROSSOVERS.
2. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES
3. INSTALL 2" TYPE D HMAC PAVEMENT SURFACE OUTSIDE LANES.
4. INSTALL ONE-COURSE SURFACE TREATMENT OVER TEMPORARY STRIPING FROM STA 194+90.07 TO STA 207+00.00.
5. MARK LANE LINES WITH TABS UNTIL APPROVAL FROM THE ENGINEER TO PLACE PERMANENT MARKINGS. PLACE PERMANENT MARKINGS USING MOBILE OPERATIONS. REFER TO TCP 3-3 FOR OPERATION NOTES.
6. REMOVE ALL TCP DEVICES AND PERFORM FINAL CLEANUP. REMOVE EROSION CONTROL DEVICES AFTER ENGINEER'S APPROVAL TO DO SO.

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From CR 1250 to Avalon Drive

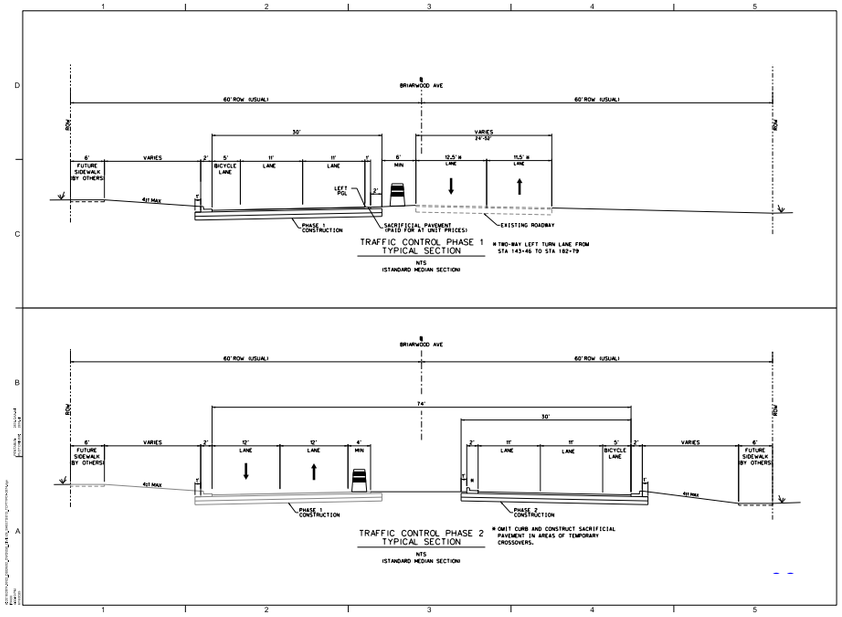
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DATE | DESCRIPTION

BRIARWOOD AVENUE
TRAFFIC CONTROL
OVERALL LAYOUT &
SEQUENCE NARRATIVE

012



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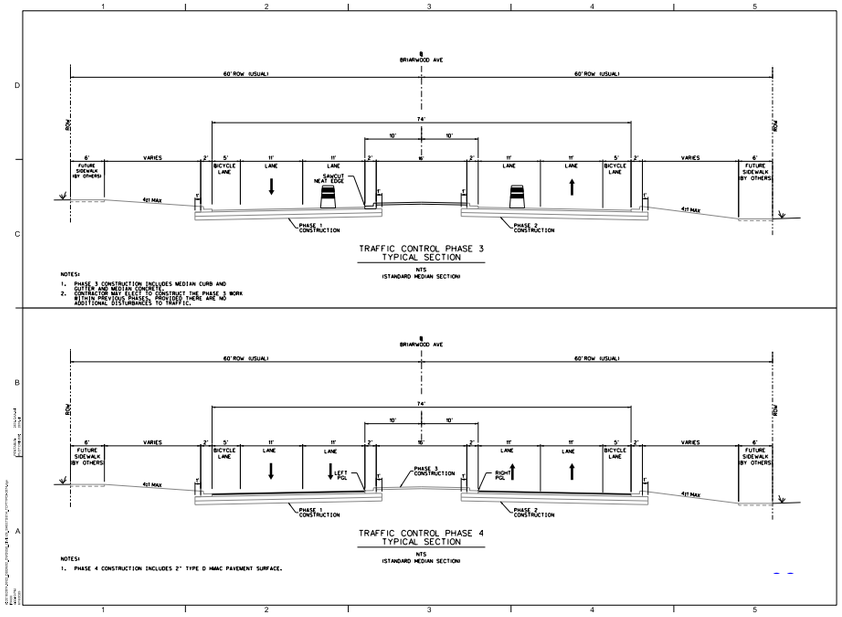
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From CR 1250 to Avalon Drive

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BRIARWOOD AVENUE
TRAFFIC CONTROL
TYPICAL SECTIONS
SHEET 1 OF 2

013



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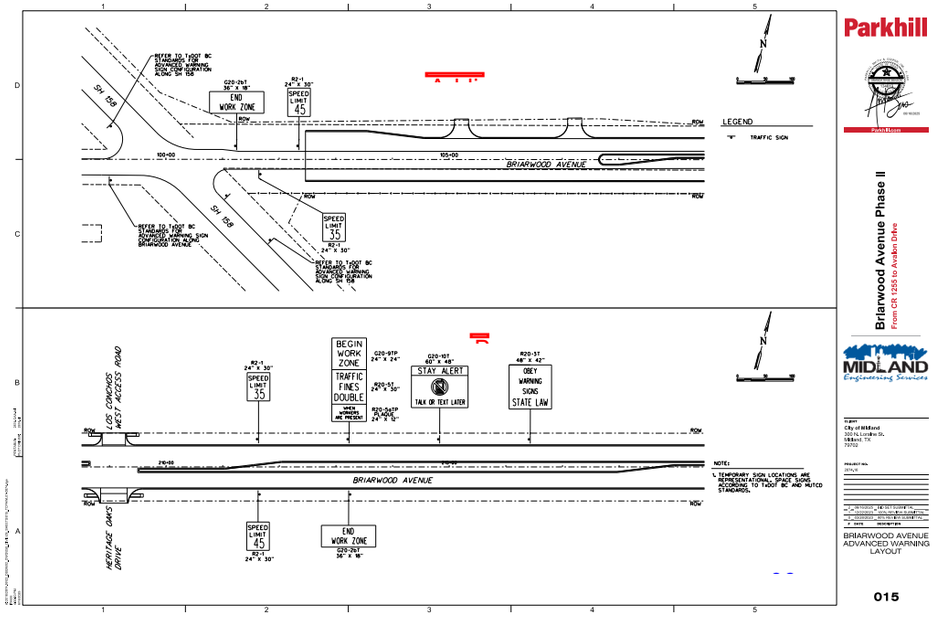
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From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
TRAFFIC CONTROL
TYPICAL SECTIONS
SHEET 2 OF 2

014



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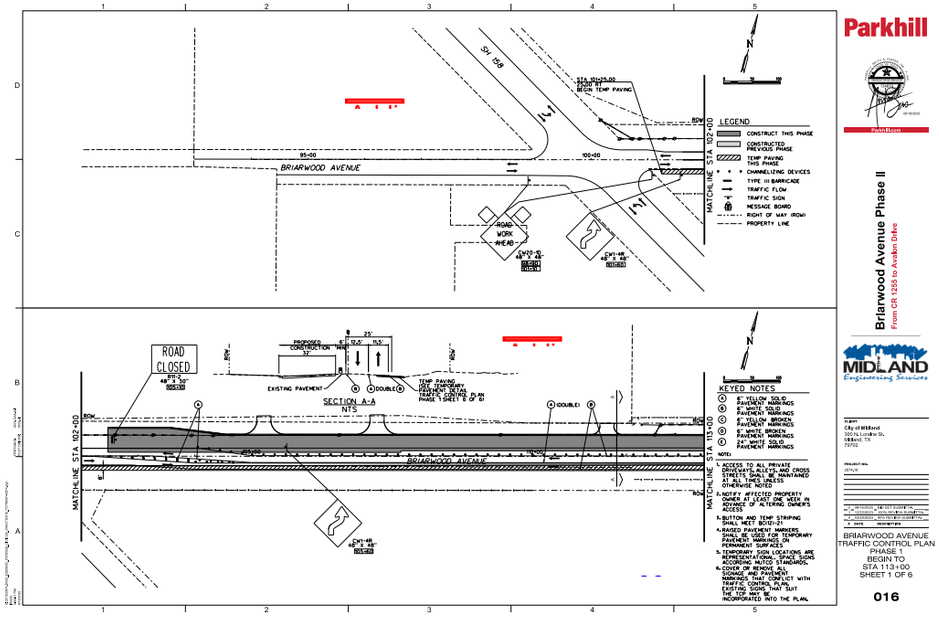
Briarwood Avenue Phase II

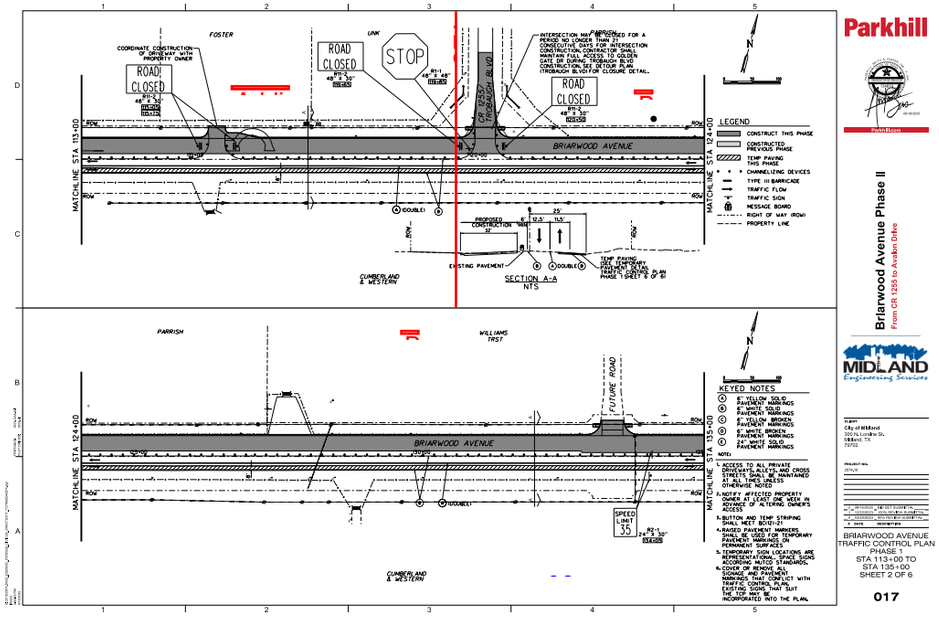
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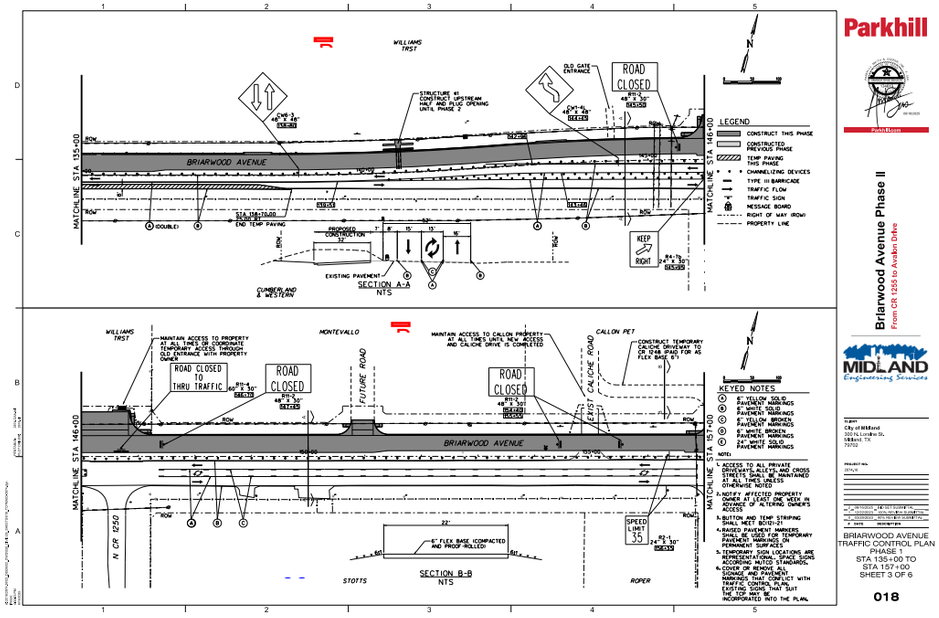
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BRIARWOOD AVENUE ADVANCED WARNING LAYOUT

015


SH 158
BRIARWOOD AVENUE
LEGEND
CONSTRUCT THIS PHASE
CONSTRUCTED PREVIOUS PHASE
TEMP PAVING THIS PHASE
CHANNELIZING DEVICES
TYPE III BARRICADE
TRAFFIC FLOW
TRAFFIC SIGN
MESSAGE BOARD
RIGHT OF WAY (ROW)
PROPERTY LINE
ROAD WORK AHEAD
ROAD CLOSED
SECTION A-A
NTS
EXISTING PAVEMENT
TEMP PAVING SEE TEMPORARY PAVEMENT MARKING TRAFFIC CONTROL PLAN PHASE 1 SHEET 6 OF 6
KEYED NOTES
6" YELLOW SOLID PAVEMENT MARKINGS
6" WHITE SOLID PAVEMENT MARKINGS
6" YELLOW BROKEN PAVEMENT MARKINGS
6" WHITE BROKEN PAVEMENT MARKINGS
24" WHITE SOLID PAVEMENT MARKINGS
NOTES:
1. ACCESS TO ALL PRIVATE DRIVEWAYS, ALLEYS, AND CROSS STREETS SHALL BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE NOTED
2. NOTIFY AFFECTED PROPERTY OWNER AT LEAST ONE WEEK IN ADVANCE OF ALTERING OWNER'S ACCESS
3. BUTTON AND TEMP STRIPING SHALL MEET BOYD-21
4. RAISED PAVEMENT MARKERS SHALL BE USED FOR TEMPORARY PAVEMENT MARKINGS ON PERMANENT SURFACES
5. TEMPORARY SIGN LOCATIONS ARE SUBJECT TO CHANGE DURING CONSTRUCTION ACCORDING TO FIELD CONDITIONS.
6. COVER OR REMOVE ALL CONFLICTING PAVEMENT MARKINGS AND PAVEMENT MARKERS IN CONFLICT WITH TRAFFIC CONTROL PLAN
7. EXISTING SIGNS THAT SUIT THE TCP WILL BE INCORPORATED INTO THE PLANS
MATCHLINE STA 102+00
MATCHLINE STA 113+00
STA 102+25.00 RIGHT BT BEGIN TEMP PAVING
95+00
100+00
105+00
110+00
115+00
ROW
PROPOSED CONSTRUCTION
EXISTING
DOUBLE
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BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 1
BEGIN TO
STA 113+00
SHEET 1 OF 6
016


FOSTER
LINK
PARRISH
WILLIAMS TRST
ROAD CLOSED
STOP
COORDINATE CONSTRUCTION OF DRIVEWAY WITH PROPERTY OWNER
CR 1255/ AVALON DRIVE
BLVD
BRIARWOOD AVENUE
FUTURE ROAD
MATCHLINE STA 113+00
MATCHLINE STA 124+00
MATCHLINE STA 135+00
ROW
LEGEND
CONSTRUCT THIS PHASE
CONSTRUCTED PREVIOUS PHASE
TEMP PAVING THIS PHASE
CHANNELIZING DEVICES
TYPE III BARRICADE
TRAFFIC FLOW
TRAFFIC SIGN
MESSAGE BOARD
RIGHT OF WAY (ROW)
PROPERTY LINE
DOUBLE
PROPOSED CONSTRUCTION TAPE
EXISTING PAVEMENT
TEMP PAVING SEE TYPICAL PAVEMENT DETAIL SHEET 5 OF 6 PHASE 1 SHEET 5 OF 6
SECTION A-A
NTS
CUMBERLAND & WESTERN
KEYED NOTES
6" YELLOW SOLID PAVEMENT MARKINGS
6" WHITE SOLID PAVEMENT MARKINGS
24" YELLOW SOLID PAVEMENT MARKINGS
6" WHITE BROKEN PAVEMENT MARKINGS
24" WHITE SOLID PAVEMENT MARKINGS
NOTES:
1. ACCESS TO ALL PRIVATE DRIVEWAYS, ALLEYS, AND CROSS STREETS SHALL BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE NOTED
2. NOTIFY AFFECTED PROPERTY OWNER AT LEAST ONE WEEK IN ADVANCE OF ALTERING OWNER'S ACCESS
3. BUTTON AND TEMP STRIPING SHALL MEET BOYD-21
4. RAISED PAVEMENT MARKERS SHALL BE USED FOR TEMPORARY PAVEMENT MARKINGS ON PERMANENT SURFACES
5. TEMPORARY SIGN LOCATIONS ARE SHOWN FOR REFERENCE ONLY, ADJUST ACCORDING TO MUTCD STANDARDS.
6. COVER OR REMOVE ALL CONFLICTING PAVEMENT MARKINGS AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL PLAN. EXISTING SIGNS THAT SUIT THE TCP WILL BE INCORPORATED INTO THE PLANS
SPEED LIMIT 35
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Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
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BRIARWOOD AVENUE TRAFFIC CONTROL PLAN PHASE 1
STA 113+00 TO STA 135+00
SHEET 2 OF 6
017



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Briarwood Avenue Phase II

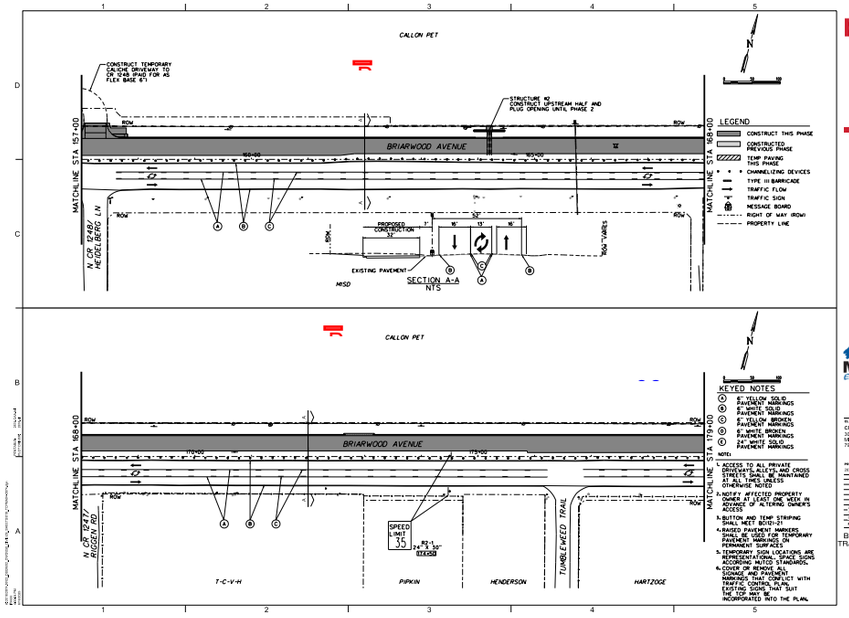
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BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 1
STA 135+00 TO
STA 157+00
SHEET 3 OF 6

018



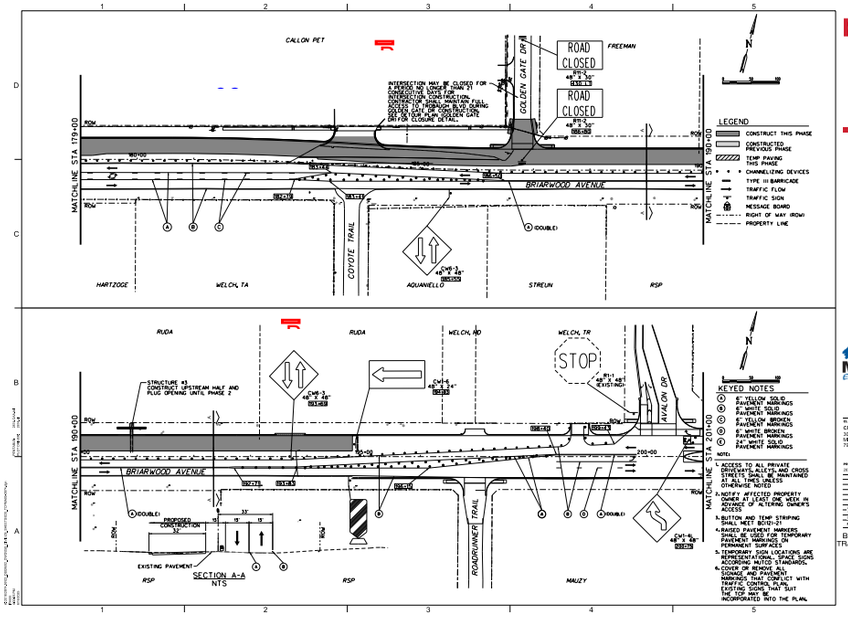
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From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 1
STA 157+00 TO
STA 179+00
SHEET 4 OF 6

019



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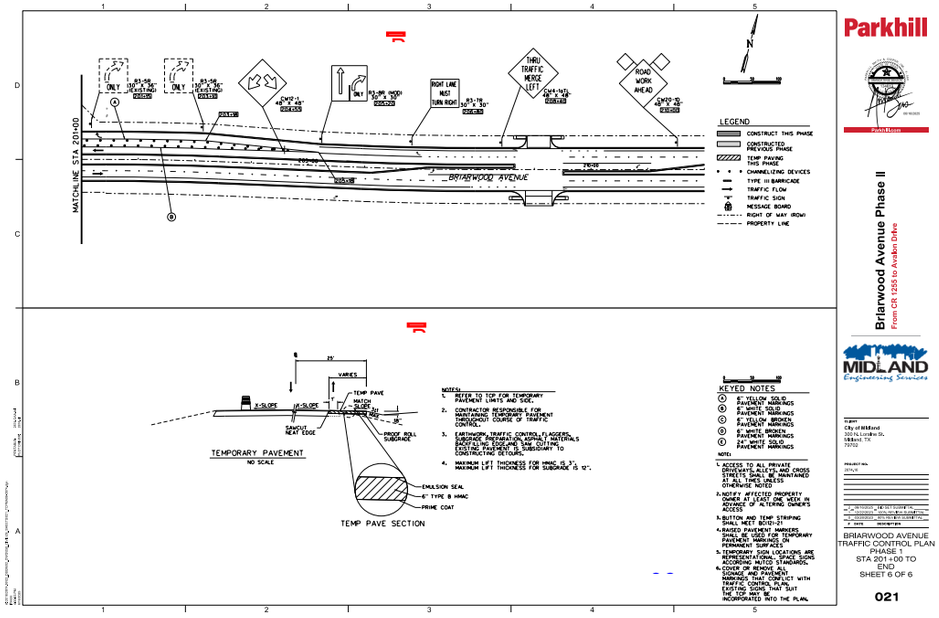
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BRIARWOOD AVENUE TRAFFIC CONTROL PLAN PHASE 1 STA 179+00 TO STA 201+00 SHEET 5 OF 6

020



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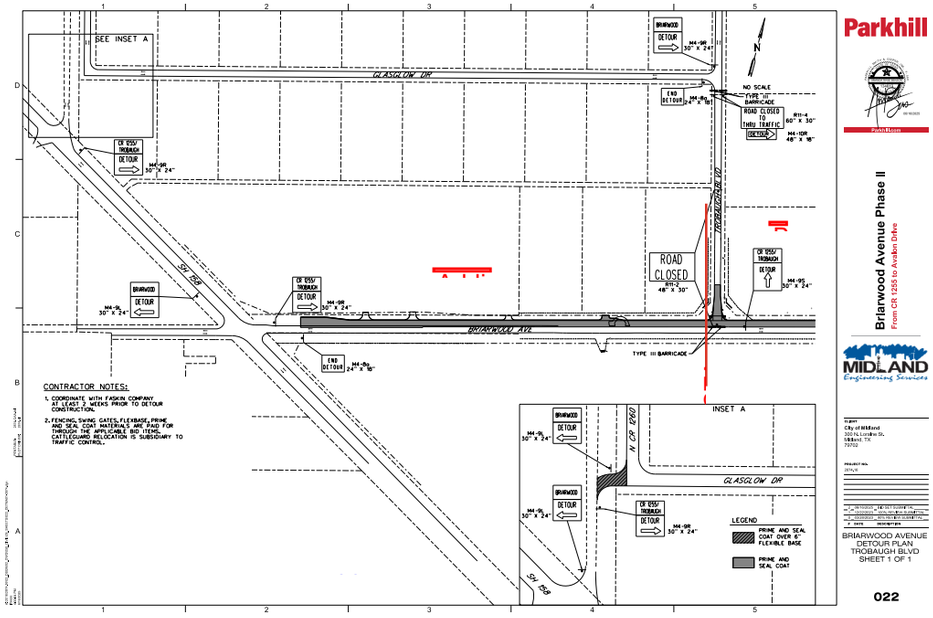
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

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BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 1
STA 201+00 TO
END
SHEET 6 OF 6

021



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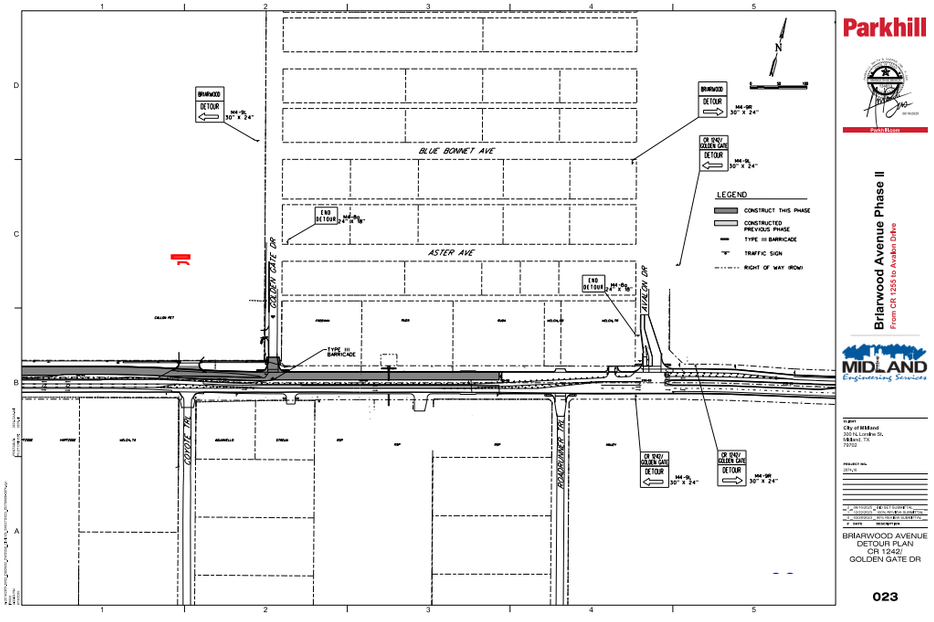
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From CR 1250 to Avalon Drive

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BRIARWOOD AVENUE
DETOUR PLAN
TROBAUGH BLVD
SHEET 1 OF 1

022



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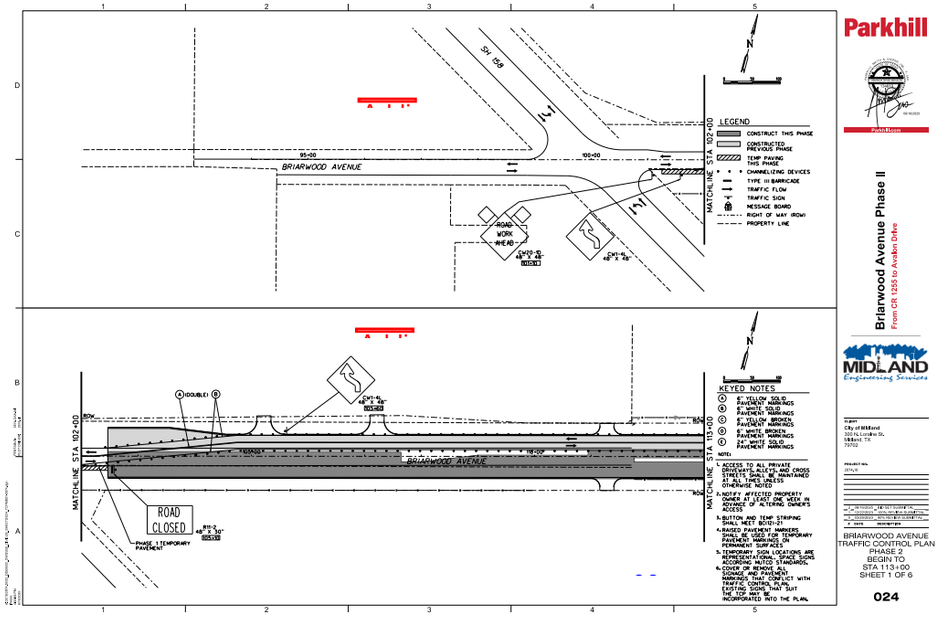
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From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
DETOUR PLAN
OR 1242/
GOLDEN GATE DR

023



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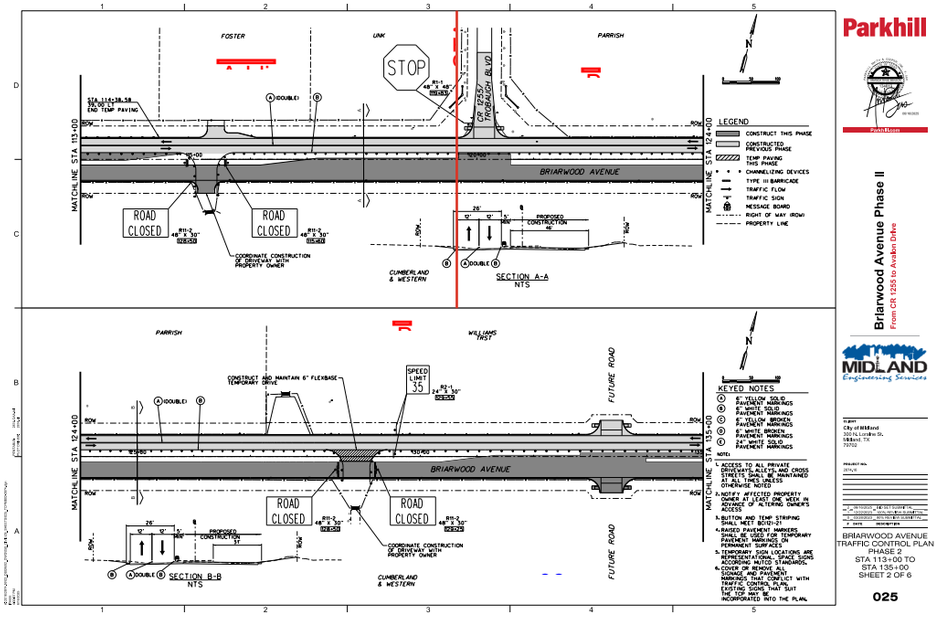
Briarwood Avenue Phase II

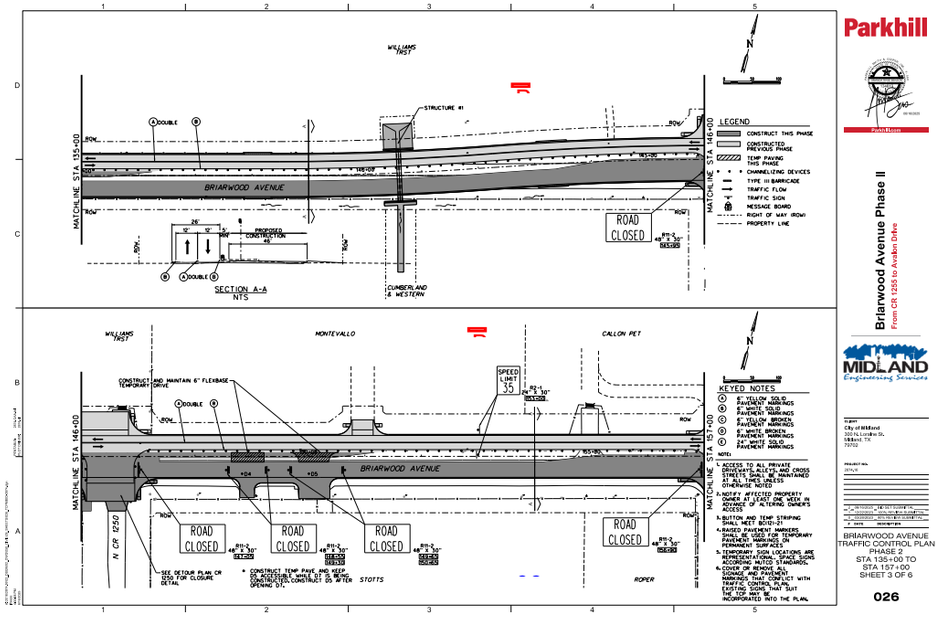
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 2
BEGIN TO
STA 113+00
SHEET 1 OF 6

024


FOSTER
UNK
PARRISH
STOP
CR 1255/ AVALON DR
BRIARWOOD AVENUE
ROAD CLOSED
ROAD CLOSED
COORDINATE CONSTRUCTION OF DRIVEWAY WITH PROPERTY OWNER
CUMBERLAND & WESTERN
SECTION A-A
NTS
MATCHLINE STA 113+00
MATCHLINE STA 124+00
LEGEND
CONSTRUCT THIS PHASE
CONSTRUCTED PREVIOUS PHASE
TEMP PAVING THIS PHASE
CHANNELIZING DEVICES
TYPE III BARRICADE
TRAFFIC FLOW
TRAFFIC SIGN
MESSAGE BOARD
RIGHT OF WAY (ROW)
PROPERTY LINE
PARRISH
WILLIAMS FIRST
CONSTRUCT AND MAINTAIN 6" FLEXBASE TEMPORARY DRIVE
SPEED LIMIT 35
FUTURE ROAD
FUTURE ROAD
BRIARWOOD AVENUE
ROAD CLOSED
ROAD CLOSED
COORDINATE CONSTRUCTION OF DRIVEWAY WITH PROPERTY OWNER
CUMBERLAND & WESTERN
SECTION B-B
NTS
MATCHLINE STA 124+00
MATCHLINE STA 135+00
KEYED NOTES
NOTES:
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 2
STA 113+00 TO
STA 135+00
SHEET 2 OF 6
025



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

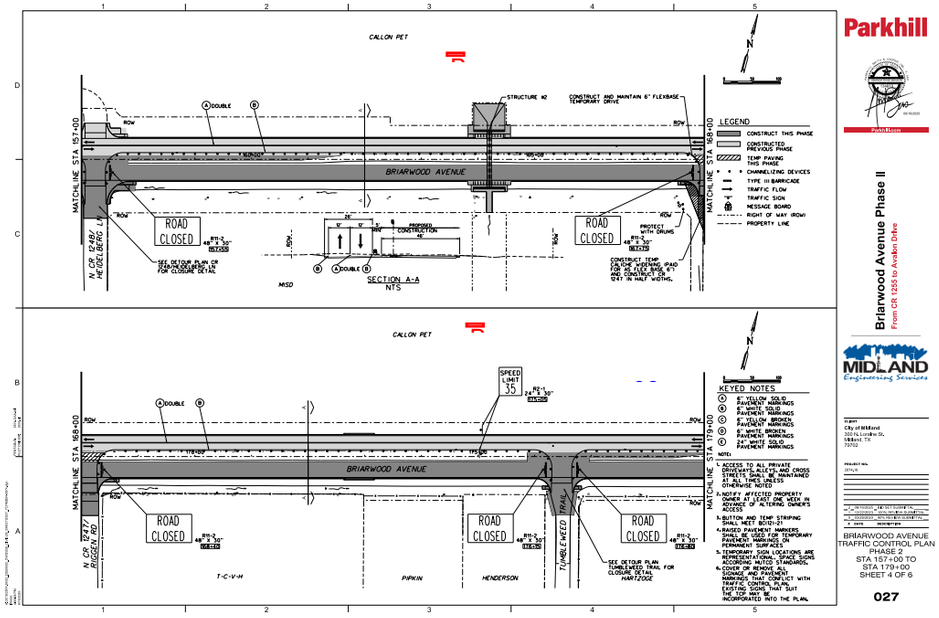
client
City of Midland
300 N. Loraine St.
Midland, TX
79702

project no.
DESIGN

DRAWN
CHECKED
DATE
DESCRIPTION

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 2
STA 135+00 TO
STA 157+00
SHEET 3 OF 6

026



Parkhill

John Rees

Briarwood Avenue Phase II

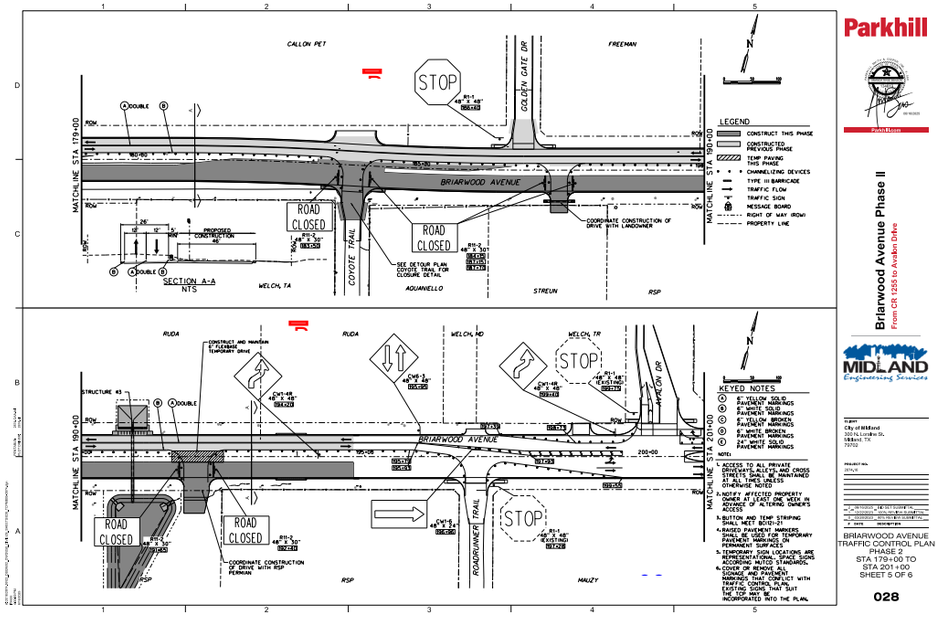
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 2
STA 157+00 TO
STA 179+00
SHEET 4 OF 6

027



Parkhill

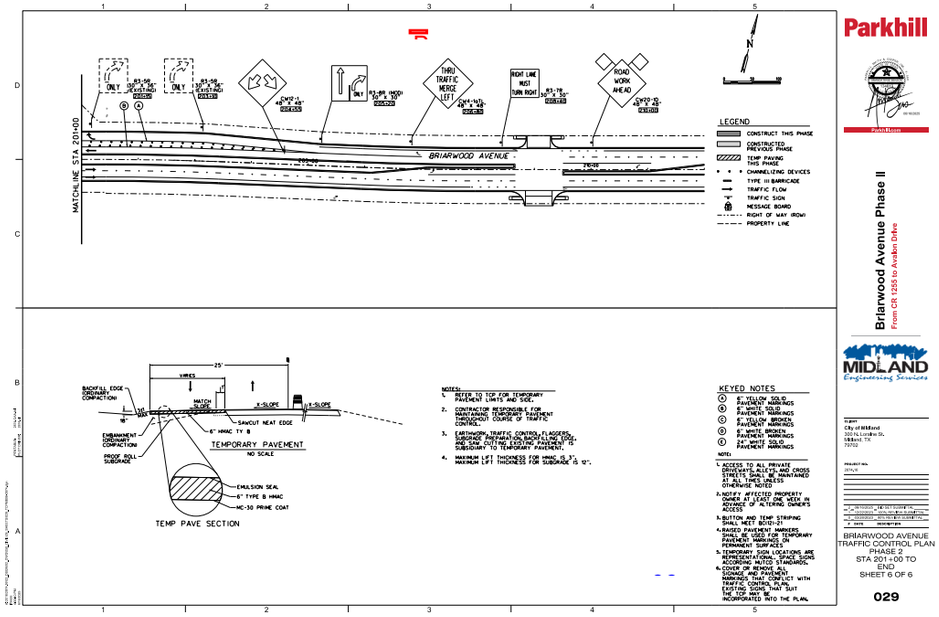
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE TRAFFIC CONTROL PLAN PHASE 2 STA 179+00 TO STA 201+00 SHEET 5 OF 6

028



Parkhill

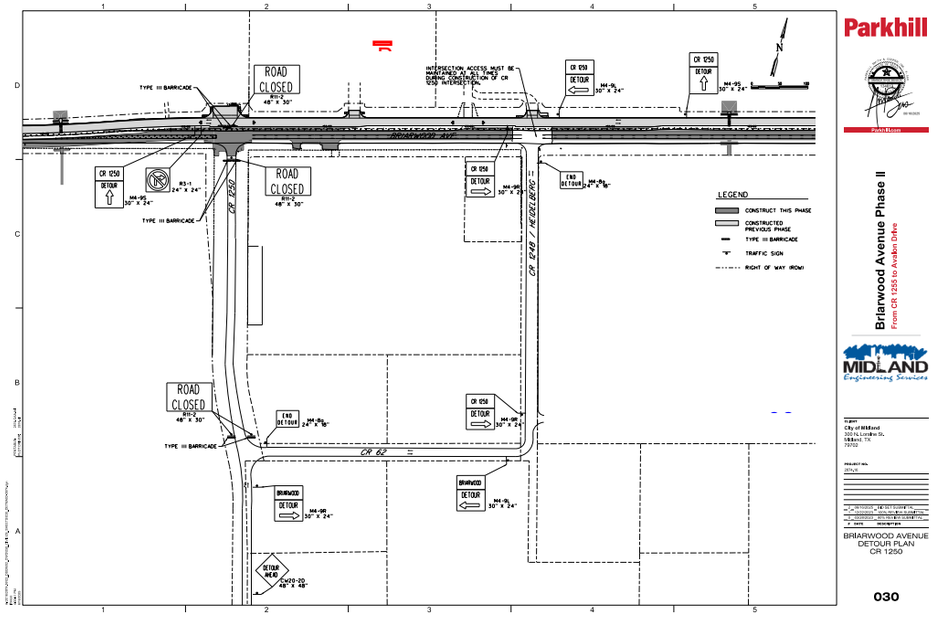
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE TRAFFIC CONTROL PLAN PHASE 2 STA 201+00 TO END SHEET 6 OF 6

029



Parkhill

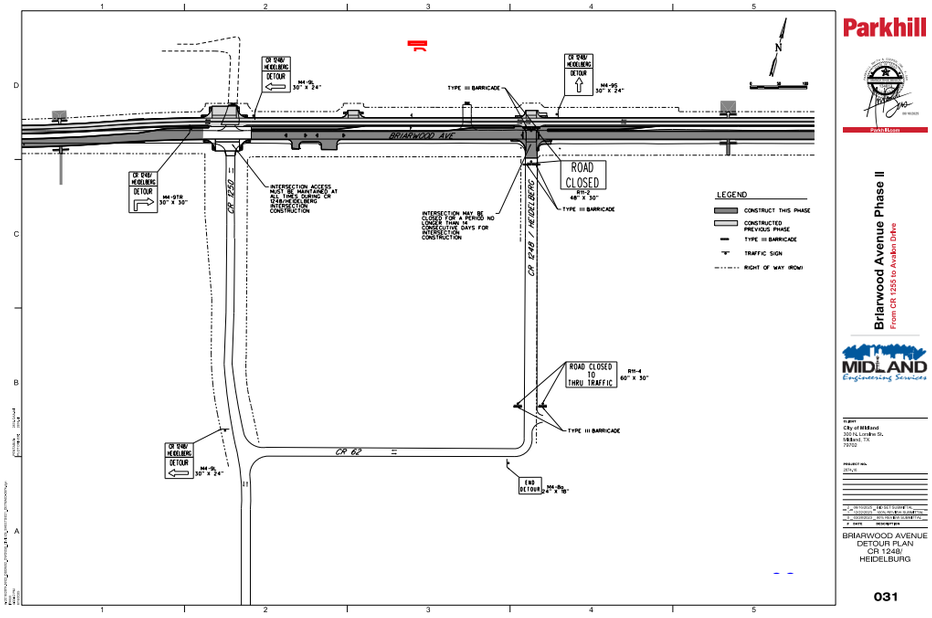
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DETOUR PLAN
CR 1250

030



Parkhill

John Rowe

Briarwood Avenue Phase II

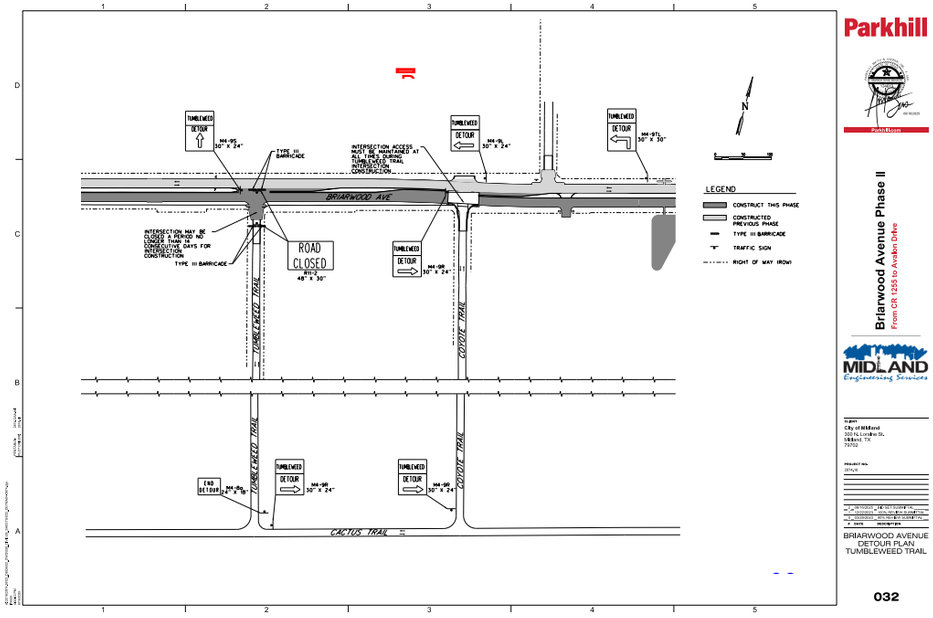
From CR 1325 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
DETOUR PLAN
CR 1240/
HEIDELBURG

031



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

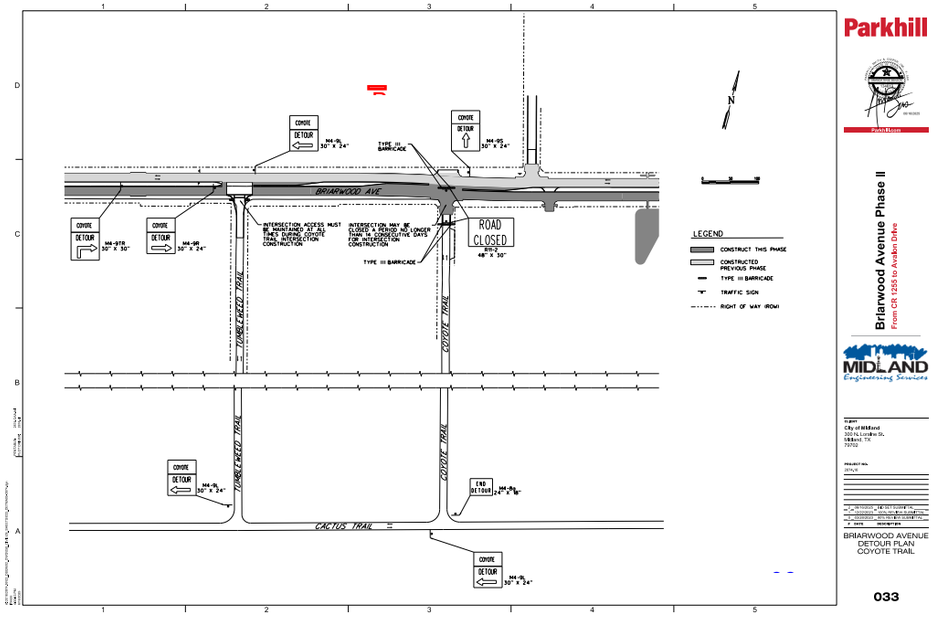
Client
City of Midland
300 N. Loraine St.
Midland, TX
79701

Project No.
067619

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
DETOUR PLAN
TUMBLEWEED TRAIL

032



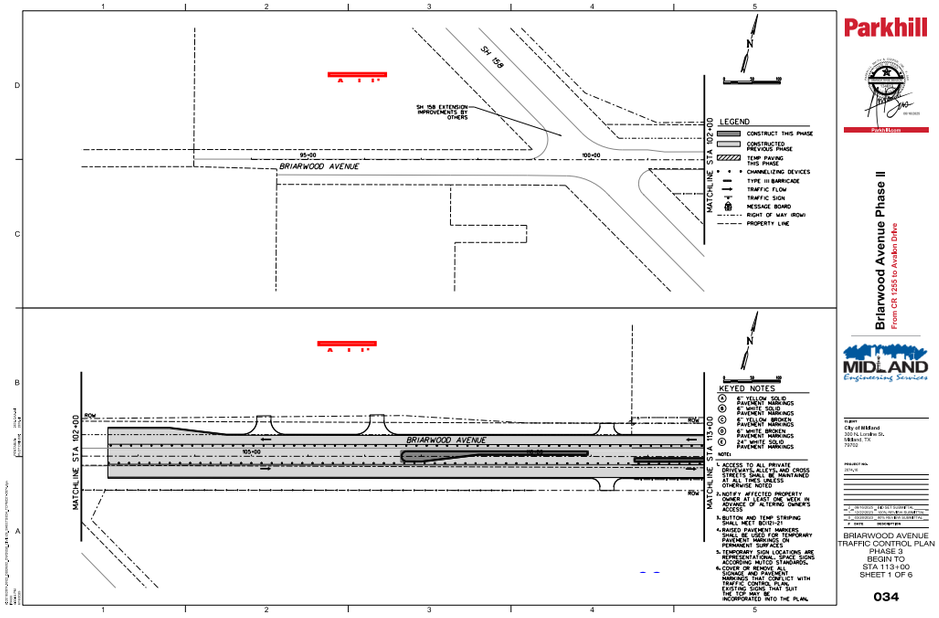
Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DETOUR PLAN
COYOTE TRAIL

033



Parkhill

Briarwood Avenue Phase II

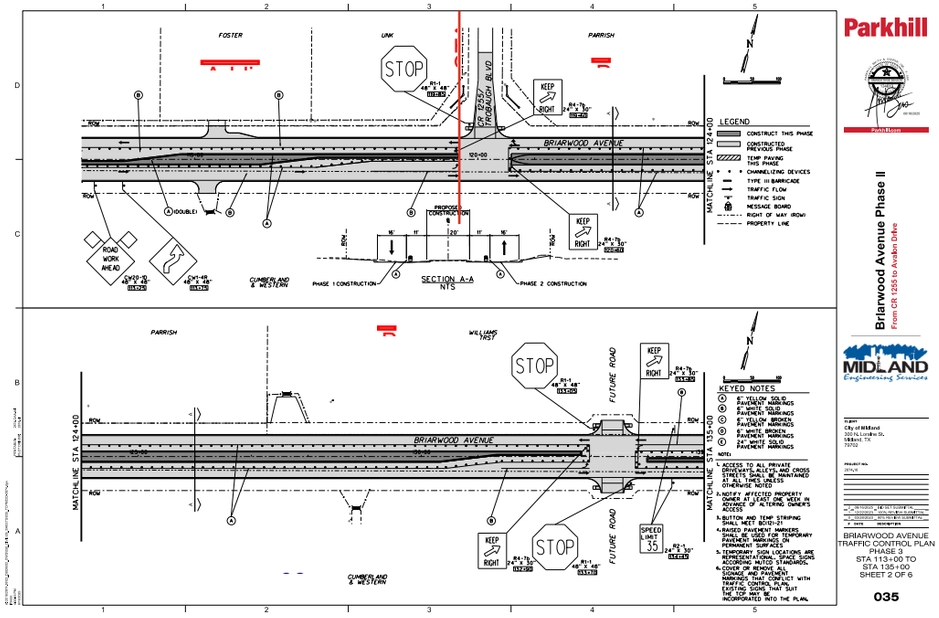
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

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300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
BEGIN TO
STA 113+00
SHEET 1 OF 6

034



Parkhill

Briarwood Avenue Phase II

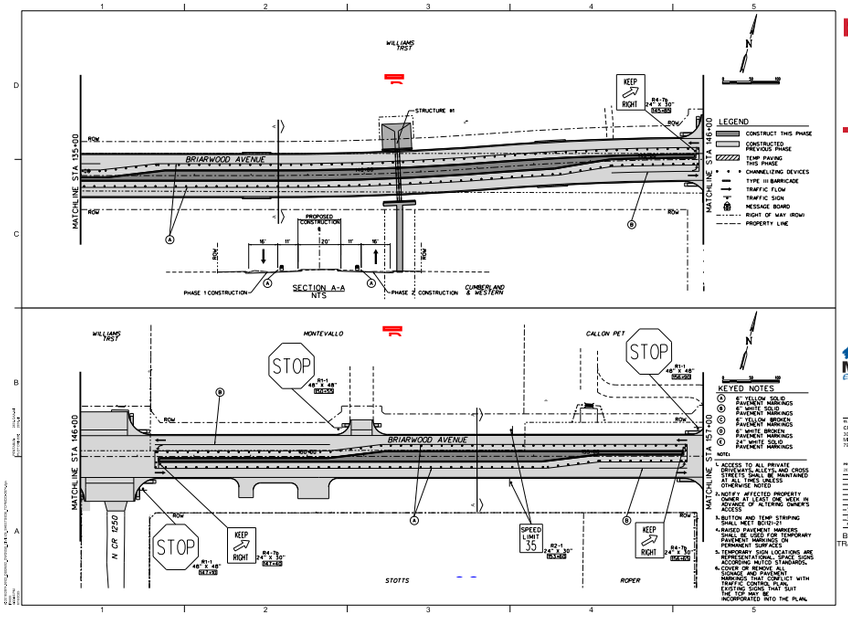
From CR 1250 to Avalon Drive

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client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 113+00 TO
STA 135+00
SHEET 2 OF 6

035



Parkhill

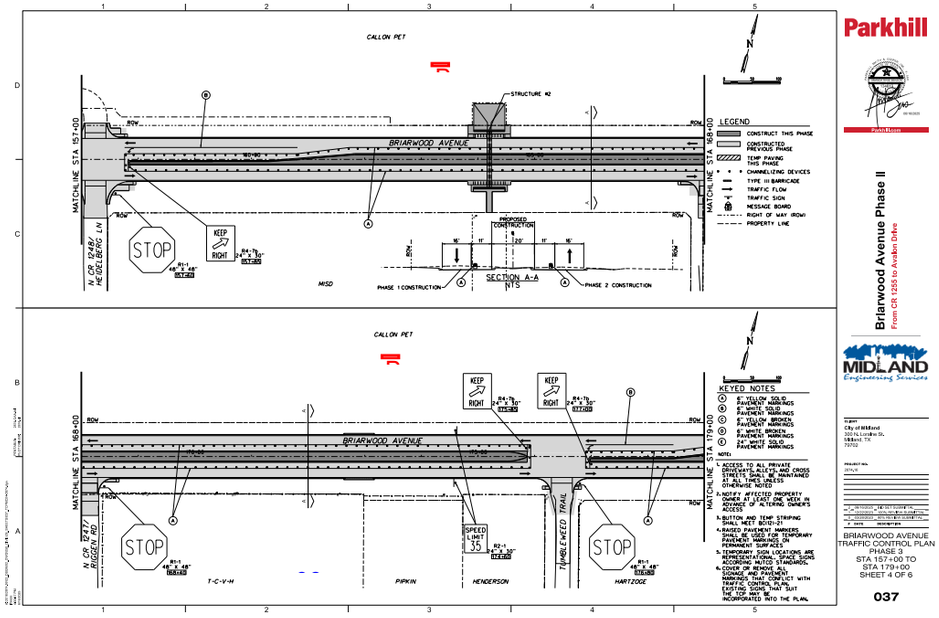
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 135+00 TO
STA 157+00
SHEET 3 OF 6

036



Parkhill

John Rowe

Briarwood Avenue Phase II

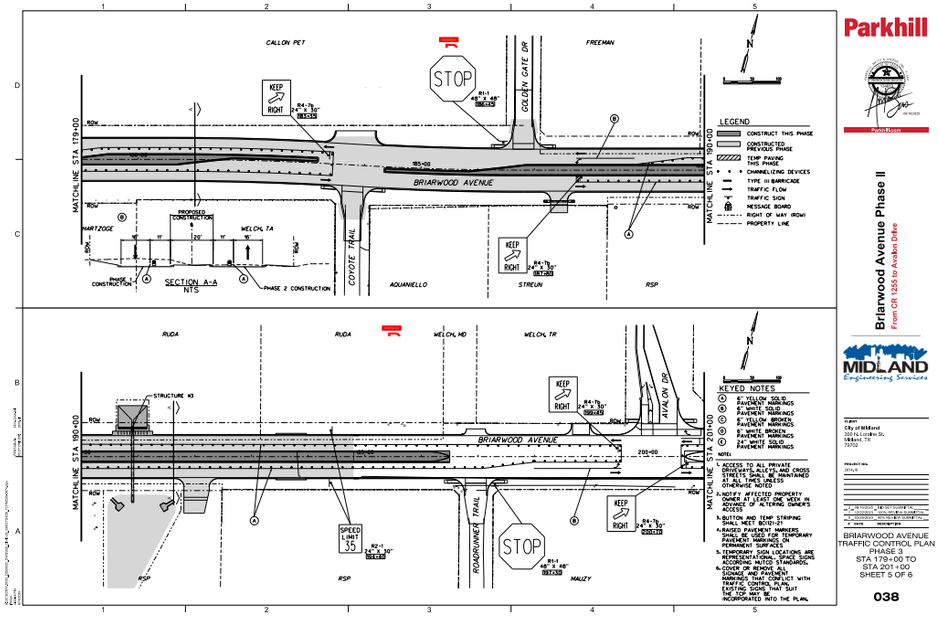
From CR 1255 to Avalon Drive

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Midland, TX
79702

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 157+00 TO
STA 179+00
SHEET 4 OF 6

037



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

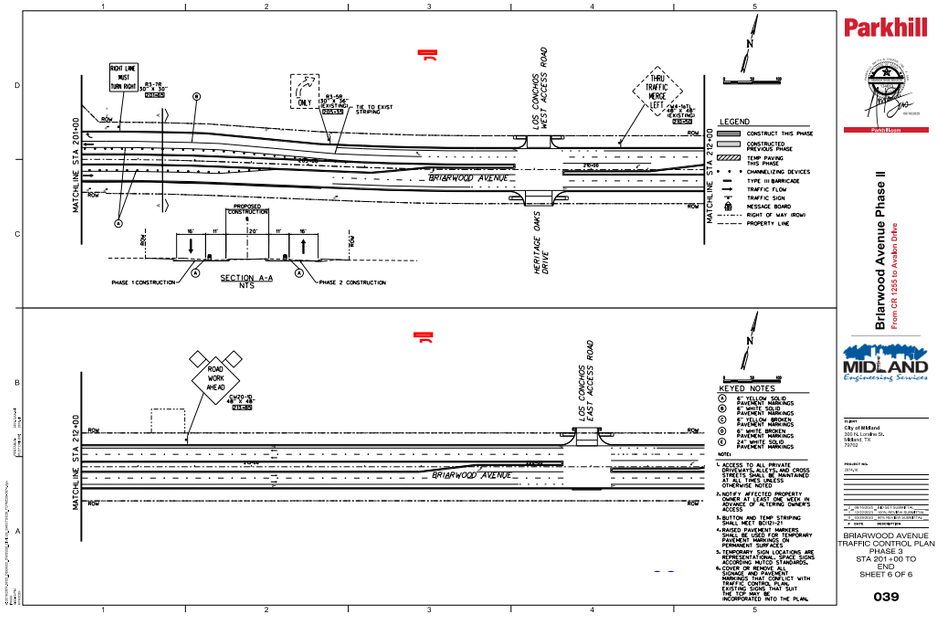
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NO.	DATE	DESCRIPTION

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 179+00 TO
STA 201+00
SHEET 5 OF 6

038



Parkhill

John Rowe

Briarwood Avenue Phase II

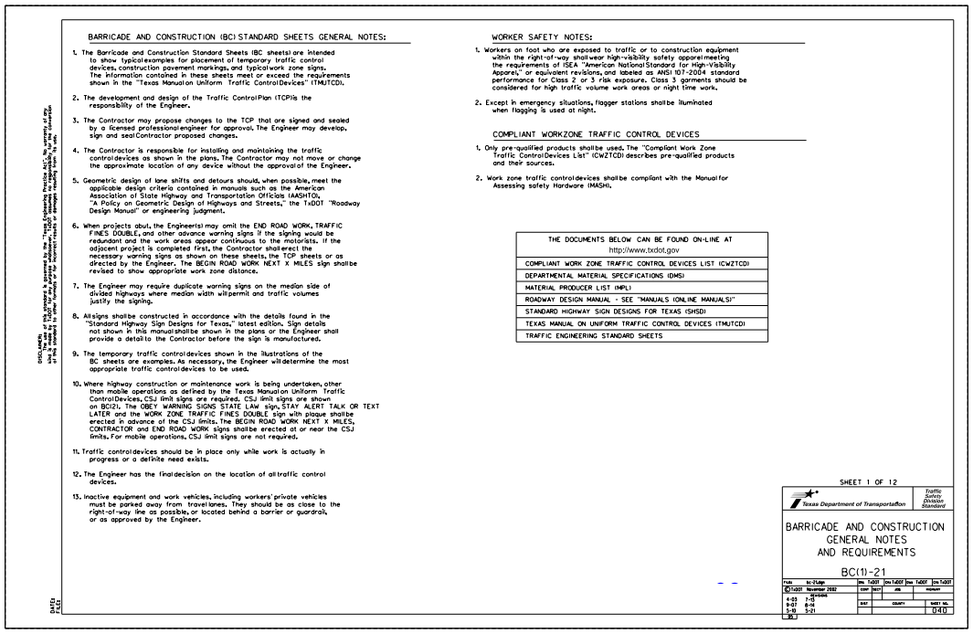
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BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 201+00 TO
END
SHEET 6 OF 6

039



BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.

2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.

2. Work zone traffic control devices shall be compliant with the Manual for Assessing Safety Hardware (MASH).

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

SHEET 1 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

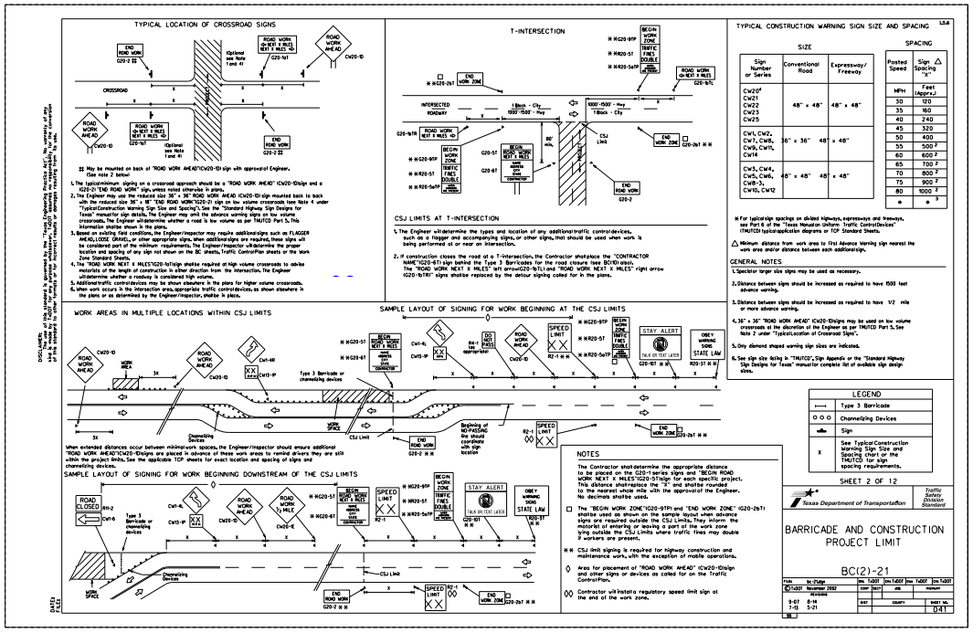
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 6-14 5-10 5-21	DIST	COUNTY		SHEET NO. 0410

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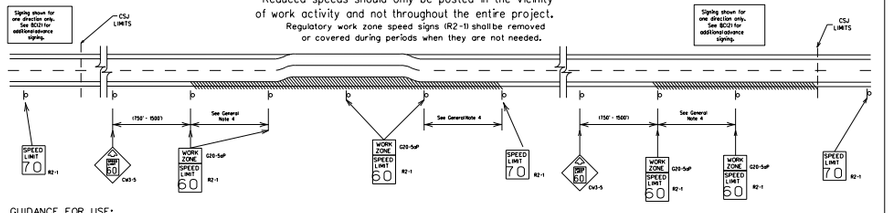
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TYPICAL LOCATION OF CROSSROAD SIGNS
T-INTERSECTION
TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING
CSJ LIMITS AT T-INTERSECTION
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS
SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS
SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS
GENERAL NOTES
NOTES
LEGEND
BARRICADE AND CONSTRUCTION PROJECT LIMIT
BC(2)-21
SHEET 2 OF 12

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.
Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic controlplans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:
- a) rough road or damaged pavement surface
- b) substantial alteration of roadway geometrics (diversions)
- c) construction detours
- d) grade
- e) width
- f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic controlplans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.
(See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed controls of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   - 40 mph and greater — 0.2 to 2 miles
   - 35 mph and less — 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the "ADVANCE SPEED LIMIT" (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   - A. Law enforcement.
   - B. Flagger stationed next to sign.
   - C. Portable changeable message sign (PCMS).
   - D. Low-power (drone)-radar transmitter.
   - E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #2014 in the TxDOT e-form system.

SHEET 3 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

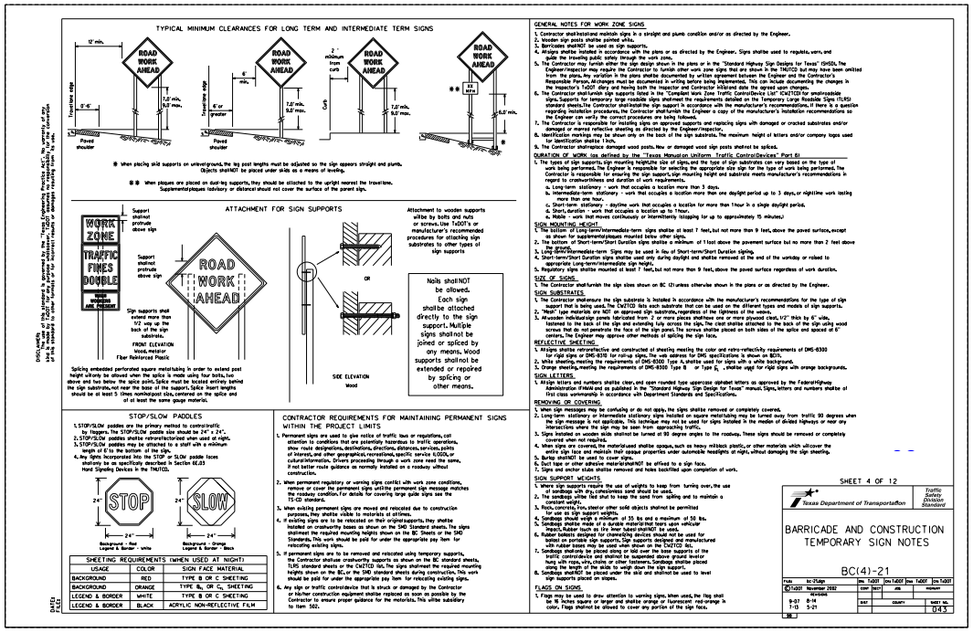
BARRICADE AND CONSTRUCTION
WORK ZONE SPEED LIMIT

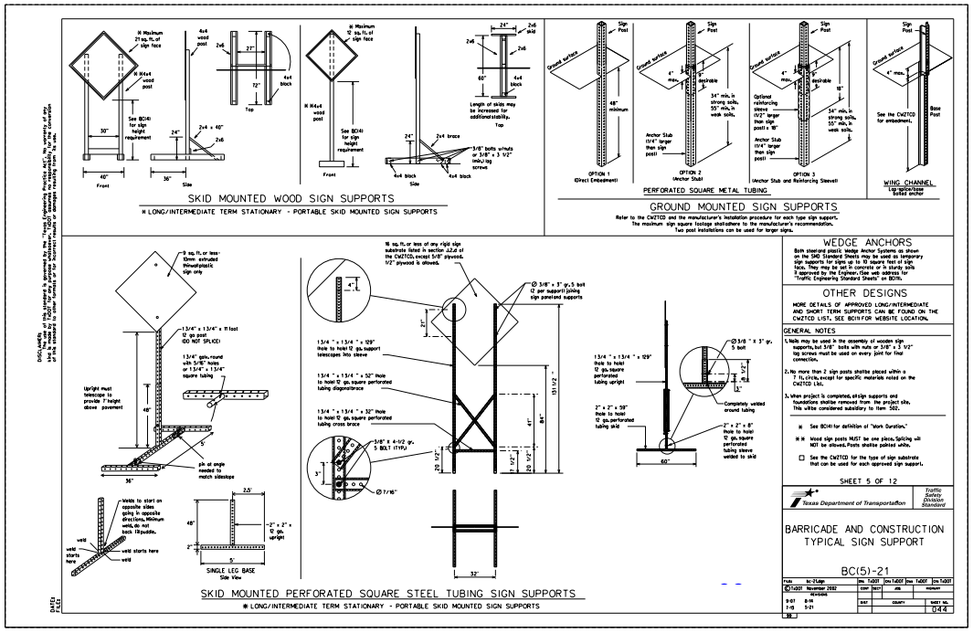
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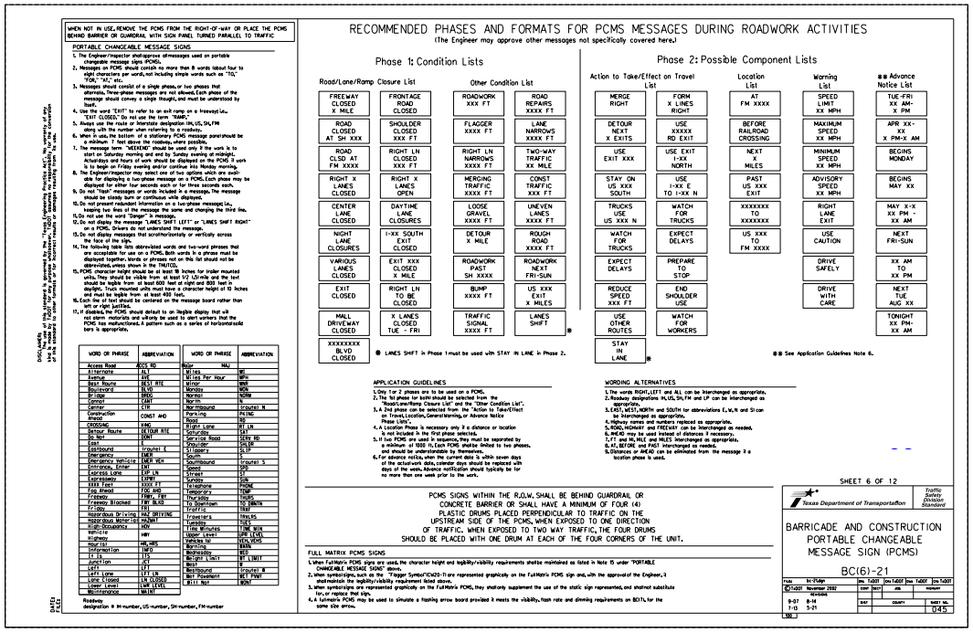
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©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS					
9-07	8-14				
7-13	5-21	DIST	COUNTY		SHEET NO.
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DATES CE(2)


TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS
ROAD WORK AHEAD
12' min.
6'-6"
7.0' min. 6.0' min.
Traveled way
Paved shoulder
6' or greater
2' minimum from curb
Curb
** 12' MAX
* When placing skid supports on unleveled ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shallNOT be placed under skids as a means of leveling.
** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travelway. Supplementaryplaques (advisory or distance) should not cover the surface of the parent sign.
ATTACHMENT FOR SIGN SUPPORTS
WORK ZONE TRAFFIC FINES DOUBLE WHEN WORKERS ARE PRESENT
Support shallnot protrude above sign
Support shallnot protrude above sign
Sign supports shall extend more than 1/2 way up the back of the sign substrate.
FRONT ELEVATION
Wood, metalor Fiber Reinforced Plastic
Splicing embedded perforated square metalshallg in order to extend post height allmay be allowed when the splice is made using four bolts,two above and two below the splice point.Splice must be located entirely behind the sign substrate,not near the base of the support.Splice insert lengths should be at least 5 times nominalpost size,centered on the splice and of at least the same gauge material.
OR
SIDE ELEVATION
Wood
Attachment to wooden supports willbe by bolts and nuts or screws.Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports
Nails shallNOT be allowed. Each sign shallbe attached directly to the sign support. Multiple signs shallnot be joined or spliced by any means. Wood supports shallnot be extended or repaired by splicing or other means.
STOP/SLOW PADDLES
1.STOP/SLOW paddles are the primary method to controltraffic by flaggers.The STOP/SLOW paddle size should be 24" x 24".
2.STOP/SLOW paddles shallbe retroreflectorized when used at night.
3.STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
4.Any Signs Incorporated into the STOP or SLOW paddle faces shallonly be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTD.
STOP
SLOW
24"
24"
Background = Red Legend & Border= White
Background = Orange Legend & Border= Black
SHEETING REQUIREMENTS (WHEN USED AT NIGHT)
USAGE | COLOR | SIGN FACE MATERIAL
BACKGROUND | RED | TYPE B OR C SHEETING
BACKGROUND | ORANGE | TYPE B, OR C, SHEETING
LEGEND & BORDER | WHITE | TYPE B OR C SHEETING
LEGEND & BORDER | BLACK | ACRYLIC NON-REFLECTIVE FILM
CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS
1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest,and other geographical,recreational,specific service GUIDE,or cultural activities. Drivers processing through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition.For details for covering large guide signs see the TS-CD standard.
3. When existing permanent signs are moved and relocated due to construction purposes,they shallbe visible to motorists at all times.
4. If existing signs are to be relocated on their originalsupports, they shallbe installed on crashworthy bases as shown on the SMD Standard sheets. The signs shallmeet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shalluse crashworthy supports as shown on the BC standard sheets, MUTCD sheets, or the SMD standards. The signs shallmeet the required mounting heights shown in the BC or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic controldevice that is struck or damaged by the Contractor's or other construction equipment shallbe replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This willbe subsidiary to Item 502.
GENERAL NOTES FOR WORK ZONE SIGNS
1. Contractor shallinstalland maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shallbe painted white.
3. Barricades shallNOT be used as sign supports.
4. All signs shallbe installed in accordance with the plans or as directed by the Engineer. Signs shallbe used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish their own sign layout that as shown in the TMUTCD but may have been omitted from the SHSD. Any sign design not specifically documented by written agreement between the Engineer and the Contractor's Responsible Person, Attorneys must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor Initialand date the agreed upon changes.
6. The Contractor shallfurnish sign supports listed in the "Compliant Work Zone Traffic ControlDevice List" (CWZTCD) for unattendable signs. Supports for temporary large mountable signs shallmeet the requirements detailed on the Temporary Large Mountable Signs (TLMS) standard sheets.The Contractor shallinstallthe sign supports in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures,the Contractor shallprovide the Engineer a copy of the manufacturer's installation recommendations so that the Engineer can verify that the signs are being installed correctly.
7. It is the Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shallbe 1 inch.
9. The Contractor shallreplace damaged wood posts. New or damaged wood sign posts shallnot be spliced.
DURATION OF WORK (as defined by the "Texas Manualon Uniform Traffic ControlDevices" Part 6):
1. The types of sign supports,sign mounting heights,the size of signs,and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring that the sign supports,mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
a. Long-term stationary - work that occupies a location more than 3 days.
b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days,or nighttime work lasting more than one hour.
c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
d. Short duration - work that occupies a location up to 1 hour.
e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes)
SIGN MOUNTING HEIGHT:
1. The bottom of Long-termIntermediate-term signs shallbe at least 7 feet,but not more than 9 feet, above the paved surface,except as shown for Long-termIntermediate-term plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shallbe a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-termIntermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shallbe removed during daylight and shallbe removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shallbe mounted at least 7 feet,but not more than 9 feet,above the paved surface regardless of work duration.
SIZE OF SIGNS:
1. The Contractor shallfurnish the sign sizes shown on BC (1)unless otherwise shown in the plans or as directed by the Engineer.
SIGN SUBSTRATES
1. The Contractor shallensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used.The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Weak" type materials are NOT an approved sign substrate,regardless of the tightness of the wires.
3. All wooden individualsign panels fabricated from 2 or more pieces shallhave one or more plywood cleat,1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign,The cleat shallbe attached to the back of the sign using wood screws that do not penetrate the face of the sign panel.The screws shallbe placed on both sides of the splice and spaced at 6" centers.The Engineer may approve other methods of splicing the sign face.
REFLECTIVE SHEETING:
1. All signs shallbe retroreflective and conspicuous at nightby means of sheeting meeting the color and retroreflectivity requirements of DMS-8300 Type B or Type C sheeting.The minimum sheeting requirements for various applications is shown on BC(1).
2. White sheeting meeting the requirements of DMS-8300 Type A shallbe used for signs with a white background.
3. Orange sheeting,meeting the requirements of DMS-8300 Type B or Type C, shallbe used for rigid signs with orange backgrounds.
SIGN LETTERS:
1. All sign letters and numbers shallbe clear,and open rounded type uppercase alphabet letters as approved by the FederalHighway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs,letters and numbers shallbe of first class workmanship in accordance with Department Standards and Specifications.
REMOVING OR COVERING
1. When sign messages may be confusing or do not apply, the signs shallbe removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metalshallmay be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shallnot be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not applicable.
4. When signs are covered, the materialused shallbe opaque, such as heavy mildew plastic,or other materials which willcover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shallNOT be used to cover signs.
6. Duct tape or other adhesive materialshallNOT be affixed to a sign face.
7. Signs and anchor holes shallbe removed and holes backfilled upon completion of work.
SIGN SUPPORT WEIGHTS
1. Where sign supports require the use of weights to keep from turning over,the use of sandbags with dry,cohesionless sand should be used.
2. The sandbags shallbe tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock,concrete,iron,steelor other solid objects shallnot be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 25 lbs and a maximum of 50 lbs.
5. Sandbags shallbe made of a tough,durable fabric such as burlap or canvas. Paper,Rubber bags or other fabrics shallNOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports.Sign supports designed and manufactured with rubber bases may be used when shown on the SMD standards.
7. Sandbags shallbe placed on the skid and shallbe tied shut.Straps of the traffic controldevice and shallnot be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shallbe placed using the length of the skids to weigh down the sign support.
8. Sandbags shallnot be placed under the skid and shallnot be used to level sign supports placed on slopes.
FLAGS ON SIGNS
1. Flags may be used to draw attention to warning signs, when used, the flag shall be 16 inches square or larger and shallbe orange or fluorescent red-orange in color. Flags shallnot be allowed to cover any portion of the sign face.
SHEET 4 OF 12
Texas Department of Transportation
Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES
BC(4)-21
FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT
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9-02 7-13 | DIST | COUNTY | SHEET NO.
7-13 5-21 | 043
DATE/ FILE:
DISCLAIMER: The standards shown on this sheet are for use on projects let by the Texas Department of Transportation (TxDOT). The use of these standards on non-TxDOT projects is the responsibility of the user. TxDOT assumes no responsibility for the misuse of these standards on non-TxDOT projects.


SKID MOUNTED WOOD SIGN SUPPORTS
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS
PERFORATED SQUARE METAL TUBING
GROUND MOUNTED SIGN SUPPORTS
WING CHANNEL
WEDGE ANCHORS
OTHER DESIGNS
GENERAL NOTES
SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS
SINGLE LEG BASE
Side View
SHEET 5 OF 12
Texas Department of Transportation
Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT
BC(5)-21



WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/inspector shall approve all messages used on portable changeable message signs (PCMS).
2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
4. Do not use "EXIT" to refer to an exit ramp on a freeway/ex... "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM ... along with the number when referring to a roadway.
6. When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Otherwise, the days of the week should be specified. "FRI-SUN" is to begin on Friday evening and/or continue thru Monday morning.
8. The Engineer/inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. Do not present redundant information on a two-phase message (i.e., keeping two lines of the message the same and changing the third line, such as "LANE CLOSED AHEAD" and "USE CAUTION").
11. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
12. Do not display messages that scroll vertically or vertically across the face of the sign.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the applicable MUTCD.
15. Characters displayed on a PCMS must be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 US-mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
16. Care must be exercised to centered on the message board rather than left or right justified.
17. If desired, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solidus (/) bars is appropriate.

WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Near	NR
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Be Prepared To	BE PREP TO	Minute	MIN
Boulevard	BLVD	Minutes	MINS
Bridge	BRDG	Normal	NORM
Cannot	CANT	North	N
Center	CTR	Northbound	Situation N
Construction	CONST AHD	Parking	PKING
Ahead		Road	RD
Crossing	XING	Right Lane	RT LN
Detour Route	DETOUR RTE	Saturday	SAT
Do Not	DONT	Service Road	SERV RD
Exit	X	Shoulder	SHLDR
Eastbound	Situation E	Slippery	SLIP
Emergency	EMER	South	S
Emergency Vehicle	EMER VEH	Southbound	Situation S
Entrance, Enter	ENT	Speed	SPD
Express Lane	EXP LN	Street	ST
Expressway	EXPWY	Sunday	SUN
XXXX Feet	XXXX FT	Telephone	PHONE
Fog Ahead	FOG AHD	Temporary	TEMP
Freeway	FWY	Thursday	THURS
Freeway Blocked	FWY BLKD	To Downtown	TO DWNTN
Friday	FRI	Today	TDAY
Hazardous Driving	HAZ DRIVING	Tomorrow	TMRW
Hazardous Material	HAZMAT	Traffic	TRFC
High Occupancy	HOV	Traffic Signals	TRFC SIGS
Vehicle		Tuesday	TUES
Highway	HWY	Upper Level	UPR LEVEL
Hour		Vehicles	VEHS
Information	INFO	Warning	WARN
I-XX	IXX	Wednesday	WED
Junction	JCT	Weight Limit	WT LIMIT
Left	LFT	West	W
Left Lane	LFT LN	Westbound	Situation W
Lane Closed	LN CLOSED	Wet Pavement	WET PVMT
Lower Level	LWR LEVEL	Will Not	WONT
Maintenance	MAINT		

Roadway designation: # = number, US = number, SH = number, FM = number

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
RIGHT X LANES CLOSED	RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
CENTER LANE CLOSED	DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
EXIT CLOSED	RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT *
XXXXXXXX BLVD CLOSED			

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List	Location List	Warning List	** Advance Notice List
MERGE RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM- X PM
DETOUR NEXT X EXITS	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX X PM-X AM
USE EXIT XXX	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	XXXXXXX TO XXXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS		DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT		DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES			TONIGHT XX PM- XX AM
STAY IN LANE *			

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only Tier 2 phases are to be used on a PCMS.
2. A Tier 2 phase can be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location phase is necessary only if a distance or location is involved in the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS phase limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Abbreviations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH for abbreviations E, W, N and S can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AM, PM may be used instead of distances if necessary.
7. MILE, MILES, FEET and FT can be interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC, WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When FullMatrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Trigger Symbol" (D620-T) are represented graphically on the FullMatrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the FullMatrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for the static sign.
4. A FullMatrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by the Texas Department of Transportation for any purpose whatsoever. The Texas Department of Transportation assumes no responsibility for the incorrect results or damages resulting from its use.

DATES / FILE:

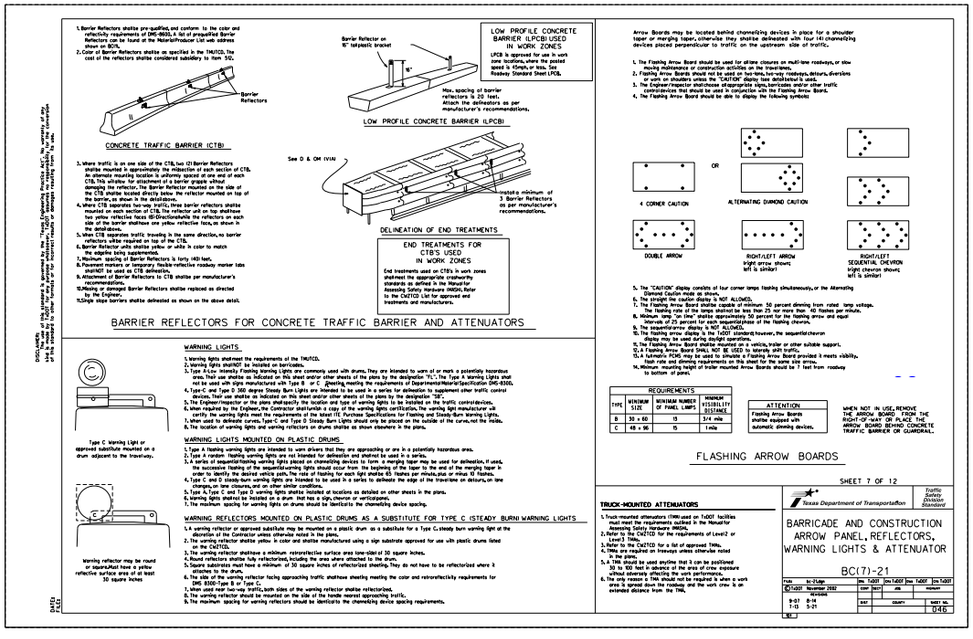
SHEET 6 OF 12

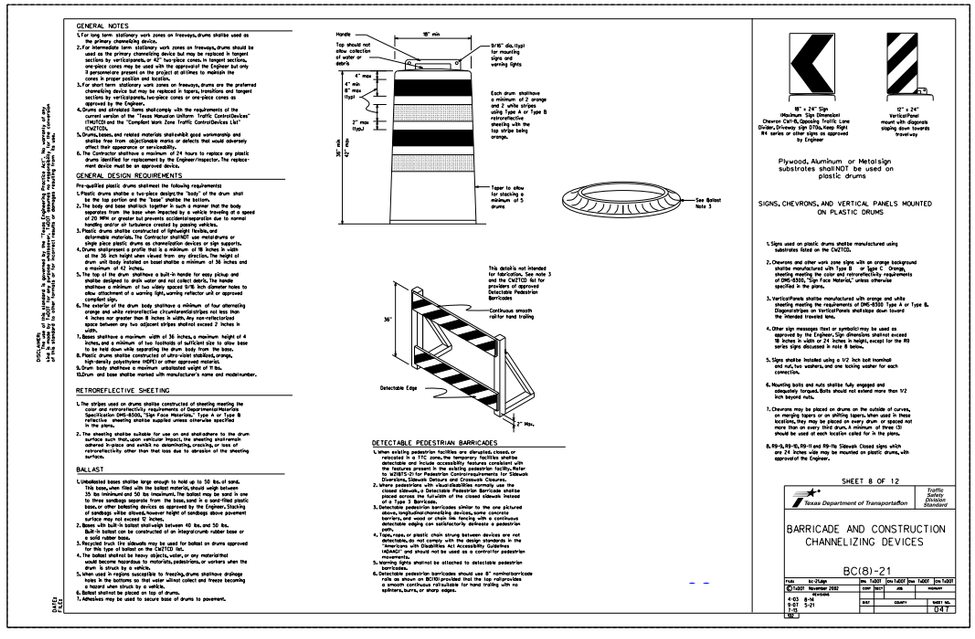
Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS				
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21				0415


1. Barrier Reflectors shall be yellow and conform to the color and
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The
CONCRETE TRAFFIC BARRIER (CTB)
3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors
4. Where CTB separates two-way traffic, three barrier reflectors shall be
5. When CTB separates traffic traveling in the same direction, no barrier
6. Barrier Reflector units shall be yellow or white in color to match
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Maximum spacing of Barrier Reflector Double-reflective roadway marker tabs
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's
10. Missing or damaged Barrier Reflectors shall be replaced as directed
11. Single slope barriers shall be delineated as shown on the above detail.
Barrier Reflector on 10" tubular bracket
Barrier Reflectors
Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.
LOW PROFILE CONCRETE BARRIER (LPCB)
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES
LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.
See D & OM (VIII)
Install a minimum of 3 Barrier Reflectors as per manufacturer's recommendations.
DELINEATION OF END TREATMENTS
END TREATMENTS FOR CTB'S USED IN WORK ZONES
End treatments used on CTB's in work zones shall meet the appropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH), Refer to the CMJTCD List for approved end treatments and manufacturers.
BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS
Type C Warning Light or approved substitute mounted on a drum adjacent to the travelway.
Warning reflector may be round or square,that have a yellow retroflective surface area of at least 30 square inches
WARNING LIGHTS
1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous
4. Type C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
7. When used to delineate curves, Type C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.
WARNING LIGHTS MOUNTED ON PLASTIC DRUMS
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing devices in turns or merging taper may be used for delineation, if used, the flash rate of adjacent lights shall be sufficiently different from the flash rate of the lights in the adjacent taper or of the merging taper to
order to identify the desired vehicle path. The rate of flashing for each light shall be 45 flashes per minute, plus or minus 11 flashes.
4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travelway on detours, on lane
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.
WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C STEADY BURN WARNING LIGHTS
1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CMJTCD.
3. The warning reflector shall have a minimum retroreflective surface area (one-sided) of 30 square inches.
4. Square reflectors shall be fully retroreflected, including the area where attached to the drum.
5. Square reflectors must have a minimum of 30 square inches of retroreflected sheeting. They do not have to be retroreflected where it attaches to the drum.
6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
7. When used near two-way traffic, both sides of the warning reflector shall be retroreflected.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.
Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.
1. The Flashing Arrow Board should be used for offline closures on multi-lane roadways, or slow moving maintenance or construction activities on the travelanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbols:
4 CORNER CAUTION
OR
ALTERNATING DIAMOND CAUTION
DOUBLE ARROW
RIGHT/LEFT ARROW Right arrow shown; left is similar
RIGHT/LEFT SEQUENTIAL CHEVRON Right chevron shown; left is similar
5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode, as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
9. The minimum size of the Arrow Board is 30" x 60".
10. The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A Flashing Arrow Board may be used in a stationary mode, if provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 1 feet from roadway to bottom of panel.
REQUIREMENTS
TYPE | MINIMUM SIZE | MINIMUM NUMBER OF PANEL LAMPS | MINIMUM VISIBILITY DISTANCE
B | 30 x 60 | 13 | 3/4 mile
C | 48 x 96 | 15 | 1 mile
ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.
WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE IT BEHIND A BARRIER OR CONCRETE TRAFFIC BARRIER OR GUARDRAIL.
FLASHING ARROW BOARDS
TRUCK-MOUNTED ATTENUATORS
1. Truck mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CMJTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CMJTCD for a list of approved TMAs.
4. TMAs shall be placed on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The TMA should be positioned to protect the area from a work area is spread above the roadway and the work crew is an extended distance from the TMA.
SHEET 7 OF 12
Texas Department of Transportation
Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR
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DIST | COUNTY | SHEET NO.
046
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DATES (REV.)



GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and alternate items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drum that is damaged or unacceptable to the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall latch together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight plastics, and shall not contain materials the Contractor considers non-recyclable or other place holders that will be removed prior to sign supports.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit body installed on base shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two safety spaces 5/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compatible device.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be tied down while separating the drum body from the base.
8. Plastic drums shall be manufactured from virgin or recycled high-density polyethylene (HDPE) or other approved materials.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

RETROREFLECTIVE SHEETING

1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall be suitable for use on and shall adhere to the drum surface for the life expectancy of the sheeting. The sheeting shall remain adhered in place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

BALLAST

1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. The base, when filled with the ballast material, should weigh between 35 lbs minimum and 50 lbs maximum. The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral sound rubber base or other approved material.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. The ballast shall not be heavy objects, valet, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
5. When used in regions susceptible to freezing, drums shall have drainage holes in the base to prevent water from collect and freeze becoming a hazard when struck by a vehicle.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.

DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with those existing prior to the disruption in accordance with Chapter 6 of NCHRP 672 for Pedestrian Control Requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed at the entrance to each width of the closed sidewalk instead of a Type 3 Barricade.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tapes, ropes, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a contractor pedestrian channelizer.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades should use 45° non-intersecting miter joints per BC(8)-21 provided that the rail has no splinters, burrs, or sharp edges.

16" x 24" Sign (Maximum Sign Dimension Chevron Can be Used on Crossing Traffic Lane Divider, Driveway sign D11b, Keep Right R4 series or other signs as approved by Engineer

12" x 24" Vertical Panel mount with diagonals sloping down towards travelway

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B or type C Orange, sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Materials," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R8 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (carriage) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers, when used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11b Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

SHEET B OF 12

Texas Department of Transportation — Traffic Safety Division Standard

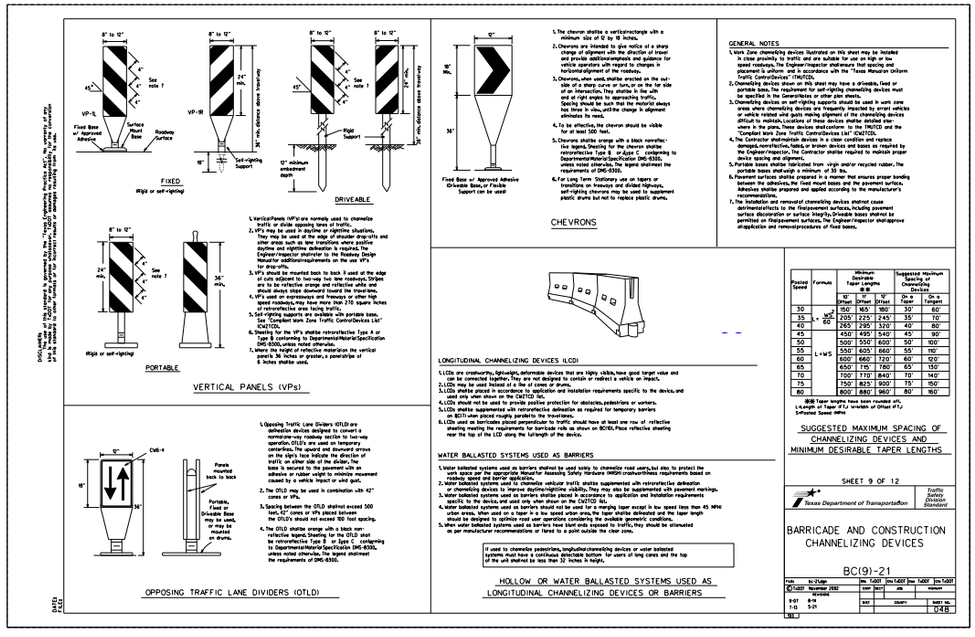
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

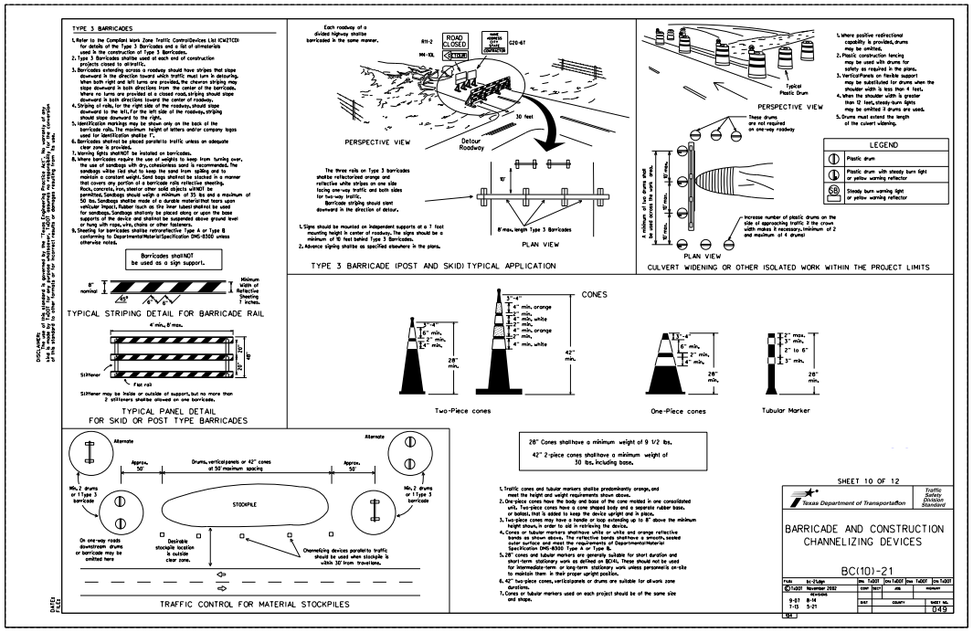
BC(8)-21

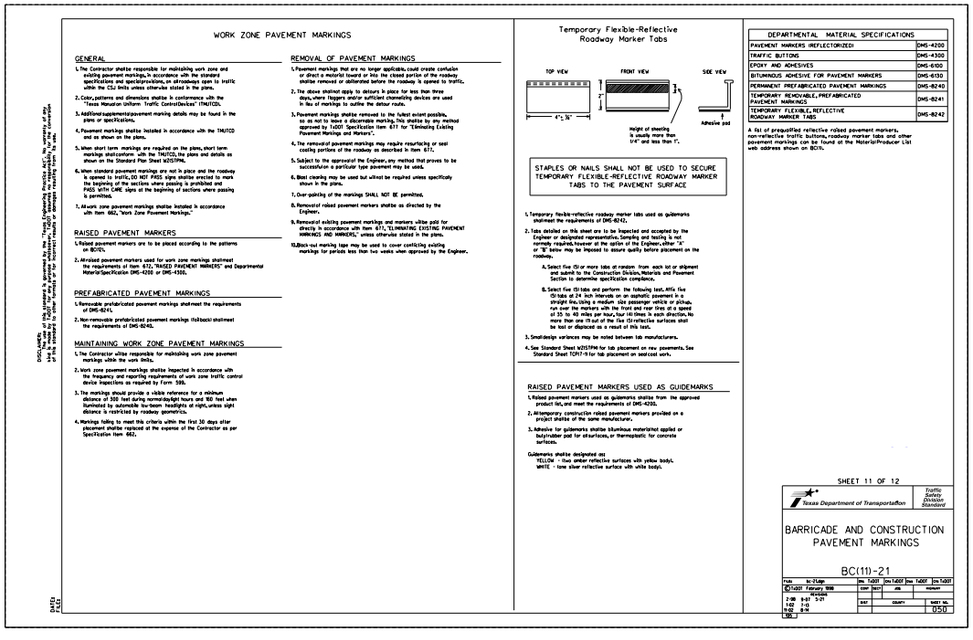
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9-07 5-21				047
7-13				
5-10				

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DATES: FILE:


VP-R
VP-IR
VP-L
FIXED
DRIVEABLE
PORTABLE
VERTICAL PANELS (VPs)
CHEVRONS
GENERAL NOTES
LONGITUDINAL CHANNELIZING DEVICES (LCD)
WATER BALLASTED SYSTEMS USED AS BARRIERS
HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS
SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES
BC(9)-21
SHEET 9 OF 12


TYPE 3 BARRICADES
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL
TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES
TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION
PERSPECTIVE VIEW
PLAN VIEW
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS
LEGEND
Plastic drum
Steady burn warning light or yellow warning reflector
CONES
Two-Piece cones
One-Piece cones
Tubular Marker
TRAFFIC CONTROL FOR MATERIAL STOCKPILES
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES
BC(10)-21
SHEET 10 OF 12



WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and specifications, or attachments open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet BC(STPM).
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS with CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(1).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (thermo) shall meet the requirements of DMS-8240.

MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 1204.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 100 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernible marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers within gore paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs

STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line, using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 25 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet MTCP(PM) for tab placement on new pavements. See Standard Sheet TCP(T-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous materials applied or butyl rubber pad for bituminous, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - Two amber reflective surfaces with yellow body.
WHITE - Two silver reflective surface with white body.

DEPARTMENTAL MATERIAL SPECIFICATIONS

PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Materials Producer List web address shown on BC(1).

SHEET 11 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

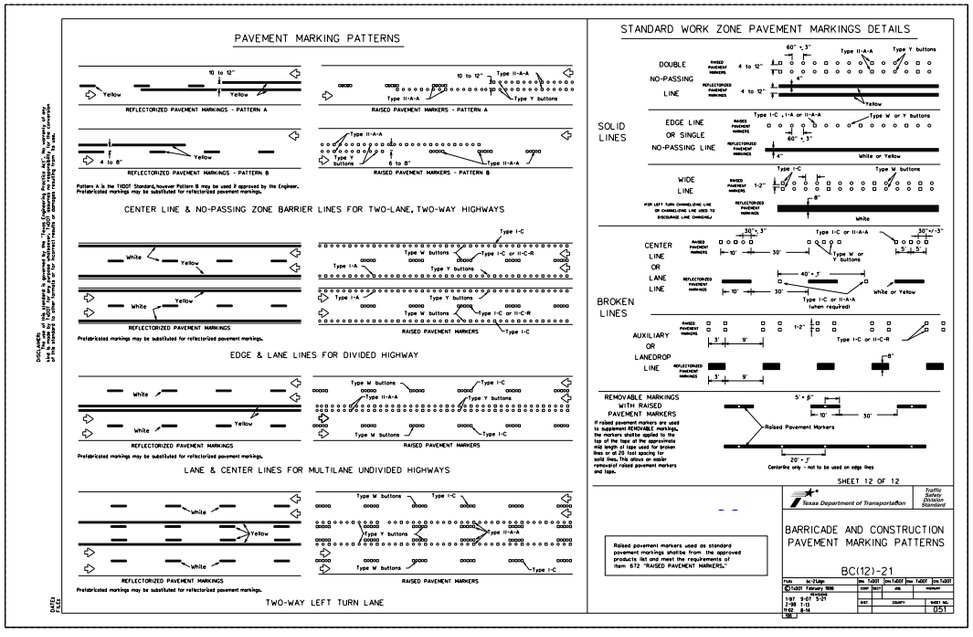
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

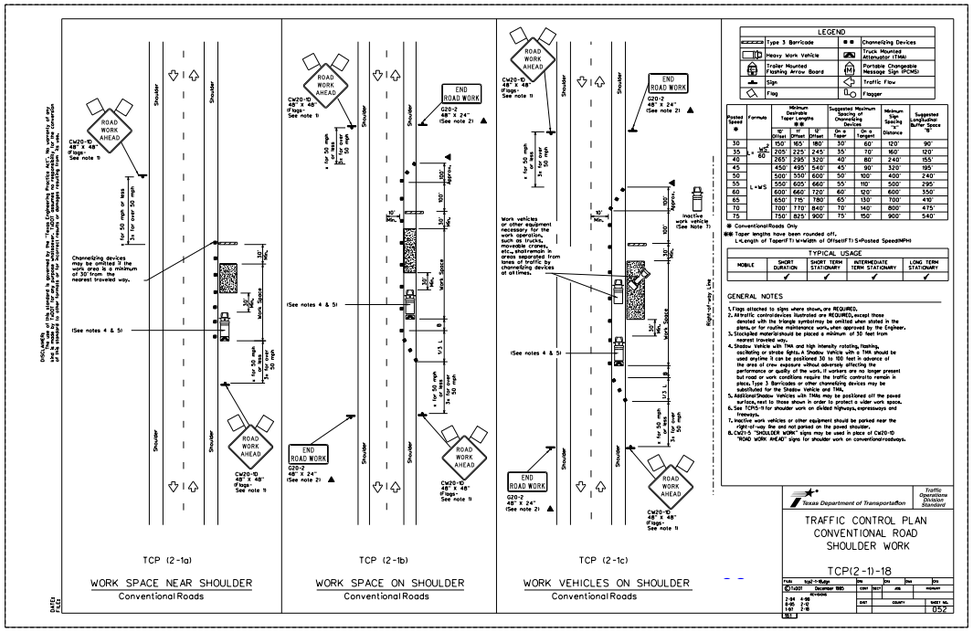
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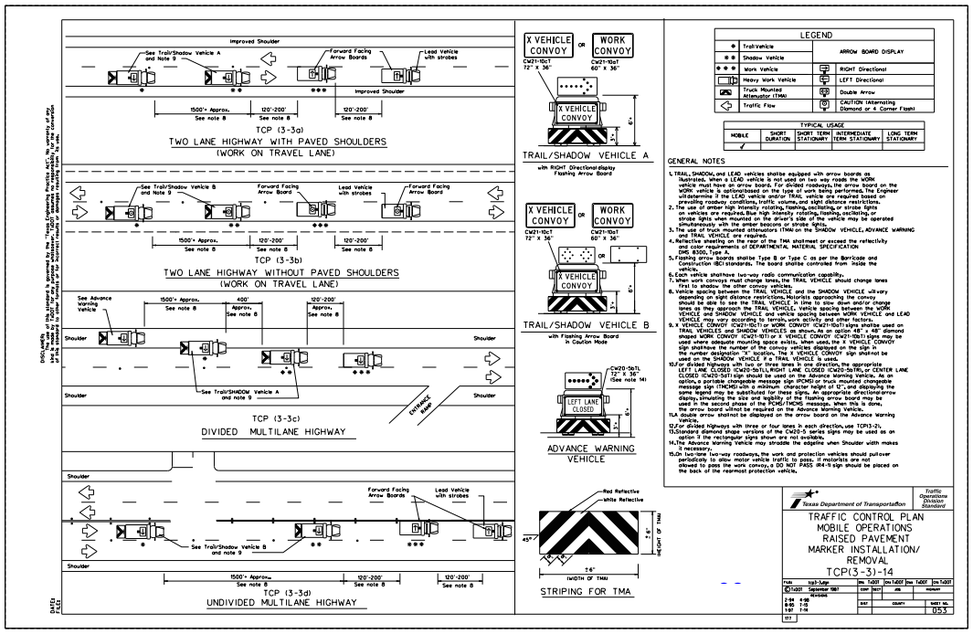
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©TxDOT February 1998	CONT	SECT	JOB		HIGHWAY
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1-02 1-13	DIST	COUNTY			SHEET NO.
7-02 8-14					1250
5-10					

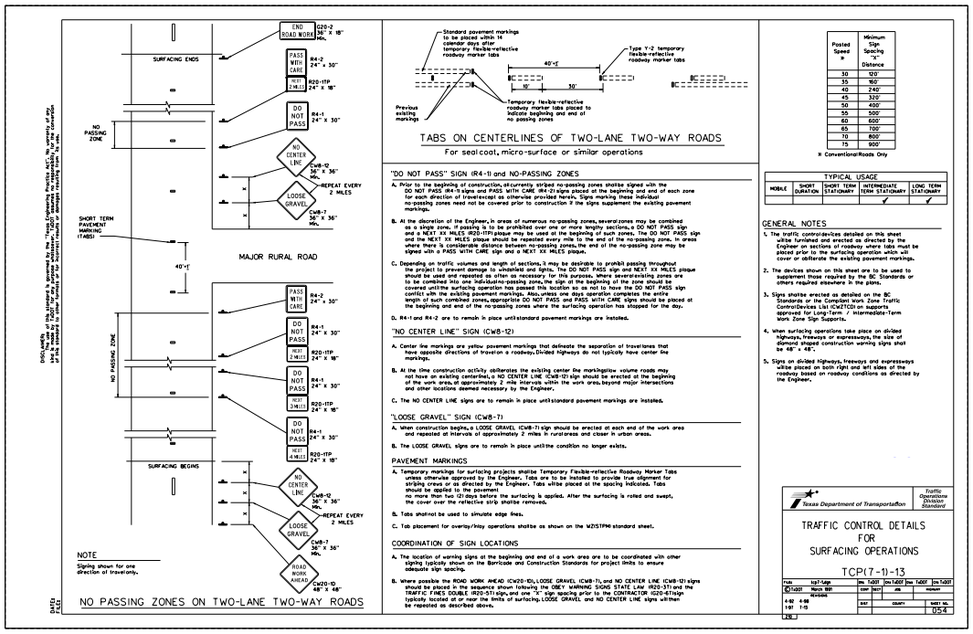
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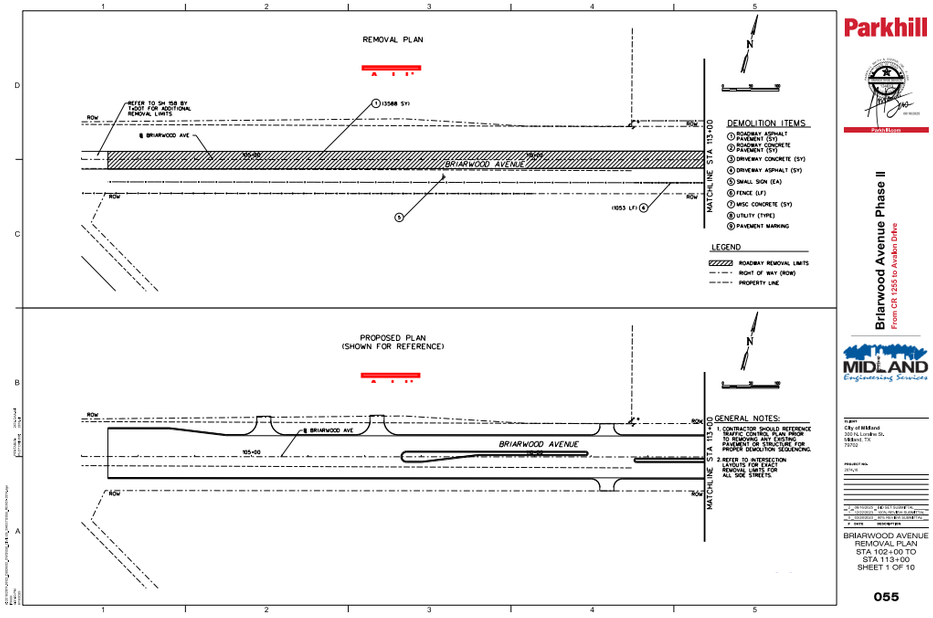
DATES (CSJ):


PAVEMENT MARKING PATTERNS
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A
RAISED PAVEMENT MARKERS - PATTERN A
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B
RAISED PAVEMENT MARKERS - PATTERN B
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS
REFLECTORIZED PAVEMENT MARKINGS
RAISED PAVEMENT MARKERS
EDGE & LANE LINES FOR DIVIDED HIGHWAY
REFLECTORIZED PAVEMENT MARKINGS
RAISED PAVEMENT MARKERS
LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS
REFLECTORIZED PAVEMENT MARKINGS
RAISED PAVEMENT MARKERS
TWO-WAY LEFT TURN LANE
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS
SOLID LINES
DOUBLE NO-PASSING LINE
EDGE LINE OR SINGLE NO-PASSING LINE
WIDE LINE
BROKEN LINES
CENTER LINE OR LANE LINE
AUXILIARY OR LANEDROP LINE
REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS
Raised Pavement Markers
Centerline only - not to be used on edge lines
Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."
SHEET 12 OF 12
Texas Department of Transportation
Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS
BC(12)-21


LEGEND
Type 3 Barricade
Channelizing Devices
Heavy Work Vehicle
Truck Mounted Attenuator (TMA)
Trailer Mounted Flashing Arrow Board
Portable Changeable Message Sign (PCMS)
Sign
Traffic Flow
Flag
Flagger
TYPICAL USAGE
MOBILE
SHORT DURATION
SHORT TERM STATIONARY
INTERMEDIATE TERM STATIONARY
LONG TERM STATIONARY
GENERAL NOTES
TCP (2-1a)
WORK SPACE NEAR SHOULDER
Conventional Roads
TCP (2-1b)
WORK SPACE ON SHOULDER
Conventional Roads
TCP (2-1c)
WORK VEHICLES ON SHOULDER
Conventional Roads
Texas Department of Transportation
TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK
TCP(2-1)-18


TCP (3-3a)
TWO LANE HIGHWAY WITH PAVED SHOULDERS
(WORK ON TRAVEL LANE)
TCP (3-3b)
TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS
(WORK ON TRAVEL LANE)
TCP (3-3c)
DIVIDED MULTILANE HIGHWAY
TCP (3-3d)
UNDIVIDED MULTILANE HIGHWAY
TRAIL/SHADOW VEHICLE A
with RIGHT Directional display
Flashing Arrow Board
TRAIL/SHADOW VEHICLE B
with Flashing Arrow Board
in Caution Mode
ADVANCE WARNING
VEHICLE
STRIPING FOR TMA
LEGEND
TYPICAL USAGE
GENERAL NOTES
TRAFFIC CONTROL PLAN
MOBILE OPERATIONS
RAISED PAVEMENT
MARKER INSTALLATION/
REMOVAL
TCP(3-3)-14


END ROAD WORK
G20-2
SURFACING ENDS
PASS WITH CARE
R4-2
NEXT XX MILES
R20-1TP
DO NOT PASS
R4-1
NO CENTER LINE
CW8-12
REPEAT EVERY 2 MILES
LOOSE GRAVEL
CW8-7
NO PASSING ZONE
SHORT TERM PAVEMENT MARKING (TABS)
40'-t'
MAJOR RURAL ROAD
SURFACING BEGINS
ROAD WORK AHEAD
CW20-1D
NOTE
Signing shown for one direction of travel only.
NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS
Standard pavement markings to be placed within 14 calendar days after temporary flexible-retroactive roadway marker tabs
Type Y-2 temporary flexible-retroactive roadway marker tabs
40'-t'
10'
30'
BC
EC
Previous existing markings
Temporary flexible-retroactive roadway marker tabs placed to indicate beginning and end of no passing zones
TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS
For seal coat, micro-surface or similar operations
"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES
A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS with CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.
B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is a considerable distance between passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.
C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to unstable soil and tights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be removed until the surfacing operation has passed this location so as not to confuse the DO NOT PASS sign control with the existing pavement markings. Where several short no-passing zones are combined into one long zone of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.
D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.
"NO CENTER LINE" SIGN (CW8-12)
A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.
B. At the time construction activity obliterates the existing center line markings, low volume roads may not have an existing centerline, a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.
C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.
"LOOSE GRAVEL" SIGN (CW8-7)
A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.
B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.
PAVEMENT MARKINGS
A. Temporary markings for surfacing projects shall be Temporary Flexible-retroactive Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping as soon as practicable as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs shall not be placed on the surface course more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the retroactive strip shall be removed.
B. Tabs shall not be used to simulate edge lines.
C. Tab placement for overlay/inlay operations shall be as shown on the WZSTPM4 standard sheet.
COORDINATION OF SIGN LOCATIONS
A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.
B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the GREY WARNING SIGNS STATE LINE (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T) sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.
Posted Speed mph
Minimum Sign Spacing "X" Distance
30 120'
35 160'
40 240'
45 320'
50 400'
55 500'
60 600'
65 700'
70 800'
75 900'
* Conventional Roads Only
TYPICAL USAGE
MOBILE
SHORT DURATION
SHORT TERM STATIONARY
INTERMEDIATE TERM STATIONARY
LONG TERM STATIONARY
✓
GENERAL NOTES
1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards. All signs shall conform to the Traffic Control Devices List (TCMTCD) or supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of the required lateral construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.
Texas Department of Transportation
Traffic Operations Division Standard
TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS
TCP(7-1)-13
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©TxDOT March 1991
REVISIONS
4-92 4-98
1-97 1-13
DIST COUNTY SHEET NO.
CONT SECT JOB HIGHWAY
155-E



Parkhill

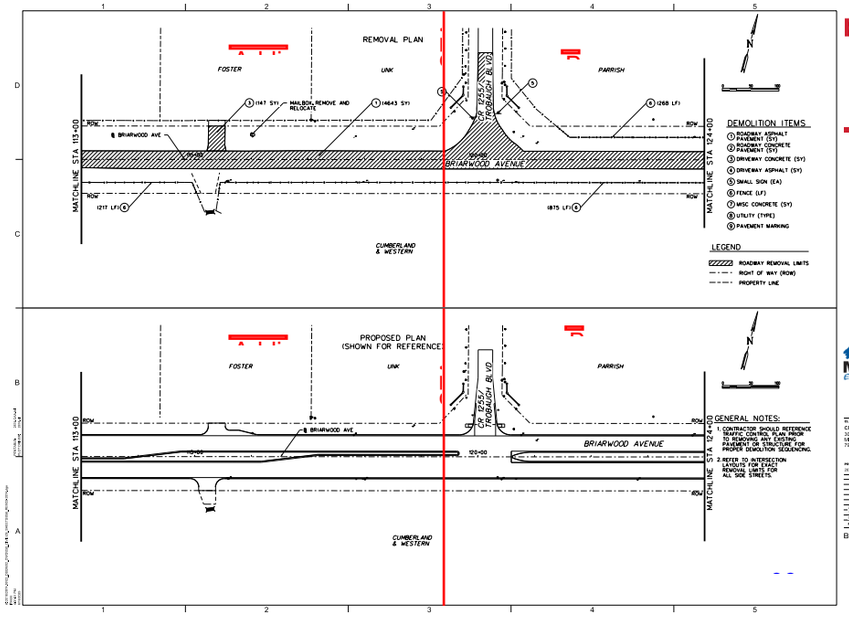
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 102+00 TO
STA 113+00
SHEET 1 OF 10

055



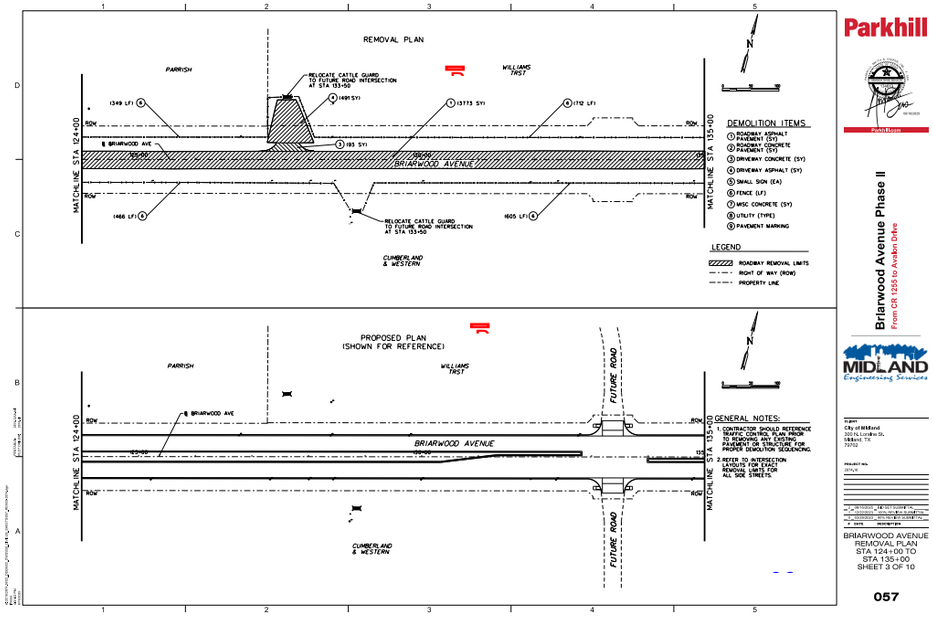
Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 113+00 TO
STA 124+00
SHEET 2 OF 10

056



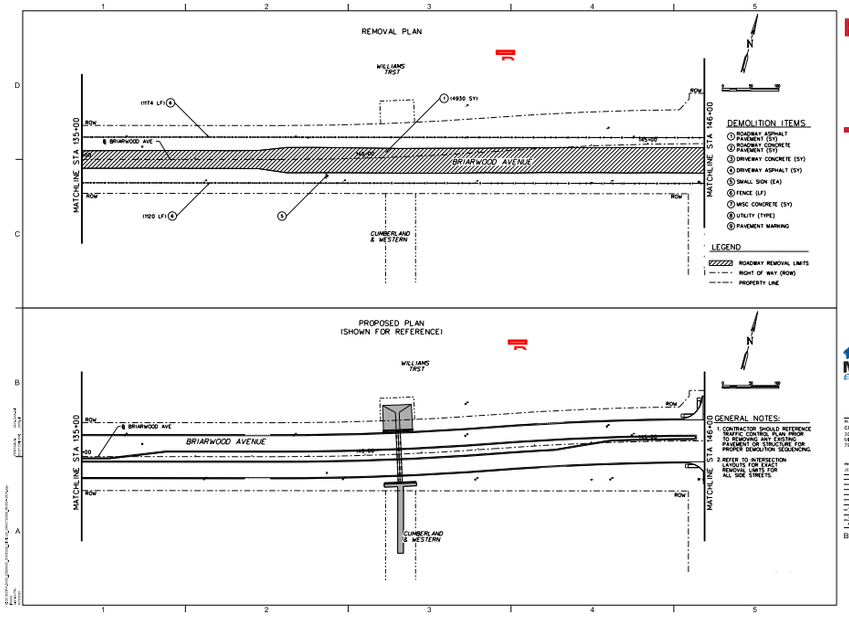
Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 124+00 TO
STA 135+00
SHEET 3 OF 10

057



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

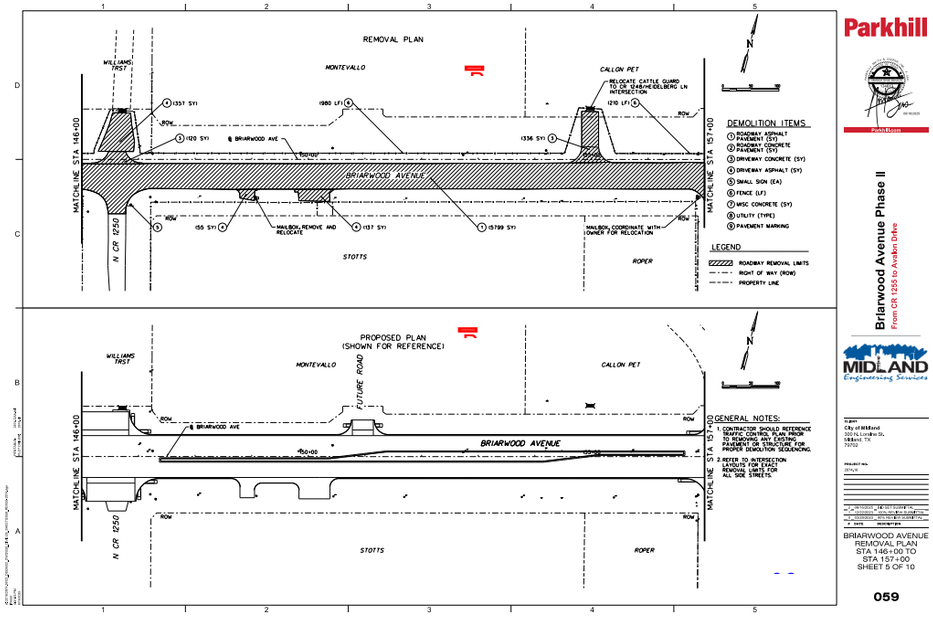
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
REMOVAL PLAN
STA 135+00 TO
STA 146+00
SHEET 4 OF 10

058



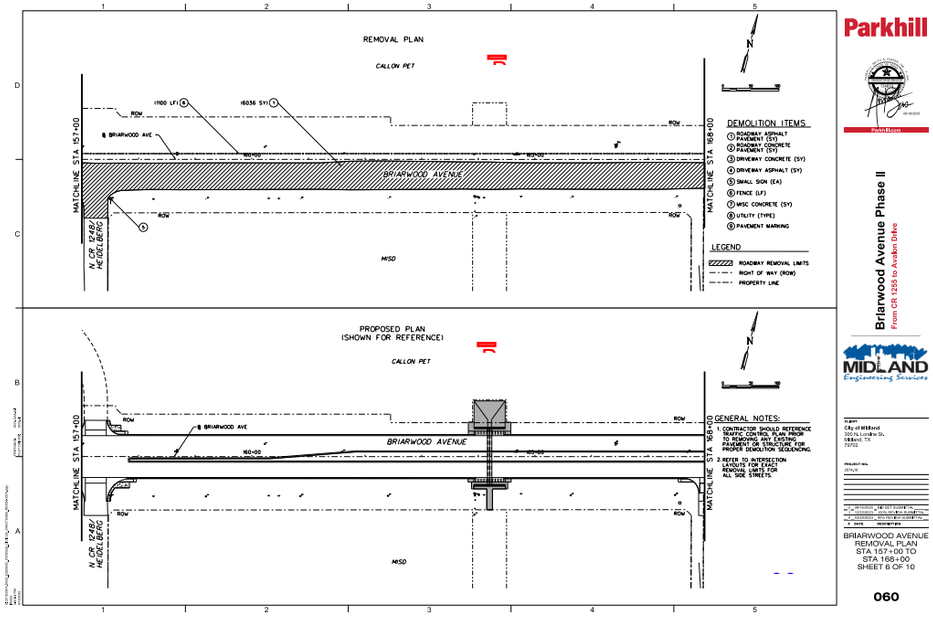
Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 146+00 TO
STA 157+00
SHEET 5 OF 10

059



Parkhill

John Rowe

Briarwood Avenue Phase II

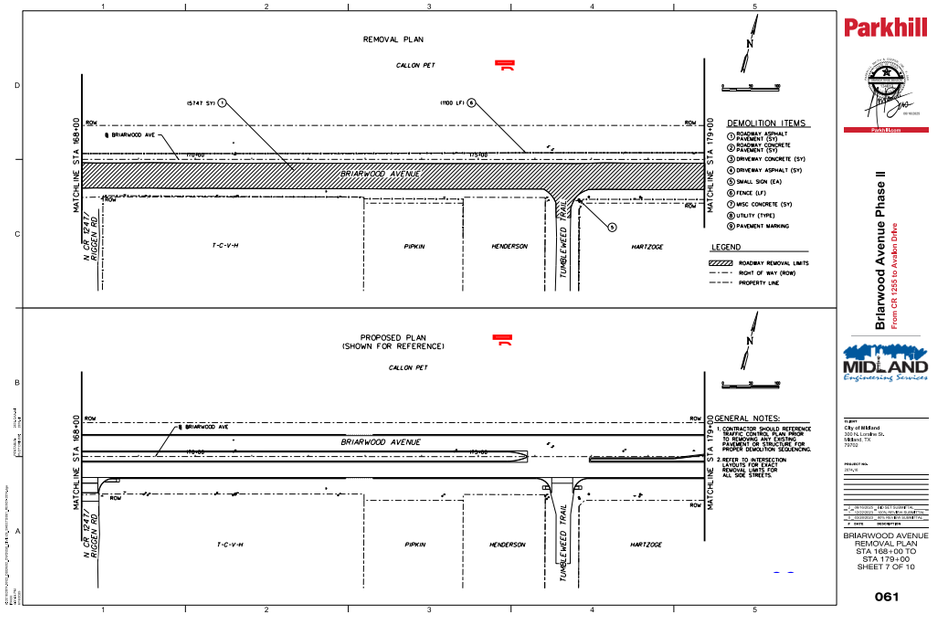
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
REMOVAL PLAN
STA 157+00 TO
STA 168+00
SHEET 6 OF 10

060



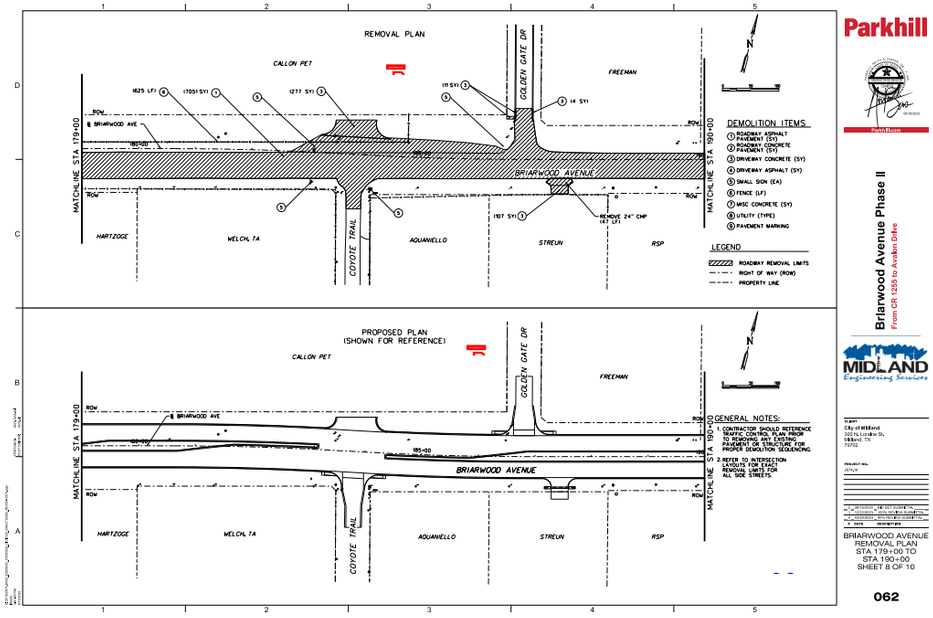
Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND
Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 168+00 TO
STA 179+00
SHEET 7 OF 10

061



Parkhill

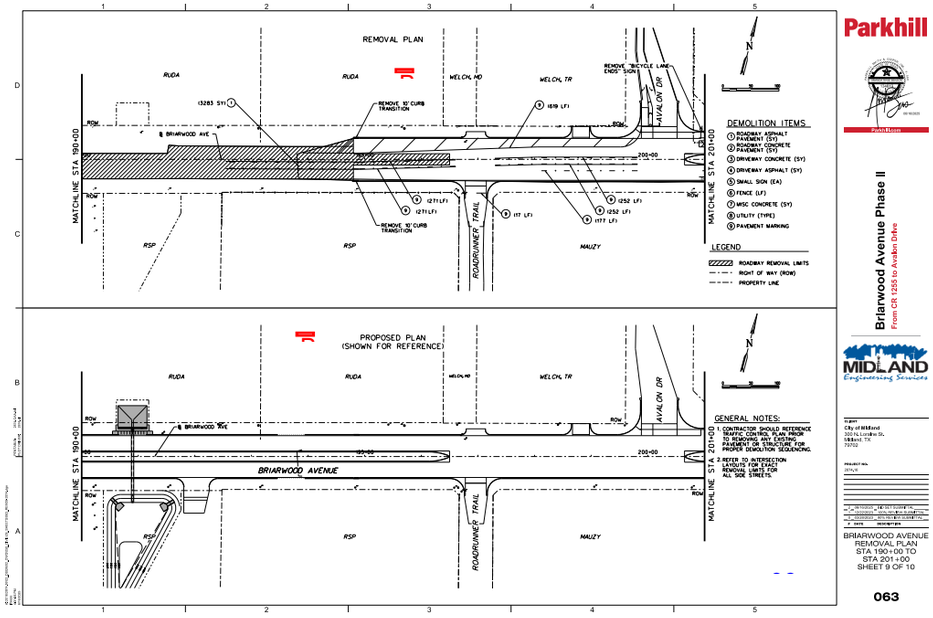
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

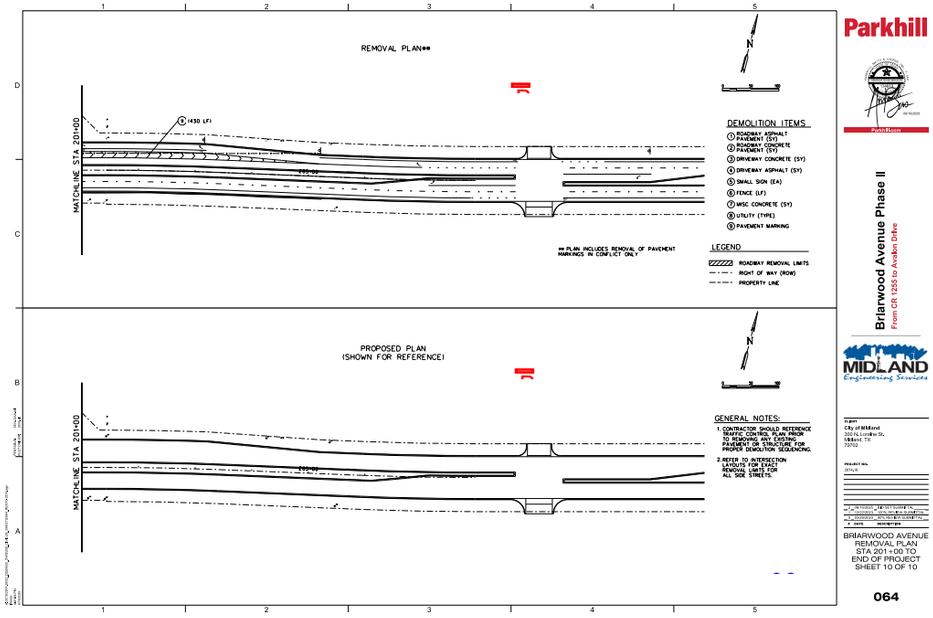
MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
REMOVAL PLAN
STA 179+00 TO
STA 190+00
SHEET 8 OF 10

062


REMOVAL PLAN
PROPOSED PLAN
(SHOWN FOR REFERENCE)
RUDA
RSP
MAUZY
WELCH, MD
WELCH, TR
AVALON DR
ROADRUNNER TRAIL
BRIARWOOD AVENUE
℄ BRIARWOOD AVE
MATCHLINE STA 190+00
MATCHLINE STA 201+00
REMOVE 12' CURB TRANSITION
REMOVE "BICYCLE LANE" ENDS" SIGN
(3283 SY)
1519 LF)
(271 LF)
117 LF)
1252 LF)
177 LF)
DEMOLITION ITEMS
1 ROADWAY ASPHALT PAVEMENT (SY)
2 CONCRETE PAVEMENT (SY)
3 DRIVEWAY CONCRETE (SY)
4 DRIVEWAY ASPHALT (SY)
5 SMALL SIGN (EA)
6 FENCE (LF)
7 MISC CONCRETE (SY)
8 UTILITY (TYPE)
9 PAVEMENT MARKING
LEGEND
ROADWAY REMOVAL LIMITS
RIGHT OF WAY (ROW)
PROPERTY LINE
GENERAL NOTES:
1. CONTRACTOR SHOULD REFERENCE TRAFFIC CONTROL PLAN PRIOR TO REMOVAL OF ANY ROADWAY PAVEMENT OR STRUCTURE FOR PROPER DURATION SEQUENCING.
2. REFER TO INTERSECTION LAYOUTS FOR EXACT REMOVAL LIMITS FOR ALL SIDE STREETS.
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE
REMOVAL PLAN
STA 190+00 TO
STA 201+00
SHEET 9 OF 10
063



Parkhill

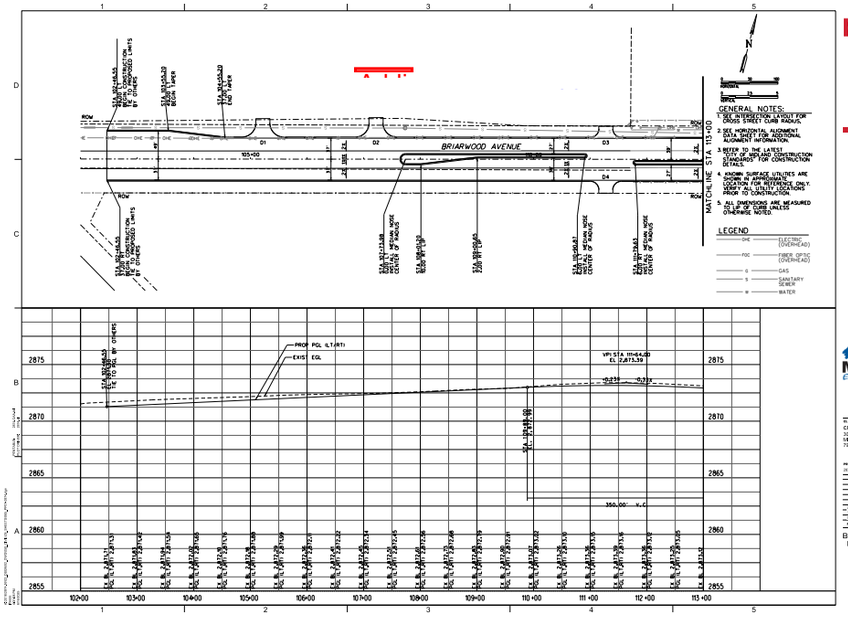
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 201+00 TO
END OF PROJECT
SHEET 10 OF 10

064



Parkhill

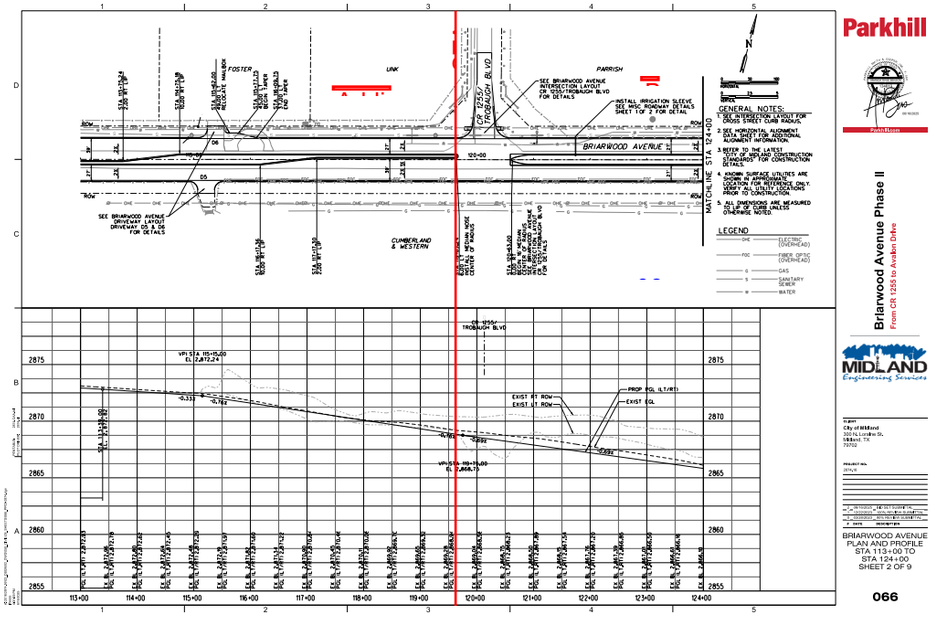
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 102+00 TO
STA 113+00
SHEET 1 OF 9

065



Parkhill

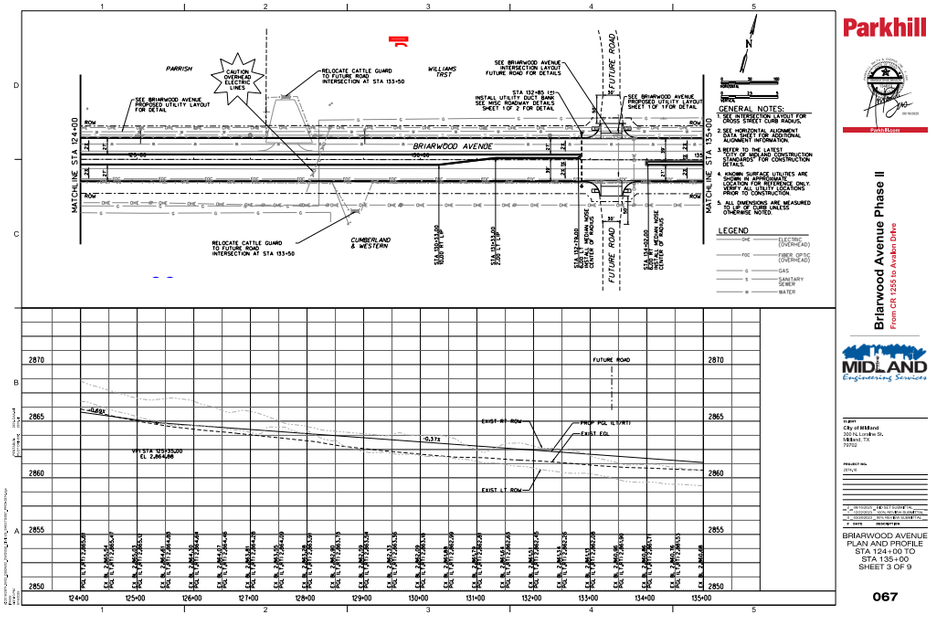
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 113+00 TO
STA 124+00
SHEET 2 OF 9

066



Parkhill

Briarwood Avenue Phase II

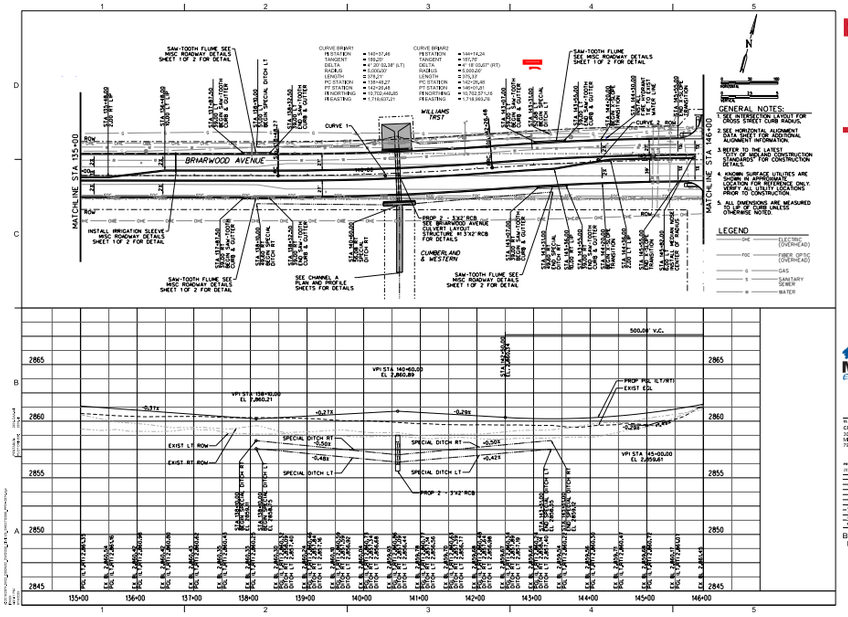
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 124+00 TO
STA 135+00
SHEET 3 OF 9

067



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND
Engineering Services

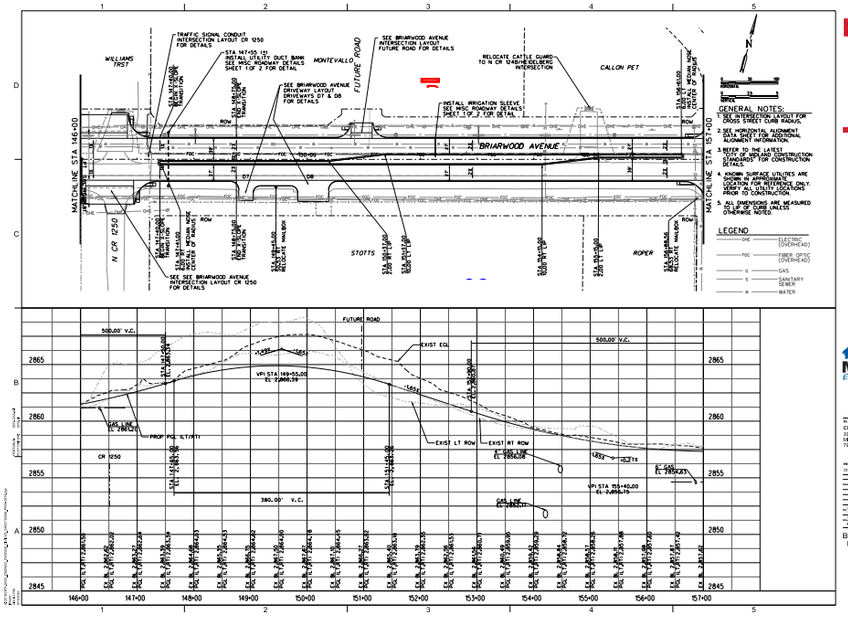
client
City of Midland
300 N. Loraine St.
Midland, TX
79702

project no.
067619

#	DATE	DESCRIPTION
1	08/19/2025	AS SUBMITTED
2	09/02/2025	INITIAL SET TO CONTRACTOR
3	09/09/2025	INITIAL SET TO CONTRACTOR

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 136+00 TO
STA 146+00
SHEET 4 OF 9

068



Parkhill

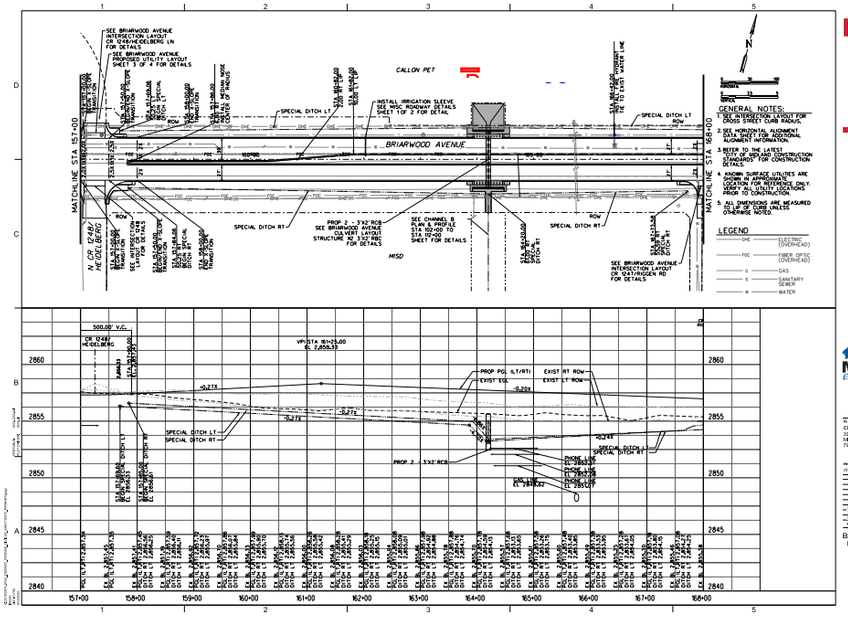
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 146+00 TO
STA 157+00
SHEET 5 OF 9

069



Parkhill

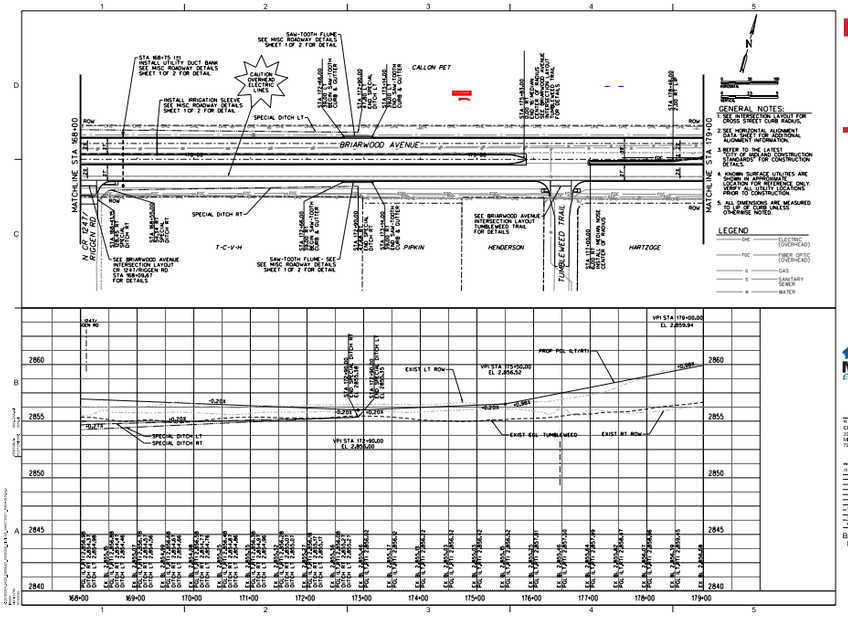
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 157+00 TO
STA 168+00
SHEET 6 OF 9

070



Parkhill

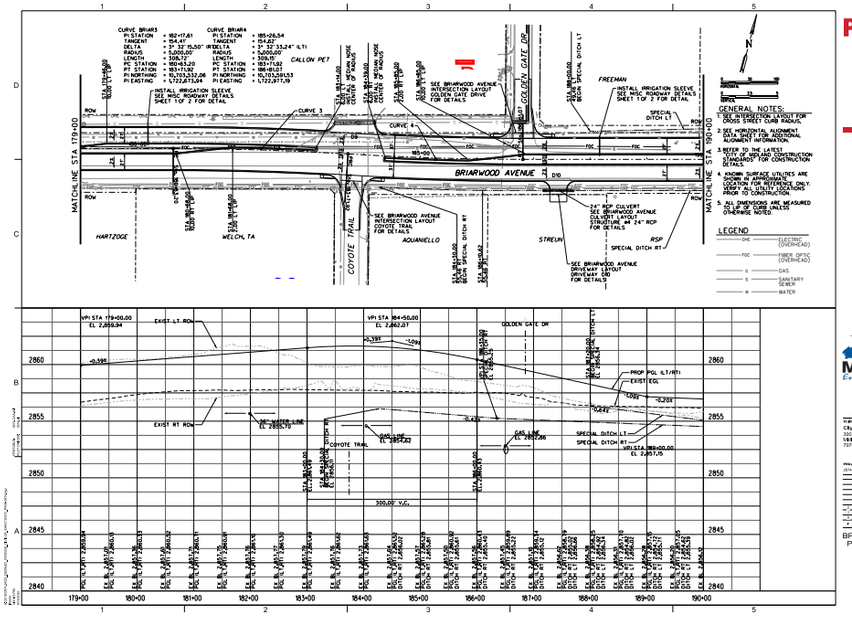
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 168+00 TO
STA 179+00
SHEET 7 OF 9

071



Parkhill

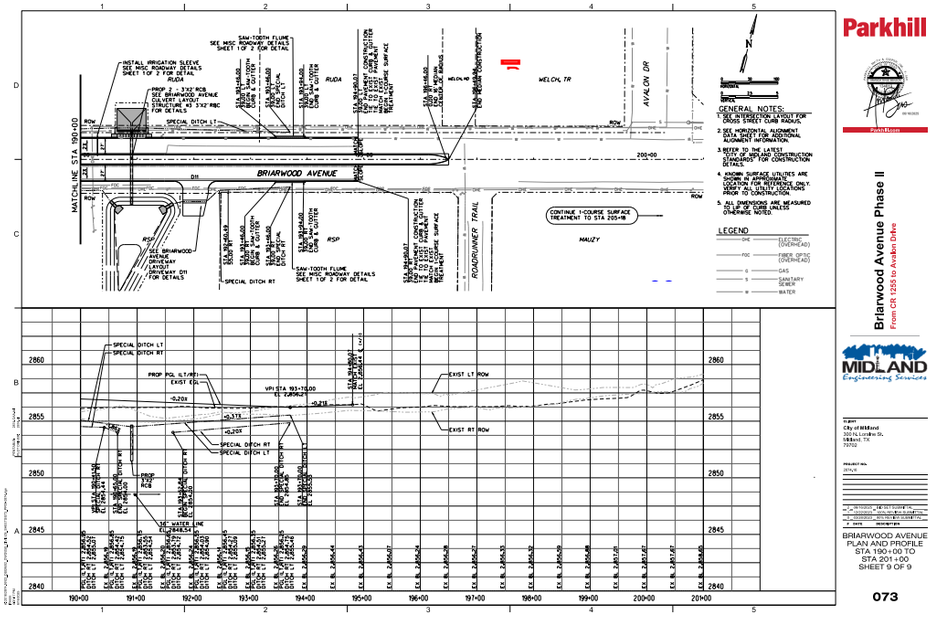
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 168+00 TO
STA 179+00
SHEET 8 OF 9

072



Parkhill

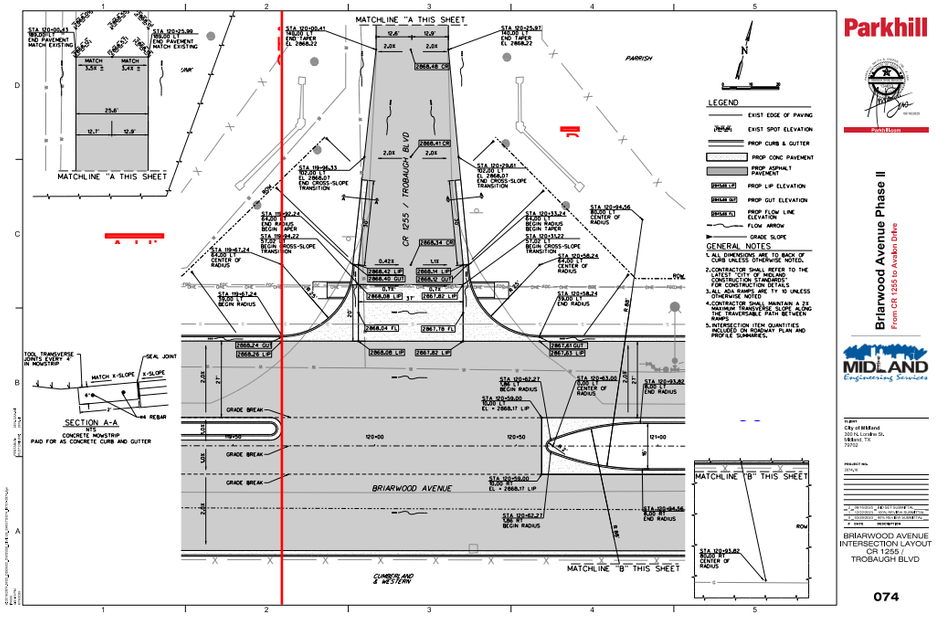
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 190+00 TO
STA 201+00
SHEET 9 OF 9

073



Parkhill

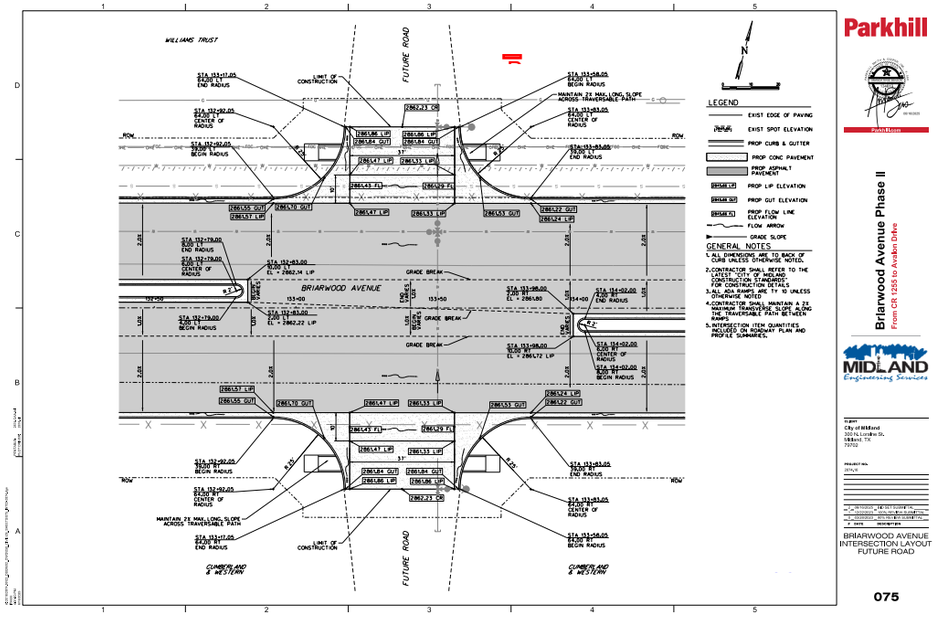
Briarwood Avenue Phase II

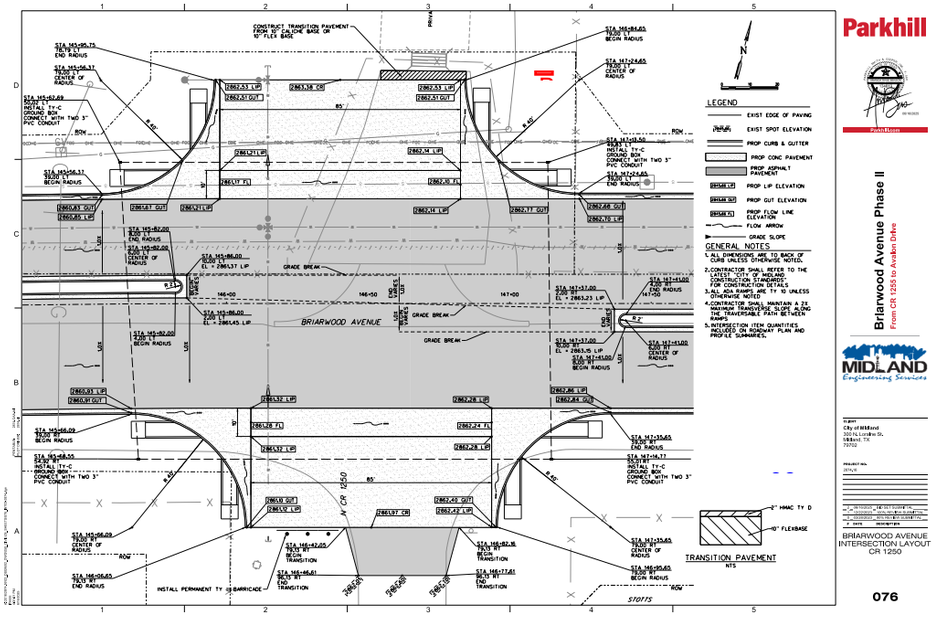
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE INTERSECTION LAYOUT CR 1255 / TROBAUGH BLVD

074


WILLIAMS TRUST
FUTURE ROAD
BRIARWOOD AVENUE
CUMBERLAND & WESTERN
LIMIT OF CONSTRUCTION
GRADE BREAK
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
1. ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL REFER TO THE LATEST "CITY OF MIDLAND CONSTRUCTION STANDARDS".
3. ALL ADA RAMPS ARE TY 10 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG ANY TRAVERSABLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE INTERSECTION LAYOUT FUTURE ROAD
075



Parkhill

Briarwood Avenue Phase II

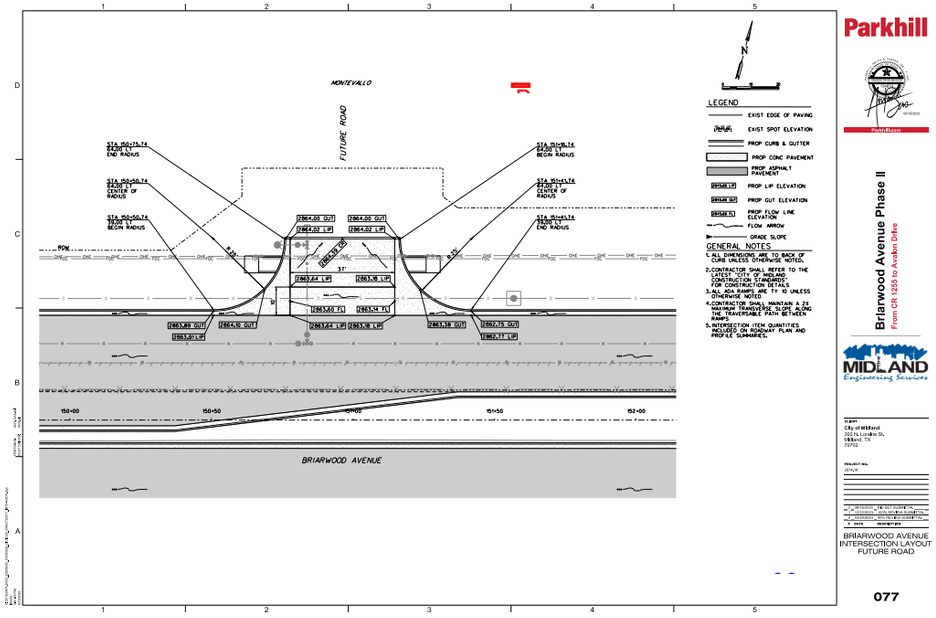
From CR 1250 to Avalon Drive

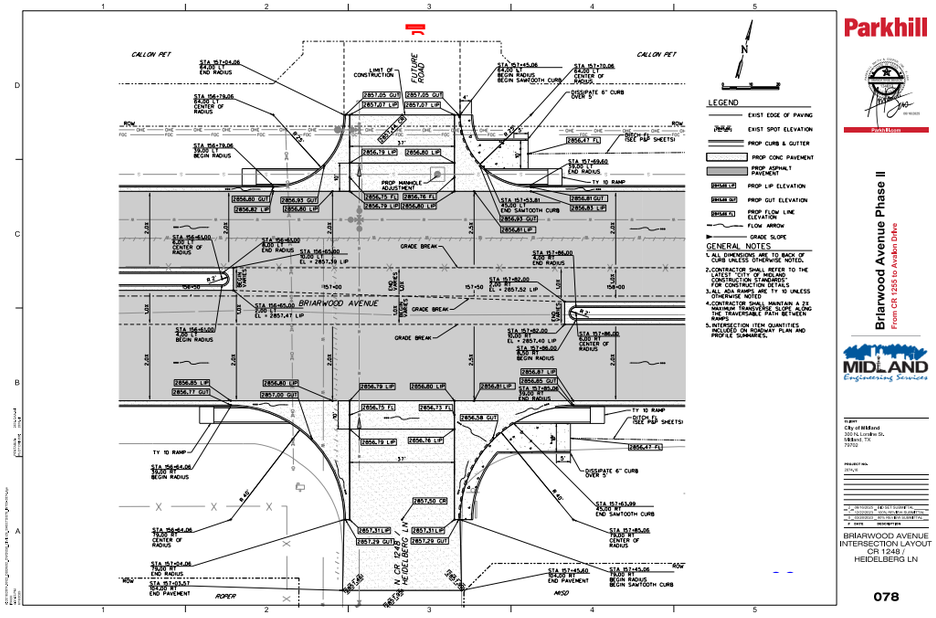
MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
INTERSECTION LAYOUT
CR 1250

076


MONTEVALLO
FUTURE ROAD
BRIARWOOD AVENUE
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
1. ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL REFER TO THE LATEST "CITY OF MIDLAND CONSTRUCTION STANDARDS".
3. ALL ADA RAMPS ARE TY 1 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG RAMP TO PROVIDE A TRAVERSABLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79701
BRIARWOOD AVENUE
INTERSECTION LAYOUT
FUTURE ROAD
077



Parkhill

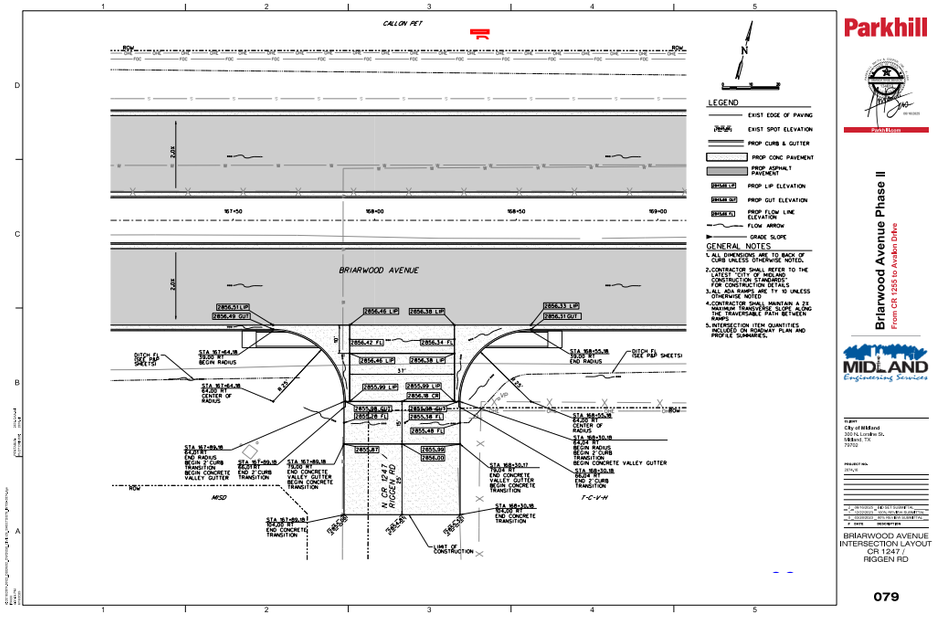
Briarwood Avenue Phase II

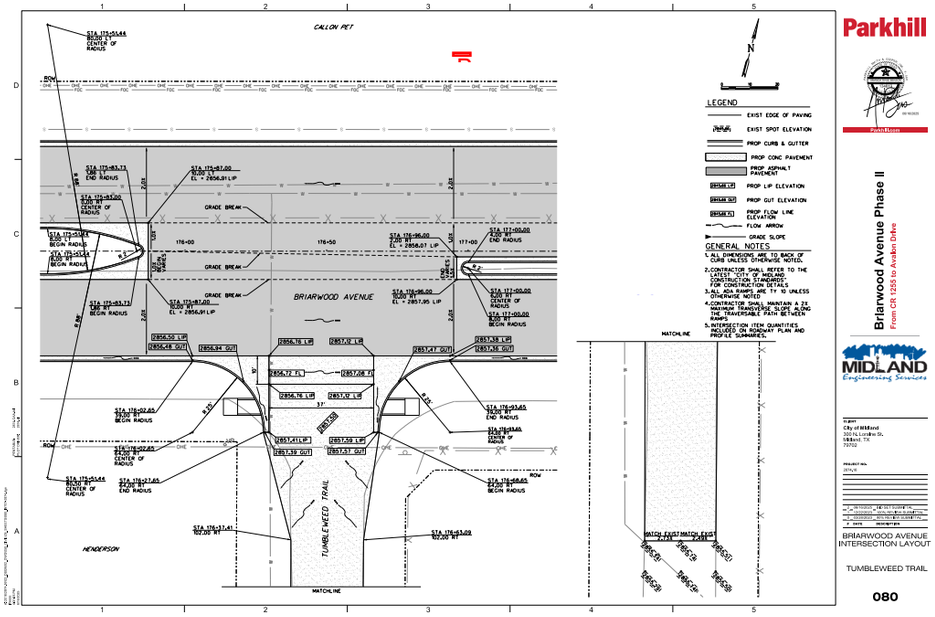
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE INTERSECTION LAYOUT CR 1249 / HEIDELBERG LN

078


CALON PET
BRIARWOOD AVENUE
N CR 1247
RIGGEN RD
MIDD
LIMIT OF CONSTRUCTION
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
1. ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL REFER TO THE LATEST "CITY OF MIDLAND CONSTRUCTION STANDARDS".
3. ALL ADA RAMPS ARE TY 1 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG THE ACCESSIBLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE
INTERSECTION LAYOUT
CR 1247 /
RIGGEN RD
079



Parkhill

Briarwood Avenue Phase II

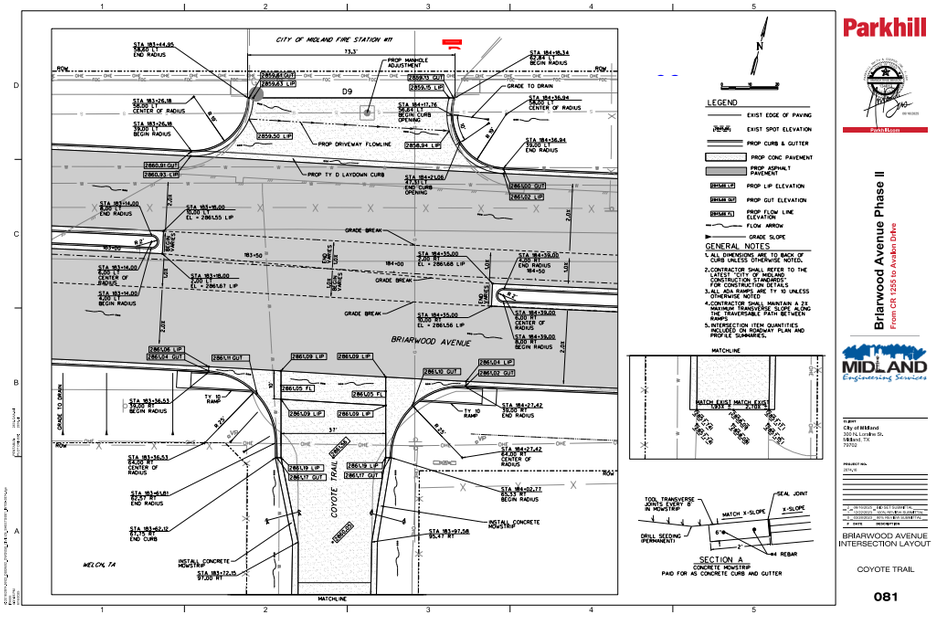
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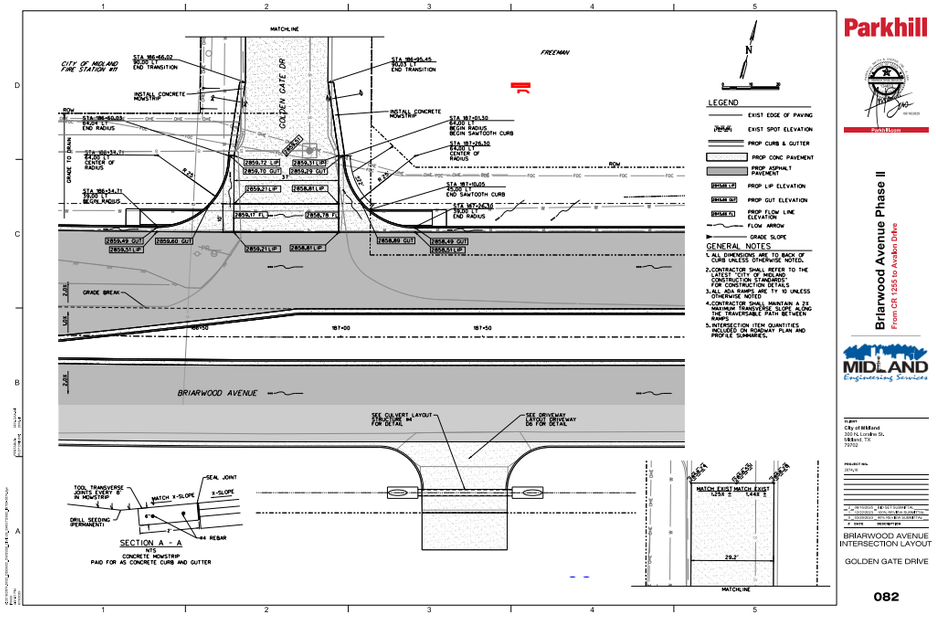
MIDLAND Engineering Services

BRIARWOOD AVENUE INTERSECTION LAYOUT

TUMBLEWEED TRAIL

080


CITY OF MIDLAND FIRE STATION #11
BRIARWOOD AVENUE
COYOTE TRAIL
D9
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP CUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
1. ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL REFER TO THE LATEST "CITY OF MIDLAND CONSTRUCTION STANDARDS".
3. ALL ADA RAMPS ARE TY 1 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG RAMP TO TRAVERSABLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
MATCHLINE
SECTION A
CONCRETE MOWSTRIP
PAID FOR AS CONCRETE CURB AND GUTTER
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE
INTERSECTION LAYOUT
COYOTE TRAIL
081



Parkhill

Briarwood Avenue Phase II

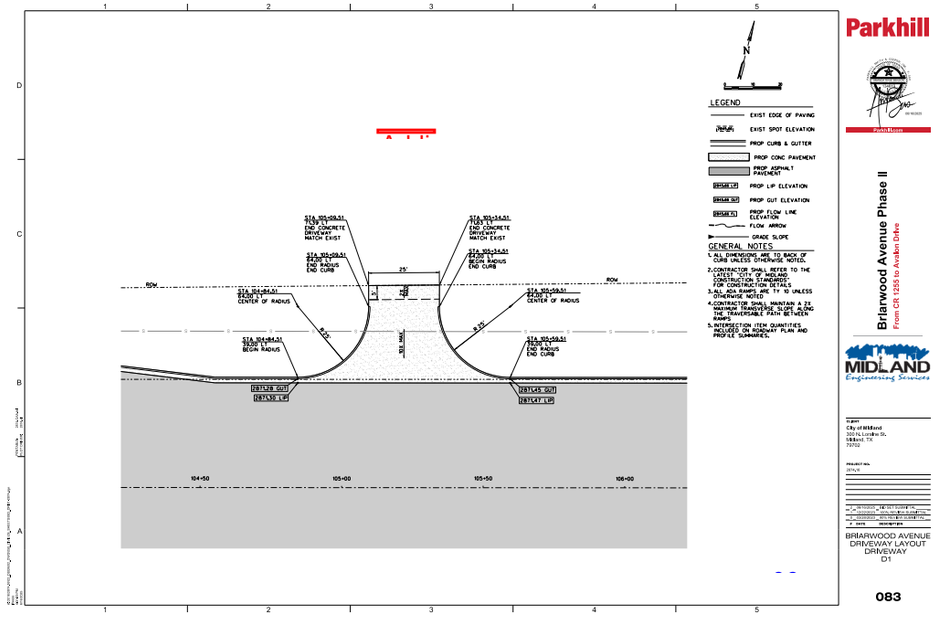
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE INTERSECTION LAYOUT

GOLDEN GATE DRIVE

082



Parkhill

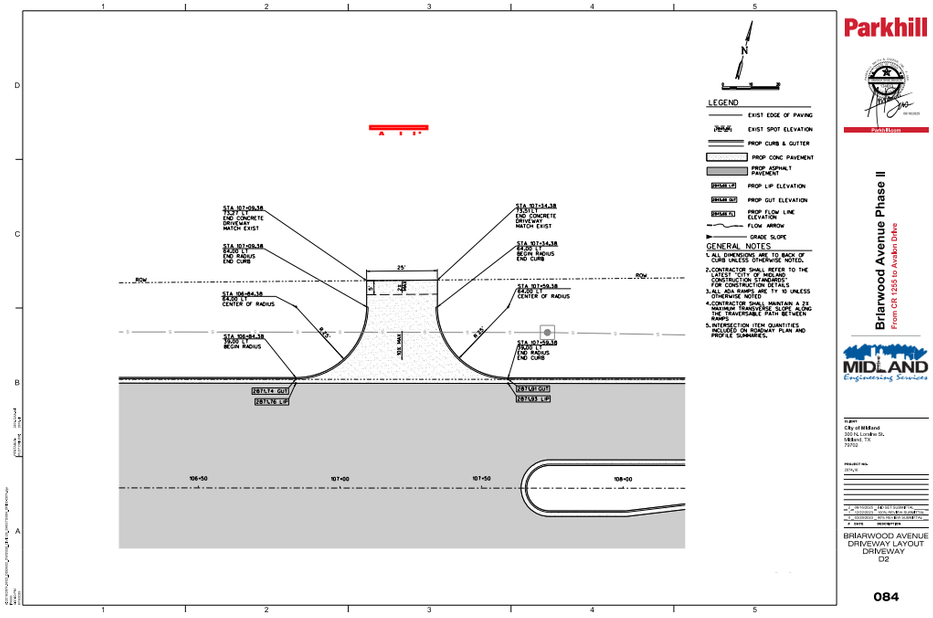
Briarwood Avenue Phase II

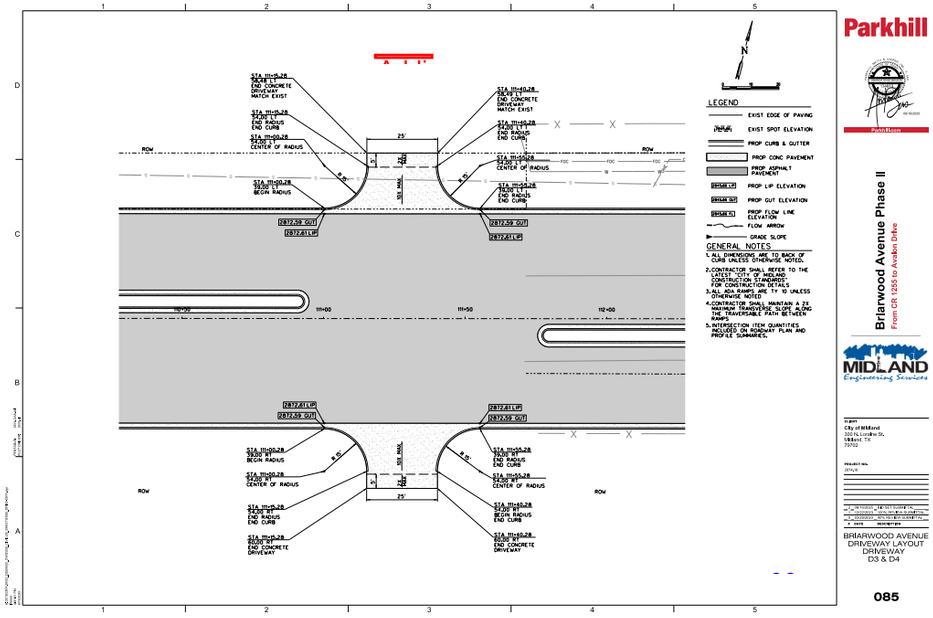
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D1

083


STA 107+09.38
15.2' LT
END CONCRETE
DRIVEWAY
MATCH EXIST
STA 107+09.38
30.00' LT
BEGIN RADIUS
END CURB
STA 106+64.38
25.00' LT
CENTER OF RADIUS
STA 106+84.38
30.00' LT
BEGIN RADIUS
END CURB
STA 107+34.38
15.2' LT
END CONCRETE
DRIVEWAY
MATCH EXIST
STA 107+14.38
30.00' LT
BEGIN RADIUS
END CURB
STA 107+59.38
25.00' LT
CENTER OF RADIUS
STA 107+59.38
30.00' LT
END RADIUS
END CURB
25'
ROW
ROW
45°
45°
101.90'
107+74 GUT
107+76 LIP
107+01 GUT
107+03 LIP
106+50
107+00
107+50
108+00
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
1. ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL REFER TO THE LATEST "CITY OF MIDLAND CONSTRUCTION STANDARDS".
3. ALL ADA RAMPS ARE TY 1 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG THE ACCESSIBLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
John Rowe
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79701
BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D2
084



Parkhill

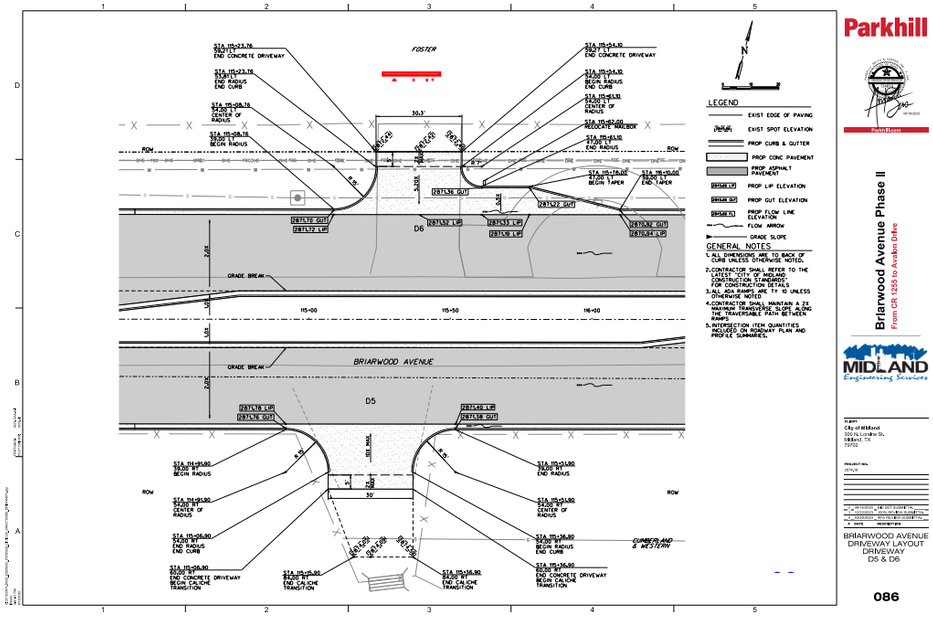
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D3 & D4

085



Parkhill

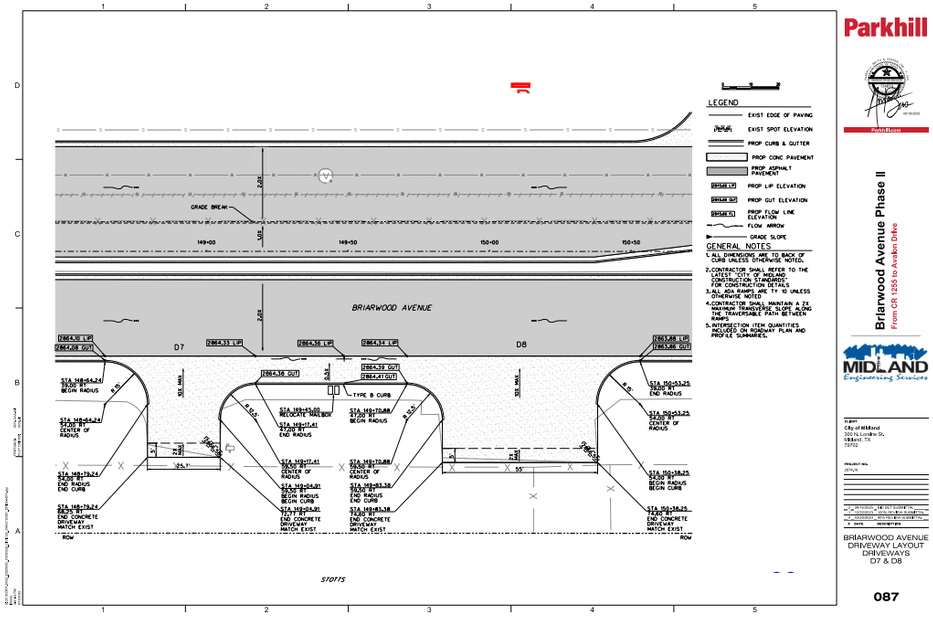
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D5 & D6

086



Parkhill

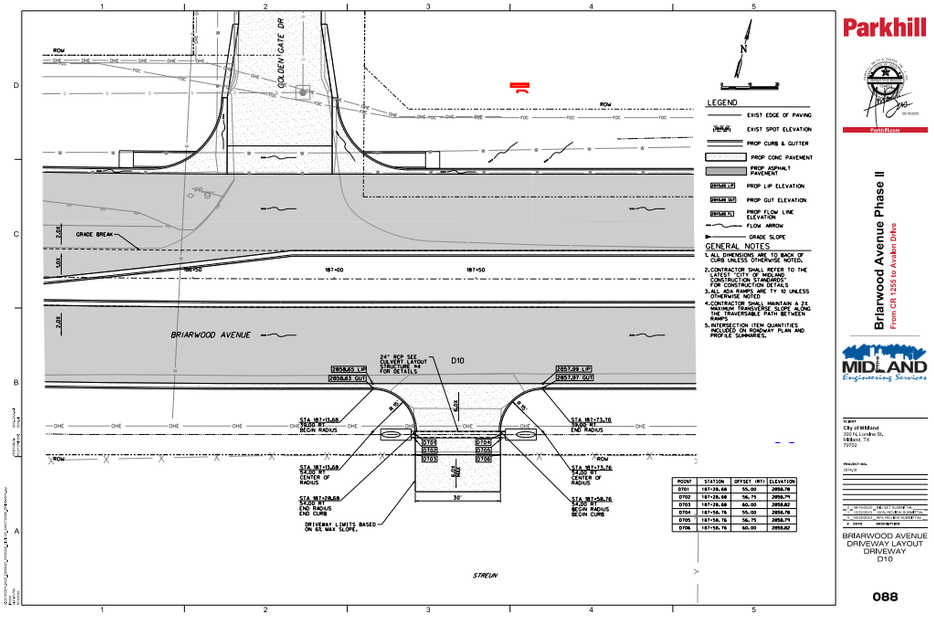
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAYS
D7 & D8

087



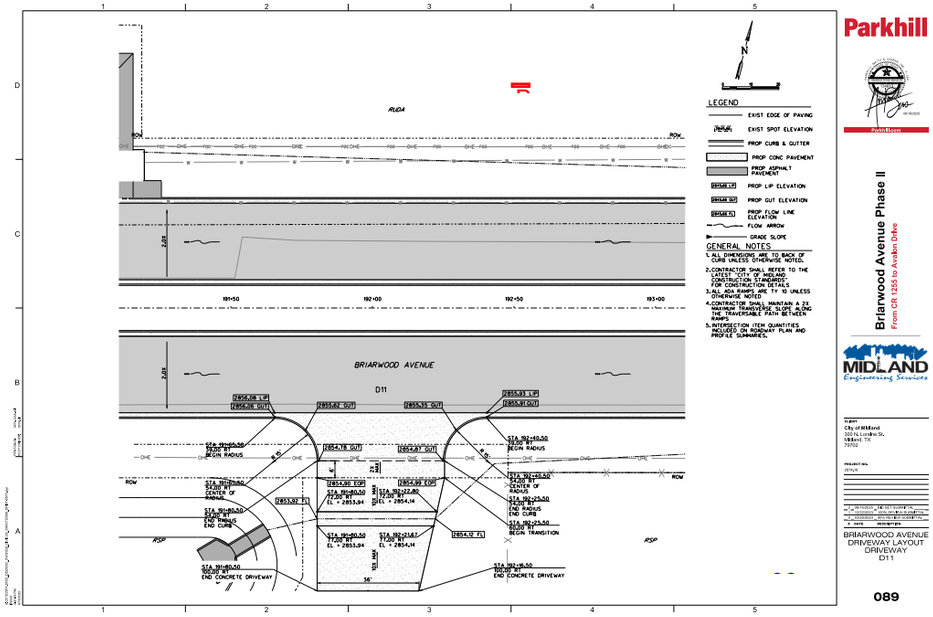
Parkhill

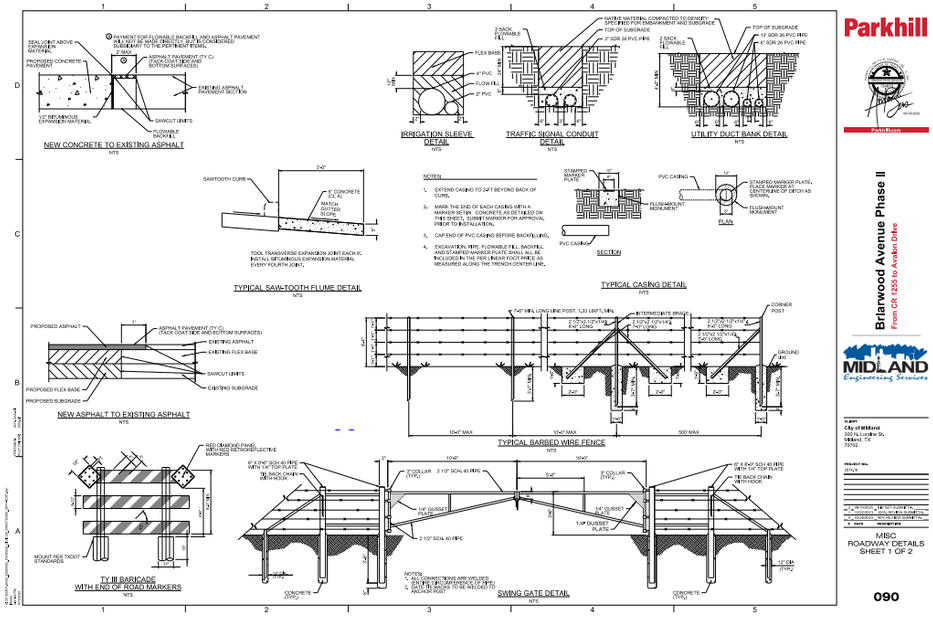
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D10

088


BRIARWOOD AVENUE
D11
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
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5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
BRIARWOOD AVENUE DRIVEWAY LAYOUT DRIVEWAY D11
089



Parkhill

Briarwood Avenue Phase II

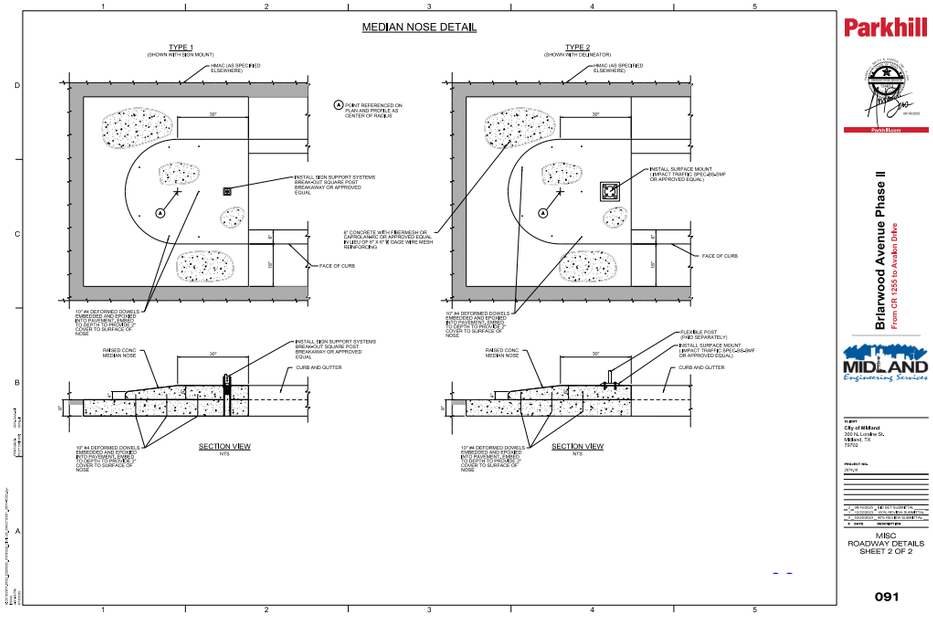
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

MISC
ROADWAY DETAILS
SHEET 1 OF 2

090



Parkhill

Briarwood Avenue Phase II

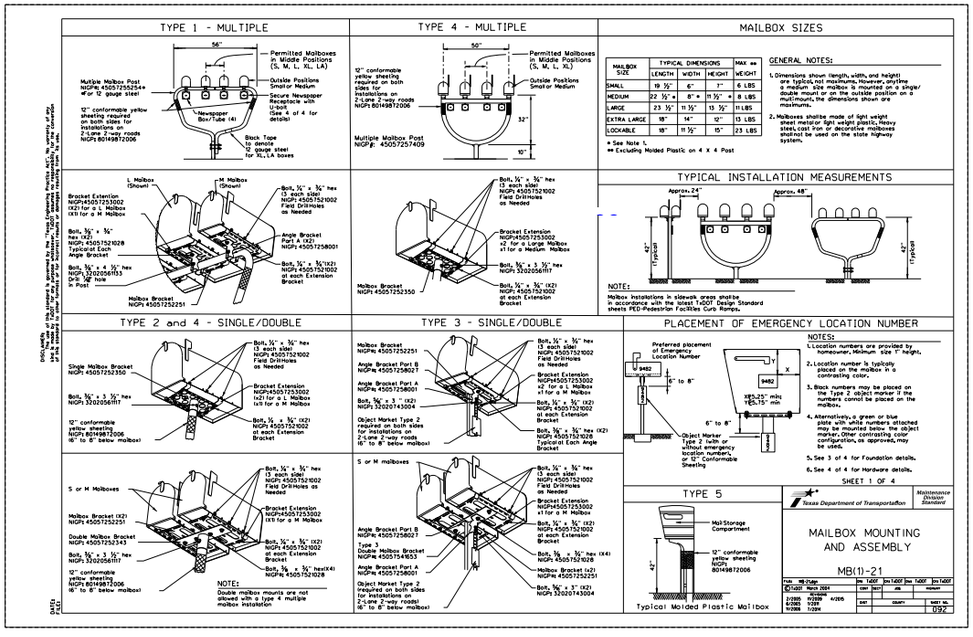
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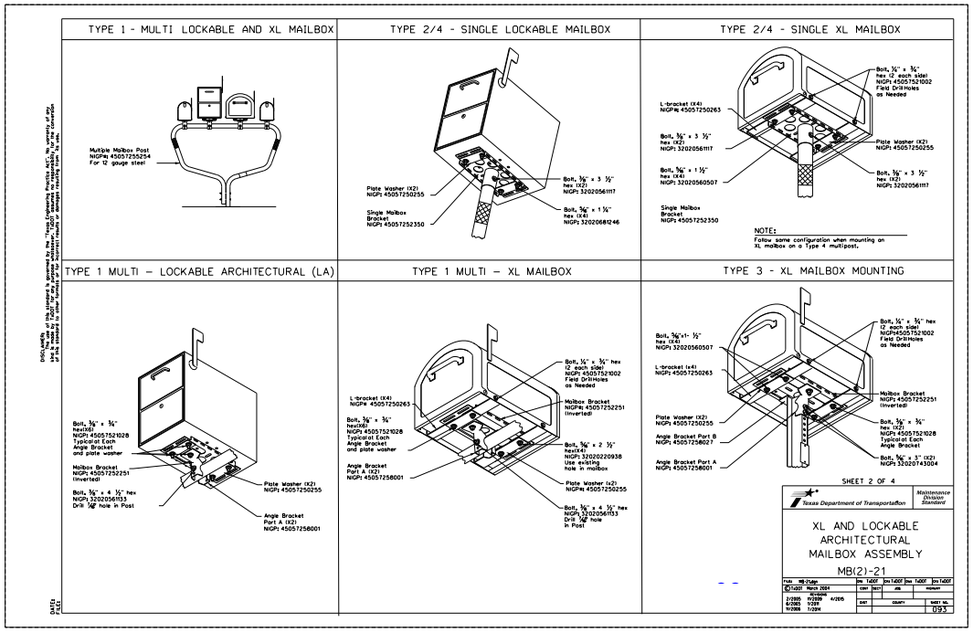
MIDLAND Engineering Services

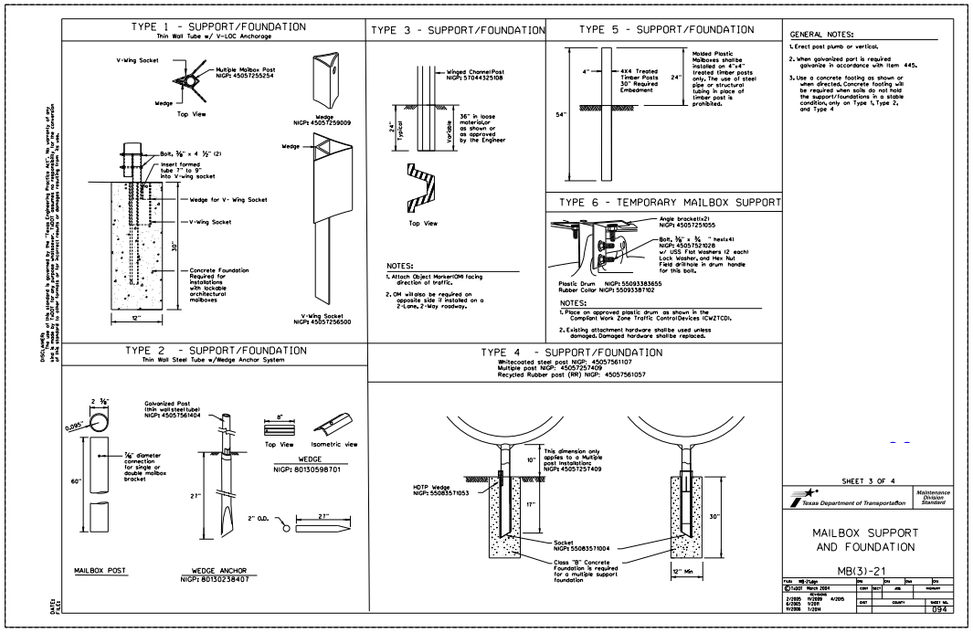
City of Midland
300 N. Loraine St.
Midland, TX
79702

MISC
ROADWAY DETAILS
SHEET 2 OF 2

091


TYPE 1 - MULTIPLE
TYPE 4 - MULTIPLE
MAILBOX SIZES
TYPICAL INSTALLATION MEASUREMENTS
TYPE 2 and 4 - SINGLE/DOUBLE
TYPE 3 - SINGLE/DOUBLE
PLACEMENT OF EMERGENCY LOCATION NUMBER
TYPE 5
Typical Molded Plastic Mailbox
MAILBOX MOUNTING AND ASSEMBLY
MB(1)-21
SHEET 1 OF 4


TYPE 1 - MULTI LOCKABLE AND XL MAILBOX
Multiple Mailbox Post
NIGP#: 45057255254
For 12 gauge steel
TYPE 2/4 - SINGLE LOCKABLE MAILBOX
Plate Washer (X2)
NIGP: 45057250255
Single Mailbox
Bracket
NIGP: 45057252350
Bolt, ⅜" x 3 ½"
hex (X2)
NIGP: 32020561117
Bolt, ⅜" x 1 ½"
hex (X4)
NIGP: 32020681246
TYPE 2/4 - SINGLE XL MAILBOX
L-bracket (X4)
NIGP#: 45057250263
Bolt, ⅜" x 3 ½"
hex (X2)
NIGP: 32020561117
Bolt, ⅜" x 1 ½"
hex (X4)
NIGP: 32020560507
Single Mailbox
Bracket
NIGP: 45057252350
Bolt, ½" x ¾"
hex (2 each side)
NIGP: 45057521002
Field Drill Holes
as Needed
Plate Washer (X2)
NIGP: 45057250255
Bolt, ⅜" x 3 ½"
hex (X2)
NIGP: 32020561117
NOTE:
Follow same configuration when mounting an
XL mailbox on a Type 4 multipost.
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)
Bolt, ⅜" x ¾"
hex(X8)
NIGP: 45057521028
Typical of Each
Angle Bracket
and plate washer
Mailbox Bracket
NIGP: 45057252251
Inverted!
Bolt, ⅜" x 4 ½" hex
NIGP: 32020561113
Drill ⅝" hole in Post
Plate Washer (X2)
NIGP: 45057250255
Angle Bracket
Part A (X2)
NIGP: 45057256001
TYPE 1 MULTI – XL MAILBOX
L-bracket (X4)
NIGP#: 45057250263
Bolt, ⅜" x ¾"
hex(X8)
NIGP: 45057521028
Typical of Each
Angle Bracket
and plate washer
Angle Bracket
Part A (X2)
NIGP: 45057256001
Bolt, ½" x ¾" hex
(2 each side)
NIGP: 45057521002
Field Drill Holes
as Needed
Mailbox Bracket
NIGP#: 45057252251
Inverted!
Bolt, ⅜" x 2 ½"
hex(X4)
NIGP: 32020220938
Use existing
hole in mailbox
Plate Washer (x2)
NIGP#: 45057250255
Bolt, ⅜" x 4 ½" hex
NIGP: 32020561113
Drill ⅝" hole
in Post
TYPE 3 - XL MAILBOX MOUNTING
Bolt, ⅜"x1- ½"
hex (X4)
NIGP: 32020560507
L-bracket (x4)
NIGP: 45057250263
Plate Washer (X2)
NIGP: 45057250255
Angle Bracket Part B
NIGP: 45057258027
Angle Bracket Part A
NIGP: 45057258001
Bolt, ½" x ¾" hex
(2 each side)
NIGP#45057521002
Field Drill Holes
as Needed
Mailbox Bracket
NIGP: 45057252251
Inverted!
Bolt, ⅜" x ¾"
hex (X2)
NIGP: 45057521028
Typical of Each
Angle Bracket
Bolt, ⅜" x 3" (X2)
NIGP: 32020743004
SHEET 2 OF 4
Texas Department of Transportation
Maintenance Division Standard
XL AND LOCKABLE
ARCHITECTURAL
MAILBOX ASSEMBLY
MB(2)-21
DATE
FILE


TYPE 1 - SUPPORT/FOUNDATION
Thin Wall Tube w/ V-LOC Anchorage
V-Wing Socket
Multiple Mailbox Post NIGP: 45057255234
Wedge
Top View
Wedge NIGP: 45057259009
Wedge
Bolt, ⅜" x 4 ½" (2)
Insert formed tube 7" to 9" into V-wing socket
Wedge for V- Wing Socket
V-Wing Socket
30"
Concrete Foundation Required for installations with lockable architectural mailboxes
12"
V-Wing Socket NIGP: 45057256500
TYPE 3 - SUPPORT/FOUNDATION
Winged ChannelPost NIGP: 51044325108
42" typical
36" in loose material or as approved by the Engineer
Top View
NOTES:
1. Attach Object Marker/OM facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.
TYPE 5 - SUPPORT/FOUNDATION
4"
4X4 Treated Timber Posts 30" Required Embedment
24"
54"
Molded Plastic Mailboxes shall be installed on 4"x4" treated timber posts only. The use of steel pipe or structural tubing in place of timber post is prohibited.
TYPE 6 - TEMPORARY MAILBOX SUPPORT
Angle bracket(s)(2) NIGP: 45057259055
Bolt, ⅜" x ¾" - 7 reqd.(4) NIGP: 45057257828 w/ USS Flat washers (2 each) Lock washer, and Hex Nut Field drill hole in drum handle for this bolt.
Plastic Drum Rubber Collar NIGP: 55093383655 NIGP: 55093387102
NOTES:
1. Place an approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.
GENERAL NOTES:
1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support foundations in a stable condition, only on Type 1, Type 2, and Type 4
TYPE 2 - SUPPORT/FOUNDATION
Thin Wall Steel Tube w/Wedge Anchor System
2 ½"
0.095"
Galvanized Post (thin wall steel tube) NIGP: 45057561404
⅝" diameter connection for single or double mailbox bracket
60"
27"
MAILBOX POST
WEDGE ANCHOR NIGP: 80130238407
6"
Top View
Isometric view
WEDGE NIGP: 80130598701
2" O.D.
27"
TYPE 4 - SUPPORT/FOUNDATION
Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057
HDTP Wedge NIGP: 55083571053
This dimension only applies to a Multiple post installation NIGP: 45057257409
10"
17"
Socket NIGP: 55083571004
Class "B" Concrete Foundation is required for a multiple support foundation
30"
12" Min
SHEET 3 OF 4
Texas Department of Transportation
Maintenance Division Standard
MAILBOX SUPPORT AND FOUNDATION
MB(3)-21
FILE: MB21x8pi
DATE: 7/2021 March 2024
CONT SECT JOB HIGHWAY
2105S 9339 6005
6290S 1039
9170S 1039
DIST COUNTY SHEET NO.
09E

TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Positions S, M, L, XL, or LA Inside Positions S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M, L, XL, or LA	SS, SM, or MM	Outside Position: S or M Inside Position: S, M, L, or XL	Molded Plastic	S, or M
Mailbox Post NIGP #	45057255254 (Galvanized Multiple)	45057561404 (Thin Walled Gavanize)	57044325108 (Wing Channel Post)	45057561107 (Thin walled white powder coated) 45057561057 (Recycled Rubber Post: S or M only)	45057561107 (Thin Walled White Powder Coated)	45057257409 (White Powder Coated Multiple)	4x4 Timber	Construction Barrel
Post and Mailbox Hardware NIGP #	45057259009 (Wedge) 45057256500 (V-Wing Socket) 45057253002 (Bracket Extension) 45057253251 (Mailbox Bracket) 45057258001 (Part A Angle Bracket x2) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	80130598701 (Wedge) 80130238407 (Wedge Anchor) 45057253002 (Bracket Extension) 45057253343 (Double MB Bracket) 45057253250 (S. Mailbox Bracket) 45057253251 (Mailbox Bracket) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket forXL x4)	45057541653 (Type 3 Double Mailbox Bracket) 45057253251 (Mailbox Bracket) 45057253002 (Bracket Extension) 45057258001 (Part A Angle Bracket) 45057258027 (Part B Angle Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253350 (Single Mailbox Bracket) 45057253002 (Bracket Extension) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252343 (Double Mount Bracket) 45057252251 (Mailbox Bracket x2)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252350 (Single Mount Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	None	45057251055 Angle Bracket (x2)
Foundation Used	Class B Concrete (Required for LA Mailboxes)	Class B Concrete (Required for LA Mailboxes)	None	Class B Concrete (not used with recycled rubber post, required for LA Mailboxes)	Class B Concrete (not required)	Class B Concrete	None	None



NIGP: 45057250263

L-Bracket x4 for XL sized mailboxes

NIGP: 45057252343

Double Mailbox Bracket
For Type 2 and Type 4 double mount

NIGP: 45057252350

Single Mailbox Bracket
For Type 2 single and for Type 4 single and multi mount



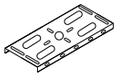
NIGP: 45057258001

Part "A" Angle Bracket
For Type 1 multi (2 per mailbox) and Type 3 single and double



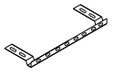
NIGP: 45057251055

Type 6 Angle Bracket
(2 per mailbox)



NIGP: 45057252251

Mailbox Bracket
For Type 1 multi and any double mount (use 2)



NIGP: 45057253002

Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



NIGP: 45057258027

Part "B" Angle Bracket
For Type 3 single and double



NIGP: 80130598701

Wedge for Type 2



NIGP: 45057250255

Plate Washer for Architecural and XL Mailboxes



NIGP: 45057541653

Type 3 double mailbox bracket



NIGP: 55083571053

Type 4 Mailbox Wedge



NIGP: 55083571004

Type 4 Mailbox Socket



NIGP: 80130238407

Type 2 wedge Anchor



NIGP: 45057259009

Wedge for Type 1 V-wing Socket



NIGP: 45057256500

V-wing Socket for Type 1 Foundation

NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 OM 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 OM 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Reflective Yellow Sheeting for Flexible Posts

NOTES:

1. Type 2 object marker in accordance with Traffic Engineering Standard Delineators & Object Markers.
2. A light weight receptacle for newspaper delivery can be attached to mailbox posts if the receptacle does not touch the mailbox presented to traffic or delivery of the mail, excluding except as to location on mailbox, or display advertising, except the publication title.

BID CODES FOR CONTRACTS

MB-(X) ASSM TY (XXX) (X)

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- MP = Molded Plastic

Type of Post
- WC = Winged Channel Post
- RW = Recycled Rubber
- TWW = Thin Walled White Tubing
- TWG = Thin Walled Galvanized Tubing
- TIM = Timber

Type of Foundation
- Ty 1 = V-Loc
- Ty 2 = Wedge Anchor Steel System
- Ty 3 = Winged Channel post
- Ty 4 = Wedge Anchor Plastic System
- Ty 5 = 4 X 4 Post

SHEET 4 OF 4

Texas Department of Transportation — Maintenance Division Standard

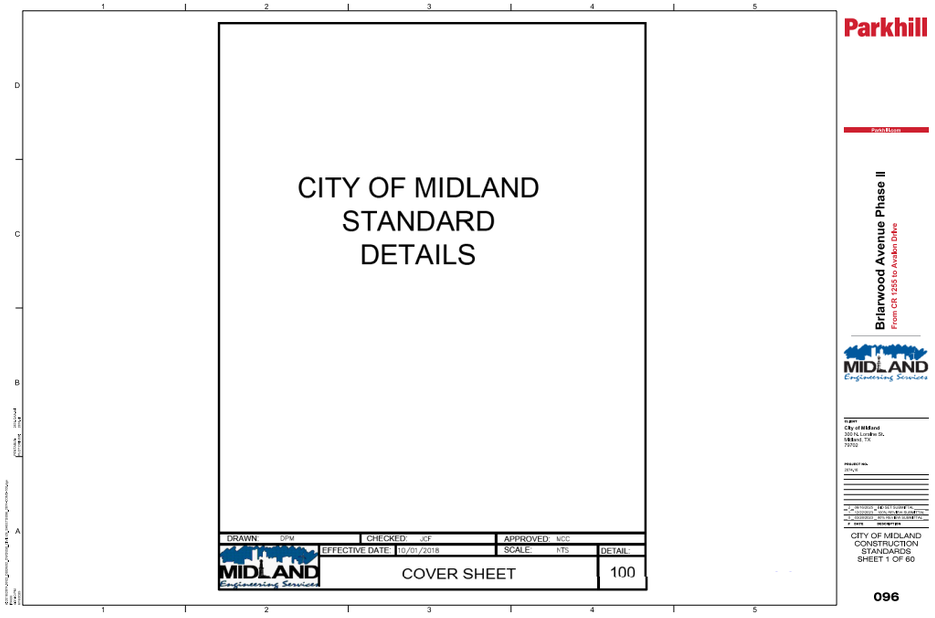
NIGP PARTS LIST AND COMPATIBILITY

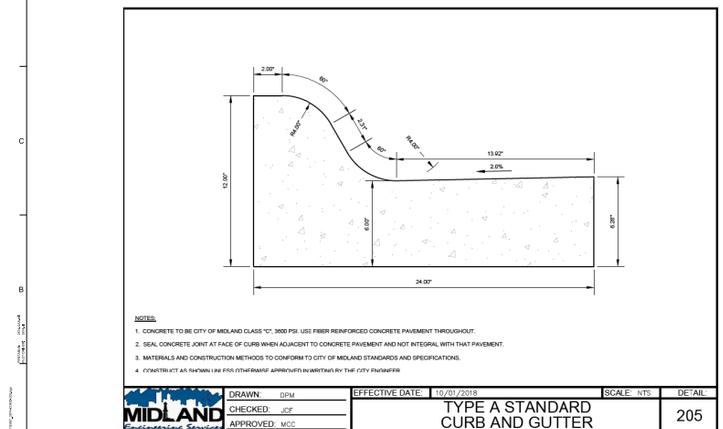
MB(4)-21

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©TxDOT March 2024		CONT	SECT	JOB	HIGHWAY
DATE: 2/2005	GAME: TXDOT				
6/2005	TXDOT				
9/2006	TXDOT	DIST	COUNTY		SHEET NO.
					0297

DATES / FILES

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CITY OF MIDLAND
STANDARD
DETAILS
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL
MIDLAND
Engineering Services
COVER SHEET
100
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND
Engineering Services
CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 1 OF 60
096



NOTES:

1. CONCRETE TO BE CITY OF MIDLAND CLASS "C", 3600 PSI, USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT.
2. SEAL CONCRETE JOINT AT FACE OF CURB WHEN ADJACENT TO CONCRETE PAVEMENT AND NOT INTEGRAL WITH THAT PAVEMENT.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONTRACTOR AS SHOWN LINE FOR OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER

MIDLAND Engineering Services	DRAWN: BPM CHECKED: JCF APPROVED: MCC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS
TYPE A STANDARD CURB AND GUTTER			DETAIL: 205

Parkhill

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

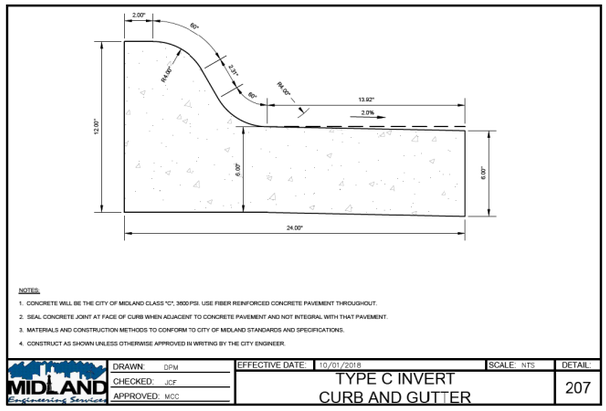
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007419

#	DATE	DESCRIPTION

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 2 OF 60

097



NOTES:

1. CONCRETE WILL BE THE CITY OF MIDLAND CLASS "C", 3600 PSI. USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT.
2. SEAL CONCRETE JOINT AT FACE OF CURB WHEN ADJACENT TO CONCRETE PAVEMENT AND NOT INTEGRAL WITH THAT PAVEMENT.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MCC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL: 207
		TYPE C INVERT CURB AND GUTTER		

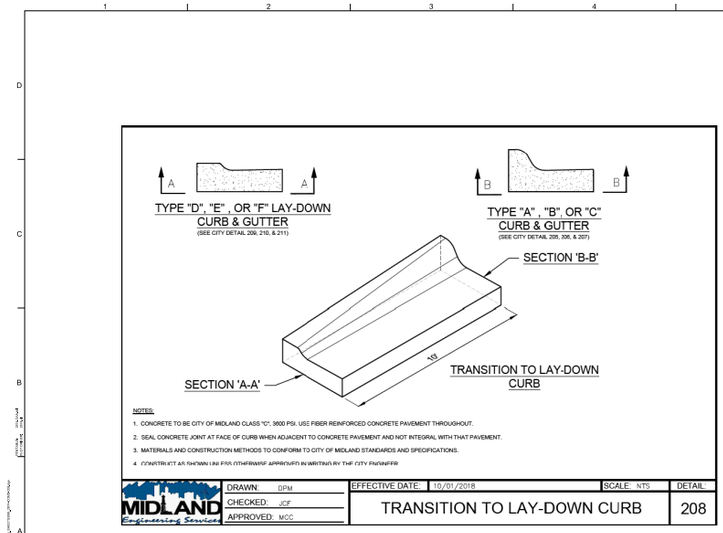
Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 3 OF 60

098



Parkhill

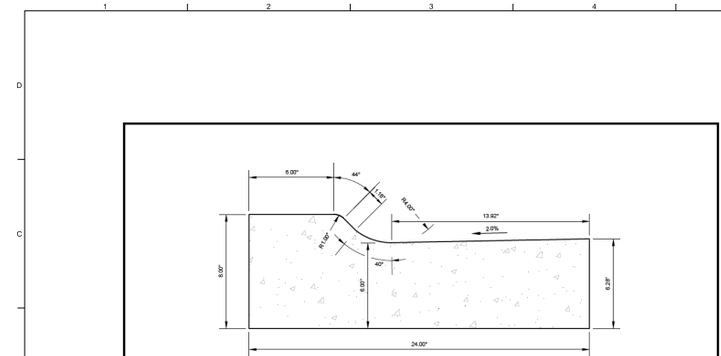
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 4 OF 60

099



NOTES:

1. CONCRETE WILL BE THE CITY OF MIDLAND CLASS "C", 3600 PSI. USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT.
2. SEAL CONCRETE JOINT AT FACE OF CURB WHEN ADJACENT TO CONCRETE PAVEMENT AND NOT INTEGRAL WITH THAT PAVEMENT.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MSC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL: 209
		TYPE D LAY-DOWN CURB AND GUTTER		

Parkhill

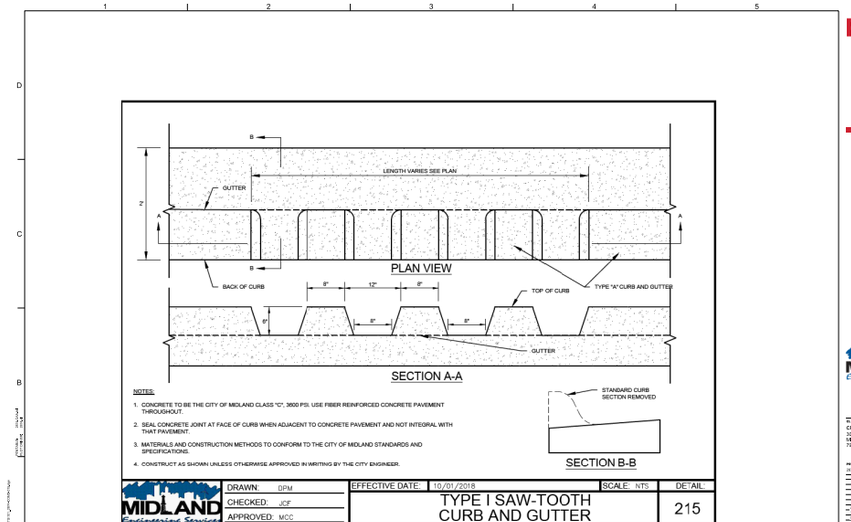
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 5 OF 60

100



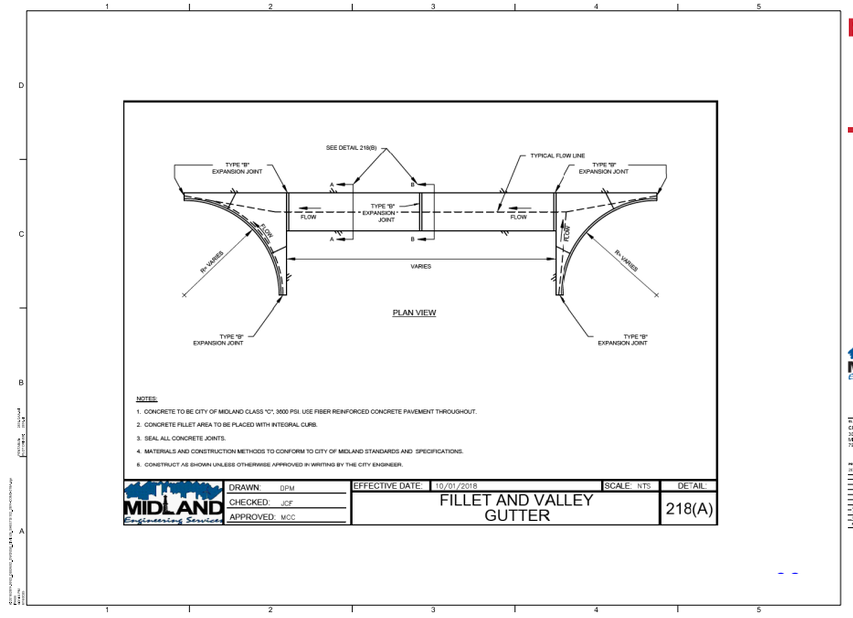
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Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION STANDARDS
SHEET 6 OF 60

101



NOTES:

1. CONCRETE TO BE CITY OF MIDLAND CLASS "C", 3600 PSI. USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT.
2. CONCRETE FILLET AREA TO BE PLACED WITH INTEGRAL CURB.
3. SEAL ALL CONCRETE JOINTS.
4. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
6. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

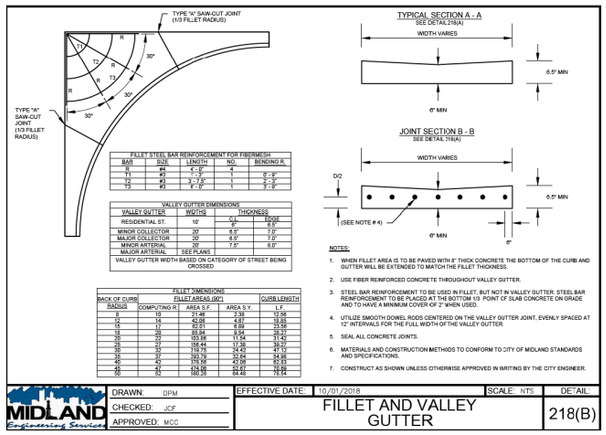
DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	FILLET AND VALLEY GUTTER		218(A)
APPROVED: MCC			

Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 7 OF 60

102



FILLET STEEL BAR REINFORCEMENT FOR FIBERMESH

BAR	SIZE	LENGTH	NO.	BENDING R.
T1	#4	4'-0"	1	6"-0"
T2	#3	4'-0"	1	3"-0"
T3	#3	3'-7.5"	1	2"-3"
T3	#3	4'-0"	1	3"-0"

VALLEY GUTTER DIMENSIONS

VALLEY GUTTER	WIDTH	THICKNESS	
		C.L.	EDGE
RESIDENTIAL ST.	10'	6.5"	7.0"
MINOR COLLECTOR	20'	6.5"	7.0"
MAJOR COLLECTOR	20'	6.5"	7.0"
MINOR ARTERIAL	20'	7.5"	8.0"
MAJOR ARTERIAL	SEE PLANS		

VALLEY GUTTER WIDTH BASED ON CATEGORY OF STREET BEING CROSSED

FILLET DIMENSIONS

BACK OF CURB RADIUS	FILLET AREAS (SF)			CURB LENGTH
	COMPUTING R.	AREA S.F.	AREA S.Y.	L.F.
6	10	21.46	2.39	12.58
12	14	42.96	4.87	18.65
15	17	42.61	6.69	23.56
18	20	85.84	9.54	28.27
20	22	103.68	11.74	31.42
25	27	156.44	14.45	39.27
30	32	192.73	17.25	47.12
35	37	282.79	22.64	54.98
40	42	370.56	42.96	62.83
45	47	474.66	52.67	70.68
50	52	588.39	64.48	78.54

NOTES:

1. WHEN FILLET AREA IS TO BE PAVED WITH 6" THICK CONCRETE THE BOTTOM OF THE CURB AND GUTTER WILL BE EXTENDED TO MATCH THE FILLET THICKNESS.
2. USE FIBER REINFORCED CONCRETE THROUGHOUT VALLEY GUTTER.
3. STEEL BAR REINFORCEMENT TO BE USED IN FILLET, BUT NOT IN VALLEY GUTTER. STEEL BAR REINFORCEMENT TO BE PLACED AT THE BOTTOM 1/3 POINT OF SLAB CONCRETE ON GRADE AND TO HAVE A MINIMUM COVER OF 2" WHEN USED.
4. UTILIZE SMOOTH DOWEL RODS CENTERED ON THE VALLEY GUTTER JOINT, EVENLY SPACED AT 12" INTERVALS FOR THE FULL WIDTH OF THE VALLEY GUTTER.
5. SEAL ALL CONCRETE JOINTS.
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MCC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL: 218(B)
		FILLET AND VALLEY GUTTER		

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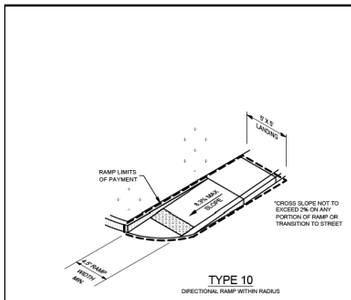
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 8 OF 60

103



TYPE 10

DIRECTIONAL RAMP WITHIN RADIUS

CURB RAMP NOTES:

1. ADJUST CURB RAMP LOCATION AND OR TYPE SO THAT NO OBSTRUCTION IS LOCATED WITHIN THE LANDING AREA.
2. ALL SLOPES ARE MAXIMUM ALLOWABLE. THE LEAST POSSIBLE SLOPE SHALL BE USED.
3. LANDINGS SHALL BE 5'X 5' MINIMUM WITH A MAXIMUM 2% SLOPE IN ANY DIRECTION. WHERE OBSTRUCTIONS EXIST, THERE SHALL BE A 3' MINIMUM CLEARANCE IN WIDTH AND LENGTH OF THE LANDING.
4. MANEUVERING SPACE AT THE BOTTOM OF CURB RAMPS SHALL BE A MINIMUM OF 4'X4' WHOLLY CONTAINED WITHIN THE CROSSWALK AND TO THE ENTIRE OUTSIDE OF THE PARALLEL VEHICULAR TRAVEL PATH.
5. MAXIMUM ALLOWABLE CROSS SLOPE ON SIDEWALK AND CURB RAMP SURFACES IS 2%.
6. CURB RAMPS WITH RETURNED CURBS MAY BE USED ONLY WHERE PEDESTRIANS WOULD NOT NORMALLY WALK ACROSS THE RAMP, EITHER BECAUSE THE ADJACENT SURFACE IS PLANTING OR OTHER NON-WALKING SURFACE OR BECAUSE THE SIDE APPROACH IS SUBSTANTIALLY OBSTRUCTED. OTHERWISE, PROVIDE FLARED SIDES.
7. ADDITIONAL INFORMATION ON CURB RAMP LOCATION, DESIGN, LIGHT REFLECTIVE VALUE AND TEXTURE MAY BE FOUND IN THE CURRENT EDITION OF THE TEXAS ACCESSIBILITY STANDARDS (TAS) AND 16 TAC 68.102.
8. AT INTERSECTIONS WHERE CROSSWALK MARKINGS ARE NOT REQUIRED, CURB RAMPS SHALL BE ALIGNED WITH THEORETICAL CROSSWALKS,OR AS DIRECTED BY THE ENGINEER.
9. PROVIDE A SMOOTH TRANSITION WHERE THE CURB RAMPS CONNECT TO THE STREET.
10. FLARE SLOPE SHALL NOT EXCEED 10% MEASURED ALONG CURB LINE.
11. ALL RAMPS AND LANDINGS WITH A CONCRETE SURFACE SHALL HAVE A COURSE BROOM FINISH OR OTHER ROUGH NON-SKID TYPE FINISH AS APPROVED BY THE ENGINEER.
12. PLACE 6"-0F CONCRETE IN RAMPS, LANDINGS, AND FLARES THAT ARE LOCATED AT THE RETURNS ADJACENT TO THE BACK OF CURB OF ARTERIAL STREETS AND COMMERCIAL SITES.

GENERAL NOTES:

1. CONCRETE TO BE CITY OF MIDLAND CLASS "A" WITH A MINIMUM28 DAY COMPRESSION STRENGTH OF 3000 PS. USE FIBER REINFORCED CONCRETE THROUGHOUT.
2. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO THE CITY OF MIDLAND STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE DIRECTED BY ADA STANDARDS AND RESOURCES.

DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	DIRECTIONAL RAMP WITHIN RADIUS		231
APPROVED: MCC			

Parkhill

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 19 OF 60

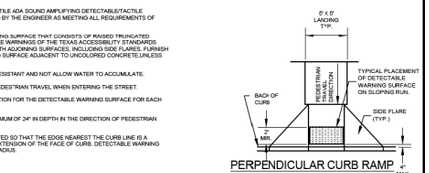
104

DETECTABLE WARNING SURFACE NOTES:

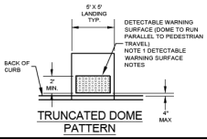
1. DETECTABLE WARNING SURFACE SUCH AS ARMOR-TILE ADA SOUND AMPLIFYING DETECTABLE/TACTILE WARNING SURFACE TILE OR EQUAL AND APPROVED BY THE ENGINEER AS MEETING ALL REQUIREMENTS OF ASTM C-936, C-33.
2. CURB RAMPS MUST CONTAIN A DETECTABLE WARNING SURFACE THAT CONSISTS OF RAISED TRUNCATED DOMES COMPLYING WITH SECTION 7.08 DETACHABLE WARNINGS OF THE TEXAS ACCESSIBILITY STANDARDS (TAS). THE SURFACE MUST CONTRAST VISUALLY WITH ADJOINING SURFACES, INCLUDING SIDE FLARES. FURNISH DARK BROWN OR DARK RED DETECTABLE WARNING SURFACE ADJACENT TO UNCOLORED CONCRETE,UNLESS SPECIFIED ELSEWHERE IN THE PLANS.
3. DETECTABLE WARNING SURFACES MUST BE SLIP RESISTANT AND NOT ALLOW WATER TO ACCUMULATE.
4. ALIGN TRUNCATED DOMES IN THE DIRECTION OF PEDES"RIAN TRAVEL WHEN ENTERING THE STREET.
5. SHADED AREAS INDICATE THE APPROXIMATE LOCATION FOR THE DETECTABLE WARNING SURFACE FOR EACH CURB RAMP TYPE.
6. DETECTABLE WARNING SURFACES SHALL BE A MINIMUM OF 24" IN DEPTH IN THE DIRECTION OF PEDESTRIAN TRAVEL.
7. DETECTABLE WARNING SURFACES SHALL BE LOCATED SO THAT THE EDGE NEAREST THE CURB LINE IS A MINIMUM OF 6" AND A MAXIMUM OF 15" FROM THE EXTENSION OF THE FACE OF CURB. DETECTABLE WARNING SURFACES MAY BE CURVED ALONG THE CORNER RADIUS.
8. SINGLE TILE PLATES COLONIAL RED COLOR.

GENERAL NOTES:

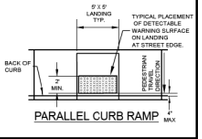
1. CONCRETE TO BE CITY OF MIDLAND CLASS "A" WITH A MINIMUM 28 DAY COMPRESSION STRENGTH OF 3000 PSI. USE FIBER REINFORCED CONCRETE THROUGHOUT.
2. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO THE CITY OF MIDLAND STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE DIRECTED BY ADA STANDARDS AND RESOURCES.



PERPENDICULAR CURB RAMP



TRUNCATED DOME PATTERN



PARALLEL CURB RAMP

DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL
CHECKED: JCF	DETECTABLE WARNING SURFACE		233
APPROVED: MCC			

Parkhill

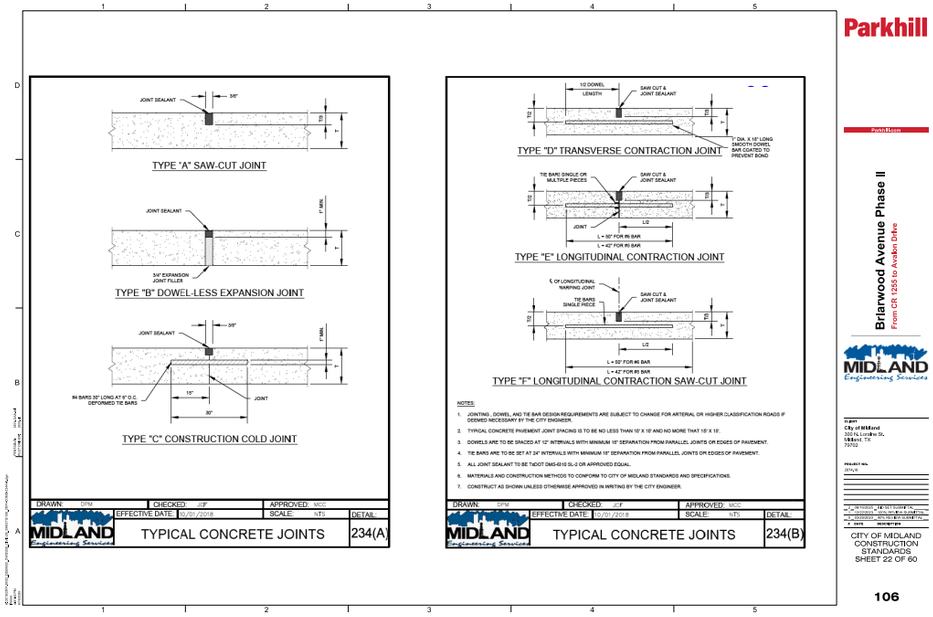
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

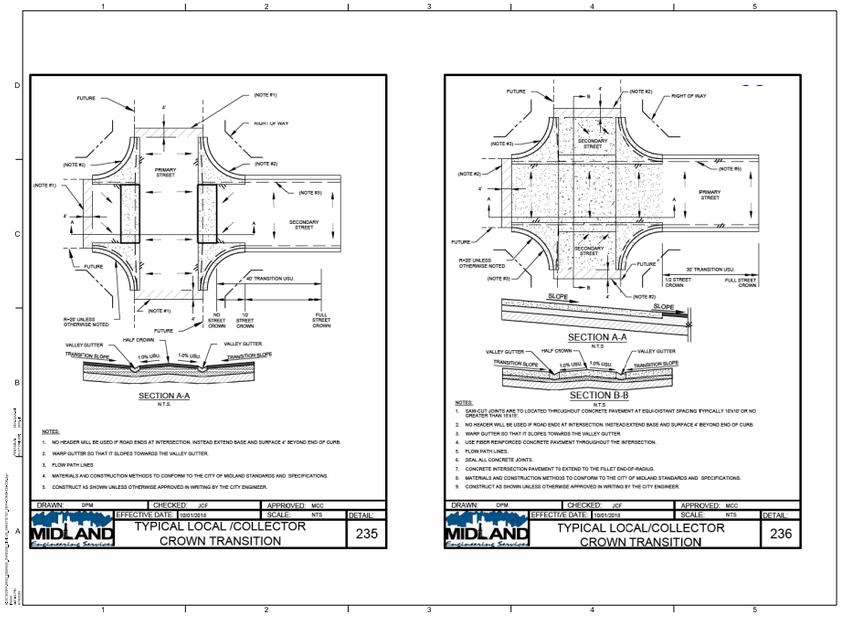
MIDLAND Engineering Services

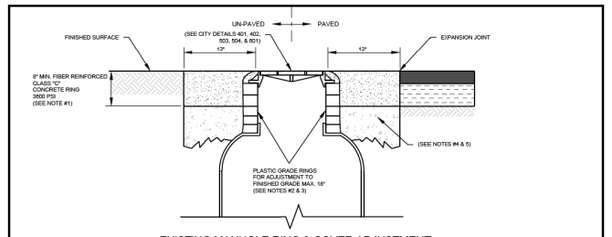
City of Midland
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Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 21 OF 60

105


JOINT SEALANT
3/8"
T/3
T
TYPE "A" SAW-CUT JOINT
JOINT SEALANT
1" MIN.
T
3/4" EXPANSION JOINT FILLER
TYPE "B" DOWEL-LESS EXPANSION JOINT
JOINT SEALANT
3/8"
1" MIN.
#4 BARS 30" LONG AT 6' O.C. DEFORMED TIE BARS
15"
30"
JOINT
TYPE "C" CONSTRUCTION COLD JOINT
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL: 234(A)
MIDLAND Engineering Services
TYPICAL CONCRETE JOINTS
1/2 DOWEL LENGTH
SAW CUT & JOINT SEALANT
T/2
T/3
T
1" DIA. X 18" LONG SMOOTH DOWEL BAR COATED TO PREVENT BOND
TYPE "D" TRANSVERSE CONTRACTION JOINT
TIE BARS SINGLE OR MULTIPLE PIECES
SAW CUT & JOINT SEALANT
T/2
T/3
T
JOINT
L/2
L = 50" FOR #5 BAR
L = 42" FOR #4 BAR
TYPE "E" LONGITUDINAL CONTRACTION JOINT
℄ OF LONGITUDINAL WARPING JOINT
TIE BARS SINGLE PIECE
SAW CUT & JOINT SEALANT
T/2
T/3
T
L/2
L = 50" FOR #6 BAR
L = 42" FOR #5 BAR
TYPE "F" LONGITUDINAL CONTRACTION SAW-CUT JOINT
NOTES:
1. JOINTING, DOWEL, AND TIE BAR DESIGN REQUIREMENTS ARE SUBJECT TO CHANGE FOR ARTERIAL OR HIGHER CLASSIFICATION ROADS IF DEEMED NECESSARY BY THE CITY ENGINEER.
2. TYPICAL CONCRETE PAVEMENT JOINT SPACING IS TO BE NO LESS THAN 10' X 10' AND NO MORE THAT 15' X 15'.
3. DOWELS ARE TO BE SPACED AT 12" INTERVALS WITH MINIMUM 15" SEPARATION FROM PARALLEL JOINTS OR EDGES OF PAVEMENT.
4. TIE BARS ARE TO BE SET AT 24" INTERVALS WITH MINIMUM 15" SEPARATION FROM PARALLEL JOINTS OR EDGES OF PAVEMENT.
5. ALL JOINT SEALANT TO BE TxDOT DMS-6310 SL-2 OR APPROVED EQUAL.
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL: 234(B)
MIDLAND Engineering Services
TYPICAL CONCRETE JOINTS
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND CONSTRUCTION STANDARDS SHEET 22 OF 60
106


FUTURE
(NOTE #1)
RIGHT OF WAY
(NOTE #2)
PRIMARY STREET
SECONDARY STREET
R=25' UNLESS OTHERWISE NOTED
40' TRANSITION USU.
NO STREET CROWN
1/2 STREET CROWN
FULL STREET CROWN
HALF CROWN
VALLEY GUTTER
TRANSITION SLOPE
1.0% USU
7.0% USU
SECTION A-A
N.T.S
NOTES:
1. NO HEADER WILL BE USED IF ROAD ENDS AT INTERSECTION. INSTEAD EXTEND BASE AND SURFACE 4' BEYOND END OF CURB.
2. WARP GUTTER SO THAT IT SLOPES TOWARDS THE VALLEY GUTTER.
3. FLOW PATH LINES
4. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO THE CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
5. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
TYPICAL LOCAL /COLLECTOR CROWN TRANSITION
235
SECONDARY STREET
PRIMARY STREET
30' TRANSITION USU.
SLOPE
SECTION B-B
N.T.S
NOTES:
1. SAW-CUT JOINTS ARE TO LOCATED THROUGHOUT CONCRETE PAVEMENT AT EQUI-DISTANT SPACING TYPICALLY 10'x10' OR NO GREATER THAN 15'x15'.
2. NO HEADER WILL BE USED IF ROAD END AT INTERSECTION. INSTEAD EXTEND BASE AND SURFACE 4' BEYOND END OF CURB.
3. WARP GUTTER SO THAT IT SLOPES TOWARDS THE VALLEY GUTTER.
4. USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT THE INTERSECTION.
5. FLOW PATH LINES.
6. SEAL ALL CONCRETE JOINTS.
7. CONCRETE INTERSECTION PAVEMENT TO EXTEND TO THE FILLET END-OF-RADIUS.
8. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO THE CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
9. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
TYPICAL LOCAL/COLLECTOR CROWN TRANSITION
236
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND CONSTRUCTION STANDARDS SHEET 23 OF 60
107



EXISTING MANHOLE RING & COVER ADJUSTMENT

NOTES:

1. INSTALL 12" MIN. FIBER REINFORCED CLASS "C" CONCRETE RING, 3650 PSI, WHEN MANHOLE IS LOCATED IN AN ARTERIAL R.O.W.
2. GRADE RINGS TO MEET ASTM STANDARD A48 AND TO BE 2", 4", OR 6" THICKNESS AS REQUIRED. INSTALL ASPHALT TAR IN THICK, UNIFORM COATING OVER ALL OUTER ADJUSTMENT RING SURFACES AND JOINTS.
3. ENGINEERING SERVICES REPRESENTATIVE AND UTILITY SERVICES REPRESENTATIVE MAY ALLOW GREATER ADJUSTMENT RING DEPTH TO ACCOMMODATE PAVING STRUCTURES.
4. REMOVE ALL MATERIAL EXCAVATED FROM SITE AND EXCAVATION.
5. FILL ANY OVER-EXCAVATION WITH FLOWABLE FILL 2-SACK (2-SACK = 188 LBS/CY, PORTLAND CEMENT).
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MCC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS
		EXISTING MANHOLE RING & COVER ADJUSTMENT	DETAIL: 319

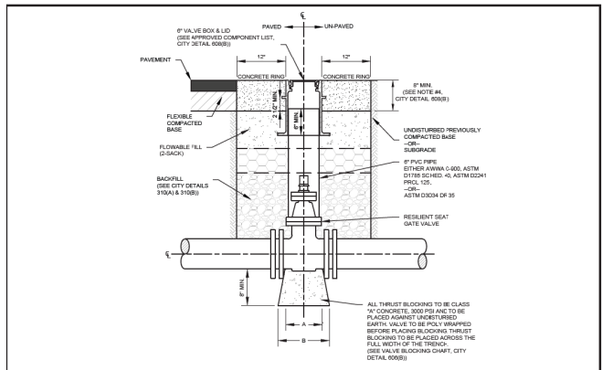
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Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION STANDARDS
SHEET 36 OF 60

108



DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	TYPICAL VALVE AND VALVE BOX		608(A)
APPROVED: MCC			

Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

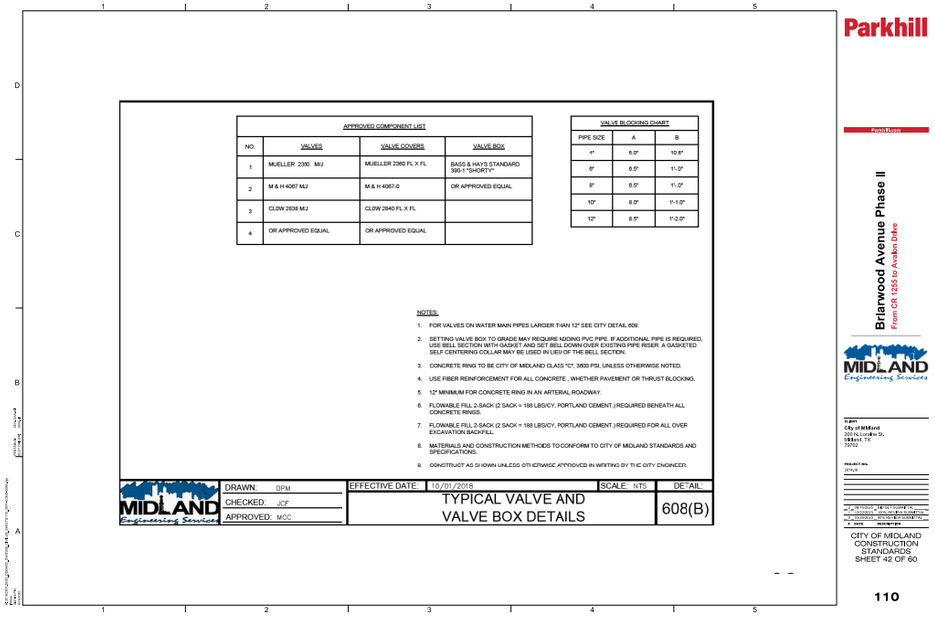
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007419

#	DATE	DESCRIPTION

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 41 OF 60

109



APPROVED COMPONENT LIST			
NO.	VALVES	VALVE COVERS	VALVE BOX
1	MUELLER 2360 MJ	MUELLER 2360 FL X FL	BASS & HAYS STANDARD 300-1 "SHORTY"
2	M & H 4067 MJ	M & H 4067-0	OR APPROVED EQUAL
3	CLOW 2838 MJ	CLOW 2840 FL X FL	
4	OR APPROVED EQUAL	OR APPROVED EQUAL	

VALVE BLOCKING CHART		
PIPE SIZE	A	B
4"	6.0"	10.8"
6"	6.5"	1'-0"
8"	6.5"	1'-3"
10"	8.0"	1'-1.5"
12"	8.5"	1'-2.5"

NOTES:

1. FOR VALVES ON WATER MAIN PIPES LARGER THAN 12" SEE CITY DETAIL 609.
2. SETTING VALVE BOX TO GRADE MAY REQUIRE ADDING PVC PIPE. IF ADDITIONAL PIPE IS REQUIRED, USE BELL SECTION WITH GASKET AND SET BELL DOWN OVER EXISTING PIPE RISER. A GASKETED SELF CENTERING COLLAR MAY BE USED IN LIEU OF THE BELL SECTION.
3. CONCRETE RING TO BE CITY OF MIDLAND CLASS "C", 3600 PSI, UNLESS OTHERWISE NOTED.
4. USE FIBER REINFORCEMENT FOR ALL CONCRETE , WHETHER PAVEMENT OR THRUST BLOCKING.
5. 12" MINIMUM FOR CONCRETE RING IN AN ARTERIAL ROADWAY.
6. FLOWABLE FILL 2-SACK (2 SACK = 188 LBS/CY, PORTLAND CEMENT,) REQUIRED BENEATH ALL CONCRETE RINGS.
7. FLOWABLE FILL 2-SACK (2 SACK = 188 LBS/CY, PORTLAND CEMENT,) REQUIRED FOR ALL OVER EXCAVATION BACKFILL.
8. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
9. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	TYPICAL VALVE AND VALVE BOX DETAILS		608(B)
APPROVED: MCC			

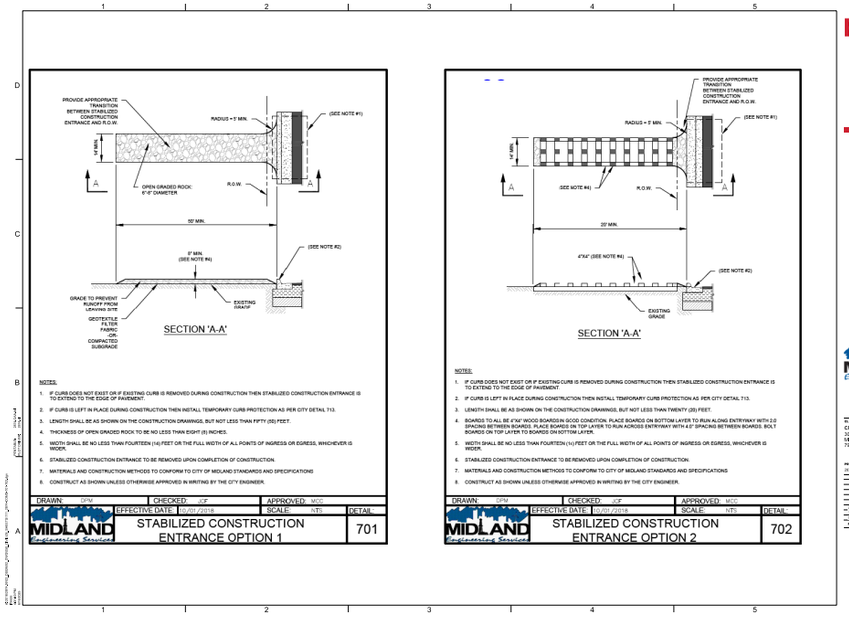
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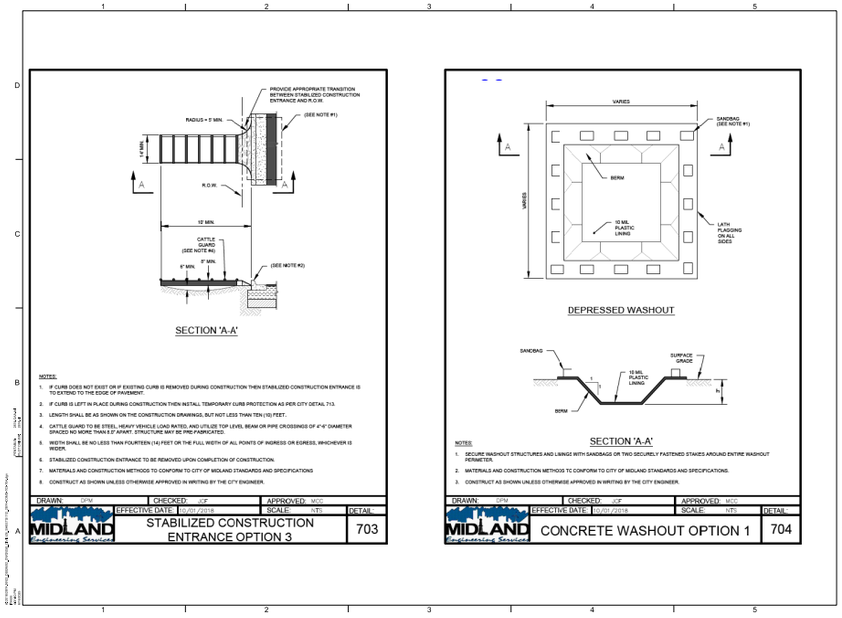
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

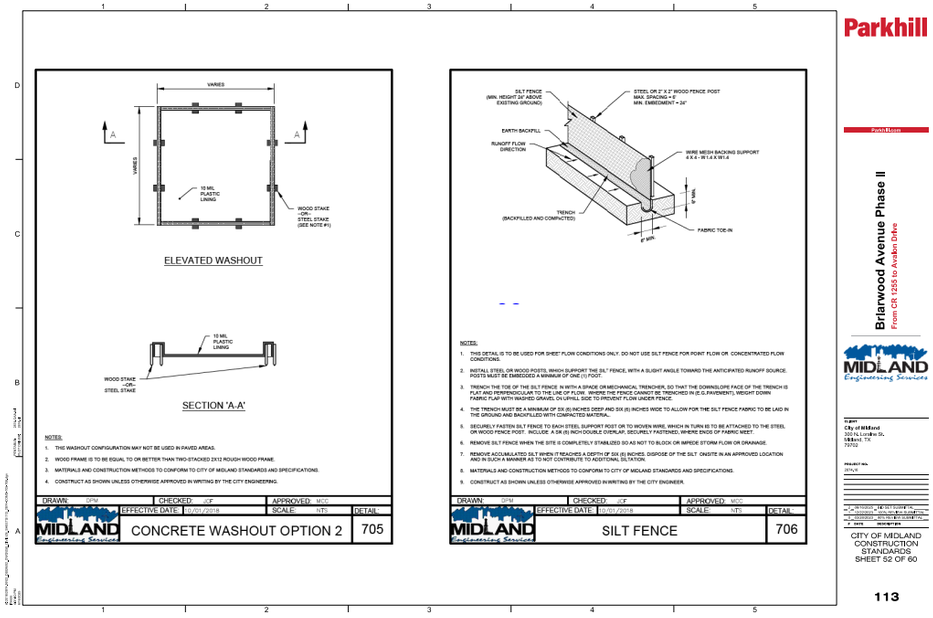
City of Midland
300 N. Loraine St.
Midland, TX
79702

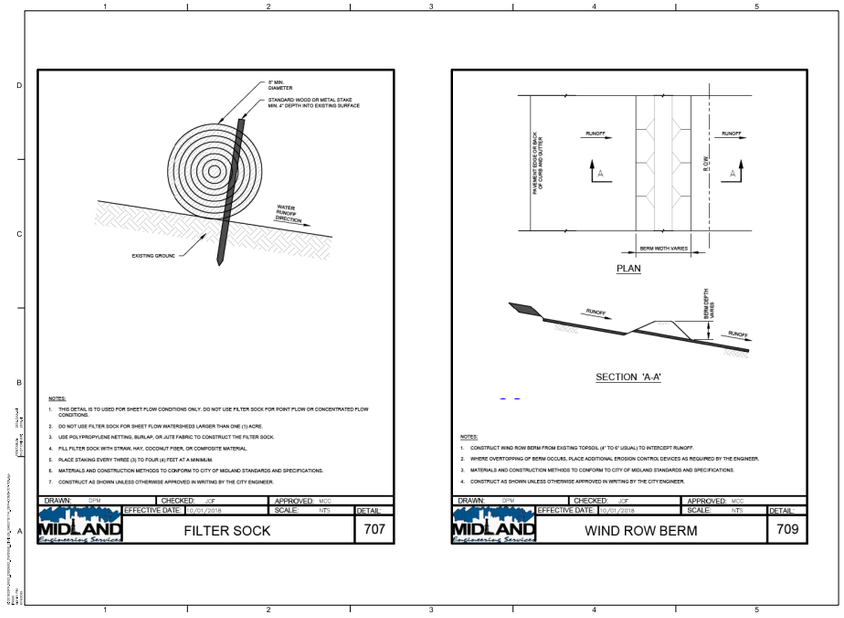
CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 42 OF 60

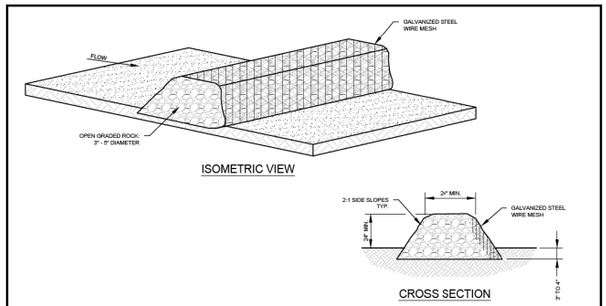
110


PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND R.O.W.
RADIUS = 5' MIN.
(SEE NOTE #1)
6" MIN.
A
OPEN GRADED ROCK: 6"-8" DIAMETER
R.O.W.
50' MIN.
8" MIN. (SEE NOTE #4)
(SEE NOTE #2)
GRADE TO PREVENT RUNOFF FROM LEAVING SITE
EXISTING GRADE
GEOTEXTILE FILTER FABRIC OR COMPACTED SUBGRADE
SECTION 'A-A'
NOTES:
1. IF CURB DOES NOT EXIST OR IF EXISTING CURB IS REMOVED DURING CONSTRUCTION THEN STABILIZED CONSTRUCTION ENTRANCE IS TO EXTEND TO THE EDGE OF PAVEMENT.
2. IF CURB IS LEFT IN PLACE DURING CONSTRUCTION THEN INSTALL TEMPORARY CURB PROTECTION AS PER CITY DETAIL 713.
3. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN FIFTY (50) FEET.
4. THICKNESS OF OPEN GRADED ROCK TO BE NO LESS THAN EIGHT (8) INCHES.
5. WIDTH SHALL BE NO LESS THAN FOURTEEN (14) FEET OR THE FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS, WHICHEVER IS WIDER.
6. STABILIZED CONSTRUCTION ENTRANCE TO BE REMOVED UPON COMPLETION OF CONSTRUCTION.
7. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS
8. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2019
SCALE: NTS
DETAIL: 701
MIDLAND Engineering Services
STABILIZED CONSTRUCTION ENTRANCE OPTION 1
PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND R.O.W.
RADIUS = 5' MIN.
(SEE NOTE #1)
6" MIN.
A
(SEE NOTE #4)
R.O.W.
20' MIN.
4"X4" (SEE NOTE #4)
(SEE NOTE #2)
EXISTING GRADE
SECTION 'A-A'
NOTES:
1. IF CURB DOES NOT EXIST OR IF EXISTING CURB IS REMOVED DURING CONSTRUCTION THEN STABILIZED CONSTRUCTION ENTRANCE IS TO EXTEND TO THE EDGE OF PAVEMENT.
2. IF CURB IS LEFT IN PLACE DURING CONSTRUCTION THEN INSTALL TEMPORARY CURB PROTECTION AS PER CITY DETAIL 713.
3. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN TWENTY (20) FEET.
4. BOARDS TO ALL BE 4"X4" WOOD BOARDS IN GOOD CONDITION. PLACE BOARDS ON BOTTOM LAYER TO RUN ALONG ENTRYWAY WITH 2.0 SPACING BETWEEN BOARDS. PLACE BOARDS ON TOP LAYER TO RUN ACROSS ENTRYWAY WITH 4.0" SPACING BETWEEN BOARDS. BOLT BOARDS ON TOP LAYER TO BOARDS ON BOTTOM LAYER.
5. WIDTH SHALL BE NO LESS THAN FOURTEEN (14) FEET OR THE FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS, WHICHEVER IS WIDER.
6. STABILIZED CONSTRUCTION ENTRANCE TO BE REMOVED UPON COMPLETION OF CONSTRUCTION.
7. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS
8. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2019
SCALE: NTS
DETAIL: 702
MIDLAND Engineering Services
STABILIZED CONSTRUCTION ENTRANCE OPTION 2
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND Engineering Services
CITY OF MIDLAND CONSTRUCTION STANDARDS SHEET 50 OF 60
111


PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND R.O.W.
RADIUS = 5' MIN.
(SEE NOTE #1)
4" MIN.
R.O.W.
12' MIN.
CATTLE GUARD (SEE NOTE #4)
6" MIN.
8" MIN.
(SEE NOTE #2)
SECTION 'A-A'
NOTES:
1. IF CURB DOES NOT EXIST OR IF EXISTING CURB IS REMOVED DURING CONSTRUCTION THEN STABILIZED CONSTRUCTION ENTRANCE IS TO EXTEND TO THE EDGE OF PAVEMENT.
2. IF CURB IS LEFT IN PLACE DURING CONSTRUCTION THEN INSTALL TEMPORARY CURB PROTECTION AS PER CITY DETAIL 713.
3. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN TEN (10) FEET.
4. CATTLE GUARD TO BE STEEL, HEAVY VEHICLE LOAD RATED, AND UTILIZE TOP LEVEL BEAM OR PIPE CROSSINGS OF 4"-6" DIAMETER SPACED NO MORE THAN 6" APART. STRUCTURE MAY BE PRE-FABRICATED.
5. WIDTH SHALL BE NO LESS THAN FOURTEEN (14) FEET OR THE FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS, WHICHEVER IS WIDER.
6. STABILIZED CONSTRUCTION ENTRANCE TO BE REMOVED UPON COMPLETION OF CONSTRUCTION.
7. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS
8. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 12/01/2018
SCALE: NTS
DETAIL:
STABILIZED CONSTRUCTION ENTRANCE OPTION 3
703
VARIES
SANDBAG (SEE NOTE #1)
BERM
10 MIL PLASTIC LINING
LATH FLAGGING ON ALL SIDES
DEPRESSED WASHOUT
SURFACE GRADE
SECTION 'A-A'
NOTES:
1. SECURE WASHOUT STRUCTURES AND LININGS WITH SANDBAGS OR TWO SECURELY FASTENED STAKES AROUND ENTIRE WASHOUT PERIMETER.
2. MATERIALS AND CONSTRUCTION METHODS TC CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
3. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
CONCRETE WASHOUT OPTION 1
704
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
CITY OF MIDLAND CONSTRUCTION STANDARDS SHEET 51 OF 60
112


VARIES
VARIES
A
A
10 MIL PLASTIC LINING
WOOD STAKE -OR- STEEL STAKE (SEE NOTE #1)
ELEVATED WASHOUT
10 MIL PLASTIC LINING
WOOD STAKE -OR- STEEL STAKE
SECTION 'A-A'
NOTES:
1. THIS WASHOUT CONFIGURATION MAY NOT BE USED IN PAVED AREAS.
2. WOOD FRAME IS TO BE EQUAL TO OR BETTER THAN TWO-STACKED 2X12 ROUGH WOOD FRAME.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEERING.
DRAWN: DPM
CHECKED: JDF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
CONCRETE WASHOUT OPTION 2
705
SILT FENCE
STEEL OR 2" X 2" WOOD FENCE POST MAX. SPACING = 8' MIN. EMBEDMENT = 24"
SILT FENCE (MIN. HEIGHT 24" ABOVE EXISTING GROUND)
EARTH BACKFILL
RUNOFF FLOW DIRECTION
WIRE MESH BACKING SUPPORT 6 G. - W 1.4, 6 X W1.4
6" MIN.
TRENCH (BACKFILLED AND COMPACTED)
8" MIN.
FABRIC TOE-IN
NOTES:
1. THIS DETAIL IS TO BE USED FOR SHEET FLOW CONDITIONS ONLY. DO NOT USE SILT FENCE FOR POINT FLOW OR CONCENTRATED FLOW CONDITIONS.
2. INSTALL STEEL OR WOOD POSTS, WHICH SUPPORT THE SILT FENCE, WITH A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POSTS MUST BE EMBEDDED A MINIMUM OF ONE (1) FOOT.
3. TRENCH THE TOE OF THE SILT FENCE IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW. WHERE THE FENCE CANNOT BE TRENCHED IN (E.G.PAVEMENT), WEIGHT DOWN FABRIC FLAP WITH WASHED GRAVEL ON UPHILL SIDE TO PREVENT FLOW UNDER FENCE.
4. THE TRENCH MUST BE A MINIMUM OF SIX (6) INCHES DEEP AND SIX (6) INCHES WIDE TO ALLOW FOR THE SILT FENCE FABRIC TO BE LAID IN THE GROUND AND BACKFILLED WITH COMPACTED MATERIA...
5. SECURELY FASTEN SILT FENCE TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE, WHICH IN TURN IS TO BE ATTACHED TO THE STEEL OR WOOD FENCE POST. INCLUDE A 24 (6) INCH DOUBLE OVERLAP, SECURELY FASTENED, WHERE ENDS OF FABRIC MEET.
6. REMOVE SILT FENCE WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. REMOVE ACCUMULATED SILT WHEN IT REACHES A DEPTH OF SIX (6) INCHES. DISPOSE OF THE SILT ONSITE IN AN APPROVED LOCATION AND IN SUCH A MANNER AS TO NOT CONTRIBUTE TO ADDITIONAL SILTATION.
8. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
9. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JDF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
SILT FENCE
706
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND Engineering Services
client
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND CONSTRUCTION STANDARDS SHEET 52 OF 60
113


5" MIN. DIAMETER
STANDARD WOOD OR METAL STAKE MIN. 4" DEPTH INTO EXISTING SURFACE
WATER RUNOFF DIRECTION
EXISTING GROUND
NOTES:
1. THIS DETAIL IS TO USED FOR SHEET FLOW CONDITIONS ONLY. DO NOT USE FILTER SOCK FOR POINT FLOW OR CONCENTRATED FLOW CONDITIONS.
2. DO NOT USE FILTER SOCK FOR SHEET FLOW WATERSHEDS LARGER THAN ONE (1) ACRE.
3. USE POLYPROPYLENE NETTING, BURLAP, OR JUTE FABRIC TO CONSTRUCT THE FILTER SOCK.
4. FILL FILTER SOCK WITH STRAW, HAY, COCONUT FIBER, OR COMPOSITE MATERIAL.
5. PLACE STAKING EVERY THREE (3) TO FOUR (4) FEET AT A MINIMUM.
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JDF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
FILTER SOCK
707
RUNOFF
RUNOFF
PAVEMENT EDGE OR BACK OF CURB AND GUTTER
6' DIA.
A
A
BERM WIDTH VARIES
PLAN
RUNOFF
RUNOFF
MAX DEPTH VARIES
SECTION 'A-A'
NOTES:
1. CONSTRUCT WIND ROW BERM FROM EXISTING TOPSOIL (4" TO 6" USUAL) TO INTERCEPT RUNOFF.
2. WHERE OVERTOPPING OF BERM OCCURS, PLACE ADDITIONAL EROSION CONTROL DEVICES AS REQUIRED BY THE ENGINEER.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JDF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
WIND ROW BERM
709
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 53 OF 60
114



ISOMETRIC VIEW

CROSS SECTION

NOTES:

1. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
2. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MSC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL: 708
		ROCK FILTER DAM		

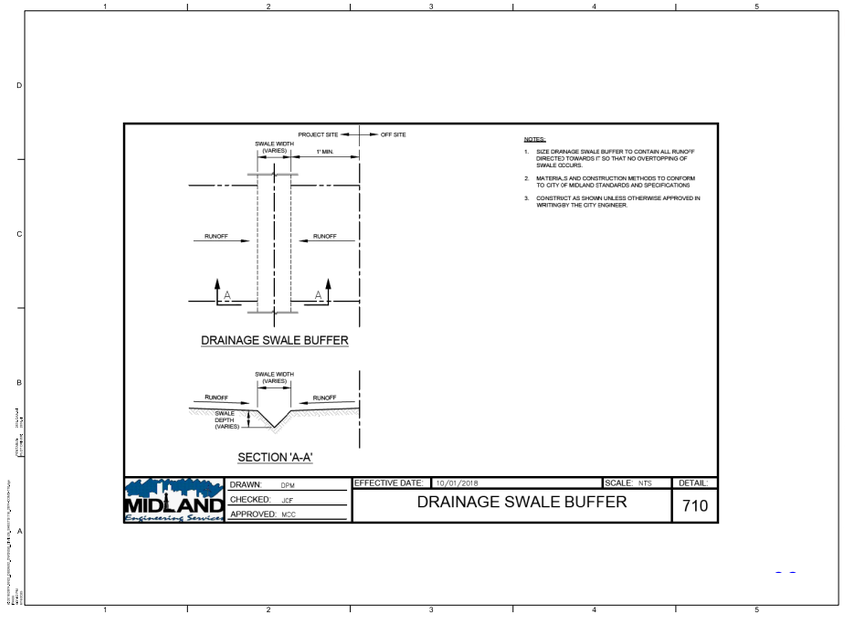
Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION STANDARDS
SHEET 54 OF 60

115



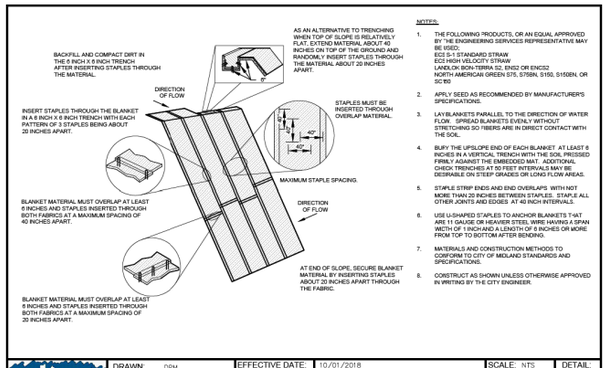
Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 56 OF 60

116



Parkhill

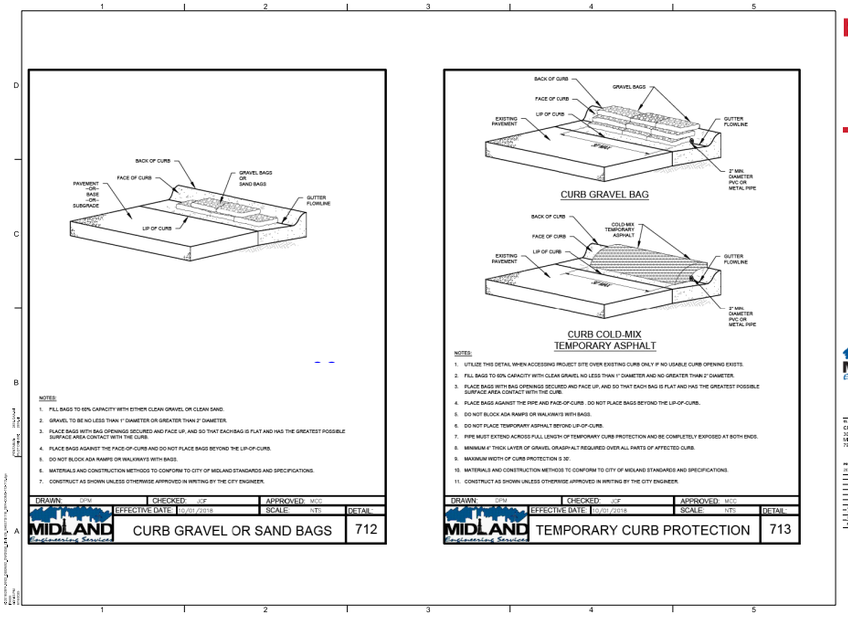
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

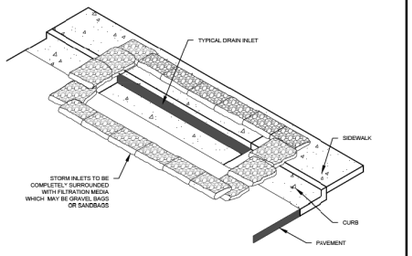
MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 56 OF 60

117


BACK OF CURB
FACE OF CURB
PAVEMENT (ASPHALT, CONCRETE) -OR- SUBGRADE
LIP OF CURB
GRAVEL BAGS OR SAND BAGS
GUTTER FLOWLINE
NOTES:
1. FILL BAGS TO 60% CAPACITY WITH EITHER CLEAN GRAVEL OR CLEAN SAND.
2. GRAVEL TO BE NO LESS THAN ½" DIAMETER OR GREATER THAN 2" DIAMETER.
3. PLACE BAGS WITH BAG OPENINGS SECURED AND FACE UP, AND SO THAT EACHBAG IS FLAT AND HAS THE GREATEST POSSIBLE SURFACE AREA CONTACT WITH THE CURB.
4. PLACE BAGS AGAINST THE FACE-OF-CURB AND DO NOT PLACE BAGS BEYOND THE LIP-OF-CURB.
5. DO NOT BLOCK ADA RAMPS OR WALKWAYS WITH BAGS.
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/20 /2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
CURB GRAVEL OR SAND BAGS
712
BACK OF CURB
FACE OF CURB
LIP OF CURB
EXISTING PAVEMENT
GRAVEL BAGS
GUTTER FLOWLINE
2" MIN. DIAMETER PVC OR METAL PIPE
CURB GRAVEL BAG
COLD-MIX TEMPORARY ASPHALT
CURB COLD-MIX TEMPORARY ASPHALT
NOTES:
1. UTILIZE THIS DETAIL WHEN ACCESSING PROJECT SITE OVER EXISTING CURB ONLY IF NO USABLE CURB OPENING EXISTS.
2. FILL BAGS TO 60% CAPACITY WITH CLEAN GRAVEL NO LESS THAN ½" DIAMETER AND NO GREATER THAN 2" DIAMETER.
3. PLACE BAGS WITH BAG OPENINGS SECURED AND FACE UP, AND SO THAT EACH BAG IS FLAT AND HAS THE GREATEST POSSIBLE SURFACE AREA CONTACT WITH THE CURB.
4. PLACE BAGS AGAINST THE PIPE AND FACE-OF-CURB . DO NOT PLACE BAGS BEYOND THE LIP-OF-CURB.
5. DO NOT BLOCK ADA RAMPS OR WALKWAYS WITH BAGS.
6. DO NOT PLACE TEMPORARY ASPHALT BEYOND LIP-OF-CURB.
7. PIPE MUST EXTEND ACROSS FULL LENGTH OF TEMPORARY CURB PROTECTION AND BE COMPLETELY EXPOSED AT BOTH ENDS.
8. MINIMUM 4" THICK LAYER OF GRAVEL OR ASPH ALT REQUIRED OVER ALL PARTS OF AFFECTED CURB.
9. MAXIMUM WIDTH OF CURB PROTECTION S 30'.
10. MATERIALS AND CONSTRUCTION METHODS TC CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
11. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/20 /2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
TEMPORARY CURB PROTECTION
713
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND CONSTRUCTION STANDARDS SHEET 57 OF 60
118



GRAVEL BAGS OR SANDBAGS

NOTES:

1. FILL BAGS TO 60% CAPACITY WITH CLEAN GRAVEL OR CLEAN SAND.
2. PLACE BAGS WITH BAG OPENINGS SECURED AND FACE UP, AND SO THAT EACH BAG IS FLAT AND HAS THE GREATEST POSSIBLE SURFACE AREA CONTACT WITH THE SURFACE.
3. GRAVEL TO BE NO LESS THAN 1" DIAMETER OR GREATER THAN 2" DIAMETER.
4. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS
5. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

DRAWN: DPM	CHECKED: JCF	APPROVED: MCC
EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL: 714

CURB INLET PROTECTION

Parkhill

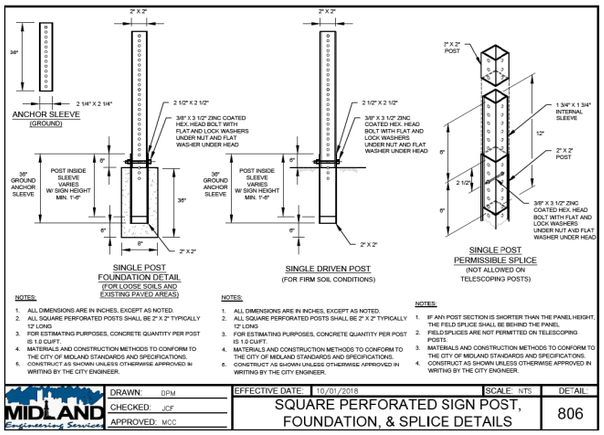
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 58 OF 60

119



Parkhill

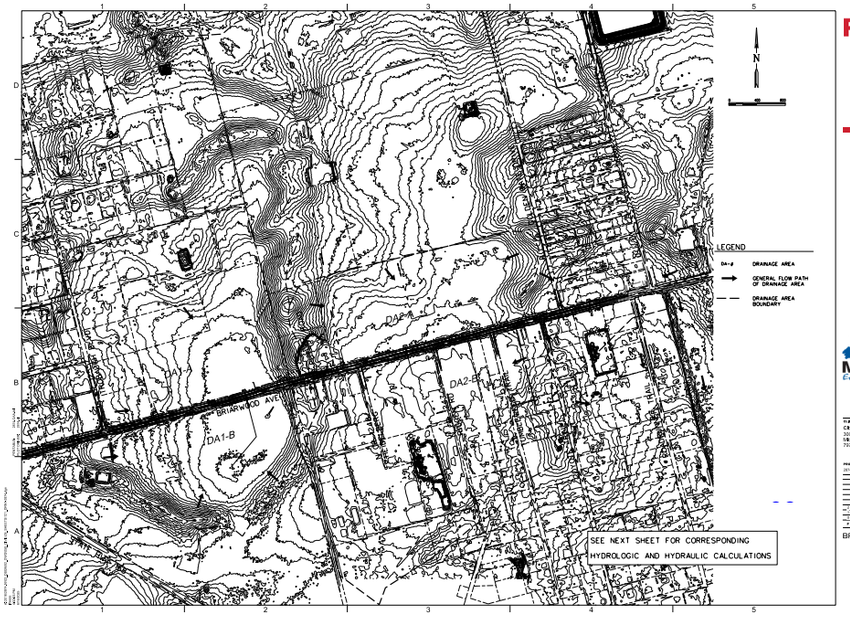
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 59 OF 60

120



Parkhill

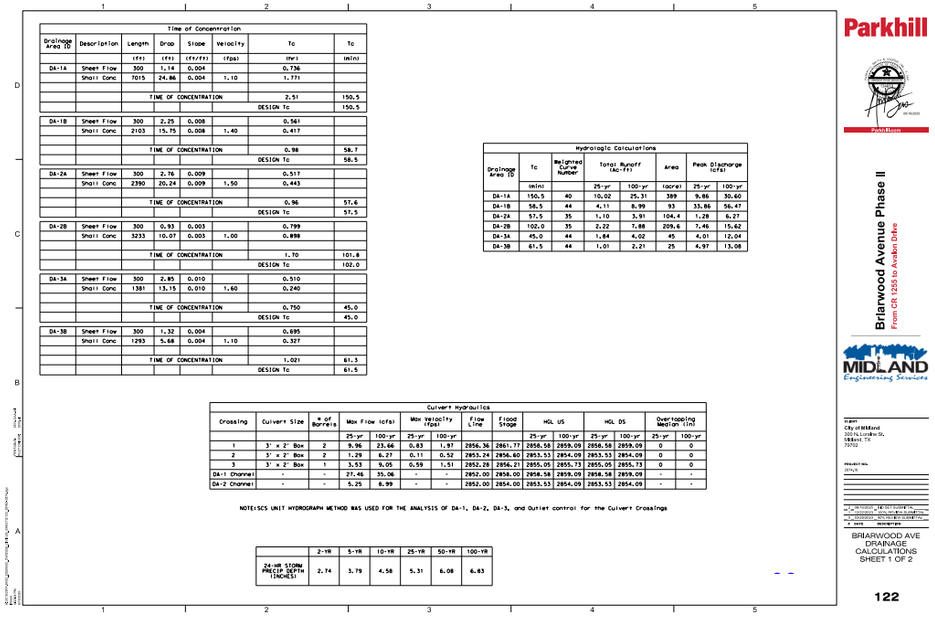
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE DRAINAGE AREA MAP

121



Time of Concentration

Drainage Area ID	Description	Length	Drop	Slope	Velocity	Tc	Tc
		(ft)	(ft)	(ft/ft)	(fps)	(hr)	(min)
DA-1A	Sheet Flow	300	1.14	0.004		0.736	
	Shall Conc	7015	24.86	0.004	1.10	1.771	
				TIME OF CONCENTRATION		2.51	150.5
						DESIGN Tc	150.5
DA-1B	Sheet Flow	300	2.25	0.008		0.561	
	Shall Conc	2103	15.75	0.008	1.40	0.417	
				TIME OF CONCENTRATION		0.98	58.7
						DESIGN Tc	58.5
DA-2A	Sheet Flow	300	2.76	0.009		0.517	
	Shall Conc	2390	20.24	0.009	1.50	0.443	
				TIME OF CONCENTRATION		0.96	57.6
						DESIGN Tc	57.5
DA-2B	Sheet Flow	300	0.93	0.003		0.799	
	Shall Conc	3233	10.07	0.003	1.00	0.898	
				TIME OF CONCENTRATION		1.70	101.8
						DESIGN Tc	102.0
DA-3A	Sheet Flow	300	2.85	0.010		0.510	
	Shall Conc	1381	13.15	0.010	1.60	0.240	
				TIME OF CONCENTRATION		0.750	45.0
						DESIGN Tc	45.0
DA-3B	Sheet Flow	300	1.32	0.004		0.695	
	Shall Conc	1293	5.68	0.004	1.10	0.327	
				TIME OF CONCENTRATION		1.021	61.3
						DESIGN Tc	61.5

Hydrologic Calculations

Drainage Area ID	Tc	Weighted Curve Number	Total Runoff (Ac-ft)		Area	Peak Discharge (cfs)	
	(min)		25-yr	100-yr	(acres)	25-yr	100-yr
DA-1A	150.5	40	10.02	25.31	389	9.86	30.60
DA-1B	58.5	44	4.11	8.99	93	33.86	56.47
DA-2A	57.5	35	1.10	3.91	104.4	1.28	6.27
DA-2B	102.0	35	2.22	7.88	209.6	7.45	15.62
DA-3A	45.0	44	1.84	4.02	45	4.01	12.04
DA-3B	61.5	44	1.01	2.21	25	4.97	13.08

Culvert Hydraulics

Crossing	Culvert Size	# of Barrels	Max Flow (cfs)		Max Velocity (fps)		Flow Line	Flood Stage	HGL US		HGL DS		Overtopping Section (ft)	
			25-yr	100-yr	25-yr	100-yr			25-yr	100-yr	25-yr	100-yr	25-yr	100-yr
1	3' x 2' Box	2	9.96	23.66	0.83	1.97	2856.36	2861.77	2858.58	2859.09	2858.58	2859.09	0	0
2	3' x 2' Box	2	1.29	6.27	0.11	0.52	2853.24	2856.60	2853.53	2854.09	2853.53	2854.09	0	0
3	3' x 2' Box	1	3.53	9.05	0.59	1.51	2852.28	2856.21	2855.05	2855.73	2855.05	2855.73	0	0
DA-1 Channel	-	-	27.46	35.06	-	-	2852.00	2858.00	2858.58	2859.09	2858.58	2859.09	-	-
DA-2 Channel	-	-	5.25	8.99	-	-	2852.00	2854.00	2853.53	2854.09	2853.53	2854.09	-	-

NOTE:SCS UNIT HYDROGRAPH METHOD WAS USED FOR THE ANALYSIS OF DA-1, DA-2, DA-3, and Outlet control for the Culvert Crossings

	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
24-HR STORM PRECIP DEPTH (INCHES)	2.74	3.79	4.58	5.31	6.08	6.83

Parkhill

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

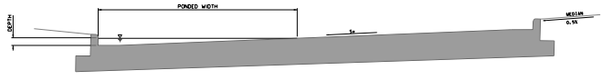
BRIARWOOD AVE
DRAINAGE
CALCULATIONS
SHEET 1 OF 2

122

PONDED WIDTH CALCULATIONS (LEFT AND RIGHT GUTTER)

STA.	to/from	STA.	Area (AC)	CONTRIBUTING AREA	Q10 (CFS)	Q100 (CFS)	MANNING'S n	Sx (FT/FT)	S (FT/FT)	10-YR PONDED DEPTH (FT)	10-YR PONDED WIDTH (FT)	100-YR PONDED DEPTH (FT)	100-YR PONDED WIDTH (FT)
152+27	from	151+00	1.21	ROW/PAVE	3.60	10.32	0.22	0.02	0.0333	0.41	30.7	0.49	39.07
151+62	to	149+37	1.23	ROW/PAVE	20.57	58.92	0.22	0.02	0.0350	0.56	41.4	0.64	51.07
149+77	from	149+80	0.16	PAVE	1.21	3.27	0.22	0.02	0.0037	0.25	19.1	0.29	14.49
149+82	to	149+77	0.17	PAVE	1.24	3.60	0.22	0.02	0.0004	0.25	19.3	0.29	11.97
153+17	from	149+55	1.26	ROW/PAVE	7.44	17.49	0.22	0.02	0.0119	0.32	19.9	0.37	18.51
149+60	to	149+55	0.05	ROW/PAVE	0.28	0.66	0.22	0.02	0.0100	0.22	17.7	0.24	10.40
151+32	to	151+25	0.10	ROW/PAVE	0.58	1.36	0.22	0.02	0.0033	0.22	17.7	0.24	10.40
151+25	to	151+03	0.76	ROW/PAVE	5.84	14.87	0.22	0.02	0.0033	0.41	30.7	0.49	34.73
151+03	to	150+97	0.76	ROW/PAVE	5.84	14.87	0.22	0.02	0.0033	0.41	30.7	0.49	34.73
172+97	from	169+72	1.42	ROW/PAVE	11.49	17.31	0.22	0.02	0.0092	0.44	23.1	0.49	25.81
169+72	to	169+47	1.41	ROW/PAVE	9.81	14.80	0.22	0.02	0.0104	0.41	30.7	0.49	25.80
169+10	from	164+80	0.72	ROW/PAVE	4.01	7.89	0.22	0.02	0.0051	0.31	16.8	0.35	12.42

NOTES: HEIGHT OF CURB = 6" ABOVE LIP 7" ABOVE GUTTER
MIN ALLOW PONDED DEPTH = APPRX. 0.58'
S = LONGITUDINAL SLOPE
Sx = PAVEMENT CROSS SLOPE



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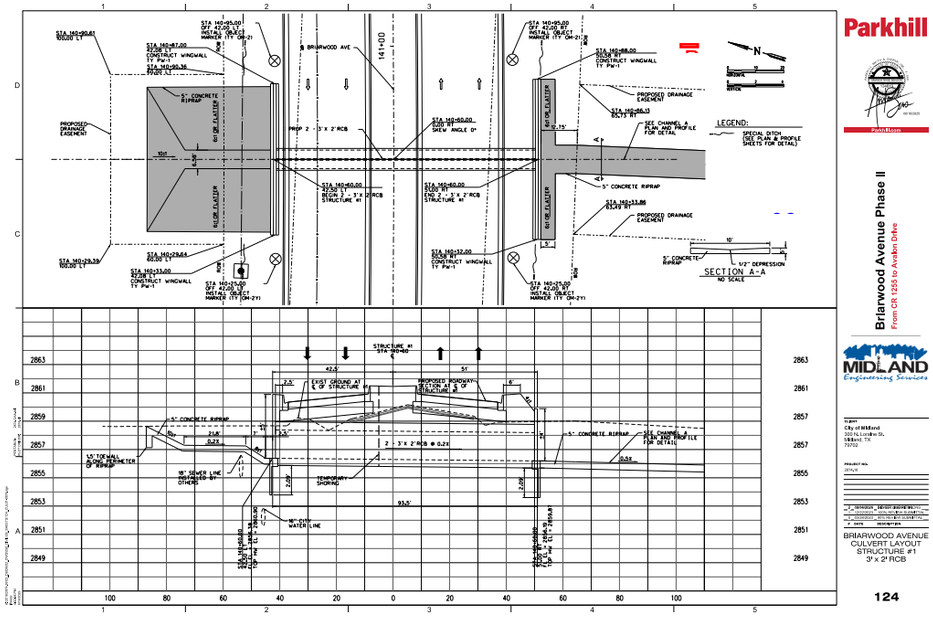
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
DRAINAGE
CALCULATIONS
SHEET 2 OF 2

123



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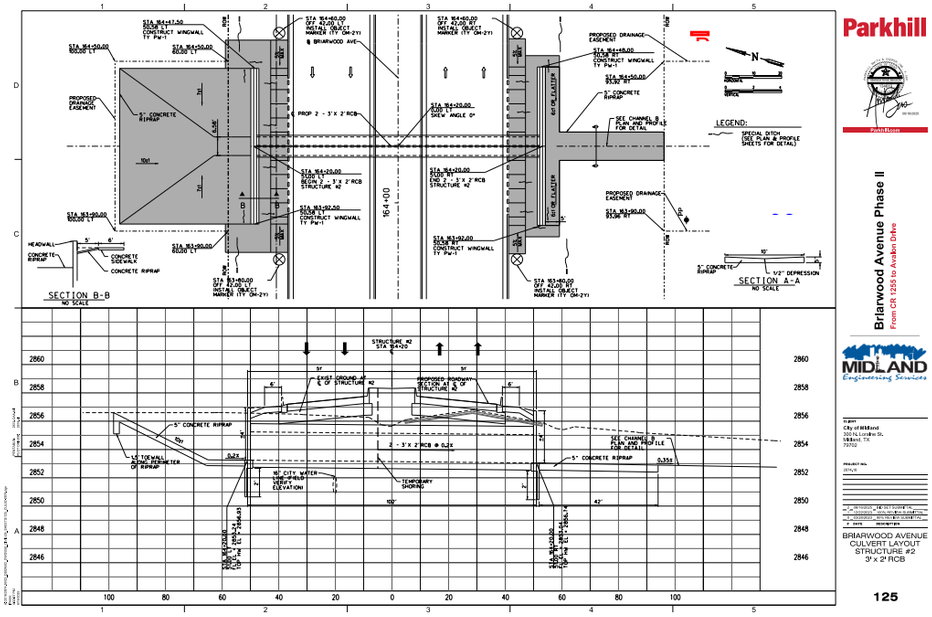
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND
Engineering Services

BRIARWOOD AVENUE
CULVERT LAYOUT
STRUCTURE #1
3' x 2' RCB

124



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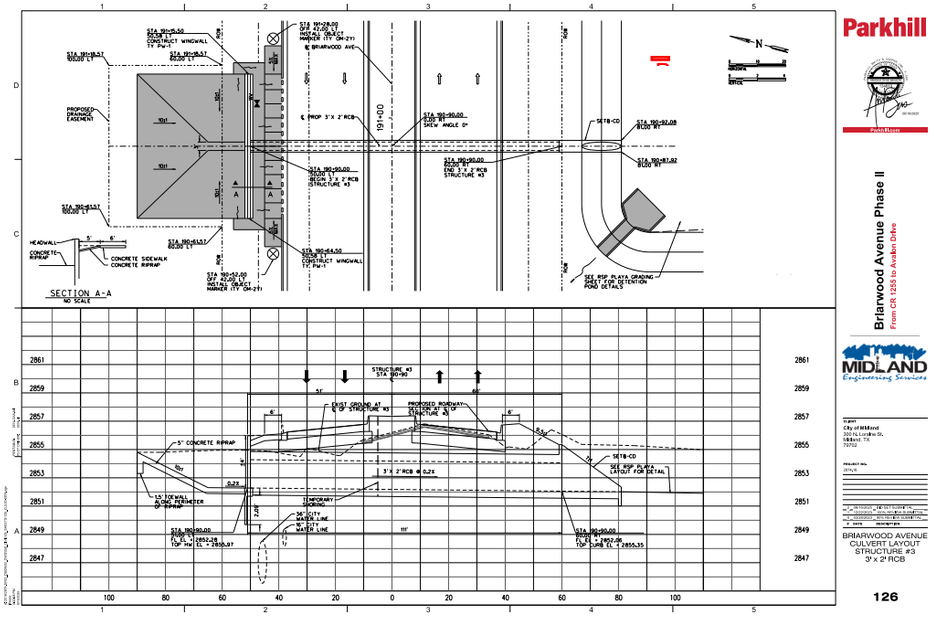
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
CULVERT LAYOUT
STRUCTURE #2
3' x 2' RCB

125



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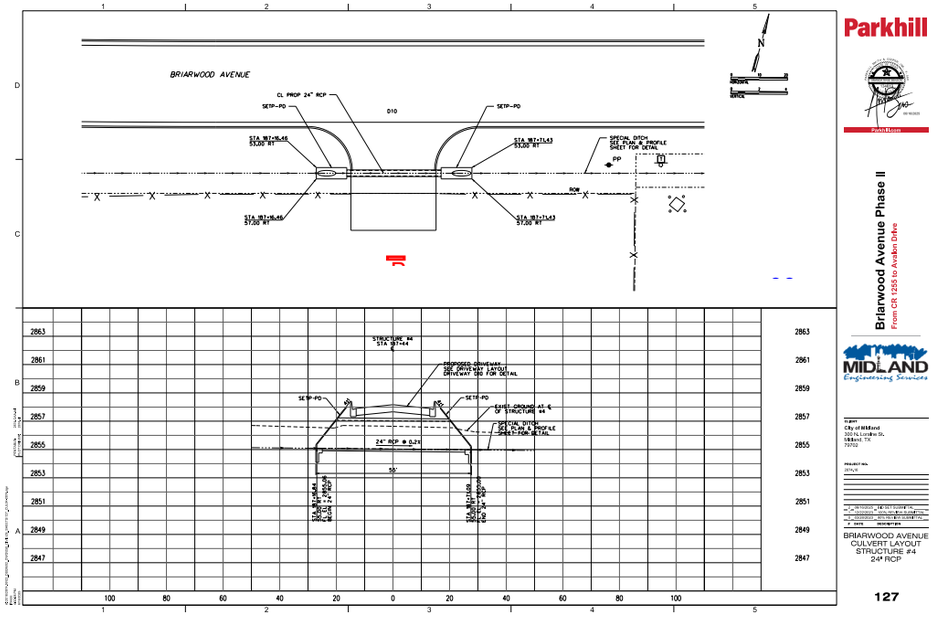
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
CULVERT LAYOUT
STRUCTURE #3
3' x 2' RCB

126



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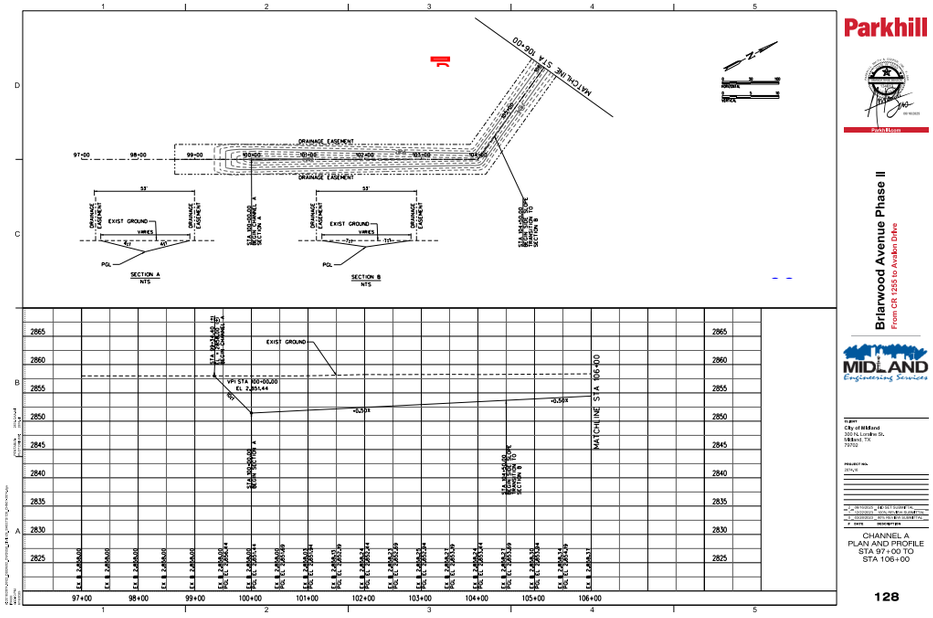
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
CULVERT LAYOUT
STRUCTURE #4
24" RCP

127



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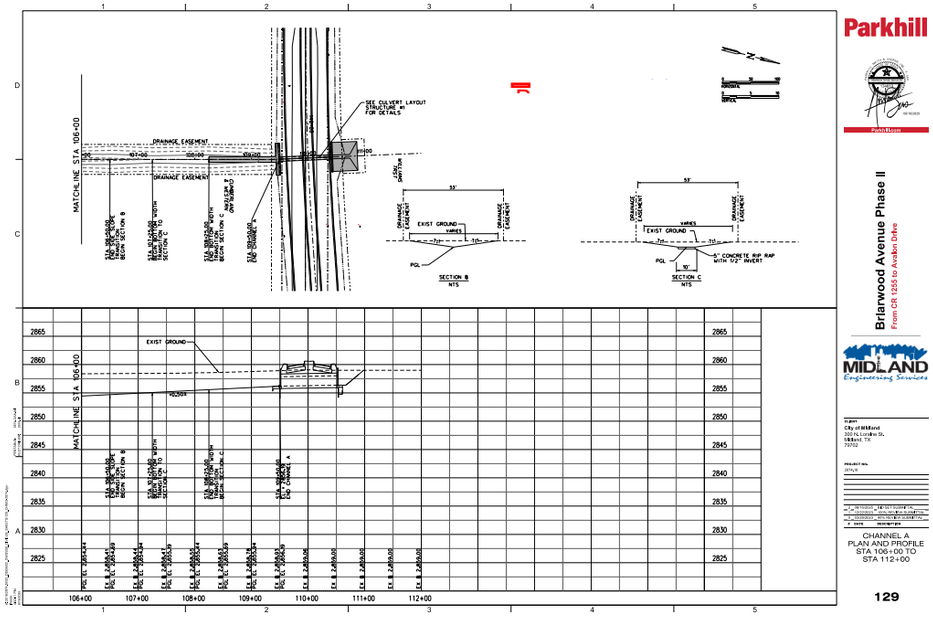
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CHANNEL A
PLAN AND PROFILE
STA 97+00 TO
STA 106+00

128



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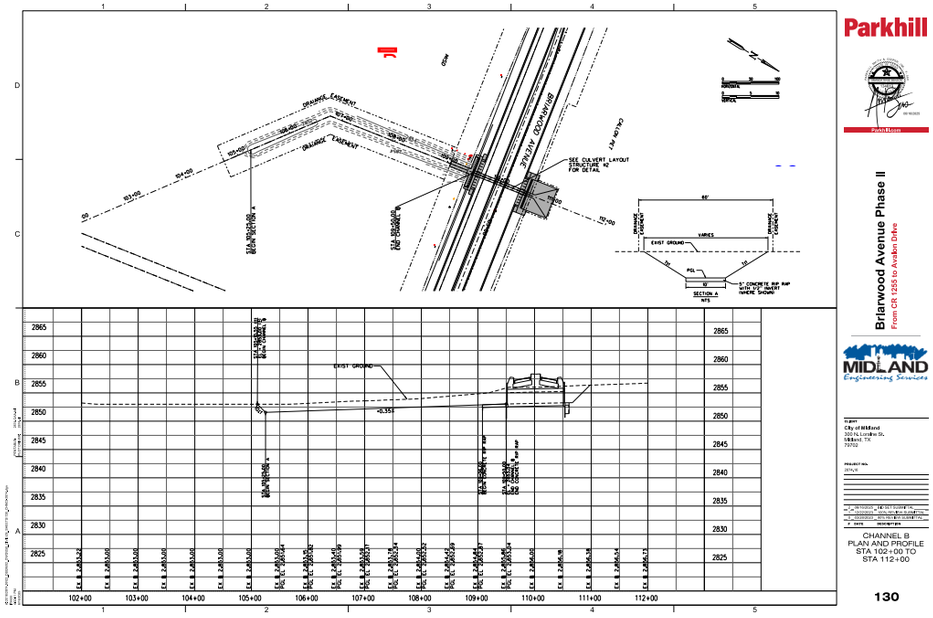
Briarwood Avenue Phase II

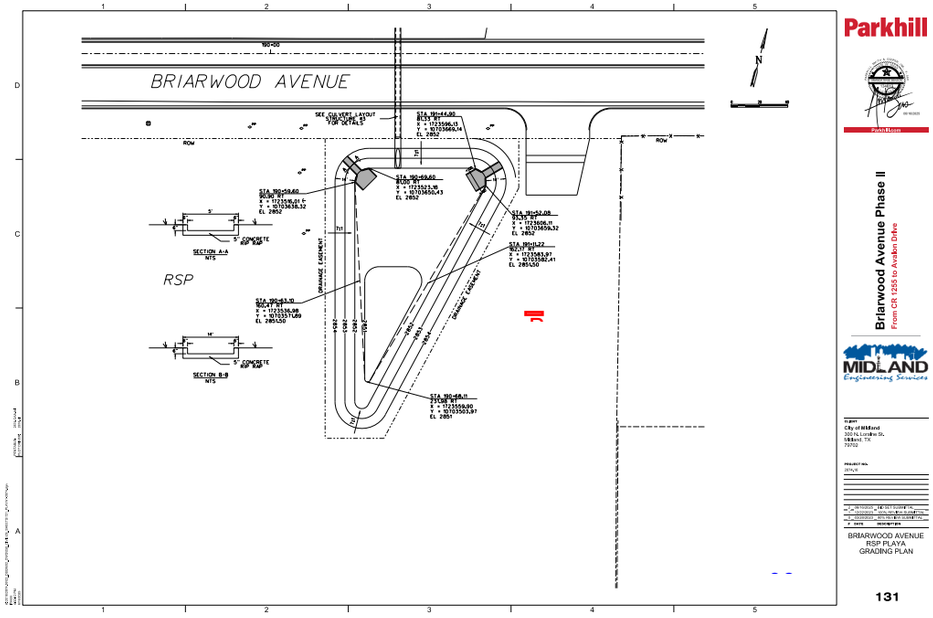
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CHANNEL A
PLAN AND PROFILE
STA 106+00 TO
STA 112+00

129


Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
CHANNEL B
PLAN AND PROFILE
STA 102+00 TO
STA 112+00
130



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Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
RSP PLAYA
GRADING PLAN

131

Culvert Station and/or Creek Name Followed by applicable end (LI, RI, or Both)	Description of Box Culvert No. Spans - Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (1)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Extrened Curb Height (Ft)	Hw Height of Wingwall (Ft) (2)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (CY) (3)	Class "C" Conc (Wingwall) (CY) (3)	Total Wingwall Area (SF)
Structure #1 STA 140+60 (LT)	2 – 3' x 2'	3'	MC-3-23	PW-1	0°	6:1	8"	7"	2.000'	4.667'	N/A	N/A	22.000'	7.750'	N/A	0.0	0.6	19.2	282
Structure #1 STA 140+60 (RT)	2 – 3' x 2'	3'	MC-3-23	PW-1	0°	6:1	8"	7"	1.000'	3.667'	N/A	N/A	22.000'	7.750'	N/A	0.0	0.3	12.3	182
Structure #2 STA 184+20 (Both)	2 – 3' x 2'	3'	MC-3-23	PW-1	0°	6:1	8"	7"	1.000'	3.667'	N/A	N/A	22.000'	7.750'	N/A	0.0	0.6	24.6	322
Structure #3 STA 190+90 (LT)	1 – 3' x 2'	3'	SCC•3&4	PW-1	0°	6:1	8"	7"	1.000'	3.667'	N/A	N/A	22.000'	4.167'	N/A	0.0	0.2	12.0	161
Structure #3 STA 190+90 (RT)	1 – 3' x 2'	3'	SCC•3&4	SETB•CO	0°	6:1	8"	7"	0.750'	3.167'	N/A	N/A	17.000'	N/A	4.167'	0.0	0.1	2.9	N/A

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (BCRM) standard sheet, the curb concrete is to be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to furnish precast culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

NOTES:
Skew = 0° on SW-0, FW-0, SETB-CO, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment.

SL:1 = Horizontal : 1 Vertical
- Side slope at culvert for flared or straight wingwalls.
- Channel slope for parallel wingwalls.
- Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only).
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

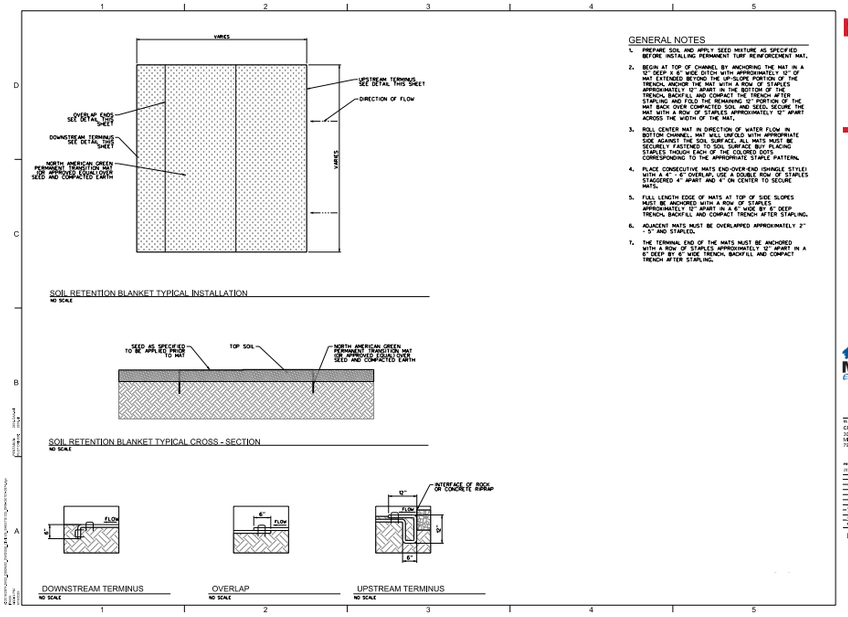
BCS

c: 10-Feb-25 8:30:35 pm	dn: FxDT	ck: TxDT	dw: FxDT	ck: TxDT
FxDT February 2025	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		

132

PRELIMINARY
This document is released for review by the Texas Engineering Practice Act. No person may use or rely upon it for the performance of engineering or surveying services.

DATE
FILE



GENERAL NOTES

1. PREPARE SOIL AND APPLY SEED MIXTURE AS SPECIFIED BEFORE INSTALLING PERMANENT TURF REINFORCEMENT MAT.
2. BEGIN AT TOP OF CHANNEL BY ANCHORING THE MAT IN A 12" DEEP X 6" WIDE DITCH WITH APPROXIMATELY 12" OF MAT EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE MAT WITH A ROW OF STAPLES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING AND FOLD THE REMAINING 12" PORTION OF THE MAT BACK OVER COMPACTED SOIL AND SEED. SECURE THE MAT WITH A ROW OF STAPLES APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE MAT.
3. ROLL CENTER MAT IN DIRECTION OF WATER FLOW IN BOTTOM CHANNEL. MAT WILL UNFOLD WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL MATS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES IN APPROPRIATE LOCATIONS AS SHOWN IN THE CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. PLACE CONSECUTIVE MATS END-OVER-END (SHINGLE STYLE) WITH A 4" - 6" OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER TO SECURE MATS.
5. FULL LENGTH EDGE OF MATS AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES APPROXIMATELY 12" APART IN A 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT TRENCH AFTER STAPLING.
6. ADJACENT MATS MUST BE OVERLAPPED APPROXIMATELY 2" - 5" AND STAPLED.
7. THE TERMINAL END OF THE MATS MUST BE ANCHORED WITH A ROW OF STAPLES APPROXIMATELY 12" APART IN A 6" DEEP BY 6" WIDE TRENCH. BACKFILL AND COMPACT TRENCH AFTER STAPLING.

Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

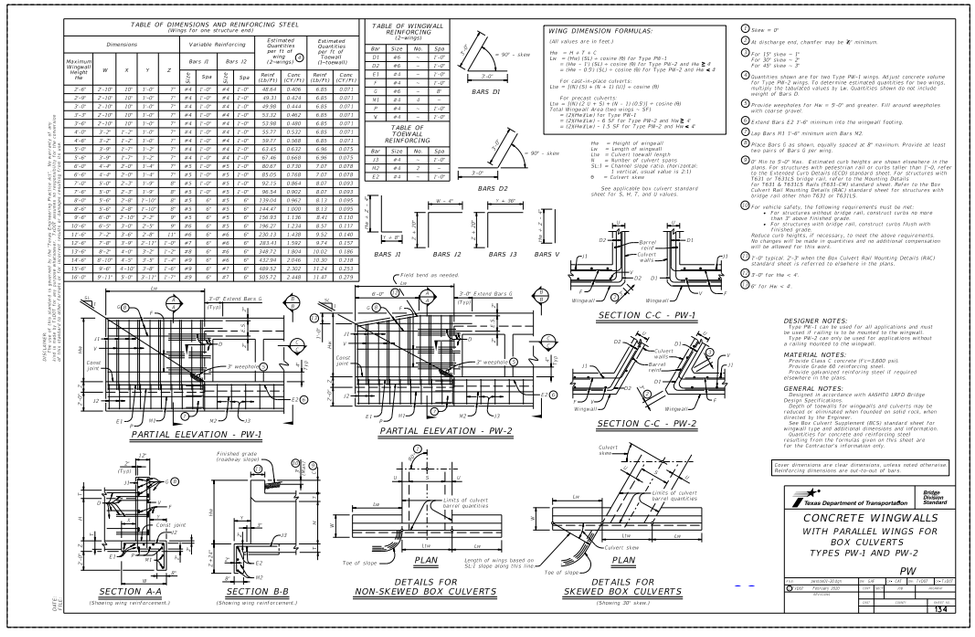
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

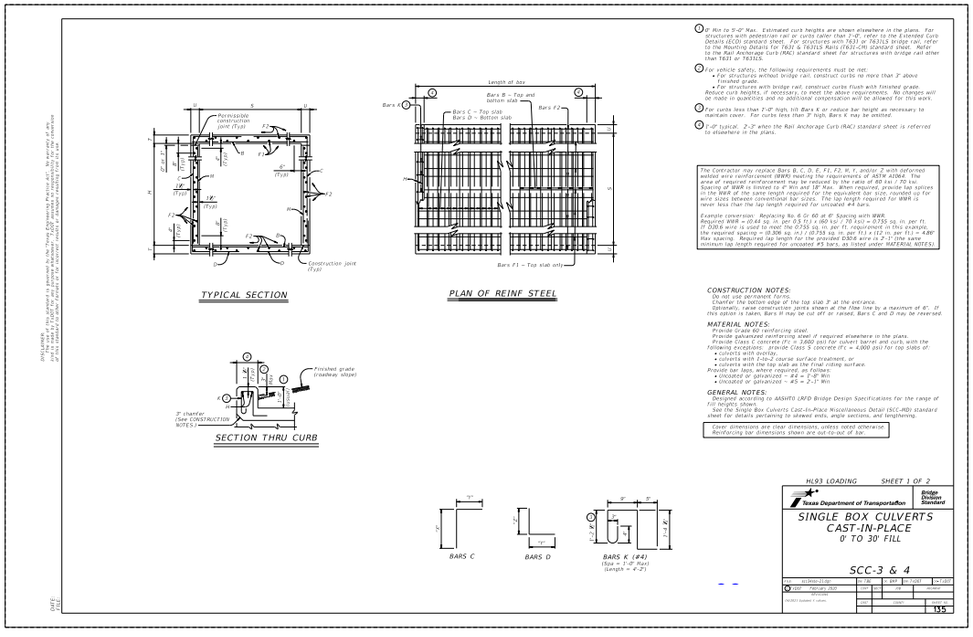
Project No.
067419

#	DATE	DESCRIPTION
1	08/15/2025	AS BUILT CONDITIONS
2	09/09/2025	INITIAL BID SUBMITTAL
3	09/09/2025	REVISED BID SUBMITTAL

DRAINAGE DETAILS
STONE RIPRAP
&
SOIL RETENTION BLANKET

133


TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)
TABLE OF WINGWALL REINFORCING
(2 wings)
TABLE OF TOEWALL REINFORCING
WING DIMENSION FORMULAS:
DESIGNER NOTES:
MATERIAL NOTES:
GENERAL NOTES:
PARTIAL ELEVATION - PW-1
PARTIAL ELEVATION - PW-2
SECTION C-C - PW-1
SECTION C-C - PW-2
SECTION A-A
SECTION B-B
PLAN
DETAILS FOR NON-SKEWED BOX CULVERTS
DETAILS FOR SKEWED BOX CULVERTS
CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR
BOX CULVERTS
TYPES PW-1 AND PW-2
PW
Texas Department of Transportation
Bridge Division Standard
134



0' Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail on curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Extended Curb Details (ECD) standard sheet. For structures with bridge rail other than T631 or T631LS, refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

For curbs less than 2'-0" high, bill Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3' high, Bars K may be omitted.

1'-0" typical. 2'-2" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, H, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Provide WWR with the longest wire running perpendicular to the direction of bar splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR.
Required WWR = (0.44 sq. in. per ft) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft) x (12 in. per ft) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 7'-1" (the same minimum lap length required for uncoated #3 bars, as listed under MATERIAL NOTES).

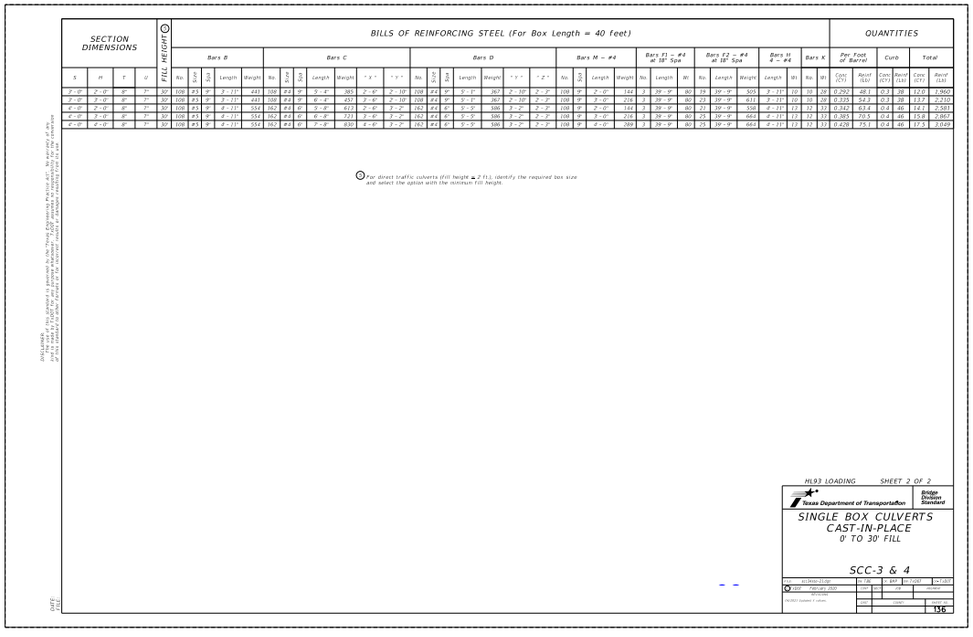
CONSTRUCTION NOTES:
Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the fillet line by a maximum of 6". If this option is taken, Bars H may be cut off or raised, Bars C and D may be reversed.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class S concrete (f'c = 4,500 psi) for the top slab, bottom slab and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 2-lift-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide the following minimum bar laps:
- Uncoated bar, galvanized – #4 or #5 = 2'-0" Min
- Uncoated or galvanized – #6 = 2'-7" Min

GENERAL NOTES:
Design is according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
See the Single Box Culverts Cast-In-Place Miscellaneous Detail (SCC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



SECTION DIMENSIONS

S	H	T	U
2'-0"	2'-0"	8"	7"
2'-0"	2'-0"	8"	7"
2'-0"	2'-0"	8"	7"
2'-0"	2'-0"	8"	7"
2'-0"	2'-0"	8"	7"
2'-0"	2'-0"	8"	7"

FILL HEIGHT ①

BILLS OF REINFORCING STEEL (For Box Length = 40 feet)

	Bars B					Bars C						Bars D						Bars M — #4				Bars F1 — #4 at 18" Spa			Bars F2 — #4 at 18" Spa			Bars H 4 — #6			Bars X		
	No.	Size (#)	Spa (in)	Length	Weight	No.	Size (#)	Spa (in)	Length	Weight	"X"	"Y"	No.	Size (#)	Spa (in)	Length	Weight	"Y"	"Z"	No.	Size (#)	Spa (in)	Length	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt
2'-0"	108	#5	9"	7'-11"	443	108	#8	9"	5'-4"	305	2'-6"	7'-10"	108	#4	9"	5'-5"	367	2'-10"	2'-3"	108	9"	2'-0"	144	3	39'-9"	80	19	39'-9"	505	7'-11"	10	10	20
2'-0"	108	#5	9"	7'-11"	443	108	#8	9"	6'-4"	457	3'-6"	7'-10"	108	#4	9"	5'-5"	367	2'-10"	2'-3"	108	9"	2'-0"	216	3	39'-9"	80	23	39'-9"	611	7'-11"	10	10	20
2'-0"	108	#5	9"	7'-11"	554	162	#8	6"	5'-8"	613	2'-6"	7'-2"	162	#4	6"	5'-5"	506	3'-2"	2'-3"	108	9"	2'-0"	144	3	39'-9"	80	21	39'-9"	558	9'-11"	13	12	25
2'-0"	108	#5	9"	7'-11"	554	162	#8	6"	6'-8"	723	3'-6"	7'-2"	162	#4	6"	5'-5"	506	3'-2"	2'-3"	108	9"	3'-0"	216	3	39'-9"	80	25	39'-9"	664	9'-11"	13	12	25
2'-0"	108	#5	9"	9'-11"	554	162	#8	6"	7'-8"	832	4'-6"	7'-2"	162	#4	6"	5'-5"	506	3'-2"	2'-3"	108	9"	4'-0"	288	3	39'-9"	80	25	39'-9"	664	9'-11"	13	12	25

QUANTITIES					
	Per Foot of Barrel	Curb		Total	
	Conc (CY)	Reinf (LB)	Conc (CY)	Reinf (LB)	Conc (CY)	Reinf (LB)
2'-0"	0.292	48.1	0.3	38	12.0	1,960
2'-0"	0.325	54.3	0.3	38	13.7	2,210
2'-0"	0.342	63.4	0.4	46	14.1	2,581
2'-0"	0.385	70.5	0.4	46	15.8	2,867
2'-0"	0.428	75.1	0.4	46	17.5	3,049

① For direct traffic culverts (Fill height ≤ 2 Ft), identify the required box size and select the option with the minimum Fill height.

DESIGNED
in accordance with the "Texas Department of Transportation Policy on the Use of the AASHTO LRFD Bridge Design Specifications" and the "Texas Department of Transportation Policy on the Use of the AASHTO LRFD Bridge Design Specifications for Railroad Overpasses and Railroad Underpasses" and with the following exceptions:

DATE SEE

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS
CAST-IN-PLACE
0' TO 30' FILL

SCC-3 & 4

FILE	bc3460-22.dgn	DN: CTxDOT	CK: BAP	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		DIST	COUNTY		
08-22 Updated to current standards					136

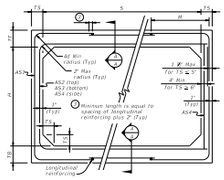
PACKET 6.425 September 9, 2025

BOX DATA

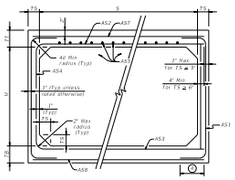
SECTION DIMENSIONS					Fill Height	W (min)	REINFORCING (sq. in. / ft.) ①						② Unit Weight
S (ft.)	H (ft.)	T1 (in.)	T2 (in.)	T5 (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
3	2	7	6	4	< 2	-	0.17	0.25	0.16	0.10	0.17	0.17	0.14	3.3
3	2	4	4	4	2 < 3	31	0.13	0.19	0.16	0.10	-	-	-	2.4
3	2	4	4	4	3 < 5	31	0.10	0.11	0.12	0.10	-	-	-	2.4
3	2	4	4	4	5	31	0.10	0.10	0.10	0.10	-	-	-	2.4
3	2	4	4	4	15	31	0.10	0.13	0.13	0.10	-	-	-	2.4
3	2	4	4	4	20	31	0.11	0.17	0.17	0.10	-	-	-	2.4
3	2	4	4	4	25	31	0.14	0.21	0.21	0.10	-	-	-	2.4
3	2	4	4	4	30	31	0.17	0.25	0.25	0.10	-	-	-	2.4
3	2	4	4	4	35	31	0.20	0.29	0.30	0.10	-	-	-	2.4
3	3	7	6	4	< 2	-	0.17	0.27	0.17	0.10	0.17	0.17	0.14	3.7
3	3	4	4	4	2 < 3	31	0.10	0.22	0.21	0.10	-	-	-	2.8
3	3	4	4	4	3 < 5	31	0.10	0.14	0.14	0.10	-	-	-	2.8
3	3	4	4	4	10	31	0.10	0.11	0.11	0.10	-	-	-	2.8
3	3	4	4	4	15	31	0.10	0.14	0.15	0.10	-	-	-	2.8
3	3	4	4	4	20	31	0.10	0.18	0.19	0.10	-	-	-	2.8
3	3	4	4	4	25	31	0.10	0.23	0.23	0.10	-	-	-	2.8
3	3	4	4	4	30	31	0.12	0.27	0.28	0.10	-	-	-	2.8
3	3	4	4	4	35	31	0.14	0.32	0.32	0.10	-	-	-	2.8

① For box length = 8'-0"

② AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.

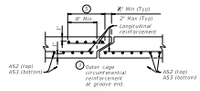


FILL HEIGHT 2 FT. AND GREATER



FILL HEIGHT LESS THAN 2 FT

② Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Widening top slab detail, KSK joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f'c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard for wing, headwall and flared end details.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

3'-0" SPAN

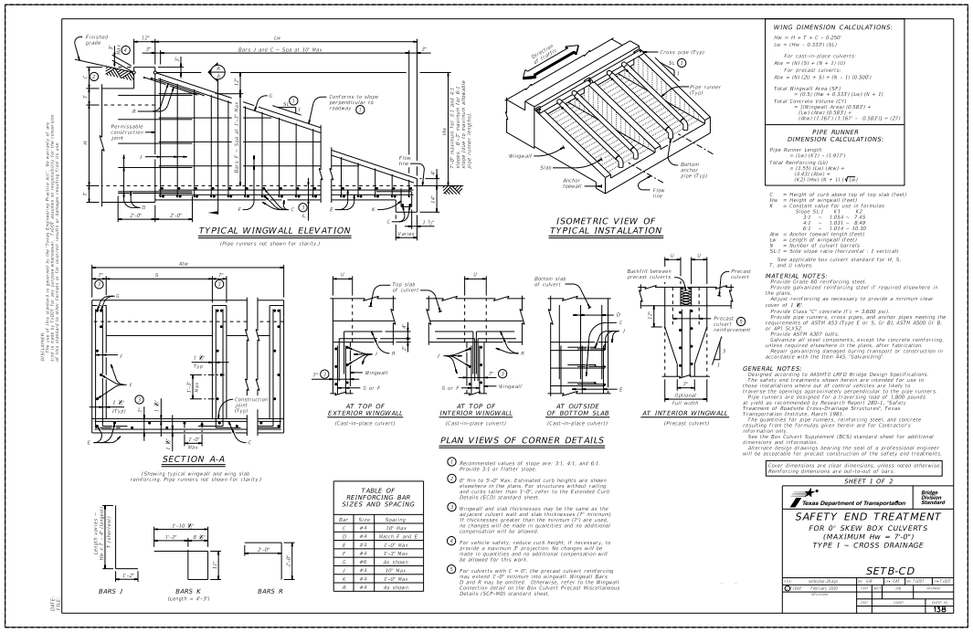
SCP-3

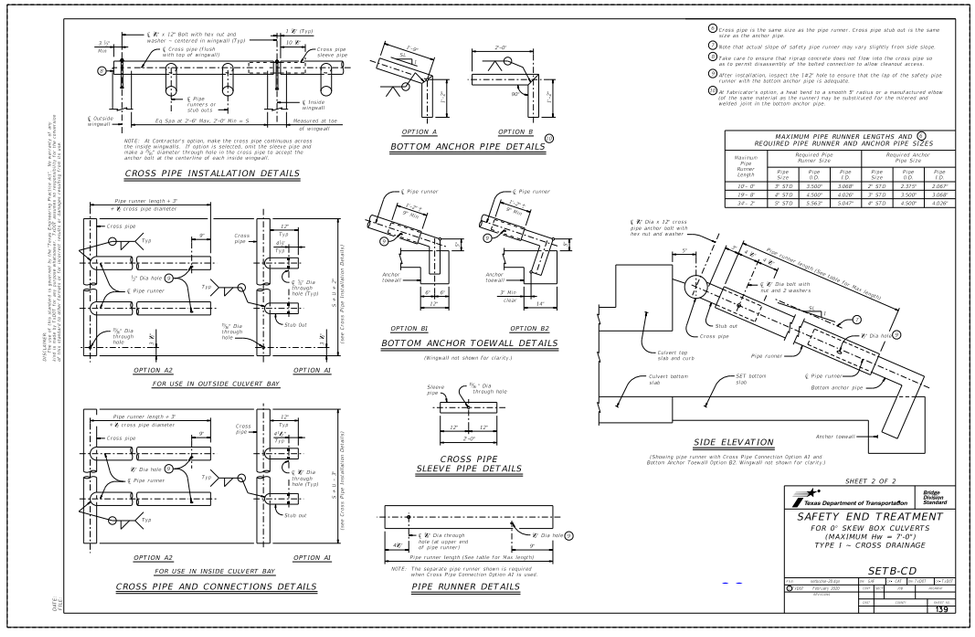
FILE	DATE	CHECKED	DESIGNED	DRAWN	CHECKED
scp3-20.dgn	2020 February	CR	CR	CR	CR

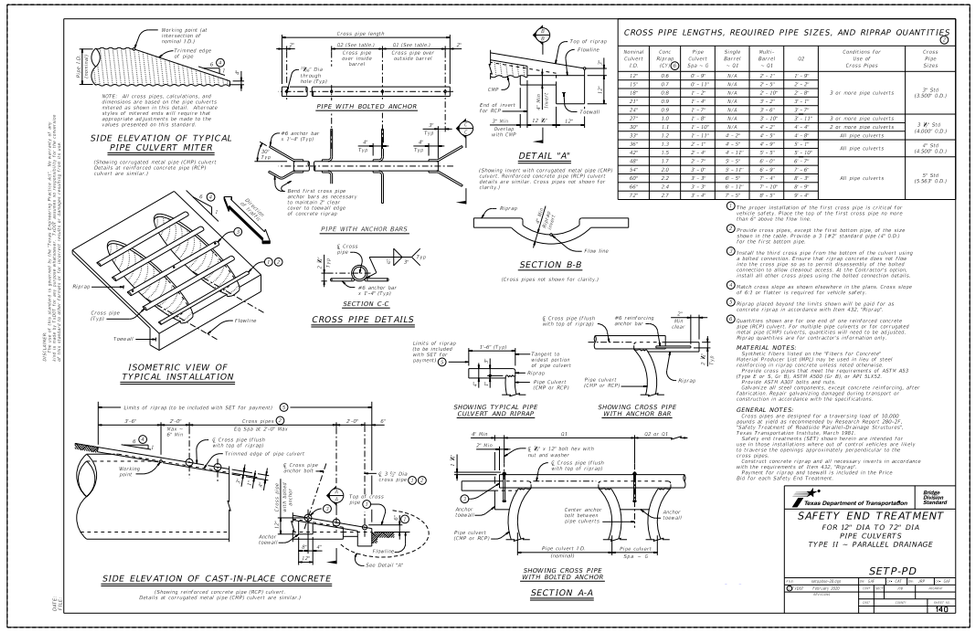
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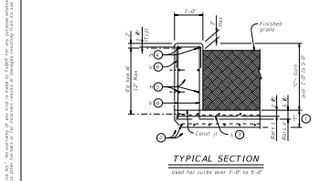
DATE

DESIGNED
DETAILED
CHECKED
QUANTITIES
CHECKED
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TYPICAL WINGWALL ELEVATION
(Pipe runners not shown for clarity.)
ISOMETRIC VIEW OF TYPICAL INSTALLATION
WING DIMENSION CALCULATIONS:
PIPE RUNNER DIMENSION CALCULATIONS:
MATERIAL NOTES:
GENERAL NOTES:
SECTION A-A
(Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)
AT TOP OF EXTERIOR WINGWALL
(Cast-in-place culvert)
AT TOP OF INTERIOR WINGWALL
(Cast-in-place culvert)
AT OUTSIDE OF BOTTOM SLAB
(Cast-in-place culvert)
AT INTERIOR WINGWALL
(Precast culvert)
PLAN VIEWS OF CORNER DETAILS
TABLE OF REINFORCING BAR SIZES AND SPACING
BARS J
BARS K
(Length = 4'-3")
BARS R
SHEET 1 OF 2
Texas Department of Transportation
Bridge Division Standard
SAFETY END TREATMENT
FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE 1 — CROSS DRAINAGE
SETB-CD
138

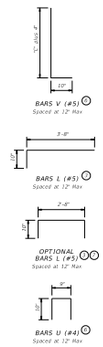

CROSS PIPE INSTALLATION DETAILS
BOTTOM ANCHOR PIPE DETAILS
OPTION A
OPTION B
BOTTOM ANCHOR TOEWALL DETAILS
OPTION B1
OPTION B2
CROSS PIPE SLEEVE PIPE DETAILS
CROSS PIPE AND CONNECTIONS DETAILS
FOR USE IN OUTSIDE CULVERT BAY
FOR USE IN INSIDE CULVERT BAY
OPTION A1
OPTION A2
PIPE RUNNER DETAILS
SIDE ELEVATION
MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES
SAFETY END TREATMENT
FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE 1 – CROSS DRAINAGE
SETB-CD
SHEET 2 OF 2
Texas Department of Transportation
Bridge Division Standard
DATE: 2/22
139


SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER
(Showing corrugated metal pipe (CMP) culvert. Details at reinforced concrete pipe (RCP) culvert are similar.)
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts retained as shown in this detail. Alternate styles of retained ends will require that appropriate adjustments be made to the values presented in this standard.
PIPE WITH BOLTED ANCHOR
PIPE WITH ANCHOR BARS
CROSS PIPE DETAILS
SECTION C-C
DETAIL "A"
(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)
SECTION B-B
(Cross pipes not shown for clarity.)
ISOMETRIC VIEW OF TYPICAL INSTALLATION
SHOWING TYPICAL PIPE CULVERT AND RIPRAP
SHOWING CROSS PIPE WITH ANCHOR BAR
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE
(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)
SHOWING CROSS PIPE WITH BOLTED ANCHOR
SECTION A-A
CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES
Nominal Culvert I.D.
Conc. Riprap (CY)
Pipe Culvert Size = S
Single Barrel = D1
Multi-Barrel = D1
D2
Conditions for Use of Cross Pipes
Cross Pipe Sizes
12" 0.6 0' - 9" N/A 2' - 2" 1' - 9"
15" 0.7 0' - 11" N/A 2' - 5" 2' - 2"
18" 0.8 1' - 2" N/A 2' - 10" 2' - 8"
21" 0.9 1' - 4" N/A 3' - 2" 3' - 1"
24" 0.9 1' - 7" N/A 3' - 6" 3' - 7"
27" 1.0 1' - 9" N/A 3' - 10" 3' - 11"
30" 1.1 1' - 10" N/A 4' - 2" 4' - 4"
33" 1.2 1' - 11" 4' - 2" 4' - 3" 4' - 9"
36" 1.3 2' - 1" 4' - 5" 4' - 9" 5' - 1"
42" 1.5 2' - 4" 4' - 11" 5' - 5" 5' - 10"
48" 1.7 2' - 7" 5' - 5" 6' - 0" 6' - 7"
54" 2.0 2' - 0" 5' - 11" 6' - 9" 7' - 6"
60" 2.2 3' - 3" 6' - 5" 7' - 4" 8' - 3"
66" 2.4 3' - 9" 6' - 11" 7' - 10" 8' - 9"
72" 2.7 3' - 3" 7' - 5" 8' - 5" 9' - 4"
3 or more pipe culverts
2 or more pipe culverts
All pipe culverts
3 #5 Std (4.000" O.D.)
3# Std (3.500" O.D.)
4# Std (4.500" O.D.)
5# Std (5.563" O.D.)
1 For proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.
2 Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 (#2" standard pipe (4" O.D.) for the first bottom pipe.
3 Install the third cross pipe from the bottom of the culvert using the bolted connection. Install the remaining cross pipes that are the cross pipe so as to permit disassembly of the bolted connection to allow clevious access. At the Contractor's option, install all other cross pipes using the bolted connection details.
4 Match cross slope as shown elsewhere in the plans. Cross slope of 4:1 or flatter is required for vehicle safety.
5 Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".
6 Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.
MATERIAL NOTES:
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Use ASTM A307 bolts and nuts, Grade A or B, except ASTM A53 (Type E or S, Gr. B), ASTM A500 Gr. B), or API 5L/5LX. Provide ASTM A307 bolts and nuts.
Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.
GENERAL NOTES:
Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures". Treatment for other traversing loads may vary.
Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.
Construct concrete riprap and all necessary inserts in accordance with the requirements of Item 432, "Riprap".
Payment for riprap and tiewalls is included in the Price Bid for each Safety End Treatment.
Texas Department of Transportation
Bridge Division Standard
SAFETY END TREATMENT
FOR 12" DIA TO 72" DIA PIPE CULVERTS
TYPE II – PARALLEL DRAINAGE
SETP-PD
FILE: setpdme-20.dgn
DATE: February 2020
FED.RD. DIV. NO. 6
STATE: TEXAS
DIST. COUNTY
CONT. SECT. JOB
HIGHWAY
SHEET NO. 140



TYPICAL SECTION

Used for curbs over 1'-0" to 3'-0"



BARS V (#5) ⑥
Spaced at 12" Max

BARS L (#5) ⑦
Spaced at 12" Max

OPTIONAL BARS L (#5) ⑦ ⑪
Spaced at 12" Max

BARS U (#4) ⑥
Spaced at 12" Max

⑤ 'T' is equal to the culvert top slab thickness. For precast boxes with slabs less than 9" thick, see SCP-MD standard for additional details.

⑥ Adjust normal culvert slab bars as necessary to clear obstructions.

⑦ Place bars L as shown. T-lit hook as necessary to maintain cover.

⑧ Place normal culvert curb bars M(#4) as shown. Adjust as necessary to clear obstructions.

⑨ Additional bars M(#4) as required to maintain 12" Max spacing.

⑩ Replace normal culvert curb bars K with one bar U and two bars V as shown spaced at 12" Max. Adjust length of bars V as necessary to maintain clear cover.

⑪ Optional bars L are to be used only for precast box culverts with 3'-0" closure pour.

⑫ Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The value in table can be interpolated for intermediate values of curb height, 'C'. Quantity includes bars K (when applicable).

TABLE OF ESTIMATED CURB QUANTITIES ⑫

Curb Height 'C'	Conc (CY/LF)	Reinf Steel (LB/LF)
1'-0"	0.037	10.4
1'-6"	0.056	14.5
2'-0"	0.074	19.0
2'-6"	0.093	18.0
3'-0"	0.111	19.0
3'-6"	0.130	21.1
4'-0"	0.148	22.4
4'-6"	0.167	24.6
5'-0"	0.185	25.9

CONSTRUCTION NOTES:
Adjust reinforcing steel as necessary to provide 1 ½" cover.
For vehicle safety, top of the curb must not project more than 3" above the finished grade.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the project.
Provide Class 'C' concrete (f'_c = 3,600 psi) minimum for curbs.
Provide bar laps, where required, as follows:
- Uncoated or galvanized – #4 = 2'-0" Min

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
These extended curb details have sufficient strength to allow for future retrofit of Type T631 or T631S railing. Refer to the TxDOT standards for Type T631 and T631 and PR3 Type rails. These details are not suitable for the retrofitting of other rail types. For new construction using T631 or T631S railing, use the T631-CR standard.
This Curb is considered as part of the Box Culvert for payment.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation | Bridge Division Standard

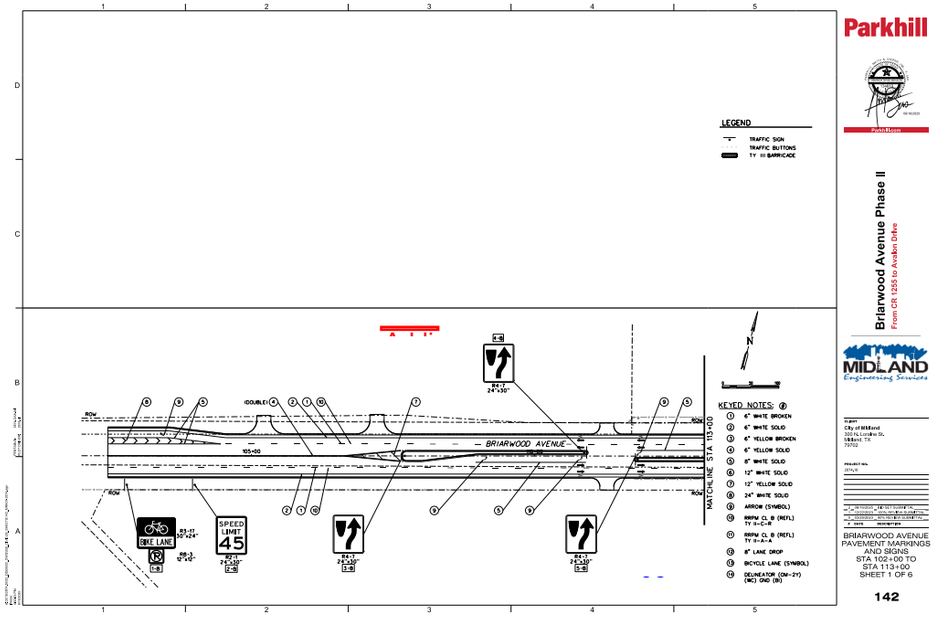
EXTENDED CURB DETAILS FOR BOX CULVERTS WITH CURBS OVER 1'-0" TO 5'-0" TALL

ECD

c: SP-PM(JLD)ECD-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.
				141

DATE: 2-21

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Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

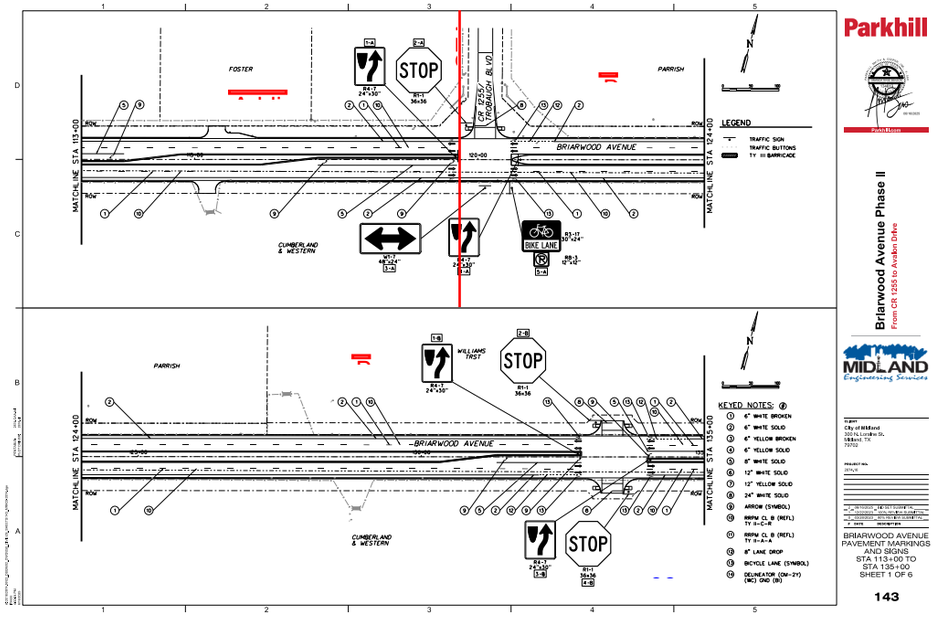
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

PROJECT No.
207470

NO.	DATE	DESCRIPTION
1	08/15/2025	AS SHOWN ON PLANS
2	08/15/2025	AS SHOWN ON PLANS
3	08/15/2025	AS SHOWN ON PLANS

BRIARWOOD AVENUE
PAVEMENT MARKINGS
AND SIGNS
STA 102+00 TO
STA 113+00
SHEET 1 OF 6

142



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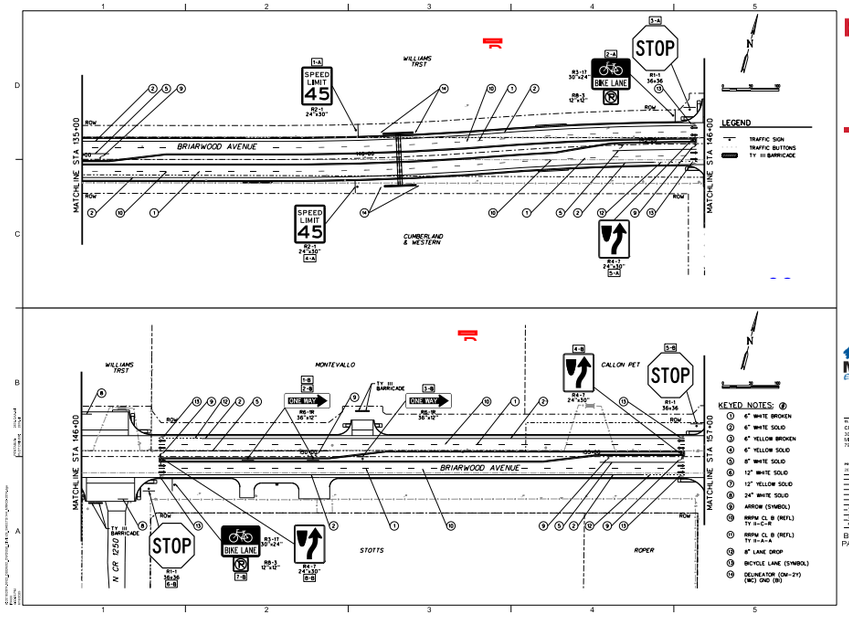
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE PAVEMENT MARKINGS AND SIGNS STA 113+00 TO STA 135+00 SHEET 1 OF 6

143



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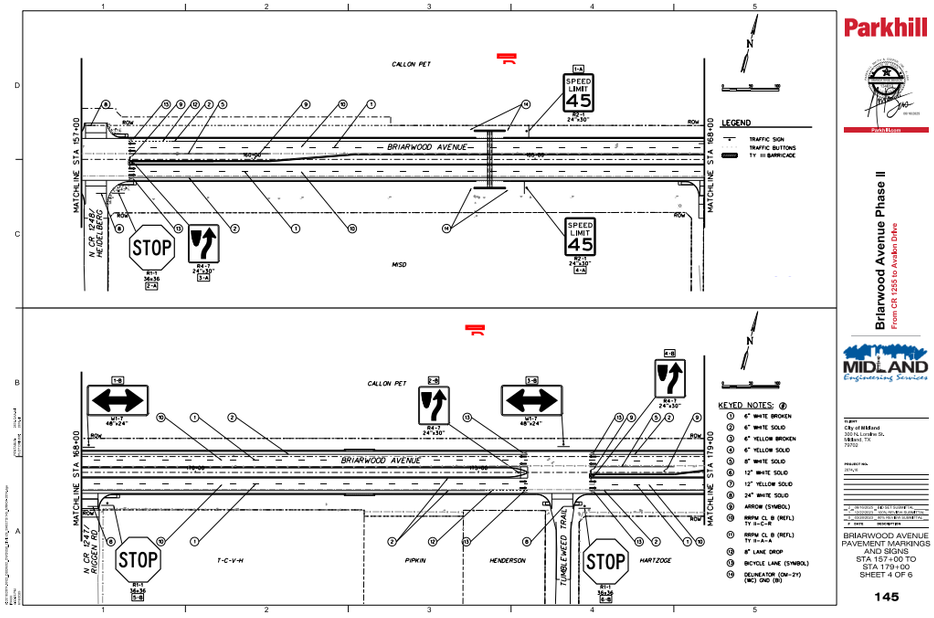
From CR 1250 to Avalon Drive

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City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
PAVEMENT MARKINGS
AND SIGNS
STA 135+00 TO
STA 157+00
SHEET 3 OF 6

144



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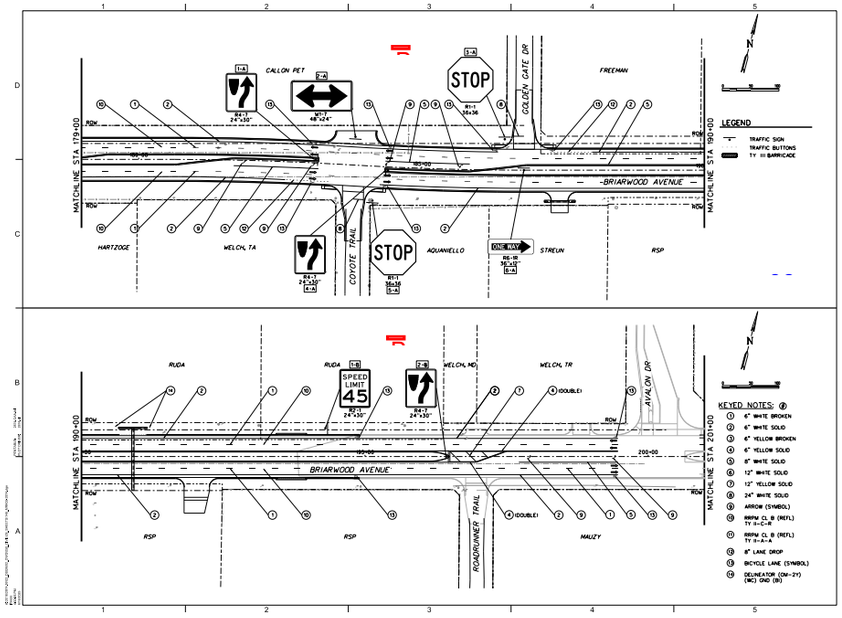
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE PAVEMENT MARKINGS AND SIGNS STA 157+00 TO STA 179+00 SHEET 4 OF 6

145



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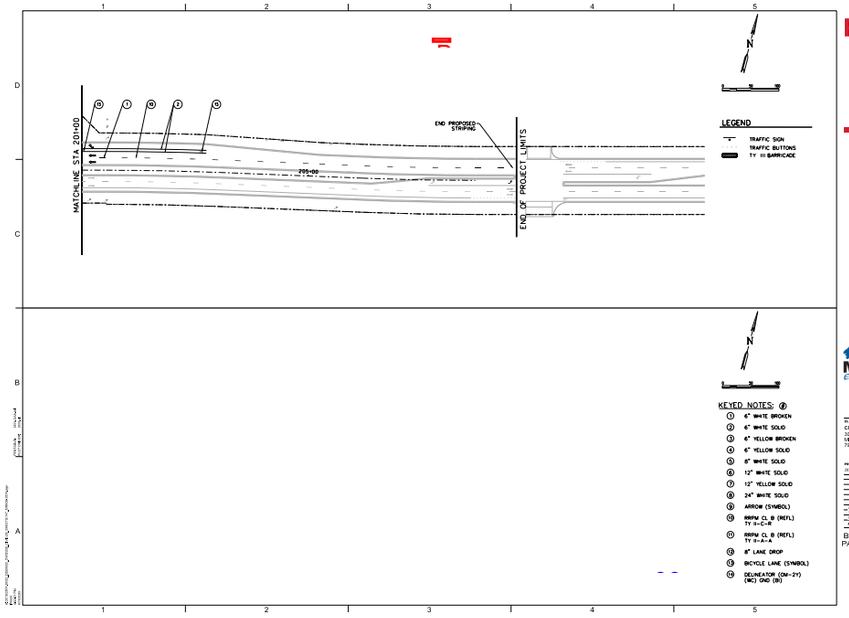
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PAVEMENT MARKINGS
AND SIGNS
STA 179+00 TO
STA 190+00
SHEET 5 OF 6

146



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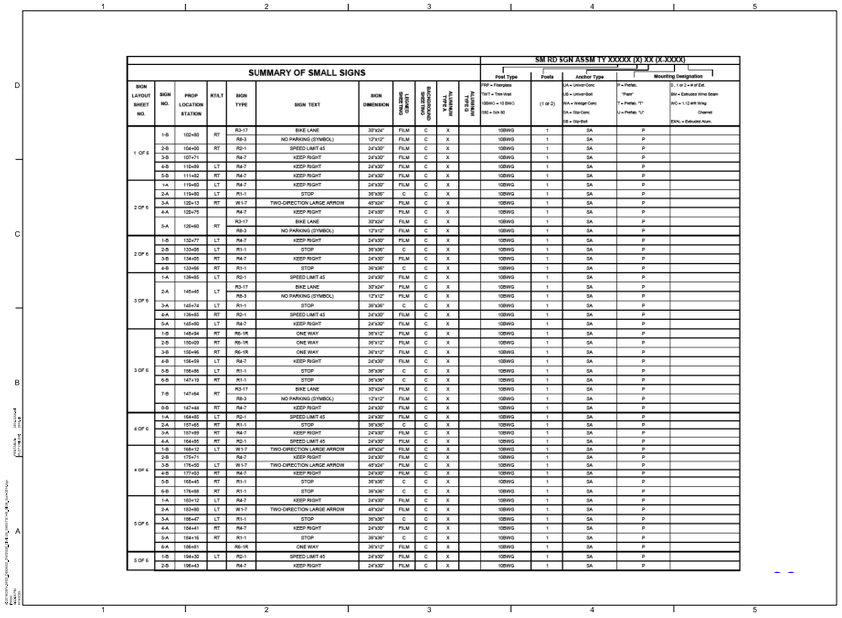
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE PAVEMENT MARKINGS AND SIGNS STA 201+00 TO END OF PROJECT SHEET 6 OF 6

147



SUMMARY OF SMALL SIGNS

SIGN LAYOUT SHEET NO.	SIGN NO.	PROP LOCATION STATION	RT/LT	SIGN TYPE	SIGN TEXT	SIGN DIMENSION	COLLEGE STATION REQUIRED	TXDOT REQUIRED	ALUMINUM (TXDOT)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)				
										Post Type	Posts	Anchor Type	Mounting Designation	
										TSP = Flangeless TWT = Tree Wrist (SMA) = 10 SMO (SB) = Sch 80	(1 or 2)	BA = Union-Conc BS = Union-Soil MA = Integr-Conc SA = Slip-Conc SB = Slip-Soil	P = Perfab. "Plate" T = Perfab. "T" L = Perfab. "L"	S - 1 or 2 x # of Ext. SW = Extruded Wind Beam NC = 1 1/2 MR Wrap Channel EWL = Extruded Alum.
1 OF 5	1-B	102+80	RT	R3-17	BIKE LANE	30"X24"	FILM	C	X		10BWG	1	SA	P	
	2-B	104+00	RT	R3-3	NO PARKING (SYMBOL)	12"X12"	FILM	C	X		10BWG	1	SA	P	
	3-B	107+71		R1-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10BWG	1	SA	P	
	4-B	110+89	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	5-B	111+82	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
2 OF 5	1-A	119+82	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	2-A	119+90	LT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	3-A	120+13	RT	W1-7	TWO-DIRECTION LARGE ARROW	48"X24"	FILM	C	X		10BWG	1	SA	P	
	4-A	120+75		R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	5-A	120+92	RT	R3-17	BIKE LANE	30"X24"	FILM	C	X		10BWG	1	SA	P	
				R3-3	NO PARKING (SYMBOL)	12"X12"	FILM	C	X		10BWG	1	SA	P	
2 OF 5	1-B	132+77	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	2-B	133+08	LT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	3-B	134+05	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	4-B	133+66	RT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
3 OF 5	1-A	139+65	LT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10BWG	1	SA	P	
	2-A	145+45	LT	R3-17	BIKE LANE	30"X24"	FILM	C	X		10BWG	1	SA	P	
				R3-3	NO PARKING (SYMBOL)	12"X12"	FILM	C	X		10BWG	1	SA	P	
	3-A	145+74	LT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	4-A	139+65	RT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10BWG	1	SA	P	
	5-A	145+65	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
3 OF 5	1-B	149+94	RT	R6-1R	ONE WAY	36"X12"	FILM	C	X		10BWG	1	SA	P	
	2-B	150+09	RT	R6-1R	ONE WAY	36"X12"	FILM	C	X		10BWG	1	SA	P	
	3-B	150+46	RT	R6-1R	ONE WAY	36"X12"	FILM	C	X		10BWG	1	SA	P	
	4-B	156+59	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	5-B	156+66	LT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	6-B	147+19	RT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	7-B	147+64	RT	R3-17	BIKE LANE	30"X24"	FILM	C	X		10BWG	1	SA	P	
				R3-3	NO PARKING (SYMBOL)	12"X12"	FILM	C	X		10BWG	1	SA	P	
	8-B	147+44	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
4 OF 5	1-A	164+65	LT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10BWG	1	SA	P	
	2-A	167+45	RT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	3-A	167+69	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	4-A	164+65	RT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10BWG	1	SA	P	
4 OF 5	1-B	169+12	LT	W1-7	TWO-DIRECTION LARGE ARROW	48"X24"	FILM	C	X		10BWG	1	SA	P	
	2-B	173+71		R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	3-B	176+50	LT	W1-7	TWO-DIRECTION LARGE ARROW	48"X24"	FILM	C	X		10BWG	1	SA	P	
	4-B	177+63	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	5-B	165+45	RT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	6-B	178+68	RT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
5 OF 5	1-A	183+12	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	2-A	183+40	LT	W1-7	TWO-DIRECTION LARGE ARROW	48"X24"	FILM	C	X		10BWG	1	SA	P	
	3-A	186+47	LT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	4-A	184+41	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	5-A	184+16	RT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	6-A	186+61		R6-1R	ONE WAY	36"X12"	FILM	C	X		10BWG	1	SA	P	
5 OF 5	1-B	194+30	LT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10BWG	1	SA	P	
	2-B	196+43		R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	

Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

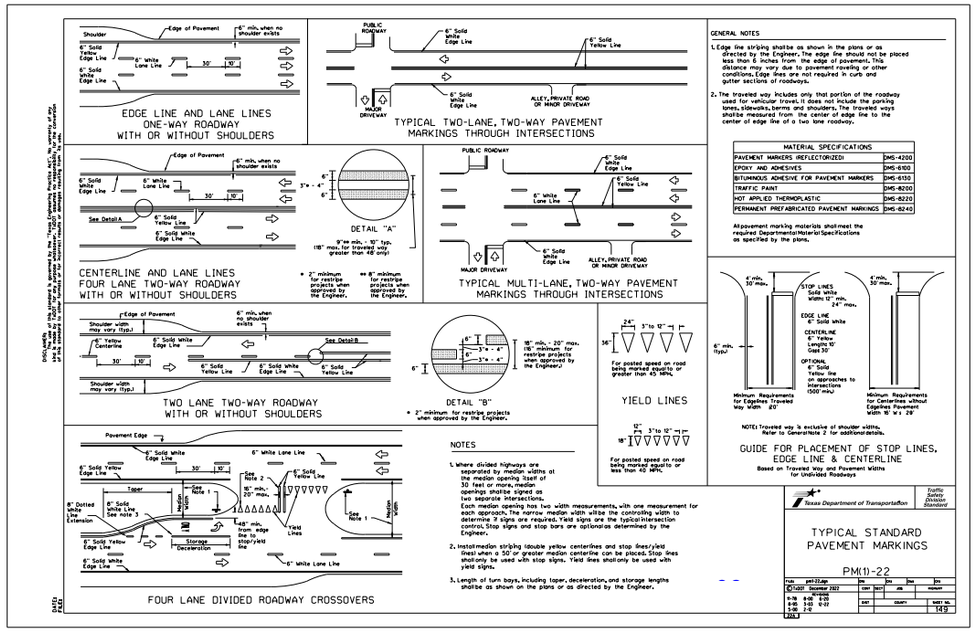
client
City of Midland
300 N. Loraine St.
Midland, TX
79702

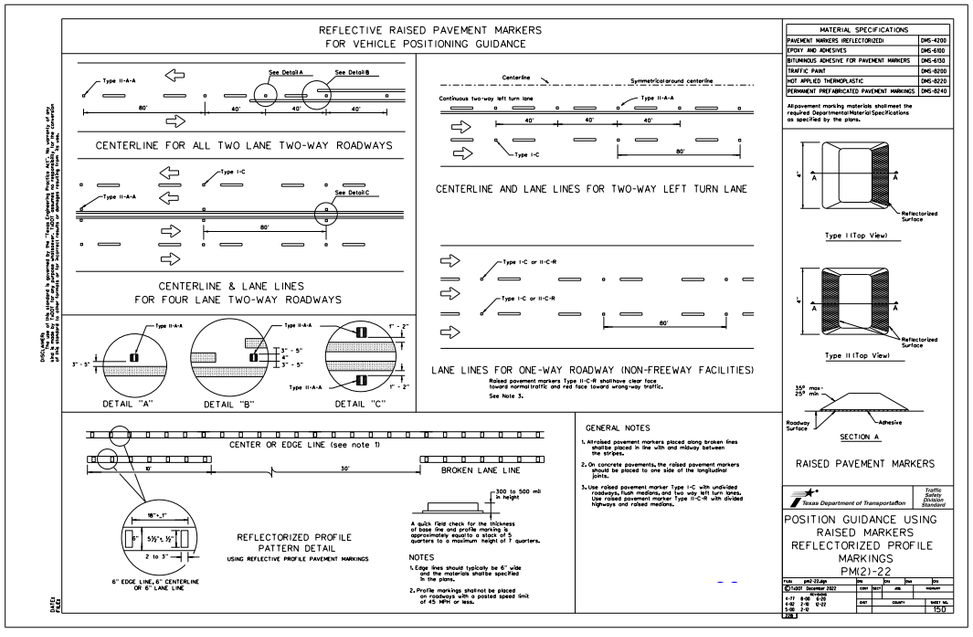
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067419

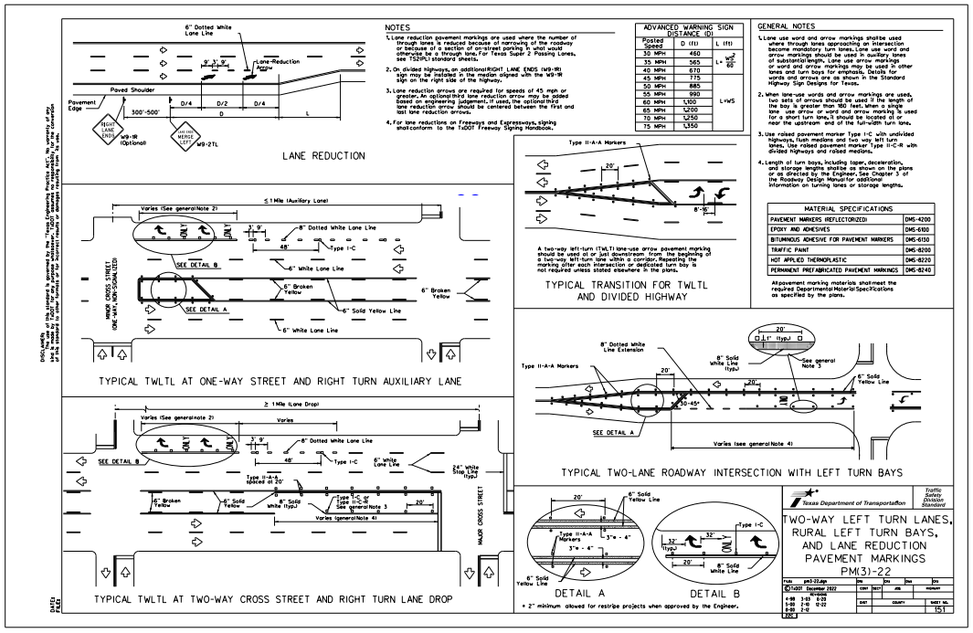
#	DATE	DESCRIPTION
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2	08/29/2025	INITIAL SUBMITTAL
3	09/05/2025	REVISED PER CITY COMMENTS

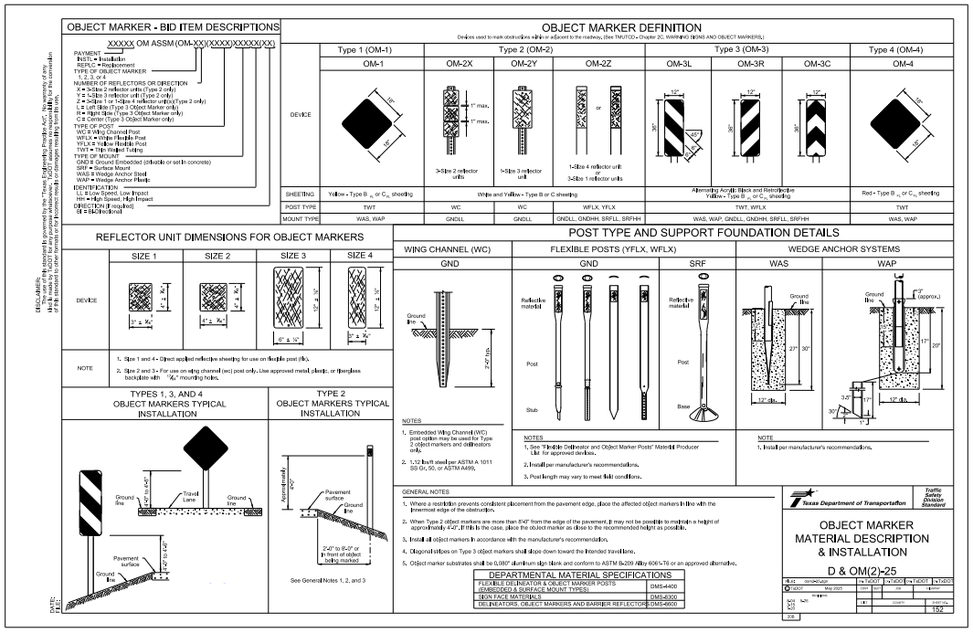
BRIARWOOD AVENUE
SMALL SIGN
SUMMARY SHEET

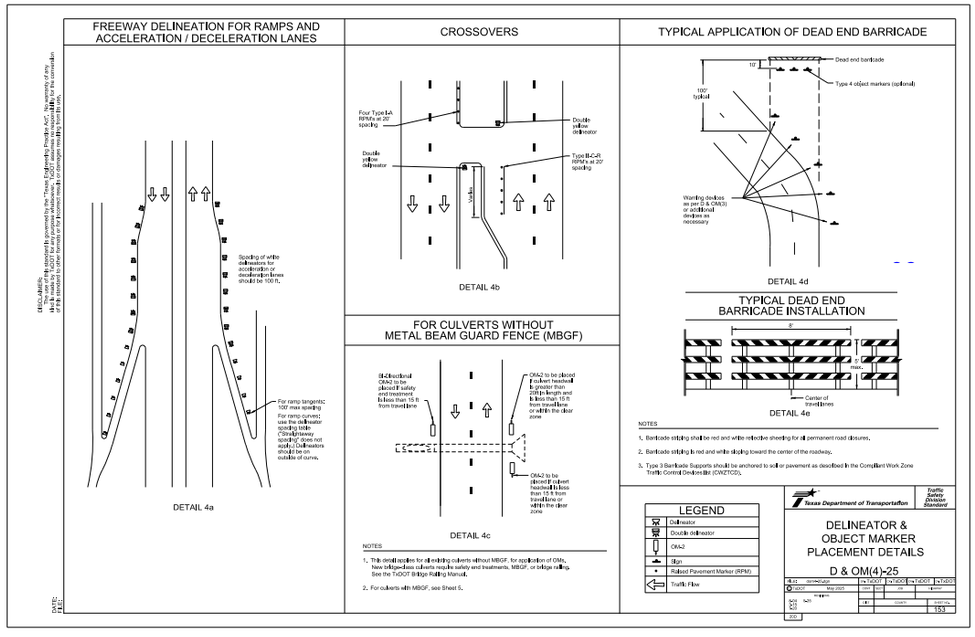
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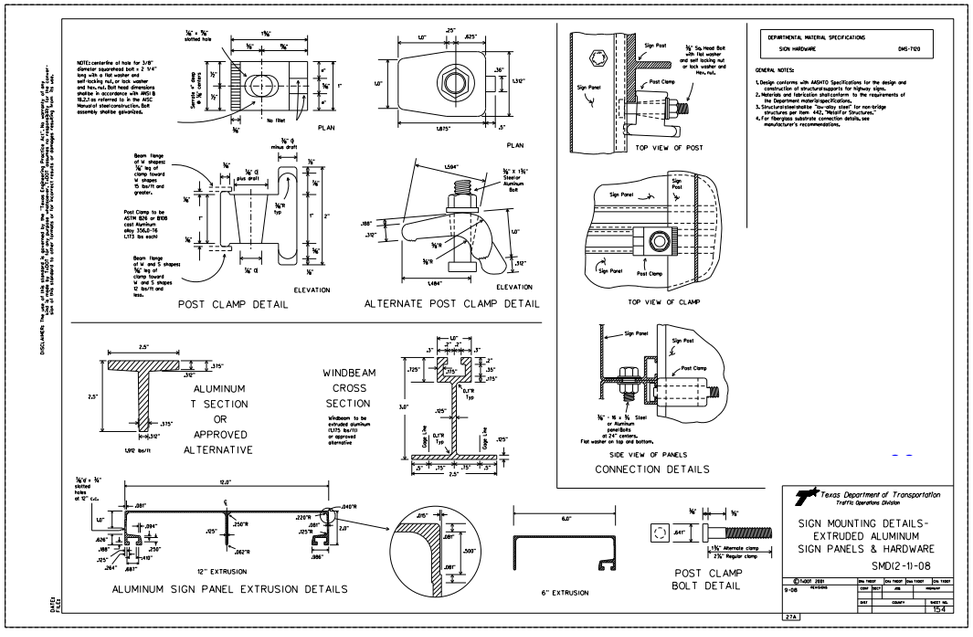

EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS
TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS
GENERAL NOTES
1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.
MATERIAL SPECIFICATIONS
PAVEMENT MARKERS (REFLECTORIZED) DMS-4200
EPOXY ADHESIVES DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS DMS-6150
TRAFFIC PAINT DMS-8200
HOT APPLIED THERMOPLASTIC DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS DMS-8240
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS
DETAIL "A"
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS
TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS
DETAIL "B"
YIELD LINES
GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE
Based on Traveled Way and Pavement Widths
for Undivided Roadways
FOUR LANE DIVIDED ROADWAY CROSSOVERS
NOTES
1. Where divided highways are separated by median widths of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.
Texas Department of Transportation
Traffic Safety Division Standard
TYPICAL STANDARD
PAVEMENT MARKINGS
PM(1)-22
DATED JUNE 2022

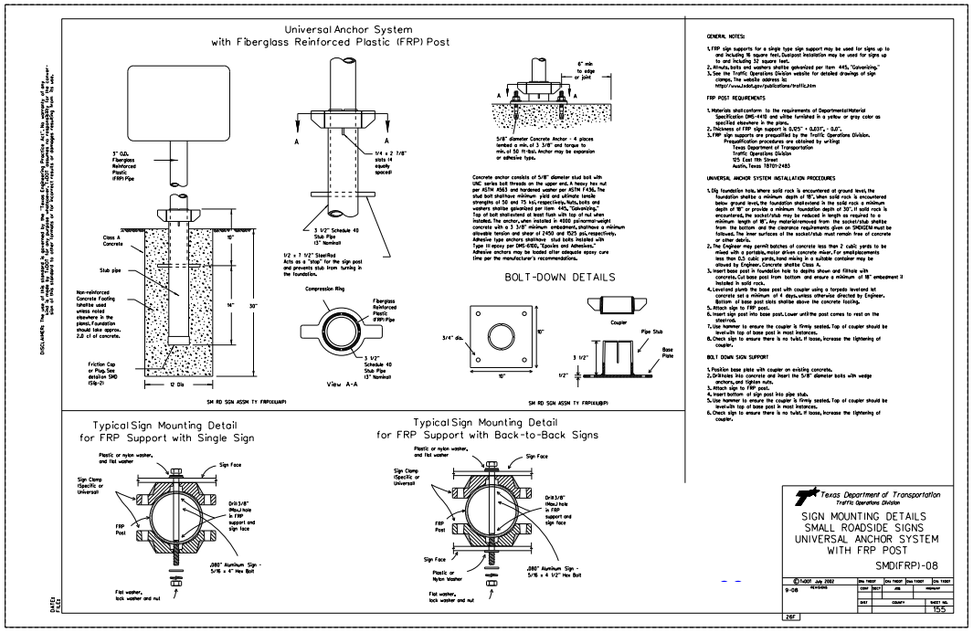

REFLECTIVE RAISED PAVEMENT MARKERS
FOR VEHICLE POSITIONING GUIDANCE
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS
CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY ROADWAYS
CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)
DETAIL "A"
DETAIL "B"
DETAIL "C"
CENTER OR EDGE LINE (see note 1)
BROKEN LANE LINE
REFLECTORIZED PROFILE
PATTERN DETAIL
USING REFLECTIVE PROFILE PAVEMENT MARKINGS
6" EDGE LINE, 6" CENTERLINE
OR 8" LANE LINE
GENERAL NOTES
NOTES
MATERIAL SPECIFICATIONS
PAVEMENT MARKERS (REFLECTORIZED) DMS-4200
EPOXY AND ADHESIVES DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS DMS-6150
TRAFFIC PAINT DMS-8200
HOT APPLIED THERMOPLASTIC DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS DMS-8240
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.
Type I (Top View)
Type II (Top View)
SECTION A
RAISED PAVEMENT MARKERS
Texas Department of Transportation
Traffic Safety Division Standard
POSITION GUIDANCE USING
RAISED MARKERS
REFLECTORIZED PROFILE
MARKINGS
PM(2)-22

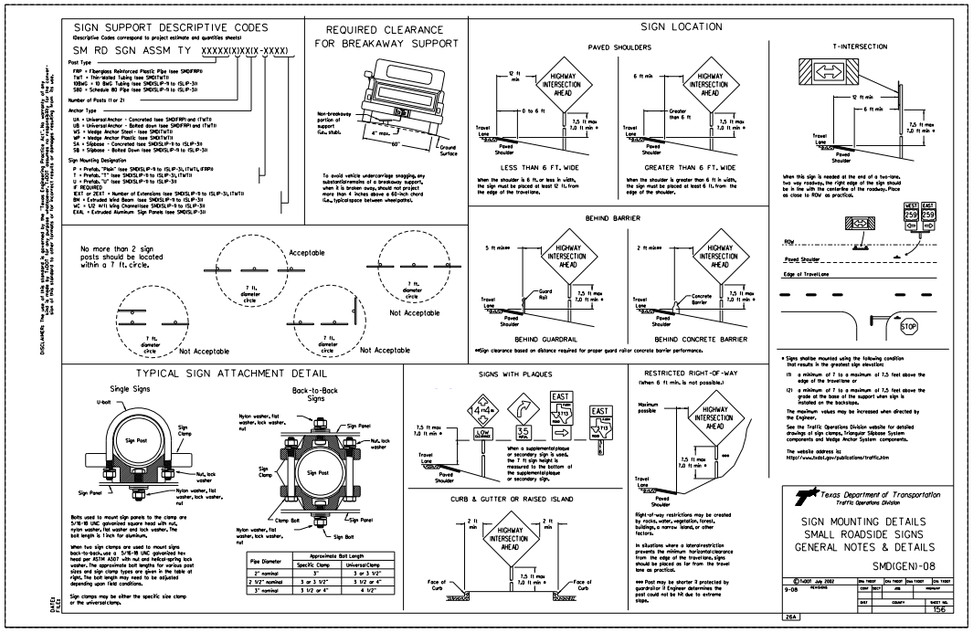

LANE REDUCTION
NOTES
1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because a lane is dropped to provide parking. If this would result in a through lane, or Texas Super 7 Passing Lanes, see TSOPM1 standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed on the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.
ADVANCED WARNING SIGN DISTANCE (D)
Posted Speed | D (ft) | L (ft)
30 MPH | 450 | L= WS/60
35 MPH | 565
40 MPH | 670
45 MPH | 775
50 MPH | 885 | L=WS
55 MPH | 990
60 MPH | 1,100
65 MPH | 1,200
70 MPH | 1,250
75 MPH | 1,350
GENERAL NOTES
1. Lane use word and arrow markings shallbe used where through lanes approaching an intersection become mandatory. Unless Lane use word and arrow markings are used, turn bays should be a minimum of substantial length. Lane use arrow markings or word and arrow markings may be used to other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow word and arrow marking is used in a turn bay, it should be placed 20 feet from or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, non-medians and two-way left turn highways, non-medians and two-way left turn highways with raised medians and Type II-C-R with divided highways and raised median.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as shown in Table 3-23 in Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.
MATERIAL SPECIFICATIONS
PAVEMENT MARKERS REFLECTORIZED | DMS-4200
EPOXY AND ADHESIVES | DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS | DMS-6150
TRAFFIC PAINT | DMS-8200
HOT APPLIED THERMOPLASTIC | DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS | DMS-8240
All pavement marking materials shallmeet the required Departmental Material Specifications as specified by the plans.
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE
TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP
DETAIL A
DETAIL B
Texas Department of Transportation
TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS
PM(3)-22

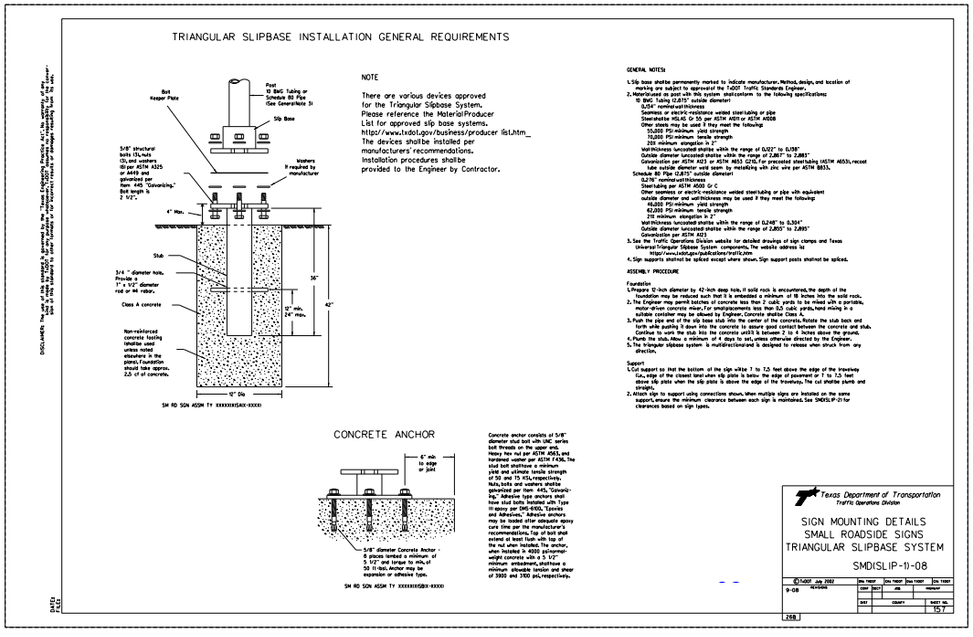

OBJECT MARKER - BID ITEM DESCRIPTIONS
XXXXX OM ASSM(OM-XX)(XXXX)(XXXX)(XX)
PAYMENT
INSTL = Installation
REPLC = Replacement
TYPE OF OBJECT MARKER
1, 2, 3, or 4
NUMBER OF REFLECTORS OR ORIENTATION
1 = Single reflector units (Type 2 only)
Y = 2-Slim 3 reflector unit (Type 2 only)
Z = 2-Slim 1 or 1-Slim 4 reflector unit(s)(Type 2 only)
LS = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
CS Center (Type 3 Object Marker only)
TYPE OF POST
GND = Ground Mounted Post
WFLX = White Flexible Post
YFLX = Yellow Flexible Post
TWT = Thin Walled Tubing
TYPE OF MOUNT
GNDI = Ground Embedded (driveable or set in concrete)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic
IDENTIFICATION
LL = Low Speed, Low Impact
HH = High Speed, High Impact
DIRECTION (if required)
BI = Bi-Directional
OBJECT MARKER DEFINITION
Devices used to mark obstructions within or adjacent to the roadway (See TMUTCD, Chapter 2C, WARNING SIGNS AND OBJECT MARKERS)
Type 1 (OM-1)
OM-1
Type 2 (OM-2)
OM-2X
OM-2Y
OM-2Z
Type 3 (OM-3)
OM-3L
OM-3R
OM-3C
Type 4 (OM-4)
OM-4
DEVICE
12in.
12in.
1" max.
1" max.
3-Slim 2 reflector units
3-Slim 3 reflector unit
or
1-Slim 4 reflector unit
or
3-Slim 1 reflector units
12"
36"
45°
12"
36"
12"
36"
12in.
12in.
SHEETING
Yellow = Type B or C sheeting
White and Yellow = Type B or C sheeting
Alternating Acrylic Black and Retroflective Yellow = Type B or C sheeting
Red = Type B or C sheeting
POST TYPE
TWT
WC
WFLX, YFLX
TWT, WFLX
TWT
MOUNT TYPE
WAS, WAP
GNDLL
GNDLL
GNDLL, GNDHH, SRFLL, SRFHH
WAS, WAP, GNDLL, GNDHH, SRFLL, SRFHH
WAS, WAP
REFLECTOR UNIT DIMENSIONS FOR OBJECT MARKERS
SIZE 1
SIZE 2
SIZE 3
SIZE 4
DEVICE
3" ± W
4" ± W
12" ± W
12" ± W
6" ± ¼"
3" ± W
NOTE
1. Size 1 and 4 - Object applied reflective sheeting for use on flexible post (fb).
2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic, or fiberglass backplate with "⅜" mounting holes.
TYPES 1, 3, AND 4 OBJECT MARKERS TYPICAL INSTALLATION
Ground line
12in. min. to 24in. max.
Travel Lane
Ground line
Pavement surface
Ground line
12in. min. to 24in. max.
TYPE 2 OBJECT MARKERS TYPICAL INSTALLATION
Approximately 24"
Pavement surface
Ground line
2'-0" to 8'-0" in front of object being marked
See General Notes 1, 2, and 3
POST TYPE AND SUPPORT FOUNDATION DETAILS
WING CHANNEL (WC)
GND
Ground line
24" min.
NOTES
1. Embedded Wing Channel (WC) post option may be used for Type 2 object markers and delineators only.
2. 1-1/2 lbs/ft steel per ASTM A 1011 SS Gr. 55, or ASTM A499.
FLEXIBLE POSTS (YFLX, WFLX)
GND
SRF
Reflective material
Post
Stub
Reflective material
Post
Base
NOTES
1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
WEDGE ANCHOR SYSTEMS
WAS
WAP
Ground line
27"
30"
12" dia.
Ground line
3" (approx.)
20"
17"
3.4"
30°
12" dia.
NOTE
1. Install per manufacturer's recommendations.
GENERAL NOTES
1. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstructions.
2. When Type 2 object markers are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0", if this is the case, place the object marker as close to the recommended height as possible.
3. Install all object markers in accordance with the manufacturer's recommendation.
4. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.
5. Object marker substrates shall be 0.080" aluminum sign blank and conform to ASTM B-209 Alloy 6061-T6 or an approved alternative.
DEPARTMENTAL MATERIAL SPECIFICATIONS
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES): DMS-4400
SIGN FACE MATERIALS: DMS-4300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS: DMS-4600
Texas Department of Transportation
Traffic Safety Division Standard
OBJECT MARKER MATERIAL DESCRIPTION & INSTALLATION
D & OM(2)-25
FILE: dom2-25.dgn
DN: TxDOT
CK: TxDOT
DW: TxDOT
CK: TxDOT
©TxDOT May 2025
CONT
SECT
JOB
HIGHWAY
DIST
COUNTY
SHEET NO.
152
DATE:
FHWA:
DESCRIPTION:
The use of this standard is governed by the "Texas Engineering Practice Act". Any modification of this standard, including deletions, or the addition of any other information, shall release the TxDOT of all responsibility for the use thereof. Seal not required unless this standard is altered.

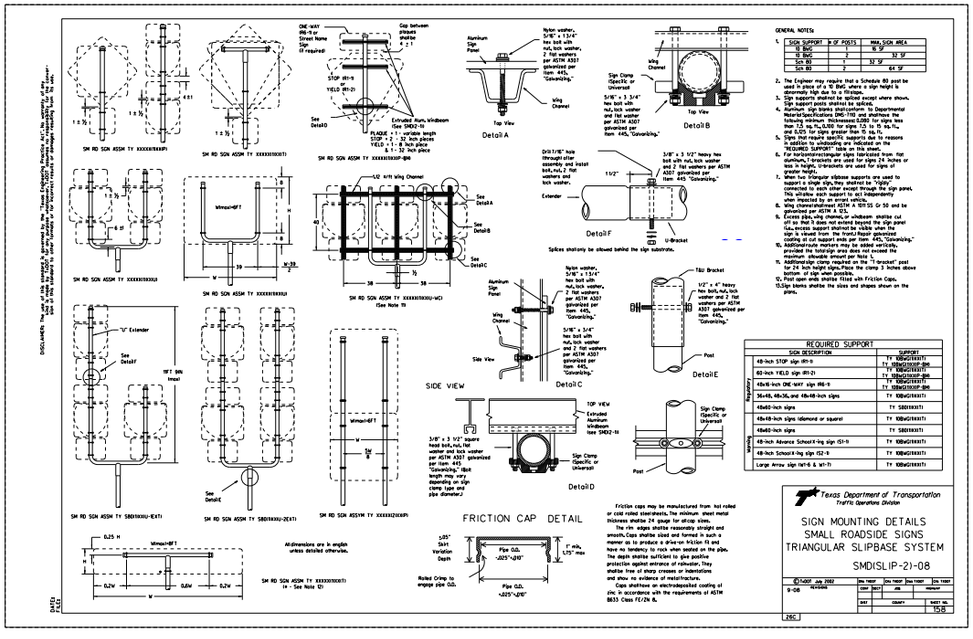

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION / DECELERATION LANES
Spacing of white delineators for acceleration or deceleration lanes should be 100 ft.
For ramp tangents: 100' max spacing
For ramp curves: use the delineator spacing table (Straight/Curve) in Table 1. Curves may not apply. Delineators should be on outside of curve.
DETAIL 4a
CROSSOVERS
Four Type 1-A (RPMs at 20' spacing
Double yellow delineator
Double yellow delineator
Type II-C-R (RPMs at 20' spacing
Varies
DETAIL 4b
FOR CULVERTS WITHOUT METAL BEAM GUARD FENCE (MBGF)
Bi-Directional OM-2 to be placed if safety end treatment is less than 15 ft from travel lane.
OM-2 to be placed if culvert headwall is greater than 20 ft in length and is less than 15 ft from travel lane or within the clear zone
OM-2 to be placed if culvert headwall is less than 15 ft from travel lane or within the clear zone
DETAIL 4c
NOTES
1. This detail applies for all existing culverts without MBGF, for application of OMs. New bridge-class culverts require safety end treatments, MBGF, or bridge railing. See the TxDOT Bridge Railing Manual.
2. For culverts with MBGF, see Sheet 5.
TYPICAL APPLICATION OF DEAD END BARRICADE
10'
Dead end barricade
Type 4 object markers (optional)
100' typical
Warning devices as per D & OM(3) or additional devices as necessary
DETAIL 4d
TYPICAL DEAD END BARRICADE INSTALLATION
8'
4' max.
Center of travel lanes
DETAIL 4e
NOTES
1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in the Compliant Work Zone Traffic Control Devices list (CWZTCD).
LEGEND
Delineator
Double delineator
OM-2
Sign
Raised Pavement Marker (RPM)
Traffic Flow
Texas Department of Transportation
Traffic Safety Division Standard
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS
D & OM(4)-25
FILE: dom4d25.dgn
DN: TxDOT
CK: TxDOT
DW: TxDOT
CK: TxDOT
©TxDOT: May 2025
CONT
SECT
JOB
HIGHWAY
DIST
COUNTY
SHEET NO.
153
DATE:
FED.RD. DIV. NO.
FILE:
DESCRIPTION
1) The use of this standard is governed by the "Texas Engineering Practice Act". Any modification of this standard, including the deletion of details, notes or dimensions, shall release the engineer of record preparing the modified document from responsibility for the use of the standard by others. In addition, the TxDOT assumes no responsibility for errors or omissions resulting from the modification of this standard or other documents prepared or sealed by the engineer of record.

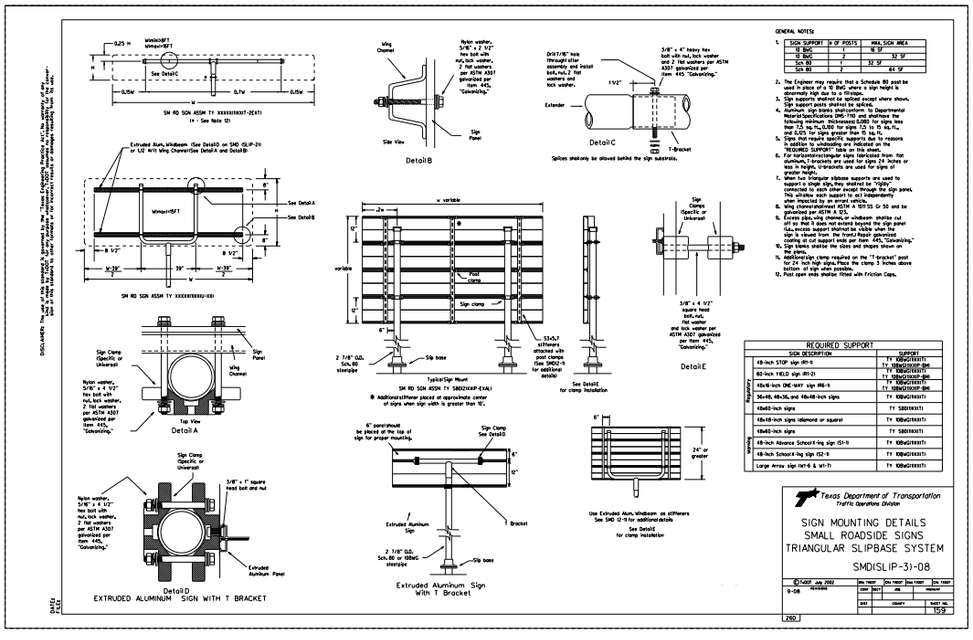

POST CLAMP DETAIL
ELEVATION
PLAN
ALTERNATE POST CLAMP DETAIL
ELEVATION
PLAN
TOP VIEW OF POST
TOP VIEW OF CLAMP
SIDE VIEW OF PANELS
CONNECTION DETAILS
DEPARTMENTAL MATERIAL SPECIFICATIONS
SIGN HARDWARE
DMS-7109
GENERAL NOTES:
ALUMINUM
T SECTION
OR
APPROVED
ALTERNATIVE
WINDBEAM
CROSS
SECTION
12" EXTRUSION
ALUMINUM SIGN PANEL EXTRUSION DETAILS
6" EXTRUSION
POST CLAMP
BOLT DETAIL
Texas Department of Transportation
Traffic Operations Division
SIGN MOUNTING DETAILS-
EXTRUDED ALUMINUM
SIGN PANELS & HARDWARE
SMD(2-1)-08

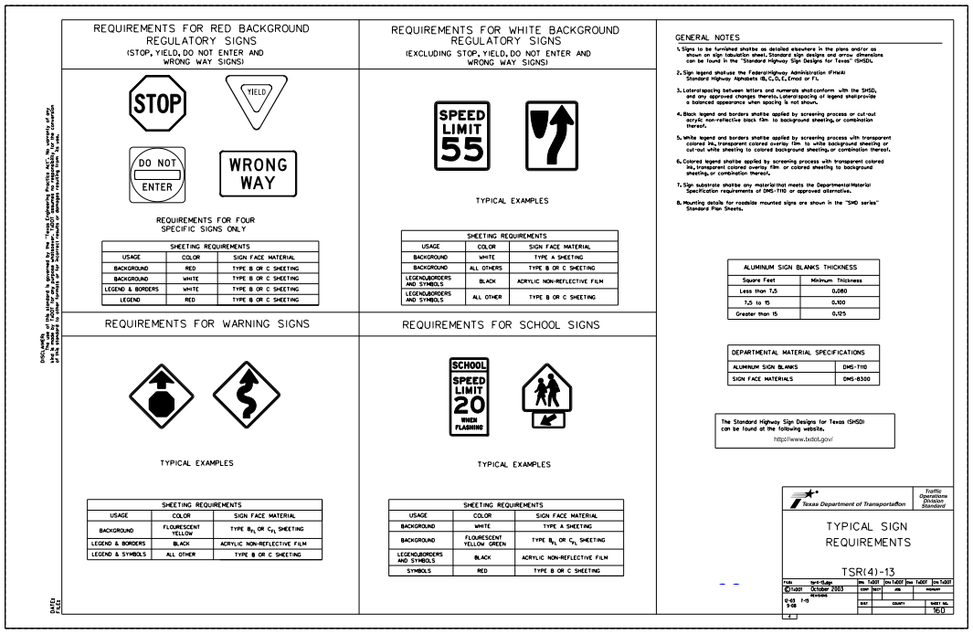

Universal Anchor System
with Fiberglass Reinforced Plastic (FRP) Post
BOLT-DOWN DETAILS
GENERAL NOTES:
FRP POST REQUIREMENTS
UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES
BOLT DOWN SIGN SUPPORT
Typical Sign Mounting Detail
for FRP Support with Single Sign
Typical Sign Mounting Detail
for FRP Support with Back-to-Back Signs
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
UNIVERSAL ANCHOR SYSTEM
WITH FRP POST
SMD(FRP)-08

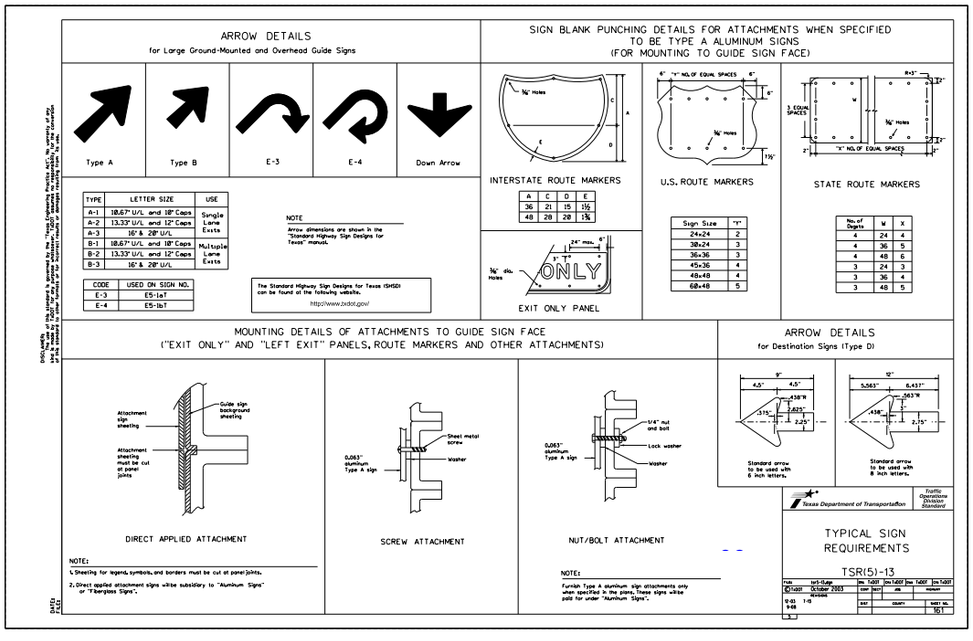

SIGN SUPPORT DESCRIPTIVE CODES
SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT
SIGN LOCATION
PAVED SHOULDERS
LESS THAN 6 FT. WIDE
GREATER THAN 6 FT. WIDE
BEHIND BARRIER
BEHIND GUARDRAIL
BEHIND CONCRETE BARRIER
T-INTERSECTION
No more than 2 sign posts should be located within a 7 ft. circle.
Acceptable
Not Acceptable
TYPICAL SIGN ATTACHMENT DETAIL
Single Signs
Back-to-Back Signs
SIGNS WITH PLAQUES
CURB & GUTTER OR RAISED ISLAND
RESTRICTED RIGHT-OF-WAY
Texas Department of Transportation
Traffic Operations Division
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
GENERAL NOTES & DETAILS
SMD(GEN)-08


TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS
NOTE
There are various devices approved for the Triangular Slipbase System. Please reference the MaterialProducer List for approved slip base systems. http://www.txdot.gov/business/producer lists.htm The devices shallbe installed per manufacturers' recommendations. Installation procedures shallbe provided to the Engineer by Contractor.
GENERAL NOTES:
ASSEMBLY PROCEDURE
Foundation
Support
CONCRETE ANCHOR
Texas Department of Transportation
Traffic Operations Division
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM
SMD(SLIP-1)-08


SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM
SMDISLIP-2)-08
FRICTION CAP DETAIL
SIDE VIEW
TOP VIEW
Detail A
Detail B
Detail C
Detail D
Detail E
Detail F
GENERAL NOTES:
REQUIRED SUPPORT
Texas Department of Transportation
Traffic Operations Division


SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM
SMDISLIP-3)-08
Texas Department of Transportation
Traffic Operations Division
GENERAL NOTES:
REQUIRED SUPPORT
Detail A
Detail B
Detail C
Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET
Detail E
Typical Sign Mount
Extruded Aluminum Sign With T Bracket


REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)
STOP
YIELD
DO NOT ENTER
WRONG WAY
REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY
SHEETING REQUIREMENTS
USAGE | COLOR | SIGN FACE MATERIAL
BACKGROUND | RED | TYPE B OR C SHEETING
BACKGROUND | WHITE | TYPE B OR C SHEETING
LEGEND & BORDERS | WHITE | TYPE B OR C SHEETING
LEGEND | RED | TYPE B OR C SHEETING
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)
SPEED LIMIT 55
TYPICAL EXAMPLES
SHEETING REQUIREMENTS
USAGE | COLOR | SIGN FACE MATERIAL
BACKGROUND | WHITE | TYPE A SHEETING
BACKGROUND | ALL OTHERS | TYPE B OR C SHEETING
LEGEND,BORDERS AND SYMBOLS | BLACK | ACRYLIC NON-REFLECTIVE FILM
LEGEND,BORDERS AND SYMBOLS | ALL OTHER | TYPE B OR C SHEETING
REQUIREMENTS FOR WARNING SIGNS
TYPICAL EXAMPLES
SHEETING REQUIREMENTS
USAGE | COLOR | SIGN FACE MATERIAL
BACKGROUND | FLOURESCENT YELLOW | TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS | BLACK | ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS | ALL OTHER | TYPE B OR C SHEETING
REQUIREMENTS FOR SCHOOL SIGNS
SCHOOL SPEED LIMIT 20 WHEN FLASHING
TYPICAL EXAMPLES
SHEETING REQUIREMENTS
USAGE | COLOR | SIGN FACE MATERIAL
BACKGROUND | WHITE | TYPE A SHEETING
BACKGROUND | FLOURESCENT YELLOW GREEN | TYPE B_{FL} OR C_{FL} SHEETING
LEGEND,BORDERS AND SYMBOLS | BLACK | ACRYLIC NON-REFLECTIVE FILM
SYMBOLS | RED | TYPE B OR C SHEETING
GENERAL NOTES
1. Signs to be furnished shallbe as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shalluse the FederalHighway Administration (FHwA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateralspacing between letters and numerals shallconform with the SHSD, and any approved changes thereto. Lateralspacing of legend shallprovide a balanced appearance when spacing is not shown.
4. Black legend and borders shallbe applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shallbe applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shallbe applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shallbe any materialthat meets the DepartmentalMaterial Specification requirements of DMS-7110 or approved alternatives.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.
ALUMINUM SIGN BLANKS THICKNESS
Square Feet | Minimum Thickness
Less than 7.5 | 0.080
7.5 to 15 | 0.100
Greater than 15 | 0.125
DEPARTMENTAL MATERIAL SPECIFICATIONS
ALUMINUM SIGN BLANKS | DMS-7110
SIGN FACE MATERIALS | DMS-8300
The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/
Texas Department of Transportation
Traffic Operations Division Standard
TYPICAL SIGN REQUIREMENTS
TSR(4)-13
FILE: tsr4-13.dgn
DN: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT
©TxDOT October 2003
CONT | SECT | JOB | HIGHWAY
REVISIONS
DIST | COUNTY | SHEET NO.
16
DATE/FILE



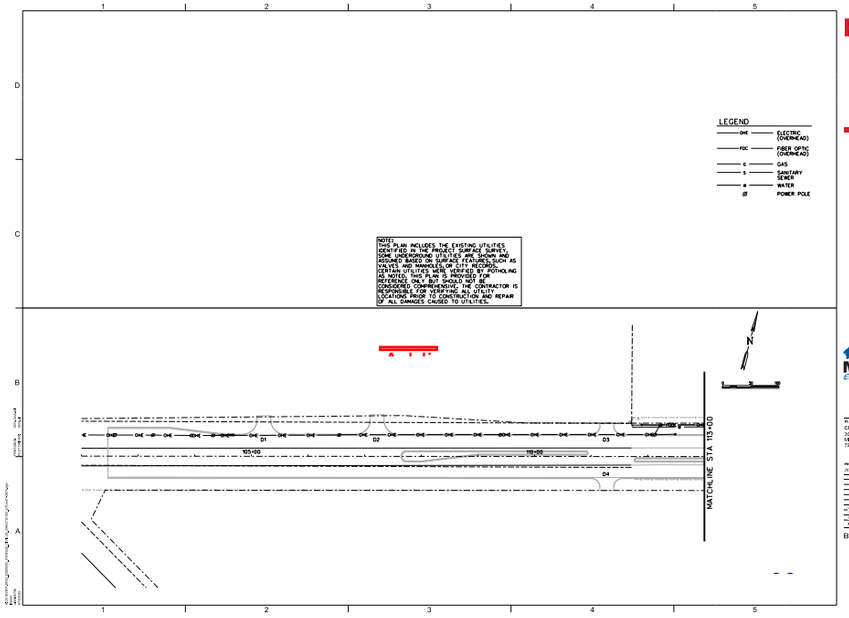
TYPE	LETTER SIZE	USE
A-1	18.67" U/L and 18" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 28" U/L	
B-1	18.67" U/L and 18" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 28" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

A	C	D	E
36	21	15	1½
48	28	20	1¾

Sign Size	"Y"
24×24	2
30×24	3
36×36	3
45×36	4
48×48	4
60×48	5

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5



Parkhill

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

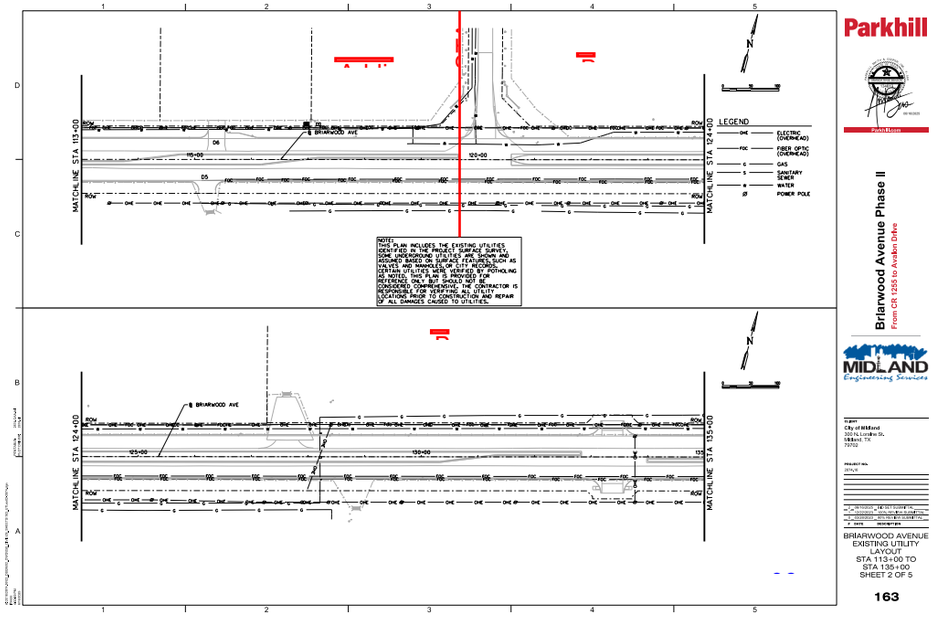
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
067419

No.	Date	Description

BRIARWOOD AVENUE
EXISTING UTILITY
LAYOUT
STA 102+00 TO
STA 113+00
SHEET 1 OF 5

162



Parkhill

John Rowe

Briarwood Avenue Phase II

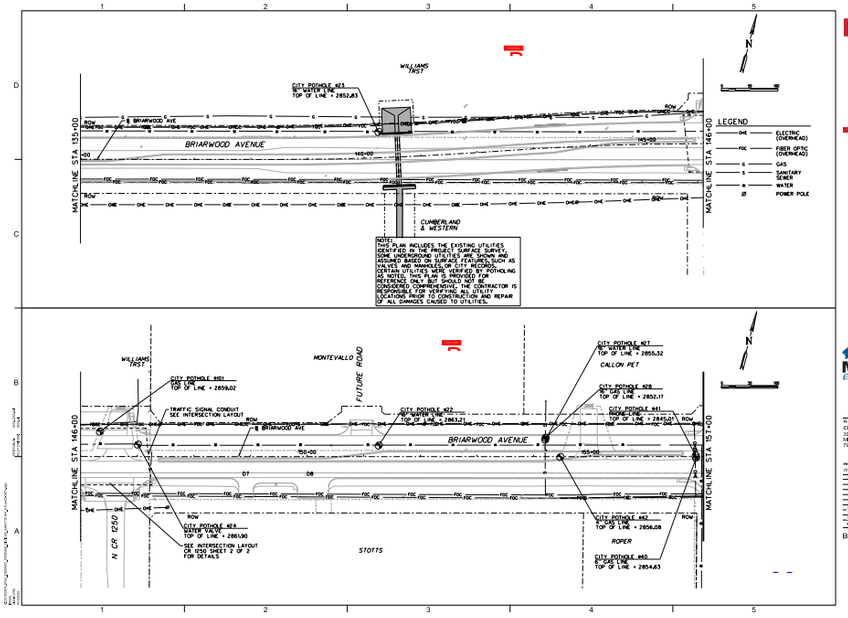
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
EXISTING UTILITY
LAYOUT
STA 113+00 TO
STA 135+00
SHEET 2 OF 5

163



Parkhill

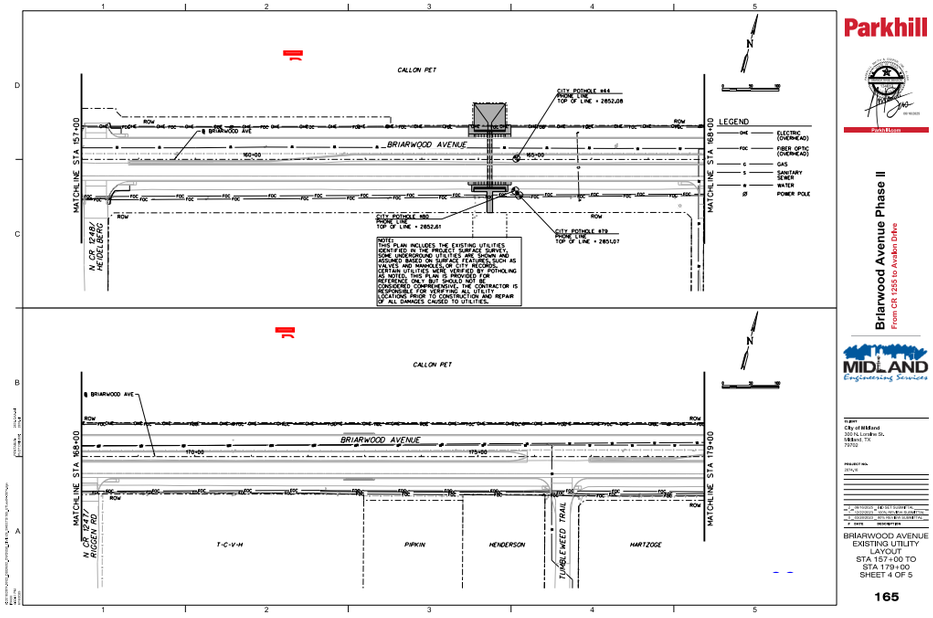
Briarwood Avenue Phase II

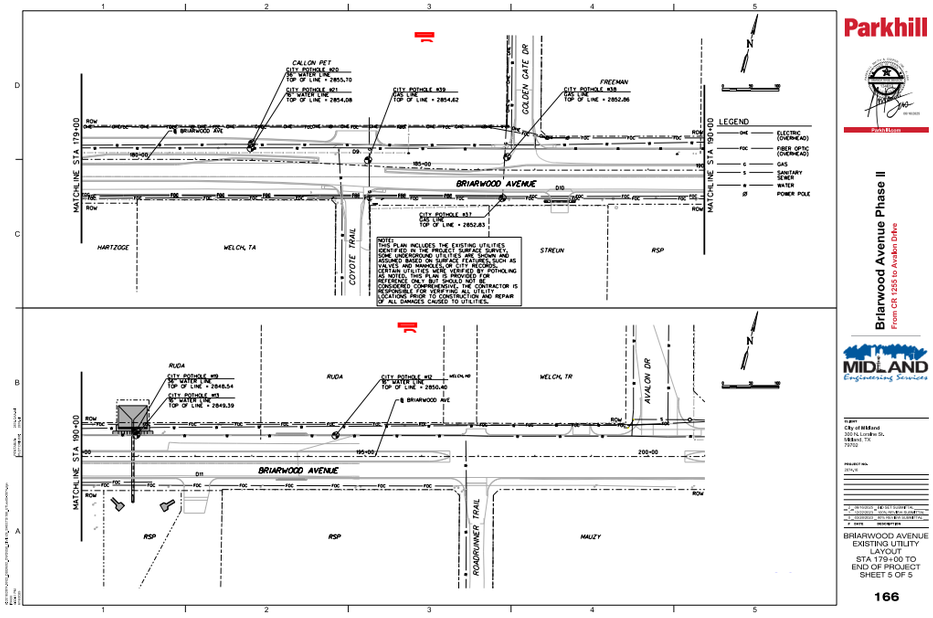
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EXISTING UTILITY LAYOUT
STA 135+00 TO STA 157+00
SHEET 3 OF 5

164


CALLON PET
BRIARWOOD AVENUE
MATCHLINE STA 157+00
MATCHLINE STA 168+00
LEGEND
ELECTRIC (OVERHEAD)
FIBER OPTIC (OVERHEAD)
GAS
SANITARY SEWER
WATER
POWER POLE
NOTES:
THIS PLAN INCLUDES THE EXISTING UTILITIES WITHIN THE PROJECT LIMITS. THE LOCATIONS OF SOME LESS NOTICEABLE UTILITIES ARE SHOWN AS ACQUIRED BASED ON SURFACE FEATURES SUCH AS VENTS AND MANHOLES, OR CITY RECORDS. UNLESS NOTED OTHERWISE, NO SUBSURFACE POTHOLING AS NOTED, THIS PLAN IS PROVIDED FOR REFERENCE ONLY BUT SHOULD NOT BE CONSIDERED COMPREHENSIVE. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION AND REPAIR OF ALL DAMAGES CAUSED TO UTILITIES.
CALLON PET
BRIARWOOD AVENUE
MATCHLINE STA 168+00
MATCHLINE STA 179+00
T-C-V-H
PIPKIN
HENDERSON
HARTZOGE
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE
EXISTING UTILITY
LAYOUT
STA 157+00 TO
STA 179+00
SHEET 4 OF 5
165



Parkhill

John Rowe

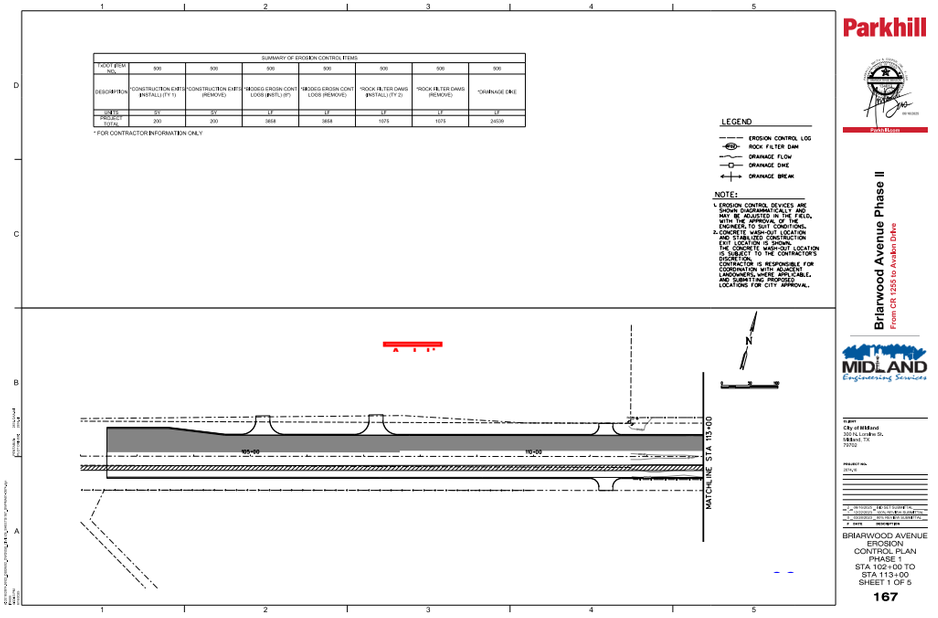
Briarwood Avenue Phase II

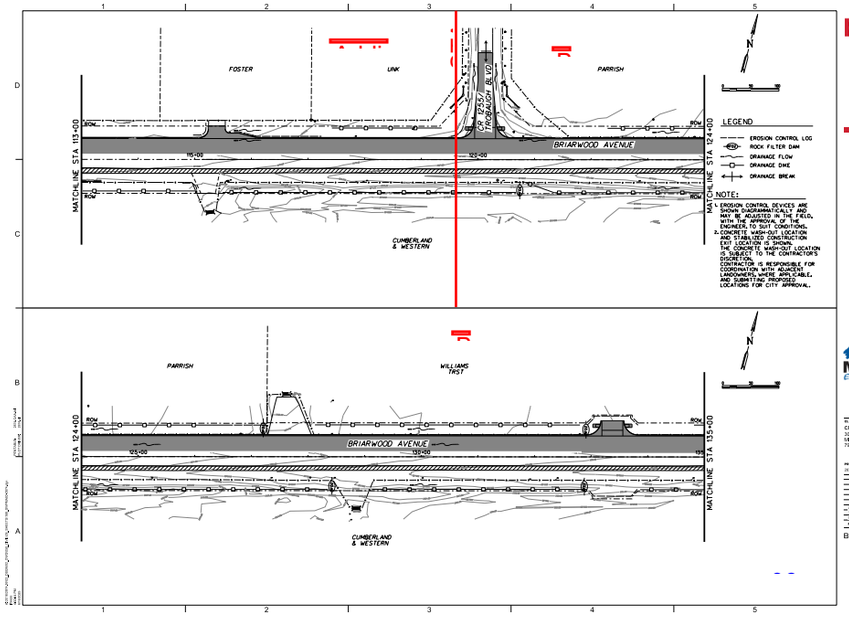
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EXISTING UTILITY
LAYOUT
STA 179+00 TO
END OF PROJECT
SHEET 5 OF 5

166


SUMMARY OF EROSION CONTROL ITEMS
TxDOT ITEM NO.
DESCRIPTION
UNITS
PROJECT TOTAL
*CONSTRUCTION EXITS (INSTALL) (TY 1)
*CONSTRUCTION EXITS (REMOVE)
*BIODEG EROSION CONT LOGS (INSTL) (9")
*BIODEG EROSION CONT LOGS (REMOVE)
*ROCK FILTER DAMS (INSTALL) (TY 2)
*ROCK FILTER DAMS (REMOVE)
*DRAINAGE DIKE
* FOR CONTRACTOR INFORMATION ONLY
LEGEND
EROSION CONTROL LOG
ROCK FILTER DAM
DRAINAGE FLOW
DRAINAGE DIKE
DRAINAGE BREAK
NOTE:
1. EROSION CONTROL DEVICES ARE SHOWN DIAGRAMMATICALLY AND MAY BE ADJUSTED IN THE FIELD, BY THE CONTRACTOR OR THE ENGINEER, TO SUIT CONDITIONS.
2. CONCRETE WASH-OUT LOCATION AND STABILIZED CONSTRUCTION ENTRANCE LOCATION FOR THE CONCRETE WASH-OUT LOCATION IS SUBJECT TO THE CONTRACTOR'S DISCRETION.
CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH ADJACENT LANDOWNERS, WHERE APPLICABLE, AND SUBMITTING PROPOSED LOCATIONS FOR CITY APPROVAL.
N
105-00
110-00
MATCHLINE STA 113+00
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 1
STA 102+00 TO
STA 113+00
SHEET 1 OF 5
167



Parkhill

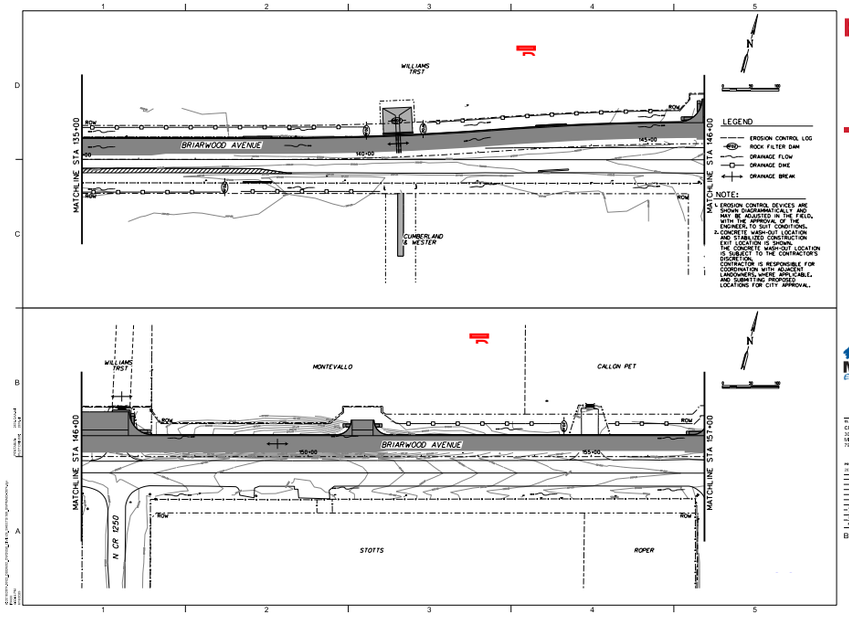
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE EROSION CONTROL PLAN PHASE 1
STA 113+00 TO STA 135+00
SHEET 2 OF 5

168



Parkhill

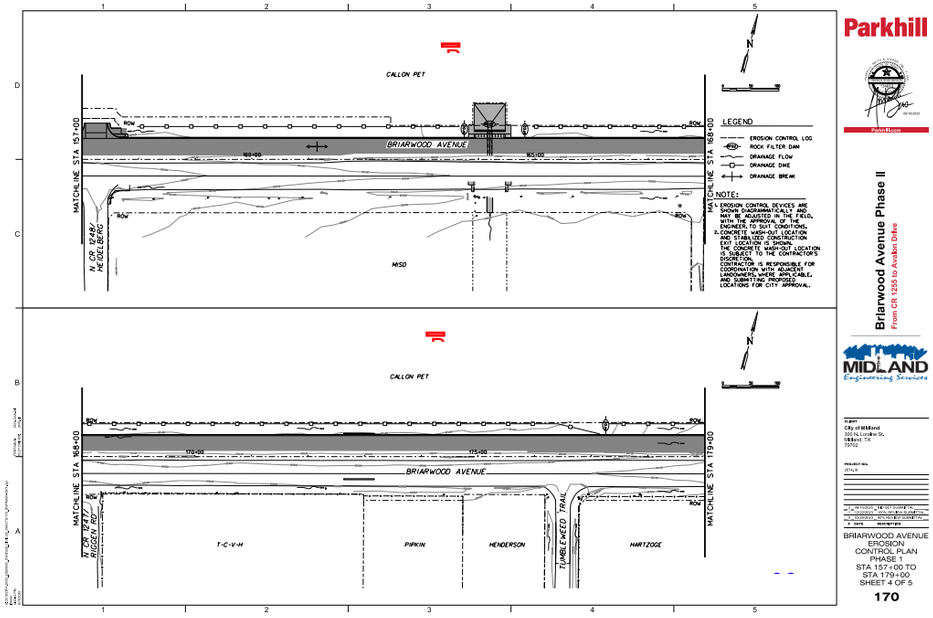
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 1
STA 135+00 TO
STA 157+00
SHEET 3 OF 5

169



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

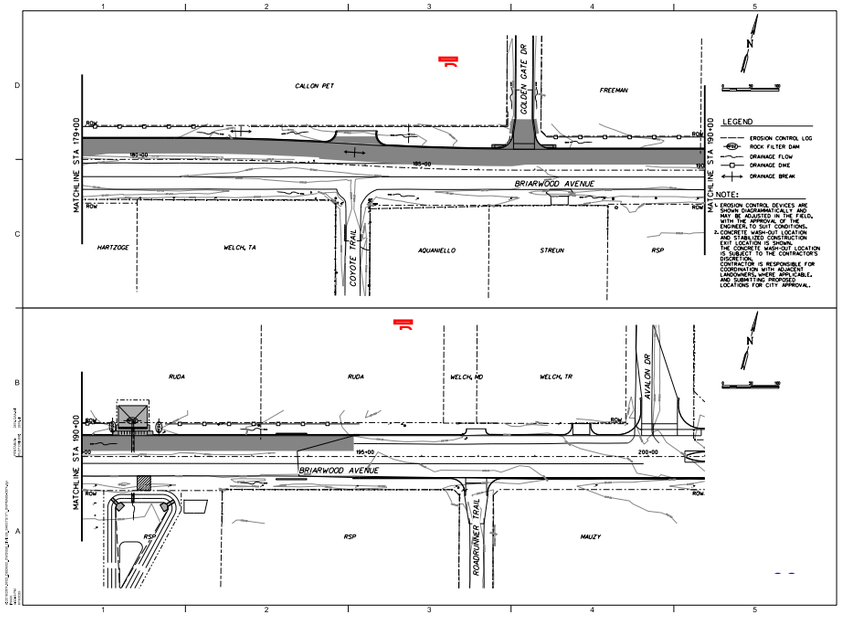
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007619

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 1
STA 157+00 TO
STA 179+00
SHEET 4 OF 5

170



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

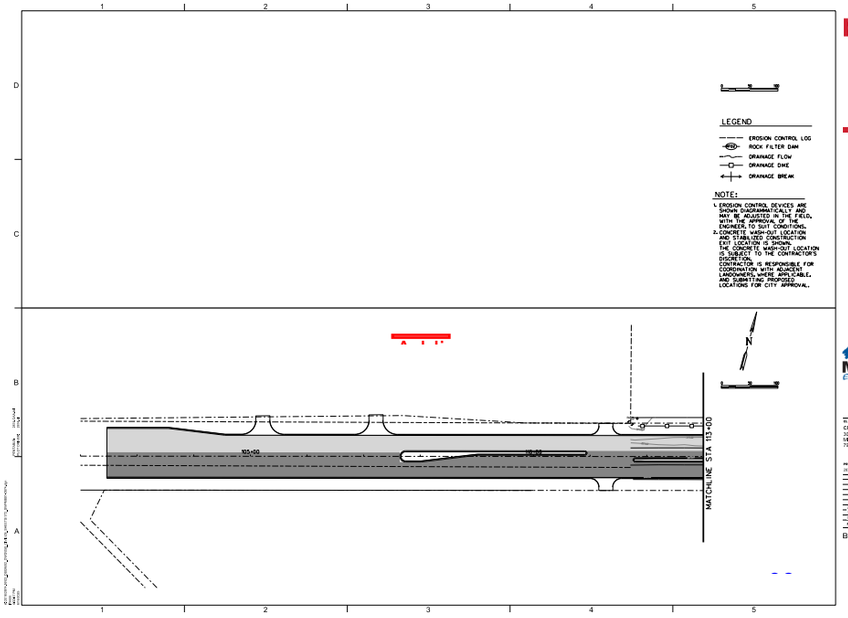
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

PROJECT No.

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 1
STA 179+00 TO
END OF PROJECT
SHEET 5 OF 5

171



Parkhill

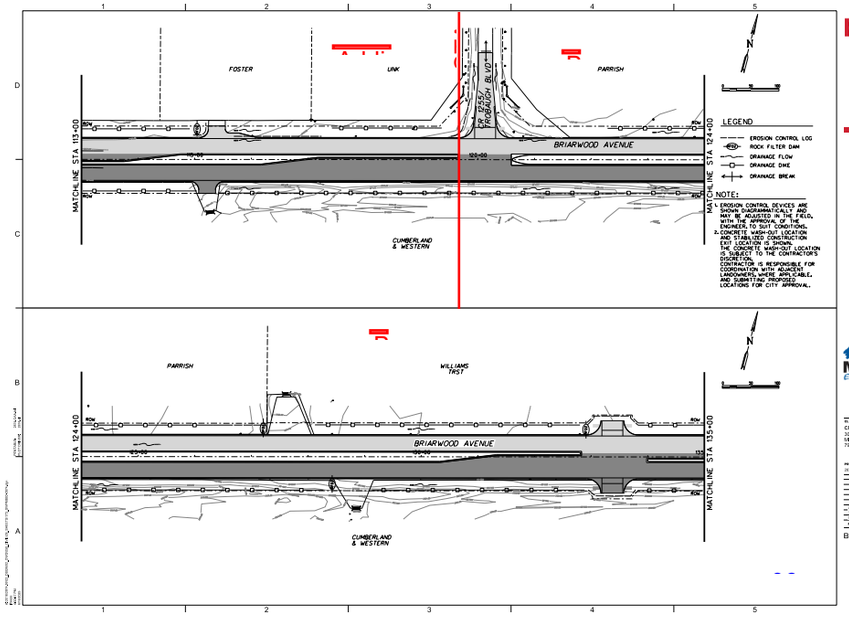
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 102+00 TO
STA 113+00
SHEET 1 OF 5

172



Parkhill

John Rowe

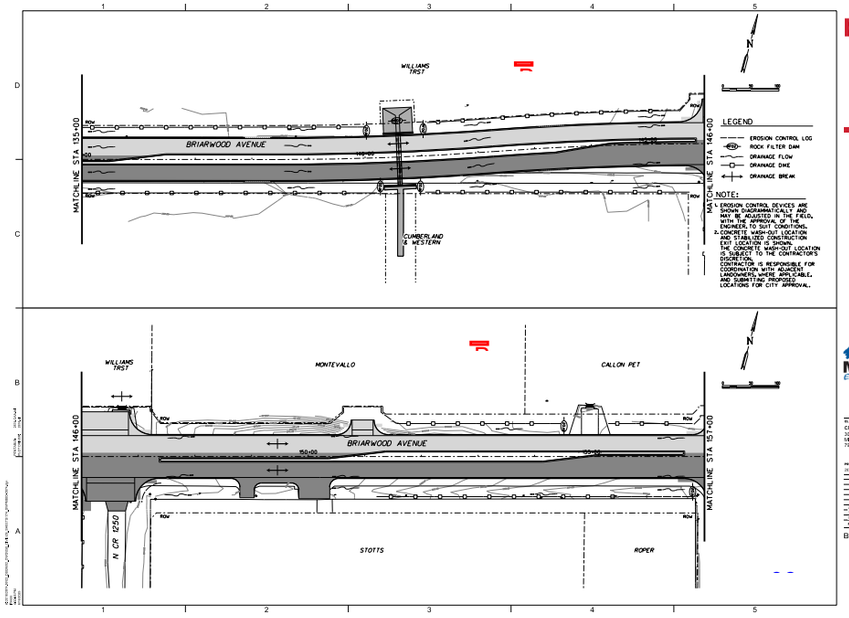
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 113+00 TO
STA 135+00
SHEET 2 OF 5

173



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

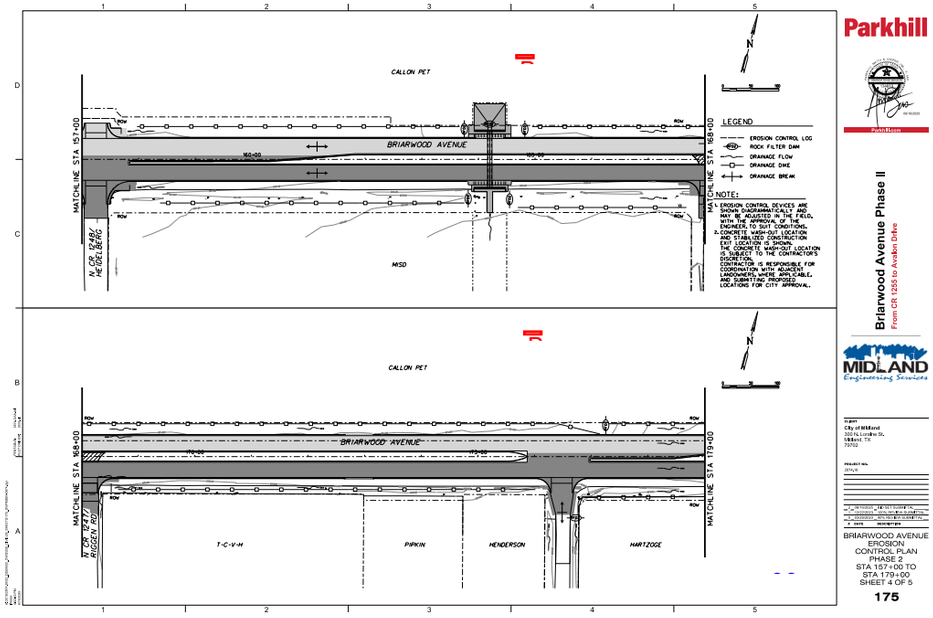
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 135+00 TO
STA 157+00
SHEET 3 OF 5

174



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

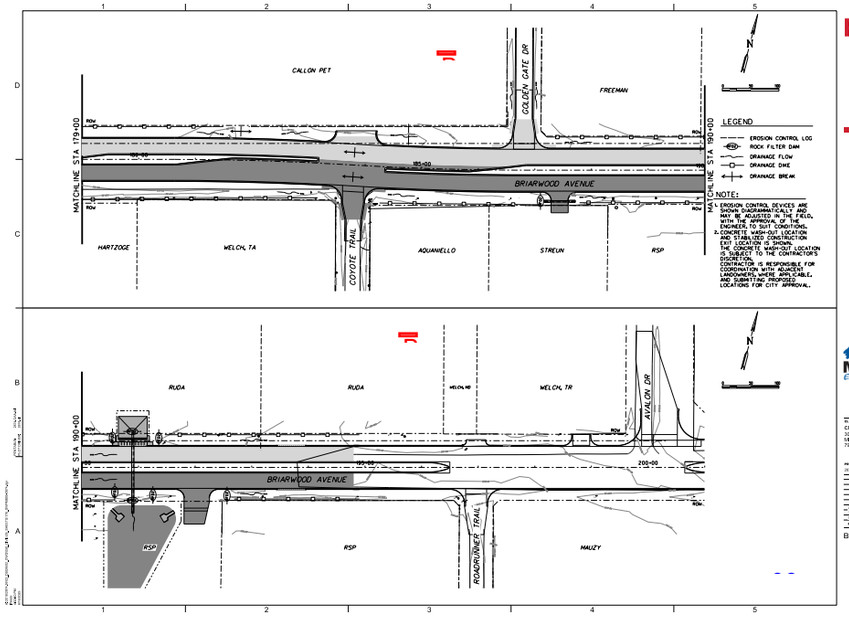
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
067619

#	DATE	DESCRIPTION
1	08/19/2025	AS BUILT CONDITIONS
2	00/00/0000	INITIAL SUBMISSION
3	00/00/0000	REVISED PER COMMENTS

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 157+00 TO
STA 179+00
SHEET 4 OF 5

175



Parkhill

John Rowe

Briarwood Avenue Phase II

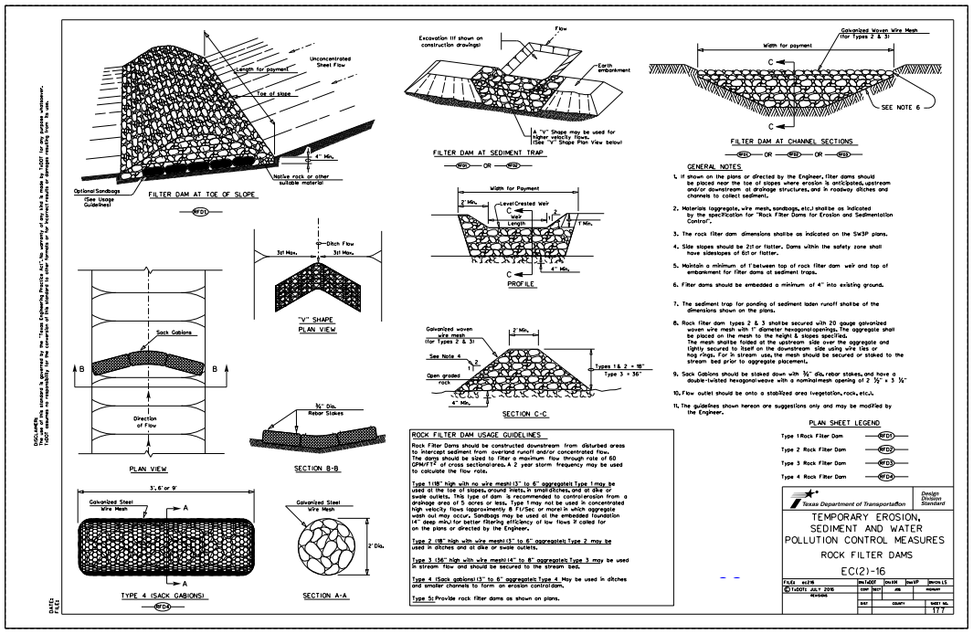
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79701

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 179+00 TO
END OF PROJECT
SHEET 5 OF 5

176



GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream of drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized wire mesh on the upstream side of the aggregate. The aggregate shall be placed on the mesh to the height & shape specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ½" dia. rebar stakes, and have a double-twisted hexagonal-weave with a nominal mesh opening of 2 ½" x 3 ½".
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT² of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate) Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at drop or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximately 8 Ft/Sec or more) in which aggregate washout may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency at low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate) Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate) Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate) Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — WFD
Type 2 Rock Filter Dam — WFD
Type 3 Rock Filter Dam — WFD
Type 4 Rock Filter Dam — WFD

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

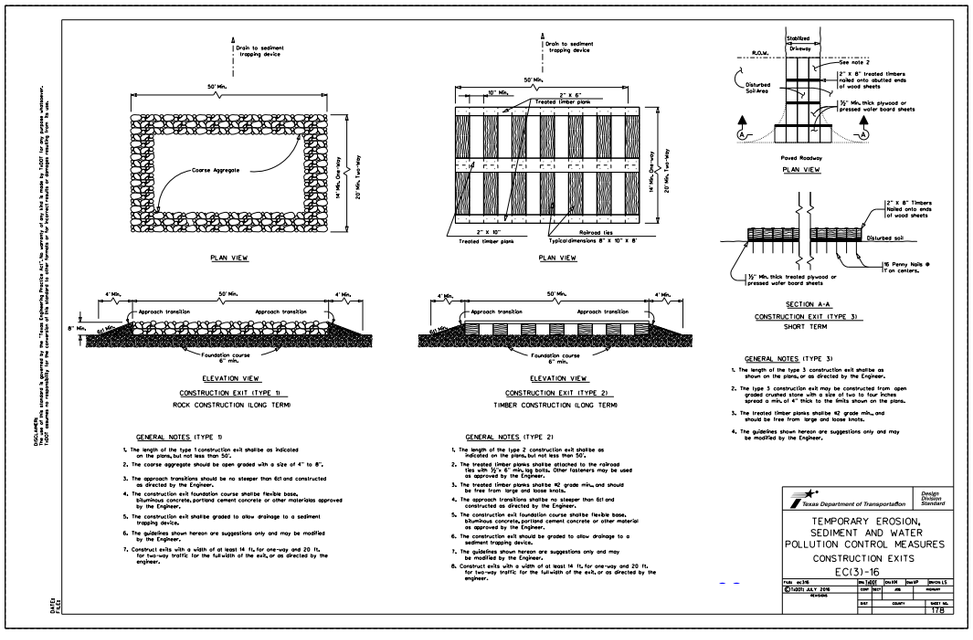
ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: TxDOT	DW: KB	CK: MWM
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS				
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GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shallbe as indicated on the plans,but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shallbe flexible base, bituminous concrete,portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shallbe graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit,or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shallbe as indicated on the plans,but not less than 50'.
2. The treated timber planks shallbe attached to the railroad ties with 7/2 x 6" min.lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shallbe #2 grade min., and should be free from large and loose knots.
4. The approach transitions shallbe no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shallbe flexible base, bituminous concrete,portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shallbe as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shallbe #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

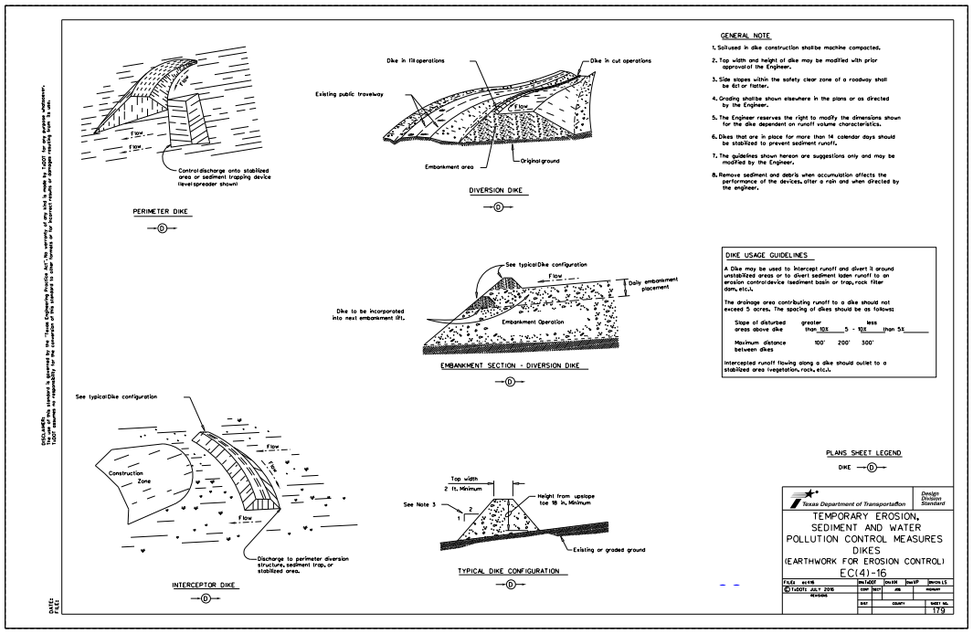
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Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
CONSTRUCTION EXITS
EC(3)-16

FILE: ec316	DN: TxDOT	CK: DR	JW: SP	JB: CONT: LS
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GENERAL NOTE

1. Soil used in dike construction shall be machine compacted.
2. Top width and height of dike may be modified with prior approval of the Engineer.
3. Side slopes within the safety clear zone of a roadway shall be 6:1 or flatter.
4. Grading shall be shown elsewhere in the plans or as directed by the Engineer.
5. The Engineer reserves the right to modify the dimensions shown for the dike dependent on runoff volume characteristics.
6. Dikes that are in place for more than 14 calendar days should be stabilized to prevent sediment runoff.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Remove sediment and debris when accumulation affects the performance of the devices, after a rain and when directed by the engineer.

DIKE USAGE GUIDELINES

A Dike may be used to intercept runoff and divert it around unstabilized areas or to divert sediment laden runoff to an erosion control device (sediment basin or trap, rock filter dam, etc.).

The drainage area contributing runoff to a dike should not exceed 5 acres. The spacing of dikes should be as follows:

Slope of disturbed areas above dike	greater than 10:1	5 - 10:1	less than 5:1
Maximum distance between dikes	100'	200'	300'

Intercepted runoff flowing along a dike should outlet to a stabilized area (vegetation, rock, etc.).

PLANS SHEET LEGEND

DIKE —D—

Texas Department of Transportation — Design Division Standard

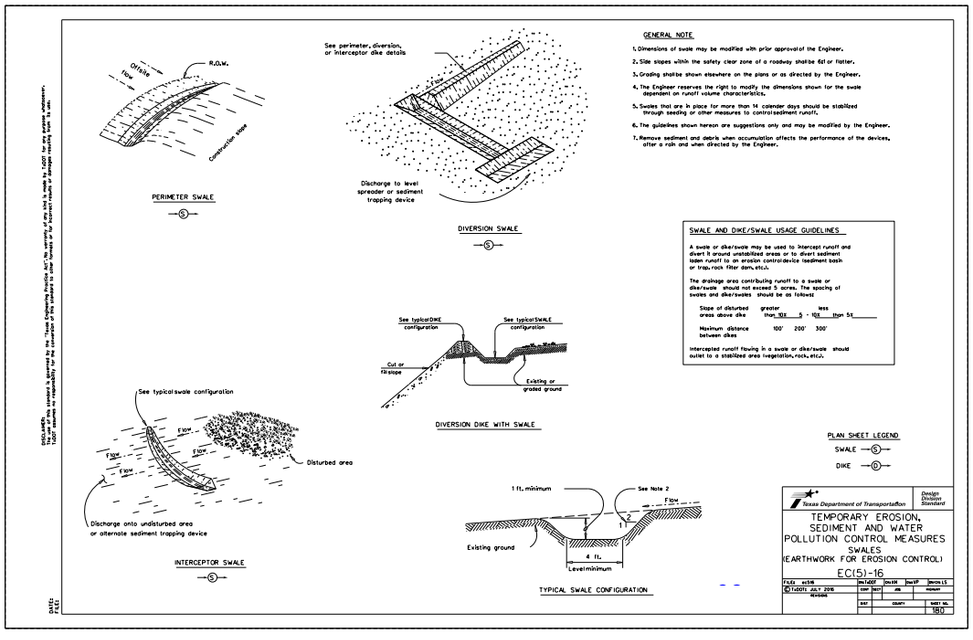
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES DIKES (EARTHWORK FOR EROSION CONTROL)

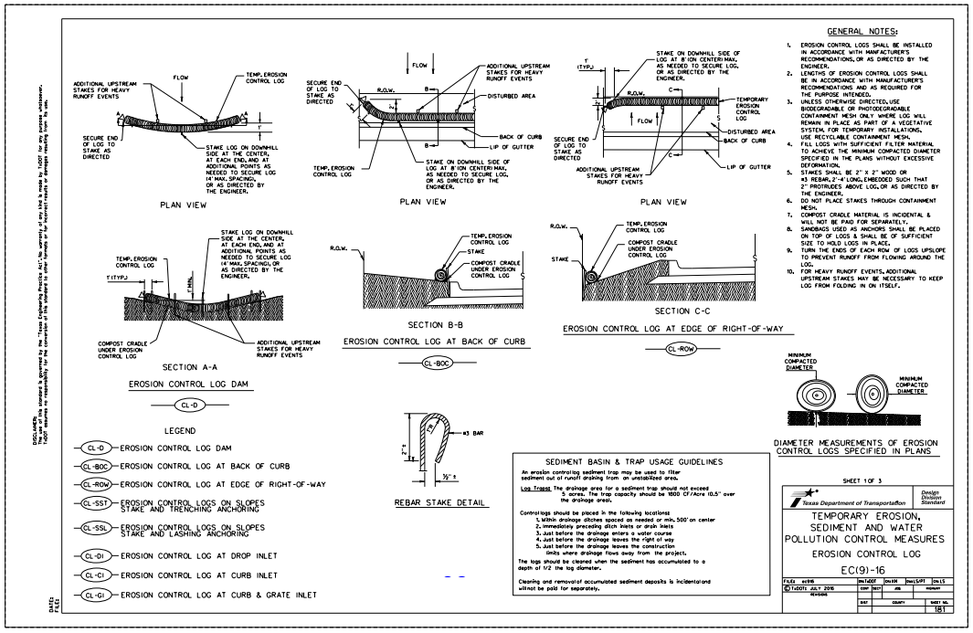
EC(4)-16

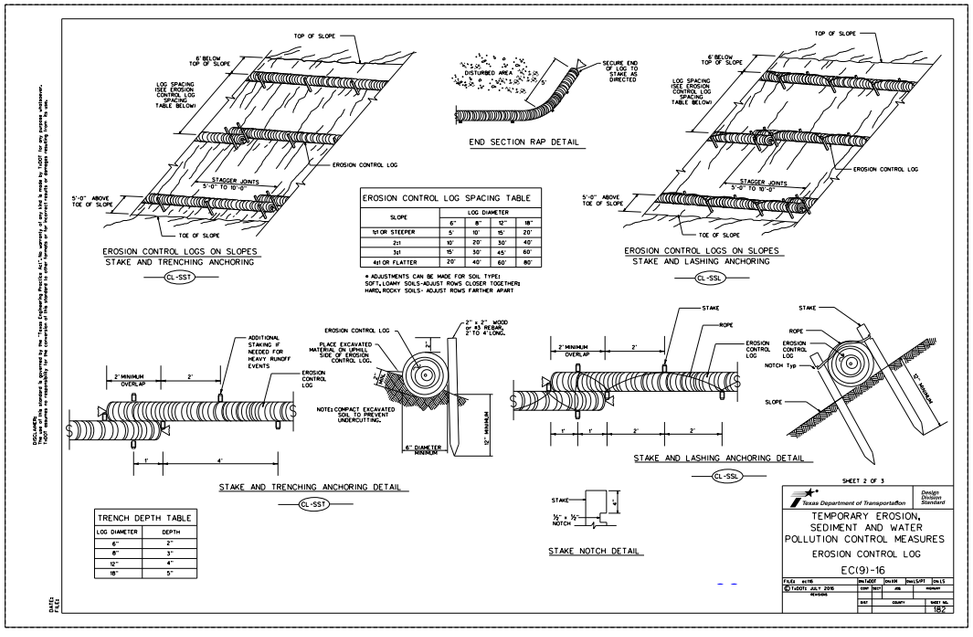
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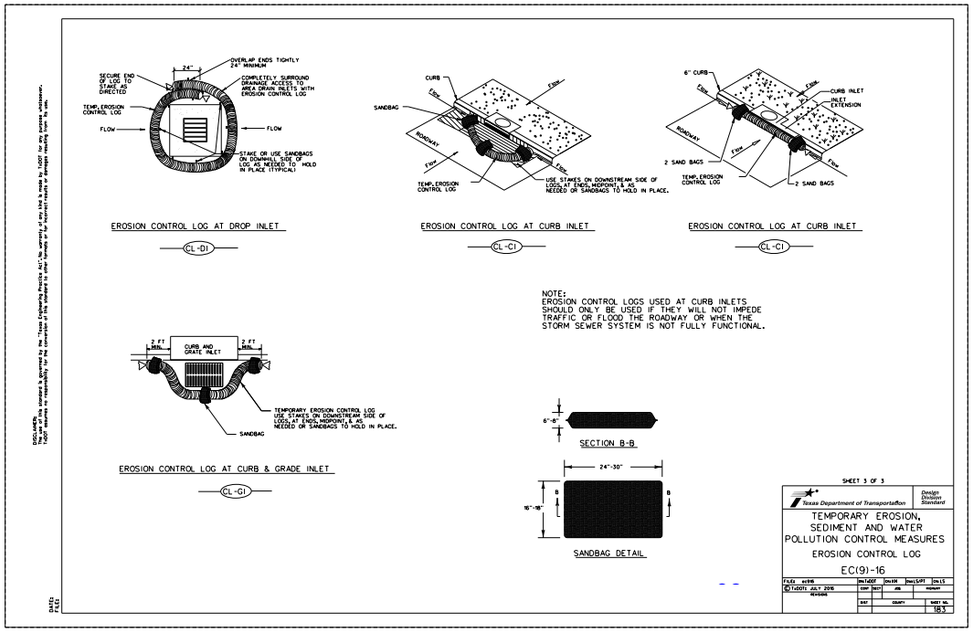
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R.O.W.
Offsite flow
Construction slope
PERIMETER SWALE
See perimeter, diversion, or interceptor dike details
Flow
Discharge to level spreader or sediment trapping device
DIVERSION SWALE
GENERAL NOTE
1. Dimensions of swale may be modified with prior approval of the Engineer.
2. Side slopes within the safety clear zone of a roadway shall be 6:1 or flatter.
3. Grading shall be shown elsewhere on the plans or as directed by the Engineer.
4. The Engineer reserves the right to modify the dimensions shown for the swale dependent on runoff volume characteristics.
5. Swales that are in place for more than 14 calendar days should be stabilized through seeding or other measures to control sediment runoff.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Remove sediment and debris when accumulation affects the performance of the devices, after a rain and when directed by the Engineer.
SWALE AND DIKE/SWALE USAGE GUIDELINES
A swale or dike/swale may be used to intercept runoff and divert it around unstabilized areas or to divert sediment laden runoff to an erosion control device (sediment basin or trap, rock filter dam, etc.).
The drainage area contributing runoff to a swale or dike/swale should not exceed 5 acres. The spacing of swales and dike/swales should be as follows:
Slope of disturbed area above dike: greater than 10:1 | 5 - 10:1 | less than 5:1
Maximum distance between dikes: 100' | 200' | 300'
Intercepted runoff flowing in a swale or dike/swale should outlet to a stabilized area (vegetation, rock, etc.).
See typical DIKE configuration
See typical SWALE configuration
Cut or fill slope
Existing or graded ground
DIVERSION DIKE WITH SWALE
See typical swale configuration
Flow
Disturbed area
Discharge onto undisturbed area or alternate sediment trapping device
INTERCEPTOR SWALE
PLAN SHEET LEGEND
SWALE
DIKE
1 ft. minimum
See Note 2
Flow
1:1
Existing ground
4 ft.
Level minimum
TYPICAL SWALE CONFIGURATION
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
SWALES
(EARTHWORK FOR EROSION CONTROL)
EC(5)-16
FILE: ec516
DN:TxDOT
CK: TxDOT
DW: CS
ck: MGMT
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SHEET NO.
180


ADDITIONAL UPSTREAM STAKES FOR HEAVY RUNOFF EVENTS
FLOW
TEMP. EROSION CONTROL LOG
SECURE END OF LOG TO STAKE AS DIRECTED
STAKE LOG ON DOWNHILL SIDE AT THE CENTER, AT EACH ENDS AND AT ADDITIONAL POINTS AS NEEDED TO SECURE LOG 14' MAX. SPACING, OR AS DIRECTED BY THE ENGINEER.
PLAN VIEW
SECURE END OF LOG TO STAKE AS DIRECTED
R.O.W.
B
ADDITIONAL UPSTREAM STAKES FOR HEAVY RUNOFF EVENTS
DISTURBED AREA
BACK OF CURB
LIP OF GUTTER
TEMP. EROSION CONTROL LOG
STAKE LOG ON DOWNHILL SIDE OF LOG AT 8'-10' CENTERS MAX. AS NEEDED TO SECURE LOG, OR AS DIRECTED BY THE ENGINEER.
PLAN VIEW
STAKE LOG ON DOWNHILL SIDE OF LOG AT 8'-10' CENTERS MAX. AS NEEDED TO SECURE LOG, OR AS DIRECTED BY THE ENGINEER.
R.O.W.
TEMPORARY EROSION CONTROL LOG
DISTURBED AREA
BACK OF CURB
LIP OF GUTTER
SECURE END OF LOG TO STAKE AS DIRECTED
ADDITIONAL UPSTREAM STAKES FOR HEAVY RUNOFF EVENTS
PLAN VIEW
STAKE LOG ON DOWNHILL SIDE AT THE CENTER, AT EACH ENDS AND AT ADDITIONAL POINTS AS NEEDED TO SECURE LOG 14' MAX. SPACING, OR AS DIRECTED BY THE ENGINEER.
TEMP. EROSION CONTROL LOG
COMPOST CRADLE UNDER EROSION CONTROL LOG
ADDITIONAL UPSTREAM STAKES FOR HEAVY RUNOFF EVENTS
SECTION A-A
EROSION CONTROL LOG DAM
CL-D
R.O.W.
TEMP. EROSION CONTROL LOG
STAKE
COMPOST CRADLE UNDER EROSION CONTROL LOG
SECTION B-B
EROSION CONTROL LOG AT BACK OF CURB
CL-BOC
R.O.W.
TEMP. EROSION CONTROL LOG
COMPOST CRADLE UNDER EROSION CONTROL LOG
STAKE
SECTION C-C
EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
CL-ROW
LEGEND
CL-D EROSION CONTROL LOG DAM
CL-BOC EROSION CONTROL LOG AT BACK OF CURB
CL-ROW EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
CL-SST EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
CL-SSL EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
CL-DI EROSION CONTROL LOG AT DROP INLET
CL-CI EROSION CONTROL LOG AT CURB INLET
CL-GI EROSION CONTROL LOG AT CURB & GRATE INLET
#3 BAR
2"±
36"±
REBAR STAKE DETAIL
SEDIMENT BASIN & TRAP USAGE GUIDELINES
An erosion controlling sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).
Control logs should be placed in the following locations:
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the projects.
The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.
Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.
GENERAL NOTES:
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.
MINIMUM COMPACTED DIAMETER
MINIMUM COMPACTED DIAMETER
DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS
SHEET 1 OF 3
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16
FILE: ec916
DN: TxDOT
CK: TxDOT
DW: KR
CK: LS
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DATED: FEB 15


TOP OF SLOPE
6' BELOW TOP OF SLOPE
LOG SPACING (SEE EROSION CONTROL LOG SPACING TABLE BELOW)
EROSION CONTROL LOG
STAGGER JOINTS 5'-0" TO 10'-0"
5'-0" ABOVE TOE OF SLOPE
TOE OF SLOPE
EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING
CL-SST
DISTURBED AREA
SECURE END OF LOG TO STAKE AS DIRECTED
END SECTION RAP DETAIL
EROSION CONTROL LOG SPACING TABLE
SLOPE
LOG DIAMETER
6" 8" 12" 18"
1:1 OR STEEPER 5' 10' 15' 20'
2:1 10' 20' 30' 40'
3:1 15' 30' 45' 60'
4:1 OR FLATTER 20' 40' 60' 80'
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPES: SOFT, LOAMY SOILS- ADJUST ROWS CLOSER TOGETHER; HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART
EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING
CL-SSL
ADDITIONAL STAKING IF NEEDED FOR HEAVY RUNOFF EVENTS
2' MINIMUM OVERLAP
2'
1'
4'
EROSION CONTROL LOG
STAKE AND TRENCHING ANCHORING DETAIL
CL-SST
EROSION CONTROL LOG
PLACE EXCAVATED MATERIAL ON UPHILL SIDE OF EROSION CONTROL LOG.
2" x 2" WOOD or #3 REBAR 2' TO 4' LONG
NOTE: COMPACT EXCAVATED SOIL TO PREVENT UNDERCUTTING.
4" DIAMETER MINIMUM
12" MINIMUM
STAKE
ROPE
EROSION CONTROL LOG
NOTCH Typ
SLOPE
12" MINIMUM
STAKE AND LASHING ANCHORING DETAIL
CL-SSL
TRENCH DEPTH TABLE
LOG DIAMETER DEPTH
6" 2"
8" 3"
12" 4"
18" 5"
STAKE
1½" x 3½" NOTCH
STAKE NOTCH DETAIL
SHEET 2 OF 3
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16
FILE: ec16 DN:TxDOT CK: DW: JMW/LSPT: JM:LS
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OVERLAP ENDS TIGHTLY 24" MINIMUM
SECURE END OF LOG TO STAKE AS DIRECTED
COMPLETELY SURROUND DRAINAGE ACCESS TO AREA DRAIN INLETS WITH EROSION CONTROL LOG
TEMP. EROSION CONTROL LOG
FLOW
FLOW
STAKE OR USE SANDBAGS ON DOWNHILL SIDE OF LOG AS NEEDED TO HOLD IN PLACE (TYPICAL)
EROSION CONTROL LOG AT DROP INLET
CL-D1
CURB
SANDBAG
ROADWAY
TEMP. EROSION CONTROL LOG
USE STAKES ON DOWNSTREAM SIDE OF LOGS AT ENDS, MIDPOINT & AS NEEDED OR SANDBAGS TO HOLD IN PLACE.
EROSION CONTROL LOG AT CURB INLET
CL-C1
6" CURB
CURB INLET
INLET EXTENSION
ROADWAY
2 SAND BAGS
TEMP. EROSION CONTROL LOG
2 SAND BAGS
EROSION CONTROL LOG AT CURB INLET
CL-C1
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.
2 FT MIN.
CURB AND GRATE INLET
2 FT MIN.
TEMPORARY EROSION CONTROL LOG USE STAKES ON DOWNSTREAM SIDE OF LOGS AT ENDS, MIDPOINT & AS NEEDED OR SANDBAGS TO HOLD IN PLACE.
SANDBAG
EROSION CONTROL LOG AT CURB & GRADE INLET
CL-G1
6"-8"
SECTION B-B
24"-30"
B
L
16"-18"
B
J
SANDBAG DETAIL
SHEET 3 OF 3
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16
FILE: ec916
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FILE:

CITY OF MIDLAND, TEXAS

Plans for the Construction of

AVALON DRIVE & BRIARWOOD AVE. TRAFFIC SIGNAL PROJECT

MAYOR

LORI BLONG

COUNCIL MEMEBERS

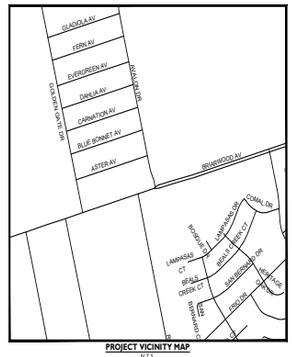
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JOHN NORMAN	**DISTRICT 2**
JACK LADD	**DISTRICT 3**
AMY STRETCHER BURKES	**DISTRICT 4**
ROBIN POOLE	**AT LARGE**
JOHN BURKHOLDER	**AT LARGE**

CITY MANAGER
TOMMY GONZALEZ

ENGINEERING SERVICE DIRECTOR
GABE McCLELLAND
OFFICE: (432) 685-7983

CITY OF MIDLAND, 300 N. LORAINE ST., MIDLAND, TX 79702

100% SUBMITTAL



PROJECT VICINITY MAP
N.T.S.

MIDLAND
Engineering Services

FEBRUARY 2025

FINAL PLANS	
CONTRACTOR	
DATE CONTRACTOR BEGAN WORK	

AS BUILT	
DATE WORK WAS COMPLETED	
DATE WORK WAS ACCEPTED	
FINAL CONTRACT COST	

INDEX OF SHEET

SHEET NUMBER	SHEET TITLE
C100	COVER SHEET
C110	GENERAL NOTES
C120	QUANTITY SUMMARY
C130	CONDUIT PLAN
C131	CONDUIT TABLE
C140	SIGNAL LAYOUT PLAN
C141	SIGNAL TABLE
C150	PAVEMENT MARKING PLAN
C200	TX DOT DETAIL ED (1) -14
C201	TX DOT DETAIL ED (2) -14
C202	TX DOT DETAIL ED (3) -14
C203	TX DOT DETAIL ED (4) -14
C204	TX DOT DETAIL ED (5) -14
C205	TX DOT DETAIL ED (6) -14
C206	TX DOT DETAIL ED (7) -14
C207	TX DOT DETAIL PED (1) -23
C208	TX DOT DETAIL PED (2) -23
C209	TX DOT DETAIL RM (1) -19
C210	TX DOT DETAIL RM (2) -19
C211	TX DOT DETAIL RM (3) -19
C212	TX DOT DETAIL RM (4) -19
C213	TX DOT DETAIL SIG -10
C214	TX DOT DETAIL SMA - 00 (1) - 12
C215	TX DOT DETAIL SMA - 00 (2) - 12
C216	TX DOT DETAIL TS - C - 12
C217	TX DOT DETAIL TR - CLEAN - 13
C218	TX DOT DETAIL TR - D - 12
C219	TX DOT DETAIL TS - ED - 12
C220	TX DOT DETAIL LUM - A - 13
C221	TX DOT DETAIL TS - CF - 21
C222	TX DOT DETAIL TR - SMA - 20
C223	TX DOT DETAIL TS - BF - 21

ANDREW L. MELLEN, P.E.
PROJECT ENGINEER

TAHA SARKANI P.E.
CITY TRAFFIC ENGINEER, CITY OF MIDLAND

JOSE E. ORTIZ P.E.
ASSISTANT CITY ENGINEER

MAVERICK
TRANSPORTATION, LLC
TBPE FIRM NO. F-14439
TBPLS FIRM NO. 10194382

NO.	DESCRIPTION	DATE

Know what's below.
Call before you dig.

COVER SHEET
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF MIDLAND, MIDLAND COUNTY, TEXAS

09/30/2025

C100 of 23

PROJECT OVERVIEW

All work and materials shall conform to the Texas Department of Transportation (TxDOT) "Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges", 2024 edition, unless otherwise indicated in these plans or directed by the Engineer. All items numbers referenced in the plans refer to TxDOT specifications.

The City of Midland (City) will furnish various items to the contractor as listed under item 680.

Contact the Traffic Signal Shop at 432-685-7508 prior to the start of any service work to schedule a city representative to attend a pre-construction meeting.

Underground utilities may be present within the right-of-way on the project. Contact Texas 811 a minimum of two business days prior to excavating.

The locations of all signal-related items, pavement markings, signing, etc., are diagrammatic only and may be shifted to accommodate field conditions under as directed by the Engineer.

ITEM 416: DRILLED SHAFT FOUNDATIONS

Locations of foundations shown on the plans are diagrammatic only and may be shifted to meet local conditions, subject to approval by the inspector. The Contractor shall stake all foundation locations and have them approved by the inspector before excavating. The Contractor shall ensure that all poles and luminaires are clear of overhead lines and existing ground utilities before excavating.

The Inspector, together with the Contractor, will calculate the vertical signal head clearance before placing any traffic signal pole foundation.

The Contractor shall notify the Inspector at least 48 hours prior to forming and placing concrete for any signal pole and controller foundation. The Inspector will determine the depth of the foundation based on the soil conditions encountered and provide adequate notice so arrive at the job site may result in removing and replacing the foundation at the Contractor's expense.

ITEM 449: ANCHOR BOLTS

A pipe joint waterproof shim is set electrically conducting protective threaded luminaire shall be used on the foundation anchor bolts for the traffic signal poles. (Cross-Hatch-Fit-It, 512 Osborne 515, Thomas & Betts Kopr-Shield, or equal).

ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING

Use Temporary Traffic Control (TTC) for this project as detailed on the latest TxDOT Barricade and Construction (BC) standard plan sheets. Work Zone standard plan sheets 'WZ (BTS-1 and BTS-2)', and as provided for in Part VI of the latest edition of the "Texas Manual on Uniform Traffic Control Devices".

In addition to the TTC and WZ standard plan sheets, install barricades and warning signs, as appropriately, to adequately warn motorists.

Existing signs are to remain as long as they do not interfere with construction and do not conflict with the traffic control plan.

Permanent signs may be installed when construction in an area is complete and they will not be in conflict with the traffic control plan for the remainder of the job.

Cover or remove any work zone signs when the work or condition referenced is not occurring.

When traffic is inter-wired, arrange warning devices in accordance with examples provided in the latest edition of the "Texas Manual on Uniform Control Devices".

No work will be permitted to commence on the road before noon. Work shall be scheduled such that all machinery and/or equipment shall be away from the roadway and stored near the right-of-way line by noon. Any operations requiring lane closures shall not begin before 9:00 A.M. or continue past 4:00 P.M., unless otherwise approved by the City in advance.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets. Provide access to all driveways during all phases of construction.

Locations used for storing construction equipment and materials of any type within the right-of-way shall be approved by the inspector. Use of the right-of-way for these purposes will be restricted to locations where driver sight distance to businesses and side-street intersections is not obstructed and so other business where an unsightly appearance will not result, as determined by the inspector.

Remove any obstructions to existing drainage due to the Contractor's operations, as required, at the Contractor's expense.

ITEM 551: SIDEWALKS

The curb ramp and pedestrian pushbutton locations shown in the plans have taken into account the geometric features of the intersections, TxDOT, and ADA/TAS accessibility requirements. If any changes occur during construction, the location of these features must be adjusted to ensure that meet ITAS/ADAAG requirements.

ITEM 618: CONDUIT

When conduit must be placed by trenching on paved areas, cut and restore pavement in accordance with Item 400 and as shown in the plans. Cut pavement using only approved saws. Cutting and restoring pavement will not be paid for directly but will be subsidiary to this item.

Ensure only a Buy High tensile strength polyester fiber pull rope is used for pulling conductors through the PVC conduit systems.

The locations of conduit and ground boxes are diagrammatic only and may be shifted to accommodate field conditions as directed.

ITEM 620: ELECTRICAL CONDUCTORS

Terminate all electrical conductors from the controller at the termination block in the traffic signal pole hand hole whether in use or not.

All wiring not covered by the plans and specifications shall be in accordance with the National Electric Code (NEC).

When the specifications for electrical items require UL listed products, it will be construed to mean UL listed or CSA listed.

Bond together any grounding conductors that share the same conduit, junction box, ground box, or structure, at every accessible point in accordance with the National Electrical Code (NEC).

ITEM 621: TRAY CABLE

All proposed tray cable and number of conductors required shall be as shown on the plans. No splices shall be allowed.

ITEM 624: GROUND BOXES

Locations of ground boxes are approximate. Final locations will be as approved by the Inspector. Provide an apron for ground boxes as shown on plan 8224(1)-14.

ITEM 628: ELECTRICAL SERVICES

Contact the Electric Utility Company (Oncor) to make all necessary arrangements to provide power for the electrical services shown on the plans in accordance with Item 628 and the Electrical Details, except that the City of Midland will make applications to the Electric Utility Company for service (See note below).

Before fabricating the electrical service, contact the City of Midland Traffic Signal Supervisor (phone 432-685-7508) to make application (billing arrangements) for service with Oncor.

Time-charge suspension due to the availability of power shall not be considered unless all arrangements for power have been submitted within fifteen (15) days after principal work has begun.

ITEM 656: FOUNDATIONS FOR TRAFFIC CONTROL DEVICES

The foundations for the traffic signal controller is subsidiary to Item 680.

Locations of foundations shown on the plans are diagrammatic only and may be shifted to meet local conditions, subject to approval by the Inspector. The Contractor shall stake all foundation locations and have them approved by the Inspector before excavating. The Contractor shall ensure that all luminaires and mast arms are clear of all overhead lines and underground utilities before excavating.

The Inspector, together with the Contractor, will calculate the vertical signal head clearance before placing any traffic signal pole foundation.

Install traffic signal controller foundation to accommodate cabinet pedestal base provided by City. Extend the slab at least 36 inches beyond the pedestal base on the front and back sides of the cabinet to provide an all-weather surface at each cabinet door.

ITEM 680: INSTALLATION OF HIGHWAY TRAFFIC SIGNALS

The Project shall consist of the installation of all equipment and materials necessary for a complete traffic signal system, as follows:

1. Provide submittal literature for all traffic signal equipment before installation. Equipment will not be accepted for delivery or any payment made until the equipment, material lists, and shop drawings have been approved by the Engineer. Approval by the Engineer does not relieve the Contractor of his responsibilities to meet the requirements of the specifications and plans. All submitted literature shall be approved and certified for all the furnished traffic signal equipment prior to its installation.

2. The City will furnish the following items to the Contractor for installation on this project:
   - *(1) City/Traffic detection system with VIVID cameras, cable, processor and mounting brackets.*
   - *(1) Clarion GPS system, including cable, processor, and mounting brackets*
   - *(1) 30 ft. mast arm pedestal pole*
   - *(1) Internally lighted street name (S30) sign*
   - *(1) R10-27k traffic sign*

   Contact the City of Midland Signal Shop at 432-685-7508 to coordinate a pick-up time for City-supplied items. Once the City has delivered the material shall be responsible for properly receiving and safeguarding all such items until project acceptance by the city.

   Contractor furnished and installed items shall include all signal and lighting poles and posts as shown in th plans, including anchor bolts, as per TxDOT specifications. The Contractor shall also furnish and install the following items as per the specifications and plans. Unless otherwise noted, all items are:
   - *(1) Traffic signal cabinet, NEMA TS2, 16 channel, dual door*
   - *(1) Traffic signal controller, Q-Free 816-1, NEMA TS2, Type 1*
   - *(1) Malfunction management unit, 16 channel*
   - *(1) Battery backup system, self-contained in backpack cabinet.*

   The City shall furnish and install a communication radio, network switch, and related accessories after the completion of construction and activation of the signal. The Contractor shall furnish and install the CAT 5 Ethernet cable for the radio as called for in the plans.

3. The locations shown on the plans for foundations, conduit and other items may be adjusted for better fit field conditions if needed due to conflicts with utilities, as approved by the Inspector.

4. Accomplish the erection of poles and luminaires located near any overhead electrical lines using established industry and utility safety practices. Consult with the appropriate utility company before beginning such work, as needed.

5. Provide vibration dampers for mast arms 28 feet long and longer. Use dampers "8Pv40" for arms up to 40 feet long, and "x5 adp" for longer mast arms. Install using Astro-Brac sign brackets, 3ginlbs aluminum channel, or equal, at a maximum of 5 feet from the end of the mast arms.

6. Wire the signal installation to operate in accordance with phase diagrams in these plans. Timing and phasing will be maintained City of Midland Traffic Operations after activation of the signal. A copy of all revisions to the original timing and phasing plans shall be delivered to City of Midland Traffic Operations, and a new copy shall be placed in the controller cabinet at the completion of the project.

7. The City of Midland Signal Shop will not assume responsibility for the maintenance of the traffic signals until the project is completed and accepted.

8. Project inspection: For electrical project inspection, contact the City of Midland Signal Shop at 432-685-7508 at least 48 hours in advance of needed inspection. At the time of the final electrical inspection, the City will create a punch list of discrepancies to be corrected before signal is put into flash mode.

9. Provide qualified technician on the project site to place the traffic signal in full operation.

10. Signal Turn-On: Place the traffic signal into operation only after all requested striping is completed and all conflicting striping is removed. Notify the City of Midland Signal Shop approximately 48 hours in advance of the signal turn-on. Signal technicians from the City must be present when the signals are placed in full operation. Unless otherwise directed, place the signal in full operation between 9:00 AM and 12:00 NOON on Tuesdays or Wednesdays only.

11. Test Period for Signals. The signals shall operate continuously for a minimum of thirty (30) calendar days in a satisfactory manner. Equipment failures during these 30 days will cause the test period to start over.

    During the thirty-day test period, the City of Midland Signal Shop will be the First Responders to all trouble calls. They will, in turn, contact the Contractor. The Contractor shall:

    - Provide qualified personnel to respond to all trouble calls and diagnose and repair any malfunctions to signal equipment supplied for the project.
    - Provide a local telephone number not subject to frequent changes and available to receive calls on a 24-hour basis.
    - Respond to trouble calls within two hours. Provide trouble-shoot times but not more than 2 hours maximum.
    - Make appropriate repairs within 24 hours.
    - Place a logbook in the controller cabinet and keep a record of each trouble call reported. Notify the Engineer of each trouble call.
    - The error log in the NMU shall not be cleared during the thirty-day test period without approval.

    If, during the test period, the City of Midland Signal Shop is called out to the intersection under the Contractor's control to restore the signals to normal operation, the City will replace the equipment with stock equipment until the original equipment is repaired and replaced.

MAVERICK
CONSULTING, INC.
TBPE FIRM NO. F-14643
TBPLS FIRM NO. 10194382
2 NW 10TH AVE, Ste. "A", PERRYTON, TX 79070
2 NW 10TH AVE, Ste. "A", PERRYTON, TX 79070
(806) 435-8833 FAX (806) 435-8833
CONTACT: MARK T. LEVERETT, P.E.
CONTACT: CHRISTOPHER T. LEVERETT, P.E.

NO.	BY	DATE

DESIGNED: MTL
DRAWN: CTL
CHECKED: MTL

Know what's below.
Call before you dig.

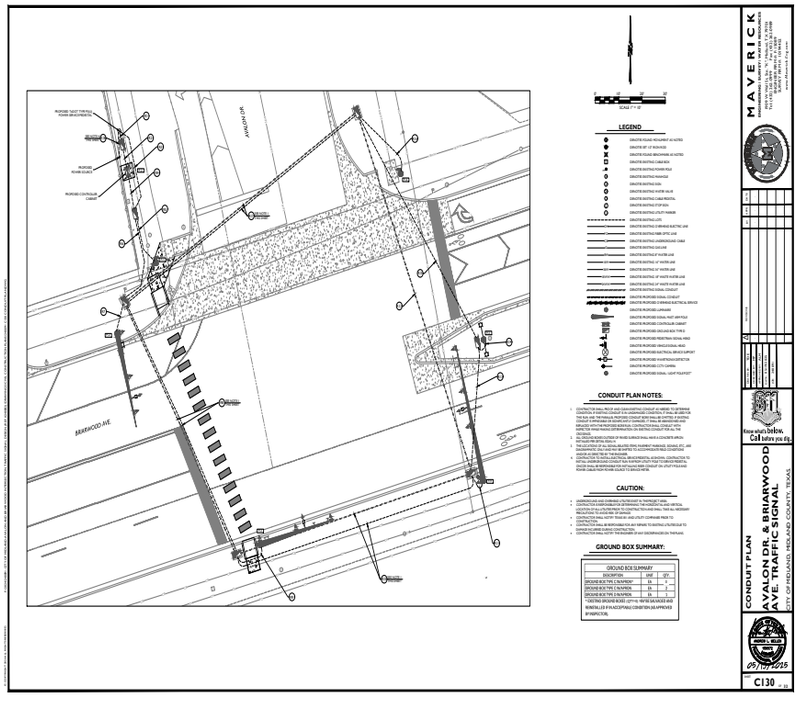
GENERAL NOTES
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF MIDLAND, MIDLAND COUNTY, TEXAS

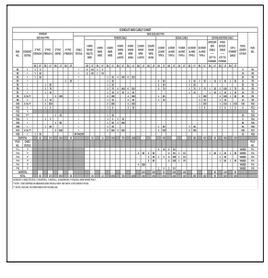
09/19/2025

C110
of 32

ESTIMATE OF QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
416 0542	DRILL SHAFT (DRIVEN) 42in DIA	LF	8
416 7616	DRILL SHAFT (EXCAVATION) 42in	LF	616
416 7624	DRILL SHAFT (EXCAVATION) 48in	LF	24
416 7648	DRILL SHAFT (EXCAVATION) 60in	LF	232
500 7001	THREADING	EA	1
610 7015	15 IN X 15 IN (C&G) REINFORCED CONCRETE CURB INLET	EA	2
610 7020	2 CONCRETE CURB INLET	EA	1
610 7030	3 CONCRETE CURB INLET	EA	1
610 7041	4 CONCRETE CURB INLET (C.M.P.)	LF	60
610 7046	4 CONCRETE CURB INLET	LF	8
610 7054	5 CONCRETE CURB INLET (C.M.P.)	LF	60
610 7066	6 CONCRETE CURB INLET	LF	8
610 7084	8 CONCRETE CURB INLET	LF	8
610 7096	9 CONCRETE CURB INLET	LF	8
610 7102	10 CONCRETE CURB INLET	LF	8
610 7114	11 CONCRETE CURB INLET	LF	8
610 7126	12 CONCRETE CURB INLET	LF	8
610 7144	14 CONCRETE CURB INLET	LF	8
610 7168	16 CONCRETE CURB INLET	LF	8
610 7192	18 CONCRETE CURB INLET	LF	8
610 7216	20 CONCRETE CURB INLET	LF	8
610 7240	22 CONCRETE CURB INLET	LF	8
610 7264	24 CONCRETE CURB INLET	LF	8
610 7288	26 CONCRETE CURB INLET	LF	8
610 7312	28 CONCRETE CURB INLET	LF	8
610 7336	30 CONCRETE CURB INLET	LF	8
610 7360	32 CONCRETE CURB INLET	LF	8
610 7384	34 CONCRETE CURB INLET	LF	8
610 7408	36 CONCRETE CURB INLET	LF	8
610 7432	38 CONCRETE CURB INLET	LF	8
610 7456	40 CONCRETE CURB INLET	LF	8
610 7480	42 CONCRETE CURB INLET	LF	8
610 7504	44 CONCRETE CURB INLET	LF	8
610 7528	46 CONCRETE CURB INLET	LF	8
610 7552	48 CONCRETE CURB INLET	LF	8
610 7576	50 CONCRETE CURB INLET	LF	8
610 7600	52 CONCRETE CURB INLET	LF	8
610 7624	54 CONCRETE CURB INLET	LF	8
610 7648	56 CONCRETE CURB INLET	LF	8
610 7672	58 CONCRETE CURB INLET	LF	8
610 7696	60 CONCRETE CURB INLET	LF	8
610 7720	62 CONCRETE CURB INLET	LF	8
610 7744	64 CONCRETE CURB INLET	LF	8
610 7768	66 CONCRETE CURB INLET	LF	8
610 7792	68 CONCRETE CURB INLET	LF	8
610 7816	70 CONCRETE CURB INLET	LF	8
610 7840	72 CONCRETE CURB INLET	LF	8
610 7864	74 CONCRETE CURB INLET	LF	8
610 7888	76 CONCRETE CURB INLET	LF	8
610 7912	78 CONCRETE CURB INLET	LF	8
610 7936	80 CONCRETE CURB INLET	LF	8
610 7960	82 CONCRETE CURB INLET	LF	8
610 7984	84 CONCRETE CURB INLET	LF	8
610 8008	86 CONCRETE CURB INLET	LF	8
610 8032	88 CONCRETE CURB INLET	LF	8
610 8056	90 CONCRETE CURB INLET	LF	8
610 8080	92 CONCRETE CURB INLET	LF	8
610 8104	94 CONCRETE CURB INLET	LF	8
610 8128	96 CONCRETE CURB INLET	LF	8
610 8152	98 CONCRETE CURB INLET	LF	8
610 8176	100 CONCRETE CURB INLET	LF	8
610 8200	102 CONCRETE CURB INLET	LF	8
610 8224	104 CONCRETE CURB INLET	LF	8
610 8248	106 CONCRETE CURB INLET	LF	8
610 8272	108 CONCRETE CURB INLET	LF	8
610 8296	110 CONCRETE CURB INLET	LF	8
610 8320	112 CONCRETE CURB INLET	LF	8
610 8344	114 CONCRETE CURB INLET	LF	8
610 8368	116 CONCRETE CURB INLET	LF	8
610 8392	118 CONCRETE CURB INLET	LF	8
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610 14056	590 CONCRETE CURB INLET	LF	8
610 14080	592 CONCRETE CURB INLET	LF	8
610 14104	594 CONCRETE CURB INLET	LF	8
610 14128	596 CONCRETE CURB INLET	LF	8
610 14152	598 CONCRETE CURB INLET	LF	8
610 14176	600 CONCRETE CURB INLET	LF	8
610 14200	602 CONCRETE CURB INLET	LF	8
610 14224	604 CONCRETE CURB INLET	LF	8
610 14248	606 CONCRETE CURB INLET	LF	8
610 14272	608 CONCRETE CURB INLET	LF	8
610 14296	610 CONCRETE CURB INLET	LF	8
610 14320	612 CONCRETE CURB INLET	LF	8
610 14344	614 CONCRETE CURB INLET	LF	8
610 14368	616 CONCRETE CURB INLET	LF	8
610 14392	618 CONCRETE CURB INLET	LF	8
610 14416	620 CONCRETE CURB INLET	LF	8
610 14440	622 CONCRETE CURB INLET	LF	8
610 14464	624 CONCRETE CURB INLET	LF	8
610 14488	626 CONCRETE CURB INLET	LF	8
610 14512	628 CONCRETE CURB INLET	LF	8
610 14536	630 CONCRETE CURB INLET	LF	8
610 14560	632 CONCRETE CURB INLET	LF	8
610 14584	634 CONCRETE CURB INLET	LF	8
610 14608	636 CONCRETE CURB INLET	LF	8
610 14632	638 CONCRETE CURB INLET	LF	8
610 14656	640 CONCRETE CURB INLET	LF	8
610 14680	642 CONCRETE CURB INLET	LF	8
610 14704	644 CONCRETE CURB INLET	LF	8
610 14728	646 CONCRETE CURB INLET	LF	8
610 14752	648 CONCRETE CURB INLET	LF	8
610 14776	650 CONCRETE CURB INLET	LF	8
610 14800	652 CONCRETE CURB INLET	LF	8
610 14824	654 CONCRETE CURB INLET	LF	8
610 14848	656 CONCRETE CURB INLET	LF	8
610 14872	658 CONCRETE CURB INLET	LF	8
610 14896	660 CONCRETE CURB INLET	LF	8
610 14920	662 CONCRETE CURB INLET	LF	8
610 14944	664 CONCRETE CURB INLET	LF	8
610 14968	666 CONCRETE CURB INLET	LF	8
610 14992	668 CONCRETE CURB INLET	LF	8
610 15016	670 CONCRETE CURB INLET	LF	8
610 15040	672 CONCRETE CURB INLET	LF	8
610 15064	674 CONCRETE CURB INLET	LF	8
610 15088	676 CONCRETE CURB INLET	LF	8
610 15112	678 CONCRETE CURB INLET	LF	8
610 15136	680 CONCRETE CURB INLET	LF	8
610 15160	682 CONCRETE CURB INLET	LF	8
610 15184	684 CONCRETE CURB INLET	LF	8
610 15208	686 CONCRETE CURB INLET	LF	8
610 15232	688 CONCRETE CURB INLET	LF	8
610 15256	690 CONCRETE CURB INLET	LF	8
610 15280	692 CONCRETE CURB INLET	LF	8
610 15304	694 CONCRETE CURB INLET	LF	8
610 15328	696 CONCRETE CURB INLET	LF	8
610 15352	698 CONCRETE CURB INLET	LF	8
610 15376	700 CONCRETE CURB INLET	LF	8
610 15400	702 CONCRETE CURB INLET	LF	8
610 15424	704 CONCRETE CURB INLET	LF	8
610 15448	706 CONCRETE CURB INLET	LF	8
610 15472	708 CONCRETE CURB INLET	LF	8
610 15496	710 CONCRETE CURB INLET	LF	8
610 15520	712 CONCRETE CURB INLET	LF	8
610 15544	714 CONCRETE CURB INLET	LF	8
610 15568	716 CONCRETE CURB INLET	LF	8
610 15592	718 CONCRETE CURB INLET	LF	8
610 15616	720 CONCRETE CURB INLET	LF	8
610 15640	722 CONCRETE CURB INLET	LF	8
610 15664	724 CONCRETE CURB INLET	LF	8
610 15688	726 CONCRETE CURB INLET	LF	8
610 15712	728 CONCRETE CURB INLET	LF	8
610 15736	730 CONCRETE CURB INLET	LF	8
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610 16048	756 CONCRETE CURB INLET	LF	8
610 16072	758 CONCRETE CURB INLET	LF	8
610 16096	760 CONCRETE CURB INLET	LF	8
610 16120	762 CONCRETE CURB INLET	LF	8
610 16144	764 CONCRETE CURB INLET	LF	8
610 16168	766 CONCRETE CURB INLET	LF	8
610 16192	768 CONCRETE CURB INLET	LF	8
610 16216	770 CONCRETE CURB INLET	LF	8
610 16240	772 CONCRETE CURB INLET	LF	8
610 16264	774 CONCRETE CURB INLET	LF	8
610 16288	776 CONCRETE CURB INLET	LF	8
610 16312	778 CONCRETE CURB INLET	LF	8
610 16336	780 CONCRETE CURB INLET	LF	8
610 16360	782 CONCRETE CURB INLET	LF	8
610 16384	784 CONCRETE CURB INLET	LF	8
610 16408	786 CONCRETE CURB INLET	LF	8
610 16432	788 CONCRETE CURB INLET	LF	8
610 16456	790 CONCRETE CURB INLET	LF	8
610 16480	792 CONCRETE CURB INLET	LF	8
610 16504	794 CONCRETE CURB INLET	LF	8
610 16528	796 CONCRETE CURB INLET	LF	8
610 16552	798 CONCRETE CURB INLET	LF	8
610 16576	800 CONCRETE CURB INLET	LF	8
610 16600	802 CONCRETE CURB INLET	LF	8
610 16624	804 CONCRETE CURB INLET	LF	8
610 16648	806 CONCRETE CURB INLET	LF	8
610 16672	808 CONCRETE CURB INLET	LF	8
610 16696	810 CONCRETE CURB INLET	LF	8
610 16720	812 CONCRETE CURB INLET	LF	8
610 16744	814 CONCRETE CURB INLET	LF	8
610 16768	816 CONCRETE CURB INLET	LF	8
610 16792	818 CONCRETE CURB INLET	LF	8
610 16816	820 CONCRETE CURB INLET	LF	8
610 16840	822 CONCRETE CURB INLET	LF	8
610 16864	824 CONCRETE CURB INLET	LF	8
610 16888	826 CONCRETE CURB INLET	LF	8
610 16912	828 CONCRETE CURB INLET	LF	8
610 16936	830 CONCRETE CURB INLET	LF	8
610 16960	832 CONCRETE CURB INLET	LF	8
610 16984	834 CONCRETE CURB INLET	LF	8
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610 17416	870 CONCRETE CURB INLET	LF	8
610 17440	872 CONCRETE CURB INLET	LF	8
610 17464	874 CONCRETE CURB INLET	LF	8
610 17488	876 CONCRETE CURB INLET	LF	8
610 17512	878 CONCRETE CURB INLET	LF	8
610 17536	880 CONCRETE CURB INLET	LF	8
610 17560	882 CONCRETE CURB INLET	LF	8
610 17584	884 CONCRETE CURB INLET	LF	8
610 17608	886 CONCRETE CURB INLET	LF	8
610 17632	888 CONCRETE CURB INLET	LF	8
610 17656	890 CONCRETE CURB INLET	LF	8
610 17680	892 CONCRETE CURB INLET	LF	8
610 17704	894 CONCRETE CURB INLET	LF	8
610 17728	896 CONCRETE CURB INLET	LF	8
610 17752	898 CONCRETE CURB INLET	LF	8
610 17776	900 CONCRETE CURB INLET	LF	8
610 17800	902 CONCRETE CURB INLET	LF	8
610 17824	904 CONCRETE CURB INLET	LF	8
610 17848	906 CONCRETE CURB INLET	LF	8
610 17872	908 CONCRETE CURB INLET	LF	8
610 17896	910 CONCRETE CURB INLET	LF	8
610 17920	912 CONCRETE CURB INLET	LF	8
610 17944	914 CONCRETE CURB INLET	LF	8
610 17968	916 CONCRETE CURB INLET	LF	8
610 17992	918 CONCRETE CURB INLET	LF	8
610 18016	920 CONCRETE CURB INLET	LF	8
610 18040	922 CONCRETE CURB INLET	LF	8
610 18064	924 CONCRETE CURB INLET	LF	8
610 18088	926 CONCRETE CURB INLET	LF	8
610 18112	928 CONCRETE CURB INLET	LF	8
610 18136	930 CONCRETE CURB INLET	LF	8
610 18160	932 CONCRETE CURB INLET	LF	8
610 18184	934 CONCRETE CURB INLET	LF	8
610 18208	936 CONCRETE CURB INLET	LF	8
610 18232	938 CONCRETE CURB INLET	LF	8
610 18256	940 CONCRETE CURB INLET	LF	8
610 18280	942 CONCRETE CURB INLET	LF	8
610 18304	944 CONCRETE CURB INLET	LF	8
610 18328	946 CONCRETE CURB INLET	LF	8
610 18352	948 CONCRETE CURB INLET	LF	8
610 18376	950 CONCRETE CURB INLET	LF	8
610 18400	952 CONCRETE CURB INLET	LF	8
610 18424	954 CONCRETE CURB INLET	LF	8
610 18448	956 CONCRETE CURB INLET	LF	8
610 18472	958 CONCRETE CURB INLET	LF	8
610 18496	960 CONCRETE CURB INLET	LF	8
610 18520	962 CONCRETE CURB INLET	LF	8
610 18544	964 CONCRETE CURB INLET	LF	8
610 18568	966 CONCRETE CURB INLET	LF	8
610 18592	968 CONCRETE CURB INLET	LF	8
610 18616	970 CONCRETE CURB INLET	LF	8
610 18640


AVALON DR
BRIARWOOD AVE
SCALE: 1" = 40'
LEGEND
CONDUIT PLAN NOTES
CAUTION:
GROUND BOX SUMMARY:
GROUND BOX SUMMARY
DESCRIPTION
UNIT
QTY.
GROUND BOX TYPE 3 (NJMPW)
Ea.
4
GROUND BOX TYPE 2 (NJMPW)
Ea.
2
GROUND BOX TYPE 1 (NJMPW)
Ea.
1
MAVERICK
CONDUIT PLAN
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOLLADAY, SALT LAKE COUNTY, UTAH
09/10/2025
CI30



HOME RUN CABLE TERMINATION CHART

CNDR NO.	CONDUCTOR COLOR	CABLE 1 to MAIN (CLOCKWISE) To CNTR	CABLE 2 to MAIN (CLOCKWISE) To CNTR	CABLE 3 to MAIN (CLOCKWISE) To CNTR	CABLE 4 to MAIN (CLOCKWISE) To CNTR	CABLE 5 to MAIN (CLOCKWISE) To CNTR
1	BLACK	SPARE	SPARE	SPARE	SPARE	SPARE
2	WHITE	SH CDM	SH CDM	SH CDM	SH CDM	SH CDM
3	RED	SH C 4&5 SH 4&5	SH C&3 SH 3&5	SH C&3 SH 3&4	SH C&3,5,7 SH 3&5	SH C&5 SH 3&4
4	GREEN	SH C 3&5 SH 3&5	SH C&3,5 SH 3&5	SH C&3,5 SH 4&5	SH C&3,5,7 SH 4&5	SH C&5 SH 3&5
5	ORANGE	SPARE	SH C&3,5 SH 4&5	SH C&3,5 SH 4&5	SH C&3,5,7 SH 4&5	SPARE
6	BLUE	SPARE	SPARE	SPARE	SPARE	SPARE
7	WHITE/BLACK	SPARE	SPARE	SPARE	SPARE	SPARE
8	RED/BLACK	SH C 4&5 SH	SPARE	SPARE	SPARE	SPARE
9	GREEN/BLACK	SH C 3&5 SH 3&5	SPARE	SH C 3&5 SH 4&5	SPARE	SPARE
10	ORANGE/BLACK	SPARE	SPARE	SH C CLOCK	SPARE	SPARE
11	BLUE/BLACK			SPARE	SPARE	
12	BLUE/WHITE			SPARE	SH C2 SH C&7	
13	RED/WHITE			SPARE	SH C2 SH 4&7	
14	GREEN/WHITE			SPARE	SH C2 SH 4&5	
15	BLUE/WHITE			SPARE	SH C2 SH 4&7	
16	BLACK/RED			SPARE	SPARE	
17	WHITE/RED			SPARE	SPARE	
18	ORANGE/RED			SPARE	SPARE	
19	BLUE/RED			SPARE	SPARE	
20	RED/GREEN			SPARE	SPARE	

NOTE: ACTUAL CABLES RUN TO FIELD PTS.
NOTE: INDICATIONAL CABLES FROM CONTROLLER CABINET(TYCO)SH 1 (CABLE#5), PLACED AT FOR PURPOSE SHOWN.

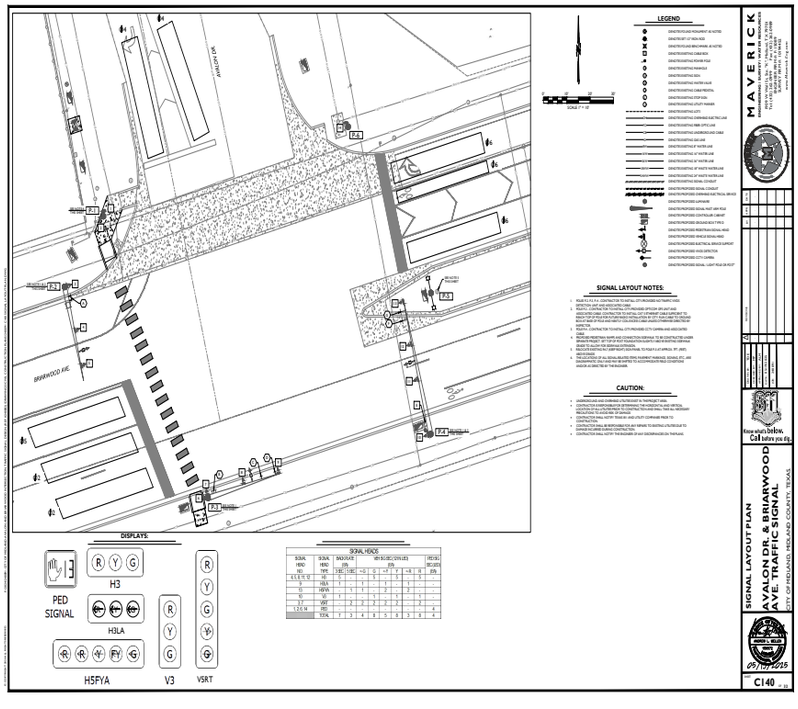
MAVERICK
TRAFFIC SIGNAL CONSULTANTS
2101 W. Pipeline Rd., Ste. 114 Hurst, TX 76054
Phone: 817-282-0263 Fax: 817-282-0264
Email: info@maverick-ts.com
TBPE Firm Registration #F-14435

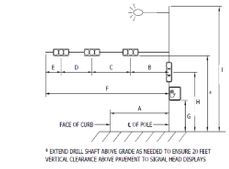
Know what's below. Call before you dig.

CONDUIT TABLES
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND VILLAGE DENTON, TEXAS

05/19/2025

CI3I


AVALON DR.
BRIARWOOD AVE.
LEGEND
SIGNAL LAYOUT NOTES
CAUTION
DISPLAYS
H3
PED SIGNAL
H3LA
H5FYA
V3
VSRT
SIGNAL HEADS
MAVERICK
SIGNAL LAYOUT PLAN
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND VILLAGE, DENTON COUNTY, TEXAS
05/19/2025
C140



SIGNAL HEADS										
SIGNAL HEAD NO.	SIGNAL HEAD TYPE	BACK PLATE (BP) (YES / NO)	VEHICLE SECTIONS (VS)						PED SIGS (SEC 1025)	
			+A	B	+C	F	+D	E		
4, 5 & 11, 12	H3	Y	-	-	Y	3	-	1	-	-
7	H3	Y	-	-	Y	3	-	1	-	-
8	HSFA	Y	1	-	-	3	-	1	-	-
10	V3	Y	1	-	Y	1	-	1	-	-
1, 7	V4T	Y	2	3	2	2	-	2	-	-
1, 2, 5, 14	H5C	Y	-	-	-	-	-	-	2	2
3	V3A	Y	3	4	3	3	3	3	3	3

SIGNAL HEAD AND POLE PLACEMENT													
POLE NO.	SIGNAL	MPS	MPC	CPS	BPS	EPS	TPS	RPS	HPS	SPS	NO. OF HEADS (UPWARDS)	NO. OF HEADS (DOWN)	FOUNDATION TYPE (STATE-MIN LEVEL)
P-1	1	25 FT 2019	PEDESTRIAN SIGNAL POST					8.0	-	10.0	2	-	24-4
P-2	1	30 FT 2019	10.0	10.0	-	6.0	15.0	-	14.0	20.0	2	1	30-4
P-3	1	35 FT 1978	10.0	10.0	-	-	15.0	8.0	14.0	20.0	2	-	35-4
P-4	1	35 FT 2013	10.0	12.0	10.0	11.0	40.0	-	14.0	20.0	2	-	35-4
P-5	1	MOVABLE MESSAGE SIGN (SEE DETAIL)	MOVABLE SIGN MOUNTING POLE					-	-	-	20.0	2	30 MSS MT
P-6	1	35 FT 2007	PEDESTRIAN SIGNAL POST					8.0	-	10.0	-	-	24-4

SIGNAL POLE DESIGN - MODEL 1 STANDARD, NON-OVERSIZE, 3 METAL, NO FLAT PLATE
* INCLUDES OVERHEAD MARKS ONLY (DOES NOT INCLUDE MPS POLE, POLE FOR SIGN POSTING SIGNAL HEADS)

ELEVATION DETAILS			
POLE NO.	SIDE (TRAFFIC SIDE)	STREET NAME	SUFFIX & BLOCK
P-2	RIGHT (WESTBND)	AVALON	3X 4000
	BACK (EASTBND)	AVALON	3X 4000
P-3	RIGHT (SOUTHBND)	BRIARWOOD	4XE 6400
	BACK	[BLANK]	
P-4	FRONT (WESTBND)	AVALON	3X 4000
	BACK (EASTBND)	AVALON	3X 4000

OVERHEAD SIGN SUMMARY				
NO.	TYPE	DESCRIPTION	SIZE	LOCATION
A	120P	AVALON (ST/RDS*) NAME SIGN	—	P-3 S/B ARM
B	120P	BRIARWOOD AVE (ST/RDS*) NAME SIGN	—	P-3 S/B ARM
C	R3-8LD	LEFT LANE ONLY / RIGHT TURN ONLY	36 X 96	P-3 SIGNAL ARM
D	R3-5	NO U-TURN	30 X 36	P-3 SIGNAL ARM
E	120P	AVALON (ST/RDS*) NAME SIGN	—	P-4 S/B ARM
F	R3-5	NO U-TURN	30 X 36	P-4 SIGNAL ARM
G	R10-12C*	LEFT TURN YIELD ON FLASHING YELLOW ARROW	—	P-4 SIGNAL ARM

* AS TO WORDING AND CONFIGURATION TO MATCH, PER THE MUTCD

APS MESSAGE CHART			
POLE NO.	PEDESTRIAN NOMENCLATURE	FUNCTION	SPEECH MESSAGE / SIGN INDICATIONS
P-1	PHASE 6	PUSH-BUTTON ON/OFF	WAIT TO CROSS AVALON DRIVE
		EXTENDED WAIT TIME ON/OFF	WAIT TO CROSS AVALON DRIVE
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	WALK SIGN IS ON TO CROSS AVALON DRIVE
P-2	PHASE 4	PUSH-BUTTON ON/OFF	WAIT TO CROSS BRIARWOOD AVENUE
		EXTENDED WAIT TIME ON/OFF	WAIT TO CROSS BRIARWOOD AVENUE
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	BRIARWOOD AVENUE, WALK SIGN IS ON TO CROSS BRIARWOOD AVENUE
P-3	PHASE 4	PUSH-BUTTON ON/OFF	WAIT TO CROSS BRIARWOOD AVENUE
		EXTENDED WAIT TIME ON/OFF	WAIT TO CROSS BRIARWOOD AVENUE
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	BRIARWOOD AVENUE, WALK SIGN IS ON TO CROSS BRIARWOOD AVENUE
P-4	PHASE 8	PUSH-BUTTON ON/OFF	WAIT TO CROSS AVALON DRIVE
		EXTENDED WAIT TIME ON/OFF	WAIT TO CROSS AVALON DRIVE
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	AVALON DRIVE, WALK SIGN IS ON TO CROSS AVALON DRIVE

ELECTRICAL SERVICE DATA										
ELECTRICAL SERVICE DESCRIPTION	SERVICE CONSUMER NO.	SERVICE CONDUCTORS AND SIZE	SERVICE DISTRIBUTION SYSTEM	SERVICE OVERCURRENT PROTECTION	TRUE POLE CONDUCTOR SIZE	PANELBOARD CONDUCTOR AMPERAGE	PANELBOARD AMPERAGE	BRANCH CIRCUIT SIZE	BRANCH CIRCUIT NO. WIRE SIZE	BRANCH CIRCUIT NO.
P-5 120/240-3Φ-3W-NL-N-FR3	P PAC	3 #6 AWG #8 AWG 1 1/4 AWG	4W	3P100	3X	1X	1X	100L 125 2 SPARE	2P20 2P20 3P30	1-3 4-6 7-9

ELECTRICAL SERVICE DATA TYP

MAVERICK
TRAFFIC ENGINEERING & ASSOCIATES, INC.
2929 N. High St. Ste. 14 Peoria, IL 61604
Phone: (309) 966-1000 Fax: (309) 966-1001
E-MAIL: INFO@MAVERICKTE.COM
WEBSITE: WWW.MAVERICKTE.COM

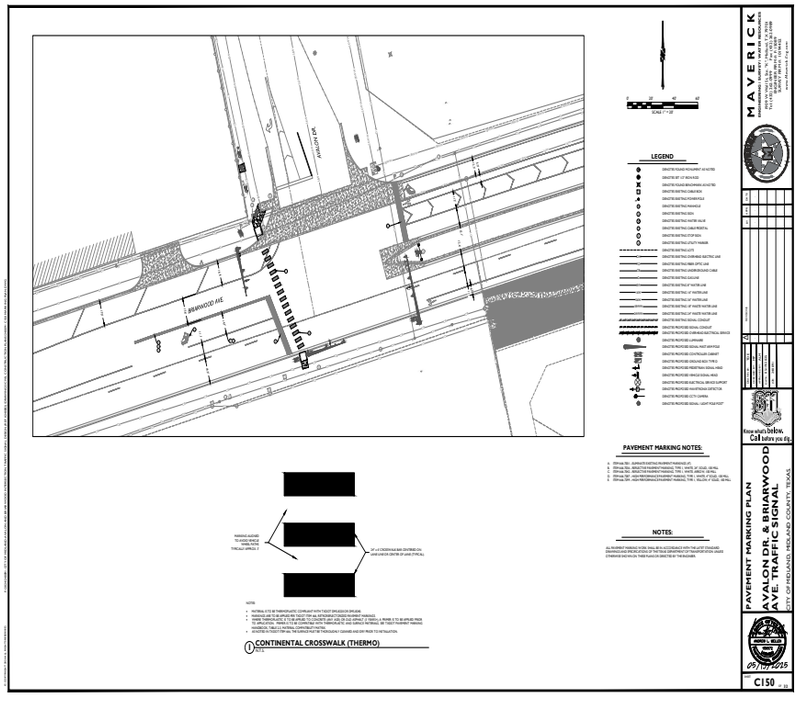
REVISIONS										
NO.	DESCRIPTION	BY	DATE	NO.	DESCRIPTION	BY	DATE	NO.	DESCRIPTION	BY	DATE
1											
2											
3											
4											
5											
6											

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SIGNAL TABLES
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND, MADISON COUNTY, ILLINOIS

05/19/2025

C141 of 15



NOTE:

1. INSTALL 6 LTS OF THERMOPLASTIC COMPLIANT WITH TXDOT SPECIFICATION 3092 AND
2. MARKINGS ARE TO BE APPLIED PER TXDOT STD PM (6A), AUTOMOBILE CROSSING MARKINGS
3. ALL PAVEMENT MARKINGS SHALL BE APPLIED PER TXDOT STD PM (6A), AUTOMOBILE CROSSING MARKINGS, PAVING IS TO BE APPLIED PRIOR TO APPLICATION. PAVING IS TO BE CLEANED PRIOR TO REMOVABLE PVC AND SURFACE MATERIALS. ALL TXDOT PAVEMENT MARKING MANDATORY. TABLE 1.1 MATERIAL COMPATIBILITY MATRIX.
4. ACCEPTED STRUCTURE WILL RECEIVE NOTICE OF THE SCHEDULE 1 CLEANING AND DRY PRIOR TO INSTALLATION.

1 CONTINENTAL CROSSWALK (THERMO)
SCALE

SCALE: 1" = 20'

LEGEND

PAVEMENT MARKING NOTES:

1. PM (4) 18 - SURFACE MOUNTED PAVEMENT MARKINGS, (4")
2. PM (4) 24 - SURFACE MOUNTED PAVEMENT MARKINGS, TYPE I, WHITE, (4") SOLID, (18 PM)
3. PM (4) 36 - SURFACE MOUNTED PAVEMENT MARKINGS, TYPE I, WHITE, (4") SOLID, (36 PM)
4. PM (4) 72 - HIGH PERFORMANCE EPOXY PAVEMENT MARKINGS, TYPE I, WHITE, 4" SOLID, (36 PM)
5. PM (4) 108 - HIGH PERFORMANCE EPOXY PAVEMENT MARKINGS, TYPE I, YELLOW, 4" SOLID, (36 PM)

NOTES:

ALL PAVEMENT MARKING WORK SHALL BE IN ACCORDANCE WITH THE LATEST STANDARD DRAWINGS AND SPECIFICATIONS OF THE TEXAS DEPARTMENT OF TRANSPORTATION, UNLESS OTHERWISE SHOWN ON THESE PLANS OR DIRECTED BY THE ENGINEER.

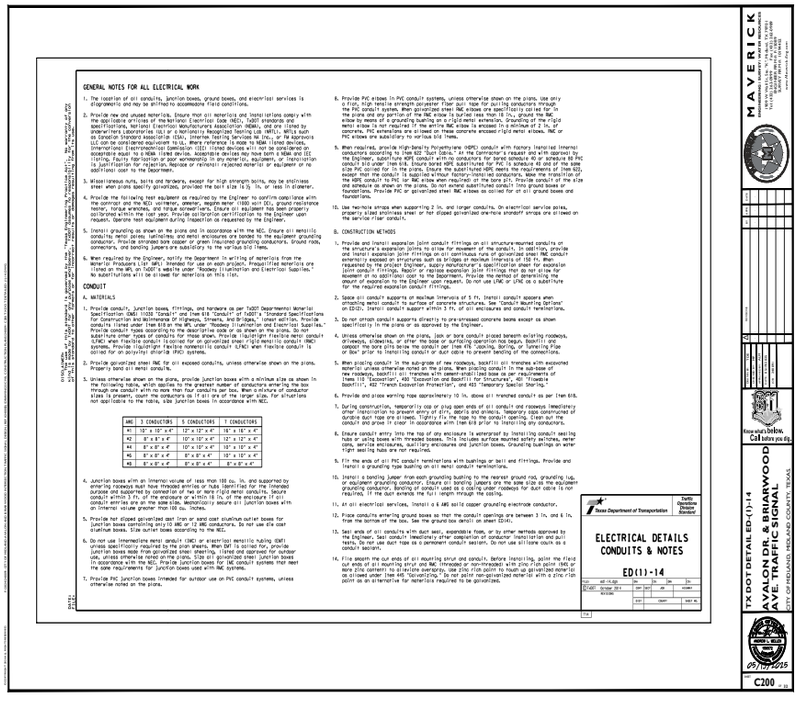
MAVERICK
TRAFFIC ENGINEERING & PLANNING
2929 W. Parker Rd. Ste. 114 Plano, TX 75023
(214) 556-1790 TBPE Firm No. F-14356
TBPE Registered Engineer: Jason Maverick
TBPE Registered Engineer: Ryan Rivera

Know what's below.
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PAVEMENT MARKING PLAN
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF MIDLOTHIAN | ELLIS COUNTY, TEXAS

05/30/2025

C150 of 33



GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and encroachment services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable portions of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriter's Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Ltd., or MET Laboratories, Inc. are acceptable. Devices that are only marked with a CE, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any materials, equipment, or installation is justification for rejection. Replace or remanufacture rejected materials or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is 5/8 in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter 1000 volt DC), ground-resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated by a qualified testing agency. Submit calibration certificates to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits, metal poles, luminaires, and metal enclosures are bonded to the equipment grounding conductor. Ground all transformers, service equipment, and electrical enclosures. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Materials Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL under Item 610, "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification DMS 11028 "Conduit" and Item 618 "Conduit" of TxDOT's Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges," latest edition. Provide only conduit that is listed by UL or a NRTL and is manufactured in the United States. Provide conduit types according to the descriptions code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized sheet rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is contained in a box, refer to Table 314.16(B) in the NEC. Except for structures not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#14	10" x 10" x 4"	10" x 10" x 4"	16" x 16" x 4"
#12	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#10	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an interior volume of less than 100 cu. in. and supported by entering roadways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only #6 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel stamping, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes according to the NEC. Use only galvanized steel RMC systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a rigid, high tensile strength polyester fiber duct tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the PVC conduit system, provide a transition from the PVC conduit to the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide high-density polyethylene (HDPE) conduit with factory ironclad internal conductors according to Item 620 "Duct Cable." At the Contractor's request and with approval by the Engineer, HDPE conduit may be substituted for PVC conduit installed by open cut. Place HDPE conduit 3/4 in. under Item 618. Ensure bored HDPE substitutes for PVC in schedule 40 one of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 620, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC or RMC elbow when required at the bore pit. Provide conduit of the size and type shown on the plans for sweeps and risers between underground runs and above ground foundations. Provide PVC or galvanized steel RMC elbows as called for on all ground boxes and foundations.

10. Use heatshrink straps when supporting 2 in. and larger conduits. On electrician service poles, use factory sized stainless steel or hot dipped galvanized premade standoff straps one at bend on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint fittings. Provide fittings that are adjustable to accommodate at least 4 in. of conduit movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFNC or LFMC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specified in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or other the base or surfacing operation has begun. Backfill and compact the bore pits before the conduit per Item 416 "Drilling, Boring, or Tunneling Pilot or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material, compacted in accordance with Item 132 "Embankment." When placing conduit in the base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted battery switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on other than sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a coring under roadways for duct cable is not required. If the duct extends the full length through the coring.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box details on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all expanding spiral and conduit. Before installing, paint the field cuts and threads of galvanized RMC with a zinc-rich primer. Where the zinc coating is damaged, or more zinc content is desirable overspray, use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS
CONDUITS & NOTES

ED(1)-14

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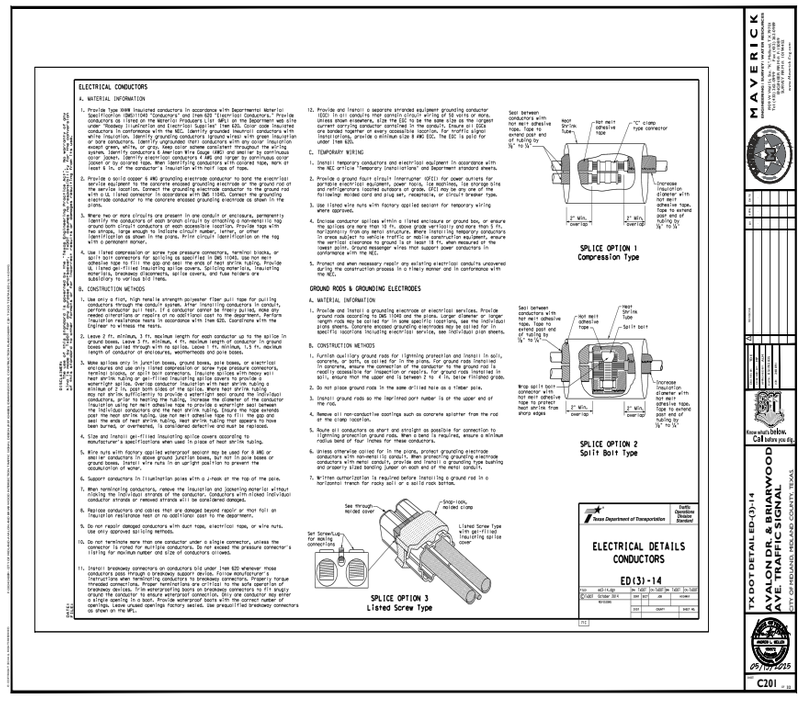
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C200



ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification DMS-11040, "Conductors," and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors with the following: Phase A black, Phase B red, Phase C blue, Neutral white insulation. Identify grounding conductors ground wires with green insulation or bare conductors. Identify ungrounded limit conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the entire system. Identify conductors # American Wire Gauge (AWG) and smaller by continuous color insulation. Identify conductors larger than # AWG at each end and each pull box (unless in by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper # AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS-11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by connecting a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two arrows, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers. Provide a minimum of 2 in. spot both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the heat shrink tubing and the conductor. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

5. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

6. Wire nuts with factory applied waterproof sealant may be used for # AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

7. Support conductors in illumination poles with a J-hook at the top of the pole.

8. When terminating conductors, remove the insulation and jacketing material without nicking the wire. Remove only enough insulation to fit completely into mated individual conductor crimps or recessed strands will be considered damaged.

9. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

10. Do not splice conductors with duct tape, electrician tape, or wire nuts. Use only approved splicing methods.

11. Install breakaway connectors on conductors 6/0 and under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions for installation. Tighten bolts to the manufacturer's specified torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings for the number of openings factory sealed. Use pressurfilled breakaway connectors as shown on the plans.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded to each electrical equipment location. For limited energy installations, provide a minimum size 8 AWG EGC. No EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors on grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 18 in. above grade vertically and more than 3 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile communication equipment, ensure the conductors are buried a minimum of 12 in. deep and are the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS-11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual pole and foundation detail sheets. Provide additional rods, as called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Function auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.

SPLICE OPTION 3
Listed Screw Type

SPLICE OPTION 1
Compression Type

SPLICE OPTION 2
Split Bolt Type

Texas Department of Transportation
Traffic Operations Division Standard

ELECTRICAL DETAILS
CONDUCTORS
ED(3)-14

DIST	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
HOU	HARRIS	0912-47-229			

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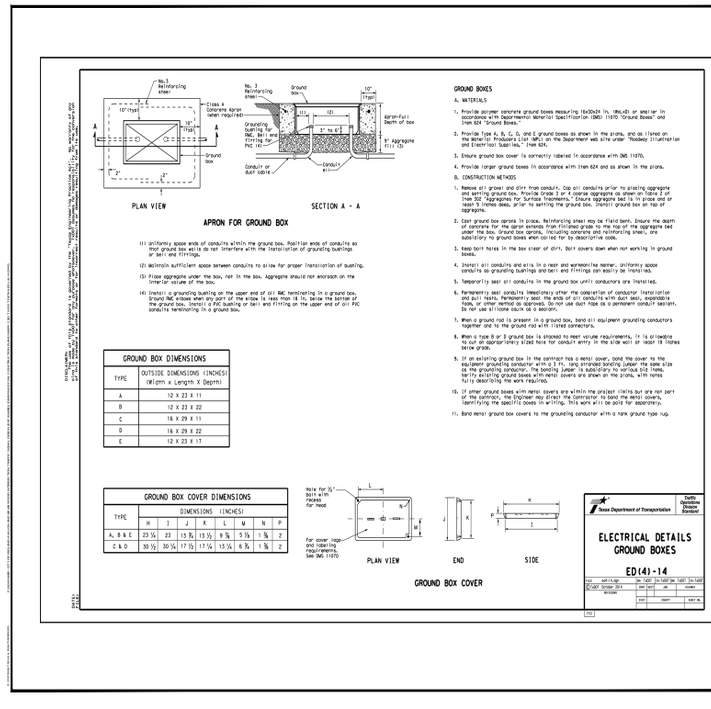
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C201



APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Where the conduit enters the box and the elbow is less than 18 in. below the bottom of the ground box, install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	J	K	L	M	N	P	
A, B & E	23 ½	23	15 ⅜	13 ½	9 ⅜	5 ⅜	1 ⅜	2
C & D	30 ½	30 ¾	17 ½	17 ¼	13 ¼	6 ⅜	1 ⅜	2

GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (HxLxD) or greater in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown in Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 6 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Open ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep dirt holes in the box clear of dirt. Dirt covers down when not working in ground boxes.

4. Install all conduits and slip in a neat and workmanlike manner, uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation in the box. Seal conduits entering the box at both ends of all conduits with duct seal, expandable plug, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type D or E ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 Ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a new ground type lug.

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Traffic Operations Division Standard

ELECTRICAL DETAILS
GROUND BOXES
ED(4)-14

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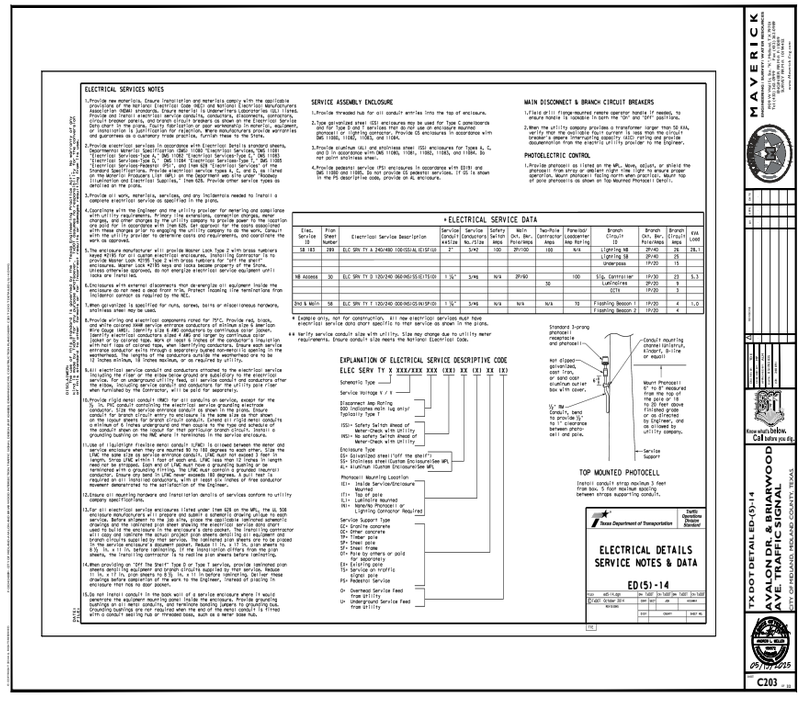
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ELECTRICAL SERVICES NOTES

1. Provide new materials, ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed.
2. Provide electrical services, including but not limited to, service entrance, meter, circuit breaker panels, and branch circuits breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation will be rejected. Provide products of the manufacturers listed in the specifications and guarantees as a customary trade practice, furnish these to the State.
3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.
4. Coordinate with the Engineer and the utility provider for metering and compliance with the utility company's service requirements. Any utility company fees, deposits, charges, and other charges, by many utility companies, to provide power to the location are paid for in accordance with Item 626. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.
5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers for "Off the Shelf" enclosures. Manufacturer will provide Corbin Russwin Type 2 to provide Master type KEYED Type 2 with brass tumblers for "Off the Shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.
6. Enclosures with screened disconnects must de-energize all equipment inside the enclosure do not need a dead front. In lit, protect focusing the terminations from incidental contact as required by the NEC.
7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.
8. Provide wiring and examition components rated for 75°C. Provide red, black, white, and green insulated conductors for circuit wiring sized #6 AWG and smaller #10 Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color (green). Identify examition conductors sized 4 AWG and larger by continuous color (green) insulation or by green tape at each end and at each point of access. Design with hot taps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately gutted nonmetallic opening in the service enclosure. Ensure the length of the service conductors extending are to be 12 inches minimum, 18 inches maximum, or as required by utility.
9. All examition service conduit and conductors attached to the examition service including that part of the wires below ground are subsidiary to the examition. Conductors for underground service, including service conductors and connections after the wires, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.
10. Provide rigid metal conduit (RMC) for all conduits on service, except for the 3/4 inch PVC conduit containing the electrical service grounding electrode conductor. Ensure the grounding electrode conductor is the same size as the main conductor for branch circuit entry to enclosure is the same size as is not shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits from the top of the service enclosure to the bottom of the service enclosure. Where the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.
11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Torque LFMC within 1 foot of each end. LFMC less than 12 inches in length must be bonded with a bonding jumper. Ensure the LFMC contains a green insulated conductor with a grounding fitting. The LFMC must contain a grounded neutral conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull rope is not required in LFMC conductors. Ensure LFMC allows for flexibility of three conductor movement demonstrated to the satisfaction of the Engineer.
12. Ensure all mounting hardware and installation details of services conform to utility company specifications.
13. For all electrical service enclosures listed under Item 626 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable reinforced schematic drawings and the reinforced plan sheets showing the examition service data sheet used to build the enclosure in the enclosure's data packet. The training contractor will train the Engineer in the use of the schematic drawings and the reinforced branch circuits supplied by that service. The reinforced plan sheets are to be placed in the service enclosure's document packet. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in. before reinforcing. Deliver these drawings before cooperation of the work to the Engineer, instead of placing in enclosure that has no door pockets.
14. When providing an "Off The Shelf" Type 0 or Type 7 service, provide reinforced plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in before reinforcing. Deliver these drawings before cooperation of the work to the Engineer, instead of placing in enclosure that has no door pockets.
15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings for all conduits. Ensure the grounding bushings are bonded. Bonding grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.
2. Type galvanized sheet (GS) enclosures may be used for Type C pedestals and for Type D and E services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.
3. Provide stainless (SS) and aluminum sheet (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless sheet.
4. Provide pedestal service (PS) enclosures in accordance with 32.81 and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is capable to turn the "On" and "Off" positions.
2. When the utility company provides a transformer larger than 50 kVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Mount, adjust, or shield the photocell to ensure that it does not get night mode light for ambient proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit Existing	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Poles/Amps	Two-Pole Contractor Amps	Panelboard/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Poles/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 1Ø0/3SU AL 6[1]SF100	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	24	28.1
									Lighting SB	2P/40	25	
									Underpasses	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 3Ø0/4W/3S-E[1]1/0	1 ¼"	3/#6	N/A	2P/60		100	1 ½" Contractor	1P/20	22	5.3
							30		Luminaires	2P/20	10	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY F 120/240 3Ø0/4W/3S-N[1]SF100	1 ¼"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National Electrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

- Schematic Type
- Service Voltage X / X
- Disconnect Amp Rating
  000 Indicates main lug only
  Typically Type I
- (SS)= Safety Switch Ahead of Meter-Check with Utility
  (NS)= No safety Switch Ahead of Meter-Check with Utility
- Enclosure Type
  GS= Galvanized steel/"off the shelf"
  SS= Stainless steel/Custom Enclosure/See MPL
  AL= Aluminum /Custom Enclosure/See MPL
- Photocell Mounting Location
  (S)= Inside Service/Enclosure Mounted
  (T)= Top of pole
  (L)= Luminaire Mounted
  (N)= Separate Photocell or Lighting Contractor Required
- Service Support Type
  CC= Granite concrete
  DC= Other concrete
  SP= Steel pole
  TP= Timber pole
  SF= Sheet frame
  OY= Pole by others or paid for separately
  EX= Existing
  TS= Service on traffic signal pole
  PD= Pedestrian Service
- O= Overhead Service Feed from Utility
  U= Underground Service Feed from Utility

TOP MOUNTED PHOTOCELL

Install conduit strap no more than 3 feet from box. 5 foot maximum spacing between straps supporting conduits.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5)-14

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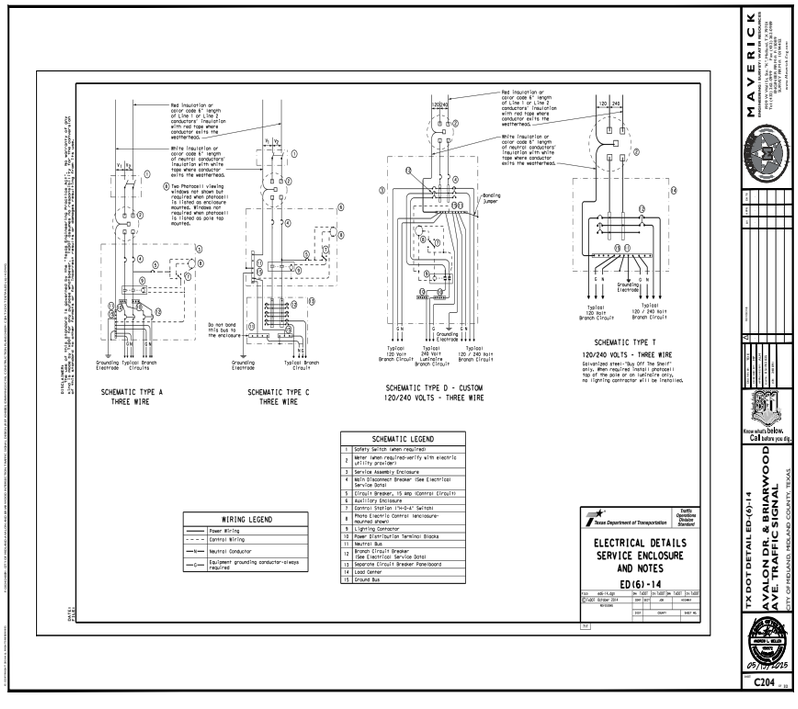
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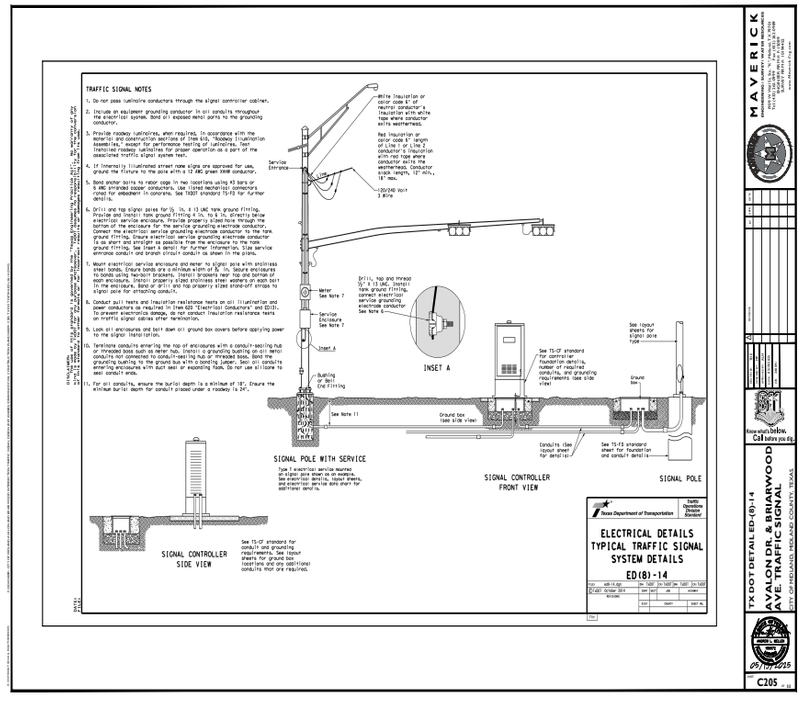
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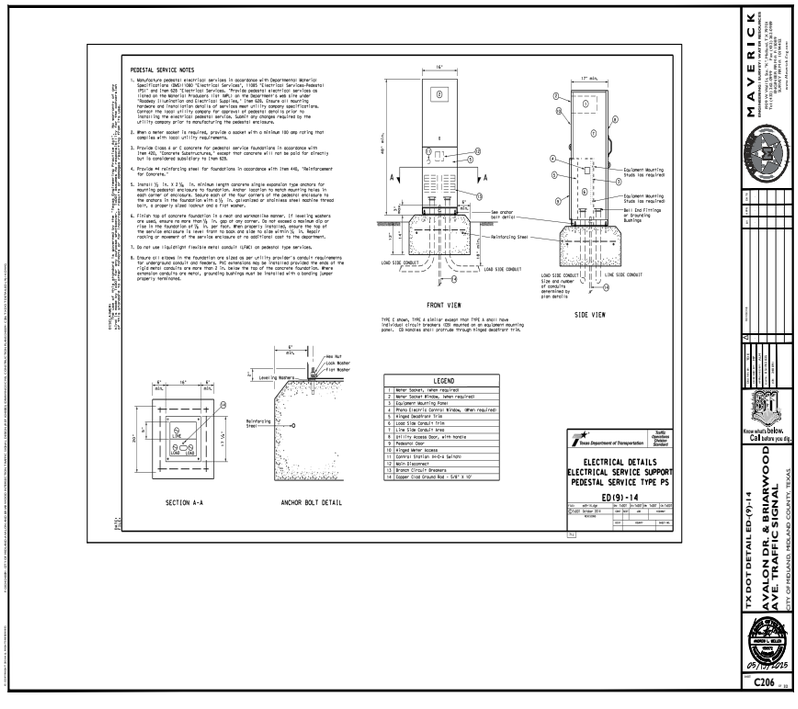
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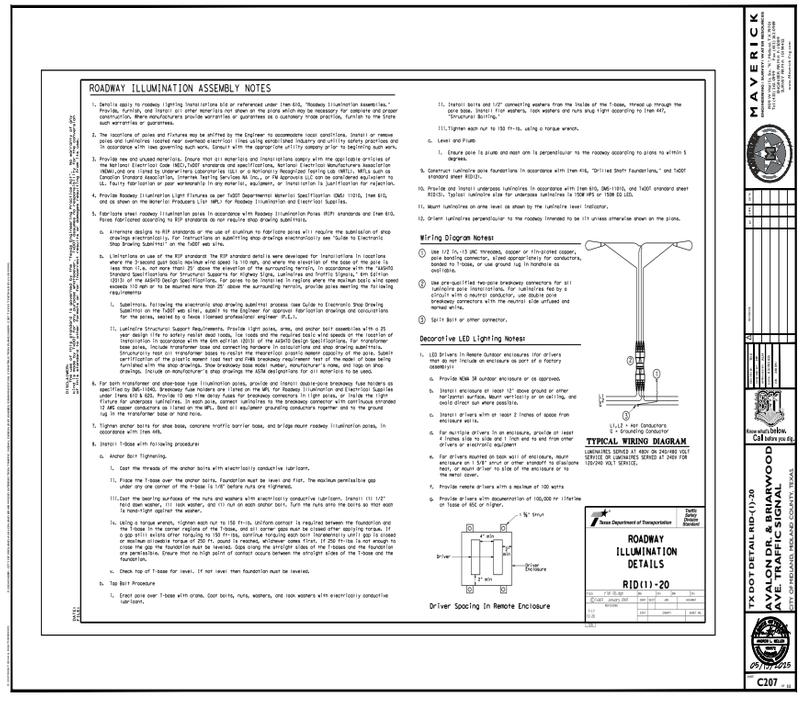
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C203


SCHEMATIC TYPE A
THREE WIRE
SCHEMATIC TYPE C
THREE WIRE
SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE
SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE
SCHEMATIC LEGEND
WIRING LEGEND
ELECTRICAL DETAILS
SERVICE ENCLOSURE
AND NOTES
ED(6)-14


TRAFFIC SIGNAL NOTES
1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," and the details for mounting of luminaires. Test luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TXDOT standard TS-FD for further details.
6. Drill and tap signal poles for ½ in. x 13 UNC rank ground fitting. Drill, tap and thread a hole in the pole for the ½ in. rank ground fitting. Route electrical service entrance conductor through properly sized holes through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the rank ground fitting. Ensure electrical service grounding electrode conductor is #6 AWG minimum. Use listed mechanical connectors for rank ground fitting. See Sheet A details for further information. Size service entrance conduit and branch circuit conduits as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands using two-hole straps. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
8. Ground all electrical service enclosures and metal cabinets in accordance with the NEC and local codes. Use a grounding electrode conductor sized in accordance with the NEC. Bond the grounding electrode conductor to the grounding bus in the service enclosure. Use a grounding electrode conductor clamp and connect to a grounding electrode. Use a minimum of one ground rod. Where multiple ground rods are used, space rods a minimum of 6 ft. apart and connect with a #6 AWG minimum bare copper conductor.
9. Leak all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".
White insulation or color code 'K' neutral conductor's insulation with white tape where conductor exits weatherhead.
Red insulation or color code 'L' (phase 1) or 'M' (phase 2) conductor's insulation with red tape where conductor exits the weatherhead. Conductor tails lengths, 12" min., 18" max.
Service Entrance
120/240 Volt 3 Wire
Meter See Note 7
Service Enclosure See Note 7
Inset A
Bushing or Bell (by) fitting
Drill, tap and thread a hole in the pole for the rank ground fitting, connect electrical service grounding electrode conductor See Note 6.
INSET A
See Note 11
Ground box (side view)
See TS-CF standard for controller foundation details, ground box details, conduits, and grounding requirements (side view)
See layout sheets for signal pole type
Ground box
Conduits (See layout sheet for details)
See TS-FD standard sheet for foundation and conduit details.
SIGNAL POLE WITH SERVICE
Type 1 electrical service mounted on signal pole shown as an example. See Sheet A for wiring diagrams, and electrical service data sheet for additional details.
SIGNAL CONTROLLER FRONT VIEW
SIGNAL POLE
SIGNAL CONTROLLER SIDE VIEW
See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.
Texas Department of Transportation
Traffic Operations Division Standard
ELECTRICAL DETAILS
TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS
ED(8)-14
ED(8)-14.dgn
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PEDESTAL SERVICE NOTES
1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS) 1080 "Electrical Services", 1085 "Electrical Services-Pedestal ITC" and then 620 "Electrical Services. "Provide pedestal electrical services listed on the Material Products List (MPL) on the Department's web site under "Electrical Services-Pedestal". Provide all items listed in the MPL. Provide hardware and installation details of services meet utility company specifications. Contact the local utility company for approval of pedestal details prior to manufacturing the pedestal and incorporate any changes required by the utility company prior to manufacturing the pedestals and cabinets.
2. When a meter socket is required, provide a socket with a minimum 100 amp rating that complies with local utility requirements.
3. Provide Class A or C concrete for pedestal service foundations in accordance with Item 420, "Concrete Substructures," except that concrete will not be paid for directly but is considered subsidiary to Item 620.
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."
5. Install (3) 1/2 in. x 13 in. minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to foundation with 1/2 in. galvanized bolt, nut, and lock washer. Countersunk or unchrome steel machine thread bolts, a properly aligned washer and a flat washer.
6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than 1/2 in. gap at any corner. Do not exceed a maximum slope of 1/2 in. in the foundation within 12 in. of any anchor. When properly installed, ensure the top of the service enclosure is level from to back and side to side within 1/2 in. Repair cracking or movement of the service enclosure at no additional cost to the department.
7. Do not use liquidtight flexible metal conduit (LFMC) on pedestal type services.
8. Ensure all elbows in the foundation are sized as per utility provider's conduit requirements for underground conduit and headers. PVC connections may be restricted provided the ends of the rigid metal conduits are more than 2 in. below the top of the concrete foundation. Where connection conduits are metal, grounding bushings must be installed with a bonding jumper properly terminated.
FRONT VIEW
SIDE VIEW
Equipment Mounting Studs (as required)
Rail End Fittings or Grounding Bushings
See anchor bolt detail
Reinforcing Steel
LOAD SIDE CONDUIT
LINE SIDE CONDUIT
Size and number of conduits determined by plan details
TYPE S shown. TYPE A similar except that TYPE A shall have individual circuit breakers (CB) mounted on an equipment-mounting panel. CB handles shall protrude through hinged deadfront trim.
SECTION A-A
ANCHOR BOLT DETAIL
Hex Nut
Lock Washer
Flat Washer
Leveling Washers
Reinforcing Steel
LEGEND
1 Meter Socket, when required
2 Meter Socket Window, when required
3 Equipment Mounting Panel
4 Circuit Breaker Window, when required
5 Hinged Deadfront Trim
6 Load Side Conduit Trim
7 Line Side Conduit Area
8 Utility Access Door, with handle
9 Pedestal Door
10 Hinged Meter Access
11 Opening Station Ground Terminal
12 Main Disconnect
13 Branch Circuit Breakers
14 Copper Clad Ground Rod - 5/8" x 10'
Texas Department of Transportation
Traffic Operations Division Standard
ELECTRICAL DETAILS
ELECTRICAL SERVICE SUPPORT
PEDESTAL SERVICE TYPE PS
ED(9)-14
FILE: ed9-14.dgn
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C206



ROADWAY ILLUMINATION ASSEMBLY NOTES

1. Details apply to roadway lighting installations bid or referenced under Item 618, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.

2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA),and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any materials, equipment, or installation is justification for rejection.

4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.

5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.

   a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web sites.

   b. Limitations on use of the RIP standards: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than 11 ft, not more than 25' above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) of the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25' above the surrounding terrain, provide poles meeting the following requirements:

      I. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web sites), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).

      II. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, live loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, provide transformer bases and connecting hardware in accordance with shop drawing submittals. Submit certification of the anchor bolt assembly fatigue design life calculations, and submit certification of the plastic segment load test and FMEA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.

6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 each time delay fuses for breakaway connectors. Light pole, or fixture the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.

7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.

8. Install T-Base with following procedure:

   a. Anchor Bolt Tightening.

      I. Coat the threads of the anchor bolts with electrically conductive lubricant.

      II. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the T-base is 1/8" before nuts are tightened.

      III. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hard down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.

      IV. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.

      V. Check top of T-base for level. If not level then foundation must be leveled.

   b. Top Bolt Procedure

      I. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

      II. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."

      III. Tighten each nut to 150 ft-lb, using a torque wrench.

   c. Level and Plumb

      I. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.

9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(3).

10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.

11. Mount luminaires on arms level as shown by the luminaire level indicator.

12. Orient luminaires perpendicular to the roadway (mounted to be ↕↕ unless otherwise shown on the plans.

Wiring Diagram Notes:

1. Use 1/2 IN.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.
2. Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.
3. Split bolt or other connector.

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V OR 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):
   a. Provide NEMA 3R outdoor enclosure or as approved.
   b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.
   c. Install drivers with at least 2 inches of space from enclosure walls.
   d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronics equipment
   e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.
   f. Provide remote drivers with a maximum of 100 watts
   g. Provide drivers with documentation of 100,000 hr lifetime or Tcase of 65C or higher.

Driver Spacing In Remote Enclosure

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ROADWAY ILLUMINATION DETAILS

RID(1)-20

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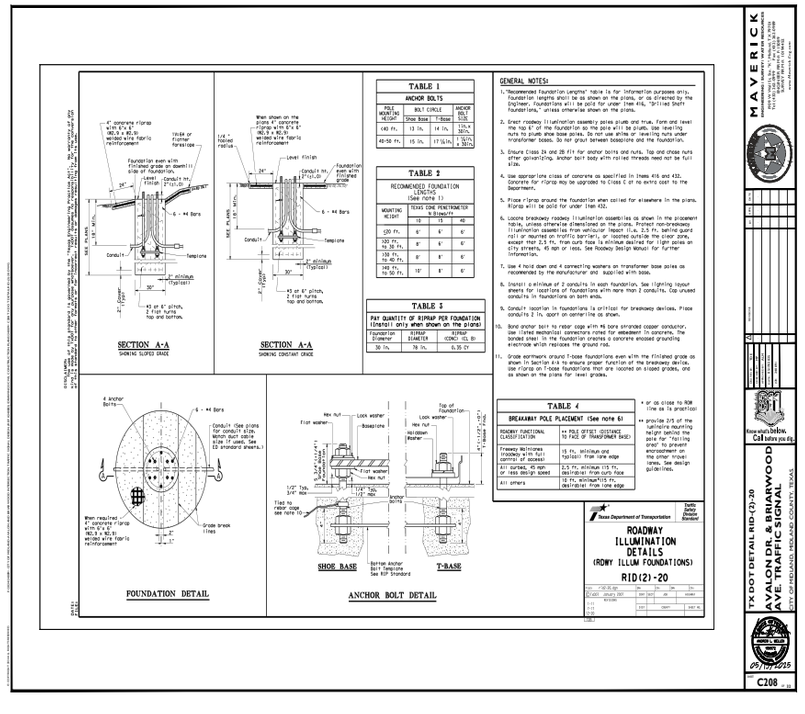


TABLE 1
ANCHOR BOLTS

POLE MOUNTING HEIGHT	BOLT CIRCLE: Shoe Base	BOLT CIRCLE: T-Base	ANCHOR BOLT SIZE
≤40 Ft.	13 3/4	14 1/4	1 1/4 x 36"
45-50 Ft.	15 3/4	17 1/4	1 1/4 x 36"

TABLE 2
RECOMMENDED FOUNDATION LENGTHS
(See note 1)

MOUNTING HEIGHT	TEXAS ZONE PENETROMETER & BLOWCOUNT: 10	15	40
≤30 Ft.	6'	6'	6'
>30 Ft. to 35 Ft.	8'	6'	6'
150 Ft. to 40 Ft.	8'	8'	6'
>40 Ft. to 50 Ft.	10'	8'	6'

TABLE 3
PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)

Foundation Diameter	Riprap Diameter	Riprap (Conc. Cl. B)
30 In.	78 In.	6.35 CY

GENERAL NOTES:

1. "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations," unless otherwise shown on the plans.
2. Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
3. Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full length.
4. Use appropriate class of concrete as specified in Items 416 and 432. Concrete for riprap may be upgraded to Class C at no extra cost to the Department.
5. Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
6. Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i.e., 2.5 Ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 Ft. from curb face is minimum desired for light poles on city streets, 45 mph or less. See Roadway Design Manual for further information.
7. Use 4 hold down and 4 connecting washers on transformer base poles as recommended by the manufacturer and supplied with base.
8. Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
9. Conduit location in foundations is critical for breakaway devices. Place conduits 2 In. apart on centerline as shown.
10. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors noted for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.
11. Grade earthwork around T-base foundations even with the finished grade as shown in Section A-A to ensure proper function of the breakaway device. Use riprap on T-base foundations that are located on sloped grades, and as shown on the plans for level grades.

TABLE 4
BREAKAWAY POLE PLACEMENT (See note 6)

ROADWAY FUNCTIONAL CLASSIFICATION	** POLE OFFSET GUIDANCE TO FACE OF TRANSFORMER BASE)
Freeway Mainlanes (roadway with full control of access)	15 Ft. minimum and typical* from curb edge
All curbed, 45 mph or less design speed	2.5 Ft. minimum (15 Ft. desirable) from curb face
All others	10 Ft. minimum (15 Ft. desirable) from curb edge

* or as close to ROW line as is practical

** provide 2/3 of the luminaire mounting height behind the pole for locating pole to prevent encroachment on the other travel lanes. See design guidelines.

Texas Department of Transportation — Traffic Operations Division Standard

ROADWAY ILLUMINATION DETAILS (RDWY ILLUM FOUNDATIONS)

RID(2)-20

File	Date	Description
rid220.dgn	January 2021	

Date	Revisions
8-21	
5-23	
7-24	

Designed	Detailed	Checked
KEH		

Project	Sheet No.

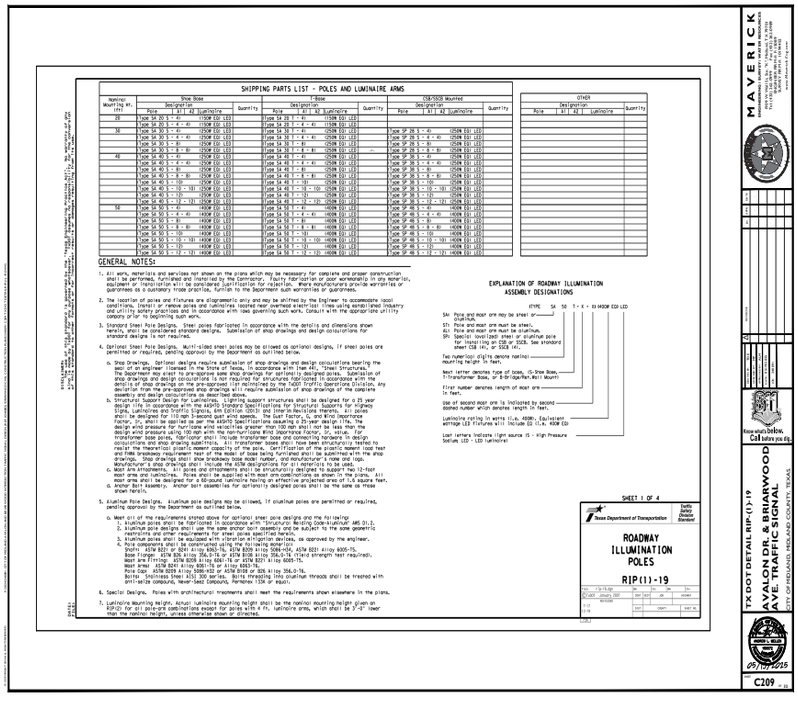
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SHIPPING PARTS LIST - POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base Designation				Qty	T-Base Designation				Qty	CSB/SSB Mounted Designation				Qty	OTHER Designation				Qty
	Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire	
30	Type SA 30 S - 4 - 4V			150W EQ LED		Type SA 30 T - 4 - 4V			150W EQ LED											
	Type SA 30 S - 4 - 8V			150W EQ LED		Type SA 30 T - 4 - 8V			150W EQ LED											
	Type SA 30 S - 4 - 4V			125W EQ LED		Type SA 30 T - 4 - 4V			125W EQ LED		Type SP 30 S - 4 - 4V			125W EQ LED						
	Type SA 30 S - 8 - 8V			125W EQ LED		Type SA 30 T - 8 - 8V			125W EQ LED		Type SP 30 S - 8 - 8V			125W EQ LED						
	Type SA 30 S - 8 - 8V			150W EQ LED		Type SA 30 T - 8 - 8V			150W EQ LED		Type SP 30 S - 8 - 8V			150W EQ LED						
40	Type SA 40 S - 4V			125W EQ LED		Type SA 40 T - 4V			125W EQ LED		Type SP 30 S - 4V			125W EQ LED						
	Type SA 40 S - 4 - 4V			125W EQ LED		Type SA 40 T - 4 - 4V			125W EQ LED		Type SP 30 S - 4 - 4V			125W EQ LED						
	Type SA 40 S - 8V			125W EQ LED		Type SA 40 T - 8V			125W EQ LED		Type SP 30 S - 8V			125W EQ LED						
	Type SA 40 S - 8 - 8V			125W EQ LED		Type SA 40 T - 8 - 8V			125W EQ LED		Type SP 30 S - 8 - 8V			125W EQ LED						
	Type SA 40 S - 10V			125W EQ LED		Type SA 40 T - 10V			125W EQ LED		Type SP 30 S - 10V			125W EQ LED						
	Type SA 40 S - 10 - 10V			125W EQ LED		Type SA 40 T - 10 - 10V			125W EQ LED		Type SP 30 S - 10 - 10V			125W EQ LED						
	Type SA 40 S - 12V			125W EQ LED		Type SA 40 T - 12V			125W EQ LED		Type SP 30 S - 12V			125W EQ LED						
	Type SA 40 S - 12 - 12V			125W EQ LED		Type SA 40 T - 12 - 12V			125W EQ LED		Type SP 30 S - 12 - 12V			125W EQ LED						
50	Type SA 50 S - 4V			140W EQ LED		Type SA 50 T - 4V			140W EQ LED		Type SP 40 S - 4V			140W EQ LED						
	Type SA 50 S - 4 - 4V			140W EQ LED		Type SA 50 T - 4 - 4V			140W EQ LED		Type SP 40 S - 4 - 4V			140W EQ LED						
	Type SA 50 S - 8V			140W EQ LED		Type SA 50 T - 8V			140W EQ LED		Type SP 40 S - 8V			140W EQ LED						
	Type SA 50 S - 8 - 8V			140W EQ LED		Type SA 50 T - 8 - 8V			140W EQ LED		Type SP 40 S - 8 - 8V			140W EQ LED						
	Type SA 50 S - 10V			140W EQ LED		Type SA 50 T - 10V			140W EQ LED		Type SP 40 S - 10V			140W EQ LED						
	Type SA 50 S - 10 - 10V			140W EQ LED		Type SA 50 T - 10 - 10V			140W EQ LED		Type SP 40 S - 10 - 10V			140W EQ LED						
	Type SA 50 S - 12V			140W EQ LED		Type SA 50 T - 12V			140W EQ LED		Type SP 40 S - 12V			140W EQ LED						
	Type SA 50 S - 12 - 12V			140W EQ LED		Type SA 50 T - 12 - 12V			140W EQ LED		Type SP 40 S - 12 - 12V			140W EQ LED						

GENERAL NOTES:

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, shall be corrected by the Contractor at his own expense. The Contractor shall assign to the Department any available warranties or guarantees as a customary trade practice, further to the Department such warranties or guarantees.

2. The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry safe practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.

4. Optional Steel Pole Designs. Multi-sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.

   a. Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal and signature of a Professional Engineer registered in the State of Texas for approval by the Engineer. The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete structure for approval by the Engineer prior to fabrication.
   b. Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition, 2013 with Interim Revisions through 2015. Poles shall be designed for 110 mph 3-second gust wind speeds. The Gust Factor, G_f, and Wind Importance Factor, I_r, shall be applied as per the AASHTO Specifications assuming a 25-year design life. The design wind pressure for hurricane wind velocities greater than 100 mph shall not be less than the design wind pressure using 100 mph with the non-hurricane Wind Importance Factor, I_r, value. For hurricane wind velocities greater than 100 mph, the Wind Importance Factor, I_r, shall be used in the design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and the breakaway design shall be part of the shop drawings. Poles furnished shall be identified with the shop drawing number, assigned sheet and structure numbers, and the manufacturer's name or logo.
   c. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.
   d. Mast arm Arrangements. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All poles shall be designed for a 90-pound luminaire having an effective projected area of 1.5 square feet.
   e. Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.

5. Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.

   a. Meet all of the requirements stated above for optional steel pole designs and the following:
      1. Aluminum poles shall be designed in accordance with the latest AASHTO Specifications (see LRFD 01.2).
      2. Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
      3. Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
      4. Pole components shall be constructed using the following materials:
      Pole: ASTM B241 Alloy 6005-T5, 6061-T6 or ASTM B221 Alloy 6005-T5.
      Base Flanges: ASTM B26 Alloy 356.0-T6 or ASTM B108 Alloy 356.0-T6 if yield strength test required.
      Mast arm Fittings: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
      Mast Arms: ASTM B241 Alloy 6005-T5 or Alloy 6061-T6.
      Handhole Frame and Cover: ASTM B26 Alloy 356.0-T6, ASTM B26 Alloy 356.0-T6.
      Bolts: Stainless Steel 2(5) 300 series. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133A or equal.

6. Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.

7. Luminaire Mounting Height. Actual luminaire mounting height shall be the nominal mounting height given on RIP(2) for all pole-arm combinations except for poles with 4 ft. luminaire arms, which shall be 3'-0" lower than the nominal height, unless otherwise shown or directed.

EXPLANATION OF ROADWAY ILLUMINATION ASSEMBLY DESIGNATIONS

TYPE SA 50 T - X - 10 140W EQ LED

- SA: Pole and mast arm may be steel or Slip Fit.
- ST: Pole and mast arm must be steel.
- AL: Pole and mast arm must be aluminum.
- SPs: Special (overlap) steel or aluminum pole for mounting an CSB or SSB. See standard sheet CSB (#), or SSB (#).

Two numerical digits denote nominal mounting height in feet.

Mast letter denotes type of base, (S-Shoe Base, T-Transformer Base, or B-Bridge/Pier, Wall Mount)

Final number denotes length of mast arm in feet.

Use of second mast arm is indicated by second dashed number which denotes length in feet.

Luminaire rating in watts (i.e. 400W., Equivalent wattage LED Fixtures will include EQ in it. 400W EQ)

Last letters indicate light source (S - High Pressure Sodium, LED - LED Luminaire)

SHEET 1 OF 4

Texas Department of Transportation — Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(1)-19

FILE: rip19-19.dgn	DN:	CK:	DW:	CK:
©TxDOT January 2001	CONT	SECT	JOB	HIGHWAY
REVISIONS				
8-19	DIST	COUNTY		SHEET NO.

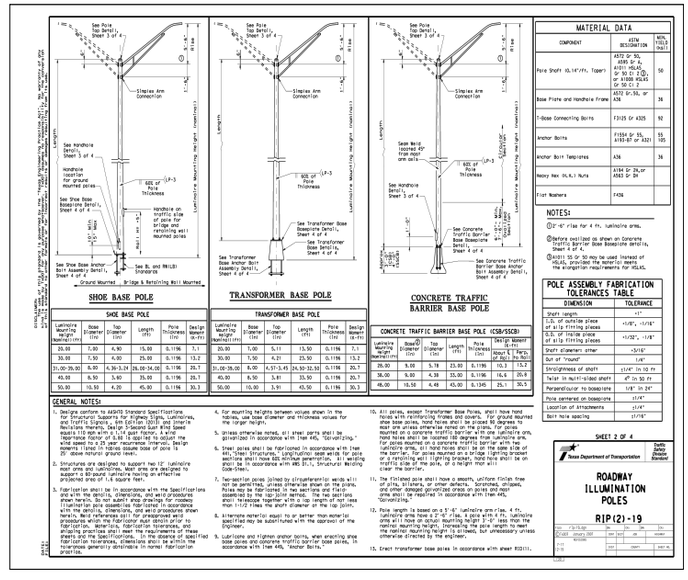
MAVERICK
TEXAS REGISTERED ENGINEERING FIRM F-2113
2929 Mossrock, Suite 104, San Antonio, TX 78230
Phone: (210) 979-8444 Fax: (210) 979-8441
Scott Maverick, P.E.

Know what's below. Call before you dig.

TX DOT DETAIL RIP(1)-19
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOLLAND, MCLENNAN COUNTY, TEXAS

05/19/2025

C209 of 33



SHOE BASE POLE

SHOE BASE POLE					
Luminaire Mounting Height (nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (k-ft)
30.00	7.50	4.90	15.50	0.1196	7.1
30.00	7.50	4.90	25.50	0.1196	13.2
31.00-35.00	8.90	4.39-3.39	25.00-34.00	0.1196	20.7
40.00	8.50	5.40	35.50	0.1196	20.7
50.00	10.50	4.20	45.50	0.1196	30.3

TRANSFORMER BASE POLE

TRANSFORMER BASE POLE					
Luminaire Mounting Height (nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (k-ft)
30.00	7.50	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-35.00	8.90	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	5.81	33.50	0.1196	20.7
50.00	10.00	3.91	43.50	0.1196	30.3

CONCRETE TRAFFIC BARRIER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)

Luminaire Mounting Height (nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (k-ft)	
					Mount 4 ft Perp. or Bel. to Roll	
25.00	9.50	5.78	23.00	0.1196	10.3	13.2
30.00	9.50	4.38	33.00	0.1196	16.6	20.8
40.00	10.50	4.48	43.00	0.1345	25.1	30.5

MATERIAL DATA

COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft- (0.14"/Ft. Taper)	A572 Gr 50, A595 Gr A, A1011 Gr 50 or 55 CL 2 (3), or A1008 HSLAS Gr 50 CL 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T-Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H,or A563 Gr DH	
Flat Washers	F436	

NOTES:
1. 2"-6" rise for 4 Ft. luminaire arms.
2. Before oxidized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.
3. A1011 SS Gr 50 may be used instead of A572 Gr 50 provided it meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE

DIMENSION	TOLERANCE
Shaft length	±1"
O.D. of outside piece at slip fitting pieces	+1/8", -1/16"
O.D. of inside piece at slip fitting pieces	+1/32", -1/8"
Shaft diameters other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 Ft
Twist in multi-sided shaft	4° in 50 Ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of attachments	±1/4"
Bolt hole spacing	±1/16"

GENERAL NOTES:

1. Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto, Design 3-Second Gust Wind Speed supporting 90 mph (3-Second Gust) Wind Speed supporting 90 mph (3-Second Gust), Adjust the wind speed to a 25 year recurrence interval. Design moments timed in ridrop assume base of pole is 25' above natural ground level.
2. Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a 6 square foot luminaire on an effective projected area of 1.5 square feet.
3. Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown on the plans. The Fabricator shall submit working drawings of luminaire pole assemblies fabricated in accordance with the details, dimensions, and weld procedures shown on the plans. The Fabricator shall submit weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of these sheets and the Specifications. In the absence of specified tolerances, the Fabricator shall follow the most rigorous generally obtainable in normal fabrication practice.
4. For mounting heights between values shown in the table, interpolate between diameter and thickness values for the larger height.
5. Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."
6. Steel poles shall be fabricated in accordance with Item 441, "Steel Structures." Longitudinal base welds for pole shafts shall be complete penetration groove welds and shall be in accordance with AWS D1.1, Structural Welding Code-Steel.
7. Telescoping poles joined by slip-fit/expansion welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall be telescoped a minimum of 1 1/2 times and a maximum of 1 1/2 times the shaft diameter at the lap joint.
8. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
9. Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."
10. All poles, except Transformer Base Poles, shall have hand holes and reinforcing as shown on the details. For shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a bridge rail/retaining wall, the hand hole shall not be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or a retaining wall, the hand hole shall be on the traffic side of the pole, at a height that will clear the barrier.
11. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratches, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."
12. Pole length is based on a 5'-6" luminaire arm rise. A ft. increase in arm rise will require a 1 ft. increase in pole length. Poles will have an actual mounting height 2'-0" less than the nominal mounting height. Increasing the pole length to meet the nominal mounting height is allowed, but unnecessary unless otherwise directed by the engineer.
13. Erect transformer base poles in accordance with sheet RIC(II).

SHEET 2 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(2)-19

MAVERICK

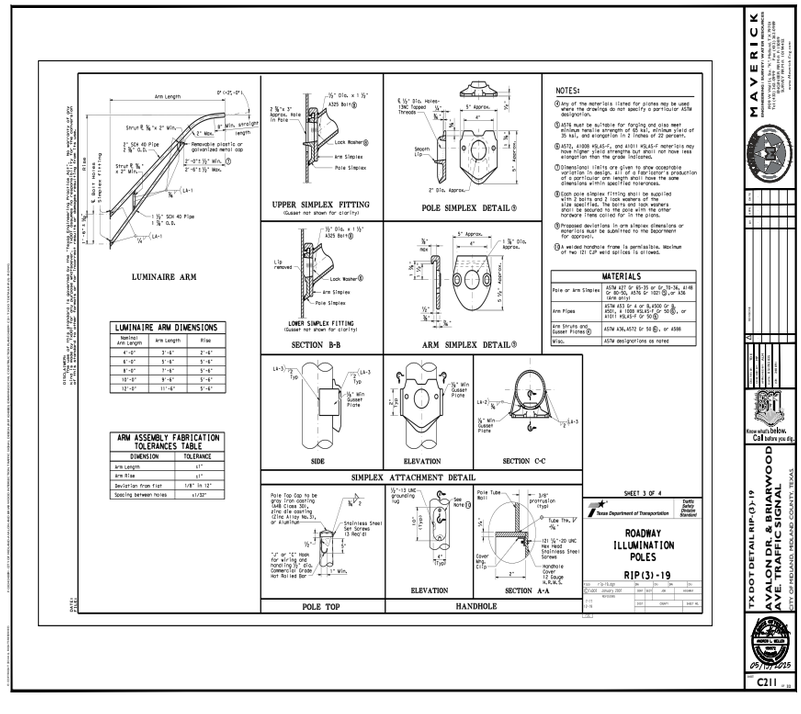
TX DOT DETAIL RIP-(2)-19

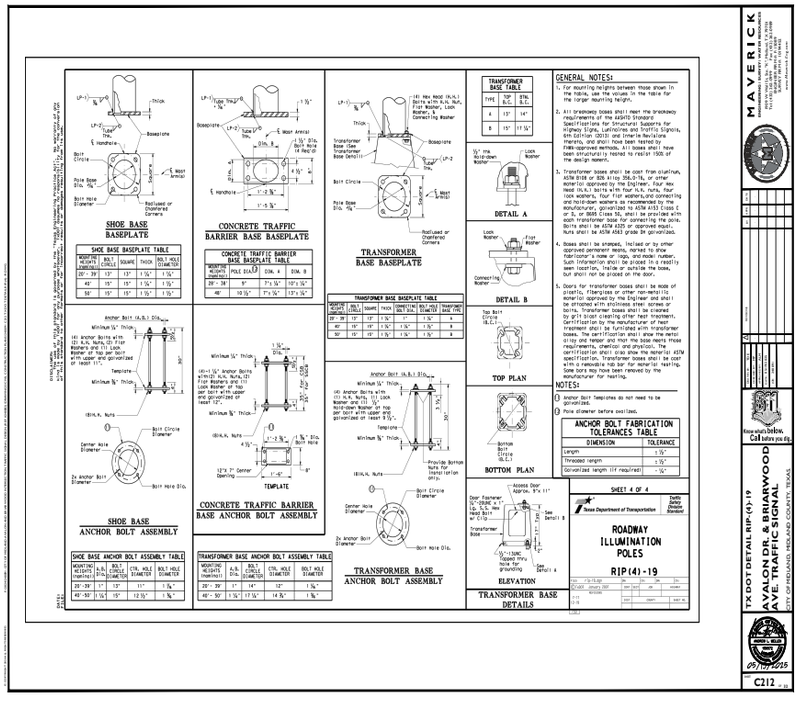
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL

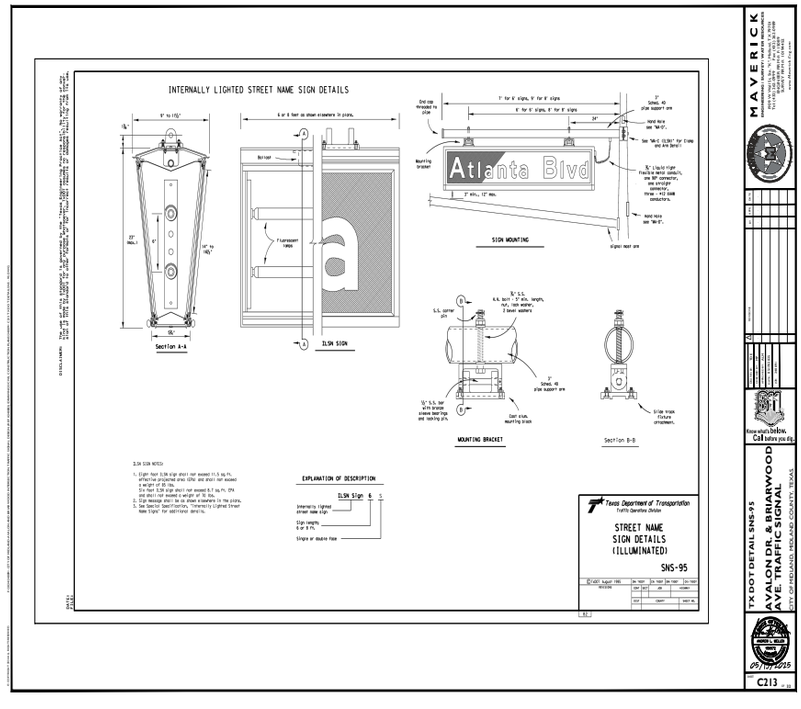
CITY OF HOLLAND, WILLIAMSON COUNTY, TEXAS

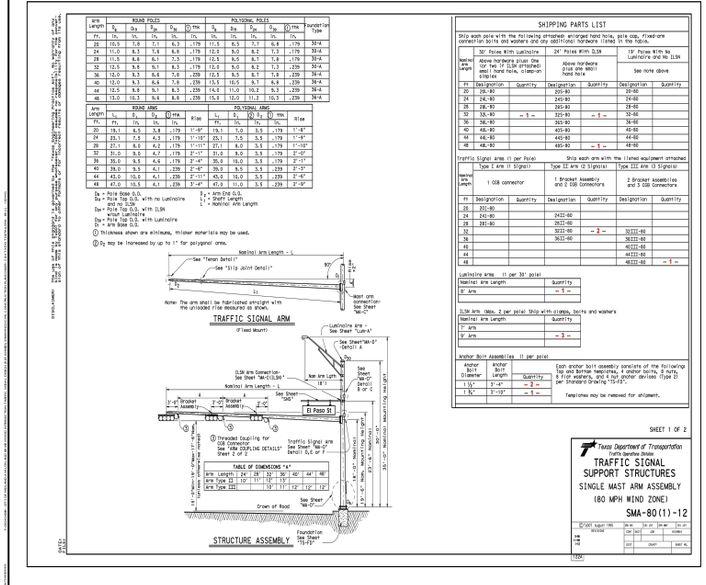
05/19/2025

C210


LUMINAIRE ARM
LUMINAIRE ARM DIMENSIONS
Nominal Arm Length | Arm Length | Rise
4'-0" | 3'-6" | 2'-6"
6'-0" | 5'-6" | 5'-6"
8'-0" | 7'-6" | 5'-6"
10'-0" | 9'-6" | 5'-6"
12'-0" | 11'-6" | 5'-6"
ARM ASSEMBLY FABRICATION TOLERANCES TABLE
DIMENSION | TOLERANCE
Arm Length | ±1"
Arm Rise | ±1"
Deviation from Flat | 1/8" in 12"
Spacing between holes | ±1/32"
UPPER SIMPLEX FITTING
(Gusset not shown for clarity)
POLE SIMPLEX DETAIL⑥
LOWER SIMPLEX FITTING
(Gusset not shown for clarity)
SECTION B-B
ARM SIMPLEX DETAIL⑥
NOTES:
④ Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.
⑤ ASTM must be suitable for forging and also meet the following requirements: Charpy V-notch value of 35 ksi, and elongation in 2 inches of 22 percent.
⑥ A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.
⑦ Dimensional limits are given to show acceptable variations in design. They are not intended to permit production of a particular piece, except those the same dimensions within specified tolerances.
⑧ Each pole simplex fitting shall be supplied complete with all bolts, nuts, and washers as specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans.
⑨ Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.
⑩ A welded handhole frame is permissible. Maximum of two 121 CJP weld splices is allowed.
MATERIALS
Pole or Arm Simplex | ASTM A27 Gr 65-35 or Gr 70-36, A148 Gr 80-50, A576 Gr 1021 ⑤,or A36 (one piece)
Arm Pipes | ASTM A53 Gr A or B, A500 Gr B, A501, A1085, A1011 HSLAS-F Gr 50 ⑥, or A1011 HSLAS-F Gr 50 ⑥
Arm Struts and Gusset Plates ⑨ | ASTM A36, A572 Gr 50 ⑥, or A588
Misc. | ASTM designations as noted
SIDE
ELEVATION
SECTION C-C
SIMPLEX ATTACHMENT DETAIL
POLE TOP
ELEVATION
SECTION A-A
HANDHOLE
SHEET 3 OF 4
Texas Department of Transportation
Traffic Safety Division Standard
ROADWAY ILLUMINATION POLES
RIP(3)-19
MAVERICK
TX DOT DETAIL RIP(3)-19
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOLLAND, WILLIAMSON COUNTY, TEXAS
05/19/2025
C211


SHOE BASE BASEPLATE
SHOE BASE BASEPLATE TABLE
CONCRETE TRAFFIC BARRIER BASE BASEPLATE
CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE
TRANSFORMER BASE BASEPLATE
TRANSFORMER BASE BASEPLATE TABLE
TRANSFORMER BASE TABLE
DETAIL A
DETAIL B
TOP PLAN
BOTTOM PLAN
ELEVATION
TRANSFORMER BASE DETAILS
GENERAL NOTES:
NOTES:
ANCHOR BOLT FABRICATION TOLERANCES TABLE
SHOE BASE ANCHOR BOLT ASSEMBLY
SHOE BASE ANCHOR BOLT ASSEMBLY TABLE
CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY
TEMPLATE
TRANSFORMER BASE ANCHOR BOLT ASSEMBLY
TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE
SHEET 4 OF 4
ROADWAY ILLUMINATION POLES
RIP(4)-19
MAVERICK
TX DOT DETAIL RIP(4)-19
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOLLAND, WILLIAMSON COUNTY, TEXAS
05/19/2025
C212


INTERNALLY LIGHTED STREET NAME SIGN DETAILS
Atlanta Blvd
SIGN MOUNTING
ILSN SIGN
MOUNTING BRACKET
Section A-A
Section B-B
EXPLANATION OF DESCRIPTION
ILSN Sign &
Texas Department of Transportation
Traffic Operations Division
STREET NAME
SIGN DETAILS
(ILLUMINATED)
SNS-95
MAVERICK
TX DOT DETAIL SNS-95
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND VILLAGE, DENTON COUNTY, TEXAS
C213



Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	B_A	D_{BA}	B_B	D_{BB}	① t min	B_A	D_{BA}	B_B	D_{BB}	① t min	
Ft.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2	7.3	.179	30-A
28	11.5	8.8	8.1	7.3	.179	12.5	9.5	8.7	7.8	.179	30-A
32	12.5	9.8	9.1	8.3	.179	12.8	9.8	8.2	7.3	.239	30-A
36	13.0	9.3	9.6	7.8	.239	13.5	9.5	8.7	7.8	.239	36-A
40	13.0	9.3	9.6	7.8	.239	13.5	10.5	9.3	8.8	.239	36-A
44	12.5	8.8	9.1	8.3	.239	14.8	11.0	10.2	9.3	.239	36-A
48	13.0	10.3	9.6	8.8	.258	15.8	12.0	11.2	10.3	.239	36-A

Arm Length	ROUND ARMS					POLYGONAL ARMS					
	L_1	B_A	B_B	① t min	Rise	L_1	B_A	D_{BA}	① t min	Rise
Ft.	Ft.	In.	In.	In.		Ft.	In.	In.	In.	
20	19.1	6.5	5.4	.179	1'-4"	19.1	7.0	5.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	5.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	5.5	.179	1'-10"
32	31.0	8.0	4.7	.179	2'-1"	31.0	8.0	5.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	5.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-6"	39.0	9.5	5.5	.239	2'-3"
44	43.0	10.5	4.1	.239	2'-11"	43.0	10.0	5.5	.239	2'-6"
48	47.0	10.5	4.1	.239	3'-4"	47.0	11.0	5.5	.239	2'-6"

B_A = Pole Base O.D.
D_{BA} = Pole Top O.D. with no Luminaire and no SLSA
D_{BB} = Pole Top O.D. with SLSA and/or Luminaire
B_B = Pole Top O.D. with Luminaire
D_A = Arm Base O.D.

B_A = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.
② D_B may be increased by up to 1" for polygonal arms.

TRAFFIC SIGNAL ARM
(Flared Mount)

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

Nominal Arm Length	30' Poles With Luminaire		24' Poles With SLSA		19' Poles With No Luminaire and No SLSA	
	Above Hardware Shipped One for Two 13' SLSA attached) small hand hole, clamp-on strap-on		Above Hardware Shipped with small hand hole		See note above	
Ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-80		20S-80		20-80	
24	24L-80		24S-80		24-80	
28	28L-80		28S-80		28-80	
32	32L-80	– 1 –	32S-80	– 1 –	32-80	
36	36L-80		36S-80		36-80	
40	40L-80		40S-80		40-80	
44	44L-80		44S-80		44-80	
48	48L-80		48S-80	– 1 –	48-80	

Traffic Signal Arms (1 per Pole): Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signal		Type III Arm (3 Signal	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
Ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20S-80					
24	24S-80		24SS-60			
28	28S-80		28SS-60			
32			32SS-60	– 2 –	32SSS-60	
36			36SS-60		36SSS-60	
40					40SSS-60	
44					44SSS-60	
48					48SSS-60	– 1 –

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	– 1 –

SLSA Arms (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
5' Arm	
8' Arm	– 3 –

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity	Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 washers, and 4 leveling nuts or another devices (Type 2) per Standard Sheet "SS-2"
1 1/2"	3'-4"	– 2 –	
1 3/4"	3'-10"	– 1 –	Templates may be removed for shipment.

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division
TRAFFIC SIGNAL SUPPORT STRUCTURES
SINGLE MAST ARM ASSEMBLY
(80 MPH WIND ZONE)
SMA-80(1)-12

FILE: sma80(1)-12.dgn	DN: TxDOT	CK: TxDOT	DW: MP	CK: JM
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REVISIONS	DIST	COUNTY		SHEET NO.

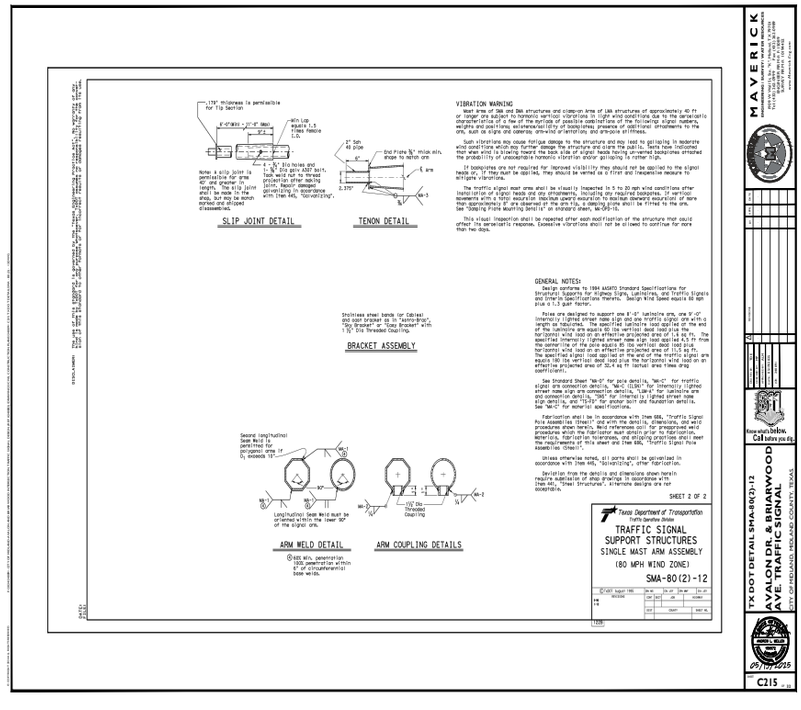
MAVERICK
Maverick Engineering, Inc.
2015 W. Hwy 114, Ste. 114, Keller, TX 76248
Phone: 817-337-1515 Fax: 817-337-1516
Texas Registered Engineering Firm F-13169

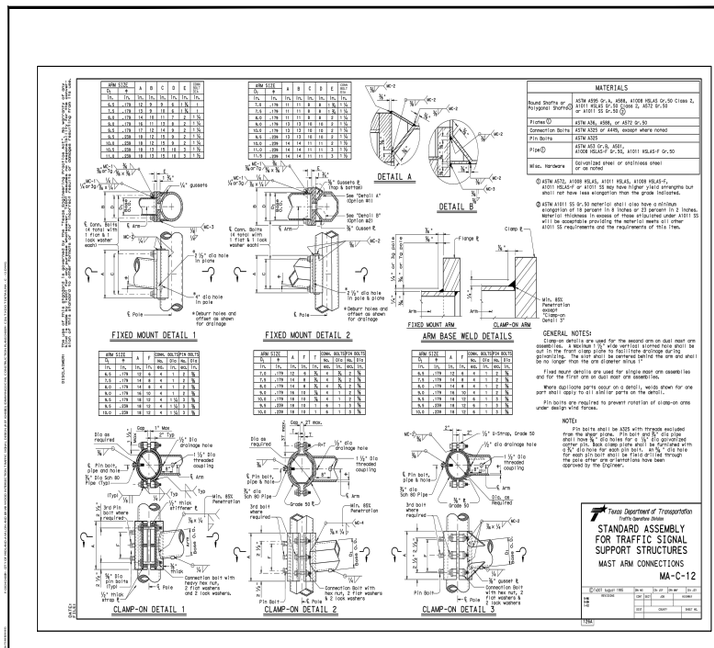
TX DOT DETAIL SMA-80(1)-12
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND VILLAGE DENTON COUNTY, TEXAS

Know what's below. Call before you dig.

05/19/2025

C214


SLIP JOINT DETAIL
TENON DETAIL
BRACKET ASSEMBLY
ARM WELD DETAIL
ARM COUPLING DETAILS
VIBRATION WARNING
GENERAL NOTES:
TRAFFIC SIGNAL
SUPPORT STRUCTURES
SINGLE MAST ARM ASSEMBLY
(80 MPH WIND ZONE)
SMA-80(2)-12
SHEET 2 OF 2
MAVERICK
TX DOT DETAIL SMA-80(2)-12
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF MIDLAND MIDLAND COUNTY, TEXAS
05/17/2025
C215



MAVERICK
MAVERICK ENGINEERING, LLC
2101 W. Parmer Ln. Ste. 1 Austin, TX 78727
Phone: 512-260-3420 Fax: 512-260-3421
Texas Registered Engineering Firm F-20100
Texas Registered Surveying Firm 10194400

TX DOT DETAIL MA-C-12
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND VILLAGE DENTON COUNTY, TEXAS

05/19/2025

C216

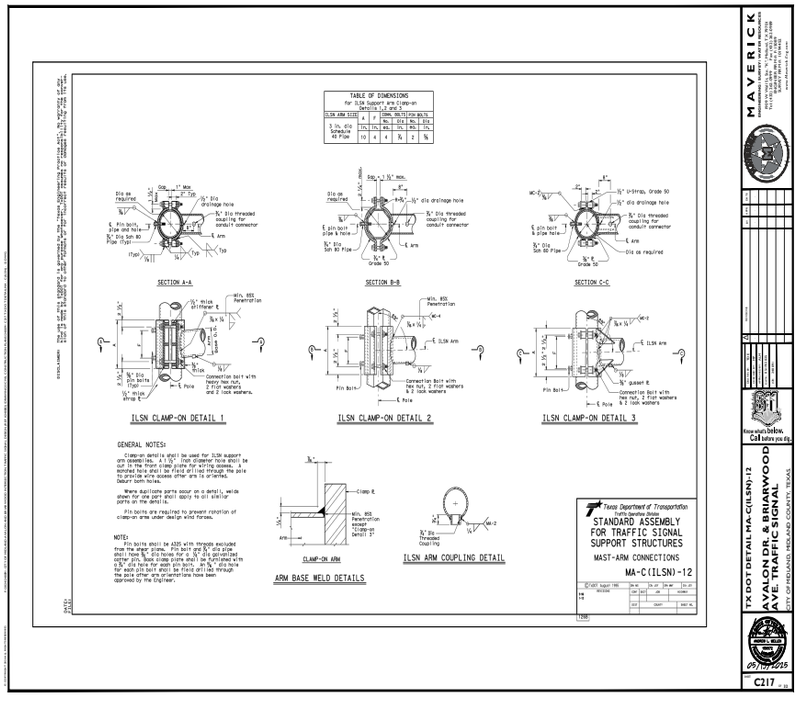


TABLE OF DIMENSIONS
for ILSN Support arm Clamp-on
Support arm (Ref.)

ILSN ARM SIZE	A	F	(TRBL BOLTS) FOR BOLTS	
			No.	Dia.
5 ½ dia Schedule 40 Pipe	10	4	No. 5	7/8
	12½	5½	No. 6	1"
	15	4½	2	1"

SECTION A-A

SECTION B-B

SECTION C-C

ILSN CLAMP-ON DETAIL 1

ILSN CLAMP-ON DETAIL 2

ILSN CLAMP-ON DETAIL 3

GENERAL NOTES:

Clamp-on details shall be used for ILSN support arm assemblies. A 1½" dia drainage hole shall be drilled in the bottom of the arm. The 1½" dia drainage hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the details.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTES:

Pin bolts shall be A325 with threads excluded from the shear plane. The 1¼" dia slip base shall have 1⅛" dia holes for a ⅞" dia galvanized anchor pin. Base clamp plate shall be furnished with a 1½" dia hole for wire access. The 1½" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

CLAMP-ON ARM

ARM BASE WELD DETAILS

ILSN ARM COUPLING DETAIL

Texas Department of Transportation
Traffic Operations Division
STANDARD ASSEMBLY
FOR TRAFFIC SIGNAL
SUPPORT STRUCTURES
MAST-ARM CONNECTIONS
MA-C(ILSN)-12

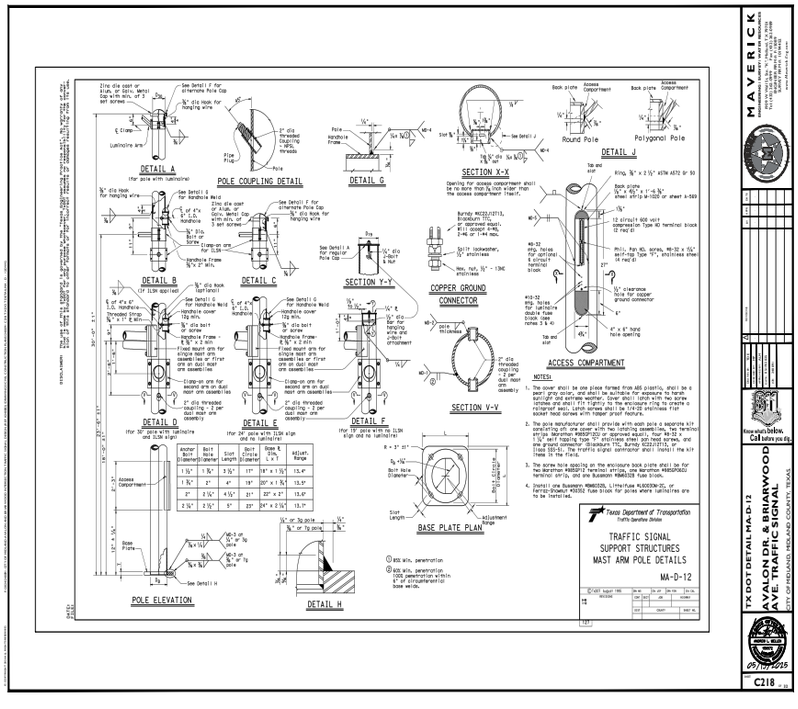
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	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.

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MAVERICK ENGINEERING, LLC
2101 W. Parker Rd., Ste. 114, Plano, TX 75023
Phone: 214-702-8200
Email: info@maverick-eng.com
Texas Registered Engineering Firm F-20121

TX DOT DETAIL MA-C(ILSN)-12
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CITY OF MIDLOTHIAN, TEXAS - ELLIS COUNTY, TEXAS

05/19/2025

C217



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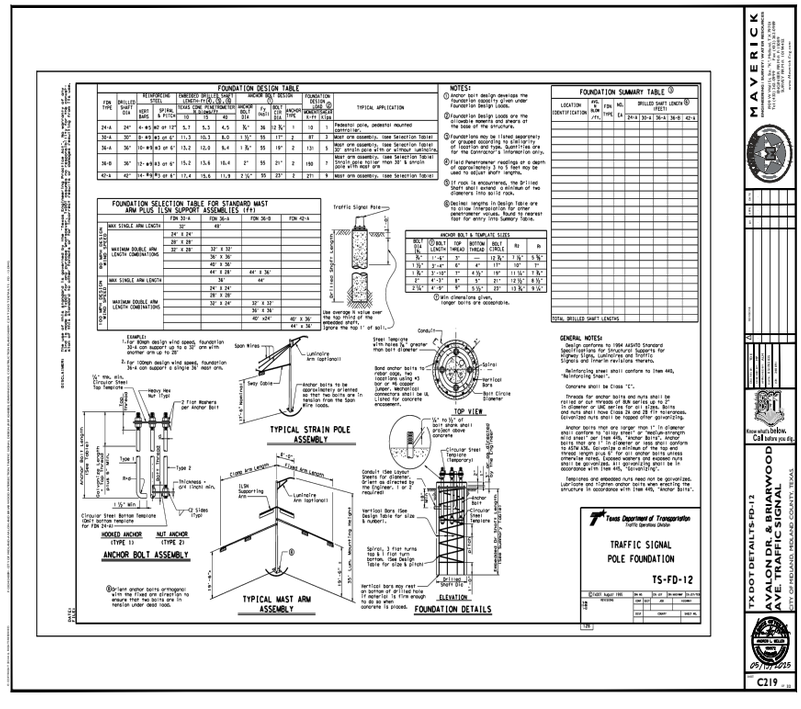
TX DOT DETAIL MA-D-12

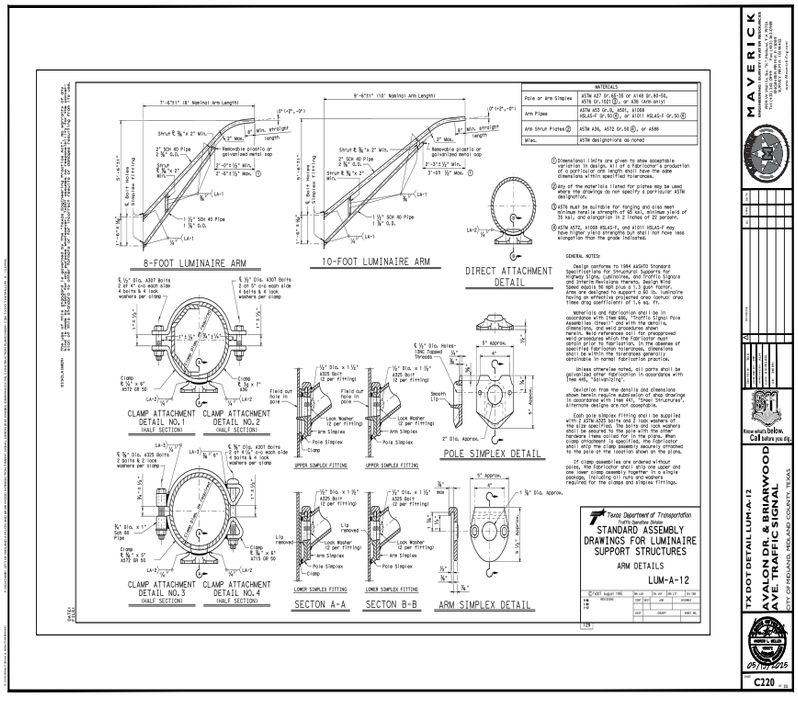
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL

CITY OF HOLLAND, MCLENNAN COUNTY, TEXAS

05/19/2025

C218


FOUNDATION DESIGN TABLE
FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)
NOTES:
FOUNDATION SUMMARY TABLE
ANCHOR BOLT & TEMPLATE SIZES
TYPICAL STRAIN POLE ASSEMBLY
TYPICAL MAST ARM ASSEMBLY
ANCHOR BOLT ASSEMBLY
FOUNDATION DETAILS
ELEVATION
TOP VIEW
GENERAL NOTES:
TRAFFIC SIGNAL
POLE FOUNDATION
TS-FD-12
MAVERICK
TX DOT DETAILTS-FD-12
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
C219

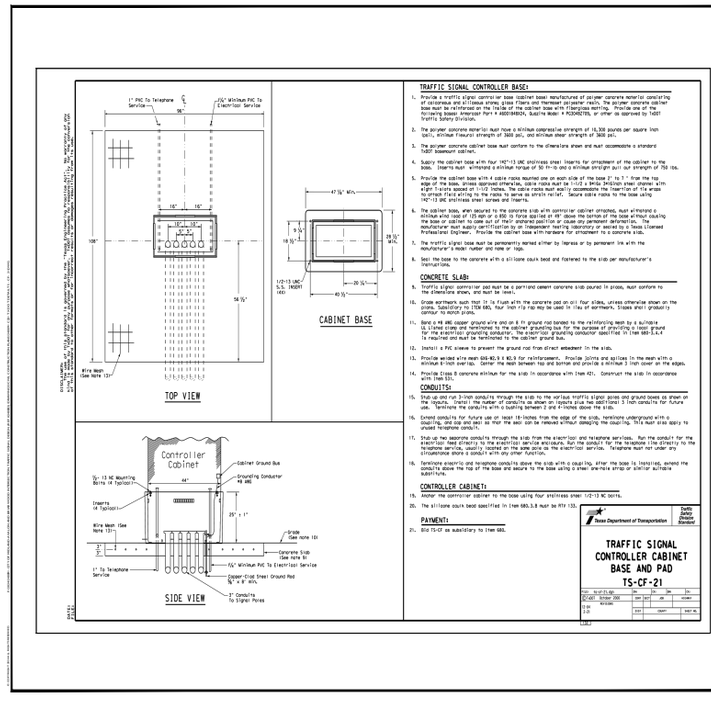


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TX DOT DETAIL LUM-A-12
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF MIDLAND, MIDLAND COUNTY, TEXAS

05/19/2025

C220



TRAFFIC SIGNAL CONTROLLER BASE:

1. Provide a traffic signal controller base (cabinet base) manufactured of polymer concrete material consisting of aggregate and resin binder. Provide a base that is monolithic in construction. The cabinet base must be reinforced on the inside of the cabinet base with fiberglass matting. Provide one of the following bases: Ameraspan Part # A60018492H, Susatte Model # PC30402TBS, or other as approved by TxDOT Traffic Safety Division.
2. The polymer concrete material must have a minimum compressive strength of 10,300 pounds per square inch (psi), minimum flexural strength of 3600 psi, and minimum shear strength of 3600 psi.
3. The polymer concrete cabinet base must conform to the dimensions shown and must accommodate a standard TxDOT basemount cabinet.
4. Supply the cabinet base with four 1/2"-13 UNC stainless steel inserts for attachment of the cabinet to the base. Inserts must withstand a minimum torque of 50 ft-lb and a minimum straight pull out strength of 750 lbs.
5. Provide the cabinet base with 4 cable risers mounted one on each side of the base 3" to 5" from the top edge of the base. Unless approved otherwise, cable risers must be 1-1/2 x 9¼in 3416inch steel channel with eight 1-slots spaced at 1-1/2 inches. The cable risers must easily accommodate the insertion of tie wraps to attach field wiring to the risers to serve as strain relief. Secure cable risers to the base using 1/2"-13 UNC stainless steel screws and inserts.
6. The cabinet base, when secured to the concrete slab with controller cabinet attached, must withstand a minimum wind load of 125 mph or a 300 lb force applied at 48" above the bottom of the base without causing the base or cabinet to come out of their anchored position or cause any permanent deformation. The manufacturer must provide a letter certifying this requirement, signed and sealed by a Texas licensed Professional Engineer. Provide the cabinet base with hardware for attachment to a concrete slab.
7. The traffic signal base must be permanently marked either by ingress or by permanent ink with the manufacturer's model number and date of mfgr.
8. Seal the base to the concrete with a silicone caulk bead and fastened to the slab per manufacturer's instructions.

CONCRETE SLAB:

9. Traffic signal controller pad must be a portland cement concrete slab poured in place, must conform to the dimensions shown, and must be level.
10. Grade earthwork such that it is flush with the concrete pad on all four sides, unless otherwise shown on the plans. Satisfactory to ITEM 680, four inch rip rap may be used in lieu of earthwork. Slopes shall gradually contour to match grade.
11. Bond a #6 AWG copper ground wire and an 8 ft ground rod bonded to the reinforcing mesh by a suitable UL listed clamp and terminated to the cabinet grounding bus for the purpose of providing a local ground for the electrical grounding conductor. The electrical grounding conductor specified in Item 680.3.4.4 is required and must be terminated to the cabinet ground bus.
12. Install a PVC sleeve to prevent the ground rod from direct embedment in the slab.
13. Provide welded wire mesh 6X6-W2.9 X W2.9 for reinforcement. Provide joints and splices in the mesh with a minimum 6-inch overlap. Center the mesh between top and bottom and provide a minimum 3 inch cover on the edges.
14. Provide Class B concrete minimum for the slab in accordance with Item 421. Construct the slab in accordance with Item 531.

CONDUITS:

15. Stub up and run 3-inch conduits through the slab for the various traffic signal poles and ground boxes as shown on the layouts. Install the number of conduits as shown in layouts plus two additional 3 inch conduits for future use. Terminate the conduits with a bushing between 2 and 4 inches above the slab.
16. Extend conduits for future use at least 18 inches from the edge of the slab, terminate underground with a coupling and plug or cap so that the pole can be removed without damaging the coupling. Stub mast arm poles to unused telephone conduit.
17. Stub up two separate conduits through the slab from the electrician and telephone services. Run the conduit for the electrician feed directly to the electrician service enclosure. Run the conduit for the telephone line directly to the telephone service, usually located on the same pole as the electrician service. Telephone must not under any circumstance share a conduit with any other function.
18. Terminate electric and telephone conduits above the slab with a coupling. After the base is installed, extend the conduits above the top of the base and secure to the base using a sheet aluminum strap or similar suitable substitute.

CONTROLLER CABINET:

19. Anchor the controller cabinet to the base using four stainless steel 1/2-13 NC bolts.
20. The silicone caulk bead specified in Item 680.3.8 must be RTV 133.

PAYMENT:

21. Bid TS-CF as subsidiary to Item 680.

Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC SIGNAL CONTROLLER CABINET BASE AND PAD

TS-CF-21

FILE: ts-cf-21.dgn	DN:	CK:	DW:	CK:
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MAVERICK — TRAFFIC ENGINEERING & SIGNAL DESIGN — 2929 Briarpark Dr., Ste. 1 Houston, TX 77042 — 713.784.4500 — TBPE Firm No. F-13179

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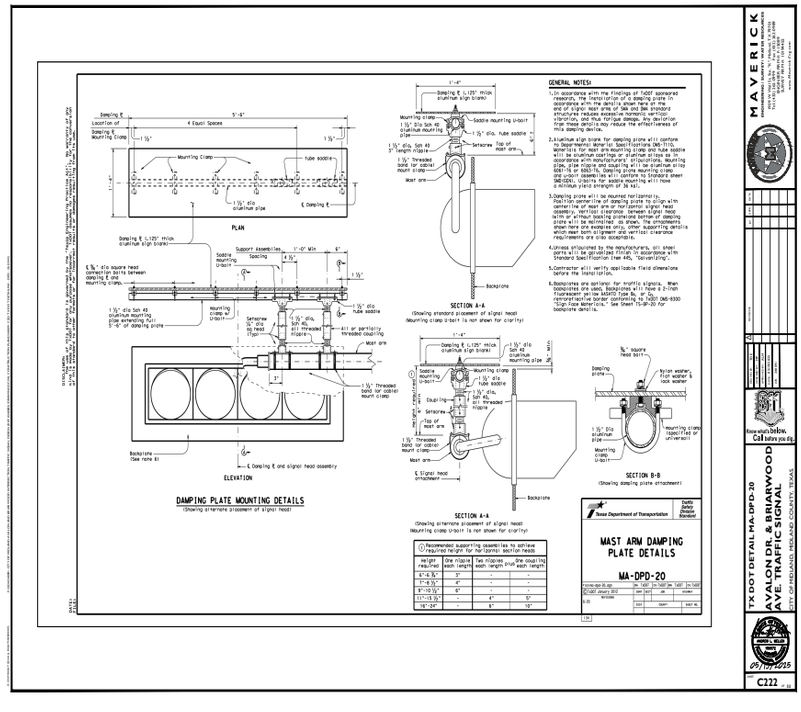
TX DOT DETAIL TS-CF-21

AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL

CITY OF HOUSTON, HARRIS COUNTY, TEXAS

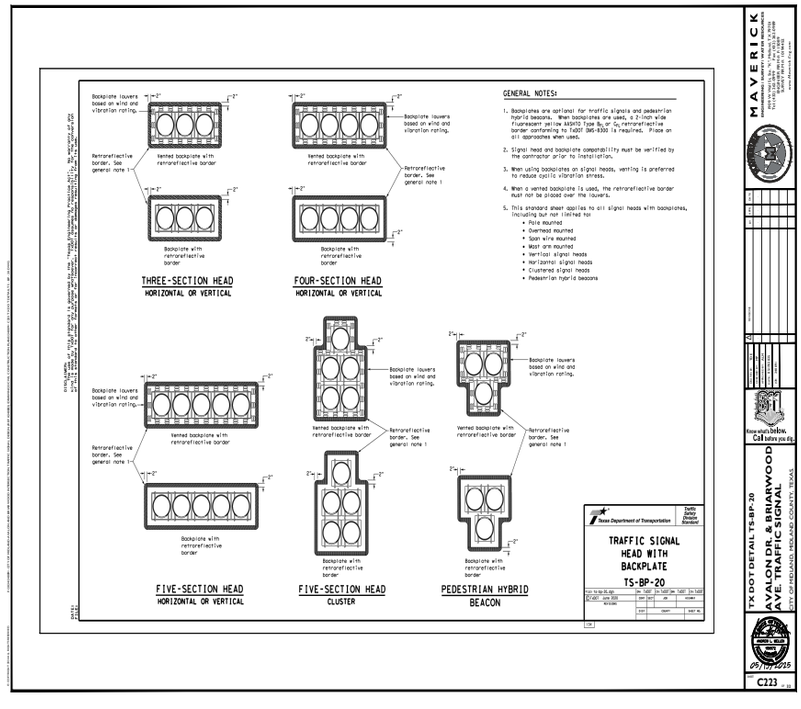
05/19/2025

C221



Recommended supporting assemblies to achieve required height for horizontal section heads			
Height required	One nipple each length	Two nipples each length (min)	One coupling each length
6'-6 3/4"	3"	-	-
7'-6 3/4"	4"	-	-
8'-10 1/2"	6"	-	-
11'-1 3/4"	-	4"	5"
15'-2"	-	5"	10"

MAVERICK
TRAFFIC SYSTEMS, INC.
TX DOT DETAIL MA-DPD-20
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOLLAND WILLIAMSON COUNTY, TEXAS
05/19/2025
C222


Backplate louvers based on wind and vibration rating.
Retroreflective border. See general note 1
Vented backplate with retroreflective border
Backplate with retroreflective border
THREE-SECTION HEAD
HORIZONTAL OR VERTICAL
FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL
FIVE-SECTION HEAD
HORIZONTAL OR VERTICAL
FIVE-SECTION HEAD
CLUSTER
PEDESTRIAN HYBRID
BEACON
GENERAL NOTES:
1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type B_V or C_{VL} retroreflective border conforming to Tx DOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatibility must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
• Pole mounted
• Overhead mounted
• Span wire mounted
• Mast arm mounted
• Vertical signal heads
• Horizontal signal heads
• Clustered signal heads
• Pedestrian hybrid beacons
Texas Department of Transportation
Traffic Safety Division Standard
TRAFFIC SIGNAL HEAD WITH BACKPLATE
TS-BP-20
tsbp-20.dgn
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C223

BID ITEMS

(See Proposal sheet for additional information.)

Project Name: BRIARWOOD AVE PHASE II
Project Number: P21-06
BASE BID

Miscellaneous Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Mobilization, furnished, installed, complete and in place.	1	LS	M1	$_____	$_____
2)	4" PVC Pipe Casing (Irrigation Sleeve, SDR 26 ASTM), furnished, installed, complete and in place.	252	LF	M2	$_____	$_____
3)	3" PVC Pipe Conduit (Schedule 40 Electric), furnished, installed, complete and in place.	501	LF	M3	$_____	$_____
4)	Erosion/Sediment Control, furnished, installed, complete and in place.	1	LS	M4	$_____	$_____
5)	Traffic Control, furnished, installed, complete and in place.	1	LS	M5	$_____	$_____
6)	Job Site Safety, furnished, installed, complete and in place.	1	LS	M6	$_____	$_____
7)	Seeded Erosion Control Mats, furnished, installed, complete and in place.	8500	SY	M7	$_____	$_____
8)	Seeding & Stabilization, furnished, installed, complete and in place.	8000	SY	M8	$_____	$_____
9)	Spray Watering, furnished, installed, complete and in place.	1	LS	M9	$_____	$_____
Total Miscellaneous Items 1 - 9		$_____				

Demolition Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Preparation of Right-of-Way, furnished, installed, complete and in place.	21	ACRE	D1	$_____	$_____
2)	Unclassified Roadway Excavation (Base Removal, Depth ≤ 14”), complete and in place.	38618	SY	D2	$_____	$_____
3)	Unclassified Roadway Excavation (Non Pavement & Base Removal), complete and in place.	30000	SY	D3	$_____	$_____
4)	Unclassified Basin & Channel Excavation, complete and in place.	4300	CY	D4	$_____	$_____
5)	Removal & Dispose of Existing Unclassified Pavement, complete and in place.	38618	SY	D5	$_____	$_____
6)	Removal & Disposal of Existing Miscellaneous Concrete, complete and in place.	1095	SY	D6	$_____	$_____
7)	Removal & Disposal of Existing Fence And Gate, complete and in place.	10071	LF	D7	$_____	$_____
Total Demolition Items 1 - 7		$_____				

Storm Drain Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	3'x2' Reinforced Concrete Box Culvert furnished, installed, complete and in place.	502	LF	SD1	$_____	$_____
2)	24" Reinforced Concrete Pipe (RCP), furnished, installed, complete and in place.	55	LF	SD2	$_____	$_____
3)	Reinforced Concrete Headwall (Wingwall, PW-1, HW=4', furnished, installed, complete and in place.	4	EA	SD3	$_____	$_____
4)	Reinforced Concrete Headwall (Wingwall, PW-1, HW=5'), furnished, installed, complete and in place.	1	EA	SD3	$_____	$_____
5)	Headwall Safety End Treatment (Type I), furnished, installed, complete and in place.	1	EA	SD4	$_____	$_____
6)	Headwall Safety End Treatment (Type 2), furnished, installed, complete and in place.	2	EA	SD4	$_____	$_____
7)	Open Trenching of Storm Drain, furnished, installed, complete and in place.	557	LF	SD5	$_____	$_____
8)	5" Concrete Rip-Rap, furnished, installed, complete and in place.	1300	SY	SD6	$_____	$_____
Total Storm Drain Items 1 - 8		$_____				

Structural Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Barbed-Wire Fence, furnished, installed, complete and in place.	200	LF	ST1	$_____	$_____
2)	Swing Gate, furnished, installed, complete and in place.	1	EA	ST2	$_____	$_____
3)	Electric Gate, furnished, installed, complete and in place.	0	EA	ST3	$_____	$_____
4)	24' Cattle Guard Relocation, furnished, complete and in place.	3	EA	ST4	$_____	$_____
5)	Knox Lock, furnished, installed, complete and in place.	1	EA	ST5	$_____	$_____
6)	Relocate Mailbox Foundation, furnished, installed, complete and in place.	2	EA	ST6	$_____	$_____
Total Structural Items 1 - 6		$_____				

Paving Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Subgrade Preparation (Depth ≤ 6”), furnished, installed, complete and in place.	70083	SY	P1	$_____	$_____
2)	Unclassified Embankment (Density Controlled), furnished, installed, complete and in place.	11000	CY	P2	$_____	$_____
3)	8” Jointed Concrete Pavement, furnished, installed, complete and in place.	2276	SY	P3	$_____	$_____
4)	2” Type D HMAC Asphalt Pavement Surface Course (PG70-22, 110 LBS / SY @ 1” Thick), furnished, installed, complete and in place.	49996	SY	P4	$_____	$_____
5)	3” Type C HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1” Thick), furnished, installed, complete and in place.	49996	SY	P5	$_____	$_____
6)	6” Temporary Type B HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1” Thick), furnished, installed, complete and in place.	1668	SY	P6	$_____	$_____
7)	10” Flexible Base (Type A, Grade 4), furnished, installed, complete and in place.	67672	SY	P7	$_____	$_____
8)	Bituminous Prime Coat (MC-30, 0.20 Gal / SY), furnished, installed, complete and in place.	13535	GAL	P8	$_____	$_____
9)	Tack Coat (MC-30, 0.10 Gal / SY), furnished, installed, complete and in place.	5000	GAL	P9	$_____	$_____
10)	4” Stamped Concrete Median, furnished, installed, complete and in place.	9575	SY	P10	$_____	$_____
11)	4” Concrete Median, furnished, installed, complete and in place.	700	SY	P11	$_____	$_____
12)	8” Concrete Fillet, furnished, installed, complete and in place.	815	SY	P12	$_____	$_____
13)	8” Concrete Valley Gutter, furnished, installed, complete and in place.	641	SY	P13	$_____	$_____
14)	6” Concrete Driveway Approach, furnished, installed, complete and in place.	1090	SY	P14	$_____	$_____
15)	Type A Concrete Curb & Gutter, furnished, installed, complete and in place.	14710	LF	P15	$_____	$_____
16)	Type C Concrete Curb & Gutter, furnished, installed, complete and in place.	13975	LF	P15	$_____	$_____
17)	Type I Concrete Curb & Gutter, furnished, installed, complete and in place.	629	LF	P15	$_____	$_____

18)	Concrete Pedestrian Access Ramp, furnished, installed, complete and in place.	327	SY	P16	$_____	$_____
19)	Manhole Ring & Cover Adjustment, furnished, installed, complete and in place.	14	EA	P17	$_____	$_____
20)	Water Valve Box Ring & Cover Adjustment, furnished, installed, complete and in place.	28	EA	P17	$_____	$_____
21)	6" Temporary Flexible Base (Type A, Grade 4), furnished, installed, complete and in place.	356	SY	P7	$_____	$_____
Total Paving Items 1 - 21		$_____				

Traffic Control Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Eliminate Existing Pavement Markings and Markers (Line Markings), furnished, installed, complete and in place.	64000	LF	T1	$	$
2)	Retroreflectorized Pavement Markings, TxDOT Item 666 (24" White, Solid), furnished, installed, complete and in place.	200	LF	T2	$	$
3)	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, Solid), furnished, installed, complete and in place.	2177	LF	T2	$	$
4)	Retroreflectorized Pavement Markings, TxDOT Item 666 (12" Yellow, Solid), furnished, installed, complete and in place.	66	LF	T2	$	$
5)	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, LNDP), furnished, installed, complete and in place.	250	LF	T2	$	$
6)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Solid), furnished, installed, complete and in place.	14415	LF	T3	$	$
7)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Broken), furnished, installed, complete and in place.	3823	LF	T3	$	$
8)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" Yellow, Solid), furnished, installed, complete and in place.	801	LF	T3	$	$
9)	Prefabricated Pavement Markings, TxDOT Item 666 (White, Arrow Symbol), furnished, installed, complete and in place.	21	EA	T4	$	$
10)	Prefabricated Pavement Markings, TxDOT Item 666 (White, Bike Lane Symbol), furnished, installed, complete and in place.	30	EA	T4	$	$
11)	In Road Sign Assembly (SUP&AM [Type S80(1)SB(p)]), furnished, installed, complete and in place.	39	SF	T5	$	$
12)	Remove Sign Assembly, furnished, installed, complete and in place.	12	EA	T6	$	$
13)	Retroreflective Raised Pavement Marker (Type II-C-R), furnished, installed, complete and in place.	360	EA	T7	$	$
14)	Utility Duct Bank, furnished, installed, complete and in place.	288	LF	T8	$	$
15)	Type C Ground Box (162911) With Apron, furnished, installed, complete and in place.	4	EA	T9	$	$
16)	Delineator Assembly (OM-2Y)(WC)GND(BI), furnished, installed, complete and in place.	10	EA	T10	$	$
17)	Delineator Assembly (8' Permenant Type III Barricade), furnished, installed, complete and in place.	6	EA	T10	$	$
18)	Temporary Workzone Pavement Markings, furnished, installed, complete and in place.	1	LS	T11	$	$
Total Traffic Control Items 1 - 18		$				

Price For:	
1. Miscellaneous Items	$
2. Demolition Items	$
3. Storm Drain Items	$
4. Structural Items	$
5. Paving Items	$
6. Traffic Control Items	$
Total Price	$

PAY NOTES

P21-06

BRIARWOOD AVE PHASE II

BASE BID

	Bid Item	Pay Quantity Note
Miscellaneous Items		
1	Mobilization	M1
2	4" PVC Pipe Casing, (Irrigation Sleeve, SDR 26 ASTM D2241)	M2
3	3" PVC Pipe Conduit (Schedule 40 Electric)	M3
4	Erosion/Sediment Control	M4
5	Traffic Control	M5
6	Job Site Safety	M6
7	Seeded Erosion Control Mats	M7
8	Seeding & Stabilization	M8
9	Spray Watering	M9
Demolition Items		
1	Preparation of Right-of-Way	D1
2	Unclassified Roadway Excavation (Base Removal, Depth ≤ 14")	D2
3	Unclassified Roadway Excavation (Non Pavement & Base Removal)	D3
4	Unclassified Excavation (Basin & Channel)	D4
5	Removal & Disposal of Existing Unclassified Pavement	D5
6	Removal & Disposal of Existing Miscellaneous Concrete	D6
7	Removal & Disposal of Existing Fence And Gate	D7
Storm Drain Items		
1	3'x2' Reinforced Concrete Box Culvert	SD1
2	24" Reinforced Concrete Pipe (RCP)	SD2
3	Reinforced Concrete Headwall (Wingwall, PW-1, HW=4')	SD3
4	Reinforced Concrete Headwall (Wingwall, PW-1, HW=5')	SD3
5	Headwall Safety End Treatment (Type I)	SD4
6	Headwall Safety End Treatment (Type II)	SD4
7	Open Trenching of Storm Drain	SD5
8	5" Concrete Rip-Rap	SD6
Structural Items		
1	Barbed-Wire Fence	ST1
2	Swing Gate	ST2
3	Electric Gate	ST3
4	24' Cattle Guard Relocation	ST4
5	Knox Lock	ST5
6	Relocate Mailbox Foundation	ST6

Paving Items

1	Subgrade Preparation (Depth ≤ 6")	P1
2	Unclassified Embankment (Density Controlled)	P2
3	8" Jointed Concrete Pavement	P3
4	2" Type D HMAC Asphalt Pavement Surface Course (PG70-22, 110 LBS / SY @ 1" Thick)	P4
5	3" Type C HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick)	P5
6	6" Temporary Type B HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick)	P6
7	10" Flexible Base (Type A, Grade 4)	P7
8	Bituminous Prime Coat (MC-30, 0.20 Gal / SY)	P8
9	Tack Coat (MC-30, 0.10 Gal / SY)	P9
10	4" Stamped Concrete Median	P10
11	4" Concrete Median	P11
12	8" Concrete Fillet	P12
13	8" Concrete Valley Gutter	P13
14	6" Concrete Driveway Approach	P14
15	Type A Concrete Curb & Gutter	P15
16	Type C Concrete Curb & Gutter	P15
17	Type I Concrete Curb & Gutter	P15
18	Concrete Pedestrian Access Ramp	P16
19	Manhole Ring & Cover Adjustment	P17
20	Water Valve Box Ring & Cover Adjustment	P17
21	6" Temporary Flexible Base (Type A, Grade 4)	P7

Traffic Items

1	Eliminate Existing Pavement Markings and Markers (Line Markings)	T1
2	Retroreflectorized Pavement Markings, TxDOT Item 666 (24" White, Solid)	T2
3	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, Solid)	T2
4	Retroreflectorized Pavement Markings, TxDOT Item 666 (12" Yellow, Solid)	T2
5	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, LNDP)	T2
6	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Solid)	T3
7	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Broken)	T3
8	Thermoplastic Pavement Markings, TxDOT Item 666 (6" Yellow, Solid)	T3
9	Prefabricated Pavement Markings (White, Arrow Symbol)	T4
10	Prefabricated Pavement Markings (White, Bike Lane Symbol)	T4
11	In Road Sign Assembly (SUP&AM [Type S80(1)SB(p)])	T5
12	Remove Sign Assembly	T6
13	Retroreflective Raised Pavement Marker (Type II-C-R)	T7
14	Utility Duct Bank	T8
15	Type C Ground Box (162911) With Apron	T9
16	Delineator Assembly (OM-2Y)(WC)GND(BI)	T10
17	Delineator Assembly (8' Permenant Type III Barricade)	T10
18	Temporary Workzone Pavement Markings	T11

PAY QUANTITY NOTES

M1 Includes the necessary equipment, labor, materials, and incidentals for all Mobilization to the job site complete and in place. Measurement and payment to be made per lump sum.

M2 Includes the necessary equipment, labor, materials, and incidentals for the installation of Pipe Casing per the construction drawings and City of Midland standards and specifications, including all spacers, grout, embedment, detector wire, tracer tape, and appurtenances. Measurement and payment to be per linear foot measured along the ground surface following the pipe centerline through all valves, fittings, structures, and appurtenances.

M3 Includes the necessary equipment, labor, materials, and incidentals for the installation of Pipe Conduit per the construction drawings and City of Midland standards and specifications, including all trenching, embedment, backfill, and appurtenances. Measurement and payment to be per linear foot measured along the ground surface following the pipe centerline through all boxes, fittings, structures, and appurtenances.

M4 Includes the necessary equipment, labor, materials, and incidentals to implement the Erosion Control Plan per the construction drawings and City of Midland standards and specifications. Measurement and payment to be made per lump sum.

M5 Includes the necessary equipment, labor, materials, and incidentals to implement the Traffic Control per the approved Traffic Control Plan. Any required traffic control devices are to meet the City of Midland Traffic Division Standards. Measurement and payment to be made per lump sum.

M6 Includes the necessary equipment, labor, materials, and incidentals to implement Job Site Safety and to provide a safe work environment for the project work area (including all personal protection equipment, trench safety, etc.) per the construction drawings and in compliance with all applicable Federal, State, and Local requirements or regulations including those of OSHA and the City of Midland. JOB SITE SAFETY IS THE RESPONSABILITY OF THE CONTRACTOR. Measurement and payment to be made per lump sum.

M7 Includes the necessary equipment, labor, materials, and incidentals for Seeded Erosion Control Mats per the construction drawings and City of Midland standards and specifications, including all removal, storage, and replacement of existing topsoil as well as all mats, seeding, staking, and appurtenances. Watering is addressed in a separate pay note. Measurement and payment to be made per square yard measured along the ground surface.

M8 Includes the necessary equipment, labor, materials, and incidentals for Seeding & Stabilization per the construction drawings and City of Midland standards and specifications, including all removal, storage, and replacement of existing topsoil as well as all seeding and appurtenances. Watering is addressed in a separate pay note. Measurement and payment to be made per square yard measured along the ground surface.

M9 Includes the necessary equipment, labor, materials, and incidentals for Spray Watering per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per lump sum.

D1 Includes the necessary equipment, labor, materials, and incidentals for Preparation of Right-of-Way per the construction drawings and City of Midland standards and specifications including removal and disposal of all obstructions from the right-of-way and easements where removal of such obstructions is not indicated in the consturction drawings, all scraping and preservation of top soil, and including all clearing, grubbing, and appurtenances. Measurement and payment to be made per acre measured along the ground surface.

D2 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per square yard measured along the ground surface.

D3 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per square yard of material removed.

D4 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing pavement and sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per cubic yard of material removed.

D5 Includes the necessary equipment, labor, materials, and incidentals for the Removal & Disposal of Existing Unclassified Pavement per the construction drawings and City of Midland standards and specifications including all pavement removal, saw-cutting, and appurtenances. Depths given are approximate and pavement material is to be removed in its entirety. No additional compensation will be made for increased pavement depth removal. Measurement and payment to be made per square yard measured along the ground surface.

D6 Includes the necessary equipment, labor, materials, and incidentals for the Removal & Disposal of Existing Miscellaneous Concrete per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

D7 Includes the necessary equipment, labor, materials, and incidentals to Remove & Dispose of Existing Fence And Gate per the construction drawings and City of Midland standards and specifications, including removal of all, columns, posts, foundations, anchors, gates, frames, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per linear foot measures along the ground surface following the fence centerline through all structures and appurtenances.

SD1 Includes the necessary equipment, labor, materials, and incidentals for the installation of Reinforced Concrete Box Culvert per the construction drawings and City of Midland standards and specifications, including all embedment, detector wire, tracer tape, necessary testing, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the box culvert centerline through all structures and appurtenances.

SD2 Includes the necessary equipment, labor, materials, and incidentals for the installation of Storm Drains per the construction drawings and City of Midland standards and specifications, including all embedment, detector wire, tracer tape, necessary testing, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the pipe centerline through all structures and appurtenances.

SD3 Includes the necessary equipment, labor, materials, and incidentals for the installation of a Reinforced Concrete Headwall per the construction drawings and City of Midland standards and specifications, including all forms, reinforcment, placement, sealing, finishing, and appurtenances. Measurement and payment to be made per each concrete headwall installed.

SD4 Includes the necessary equipment, labor, materials, and incidentals for the installation of a Headwall Safety End Treatment per the construction drawings and City of Midland standards and specifications, including all forms, reinforcment, placement, sealing, finishing, and appurtenances. Measurement and payment to be made per each headwall safety end treatment installed.

SD5 Includes the necessary equipment, labor, materials, and incidentals for Open Trenching of Storm Drain per the construction drawings and City of Midland standards and specifications, including all unclassified excavation, backfill not including flowable fill backfill, providing trench safety and protection for workers to install pipe, structures, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the pipe centerline through all structures, fittings, and appurtenances.

SD6 Includes the necessary equipment, labor, materials, and incidentals for the installation of Concrete Rip-Rap per the consturction drawings and City of Midland standards and specifications, including all excavation, forms, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

ST1 Includes the necessary equipment, labor, materials, and incidentals to install a Fence per the construction drawings and City of Midland standards and specifications, including all columns, posts, foundations, anchors, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the fence centerline through all structures and appurtenances.

ST2 Includes the necessary equipment, labor, materials, and incidentals to install a Fence Gate per the construction drawings and City of Midland standards and specifications, including all columns, posts, foundations, anchors, frames, attachments, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per each gate installed.

ST3 Includes the necessary equipment, labor, materials, and incidentals to install an Electric Gate per the construction drawings and City of Midland standards and specifications, including all columns, posts, foundations, anchors, frames, attachments, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per each gate installed.

ST4 Includes the necessary equipment, labor, materials, and incidentals to relocate a Cattle Guard per the construction drawings and City of Midland standards and specifications, including all beams, foundations, anchors, frames, attachments, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per each cattle guard installed.

ST5 Includes the necessary equipment, labor, materials, and incidentals to install a Knox Lock per the construction drawings and City of Midland standards and specifications, including all posts, foundations, anchors, frames, safe or box, attachments, and structures as well as all appurtenances. Measurement and payment to be made per each knox lock installed.

ST6 Includes the necessary equipment, labor, materials, and incidentals to Relocate Mailbox Foundation per the construction drawings and City of Midland standards and specifications, including all structure removal, foundation placement, and appurtenances. Measurement and payment to be made per each existing mailbox foundation removed and new mailbox foundation set.

P1 Includes the necessary equipment, labor, materials, and incidentals for Subgrade Preparation per the construction drawings and City of Midland standards and specifications, including all proof-rollling, sub-grade reworking, scarifying, compaction, and appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

P2 Includes the necessary equipment, labor, materials, and incidentals for placement of Unclassified Embankment per the construction drawings and City of Midland standards and specifications, including all sprinkling, rolling, correction of soft spots, grading, sloping, compaction, and appurtenances. Measurement and payment to be made per each cubic yard placed.

P3 Includes the necessary equipment, labor, materials, and incidentals for placement of Jointed Concrete Pavement per the construction drawings and City of Midland standards and specifications, including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P4 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "D" HMAC Asphalt Pavement Surface Course (PG 70-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P5 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "C" HMAC Asphalt Pavement Surface Course (PG 64-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P6 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "B" HMAC Asphalt Pavement Surface Course (PG 64-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P7 Includes the necessary equipment, labor, materials, and incidentals for placement of Flexible Base compacted to 95% Density, ASTM D1557, per the construction drawings and City of Midland standards and specifications including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P8 Includes the necessary equipment, labor, materials, and incidentals for application of Bituminous Prime Coat (MC-30, 0.20 GAL / SY) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per gallon of material applied at the designated rate.

P9 Includes the necessary equipment, labor, materials, and incidentals for application of Tack Coat (MC-30, 0.10 GAL / SY) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per gallon of material applied at the designated rate.

P10 Includes the necessary equipment, labor, materials, and incidentals for placement of Stamped Concrete Median per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P11 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Median per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P12 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Fillet per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Curb section is formed and poured monolithically with fillet and is not a separate bid item. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P13 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Valley Gutter per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P14 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Driveway Approach per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Pedestrian access ramps at the driveway approach are considered part of the approach and are not a separate bid item. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P15 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Curb & Gutter per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, finishing, and appurtenances. Measurement and payment to be made per linear foot of material placed measured along the back-of-curb.

P16 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Pedestrian Access Ramp per the construction drawings and City of Midland standards and specifications, including all forming, reinforcement, placement, jointing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P17 Includes the necessary equipment, labor, materials, and incidentals for Ring & Cover Adjustment per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, flowable fill, jointing, sealing, finishing, and appurtenances. This includes a minimum 1.0' wide concrete collar whose width is measured from the outer edge of the cover to the outer edge of the concrete ring. Measurement and payment to be made per each adjustment made.

T1 Includes the necessary equipment, labor, materials, and incidentals to Eliminate Existing Pavement Markings and Markers (Line Marking) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot eliminated.

T2 Includes the necessary equipment, labor, materials, and incidentals for the placement of Retroreflectorized Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed.

T3 Includes the necessary equipment, labor, materials, and incidentals for the placement of Thermoplastic Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed.

T4 Includes the necessary equipment, labor, materials, and incidentals for the placement of Prefabricated Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each marking placed.

T5 Includes the necessary equipment, labor, materials, and incidentals for In Road Sign Assembly per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each sign assembled.

T6 Includes the necessary equipment, labor, materials, and incidentals to Remove Sign Assembly per the construction drawings and City of Midland standards and specifications, including all excavation, backfill, stabilization, foundations, bases, and appurtenances. Measurement and payment to be made per each existing sign assembly removed.

T7 Includes the necessary equipment, labor, materials, and incidentals for the placement of Retroreflective Raised Pavement Markers per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each marker placed.

T8 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Utility Duct Bank improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed measured along the ground surface.

T9 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Ground Box With Apron improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each ground box with apron placed.

T10 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Delineator Assembly improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each delineator assembly placed.

T11 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Temporary Workzone Pavement Markings improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per lump sum.

BID ITEMS

(See Proposal sheet for additional information.)

Project Name: BRIARWOOD AVE PHASE II
Project Number: P21-06
ADDITIVE ALTERNATE BID 01

Miscellaneous Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Mobilization, furnished, installed, complete and in place.	1	LS	M1	$_____	$_____
2)	4" PVC Pipe Casing (Irrigation Sleeve, SDR 26 ASTM), furnished, installed, complete and in place.	0	LF	M2	$_____	$_____
3)	3" PVC Pipe Conduit (Schedule 40 Electric), furnished, installed, complete and in place.	0	LF	M3	$_____	$_____
4)	Erosion/Sediment Control, furnished, installed, complete and in place.	1	LS	M4	$_____	$_____
5)	Traffic Control, furnished, installed, complete and in place.	1	LS	M5	$_____	$_____
6)	Job Site Safety, furnished, installed, complete and in place.	1	LS	M6	$_____	$_____
7)	Seeded Erosion Control Mats, furnished, installed, complete and in place.	2077	SY	M7	$_____	$_____
8)	Seeding & Stabilization, furnished, installed, complete and in place.	2000	SY	M8	$_____	$_____
9)	Spray Watering, furnished, installed, complete and in place.	1	LS	M9	$_____	$_____
Total Miscellaneous Items 1 - 9		$_____				

Demolition Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Preparation of Right-of-Way, furnished, installed, complete and in place.	9	ACRE	D1	$_____	$_____
2)	Unclassified Roadway Excavation (Base Removal, Depth ≤ 14”), complete and in place.	7272	SY	D2	$_____	$_____
3)	Unclassified Roadway Excavation (Non Pavement & Base Removal), complete and in place.	7500	SY	D3	$_____	$_____
4)	Unclassified Basin & Channel Excavation, complete and in place.	0	CY	D4	$_____	$_____
5)	Removal & Dispose of Existing Unclassified Pavement, complete and in place.	7272	SY	D5	$_____	$_____
6)	Removal & Disposal of Existing Miscellaneous Concrete, complete and in place.	0	SY	D6	$_____	$_____
7)	Removal & Disposal of Existing Fence And Gate, complete and in place.	783	LF	D7	$_____	$_____
Total Demolition Items 1 - 7		$_____				

Storm Drain Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	3'x2' Reinforced Concrete Box Culvert furnished, installed, complete and in place.	0	LF	SD1	$_____	$_____
2)	24" Reinforced Concrete Pipe (RCP), furnished, installed, complete and in place.	0	LF	SD2	$_____	$_____
3)	Reinforced Concrete Headwall (Wingwall, PW-1, HW=4', furnished, installed, complete and in place.	0	EA	SD3	$_____	$_____
4)	Reinforced Concrete Headwall (Wingwall, PW-1, HW=5'), furnished, installed, complete and in place.	0	EA	SD3	$_____	$_____
5)	Headwall Safety End Treatment (Type I), furnished, installed, complete and in place.	0	EA	SD4	$_____	$_____
6)	Headwall Safety End Treatment (Type 2), furnished, installed, complete and in place.	0	EA	SD4	$_____	$_____
7)	Open Trenching of Storm Drain, furnished, installed, complete and in place.	0	LF	SD5	$_____	$_____
8)	5" Concrete Rip-Rap, furnished, installed, complete and in place.	0	SY	SD6	$_____	$_____
Total Storm Drain Items 1 - 8		$_____				

Structural Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Barbed-Wire Fence, furnished, installed, complete and in place.	0	LF	ST1	$_____	$_____
2)	Swing Gate, furnished, installed, complete and in place.	0	EA	ST2	$_____	$_____
3)	Electric Gate, furnished, installed, complete and in place.	0	EA	ST3	$_____	$_____
4)	24' Cattle Guard Relocation, furnished, complete and in place.	0	EA	ST4	$_____	$_____
5)	Knox Lock, furnished, installed, complete and in place.	0	EA	ST5	$_____	$_____
6)	Relocate Mailbox Foundation, furnished, installed, complete and in place.	2	EA	ST6	$_____	$_____
Total Structural Items 1 - 6		$_____				

Paving Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Subgrade Preparation (Depth ≤ 6”), furnished, installed, complete and in place.	16076	SY	P1	$_____	$_____
2)	Unclassified Embankment (Density Controlled), furnished, installed, complete and in place.	500	CY	P2	$_____	$_____
3)	8” Jointed Concrete Pavement, furnished, installed, complete and in place.	0	SY	P3	$_____	$_____
4)	2” Type D HMAC Asphalt Pavement Surface Course (PG70-22, 110 LBS / SY @ 1” Thick), furnished, installed, complete and in place.	15540	SY	P4	$_____	$_____
5)	3” Type C HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1” Thick), furnished, installed, complete and in place.	15540	SY	P5	$_____	$_____
6)	6” Temporary Type B HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1” Thick), furnished, installed, complete and in place.	1759	SY	P6	$_____	$_____
7)	10” Flexible Base (Type A, Grade 4), furnished, installed, complete and in place.	15060	SY	P7	$_____	$_____
8)	Bituminous Prime Coat (MC-30, 0.20 Gal / SY), furnished, installed, complete and in place.	8886	GAL	P8	$_____	$_____
9)	Tack Coat (MC-30, 0.10 Gal / SY), furnished, installed, complete and in place.	1554	GAL	P9	$_____	$_____
10)	4” Stamped Concrete Median, furnished, installed, complete and in place.	1058	SY	P10	$_____	$_____
11)	4” Concrete Median, furnished, installed, complete and in place.	295	SY	P11	$_____	$_____
12)	8” Concrete Fillet, furnished, installed, complete and in place.	0	SY	P12	$_____	$_____
13)	8” Concrete Valley Gutter, furnished, installed, complete and in place.	0	SY	P13	$_____	$_____
14)	6” Concrete Driveway Approach, furnished, installed, complete and in place.	610	SY	P14	$_____	$_____
15)	Type A Concrete Curb & Gutter, furnished, installed, complete and in place.	3444	LF	P15	$_____	$_____
16)	Type C Concrete Curb & Gutter, furnished, installed, complete and in place.	1809	LF	P15	$_____	$_____
17)	Type I Concrete Curb & Gutter, furnished, installed, complete and in place.	0	LF	P15	$_____	$_____

18)	Concrete Pedestrian Access Ramp, furnished, installed, complete and in place.	0	SY	P16	$_____	$_____
19)	Manhole Ring & Cover Adjustment, furnished, installed, complete and in place.	4	EA	P17	$_____	$_____
20)	Water Valve Box Ring & Cover Adjustment, furnished, installed, complete and in place.	0	EA	P17	$_____	$_____
21)	6" Temporary Flexible Base (Type A, Grade 4), furnished, installed, complete and in place.	0	SY	P7	$_____	$_____
Total Paving Items 1 - 21		$_____				

Traffic Control Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Eliminate Existing Pavement Markings and Markers (Line Markings), furnished, installed, complete and in place.	2995	LF	T1	$_____	$_____
2)	Retroreflectorized Pavement Markings, TxDOT Item 666 (24" White, Solid), furnished, installed, complete and in place.	118	LF	T2	$_____	$_____
3)	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, Solid), furnished, installed, complete and in place.	636	LF	T2	$_____	$_____
4)	Retroreflectorized Pavement Markings, TxDOT Item 666 (12" Yellow, Solid), furnished, installed, complete and in place.	46	LF	T2	$_____	$_____
5)	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, LNDP), furnished, installed, complete and in place.	0	LF	T2	$_____	$_____
6)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Solid), furnished, installed, complete and in place.	3442	LF	T3	$_____	$_____
7)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Broken), furnished, installed, complete and in place.	807	LF	T3	$_____	$_____
8)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" Yellow, Solid), furnished, installed, complete and in place.	1226	LF	T3	$_____	$_____
9)	Prefabricated Pavement Markings, TxDOT Item 666 (White, Arrow Symbol), furnished, installed, complete and in place.	6	EA	T4	$_____	$_____
10)	Prefabricated Pavement Markings, TxDOT Item 666 (White, Bike Lane Symbol), furnished, installed, complete and in place.	6	EA	T4	$_____	$_____
11)	In Road Sign Assembly (SUP&AM [Type S80(1)SB(p)]), furnished, installed, complete and in place.	6	SF	T5	$_____	$_____
12)	Remove Sign Assembly, furnished, installed, complete and in place.	0	EA	T6	$_____	$_____
13)	Retroreflective Raised Pavement Marker (Type II-C-R), furnished, installed, complete and in place.	103	EA	T7	$_____	$_____
14)	Utility Duct Bank, furnished, installed, complete and in place.	0	LF	T8	$_____	$_____
15)	Type C Ground Box (162911) With Apron, furnished, installed, complete and in place.	0	EA	T9	$_____	$_____
16)	Delineator Assembly (OM-2Y)(WC)GND(BI), furnished, installed, complete and in place.	0	EA	T10	$_____	$_____
17)	Delineator Assembly (8' Permenant Type III Barricade), furnished, installed, complete and in place.	0	EA	T10	$_____	$_____
18)	Temporary Workzone Pavement Markings, furnished, installed, complete and in place.	1	LS	T11	$_____	$_____
Total Traffic Control Items 1 - 18		$_____				

Price For:	
1. Miscellaneous Items	$
2. Demolition Items	$
3. Storm Drain Items	$
4. Structural Items	$
5. Paving Items	$
6. Traffic Control Items	$
Total Price	$

PAY NOTES

P21-06

BRIARWOOD AVE PHASE II

ADDITIVE ALTERNATE BID 01

Bid Item		Pay Quantity Note
Miscellaneous Items		
1	Mobilization	M1
2	4" PVC Pipe Casing, (Irrigation Sleeve, SDR 26 ASTM D2241)	M2
3	3" PVC Pipe Conduit (Schedule 40 Electric)	M3
4	Erosion/Sediment Control	M4
5	Traffic Control	M5
6	Job Site Safety	M6
7	Seeded Erosion Control Mats	M7
8	Seeding & Stabilization	M8
9	Spray Watering	M9
Demolition Items		
1	Preparation of Right-of-Way	D1
2	Unclassified Roadway Excavation (Base Removal, Depth ≤ 14")	D2
3	Unclassified Roadway Excavation (Non Pavement & Base Removal)	D3
4	Unclassified Excavation (Basin & Channel)	D4
5	Removal & Disposal of Existing Unclassified Pavement	D5
6	Removal & Disposal of Existing Miscellaneous Concrete	D6
7	Removal & Disposal of Existing Fence And Gate	D7
Storm Drain Items		
1	3'x2' Reinforced Concrete Box Culvert	SD1
2	24" Reinforced Concrete Pipe (RCP)	SD2
3	Reinforced Concrete Headwall (Wingwall, PW-1, HW=4')	SD3
4	Reinforced Concrete Headwall (Wingwall, PW-1, HW=5')	SD3
5	Headwall Safety End Treatment (Type I)	SD4
6	Headwall Safety End Treatment (Type II)	SD4
7	Open Trenching of Storm Drain	SD5
8	5" Concrete Rip-Rap	SD6
Structural Items		
1	Barbed-Wire Fence	ST1
2	Swing Gate	ST2
3	Electric Gate	ST3
4	24' Cattle Guard Relocation	ST4
5	Knox Lock	ST5
6	Relocate Mailbox Foundation	ST6

Paving Items

1	Subgrade Preparation (Depth ≤ 6")	P1
2	Unclassified Embankment (Density Controlled)	P2
3	8" Jointed Concrete Pavement	P3
4	2" Type D HMAC Asphalt Pavement Surface Course (PG70-22, 110 LBS / SY @ 1" Thick)	P4
5	3" Type C HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick)	P5
6	6" Temporary Type B HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick)	P6
7	10" Flexible Base (Type A, Grade 4)	P7
8	Bituminous Prime Coat (MC-30, 0.20 Gal / SY)	P8
9	Tack Coat (MC-30, 0.10 Gal / SY)	P9
10	4" Stamped Concrete Median	P10
11	4" Concrete Median	P11
12	8" Concrete Fillet	P12
13	8" Concrete Valley Gutter	P13
14	6" Concrete Driveway Approach	P14
15	Type A Concrete Curb & Gutter	P15
16	Type C Concrete Curb & Gutter	P15
17	Type I Concrete Curb & Gutter	P15
18	Concrete Pedestrian Access Ramp	P16
19	Manhole Ring & Cover Adjustment	P17
20	Water Valve Box Ring & Cover Adjustment	P17
21	6" Temporary Flexible Base (Type A, Grade 4)	P7

Traffic Items

1	Eliminate Existing Pavement Markings and Markers (Line Markings)	T1
2	Retroreflectorized Pavement Markings, TxDOT Item 666 (24" White, Solid)	T2
3	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, Solid)	T2
4	Retroreflectorized Pavement Markings, TxDOT Item 666 (12" Yellow, Solid)	T2
5	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, LNDP)	T2
6	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Solid)	T3
7	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Broken)	T3
8	Thermoplastic Pavement Markings, TxDOT Item 666 (6" Yellow, Solid)	T3
9	Prefabricated Pavement Markings (White, Arrow Symbol)	T4
10	Prefabricated Pavement Markings (White, Bike Lane Symbol)	T4
11	In Road Sign Assembly (SUP&AM [Type S80(1)SB(p)])	T5
12	Remove Sign Assembly	T6
13	Retroreflective Raised Pavement Marker (Type II-C-R)	T7
14	Utility Duct Bank	T8
15	Type C Ground Box (162911) With Apron	T9
16	Delineator Assembly (OM-2Y)(WC)GND(BI)	T10
17	Delineator Assembly (8' Permenant Type III Barricade)	T10
18	Temporary Workzone Pavement Markings	T11

PAY QUANTITY NOTES

M1 Includes the necessary equipment, labor, materials, and incidentals for all Mobilization to the job site complete and in place. Measurement and payment to be made per lump sum.

M2 Includes the necessary equipment, labor, materials, and incidentals for the installation of Pipe Casing per the construction drawings and City of Midland standards and specifications, including all spacers, grout, embedment, detector wire, tracer tape, and appurtenances. Measurement and payment to be per linear foot measured along the ground surface following the pipe centerline through all valves, fittings, structures, and appurtenances.

M3 Includes the necessary equipment, labor, materials, and incidentals for the installation of Pipe Conduit per the construction drawings and City of Midland standards and specifications, including all trenching, embedment, backfill, and appurtenances. Measurement and payment to be per linear foot measured along the ground surface following the pipe centerline through all boxes, fittings, structures, and appurtenances.

M4 Includes the necessary equipment, labor, materials, and incidentals to implement the Erosion Control Plan per the construction drawings and City of Midland standards and specifications. Measurement and payment to be made per lump sum.

M5 Includes the necessary equipment, labor, materials, and incidentals to implement the Traffic Control per the approved Traffic Control Plan. Any required traffic control devices are to meet the City of Midland Traffic Division Standards. Measurement and payment to be made per lump sum.

M6 Includes the necessary equipment, labor, materials, and incidentals to implement Job Site Safety and to provide a safe work environment for the project work area (including all personal protection equipment, trench safety, etc.) per the construction drawings and in compliance with all applicable Federal, State, and Local requirements or regulations including those of OSHA and the City of Midland. JOB SITE SAFETY IS THE RESPONSABILITY OF THE CONTRACTOR. Measurement and payment to be made per lump sum.

M7 Includes the necessary equipment, labor, materials, and incidentals for Seeded Erosion Control Mats per the construction drawings and City of Midland standards and specifications, including all removal, storage, and replacement of existing topsoil as well as all mats, seeding, staking, and appurtenances. Watering is addressed in a separate pay note. Measurement and payment to be made per square yard measured along the ground surface.

M8 Includes the necessary equipment, labor, materials, and incidentals for Seeding & Stabilization per the construction drawings and City of Midland standards and specifications, including all removal, storage, and replacement of existing topsoil as well as all seeding and appurtenances. Watering is addressed in a separate pay note. Measurement and payment to be made per square yard measured along the ground surface.

M9 Includes the necessary equipment, labor, materials, and incidentals for Spray Watering per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per lump sum.

D1 Includes the necessary equipment, labor, materials, and incidentals for Preparation of Right-of-Way per the construction drawings and City of Midland standards and specifications including removal and disposal of all obstructions from the right-of-way and easements where removal of such obstructions is not indicated in the consturction drawings, all scraping and preservation of top soil, and including all clearing, grubbing, and appurtenances. Measurement and payment to be made per acre measured along the ground surface.

D2 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per square yard measured along the ground surface.

D3 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per square yard of material removed.

D4 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing pavement and sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per cubic yard of material removed.

D5 Includes the necessary equipment, labor, materials, and incidentals for the Removal & Disposal of Existing Unclassified Pavement per the construction drawings and City of Midland standards and specifications including all pavement removal, saw-cutting, and appurtenances. Depths given are approximate and pavement material is to be removed in its entirety. No additional compensation will be made for increased pavement depth removal. Measurement and payment to be made per square yard measured along the ground surface.

D6 Includes the necessary equipment, labor, materials, and incidentals for the Removal & Disposal of Existing Miscellaneous Concrete per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

D7 Includes the necessary equipment, labor, materials, and incidentals to Remove & Dispose of Existing Fence And Gate per the construction drawings and City of Midland standards and specifications, including removal of all, columns, posts, foundations, anchors, gates, frames, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per linear foot measures along the ground surface following the fence centerline through all structures and appurtenances.

SD1 Includes the necessary equipment, labor, materials, and incidentals for the installation of Reinforced Concrete Box Culvert per the construction drawings and City of Midland standards and specifications, including all embedment, detector wire, tracer tape, necessary testing, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the box culvert centerline through all structures and appurtenances.

SD2 Includes the necessary equipment, labor, materials, and incidentals for the installation of Storm Drains per the construction drawings and City of Midland standards and specifications, including all embedment, detector wire, tracer tape, necessary testing, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the pipe centerline through all structures and appurtenances.

SD3 Includes the necessary equipment, labor, materials, and incidentals for the installation of a Reinforced Concrete Headwall per the construction drawings and City of Midland standards and specifications, including all forms, reinforcment, placement, sealing, finishing, and appurtenances. Measurement and payment to be made per each concrete headwall installed.

SD4 Includes the necessary equipment, labor, materials, and incidentals for the installation of a Headwall Safety End Treatment per the construction drawings and City of Midland standards and specifications, including all forms, reinforcment, placement, sealing, finishing, and appurtenances. Measurement and payment to be made per each headwall safety end treatment installed.

SD5 Includes the necessary equipment, labor, materials, and incidentals for Open Trenching of Storm Drain per the construction drawings and City of Midland standards and specifications, including all unclassified excavation, backfill not including flowable fill backfill, providing trench safety and protection for workers to install pipe, structures, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the pipe centerline through all structures, fittings, and appurtenances.

SD6 Includes the necessary equipment, labor, materials, and incidentals for the installation of Concrete Rip-Rap per the consturction drawings and City of Midland standards and specifications, including all excavation, forms, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

ST1 Includes the necessary equipment, labor, materials, and incidentals to install a Fence per the construction drawings and City of Midland standards and specifications, including all columns, posts, foundations, anchors, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the fence centerline through all structures and appurtenances.

ST2 Includes the necessary equipment, labor, materials, and incidentals to install a Fence Gate per the construction drawings and City of Midland standards and specifications, including all columns, posts, foundations, anchors, frames, attachments, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per each gate installed.

ST3 Includes the necessary equipment, labor, materials, and incidentals to install an Electric Gate per the construction drawings and City of Midland standards and specifications, including all columns, posts, foundations, anchors, frames, attachments, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per each gate installed.

ST4 Includes the necessary equipment, labor, materials, and incidentals to relocate a Cattle Guard per the construction drawings and City of Midland standards and specifications, including all beams, foundations, anchors, frames, attachments, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per each cattle guard installed.

ST5 Includes the necessary equipment, labor, materials, and incidentals to install a Knox Lock per the construction drawings and City of Midland standards and specifications, including all posts, foundations, anchors, frames, safe or box, attachments, and structures as well as all appurtenances. Measurement and payment to be made per each knox lock installed.

ST6 Includes the necessary equipment, labor, materials, and incidentals to Relocate Mailbox Foundation per the construction drawings and City of Midland standards and specifications, including all structure removal, foundation placement, and appurtenances. Measurement and payment to be made per each existing mailbox foundation removed and new mailbox foundation set.

P1 Includes the necessary equipment, labor, materials, and incidentals for Subgrade Preparation per the construction drawings and City of Midland standards and specifications, including all proof-rollling, sub-grade reworking, scarifying, compaction, and appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

P2 Includes the necessary equipment, labor, materials, and incidentals for placement of Unclassified Embankment per the construction drawings and City of Midland standards and specifications, including all sprinkling, rolling, correction of soft spots, grading, sloping, compaction, and appurtenances. Measurement and payment to be made per each cubic yard placed.

P3 Includes the necessary equipment, labor, materials, and incidentals for placement of Jointed Concrete Pavement per the construction drawings and City of Midland standards and specifications, including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P4 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "D" HMAC Asphalt Pavement Surface Course (PG 70-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P5 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "C" HMAC Asphalt Pavement Surface Course (PG 64-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P6 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "B" HMAC Asphalt Pavement Surface Course (PG 64-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P7 Includes the necessary equipment, labor, materials, and incidentals for placement of Flexible Base compacted to 95% Density, ASTM D1557, per the construction drawings and City of Midland standards and specifications including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P8 Includes the necessary equipment, labor, materials, and incidentals for application of Bituminous Prime Coat (MC-30, 0.20 GAL / SY) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per gallon of material applied at the designated rate.

P9 Includes the necessary equipment, labor, materials, and incidentals for application of Tack Coat (MC-30, 0.10 GAL / SY) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per gallon of material applied at the designated rate.

P10 Includes the necessary equipment, labor, materials, and incidentals for placement of Stamped Concrete Median per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P11 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Median per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P12 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Fillet per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Curb section is formed and poured monolithically with fillet and is not a separate bid item. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P13 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Valley Gutter per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P14 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Driveway Approach per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Pedestrian access ramps at the driveway approach are considered part of the approach and are not a separate bid item. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P15 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Curb & Gutter per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, finishing, and appurtenances. Measurement and payment to be made per linear foot of material placed measured along the back-of-curb.

P16 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Pedestrian Access Ramp per the construction drawings and City of Midland standards and specifications, including all forming, reinforcement, placement, jointing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P17 Includes the necessary equipment, labor, materials, and incidentals for Ring & Cover Adjustment per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, flowable fill, jointing, sealing, finishing, and appurtenances. This includes a minimum 1.0' wide concrete collar whose width is measured from the outer edge of the cover to the outer edge of the concrete ring. Measurement and payment to be made per each adjustment made.

T1 Includes the necessary equipment, labor, materials, and incidentals to Eliminate Existing Pavement Markings and Markers (Line Marking) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot eliminated.

T2 Includes the necessary equipment, labor, materials, and incidentals for the placement of Retroreflectorized Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed.

T3 Includes the necessary equipment, labor, materials, and incidentals for the placement of Thermoplastic Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed.

T4 Includes the necessary equipment, labor, materials, and incidentals for the placement of Prefabricated Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each marking placed.

T5 Includes the necessary equipment, labor, materials, and incidentals for In Road Sign Assembly per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each sign assembled.

T6 Includes the necessary equipment, labor, materials, and incidentals to Remove Sign Assembly per the construction drawings and City of Midland standards and specifications, including all excavation, backfill, stabilization, foundations, bases, and appurtenances. Measurement and payment to be made per each existing sign assembly removed.

T7 Includes the necessary equipment, labor, materials, and incidentals for the placement of Retroreflective Raised Pavement Markers per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each marker placed.

T8 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Utility Duct Bank improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed measured along the ground surface.

T9 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Ground Box With Apron improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each ground box with apron placed.

T10 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Delineator Assembly improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each delineator assembly placed.

T11 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Temporary Workzone Pavement Markings improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per lump sum.

BID ITEMS

(See Proposal sheet for additional information.)

Project Name: BRIARWOOD AVE PHASE II
Project Number: P21-06
ADDITIVE ALTERNATE BID 02

Traffic Control Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Intersection Signals & Electrical (Briarwood Drive & Avalon Drive), furnished, installed, complete and in place.	1	LS	T11	$_____	$_____
Total Traffic Control Items 1 - 1		$_____				

Price For:
6. Traffic Control Items $_____
Total Price $_____

PAY NOTES

P21-06
BRIARWOOD AVE PHASE II
ADDITIVE ALTERNATE BID 02

Bid Item		Pay Quantity Note
Traffic Items		
1	Intersection Signals & Electrical (Briarwood Drive & Avalon Drive)	T11

PAY QUANTITY NOTES

T11 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of all Intersection Signals & Electrical improvements per the construction drawings and City of Midland standards and specifications, including all lights, heads, fixtures, arms, poles, buttons, pedestals, foundations, wiring, cables, boxes, cabinets, and appurtenances. Measurement and payment to be made per lump sum for each street intersection where signal and electrical improvements are made.

ADDENDUM 07
Project Number PD21-06

TO ALL BIDDERS ON THE SUBJECT BID: Briarwood Paving Phase II

ADDENDUM 07

DATE: August 12, 2025

1. Q/A and Clarification
2. Revised Base Bid Drawing Set
3. Revised Additive Alternate 01 Drawing Set
4. Updated Additional Pavement Cross-Section Information
5. City of Midland Traffic Signal Material Specification
6. City of Midland Standard ILSN Layout
7. Revised Bid Item – Base Bid
8. Revised Bid Item – Additive Alternate Bid 01
9. Revised Pay Notes – Base Bid
10. Revised Pay Notes – Additive Alternate Bid 01

PLEASE RETURN THIS ADDENDUM WITH YOUR BID BY THE CLOSING DATE.

All other terms and conditions shall remain the same.

REECE ALBERT, INC.
Company Name

Mike Schmidt
Bidder Authorized Signature

8-12-25
Date

MIKE SCHMIDT, VICE PRESIDENT
Please Print Above Name

325-653-1241
Phone

ADDENDUM 07

Project Number PD21-06

TO ALL BIDDERS ON THE SUBJECT BID: Briarwood Paving Phase II

ADDENDUM 07

DATE: August 12, 2025

1. Q/A and Clarification
2. Revised Base Bid Drawing Set
3. Revised Additive Alternate 01 Drawing Set
4. Updated Additional Pavement Cross-Section Information
5. City of Midland Traffic Signal Material Specification
6. City of Midland Standard ILSN Layout
7. Revised Bid Item – Base Bid
8. Revised Bid Item – Additive Alternate Bid 01
9. Revised Pay Notes – Base Bid
10. Revised Pay Notes – Additive Alternate Bid 01

PLEASE RETURN THIS ADDENDUM WITH YOUR BID BY THE CLOSING DATE.

All other terms and conditions shall remain the same.

_____
Company Name

_____ _____
Bidder Authorized Signature Date

_____ _____
Please Print Above Name Phone

Briarwood Paving Phase II
Project Number PD21-06

Q/A and Clarification

During the Pre-Bid Meeting, the following questions were raised by one or more bidders. Below is a list of the questions along with the answers and clarifications.

Clarification: All information provided in Addendum 01, Addendum 02, Addendum 03, Addendum 04, Addendum 05, and Addendum 06 for this project remains in effect unless specifically addressed in this Addendum 07.

Clarification: The deadline for questions and the date and time of the bid opening remain as stated in Addendum 04.

Clarification: All addendum acknowledgement forms must be included with the bid for the bid to be considered complete. Bidders have sole responsibility for making sure they have and acknowledge all addendums provided for this project bid.

Clarification: Addendum 06 separated the Bid Items section of the Project Manual into three separate Bid Item sub-sections for a Base Bid, an Additive Alternate Bid 01, and an Additive Alternate Bid 02. This Addendum 07 is combining the previously provided Base Bid and Additive Alternate 01 Bid Items into a single Bid Item list for the Base Bid. The Additive Alternate 02 Bid Items section is being re-named Additive Alternate 01.

Base Bid Bid Items Revisions – Combined the quantities for all the bid line items between the previously separate versions of the Base Bid and Additive Alternate 01 Bid Items. Removed the Base Bid Miscellaneous Bid Item #2 line item for 4" PVC Pipe Casing for irrigation because no irrigation casing is to be installed with this project. Removed the Base Bid Structural Bid Item #3 line item for Electric Gate because the combined quantity was 0.

Additive Alternate 01 Bid Items Revisions – No revisions beyond the name change described.

Clarification: The Pay Notes sections of the Project Manual have been combined, revised, and renamed to reflect the revisions to the Bid Items sections previously described in this Addendum 07. Pay Notes M2 and ST3 were both removed from the Base Bid Pay Notes as a result of this.

Clarification: The design drawing set previously red-lined and included with Addendum 06 to distinguish between the Base Bid portion and the Additive Alternate Bid 01 portion has been revised and included with this Addendum 07 so that both portions are now combined into a single Base Bid design set.

Clarification: The design drawing set previously red-lined and included with Addendum 06 to be identified as the Additive Alternate Bid 02 design drawing set has been revised and

included with this Addendum 07 to now be identified as the Additive Alternate 01 design drawing set.

Clarification: The minimum rate of 3.0 LBS / CY called for in the design drawing sets for fiber reinforcement in concrete is incorrect. Instead, where fiber reinforcement is called for in the design drawing sets, the contractor is to use Polypropylene Fiber Reinforcing at a rate of 5.0 LBS / CY throughout for all concrete placed.

Where concrete is placed for ADA improvements such as sidewalk or ramps, the fiber reinforcement placed is to be micro-fiber reinforcement.

Where concrete is placed for non-ADA improvements such as pavement, medians, or flatwork, the fiber reinforcement placed is to be macro-fiber reinforcement.

Clarification: There will be no irrigation casing installed in this project. Bidders are to disregard irrigation casing shown in the design drawing sets, which is consistent with the answers previously provided in Addendum 02. The bid items and pay notes have been revised with this Addendum 07 to reflect this.

Note that pipe conduit for electrical lines is not impacted by this change and remains a part of this project scope as indicated in the design drawings.

Question: Here's the problems we found with the cross sections provided:

- Stations 103+00 to 115+00 do not show any existing elevations.
- The proposed typical sections in the plans show the base going under and one foot past the back of the curb at the outside curb and at the median curb. The cross sections do not show the base going past or under the median curb.
- Stations 148+00 to 150+00 show two different back slopes (2:1 and 6:1) which one should we use?
- Stations 163+00 to 167+00 (also station 162+00) show a proposed V bottom ditch but no proposed slope or grade information?

Answer: Revised cross-sections have been included with this Addendum 07. Base and sub-grade improvements are to be placed extending 1.0' beyond the back-of-curb as shown in the typical sections in the design drawing set. Side slopes, back slopes, ditch slopes, and median slopes are to be as shown in the typical sections in the design drawing set.

Question: Question 16 on addendum 2 states that if there are irrigation sleeves going to the stamped concrete median then they are not required. They are all going to the stamped concrete median. So why do we have this bid item?

Answer: This miscellaneous bid item has been removed from the Project Manual's revised Bid Items section for the Base Bid that is attached to this Addendum 07. The original answer provided in Addendum 2 remains correct.

Question: Sheet 76 - shows 2 EA 3" conduits that is assumed is item #3 on the base bid, but quantity of conduit appears to only account for 1 EA 3" conduit for bid item #3 and should be twice as much. Also, is this conduit intended to be ditched or bored?

Answer: The bid item quantity is correct as shown. The City anticipates that conduit would be placed by open trenching, however if the Contractor wants to place the conduit by boring instead at no additional cost to the City, then so long as the final installation meets the design requirements in the construction drawings and City of Midland standards, then the City would have no objection to the Contractor proceeding with the second construction method on this project.

Question: For the 4" PVC casing for item #2 on base bid, Ditched or bored also?
Answer: The previous bid item for 4" PVC Pipe Casing has been removed from the Project Manual's revised Bid Items section for the Base Bid that is attached to this Addendum 07.

Question: Looking at Google Maps for May of 2025, it appears that the power lines are not going to be very feasible to install ILSN or LUM height signal poles or the Lum pole in the island and maintain minimum OSHA clearances.
Answer: The City has sent the design drawings to Oncor to relocate the overhead lines to meet OSHA clearances, and Oncor should complete this by the end of September 2025. The City will furnish the signal pole, anchor bolds, and ILSN arms (9 ft). The City will also furnish the camera, radio, controller, and FYA signs. The Contractor will furnish and install NoTraffic detection and dual sided ILSN. The City's standard layout for ILSN is attached to this Addendum 07.

Question: For the add alternate traffic signal portion, Items should be added and/or clarified for quantities and intents for missing items that include, APS Control Unit, cameras and control equipment (install only), ILSN (install only).
Answer: The City has sent the design drawings to Oncor to relocate the overhead lines to meet OSHA clearances, and Oncor should complete this by the end of September 2025. The City will furnish the signal pole, anchor bolds, and ILSN arms (9 ft). The City will also furnish the camera, radio, controller, and FYA signs. The Contractor will furnish and install NoTraffic detection and dual sided ILSN. The City's standard layout for ILSN is attached to this Addendum 07.

Question: Please give information about the brand/size info on the City supplied ILSNs so the correct length arm can be quoted.
Answer: The City has sent the design drawings to Oncor to relocate the overhead lines to meet OSHA clearances, and Oncor should complete this by the end of September 2025. The City will furnish the signal pole, anchor bolds, and ILSN arms (9 ft). The City will also furnish the camera, radio, controller, and FYA signs. The Contractor will furnish and install NoTraffic detection and dual sided ILSN. The City's standard layout for ILSN is attached to this Addendum 07.

Question: If the add alternate for the traffic signal is awarded, will the work be done concurrently with the base bid or not? Wondering because we don't know if items such as traffic control, TMAs, message boards need to be included separately or included in the base bid. Please advise. If separately, items should be added for them as well for consistent bids.
Answer: Anything that the City of Midland awards for this project will be considered part of a single, unified overall project, and any bid submittals and construction activity

should plan to reflect this. So if Additive Alternate 01 for the traffic signal improvements is awarded, it will be considered part of the combined overall project and its overall construction activity, and not as a separate element.

BRIARWOOD AVE PHASE II
FROM 190' WEST OF SH 158 TO 500' WEST OF AVALON DRIVE
PROJECT NUMBER : P21-06

JUNE 2025

NET LENGTH OF ROADWAY = 9,245 LF

MAYOR

LORI BLONG

COUNCIL MEMBERS

BRIAN STUBBS	**DISTRICT 1**
JOHN NORMAN	**DISTRICT 2**
JACK LADD	**DISTRICT 3**
AMY STRETCHER BURKES	**DISTRICT 4**
JOHN BURKHOLDER	**AT LARGE**
ROBIN POOLE	**AT LARGE**

CITY MANAGER

TOMMY GONZALEZ

ASSISTANT CITY MANAGER

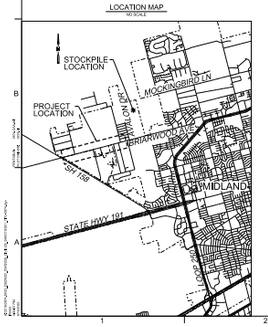
JOSE ORTIZ, P.E.

ENGINEERING SERVICES DIRECTOR

GABE McCLELLAND
OFFICE: (432)685-7983

REGISTERED ACCESSIBILITY SPECIALIST (RAS) INSPECTION
TDLR NO. EAB _____

LOCATION MAP



CITY OF MIDLAND, 300 N. LORAINE ST., MIDLAND TX 79702

MIDLAND Engineering Services

811 Know what's below. Call before you dig.

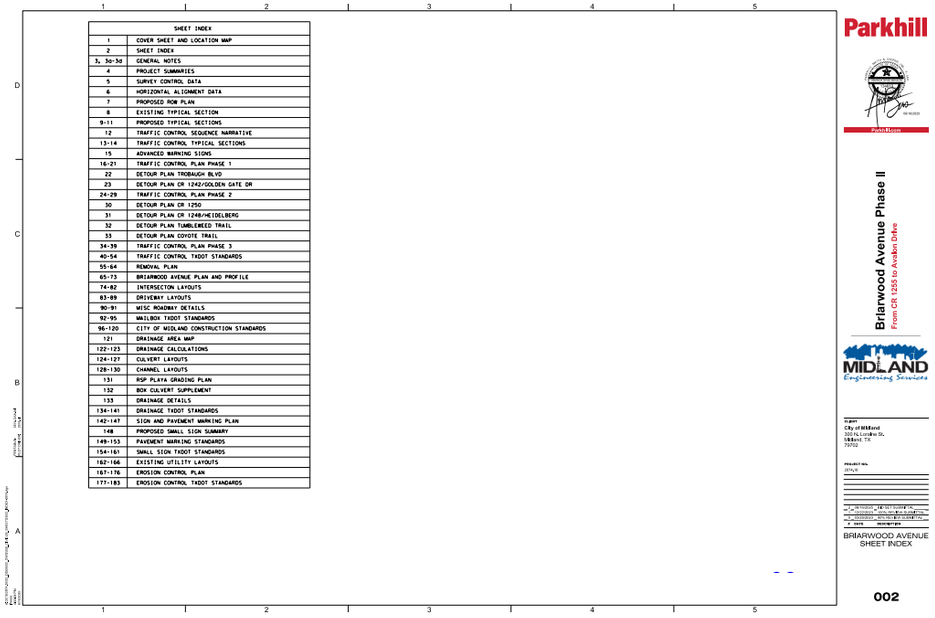
Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

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COVER SHEET AND LOCATION MAP

001



SHEET INDEX	
1	COVER SHEET AND LOCATION MAP
2	SHEET INDEX
3, 3a-3d	GENERAL NOTES
4	PROJECT SUMMARIES
5	SURVEY CONTROL DATA
6	HORIZONTAL ALIGNMENT DATA
7	PROPOSED ROW PLAN
8	EXISTING TYPICAL SECTION
9-11	PROPOSED TYPICAL SECTIONS
12	TRAFFIC CONTROL SEQUENCE NARRATIVE
13-14	TRAFFIC CONTROL TYPICAL SECTIONS
15	ADVANCED WARNING SIGNS
16-21	TRAFFIC CONTROL PLAN PHASE 1
22	DETOUR PLAN TROBAUGH BLVD
23	DETOUR PLAN CR 1242/GOLDEN GATE DR
24-29	TRAFFIC CONTROL PLAN PHASE 2
30	DETOUR PLAN CR 1250
31	DETOUR PLAN CR 1248/HEIDELBERG
32	DETOUR PLAN TUMBLEWEED TRAIL
33	DETOUR PLAN COYOTE TRAIL
34-39	TRAFFIC CONTROL PLAN PHASE 3
40-54	TRAFFIC CONTROL TXDOT STANDARDS
55-64	REMOVAL PLAN
65-73	BRIARWOOD AVENUE PLAN AND PROFILE
74-82	INTERSECTON LAYOUTS
83-89	DRIVEWAY LAYOUTS
90-91	MISC ROADWAY DETAILS
92-95	MAILBOX TXDOT STANDARDS
96-120	CITY OF MIDLAND CONSTRUCTION STANDARDS
121	DRAINAGE AREA MAP
122-123	DRAINAGE CALCULATIONS
124-127	CULVERT LAYOUTS
128-130	CHANNEL LAYOUTS
131	RSP PLAYA GRADING PLAN
132	BOX CULVERT SUPPLEMENT
133	DRAINAGE DETAILS
134-141	DRAINAGE TXDOT STANDARDS
142-147	SIGN AND PAVEMENT MARKING PLAN
148	PROPOSED SMALL SIGN SUMMARY
149-153	PAVEMENT MARKING STANDARDS
154-161	SMALL SIGN TXDOT STANDARDS
162-166	EXISTING UTILITY LAYOUTS
167-176	EROSION CONTROL PLAN
177-183	EROSION CONTROL TXDOT STANDARDS

Parkhill

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007619

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
SHEET INDEX

002

BRIARWOOD AVENUE
GENERAL NOTES:

The technical specifications adopted by the Texas Department of Transportation (TxDOT) November 1, 2014, and titled "Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges" shall govern this project, except where superseded in the Plans and Contract Documents. This specification book may be purchased from the TxDOT or downloaded at:
http://www.txdot.gov/business/resources/txdot-specifications.html

For this project, any reference within the specification book to "Department," "Engineer," or "Owner" should be interpreted as the City of Midland Engineering staff, or their representatives.

General

All Bearings, Dimensions, and Topographic features shown in this Construction Drawing set are related the Texas State Plane Coordinate System, Texas Central Zone, North American Datum 1983. All elevations are related to North American Vertical Datum 1988.

Any issues, conflicts, or discrepancies encountered during construction that conflict with this Construction Drawing set shall be brought to the attention of the Engineer prior to making any design changes in the field.

Repair damage to the Right of Way to the satisfaction of the Owner. Restore all disturbed areas due to trenching or any construction activity to a condition equivalent to the original condition within 14 working days from the time work began in the area including all necessary seeding.

Coordinate street closures with the local fire, police, other emergency personnel, and transportation.

Maintain access to adjacent property at all times.

Notify, in writing, each residence and business 7 days prior to beginning construction of the phase/phases that are expected to affect their ingress and egress or any planned interruptions. This notice may be hand delivered or mailed.

OSHA requirements and all other applicable Federal, State, or City of Midland safety requirements shall be followed and complied with at all times.

Provide a lidded dumpster to be used by Contractor's personnel on the job site. This shall be considered subsidiary to the various bid items.

Dispose of all waste materials in compliance with local, state, and federal regulations.

Do not begin work before 7:00 A.M. or end work after 7:00 P.M. unless authorized by the Engineer and remove all equipment from the roadway prior to end of workday.

Perform any erosion control measures such as seeding or sodding before beginning the next phase, unless otherwise authorized by the Engineer.

All demolition dimensions are approximate based on the most reliable data available. Contractor shall field verify actual dimensions and notify Engineer of quantity increase or discrepancies.

Contractor shall notify Engineer of any conflicts or discrepancies before removal of any items not noted in Construction Drawings.

Hot Mix Basis of Estimate

ITEM	DESCRIPTION	*RATE (approx.)
3076	Dense-Graded HMA (TY C) (PG64-22)	345 LBS/SY
3076	Dense-Graded HMA (TY D) (PG70-22)	230 LBS/SY
508	HMAC for detour (TY B)	690 LBS/SY

*Actual rates will be determined by Engineer in Field

Surface Treatment Basis of Estimate

DESCRIPTION	PRIME	QCST
ASPH TYPE & GRADE	MC-30	CRS-1P OR CRS-2P (COOL) AC-20-5TR (WARM)
ASPH RATE (GAL/SY)	0.20	0.42
AGGR TYPE		PB
AGGR GRADE		4
AGGR RATE (CY/SY)		1/100

Utilities
Overhead and underground utility installations do exist within the project limits. Surface features, such as manholes and valve boxes, were identified in the topographic survey and may be used as an approximate location of where some utilities exist. Some utilities were potholed and are identified on the plans. These identified features should not be considered a thorough or exact marking of all existing utilities. The Contractor is responsible for following all location services protocol and for repairing any damages to utilities caused by the Contractor.

Contractor is to take all necessary precautions to protect all existing facilities that are encountered regardless of whether they appear in this Construction Drawing set.

All new or existing valve, manholes, anc meter covers must be adjusted to finished grade regardless of whether the surface is paved or unpaved. Concrete collars shall be placed around all public infrastructure utility covers.

Item 100 – Preparing Right Of Way
Sprinkler systems shall be cut at the right-of-way line and restored to operating conditions using a licensed irrigator. Payment for this work shall be considered subsidiary.

Fence and gate removal not specifically identified on the Plans as a pay item shall be subsidiary to Preparing Right Of Way. Fence and gate materials shown to be removed shall be neatly stockpiled at a location designated by the landowner.

Item 105 – Removing Stabilized Treated and Untreated Base and Asphalt Pavement
Store salvaged material in stockpile(s), location(s) as directed by the Engineer.

All saw-cuts for pavement removal shall be cut in clean, straight lines.

Item 110 – Excavation
Broom the existing base or subgrade to remove any loose material dropped during excavation operations. This work is considered subsidiary to this item.

Item 160 - Topsoil
Salvage, windrow and stockpile topsoil from existing areas within the ROW. Maximum salvage depth is 6 inches, unless approved by the Engineer. Place a 6-inch layer of loosely compacted Topsoil in areas

Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND
Engineering Services

Client
City of Midland
300 N. Loraine St.
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Project No.
007419

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 1 OF 5

003

designated on the plans. An adequate quantity of topsoil is available within the project limits. Payment for topsoil work is included in the embankment quantities and no separate payment will be made for this work.

If additional topsoil is determined to be required, provide material of equal quality to achieve a 6-inch minimum thickness throughout. The topsoil and its source will be approved by the Engineer.

Contractor may use stockpiled topsoil for areas where drainage dikes are called in Construction Drawings.

Item 164 – Seeding For Erosion Control
Provide seed according to Table 2 for the Odessa District, urban seed mix for sandy soils. Furnish seed tags from the seed supplier to the Engineer for verification of quantity and type. Submit an available substitution to the Engineer, for approval, if a grass variety is not available.

Notify the Engineer of scheduled seeding operations 24 hours prior to seeding applications. Do not begin seeding operations until the Engineer has approved seedbed preparations. Locate and flag all irrigation heads, valve covers, utility facility covers, etc. prior to commencing seed application operations.

Drill seed according to specifications. Use a pasture or rangeland type drill seed. Mulch is not required.

Do not disturb or drive on newly seeded areas. Repair any damage to the seeded areas to the satisfaction of the Engineer.

Revegetate all areas and surfaces disturbed by any construction activity outside of paved or other impervious areas.

Item 169 – Vegetative Watering
Water newly seeded grass areas evenly with a minimum of two-tenths (2/10) of an inch per day for 15 consecutive days or until 70% coverage has been achieved
Water from a tanked, spray-equipped vehicle capable of spraying water to all areas without driving of trailering the vehicle on said areas.

Vegetative Watering will not be paid for separately and will be considered subsidiary to Item 164.

Item 216 – Proof Rolling
Provide a 25-ton roller, or other equipment approved by the Engineer for proof rolling. Proof Roll all subgrade in the presence of the engineer, or as directed, prior to acceptance.

All subgrade and base courses shall be Proof Rolled in accordance with City of Midland Standards. No separate payment will be made for proof rolling.

Item 247 – Flexible Base
Use Flexible Base Ty A or B, Grade 4, with a minimum Plasticity Index of 6.

No salvaged base may be reused in the construction of new base but may be incorporated into the subgrade or embankment.

Item 302 – Aggregates for Surface Treatments
Use a Grade 4, Surface Aggregate Class B aggregate. Use an unmodified asphalt with a minimum performance grade of 64-16 (PG 64-16) or better for aggregate pre-coating. Precoat aggregate with 1.0 percent by weight of asphalt.

Use a liquid asphalt anti-stripping agent of a type and at a rate approved by the Engineer. The use of flux oil is not permitted.

Cure precoated aggregate a minimum of 72 hours before applying the aggregate to the roadway surface.

Item 310 – Prime Coat
Apply an MC-30 or AE-P prime coat to all finished treated base, new flexible base and salvage base due to receive asphaltic concrete pavement or surface treatments. Remove all loose and scabbed material from the surface prior to prime coat application.

Allow prime coat to penetrate and dry for a minimum of 72 hours before placing any asphaltic material on the primed surface, unless otherwise authorized by the Engineer.

Item 316 – Seal Coat
AC-20-5TR will be used during warm weather placement. CRS-1P or CRS-2P will be used for cool weather placement as directed by the Engineer.

Use medium pneumatic tire rollers, as directed by the Engineer. Do not use flat wheel rollers.

Item 341 – Dense-Graded Hot-Mix Asphalt
Binder:
Provide a binder with a Performance Grade of 64-22 (PG 64-22) for the Type C subsurface course.

Provide a binder with a Performance Grade of 70-22 (PG 70-22) for the Type D surface course.

Aggregate quality:
Provide coarse aggregate for all surface hotmix and overlays meeting a minimum Surface Aggregate Classification (SAC) of **B** as published in TxDOT's *AGGREGATE QUALITY MONITORING PROGRAM (QMP) APPROVED SOURCE QUALITY CATALOG*.

Mixture design:
The target laboratory molded density for mix will be 96.5 percent.

Test method Tex-530-C (Boil Test) will not be required.

Placement:
Semi-trailer type vehicles are prohibited from dumping directly into the finishing machine for the finished surface unless the trailer is equipped with an auger slatted chain or another approved conveyor.

No RAP will be allowed.

No RAS will be allowed.

Mineral filler will not be allowed.

Lime will not be allowed as an anti-stripping agent.

Provide trackless asphalt for tack coat at a rate of 0.10-0.13 gal/sy. Adjustments to the rate may be made in the field at the direction of the engineer. Apply tack coat uniformly to all intermediate asphalt pavement surfaces and all joints, including cold joints with mats previously laid and joints adjacent to concrete pavements.

Item 400 – Excavation and Backfill for Structures
Structural Excavation is subsidiary to the structures being installed. Where flowable fill is chosen to be used as backfill material by the Contractor's and for the Contractor's convenience, no additional payment will be made.

Construct fill over structures to plan grade before hauling with heavy equipment over structures.

Compact backfill used for structures, other than flowable backfill, to a minimum density of 95 percent. Use a template to secure reasonably accurate Class C shaping of the foundation material outside of cement stabilized areas.

Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007478

No.	Date	Description
1	08/15/2025	AE SUBMITTAL
2	09/09/2025	ROW/UTILITY SUBMITTAL
3	10/10/2025	90% PS&E SUBMITTAL
4	11/07/2025	100% PS&E SUBMITTAL

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 2 OF 5

003a

Contact the utility company and properly secure the utility poles prior to excavating next to the utility poles. The work and material used to secure the utility poles are subsidiary to the pertinent items.
All trenching and backfill is subsidiary to the various culvert and headwall items.

Item 421 – Hydraulic Cement Concrete
All concrete shall be Class "C" (3600 psi) and maintain fiber reinforcement throughout, in addition to any steel reinforcement shown.

Use polypropylene fiber reinforcing at a minimum rate of 3 lbs/cy.

Furnish mix designs to the Engineer at least 48 hours prior to placing concrete. Provide an approved Private Laboratory Contractor to perform the needed concrete testing for mix design approval.

Fly ash will not be allowed in any mix design.

Engineer will provide quality assurance testing.

Provide air entrainment in all concrete except for concrete used in precast concrete members. Target an entrained air content of 4.0% for concrete pavement and 5.5% for all other concrete requiring air entrainment. Ensure the minimum entrained air content is at least 3.0% for all classes of concrete.

Place concrete pavement within 45 minutes of batching and use vibratory equipment to consolidate concrete. Do not use vibratory equipment to distribute concrete pavement. Segregated concrete is subject to rejection.

For this project, consider all concrete for culverts, culvert extensions, headwalls and wingwalls to be non-structural concrete.

All concrete pavement joints shall be sealed in compliances with City of Midland standards. This requirement does not apply to pedestrian access ramps, sidewalk, or curb joints.

Item 432 – Riprap
Provide 5-inch-thick concrete riprap, unless otherwise indicated in the plans.

In large areas of riprap, provide one-half (1/2)-inch thick expansion joint material at approximately 15-foot intervals, or as directed by the Engineer.

Use City of Midland approved expansion joint material and place between the proposed riprap and curb and gutter.

Reinforce all riprap on this project with No. 3 bars spaced 12 inches O.C.B.W. or No. 4 bars spaced at 18 inches O.C.B.W.

Broom-finish all riprap on this project unless otherwise directed.

In addition to reinforcing steel, polypropylene fiber is required at a rate of 3 lbs./cy. Polypropylene fiber may not be used in lieu of reinforcing steel.

Items 462 and 464 – Concrete Box Culvert and Reinforced Concrete Pipe
Join all concrete culverts with a cold-applied plastic joint gasket such as RAM-NEK or approved equal.

Maintain trench protection to protect Owner's representatives, inspectors, and Contractors during testing operations.

OSHA approved trench safety systems are required for all trenches 5.0' deep or greater.

All trenching and backfill is subsidiary to the various culvert and headwall items.

Item 466 – Headwalls and Wingwalls
Install reinforced concrete aprons on all headwalls and wingwalls, using reinforcing composed of #4 bars at 12-inch spacings, center-to-center, or as shown on the detail sheet.

Item 467 – Safety End Treatment
Provide shop drawings for pipe runners.

Item 479 – Adjusting Manholes and Inlets
Raise the manholes and water valves up to finished roadway elevation, matching the finish cross-slope.

Item 502 – Barricades, Signs and Traffic Handling
The work required for Item 502 will be paid for as a lump sum.

Prior to beginning construction, the Engineer shall approve the routing of traffic and sequence of work.

In addition to the Traffic Contro Plan (TCP) and the latest WZ standard plan sheets, install barricades and warning signs, as appropriate, to adequately warn motorists. Permanent signs may be installed when construction in an area is complete, anc they will not be in conflict with the traffic control plan for the remainder of the job.

This project has a regulatory work zone speed reduction within the project limits. The work zone speed limit is reduced from 60 mph to 35 mph. Placement of speed reduction zone signs shall comply with BC (3)-14. Speed resumption sign(s) is required atthe end of a speed reduction zone. Existing signs may remain in place durng the TCP period if they do not interfere with construction, and they do not conflict with the TCP plan.

Additional signs and barricades may be required, as directed by the Engineer, and shall be considered subsidiary to TCP.

Cover or remove any work zone signs when work or condition referenced is not occurring.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets. Provide access to all driveways during all phases of construction, unless otherwise directed on the plans.

All locations used for storing construction equipment and materials of any type within the right of way shall be approved by the Engineer. Use of the Right-of-Way for these purposes will be restricted to those locations where driver sight distance to businesses and side street intersections is not obstructed, public safety is not risked and at other locations where an unsightly appearance, as determined by the Engineer, will not exist.

No work will be permitted to commence on the road before 7:00 A.M. and shall be arranged so that all machinery and/or equipment shall be away from the roadway near the Right-of-Way line after 7:00 P.M.

Remove any obstructions to existing drainage due to the Contractor's operations as required, at the Contractors expense.

Wash the channelizing devices and barricades following each rainfall or snowfall event and at times deemed necessary by the Engineer.

To ensure the safety and convenience of traffic, flaggers may be required when construction machinery is being operated along, across, or adjacent to lanes carrying traffic. If considered necessary by the Engineer, supplemental signs and barricades may be required.

Fill any holes left by barricade or sign supports and restore the area to its original condition.

Barricades, Signs and Traffic Handling is a plan quantity item. If time is suspended, no additiona compensation will be made.

Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND
Engineering Services

Client
City of Midland
300 N. Loraine St.
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Project No.
007419

No.	Description	Date

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 3 OF 5

003b

Traffic switches will not be permitted on Fridays or any working day preceding a holiday unless authorized by the Engineer.

Construct temporary ramps to maintain access to driveways and city streets as directed by the Engineer. Temporary ramp construction is subsidiary to TCP, unless otherwise shown on the plans.

The Contractor shall bid on the traffic control plan shown in the plans. Any proposed alterations to the TCP (combining work areas / phasing / etc.) shall be submitted to the Engineer at least 10 days prior to anticipated changes.

Square tubing sign supports may be used for temporary construction signs. Aluminum and wood signs may be mounted if the vertical supports are embedded into the ground. Square tubing supports on skids which are typically held in place with sandbags can only support signs made of light weight fluted plastic.

Any trench or drop off over 2" will require a safety slope of at least 3:1 and can be constructed out of RAP, embankment or other material approved by the Engineer. The placement, maintenance, and removal are the responsibility of the Contractor and is subsidiary to the various items.

Item 506 – Temporary Erosion, Sedimentation, and Environmental Controls
All erosion control measures shown in plans and required by the Engineer, including installation and removal upon completion of construction activity, will not be paid for separately and will be included under Item 506 on a lump sum basis.

Install erosion control measures prior to beginning any construction activity on project site.

Contractor shall maintain erosion control measures at all times. Repairs to existing measures shall be made immediately upon discovery.

All erosion control measures shall be inspected immediately following any storm event. Implement additional erosion control measures during storm events as needed or directed by the Engineer.

Contractor is to maintain a reasonable clean project site at all times. Any sediment, debris, etc. outside project site area shall be removed promptly.
All stockpiles will be surrounded by silt fence or equivalent measures as approved by the Engineer to properly control sediment runoff.

Contractor shall provide a concrete washout device meeting City of Midland specifications for all concrete washout activities. Contractor may not use any other areas within the project site for concrete washout activities under any circumstance.

Contractor is required to mitigate any damages to adjacent property or to receiving waters caused by improperly installed or poorly maintained erosion control measures.

Item 508 – Constructing Detours
Any drainage pipe or SETs required for detours are subsidiary to this Item. The minimum pipe size is 18 inches.

Item 529 – Concrete Curb, Gutter and Combined Curb and Gutter
Place one-half (1/2)-inch of approved, pre-molded expansion joint material at 40-foot intervals and at the beginning and end of all radii. Place 3/25-inch grooved or sawed construction joints, as directed by the Engineer, spaced equally, with the spacing not to exceed ten feet and no less than two feet between joints.

All concrete fillets are to be placed monolithically with adjacent concrete curb.

Item 531 – Curb Ramps
The curb ramp locations shown in the plans have considered the geometric features of the intersection, traffic signals, and the pavement markings. When field conditions, such as lack of right of way width or obstructions require, the ramp may be relocated within the right of way with the approval of the Engineer. In any case, construct curb ramps in conformance with the Texas Accessibility Standards (TAS) and the Americans with Disabilities Act Accessibility Guicelines (ADAAG). All deficient ramps will be removed and replaced at the Contractor's expense.

Use polypropylene fiber reinforcing at a minimum rate of 3 lbs./cy in lieu of wire reinforcing.
Form tooled joints on each side of the fire-foot wide ramp section, and at each break in ramp slope or geometry, and at five-foot intervals as if it were sidewalk. Place asphalt expansion joint material between proposed ramps and existing concrete.

Place asphalt expansion joint material between proposed sidewalk and utility poles, guy wires, vent pipes, standpipes and as directed.

All curbs on curb ramps will not be paid for directly but are considered subsidiary to the various bid items.

Item 585 – Ride Quality for Pavement Surfaces
Use Surface Test Type A to evaluate ride quality of travel lanes in accordance with item 585, "Ride Quality for Pavement Surfaces".

Corrective action, when required, shall be diamond grinding, as approved and directed by the Engineer. No Bonus Pay Adjustments will be made for low IRI results.

This item will be considered subsidiary to the various items.

Item 618 – Conduit
Do not place boring pits closer than 2 feet from the edge of the pavement unless otherwise directed. Do not use water jetting. When boring is used for under pavement conduit installations, the maximum allowable over-cut is 1" in diameter. When conduits are bored, do not exceed 18 inches in the vertical and horizontal tolerances as measured from the intendd target point.

Do not use a pneumatically driven devce for punching holes beneath the pavement (commony known as a "missile").

Use a colored cleaner-primer on all PVC-to-PVC joints before application of PVC cement.

Seal all conduit ends with a permanently soft, non-toxic duct seal. Use a duct seal that does not adversely affect other plastic materials or corrode metals.

Furnish and install non-metallic pull ropes in conduit installed for future use and cap using standard weather-tight conduit caps, as approved.

The locations of conduit and ground boxes are diagrammatic only and may be shifted to accommodate field conditions as directed by the Engineer.

Item 620 – Electrical Conductors
Terminate all electrical conductors from the controller at the termination block in the traffic signal pole hand hole whether in use or not.

All wiring not covered by the plans anc specifications shall be in accordance with the National Electric Code (NEC).

When the specifications for electrical items require UL listed products, it will be construed to mean UL listed or CSA listed.

Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007478

No.	Description	Date

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 4 OF 5

003c

Bond together any grounding conductors that share the same conduit, junction box, ground box, or structure, at every accessible point in accordance with the National Electrical Code (NEC).

Item 624 – Ground Boxes
Locations of ground boxes are approximate. Final locations will be as approved by Engineer. Provide an apron for ground boxes as shown on TxDOT Standard ED (4)-14.

Concrete removal required for installation of ground boxes will be subsidiary to Ground Boxes. Seal ground boxes with polyurethane foam that will not adversely affect other plastic materials or corrode metals (Froth-Pak 115 2.75 density 157833 or approved equal).

Item 644 – Small Roadside Sign Assemblies
All new sign supports for stop and yield signs will have a 12" red strip of Type C High Specific Intensity Reflective tape. Place the top of the tape 4' above the edge of the roadway. This work will not be paid for directly and will be subsidiary to the pertinent bid item.

For standard small sign details and dimensions, refer to the "Standard Highway Sign Designs for Texas (SHSD)"; a supplement to the Texas Manual on Uniform Traffic Control Devices (TMUTCD)".

Stake all sign locations, and receive approval from the Engineer, prior to sign placement.

Item 658 – Delineator and Object Marker Assemblies
Delineator and object marker assembly posts shall be composed of post-consumer recycled materials. Embedded stub shall be perforated square tubing.

Item 662 – Work Zone Pavement Markings
Materials used for non-removable work zone pavement markings will be paint and beads or other approved materials.

All removable work zone pavement markings placed on final surfaces shall consist of ceramic buttons and RPMs as shown on standard sheet BC (11). These shall be applied with a thermoplastic adhesive, unless otherwise directed by the Engineer. Buttons will be paid for by the linear foot of striping for which they represent.

Contractor is responsible for the removal of ceramic buttons, RPMs, and Adhesives as directed by the Engineer and before permanent striping is installed. Payment for this work will be paid for under Item 677.

Do not place guide markers on a finished surface unless they fall on a proposed lane line. Remove Stick-down markings prior to final marking. Remove tabs after the standard pavement markings have been placed.

The deviation rate in alignment shall not exceed one inch per 200 feet of roadway. The maximum deviation shall not exceed 2 inches, nor shall any deviation be abrupt. Striping not in conformance shall be removed and replaced at the Contractor's expense.

Item 666 – Reflectorized Pavement Markings
Type I markings shall meet the minimum retroreflectivity values defined by Article 4.4 Retroreflectivity Requirements.

Permanent pavement markings are to be thermoplastic in accordance with TxDOT Item 666 Type I specifications for long-line markings. Short-line and symbol markings will meet either TxDOT Item 666 Type I or Item 668 specifications.

Do not paint any pavement markings.

Item 677 – Eliminating Existing Pavement Markings and Markers
Submit eliminating plan for approval br the Engineer in accordance with Item 677.

Item 678 – Pavement Surface Preparation for Markings
Use dry sandblasting for pavement surface preparation for markings. This work will be considered subsidiary to the various items.

Item 734 – Litter Removal
Perform litter removal as necessary ard before mowing. This work will be considered subsidiary to the various items.

Item 738 – Cleaning and Sweeping
Clean and sweep existing pavements as necessary and as directed by the Engineer. This work will be considered subsidiary to the various items.

Item 6001 - Portable Changeable Message Sign
Provide solar powered changeable message boards for this project. Modify the message as directed by the Engineer.

PCMS shall be placed in operation a minimum of one (1) week prior to construction. Location(s) and duration for PCMS shall be as directed by the Engineer.

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Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

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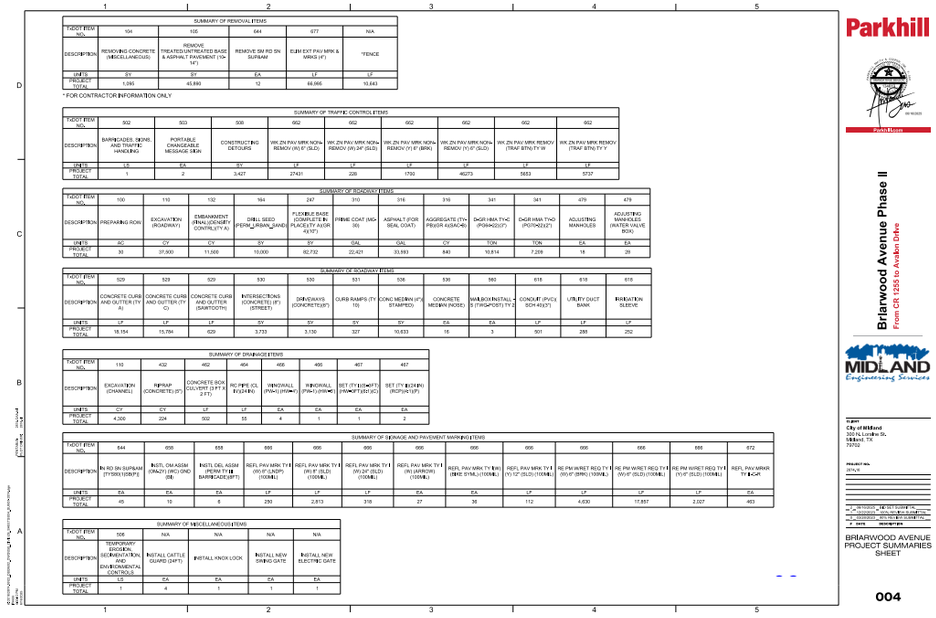
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300 N. Loraine St.
Midland, TX
79702

Project No.
007419

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 5 OF 5

003d



SUMMARY OF REMOVAL ITEMS

TxDOT ITEM NO.	104	105	644	677	N/A
DESCRIPTION	REMOVING CONCRETE (MISCELLANEOUS)	REMOVE TREATED/UNTREATED BASE & ASPHALT PAVEMENT (10-14")	REMOVE SM RD SN SUPAM	ELIM EXT PAV MRK & MRKG (4")	*FENCE
UNITS	SY	SY	EA	LF	LF
PROJECT TOTAL	1,095	45,690	12	66,666	10,643

* FOR CONTRACTOR INFORMATION ONLY

SUMMARY OF TRAFFIC CONTROL ITEMS

TxDOT ITEM NO.	502	503	506	662	662	662	662	662	662
DESCRIPTION	BARRICADES, SIGNS AND TRAFFIC HANDLING	PORTABLE CHANGEABLE MESSAGE SIGN	CONSTRUCTING DETOURS	WK ZN PAV MRK NON-REMOV (W) 6" (SLD)	WK ZN PAV MRK NON-REMOV (W) 24" (SLD)	WK ZN PAV MRK NON-REMOV (Y) 6" (BRK)	WK ZN PAV MRK NON-REMOV (Y) 6" (SLD)	WK ZN PAV MRK REMOV (TRAF BTN) TY III	WK ZN PAV MRK REMOV (TRAF BTN) TY Y
UNITS	LS	EA	SY	LF	LF	LF	LF	LF	LF
PROJECT TOTAL	1	2	3,427	27431	228	1700	46273	5853	5737

SUMMARY OF ROADWAY ITEMS

TxDOT ITEM NO.	100	110	132	164	247	310	316	316	341	341	470	478
DESCRIPTION	PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENSITY CONTROL) (TY A)	DRILL SEED (PERM_URBAN_SAND)	FLEXIBLE BASE (COMPLETE & PLACE)(TY A)(GR 4)(10")	PRIME COAT (MAT)	ASPHALT (FOR SEAL COAT)	AGGREGATE (TY-PB)(GR A)(SAC-A)	DenGR HMA TY-C (PG64-22)(QY)	DenGR HMA TY-D (PG70-22)(QY)	ADJUSTING MANHOLES	ADJUSTING MANHOLES (WATER VALVE BOX)
UNITS	AC	CY	SY	SY	SY	GAL	GAL	CY	TON	TON	EA	EA
PROJECT TOTAL	30	37,900	11,000	10,000	82,732	22,421	33,593	840	16,814	7,209	18	29

SUMMARY OF ROADWAY ITEMS

TxDOT ITEM NO.	529	529	529	530	530	531	536	536	560	618	618	618
DESCRIPTION	CONCRETE CURB AND GUTTER (TY A)	CONCRETE CURB AND GUTTER (TY C)	CONCRETE CURB AND GUTTER (SAWTOOTH)	INTERSECTIONS (CONCRETE) (8") (STREET)	DRIVEWAYS (CONCRETE)(8")	CURB RAMPS (TY 10)	CONC MEDIAN (4") STAMPED	CONCRETE MEDIAN (NOSE)	MAILBOX INSTALL-S (TRB)(POST) TY-2	CONDUIT (PVC) SCH 40(3")	UTILITY DUCT BANK	IRRIGATION SLEEVE
UNITS	LF	LF	LF	SY	SY	SY	SY	EA	EA	LF	LF	LF
PROJECT TOTAL	18,154	15,784	629	3,733	3,139	327	10,633	16	3	501	286	252

SUMMARY OF DRAINAGE ITEMS

TxDOT ITEM NO.	110	432	462	464	466	466	467	467
DESCRIPTION	EXCAVATION (CHANNEL)	RIPRAP (CONCRETE) (24")	CONCRETE BOX CULVERT (3 FT X 2 FT)	RC PIPE (CL III)(18")	HDWALL (TY=I)(SW=*)(18")	REMOVAL (TY=I)(18")	SET (TY II)(18"W)(FT) (SW=FT SET)(SC)	SET (TY II)(18") (RCP)(S=%)(FT)
UNITS	CY	CY	LF	LF	EA	EA	EA	EA
PROJECT TOTAL	4,200	224	502	55	4	1	1	2

SUMMARY OF SIGNAGE AND PAVEMENT MARKING ITEMS

TxDOT ITEM NO.	644	658	658	666	666	666	666	666	666	666	666	672
DESCRIPTION	IN RO SN SUP&AM (TY10)(10SQFT)	INSTL OM ASSM (CRASH) (SRO) GND MNT	INSTL DEL ASSM (PERM TY III BARRICADE)(8FT)	REFL PAV MRK TY I (W) 8" (SLD)(P) (100MIL)	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	REFL PAV MRK TY I (W) (ARROW) (100MIL)	REFL PAV MRK TY I(W)(WORD) (100MIL)	REFL PAV MRK TY I(Y)(12" SLD) (100MIL)	RE PM W/RET REQ TY I (W)(4" SRK) (100MIL)	RE PM W/RET REQ TY I (W)(8" SLD) (100MIL)	RE PM W/RET REQ TY I (Y)(8" SLD) (100MIL)	REFL PAV MRKR TY II-C-R
UNITS	EA	EA	EA	LF	LF	LF	EA	EA	LF	LF	LF	LF	EA
PROJECT TOTAL	45	15	6	250	2,613	318	27	36	112	4,630	17,857	2,027	463

SUMMARY OF MISCELLANEOUS ITEMS

TxDOT ITEM NO.	506	N/A	N/A	N/A	N/A
DESCRIPTION	TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS	INSTALL CATTLE GUARD (SIFT)	INSTALL KNOX LOCK	INSTALL NEW SWING GATE	INSTALL NEW ELECTRIC GATE
UNITS	LS	EA	EA	EA	EA
PROJECT TOTAL	1	4	1	1	1

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Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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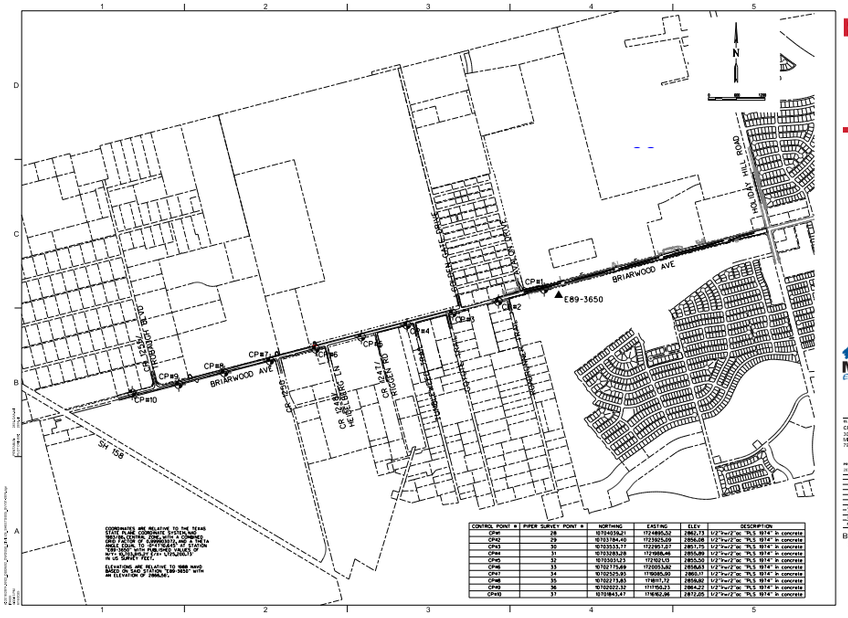
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City of Midland
300 N. Loraine St.
Midland, TX
79702

project no.

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
PROJECT SUMMARIES
SHEET

004



CONTROL POINT #	PAPER SURVEY POINT #	NORTHING	EASTING	ELEV	DESCRIPTION
CP#1	28	10704039.21	1721489.53	2862.73	1/2"rw/2" sc. "PLS 5174" in concrete
CP#2	29	10703784.40	1723925.09	2856.06	1/2"rw/2" sc. "PLS 5174" in concrete
CP#3	30	10703533.17	1723951.27	2851.75	1/2"rw/2" sc. "PLS 5174" in concrete
CP#4	31	10703283.28	1723958.46	2853.90	1/2"rw/2" sc. "PLS 5174" in concrete
CP#5	32	10703033.23	1723921.13	2853.56	1/2"rw/2" sc. "PLS 5174" in concrete
CP#6	33	10702775.69	1723953.82	2858.63	1/2"rw/2" sc. "PLS 5174" in concrete
CP#7	34	10702525.93	1719695.92	2860.17	1/2"rw/2" sc. "PLS 5174" in concrete
CP#8	35	10702273.83	1718917.72	2858.92	1/2"rw/2" sc. "PLS 5174" in concrete
CP#9	36	10702022.32	1717552.23	2864.42	1/2"rw/2" sc. "PLS 5174" in concrete
CP#10	37	10701843.47	1716162.96	2872.05	1/2"rw/2" sc. "PLS 5174" in concrete

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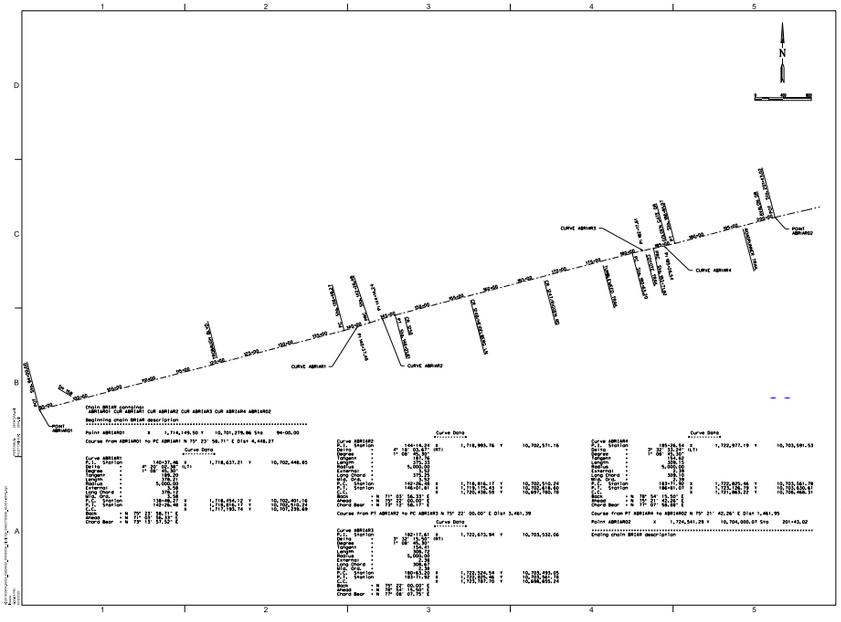
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From CR 1250 to Avalon Drive

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BRIARWOOD AVENUE SURVEY CONTROL DATA

005



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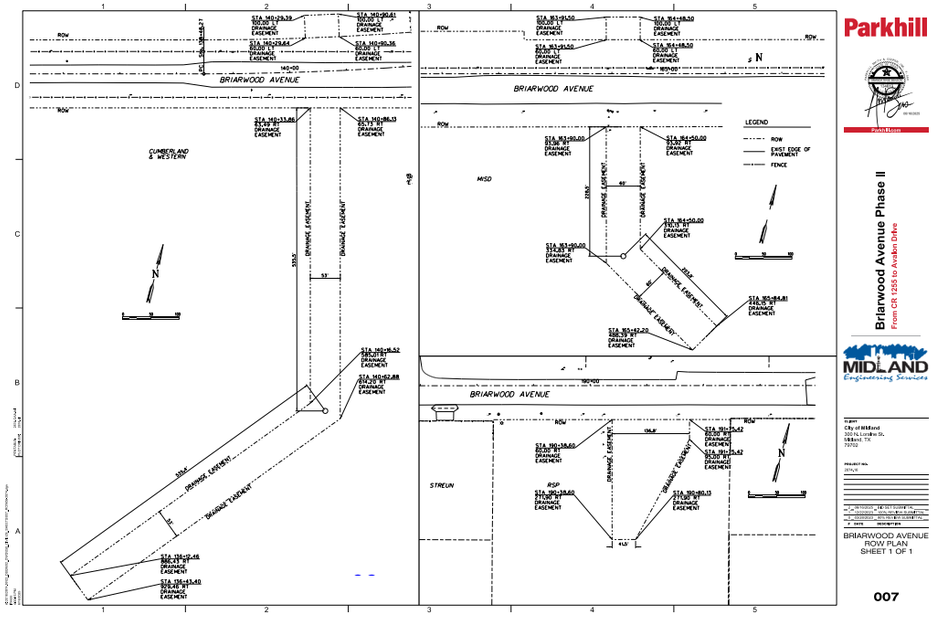
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From CR 1250 to Avalon Drive

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BRIARWOOD AVENUE
HORIZONTAL
ALIGNMENT
DATA

006



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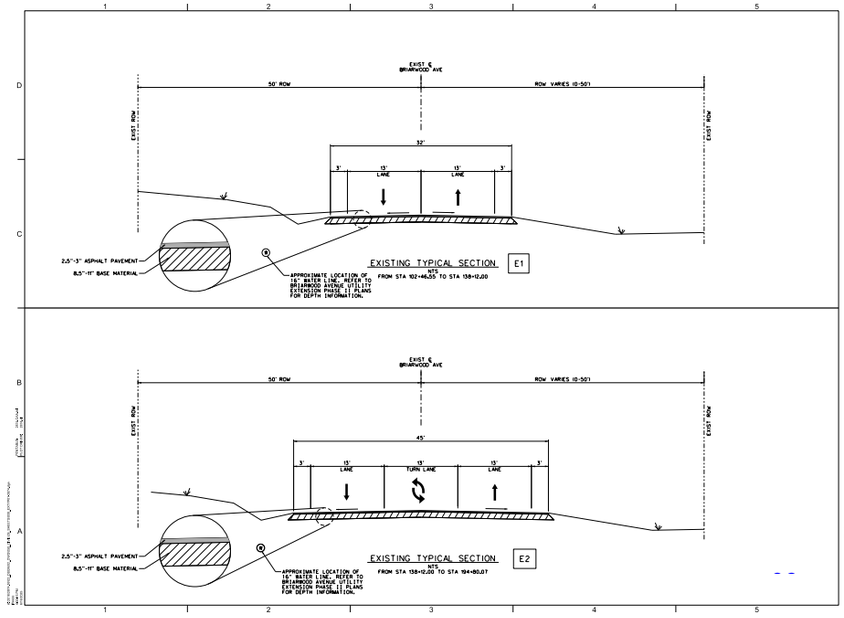
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
ROW PLAN
SHEET 1 OF 1

007



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Briarwood Avenue Phase II

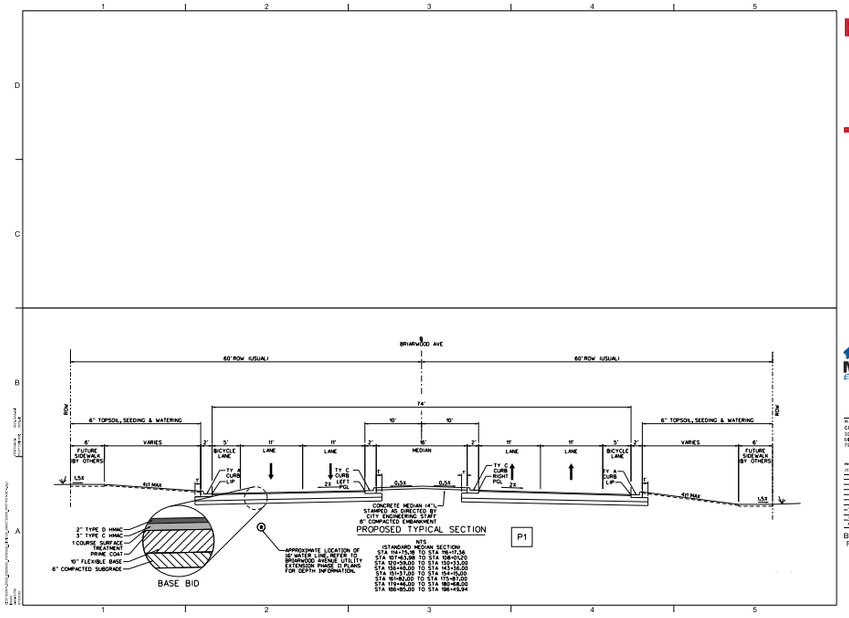
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BRIARWOOD AVENUE
EXISTING TYPICAL SECTION
SHEET 1 OF 1

008



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From CR 1250 to Avalon Drive

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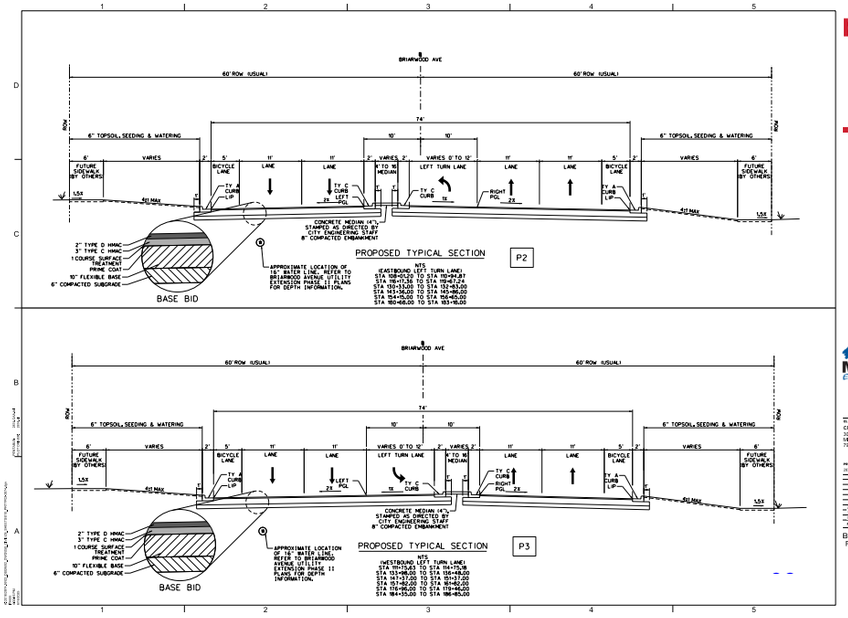
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Project No.

No.	Date	Description

BRIARWOOD AVENUE
PROPOSED TYPICAL SECTIONS
SHEET 1 OF 3

009



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Briarwood Avenue Phase II

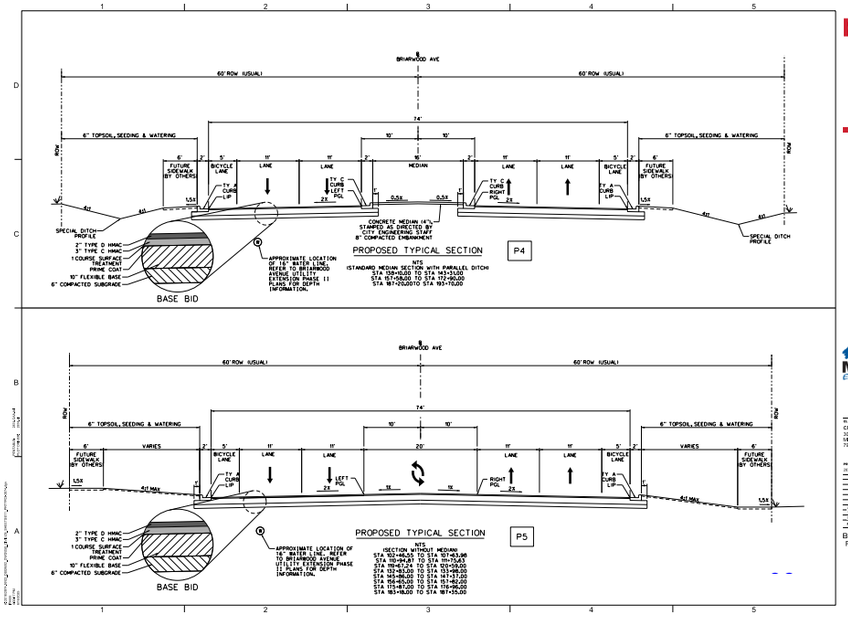
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BRIARWOOD AVENUE
PROPOSED TYPICAL SECTIONS
SHEET 2 OF 3

010



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Briarwood Avenue Phase II

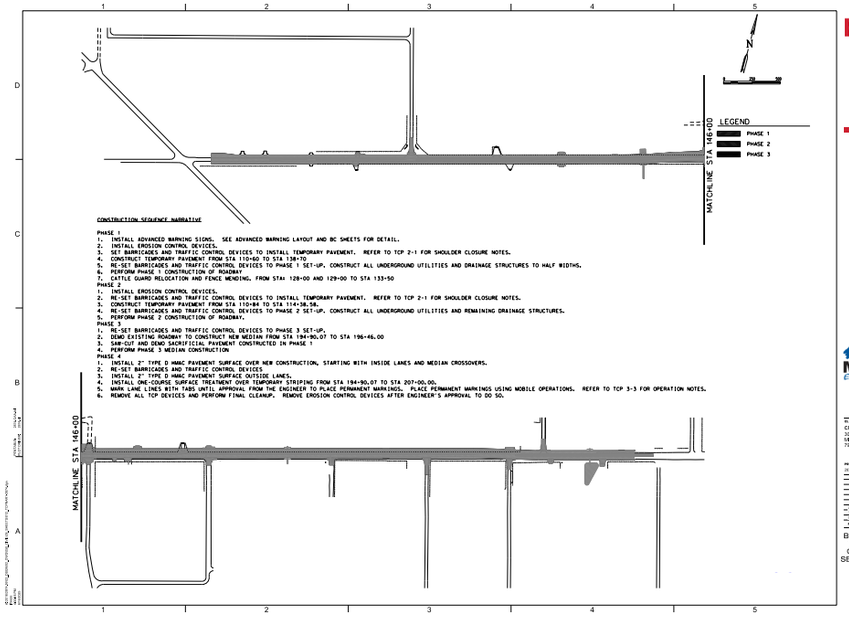
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Midland, TX
79701

BRIARWOOD AVENUE
PROPOSED TYPICAL SECTIONS
SHEET 3 OF 3

011



CONSTRUCTION SEQUENCE NARRATIVE

PHASE 1
1. INSTALL ADVANCED WARNING SIGNS. SEE ADVANCED WARNING LAYOUT AND BC SHEETS FOR DETAIL.
2. INSTALL EROSION CONTROL DEVICES.
3. SET BARRICADES AND TRAFFIC CONTROL DEVICES TO INSTALL TEMPORARY PAVEMENT. REFER TO TCP 2-1 FOR SHOULDER CLOSURE NOTES.
4. CONSTRUCT TEMPORARY PAVEMENT FROM STA 110+60 TO STA 138+70
5. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES TO PHASE 1 SET-UP. CONSTRUCT ALL UNDERGROUND UTILITIES AND DRAINAGE STRUCTURES TO HALF WIDTHS.
6. PERFORM PHASE 1 CONSTRUCTION OF ROADWAY.
7. CATTLE GUARD RELOCATION AND FENCE MENDING. FROM STA+ 128+00 AND 129+00 TO STA 133+50

PHASE 2
1. INSTALL EROSION CONTROL DEVICES.
2. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES TO INSTALL TEMPORARY PAVEMENT. REFER TO TCP 2-1 FOR SHOULDER CLOSURE NOTES.
3. CONSTRUCT TEMPORARY PAVEMENT FROM STA 110+84 TO STA 114+38.56.
4. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES TO PHASE 2 SET-UP. CONSTRUCT ALL UNDERGROUND UTILITIES AND REMAINING DRAINAGE STRUCTURES.
5. PERFORM PHASE 2 CONSTRUCTION OF ROADWAY.

PHASE 3
1. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES TO PHASE 3 SET-UP.
2. DEMO EXISTING ROADWAY TO CONSTRUCT NEW MEDIAN FROM STA 194+90.07 TO STA 196+46.00
3. SAW-CUT AND DEMO SACRIFICIAL PAVEMENT CONSTRUCTED IN PHASE 1
4. PERFORM PHASE 3 MEDIAN CONSTRUCTION

PHASE 4
1. INSTALL 2" TYPE D HMAC PAVEMENT SURFACE OVER NEW CONSTRUCTION, STARTING WITH INSIDE LANES AND MEDIAN CROSSOVERS.
2. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES
3. INSTALL 2" TYPE D HMAC PAVEMENT SURFACE OUTSIDE LANES.
4. INSTALL ONE-COURSE SURFACE TREATMENT OVER TEMPORARY STRIPING FROM STA 194+90.07 TO STA 207+00.00.
5. MARK LANE LINES WITH TABS UNTIL APPROVAL FROM THE ENGINEER TO PLACE PERMANENT MARKINGS. PLACE PERMANENT MARKINGS USING MOBILE OPERATIONS. REFER TO TCP 3-3 FOR OPERATION NOTES.
6. REMOVE ALL TCP DEVICES AND PERFORM FINAL CLEANUP. REMOVE EROSION CONTROL DEVICES AFTER ENGINEER'S APPROVAL TO DO SO.

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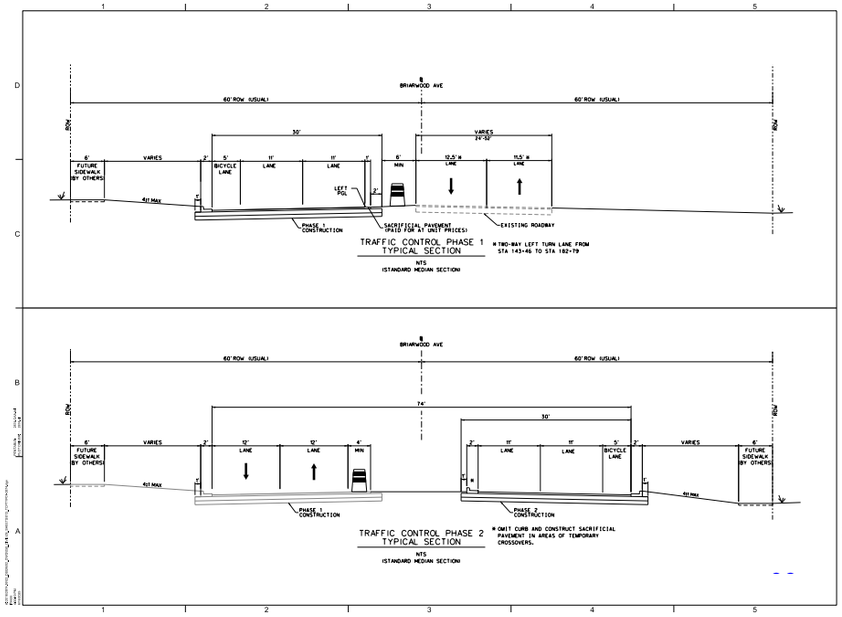
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

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BRIARWOOD AVENUE
TRAFFIC CONTROL
OVERALL LAYOUT &
SEQUENCE NARRATIVE

012



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Briarwood Avenue Phase II

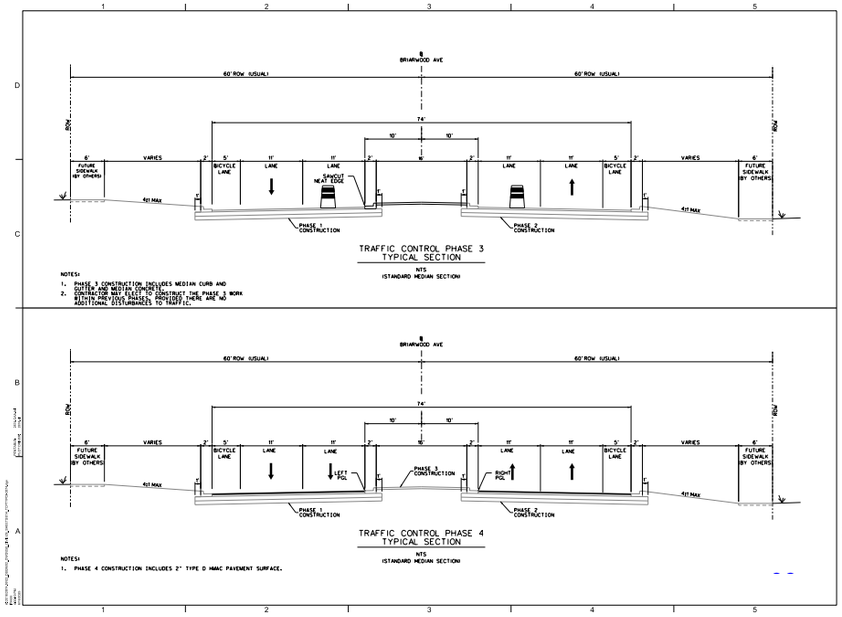
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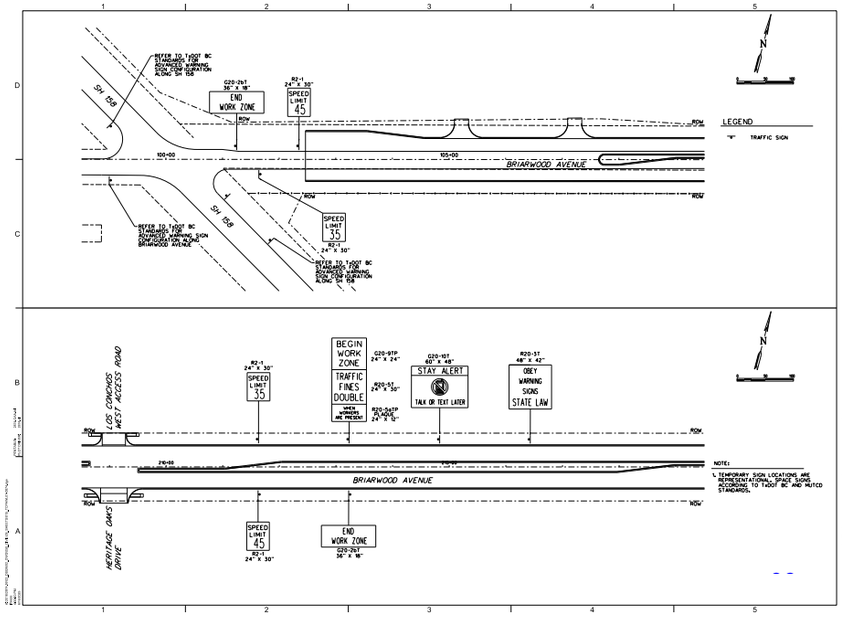
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BRIARWOOD AVENUE
TRAFFIC CONTROL
TYPICAL SECTIONS
SHEET 1 OF 2

013


BRIARWOOD AVE
60' ROW (USUAL)
74'
10'
10'
ROW
6' FUTURE SIDEWALK (BY OTHERS)
VARIES
2'
5' BICYCLE LANE
11' LANE
11' LANE
2' GRADOUT HEAT EDGE
2'
11' LANE
11' LANE
5' BICYCLE LANE
2'
VARIES
6' FUTURE SIDEWALK (BY OTHERS)
4:1 MAX
PHASE 1 CONSTRUCTION
PHASE 2 CONSTRUCTION
TRAFFIC CONTROL PHASE 3
TYPICAL SECTION
NTS
(STANDARD MEDIAN SECTION)
NOTES:
1. PHASE 3 CONSTRUCTION INCLUDES MEDIAN CURB AND GUTTER AND MEDIAN CONCRETE.
2. CONTRACTOR MAY ELECT TO CONSTRUCT THE PHASE 3 WORK SIMULTANEOUSLY WITH PHASE 2 PROVIDED THERE ARE NO ADDITIONAL DISTURBANCES TO TRAFFIC.
BRIARWOOD AVE
60' ROW (USUAL)
74'
10'
10'
ROW
6' FUTURE SIDEWALK (BY OTHERS)
VARIES
2'
5' BICYCLE LANE
11' LANE
11' LANE
LEFT POCKET
2'
PHASE 2 CONSTRUCTION
RIGHT POCKET
11' LANE
11' LANE
5' BICYCLE LANE
2'
VARIES
6' FUTURE SIDEWALK (BY OTHERS)
4:1 MAX
PHASE 1 CONSTRUCTION
PHASE 2 CONSTRUCTION
TRAFFIC CONTROL PHASE 4
TYPICAL SECTION
NTS
(STANDARD MEDIAN SECTION)
NOTES:
1. PHASE 4 CONSTRUCTION INCLUDES 2" TYPE D HMAC PAVEMENT SURFACE.
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Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
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BRIARWOOD AVENUE
TRAFFIC CONTROL
TYPICAL SECTIONS
SHEET 2 OF 2
014



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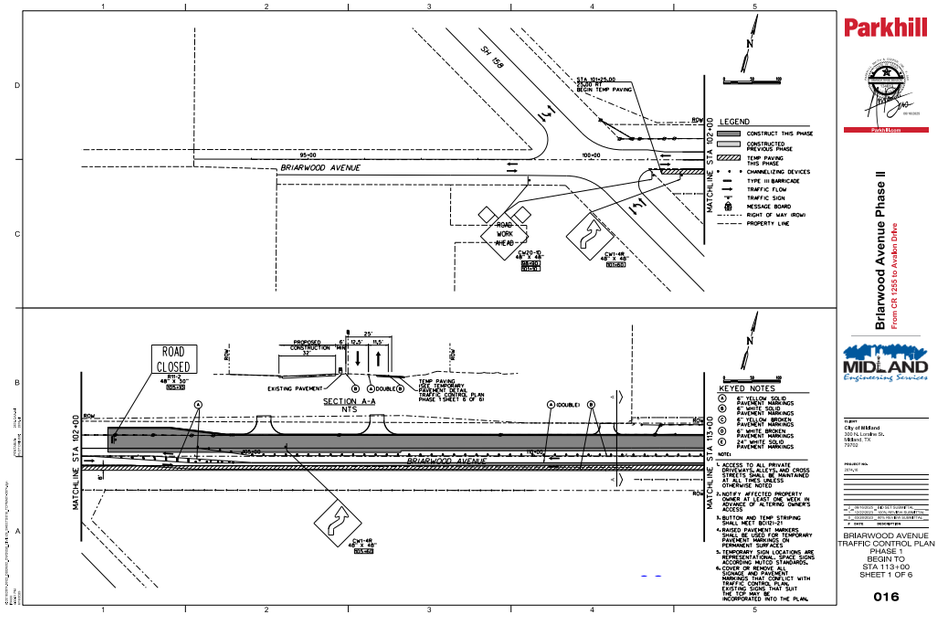
Briarwood Avenue Phase II

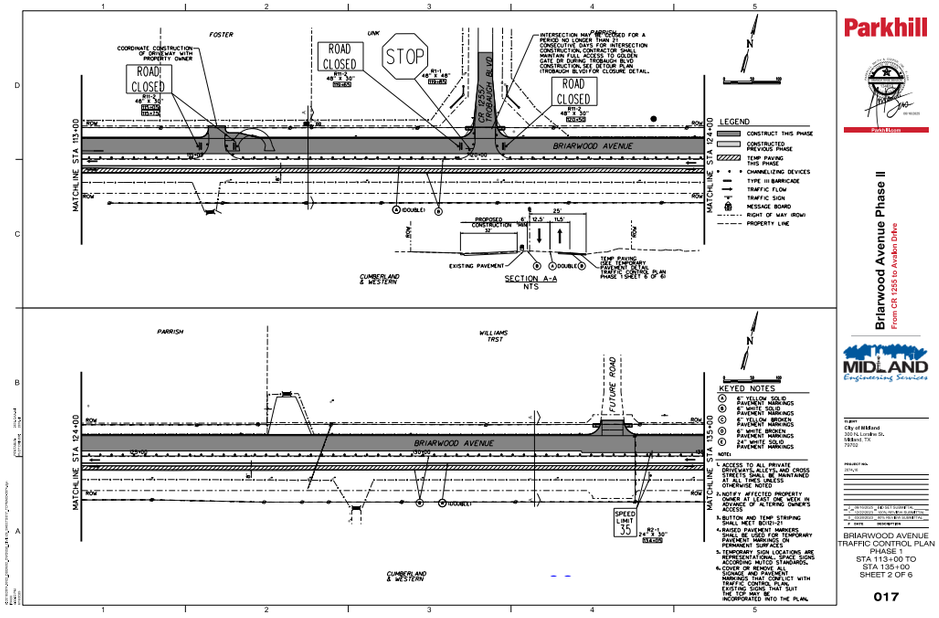
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE ADVANCED WARNING LAYOUT

015


BRIARWOOD AVENUE
SH 158
LEGEND
CONSTRUCT THIS PHASE
CONSTRUCTED PREVIOUS PHASE
TEMP PAVING THIS PHASE
CHANNELIZING DEVICES
TYPE III BARRICADE
TRAFFIC FLOW
TRAFFIC SIGN
MESSAGE BOARD
RIGHT OF WAY (ROW)
PROPERTY LINE
ROAD WORK AHEAD
ROAD CLOSED
SECTION A-A
NTS
EXISTING PAVEMENT
TEMP PAVING SEE TEMPORARY PAVEMENT MARKING TRAFFIC CONTROL PLAN PHASE 1 SHEET 5 OF 6
KEYED NOTES
6" YELLOW SOLID PAVEMENT MARKINGS
6" WHITE SOLID PAVEMENT MARKINGS
6" YELLOW BROKEN PAVEMENT MARKINGS
6" WHITE BROKEN PAVEMENT MARKINGS
24" WHITE SOLID PAVEMENT MARKINGS
NOTES:
1. ACCESS TO ALL PRIVATE DRIVEWAYS, ALLEYS, AND CROSS STREETS SHALL BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE NOTED
2. NOTIFY AFFECTED PROPERTY OWNER AT LEAST ONE WEEK IN ADVANCE OF ALTERING OWNER'S ACCESS
3. BUTTON AND TEMP STRIPING SHALL MEET BOYD-21
4. RAISED PAVEMENT MARKERS SHALL BE USED FOR TEMPORARY PAVEMENT MARKINGS ON PERMANENT SURFACES
5. TEMPORARY SIGN LOCATIONS ARE SHOWN FOR GENERAL GUIDANCE ACCORDING TMUTCD STANDARDS.
6. COVER OR REMOVE ALL SIGNAGE AND PAVEMENT MARKINGS NOT CONSISTENT WITH TRAFFIC CONTROL PLAN. EXISTING SIGNS THAT SUIT THE TCP WILL BE INCORPORATED INTO THE PLANS.
MATCHLINE STA 102+00
MATCHLINE STA 113+00
STA 102+25.00 RIGHT BT BEGIN TEMP PAVING
95+00
100+00
105+00
110+00
115+00
Parkhill
John Rowe
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79701
BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 1
BEGIN TO
STA 113+00
SHEET 1 OF 6
016



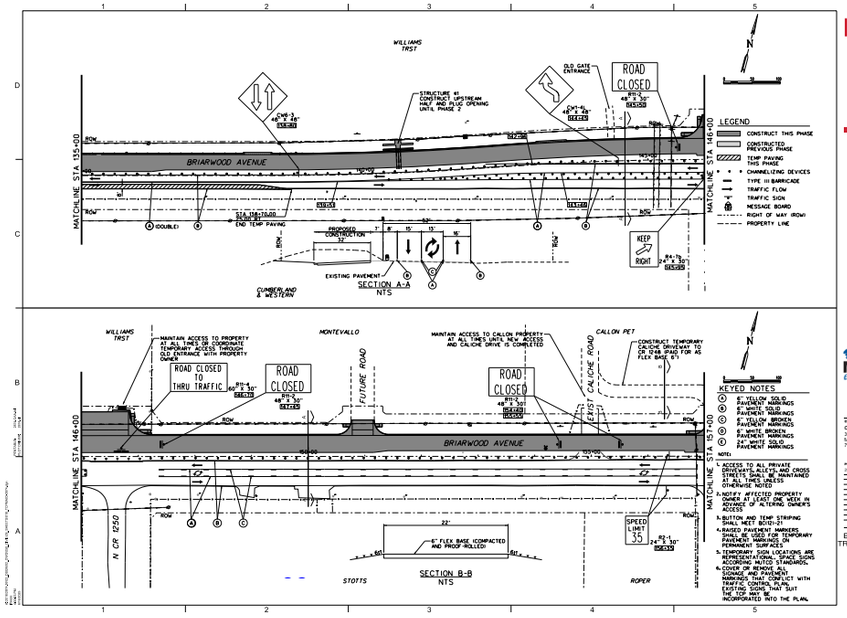
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Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE TRAFFIC CONTROL PLAN PHASE 1 STA 113+00 TO STA 135+00 SHEET 2 OF 6

017



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Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

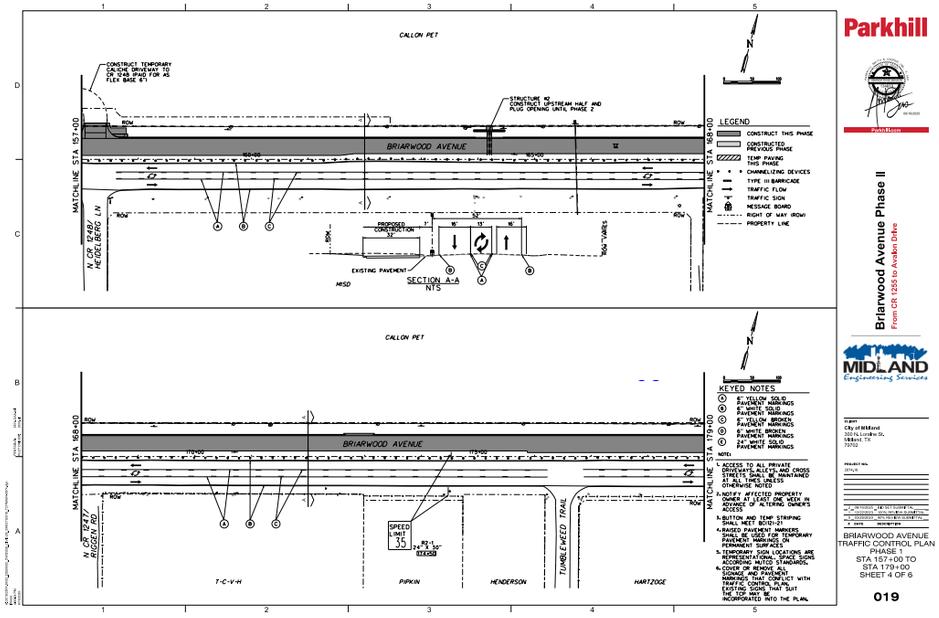
MIDLAND Engineering Services

client
City of Midland
300 N. Loraine St.
Midland, TX
79702

project no.
DESIGN
DRAWN
CHECKED
APPROVED
DATE
DESCRIPTION

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 1
STA 135+00 TO
STA 157+00
SHEET 3 OF 6

018



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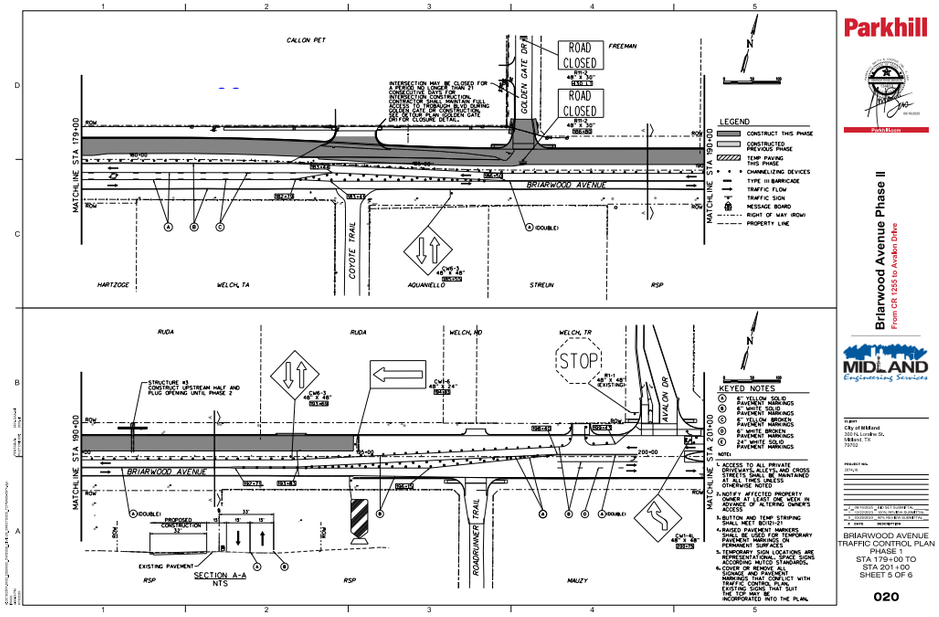
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 1
STA 157+00 TO
STA 179+00
SHEET 4 OF 6

019



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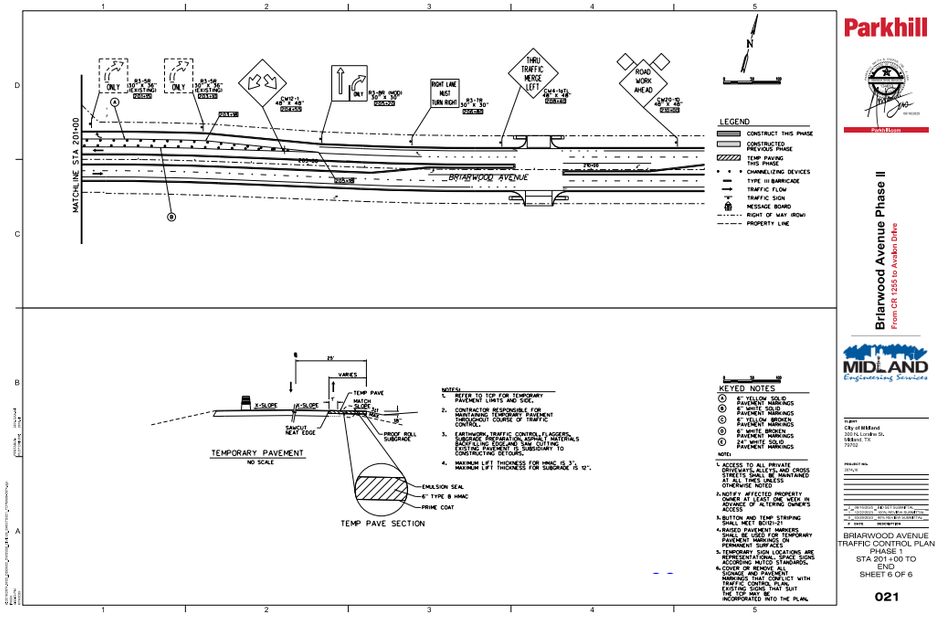
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE TRAFFIC CONTROL PLAN PHASE 1 STA 179+00 TO STA 201+00 SHEET 5 OF 6

020



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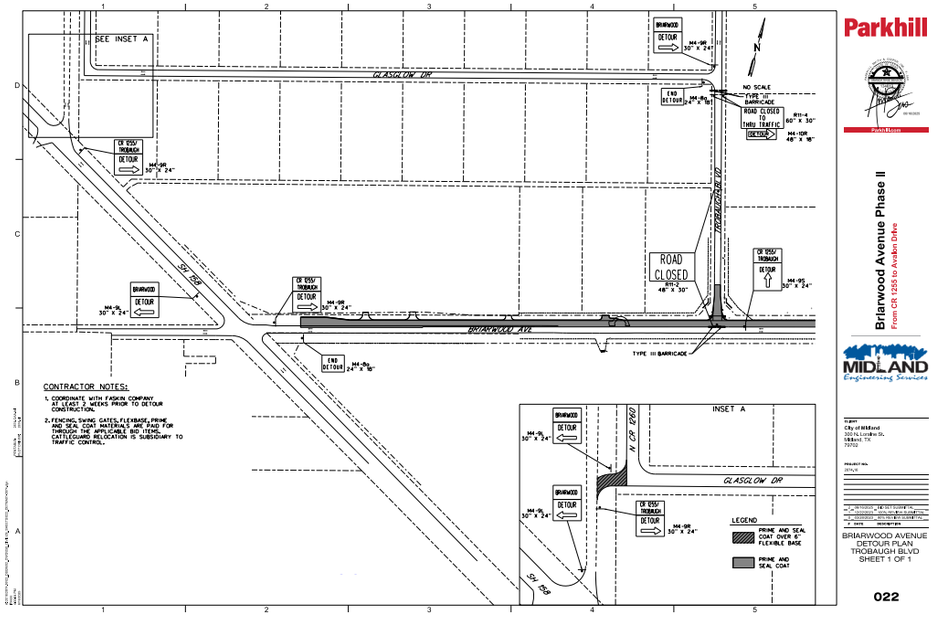
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 1
STA 201+00 TO
END
SHEET 6 OF 6

021



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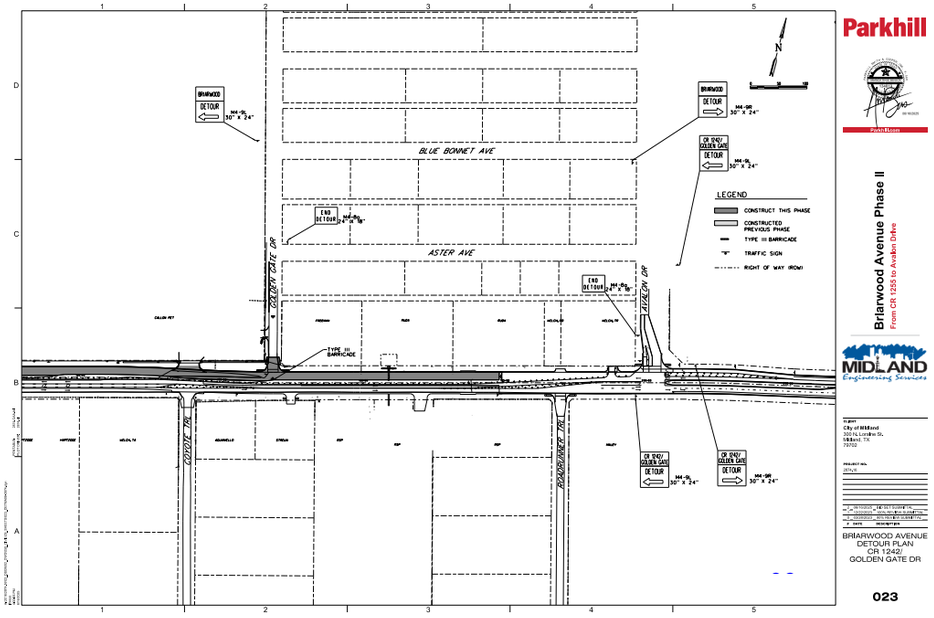
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
DETOUR PLAN
TROBAUGH BLVD
SHEET 1 OF 1

022



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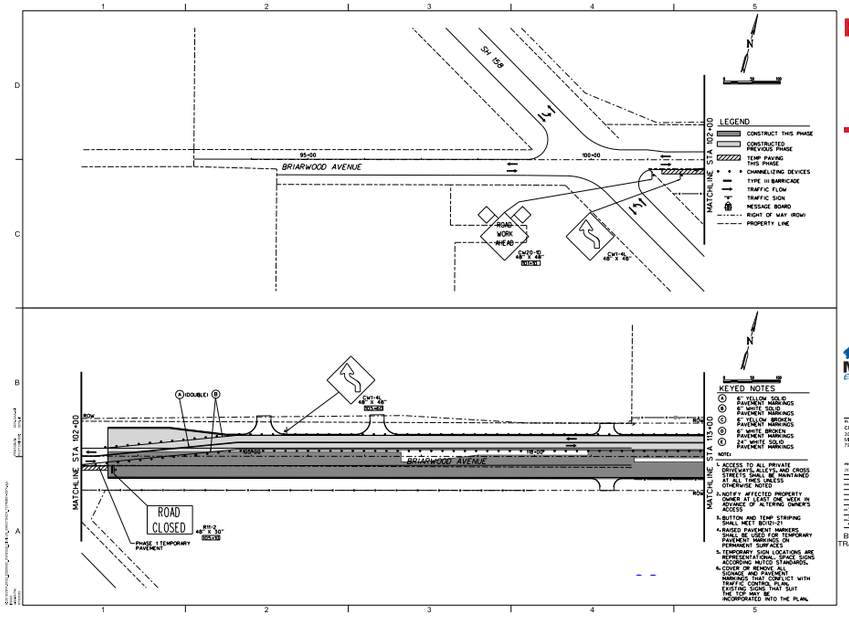
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
DETOUR PLAN
OR 1242/
GOLDEN GATE DR

023



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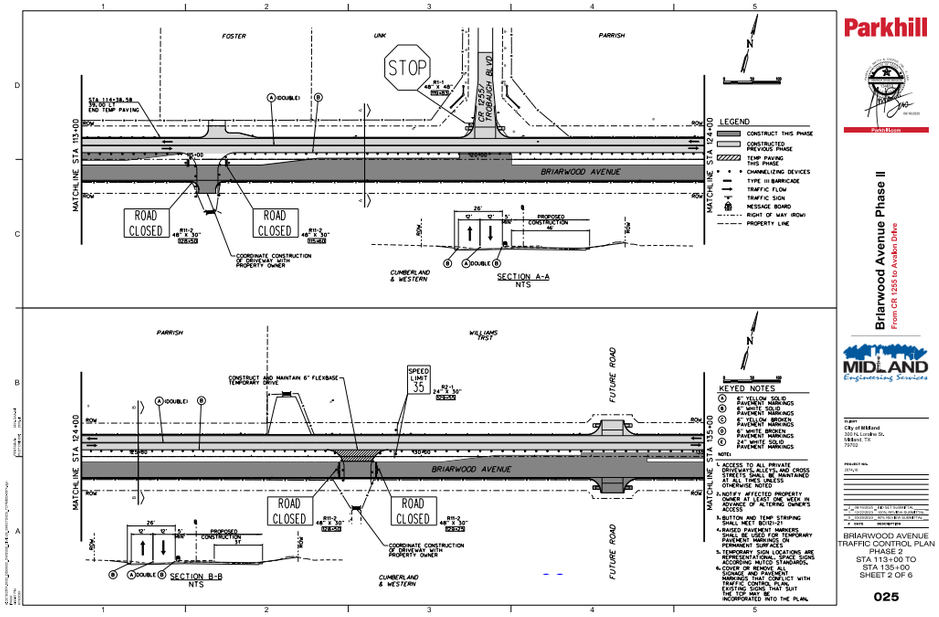
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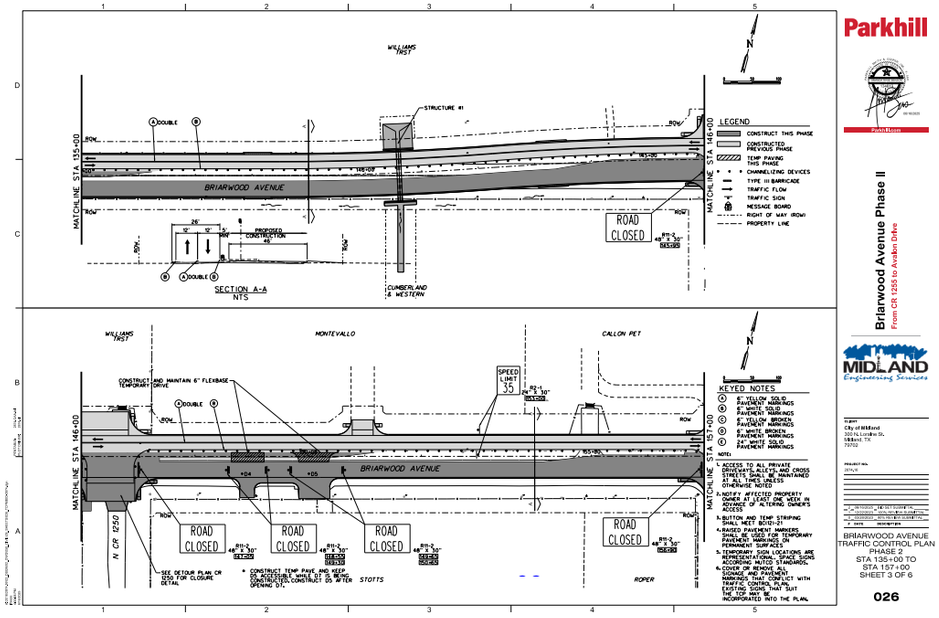
From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 2
BEGIN TO
STA 113+00
SHEET 1 OF 6

024


FOSTER
UNK
PARRISH
STOP
CR 1255/ AVALON BLVD
MATCHLINE STA 113+00
MATCHLINE STA 124+00
BRIARWOOD AVENUE
ROAD CLOSED
ROAD CLOSED
COORDINATE CONSTRUCTION OF DRIVEWAY WITH PROPERTY OWNER
PROPOSED CONSTRUCTION
CUMBERLAND & WESTERN
SECTION A-A
NTS
LEGEND
CONSTRUCT THIS PHASE
CONSTRUCTED PREVIOUS PHASE
TEMP PAVING THIS PHASE
CHANNELIZING DEVICES
TYPE III BARRICADE
TRAFFIC FLOW
TRAFFIC SIGN
MESSAGE BOARD
RIGHT OF WAY (ROW)
PROPERTY LINE
PARRISH
WILLIAMS FIRST
CONSTRUCT AND MAINTAIN 6" FLEXBASE TEMPORARY DRIVE
SPEED LIMIT 35
FUTURE ROAD
MATCHLINE STA 124+00
MATCHLINE STA 135+00
BRIARWOOD AVENUE
ROAD CLOSED
ROAD CLOSED
PROPOSED CONSTRUCTION
COORDINATE CONSTRUCTION OF DRIVEWAY WITH PROPERTY OWNER
CUMBERLAND & WESTERN
SECTION B-B
NTS
KEYED NOTES
NOTES
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 2
STA 113+00 TO
STA 135+00
SHEET 2 OF 6
025



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Briarwood Avenue Phase II

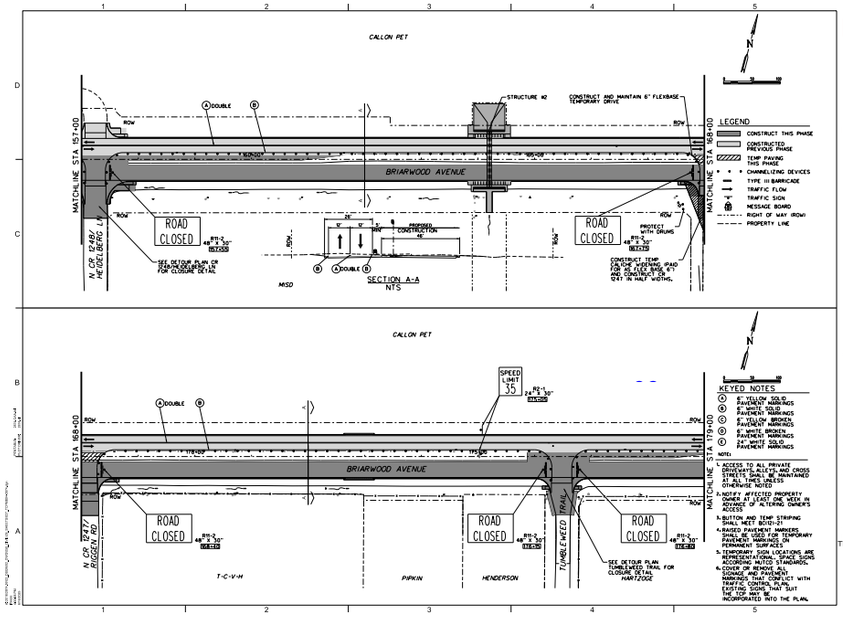
From CR 1250 to Avalon Drive

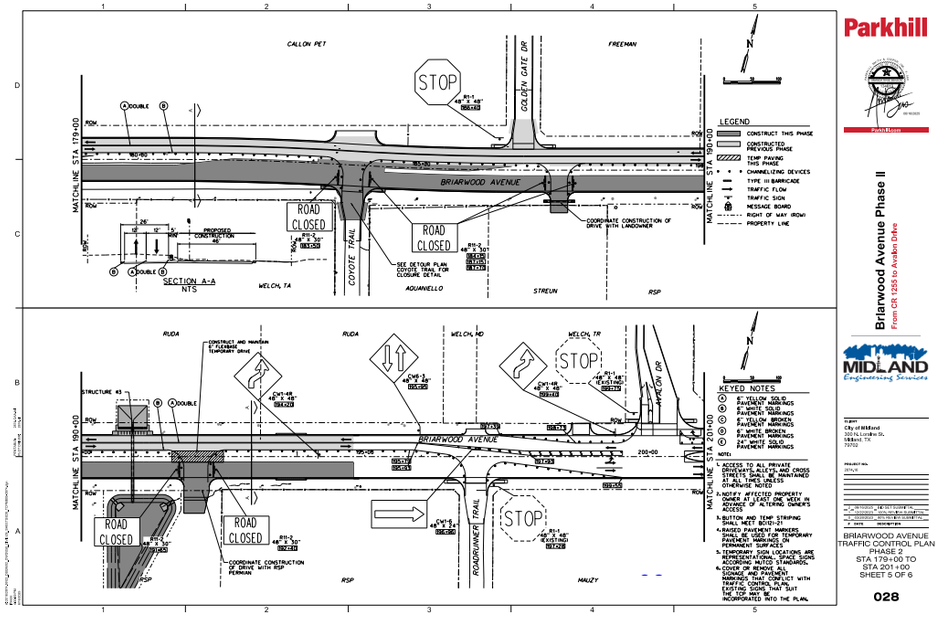
MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 2
STA 135+00 TO
STA 157+00
SHEET 3 OF 6

026


CALLON PET
BRIARWOOD AVENUE
MATCHLINE STA 157+00
MATCHLINE STA 168+00
N CR 1248/ HEIDELBERG LN
ROAD CLOSED
STRUCTURE #2
CONSTRUCT AND MAINTAIN 6" FLEXBASE TEMPORARY DRIVE
PROPOSED CONSTRUCTION
SECTION A-A
NTS
LEGEND
CONSTRUCT THIS PHASE
CONSTRUCTED PREVIOUS PHASE
TEMP PAVING THIS PHASE
CHANNELIZING DEVICES
TYPE III BARRICADE
TRAFFIC FLOW
TRAFFIC SIGN
MESSAGE BOARD
RIGHT OF WAY (ROW)
PROPERTY LINE
CALLON PET
BRIARWOOD AVENUE
MATCHLINE STA 168+00
MATCHLINE STA 179+00
N CR 1247/ RIGGEN RD
SPEED LIMIT 35
T-C-V-H
PIPKIN
HENDERSON
TUMBLEWEED TRAIL
KEYED NOTES
6" YELLOW SOLID PAVEMENT MARKINGS
6" WHITE SOLID PAVEMENT MARKINGS
6" YELLOW BROKEN PAVEMENT MARKINGS
6" WHITE BROKEN PAVEMENT MARKINGS
24" WHITE SOLID PAVEMENT MARKINGS
NOTES:
1. ACCESS TO ALL PRIVATE DRIVEWAYS, ALLEYS, AND CROSS STREETS SHALL BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE NOTED
2. NOTIFY AFFECTED PROPERTY OWNER AT LEAST ONE WEEK IN ADVANCE OF ALTERING OWNER'S ACCESS
3. BUTTON AND TEMP. STRIPING PER SHEET BOTD-21
4. RAISED PAVEMENT MARKERS SHALL BE USED FOR TEMPORARY PAVEMENT MARKINGS ON PERMANENT SURFACES
5. TEMPORARY SIGN LOCATIONS ARE SHOWN FOR REFERENCE ONLY. PLACING ACCORDING TO MUTCD STANDARDS.
6. COVER OR REMOVE ALL CONFLICTING SIGNS AND MARKINGS AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL PLAN. EXISTING SIGNS THAT SUIT THE TCP WILL BE INCORPORATED INTO THE PLAN.
SEE DETOUR PLAN TUMBLEWEED TRAIL FOR CLOSURE DETAILS HART20GE
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Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
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Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 2
STA 157+00 TO
STA 179+00
SHEET 4 OF 6
027



Parkhill

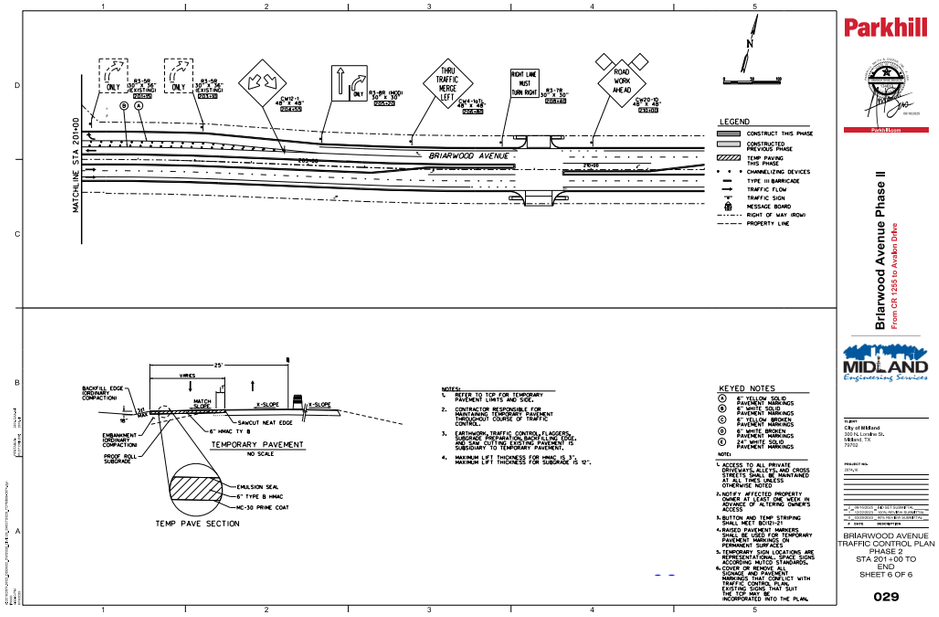
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

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BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 2
STA 179+00 TO
STA 201+00
SHEET 5 OF 6

028



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Briarwood Avenue Phase II

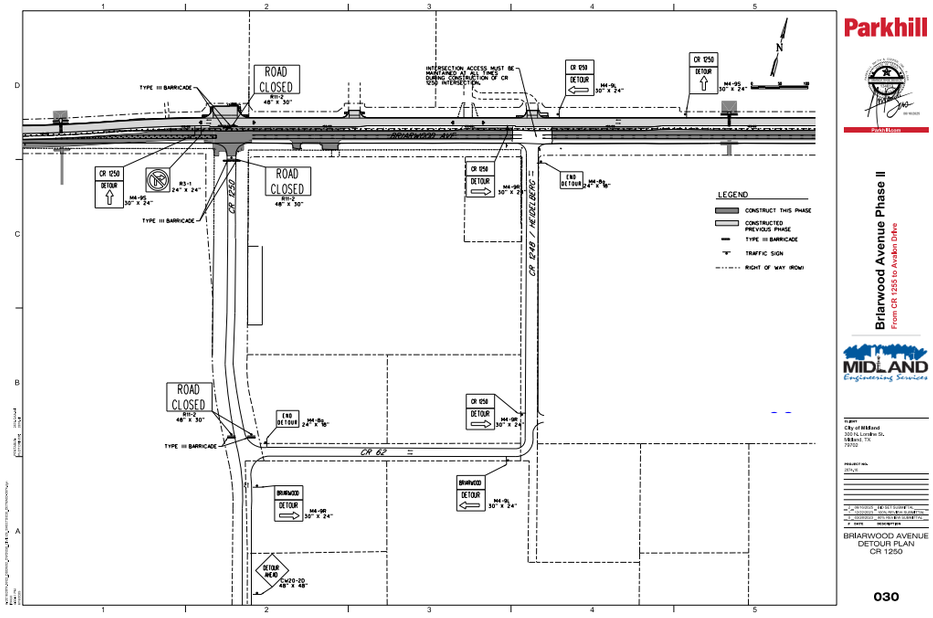
From CR 1255 to Avalon Drive

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City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 2
STA 201+00 TO
END
SHEET 6 OF 6

029



Parkhill

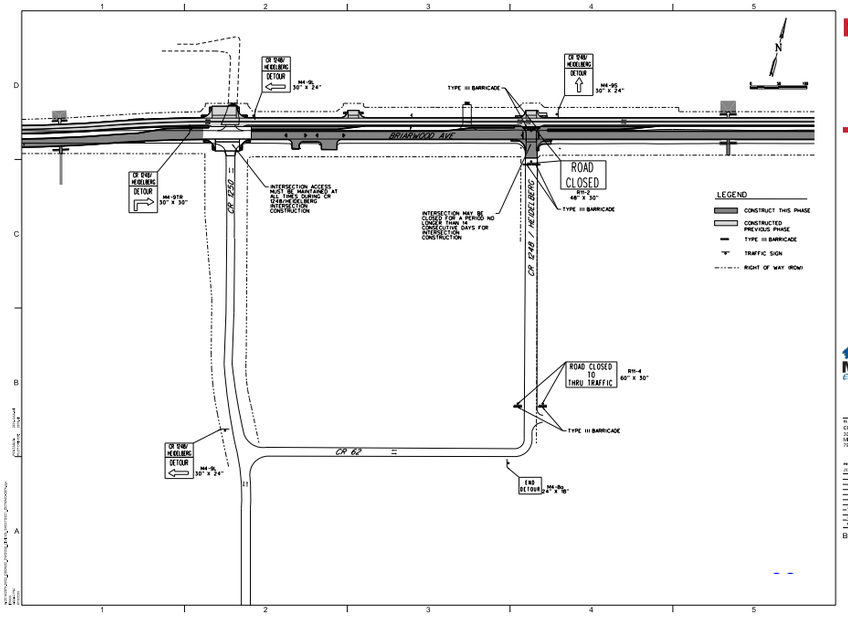
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

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BRIARWOOD AVENUE
DETOUR PLAN
CR 1250

030



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John Rivers

Briarwood Avenue Phase II

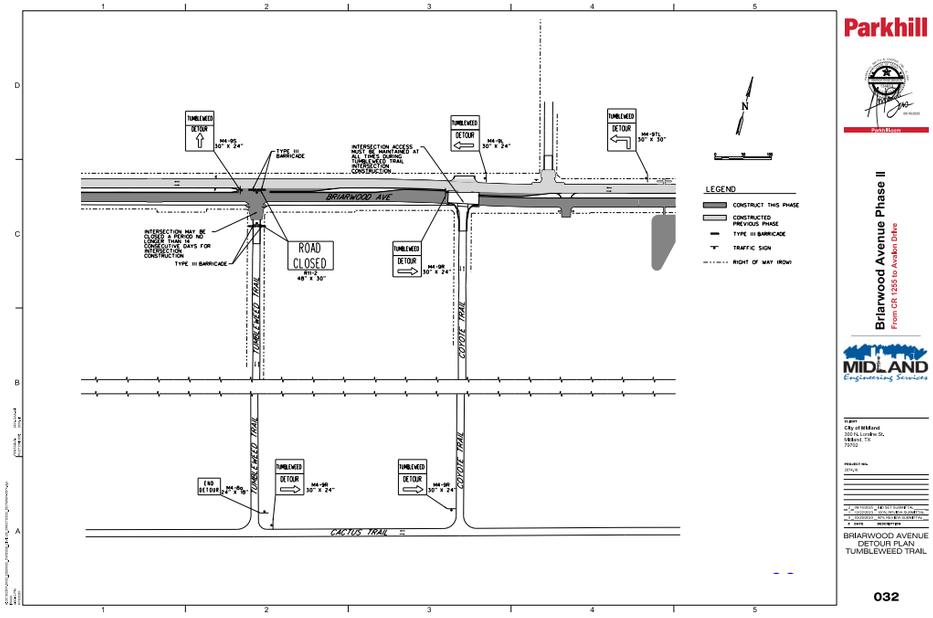
From CR 1325 to Avalon Drive

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Midland, TX
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BRIARWOOD AVENUE
DETOUR PLAN
CR 1240/
HEIDELBURG

031



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Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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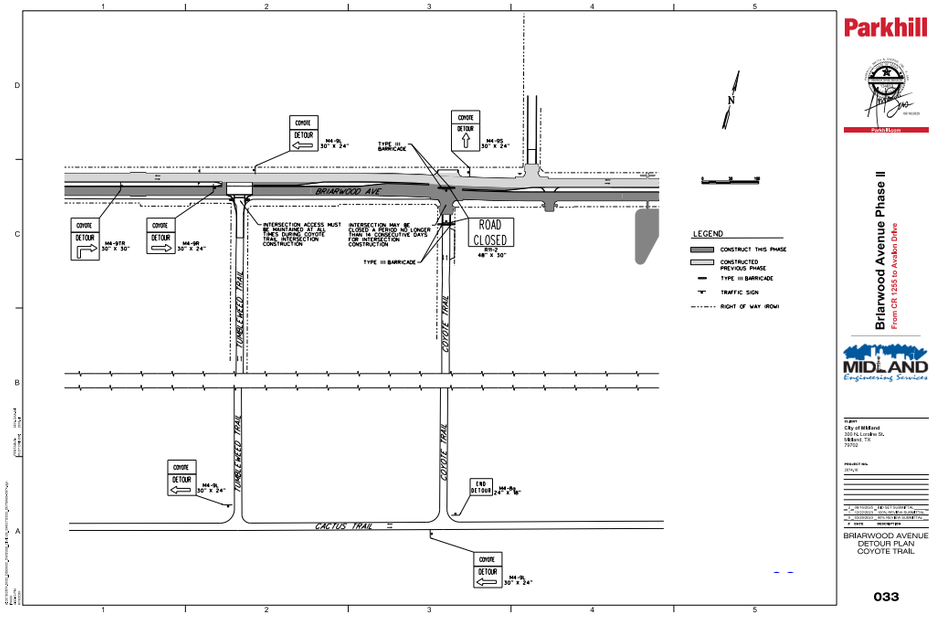
Client
City of Midland
300 N. Loraine St.
Midland, TX
79701

Project No.
057L11

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
DETOUR PLAN
TUMBLEWEED TRAIL

032



Parkhill

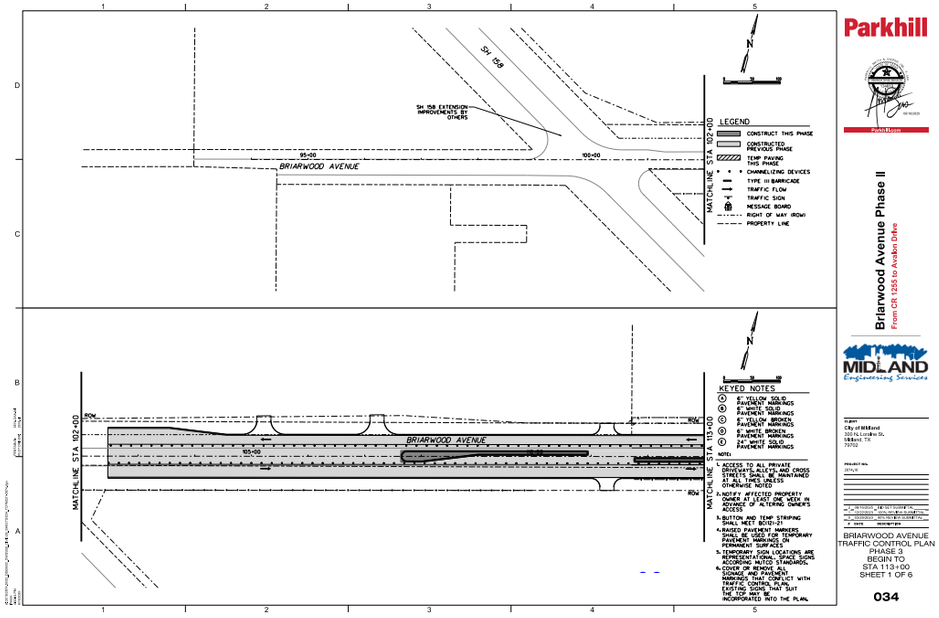
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

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BRIARWOOD AVENUE
DETOUR PLAN
COYOTE TRAIL

033



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Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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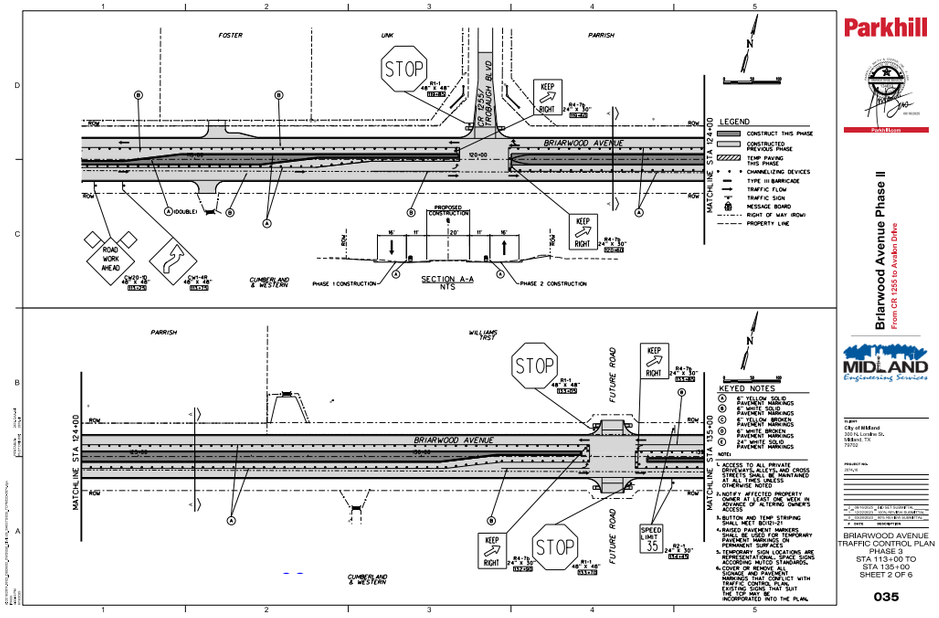
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

PROJECT No.
007619

NO.	DATE	DESCRIPTION
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2	09/09/2025	INITIAL BID SUBMITTAL
3	09/30/2025	INITIAL BID SUBMITTAL
4	DATE	DESCRIPTION

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
BEGIN TO
STA 113+00
SHEET 1 OF 6

034



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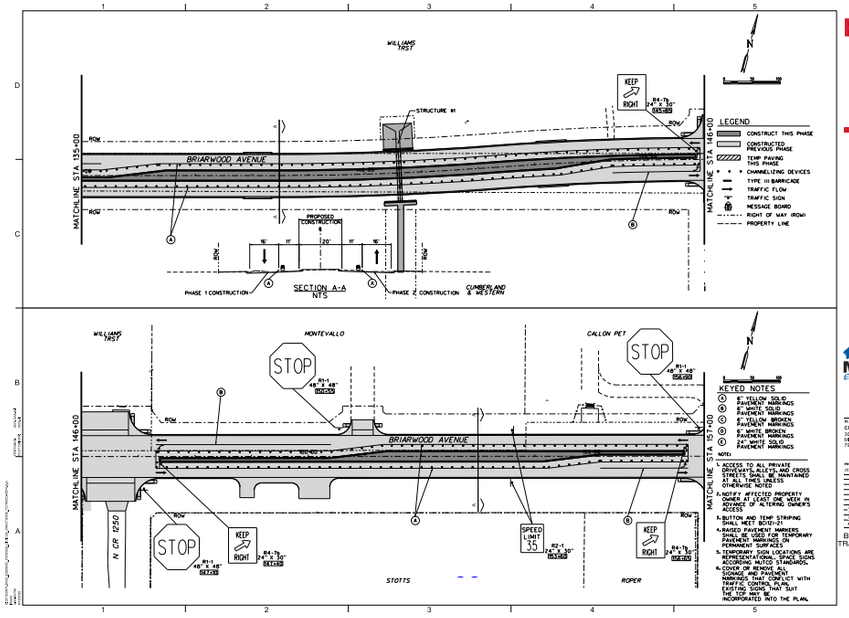
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 113+00 TO
STA 135+00
SHEET 2 OF 6

035



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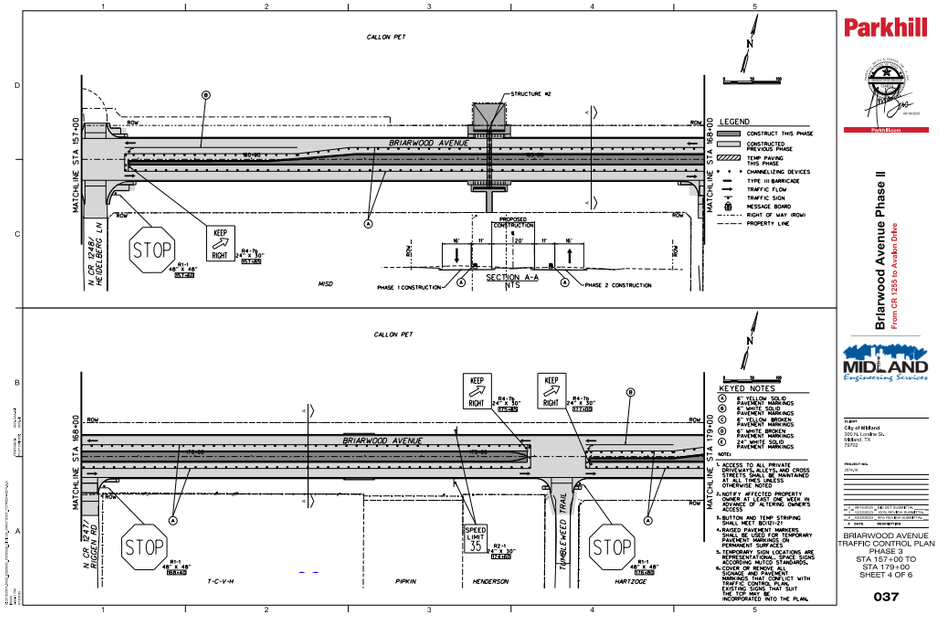
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

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BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 135+00 TO
STA 157+00
SHEET 3 OF 6

036



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Briarwood Avenue Phase II

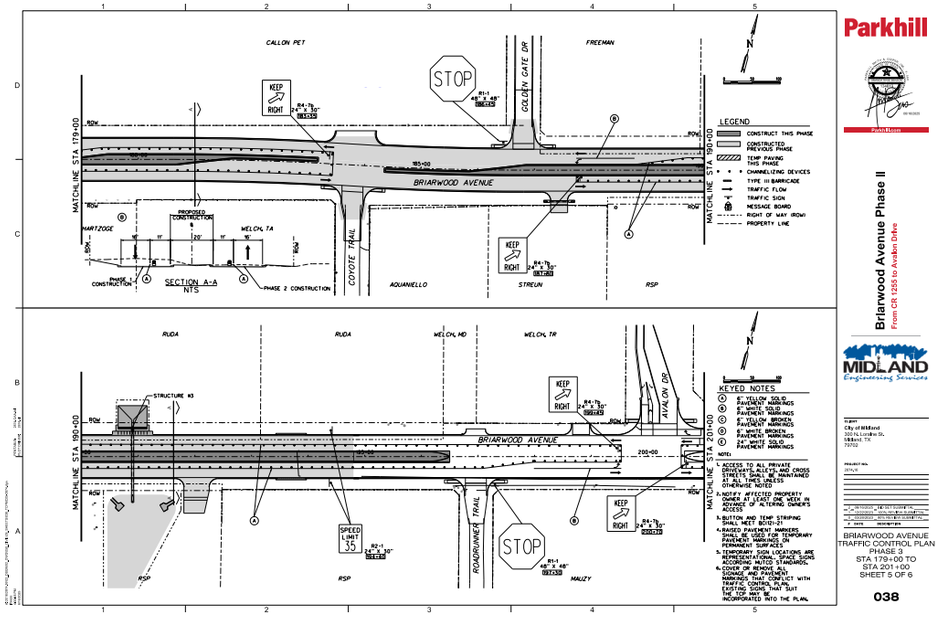
From CR 1250 to Avalon Drive

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Midland, TX
79702

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 157+00 TO
STA 179+00
SHEET 4 OF 6

037



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Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

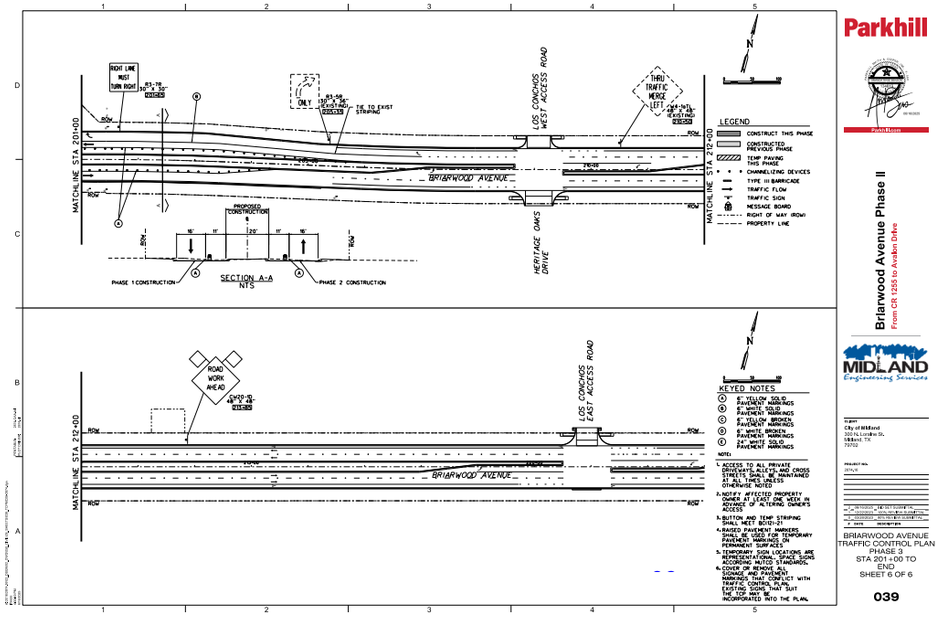
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Client
City of Midland
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Midland, TX
79702

NO.	DATE	DESCRIPTION

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 179+00 TO
STA 201+00
SHEET 5 OF 6

038



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Briarwood Avenue Phase II

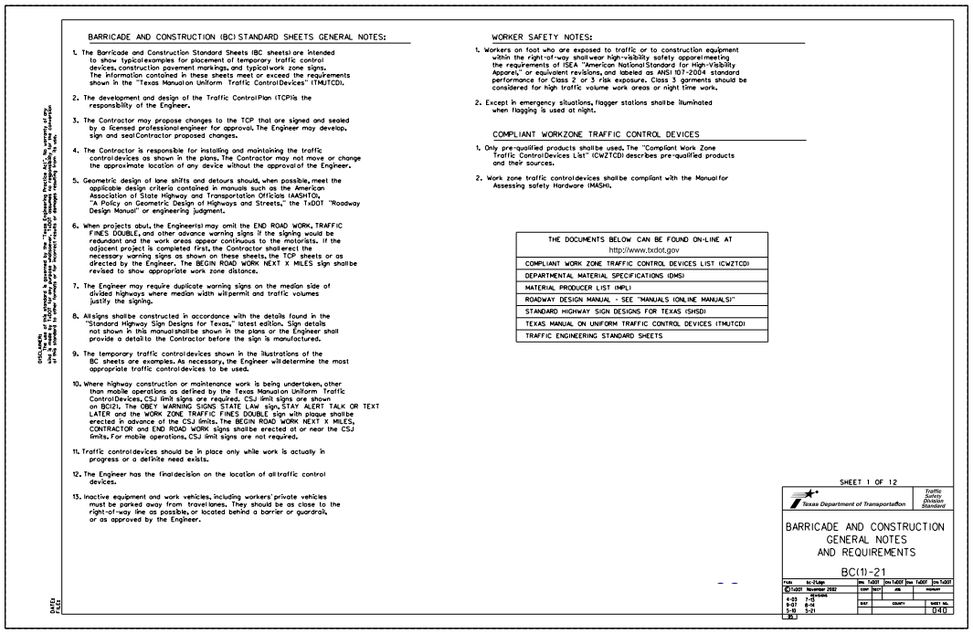
From CR 1255 to Avalon Drive

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City of Midland
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Midland, TX
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BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 201+00 TO
END
SHEET 6 OF 6

039



BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.

2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.

2. Work zone traffic control devices shall be compliant with the Manual for Assessing Safety Hardware (MASH).

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

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DATE/ CKD

SHEET 1 OF 12

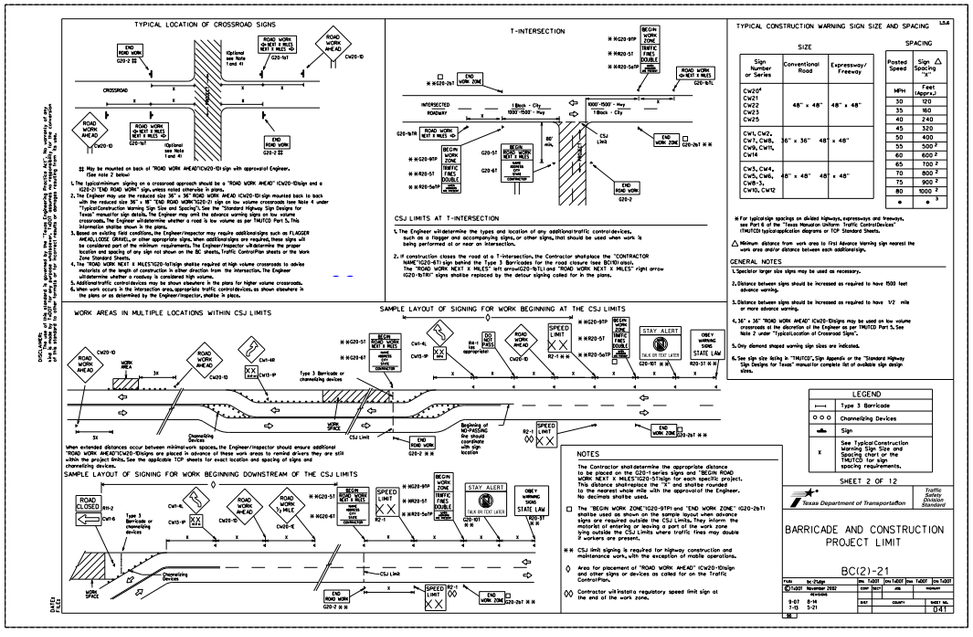
Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

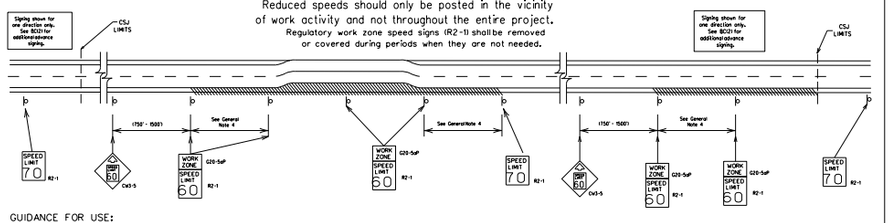
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REVISIONS 4-03 7-13 9-07 6-14 5-10 5-21				
	DIST	COUNTY		SHEET NO. 0410


TYPICAL LOCATION OF CROSSROAD SIGNS
T-INTERSECTION
TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING
CSJ LIMITS AT T-INTERSECTION
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS
SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS
SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS
GENERAL NOTES
NOTES
LEGEND
BARRICADE AND CONSTRUCTION PROJECT LIMIT
BC(2)-21
SHEET 2 OF 12

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.
Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic controlplans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:
- a) rough road or damaged pavement surface
- b) substantial alteration of roadway geometrics (diversions)
- c) construction detours
- d) grade
- e) width
- f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic controlplans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.
(See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed controls of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   - 40 mph and greater — 0.2 to 2 miles
   - 35 mph and less — 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the "ADVANCE SPEED LIMIT" (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   - A. Law enforcement.
   - B. Flagger stationed next to sign.
   - C. Portable changeable message sign (PCMS).
   - D. Low-power (transi-radar transmitter.
   - E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #2014 in the TxDOT e-form system.

SHEET 3 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

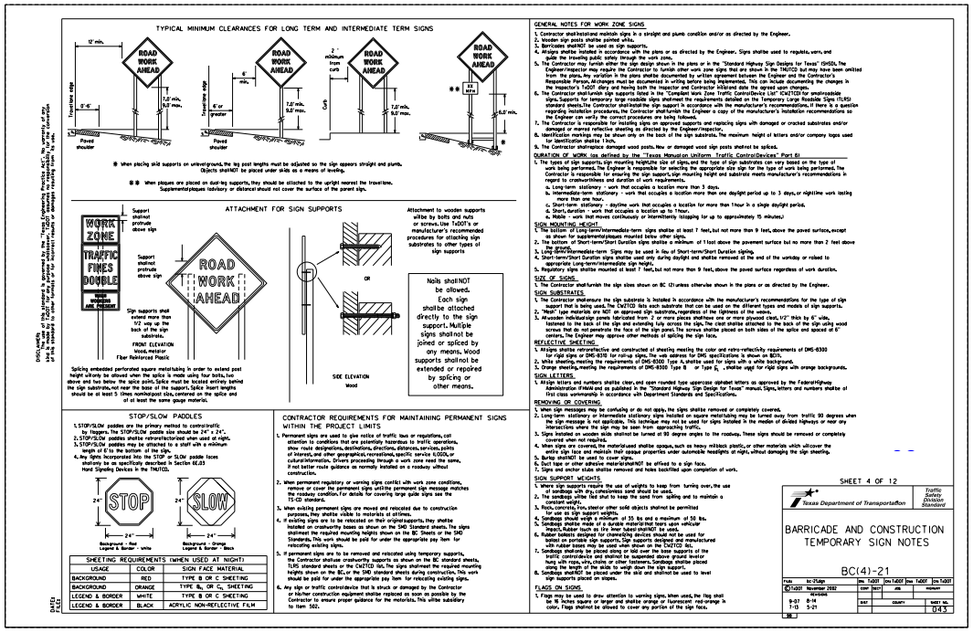
BARRICADE AND CONSTRUCTION
WORK ZONE SPEED LIMIT

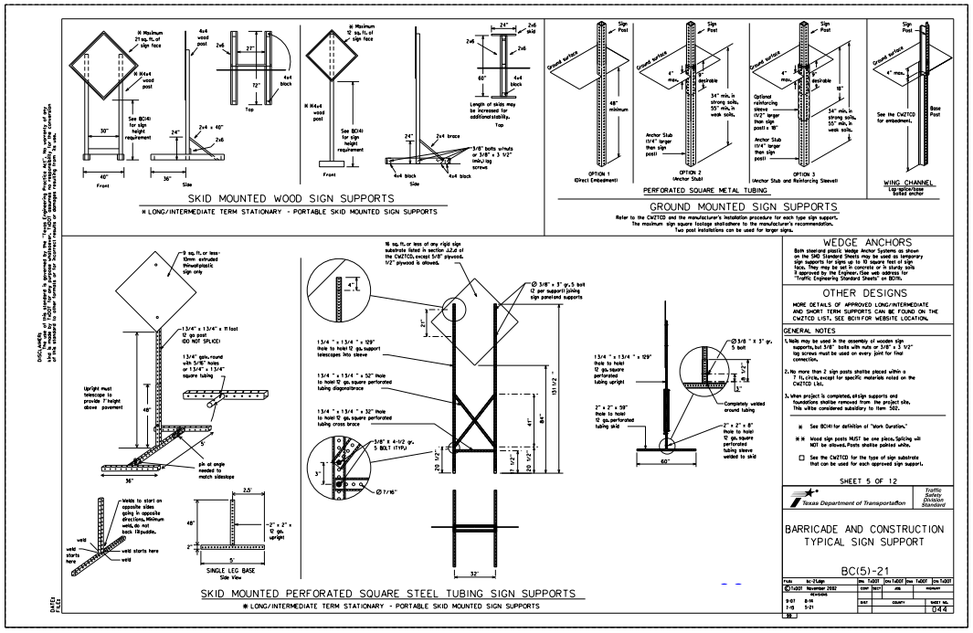
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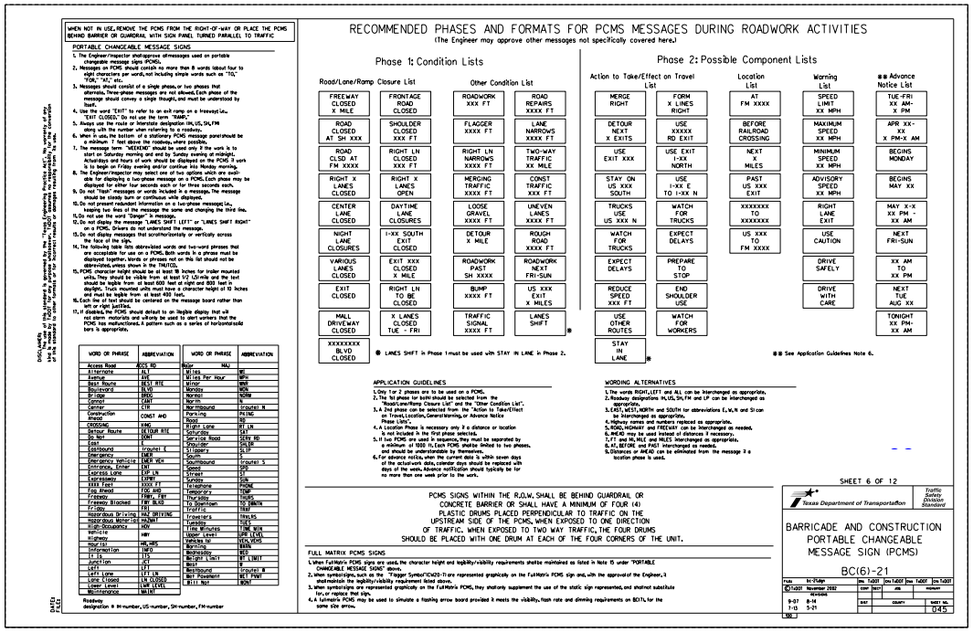
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DATE/CAD


TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS
ROAD WORK AHEAD
Traveled lane
Paved shoulder
Curb
ATTACHMENT FOR SIGN SUPPORTS
WORK ZONE
TRAFFIC FINES DOUBLE
ROAD WORK AHEAD
Support shaftnot protrude above sign
Sign supports shall extend more than 1/2 way up the back of the sign substrate.
FRONT ELEVATION
Wood, metalor Fiber Reinforced Plastic
Splicing embedded perforated square metalshallg in order to extend post height allfurly be allowed when the splice is made using four bolts,two above and two below the splice point.Splice must be located entirely behind the sign substrate,not near the base of the support.Splice insert lengths should be at least 5 times nominalpost size,centered on the splice and of at least the same gauge material.
Attachment to wooden supports willbe by bolts and nuts or screws.Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports
OR
SIDE ELEVATION
Wood
Nails shallNOT be allowed. Each sign shallbe attached directly to the sign support. Multiple signs shallnot be joined or spliced by any means. Wood supports shallnot be extended or repaired by splicing or other means.
STOP/SLOW PADDLES
1.STOP/SLOW paddles are the primary method to controltraffic by Flaggers.The STOP/SLOW paddle size should be 24" x 24".
2.STOP/SLOW paddles shallbe retroreflectorized when used at night.
3.STOP/SLOW paddles may be attached to a staff with a minimum length of 6'to the bottom of the sign.
4.Any Signs Incorporated into the STOP or SLOW paddle faces shallonly be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.
STOP
SLOW
24"
Background = Red Legend & Border= White
Background = Orange Legend & Border= Black
SHEETING REQUIREMENTS (WHEN USED AT NIGHT)
USAGE | COLOR | SIGN FACE MATERIAL
BACKGROUND | RED | TYPE B OR C SHEETING
BACKGROUND | ORANGE | TYPE B, OR C SHEETING
LEGEND & BORDER | WHITE | TYPE B OR C SHEETING
LEGEND & BORDER | BLACK | ACRYLIC NON-REFLECTIVE FILM
CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS
1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest,and other geographical,recreational,specific service 0,000,or cultural information. Drivers processing through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition.For details for covering large guide signs see the TS-CD standard.
3. When existing permanent signs are moved and relocated due to construction purposes,they shallbe visible to motorists at alltimes.
4. If existing signs are to be relocated on their originalsupports, they shallbe installed on crashworthy bases as shown on the SMD Standard sheets. The signs shallmeet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shalluse crashworthy supports as shown on the BC standard sheets, MPS standard sheets, or the SMD standard sheets.The signs shallmeet the mounting heights shown in the BC or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic controldevice that is struck or damaged by the Contractor's or other construction equipment shallbe replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This utilize subsidiary to Item 502.
GENERAL NOTES FOR WORK ZONE SIGNS
1. Contractor shallinstalland maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shallbe painted white.
3. Barricades shallNOT be used as sign supports.
4. All signs shallbe installed in accordance with the plans or as directed by the Engineer. Signs shallbe used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish their own sign layout that as shown in the TMUTCD but may have been omitted from the SHSD. Any sign design not specifically documented by written agreement between the Engineer and the Contractor's Responsible Person, Attorneys must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor Initialand date the agreed upon changes.
6. The Contractor shallfurnish sign supports listed in the "Compliant Work Zone Traffic Controldevice List" (CWZTCD)for unsatisfactory signs. Supports for temporary large mountable signs shallmeet the requirements detailed on the Temporary Large Mountable Signs (TLMS) standard sheets.The Contractor shallinstallthe sign supports in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures,the Contractor shallprovide the Engineer a copy of the manufacturer's installation recommendations so that the Engineer can verify that the signs are being installed correctly.
7. It is the Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shallbe 1 inch.
9. The Contractor shallreplace damaged wood posts. New or damaged wood sign posts shallnot be spliced.
DURATION OF WORK (as defined by the "Texas Manualon Uniform Traffic ControlDevices" Part 6)
1. The types of sign supports,sign mounting heights,the size of signs,and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring that the sign supports,mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
a. Long-term stationary - work that occupies a location more than 3 days.
b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days,or nighttime work lasting more than one hour.
c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
d. Short duration - work that occupies a location up to 1 hour.
e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes)
SIGN MOUNTING HEIGHT
1. The bottom of Long-termIntermediate-term signs shallbe at least 7 feet,but not more than 9 feet, above the paved surface,except as shown for Long-termIntermediate mounted below other signs.
2. The bottom of Short-term/Short Duration signs shallbe a minimum of 1 foot above the pavement surface but no more than 2 feet above the shoulder.
3. Long-termIntermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shallbe removed during daylight and shallbe removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shallbe mounted at least 7 feet,but not more than 9 feet,above the paved surface regardless of work duration.
SIZE OF SIGNS
1. The Contractor shallfurnish the sign sizes shown on BC (1)unless otherwise shown in the plans or as directed by the Engineer.
SIGN SUBSTRATES
1. The Contractor shallensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used.The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Weak" type materials are NOT an approved sign substrate,regardless of the tightness of the wires.
3. All wooden individualsign panels fabricated from 2 or more pieces shallhave one or more plywood cleat,1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign,The cleat shallbe attached to the back of the sign using wood screws that do not penetrate the face of the sign panel.The screws shallbe placed on both sides of the splice and spaced at 6" centers.The Engineer may approve other methods of splicing the sign face.
REFLECTIVE SHEETING
1. All signs shallbe retroreflective and conspicuous at nightby meansof sheeting meeting the color and retroreflectivity requirements of DMS-8300 Type B or Type C sheeting.The minimum sheeting requirements for various applications is shown on BC(1).
2. White sheeting meeting the requirements of DMS-8300 Type A shallbe used for signs with a white background.
3. Orange sheeting meeting the requirements of DMS-8300 Type B or Type C shallbe used for rigid signs with orange backgrounds.
SIGN LETTERS
1. All sign letters and numbers shallbe clear,and open rounded type uppercase alphabet letters as approved by the FederalHighway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs,letters and numbers shallbe of first class workmanship in accordance with Department Standards and Specifications.
REMOVING OR COVERING
1. When sign messages may be confusing or do not apply, the signs shallbe removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metalshallmay be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shallnot be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not applicable.
4. When signs are covered, the materialused shallbe opaque, such as heavy mildew plastic,or other materials which willcover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shallNOT be used to cover signs.
6. Duct tape or other adhesive materialshallNOT be affixed to a sign face.
7. Signs and anchor skids shallbe removed and holes backfilled upon completion of work.
SIGN SUPPORT WEIGHTS
1. Where sign supports require the use of weights to keep from turning over,the use of sandbags with dry,cohesionless sand should be used.
2. The Contractor shallprotect the sand from spilling and to maintain a constant weight.
3. Rock,concrete,iron,steelor other solid objects shallnot be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 25 lbs and a maximum of 50 lbs.
5. Sandbags shallbe placed on the skid and shallnot be used to level sign supports.Rubber bands or other bags shallNOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports.Sign supports designed and manufactured with rubber bases may be used when shown on the SMD standards.
7. Sandbags shallbe placed under the skid and shallnot be used to level the traffic controldevice and shallnot be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shallbe placed using the length of the skids to weigh down the sign support.
8. Sandbags shallnot be placed under the skid and shallnot be used to level sign supports placed on slopes.
FLAGS ON SIGNS
1. Flags may be used to draw attention to warning signs, when used, the flag shall be 18 inches square or larger and shallbe orange or fluorescent red-orange in color. Flags shallnot be allowed to cover any portion of the sign face.
SHEET 4 OF 12
Texas Department of Transportation
Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES
BC(4)-21
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SKID MOUNTED WOOD SIGN SUPPORTS
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS
GROUND MOUNTED SIGN SUPPORTS
PERFORATED SQUARE METAL TUBING
WING CHANNEL
WEDGE ANCHORS
OTHER DESIGNS
GENERAL NOTES
SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS
SHEET 5 OF 12
BARRICADE AND CONSTRUCTION
TYPICAL SIGN SUPPORT
BC(5)-21



WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/inspector shall approve all messages used on portable changeable message signs (PCMS).
2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
4. Do not use "EXIT" to refer to an exit ramp on a freeway/ex...
   "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM ... along with the number when referring to a roadway.
6. When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Otherwise, the days of the week should be specified. Work is to begin on Friday evening and/or continue into Monday morning.
8. The Engineer/inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either two seconds each or for three seconds each.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. Do not present redundant information on a two-phase message, i.e., keeping two lines of the message the same and changing the third line, such as "RIGHT LANE CLOSED" and "USE CAUTION."
11. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
12. Do not display messages that scroll vertically or vertically across the face of the sign.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the MUTCD.
15. Proportional characters should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 US-mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
16. Care should be exercised to centered on the message board rather than left or right justified.
17. If desired, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Hour	HR
Alternate	ALT	Hours	HRS
Avenue	AVE	Hours Per Hour	MPH
Best Route	BEST RTE	Information	INFO
Boulevard	BLVD	Minutes	MIN
Bridge	BRDG	Normal	NORM
Cannot	CANT	North	N
Center	CTR	Northbound	(routes) N
Construction	CONST AHD	Parking	PKING
Ahead		Road	RD
CROSSING	XING	Right Lane	RT LN
Detour Route	DETOUR RTE	Saturday	SAT
Do Not	DONT	Service Road	SERV RD
Exit	X	Shoulder	SHLDR
Eastbound	(route) E	Slippery	SLIP
Emergency	EMER	South	S
Emergency Vehicle	EMER VEH	Southbound	(route) S
Entrance, Enter	ENT	Speed	SPD
Express Lane	EXP LN	Street	ST
Expressway	EXPWY	Sunday	SUN
XXX Feet	XXXX FT	Telephone	PHONE
Fog Ahead	FOG AHD	Temporary	TEMP
Freeway	FWY	Thursday	THURS
Freeway Blocked	FWY BLKD	To Downtown	TO DWNTN
Friday	FRI	Tuesday	TUES
Hazardous Driving	HAZ DRIVING	Traffic	TRFC
Hazardous Material	HAZMAT	Transfer	TRANS
High Occupancy	HOV	Traveler Information	TRVL INFO
Hospital	HOSP	Turn Minutes	TIME MIN
Hour	HR	Upper Level	UPR LEVEL
Hours	HRS	Vehicles (s)	VEH, VEHS
Information	INFO	Warning	WARN
I-X	I X	Wednesday	WED
Junction	JCT	Weight Limit	WT LIMIT
Left	LFT	West	W
Left Lane	LFT LN	Westbound	(route) W
Left Closed	LFT CLOSED	Wet Pavement	WET PVMT
Lower Level	LWR LEVEL	Will Not	WONT
Maintenance	MAINT		
Roadway designation #	# number, US number, SH number, FM number		

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
RIGHT X LANES CLOSED	RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
CENTER LANE CLOSED	DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
EXIT CLOSED	RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT *
XXXXXXXX BLVD CLOSED			

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List		Location List	Warning List	** Advance Notice List
MERGE RIGHT	FORM X LINES RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM- X PM
DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX X PM-X AM
USE EXIT XXX	USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXXX TO XXXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP		DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE		DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS			TONIGHT XX PM- XX AM
STAY IN LANE *				

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only Tier 2 phases are to be used on a PCMS.
2. A 1st phase can be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location phase is necessary only if a distance or location is needed for the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Abbreviations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH for abbreviations E, W, N and S can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AM, PM may be used instead of distances if necessary.
7. MILE, MILES, FEET and FT can be interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC, WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Flagger Symbol" (CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for the static sign.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

SHEET 6 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

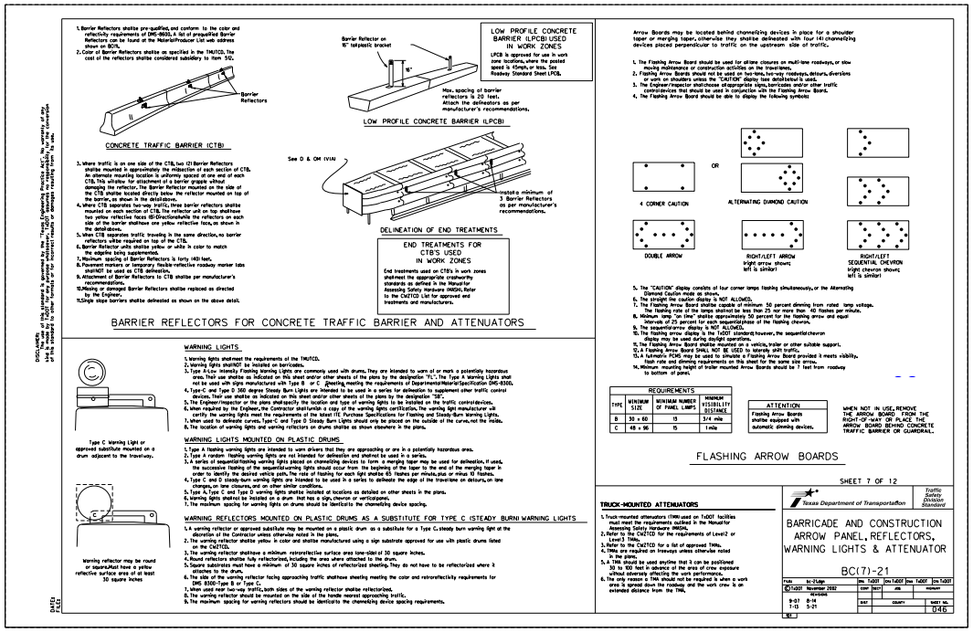
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

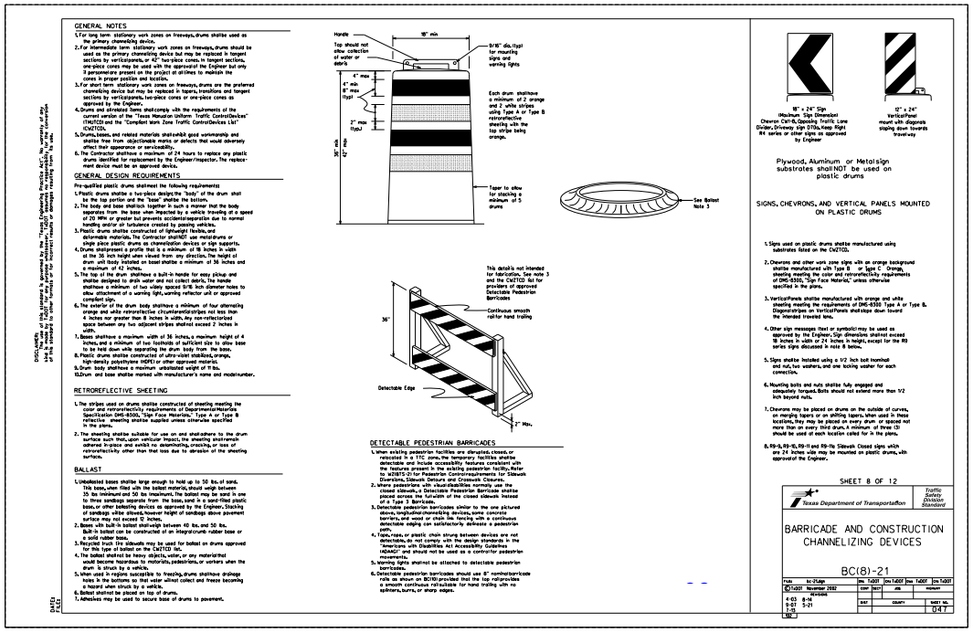
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REVISIONS				
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DATES / FILE:


1. Barrier Reflectors shallbe yellow, and conform to the color and
retroreflectivity requirements of ASTM D 4956-04, Type IV.
Reflectors can be found at the Materials Producer List web address
shown on BDM.
2. Color of Barrier Reflectors shallbe as specified in the TMUTCD. The
cost of the reflectors shallbe considered subsidiary to Item 542.
Barrier Reflectors
CONCRETE TRAFFIC BARRIER (CTB)
3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors
shallbe mounted in approximately the midsection of each section of CTB.
An alternate mounting location is uniformly spaced at one end of each
CTB. This alternate location allows for attachment of a barrier gregate without
drilling holes in the concrete barrier. The reflectors shallbe on the side of
the CTB shallbe located directly below the reflector mounted on top of
the barrier, as shown in the detailsbove.
4. Where CTB separates two-way traffic, three barrier reflectors shallbe
mounted on each section of CTB. The reflector unit on top shallhave
two yellow reflective faces 90 deviationshalle the reflectors on each
side of the barrier shallhave one yellow reflective face, as shown in
the detailsbove.
5. When CTB separates traffic traveling in the same direction, no barrier
reflectors shallbe required on top of the CTB.
6. Barrier Reflector units shallbe yellow or white in color to match
the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Maximum spacing of Barrier Reflector Shallbe reflective roadway marker lobs
shallNOT be used as CTB delineators.
9. Attachment of Barrier Reflectors to CTB shallbe per manufacturer's
recommendations.
10. Missing or damaged Barrier Reflectors shallbe replaced as directed
by the Engineer.
11. Single slope barriers shallbe delineated as shown on the above detail.
Barrier Reflector on
10" tubplastic bracket
4"
Max. spacing of barrier
reflectors is 20 feet.
Attach the delineators as per
manufacturer's recommendations.
LOW PROFILE CONCRETE BARRIER (LPCB)
LOW PROFILE CONCRETE
BARRIER (LPCB) USED
IN WORK ZONES
LPCB is approved for use in work
zone locations, where the posted
speed is 45mph, or less. See
Roadway Standard Sheet LPCB.
See D & OM (VIII)
Install a minimum of
3 Barrier Reflectors
as per manufacturer's
recommendations.
DELINEATION OF END TREATMENTS
END TREATMENTS FOR
CTB'S USED
IN WORK ZONES
End treatments used on CTB's in work zones
shallmeet the appropriate crashworthy
standards as defined in the Manual for
Assessing Safety Hardware (MASH), Refer
to the CMJTCD List for approved end
treatments and manufacturers.
BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS
Type C Warning Light or
approved substitute mounted on a
drum adjacent to the travelway.
Warning reflector may be round
or square,but have a yellow
reflective surface area of at least
30 square inches
WARNING LIGHTS
1. Warning lights shallmeet the requirements of the TMUTCD.
2. Warning lights shallNOT be installed on barricades.
3. Type A (low intensity) flashing warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous
area. Type A warning lights shallbe installed on the channelizing devices and/or other sheets of the plans by the designation "A". The Type A warning Lights shall
only be used with units manufactured with Type B or C flashing meeting the requirements of Departmental Material Specification DMS-8300.
4. Type C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control
devices. Their use shallbe as indicated on this sheet and/or other sheets of the plans by the designation "SB".
5. The Engineer/Inspector or the plans shallspecify the location and type of warning lights to be installed on the traffic controldevices.
6. When required by the Engineer, the Contractor shallfurnish a copy of the warning lights certification. The warning light manufacturer will
certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
7. When used to delineate curves, Type C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
8. The location of warning lights and warning reflectors on drums shallbe as shown elsewhere in the plans.
WARNING LIGHTS MOUNTED ON PLASTIC DRUMS
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shallnot be used in a series.
3. A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation, if used,
the sequential flashing warning lights shallbe installed on the downstream end of the taper. The rate of flashing of the merging taper is
slower than the rate of flashing for other warning lights in order to identify the desired vehicle path. The rate of flashing for each light shallbe 65 flashes per minute, plus or minus 10 flashes.
4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travelway on detours, on lane
closures, on lane closures, and on other similar conditions.
5. Type A, Type C and Type D warning lights shallbe installed at locations as detailed on other sheets in the plans.
6. Warning lights shallnot be installed on a drum that has a sign, chevron or verticalpanel.
7. The maximum spacing for warning lights on drums should be identicalto the channelizing device spacing.
WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C STEADY BURN WARNING LIGHTS
1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C steady burn warning light at the
discretion of the Contractor unless otherwise noted in the plans.
2. The warning reflector shallbe yellow in color and shallbe manufactured using a sign substrate approved for use with plastic drums listed
on the CMJTCD.
3. The warning reflector shallhave a minimum retroreflective surface area tone-sided of 30 square inches.
4. Square reflectors shallbe fully retroreflected, including the area where attached to the drum.
5. Square reflectors must have a minimum of 30 square inches of retroreflected sheeting. They do not have to be retroreflected where it
attaches to the drum.
6. The side of the warning reflector facing approaching traffic shallhave sheeting meeting the color and retroreflectivity requirements for
DMS 8300-Type B or Type C.
7. When used near two-way traffic, both sides of the warning reflector shallbe retroreflected.
8. The warning reflector should be mounted on the side of the tranile nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identicalto the channelizing device spacing requirements.
Arrow Boards may be located behind channelizing devices in place for a shoulder
taper or merging taper, otherwise they shallbe delineated with four (4) channelizing
devices placed perpendicular to traffic on the upstream side of traffic.
1. The Flashing Arrow Board should be used for oflane closures on multi-lane roadways, or slow
moving maintenance or construction activities on the travelanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions
or work on shoulders unless the "CAUTION" display (see detailsbelow) is used.
3. The Engineer/Inspector shallcheck all appropriate signs, barricades and/or other traffic
controldevices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbols:
4 CORNER CAUTION
OR
ALTERNATING DIAMOND CAUTION
DOUBLE ARROW
RIGHT/LEFT
Right arrow shown;
left is similar
RIGHT/LEFT
SEQUENTIAL CHEVRON
Right chevron shown;
left is similar
5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating
Diamond Caution mode, as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shallbe capable of minimum 50 percent dimming from rated lamp voltage.
The flashing rate of the lamps shallnot be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shallbe approximately 50 percent for the flashing arrow and equal
intervals of 25 percent for each sequentialphase of the flashing chevron.
9. The minimum number of lamps shallbe 15.
10. The flashing arrow display is the TxDOT standard;however, the sequentialchevron
display may be used during daylight operations.
11. The Flashing Arrow Board shallbe mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A Flashing Arrow Board may be used in a stationary mode, if it provides it meets visibility,
flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway
to bottom of panel.
REQUIREMENTS
TYPE | MINIMUM SIZE | MINIMUM NUMBER OF PANEL LAMPS | MINIMUM VISIBILITY DISTANCE
B | 30 x 60 | 15 | 3/4 mile
C | 48 x 96 | 15 | 1 mile
ATTENTION
Flashing Arrow Boards
shallbe equipped with
automatic dimming devices.
WHEN NOT IN USE, REMOVE
THE ARROW BOARD FROM THE
RIGHT-OF-WAY OR PLACE IT
BEHIND A BARRIER OR CONCRETE
TRAFFIC BARRIER OR GUARDRAIL.
FLASHING ARROW BOARDS
TRUCK-MOUNTED ATTENUATORS
1. Truck mounted attenuators (TMA) used on TxDOT facilities
must meet the requirements outlined in the Manual for
Assessing Safety Hardware (MASH).
2. Refer to the CMJTCD for the requirements of Level 2 or
Level 3 TMAs.
3. Refer to the CMJTCD for a list of approved TMAs.
4. TMAs should be used on freeways unless otherwise noted
in the plans.
5. A TMA should be used anytime that it can be positioned
30 to 100 feet in advance of the area of crew exposure
without adversely affecting the work performance.
6. A TMA should be positioned to protect the work from a work
area is spread above the roadway and the work crew is an
extended distance from the TMA.
SHEET 7 OF 12
Texas Department of Transportation
Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION
ARROW PANEL, REFLECTORS,
WARNING LIGHTS & ATTENUATOR
BC(7)-21
FILE: bc-21.dgn
DN: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT
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DISTRICT | COUNTY | SHEET NO.
DATES REVISED
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GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and alternate items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drum that is damaged or unacceptable to the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall latch together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight plastics, and ballasted with sand materials. The Contractor shall not use recycled tires or other place holders in the base material that will not provide adequate supports.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit body installed on base shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two safety spaces 5/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved connection device.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be tied down with rope separating the drum body from the base.
8. Plastic drums shall be manufactured from virgin or recycled high-density polyethylene (HDPE) or other approved materials.
9. Drum body shall have a maximum unballasted weight of 9 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

RETROREFLECTIVE SHEETING

1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall be suitable for use on and shall adhere to the drum surface for the life expectancy of the sheeting. The sheeting shall remain adhered in place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

BALLAST

1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. The base, when filled with the ballast material, should weigh between 35 lbs minimum and 50 lbs maximum. The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral sound rubber base or other approved material.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. The ballast shall not be heavy objects, valuables, or any materials that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
5. When used in regions susceptible to freezing, drums shall have drainage holes in the base to prevent water from being trapped and freeze becoming a hazard when struck by a vehicle.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.

DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with those existing prior to disruption in accordance with Chapter 6 of NCHRP 672 for Pedestrian Control Requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the entire width of the closed sidewalk instead of a Type 3 Barricade.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tapes, ropes, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)", and should not be used as a contractor pedestrian channelizer.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades should use 6" nominal barricade rails. See BC(9) for standard details. Rails shall not have rails with a smooth continuous noticeable for hand trailing with no splinters, burrs, or sharp edges.

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B or type C Orange, sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Materials," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R8 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers, when used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11b Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

SHEET B OF 12

Texas Department of Transportation — Traffic Safety Division Standard

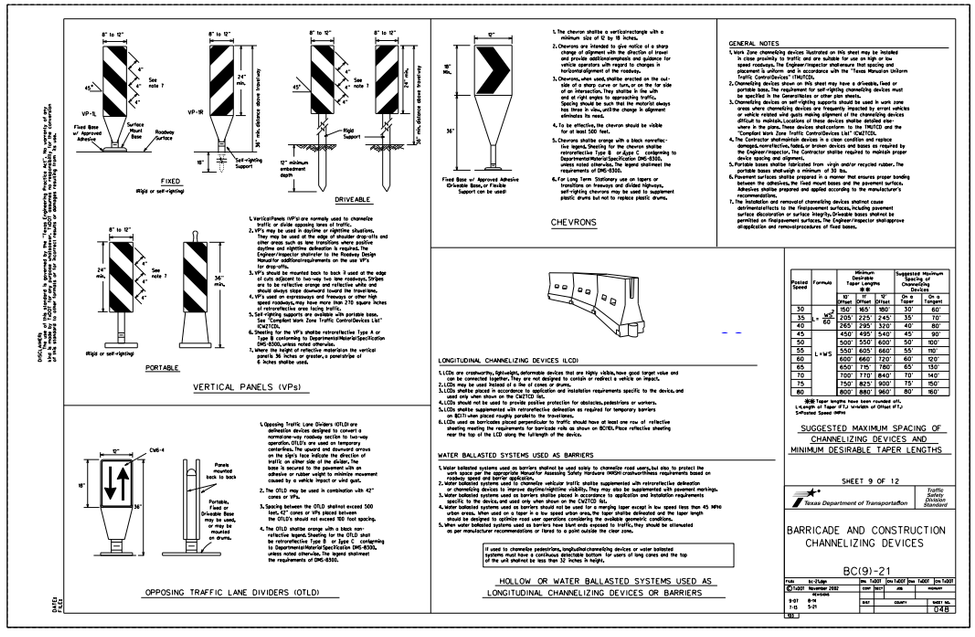
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

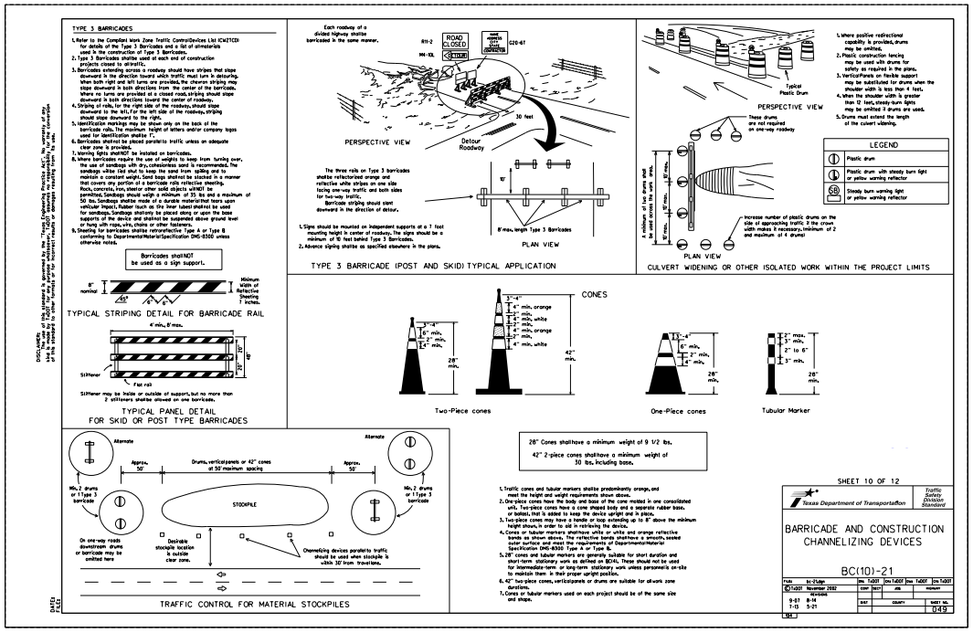
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DATED: FILE:


VP-R
VP-IR
VP-L
FIXED
DRIVEABLE
PORTABLE
VERTICAL PANELS (VPs)
CHEVRONS
GENERAL NOTES
LONGITUDINAL CHANNELIZING DEVICES (LCD)
WATER BALLASTED SYSTEMS USED AS BARRIERS
HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES
BC(9)-21
SHEET 9 OF 12


TYPE 3 BARRICADES
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL
TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES
TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION
PERSPECTIVE VIEW
PLAN VIEW
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS
LEGEND
Plastic drum
Steady burn warning light or yellow warning reflector
CONES
Two-Piece cones
One-Piece cones
Tubular Marker
TRAFFIC CONTROL FOR MATERIAL STOCKPILES
STOCKPILE
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES
BC(10)-21
SHEET 10 OF 12

WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and specifications, or attachments open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet BC(STPM).
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS with CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(1).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (thermo) shall meet the requirements of DMS-8240.

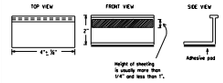
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 1204.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 100 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernible marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers within gore paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line, using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 25 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet MTXSTPM for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous materials applied or butyl rubber pad for bituminous, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - two amber reflective surfaces with yellow body.
WHITE - two silver reflective surface with white body.

DEPARTMENTAL MATERIAL SPECIFICATIONS

PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

SHEET 11 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

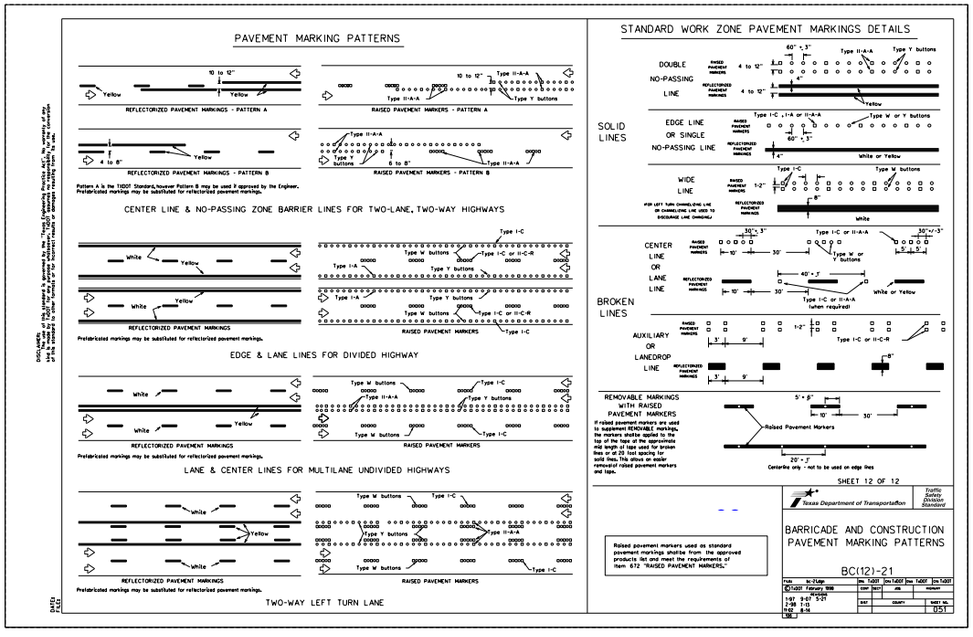
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

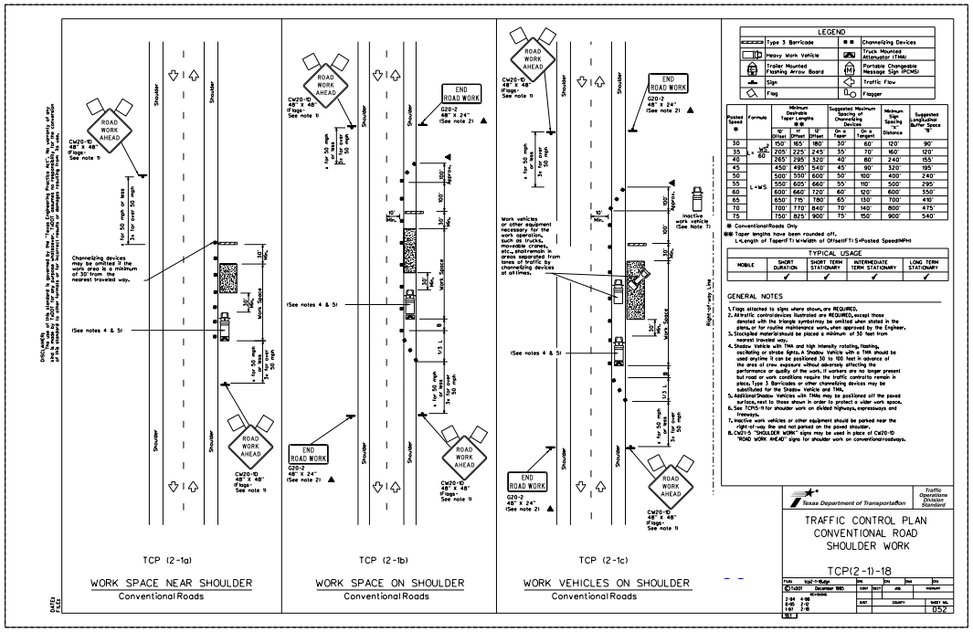
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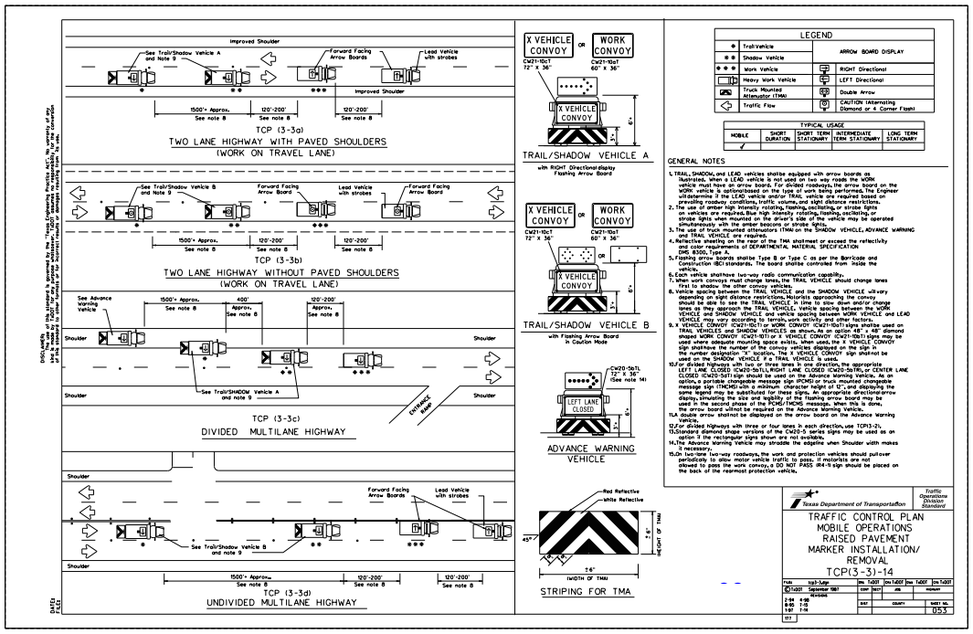
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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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2-98 8-01 5-21				
1-02 1-12	DIST	COUNTY		SHEET NO.
7-13 8-14				1251

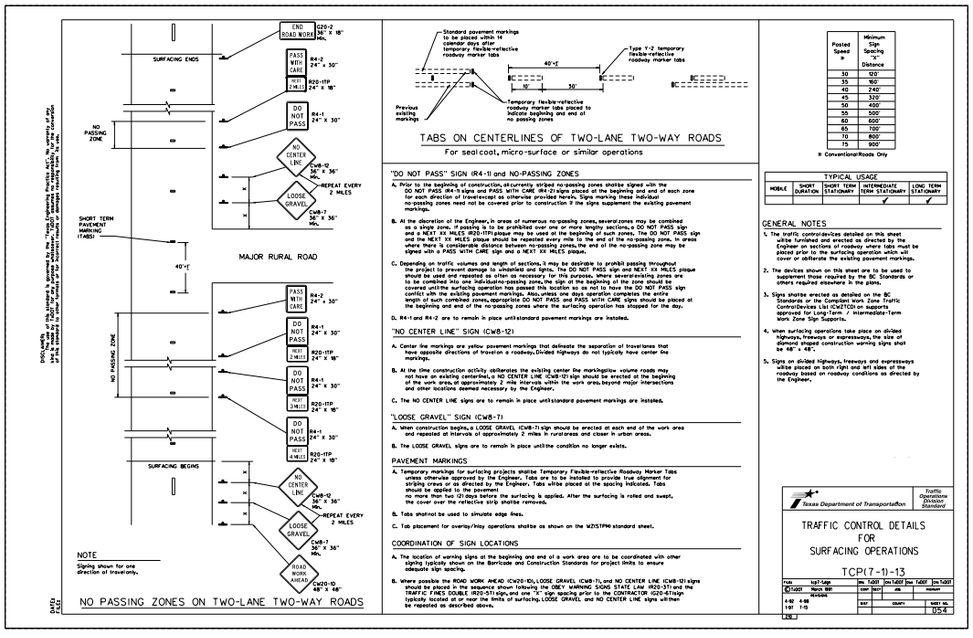
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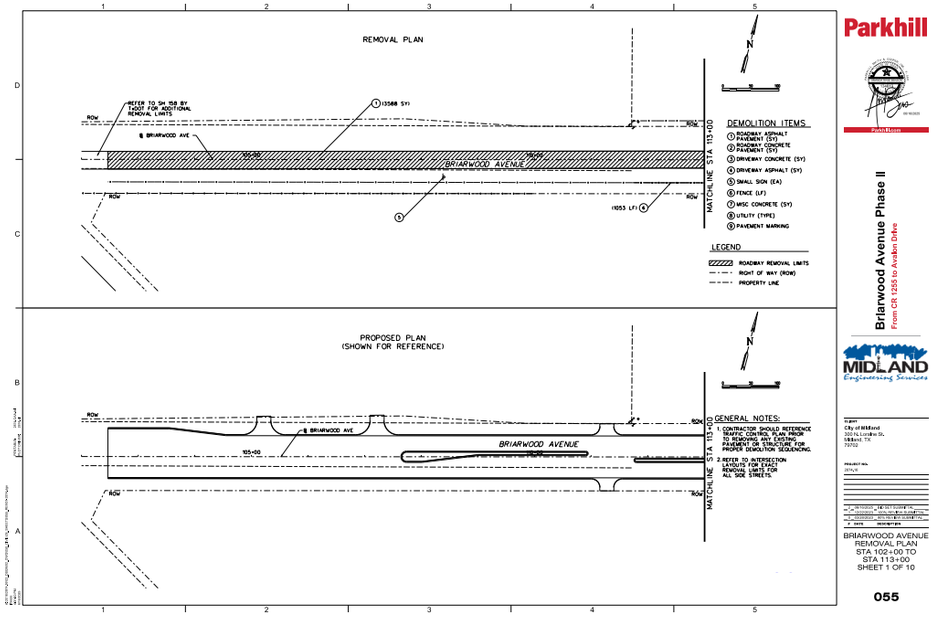
DATE/CASE


PAVEMENT MARKING PATTERNS
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A
RAISED PAVEMENT MARKERS - PATTERN A
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B
RAISED PAVEMENT MARKERS - PATTERN B
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS
REFLECTORIZED PAVEMENT MARKINGS
RAISED PAVEMENT MARKERS
EDGE & LANE LINES FOR DIVIDED HIGHWAY
REFLECTORIZED PAVEMENT MARKINGS
RAISED PAVEMENT MARKERS
LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS
REFLECTORIZED PAVEMENT MARKINGS
RAISED PAVEMENT MARKERS
TWO-WAY LEFT TURN LANE
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS
SOLID LINES
BROKEN LINES
REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS
Raised Pavement Markers
Centerline only - not to be used on edge lines
Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."
SHEET 12 OF 12
Texas Department of Transportation
Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS
BC(12)-21


TCP (2-1a)
WORK SPACE NEAR SHOULDER
Conventional Roads
TCP (2-1b)
WORK SPACE ON SHOULDER
Conventional Roads
TCP (2-1c)
WORK VEHICLES ON SHOULDER
Conventional Roads
LEGEND
Type 3 Barricade
Channelizing Devices
Heavy Work Vehicle
Truck Mounted Attenuator (TMA)
Trailer Mounted Flashing Arrow Board
Portable Changeable Message Sign (PCMS)
Sign
Traffic Flow
Flag
Flagger
TYPICAL USAGE
MOBILE
SHORT DURATION
SHORT TERM STATIONARY
INTERMEDIATE TERM STATIONARY
LONG TERM STATIONARY
GENERAL NOTES
TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK
TCP(2-1)-18


TCP (3-3a)
TWO LANE HIGHWAY WITH PAVED SHOULDERS
(WORK ON TRAVEL LANE)
TCP (3-3b)
TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS
(WORK ON TRAVEL LANE)
TCP (3-3c)
DIVIDED MULTILANE HIGHWAY
TCP (3-3d)
UNDIVIDED MULTILANE HIGHWAY
TRAIL/SHADOW VEHICLE A
with RIGHT Directional display
Flashing Arrow Board
TRAIL/SHADOW VEHICLE B
with Flashing Arrow Board
in Caution Mode
ADVANCE WARNING
VEHICLE
STRIPING FOR TMA
LEGEND
TYPICAL USAGE
GENERAL NOTES
TRAFFIC CONTROL PLAN
MOBILE OPERATIONS
RAISED PAVEMENT
MARKER INSTALLATION/
REMOVAL
TCP(3-3)-14


END ROAD WORK
G20-2
36" X 18"
SURFACING ENDS
PASS WITH CARE
R4-2
24" X 30"
NEXT XX MILES
R20-1TP
24" X 18"
DO NOT PASS
R4-1
24" X 30"
NO PASSING ZONE
NO CENTER LINE
CW8-12
36" X 36"
LOOSE GRAVEL
CW8-7
36" X 36"
REPEAT EVERY 2 MILES
SHORT TERM PAVEMENT MARKING (TABS)
40'-Y'
MAJOR RURAL ROAD
SURFACING BEGINS
ROAD WORK AHEAD
CW20-1D
48" X 48"
NOTE
Signing shown for one direction of travel only.
NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS
Standard pavement markings to be placed within 14 calendar days after temporary flexible-retroactive roadway marker tabs
Type Y-2 temporary flexible-retroactive roadway marker tabs
40'-Y'
EC
10'
30'
Previous existing markings
Temporary flexible-retroactive roadway marker tabs placed to indicate beginning and end of no passing zones
TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS
For seal coat, micro-surface or similar operations
"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES
A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS with CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.
B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is a considerable distance between passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.
C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to unstable soil and tights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be removed until the surfacing operation has passed this location so as not to confuse the DO NOT PASS sign control with the existing pavement markings. Where it is impractical to combine the DO NOT PASS signs for the length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.
D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.
"NO CENTER LINE" SIGN (CW8-12)
A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.
B. At the time construction activity obliterates the existing center line markings, low volume roads may not have an existing centerline, a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.
C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.
"LOOSE GRAVEL" SIGN (CW8-7)
A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.
B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.
PAVEMENT MARKINGS
A. Temporary markings for surfacing projects shall be Temporary Flexible-retroactive Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping as shown or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should not be placed more than 14 days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the retroactive strip shall be removed.
B. Tabs shall not be used to simulate edge lines.
C. Tab placement for overlay/inlay operations shall be as shown on the WZSTPM standard sheet.
COORDINATION OF SIGN LOCATIONS
A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.
B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the GREY WARNING SIGNS STATE LINE (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T) sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.
Posted Speed *
Minimum Sign Spacing "X" Distance
30 120'
35 160'
40 240'
45 320'
50 400'
55 500'
60 600'
65 700'
70 800'
75 900'
* Conventional Roads Only
TYPICAL USAGE
MOBILE
SHORT DURATION
SHORT TERM STATIONARY
INTERMEDIATE TERM STATIONARY ✓
LONG TERM STATIONARY ✓
GENERAL NOTES
1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards. Portable supports meeting the Traffic Control Devices List (TCAT12D) or supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of the required lane closed construction warning signs shall be 60" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.
Texas Department of Transportation
Traffic Operations Division Standard
TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS
TCP(7-1)-13
FILE: tcp7-1-13e
DN: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT
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REVISIONS
4-92 4-98
1-97 1-13
DIST COUNTY SHEET NO.
CONT SECT JOB HIGHWAY
DATE: 7-13
FILE:



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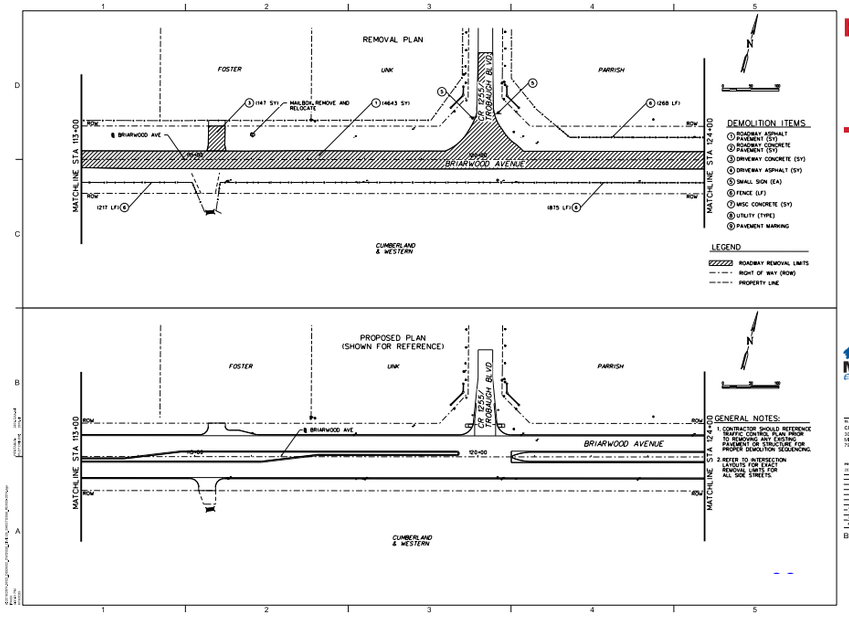
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 102+00 TO
STA 113+00
SHEET 1 OF 10

055



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John Rowe

Briarwood Avenue Phase II

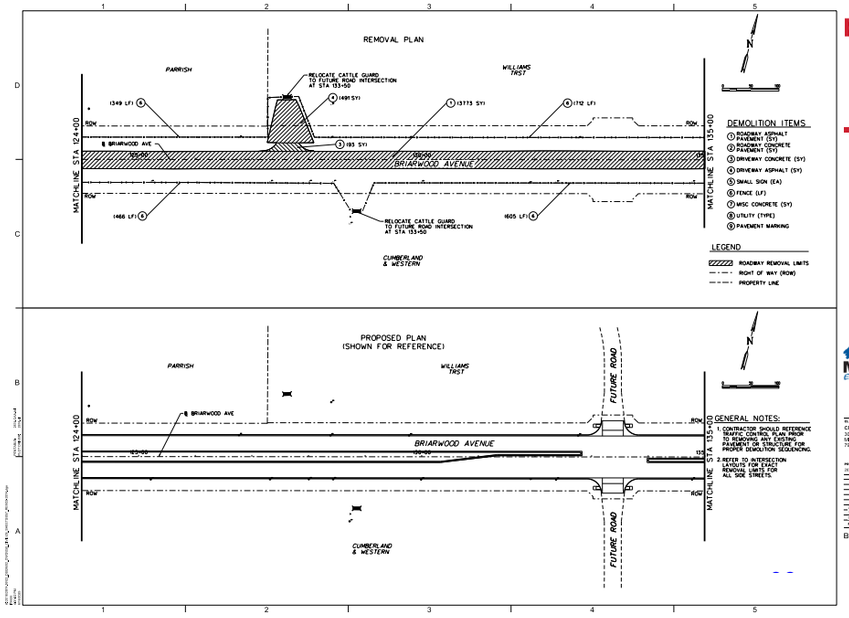
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
REMOVAL PLAN
STA 113+00 TO
STA 124+00
SHEET 2 OF 10

056



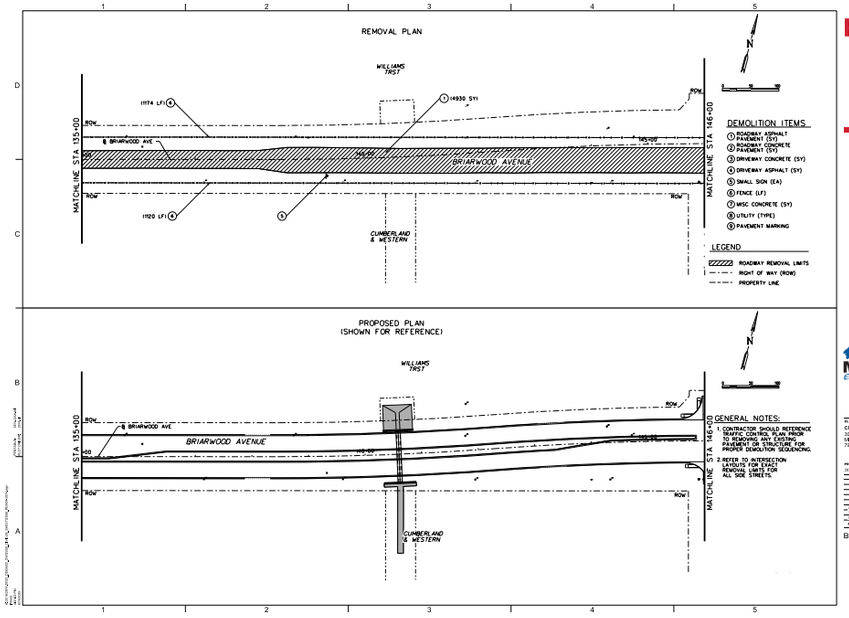
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Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND
Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 124+00 TO
STA 135+00
SHEET 3 OF 10

057



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John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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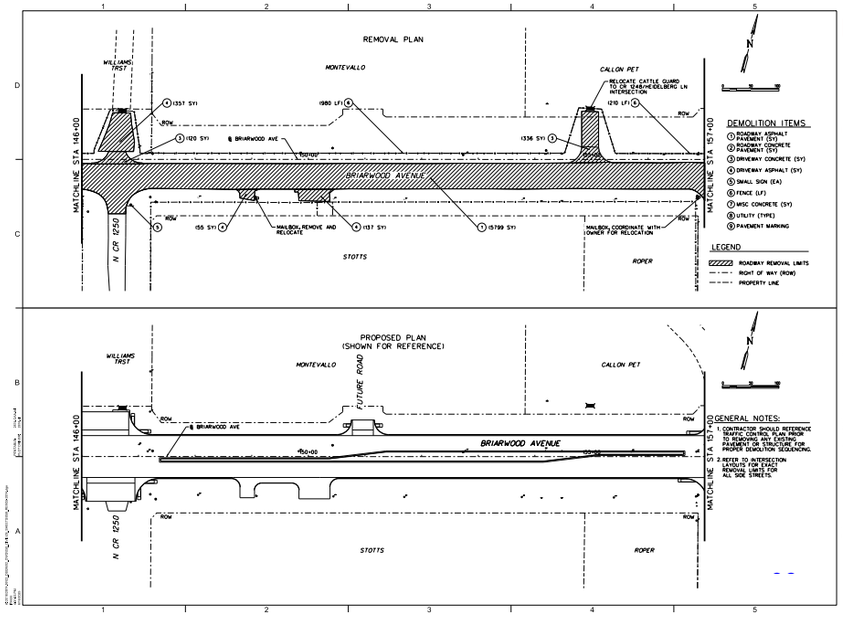
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
REMOVAL PLAN
STA 135+00 TO
STA 146+00
SHEET 4 OF 10

058



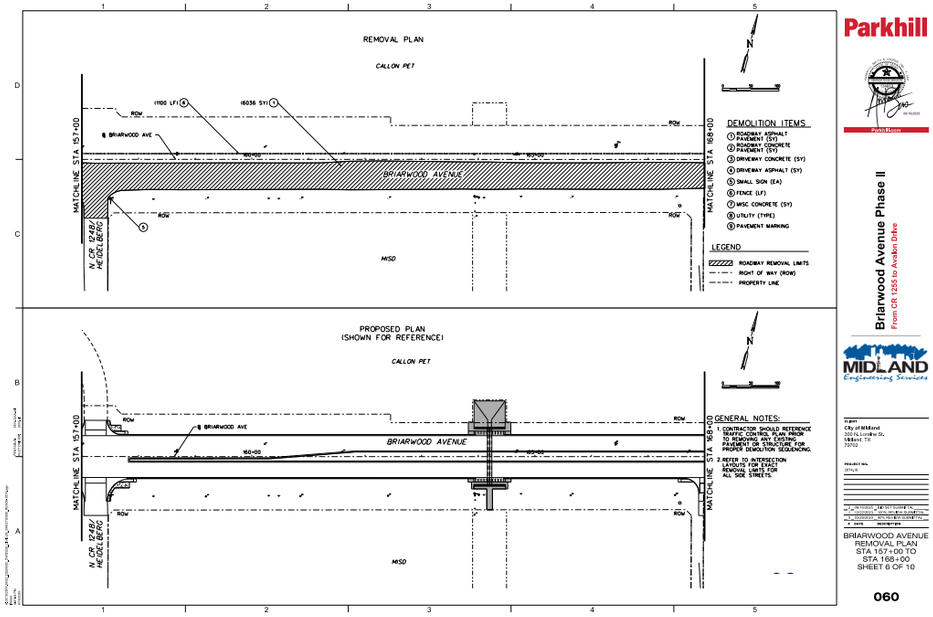
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Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

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Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 146+00 TO
STA 157+00
SHEET 5 OF 10

059



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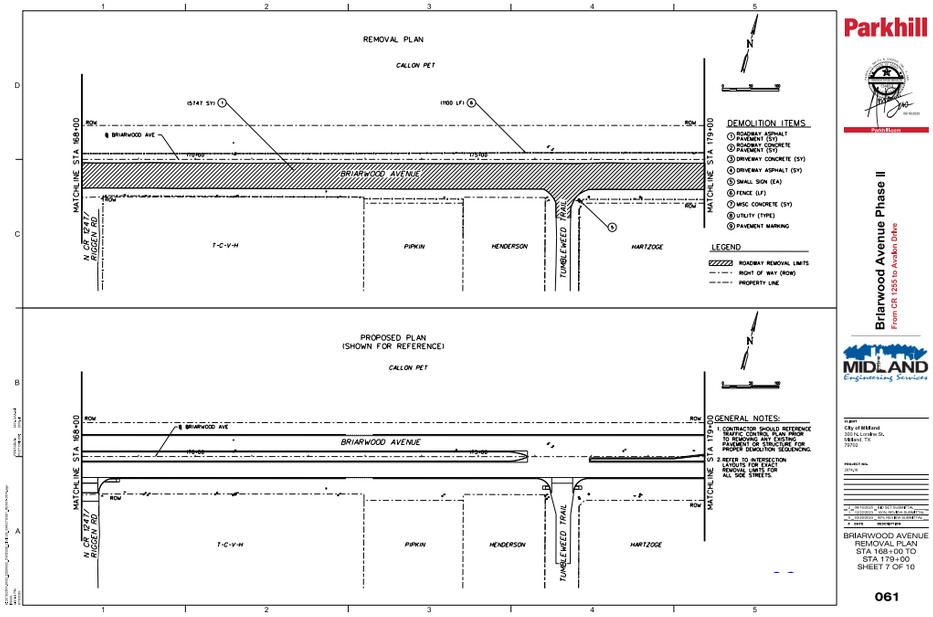
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 157+00 TO
STA 168+00
SHEET 6 OF 10

060



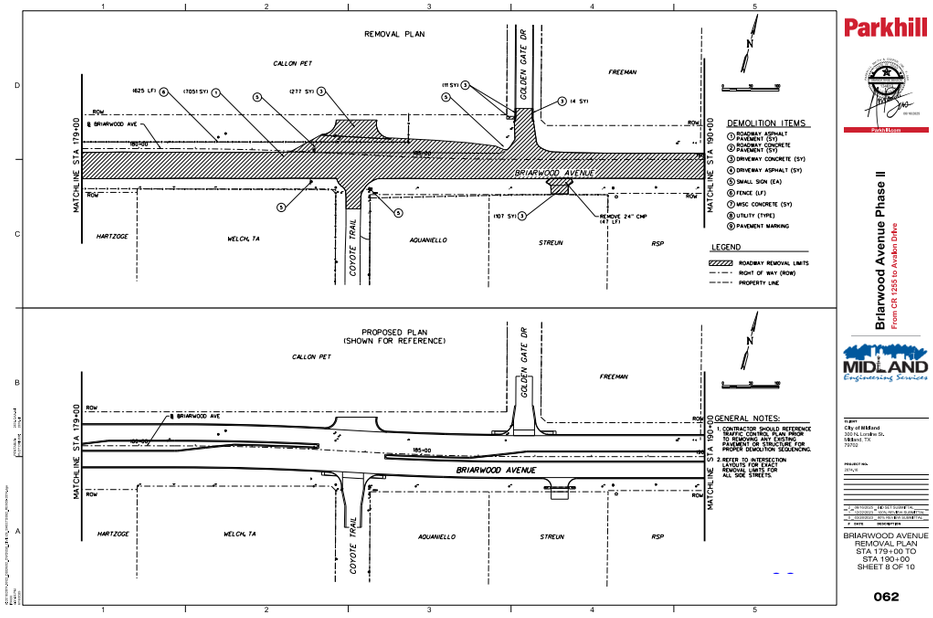
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Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
REMOVAL PLAN
STA 168+00 TO
STA 179+00
SHEET 7 OF 10

061



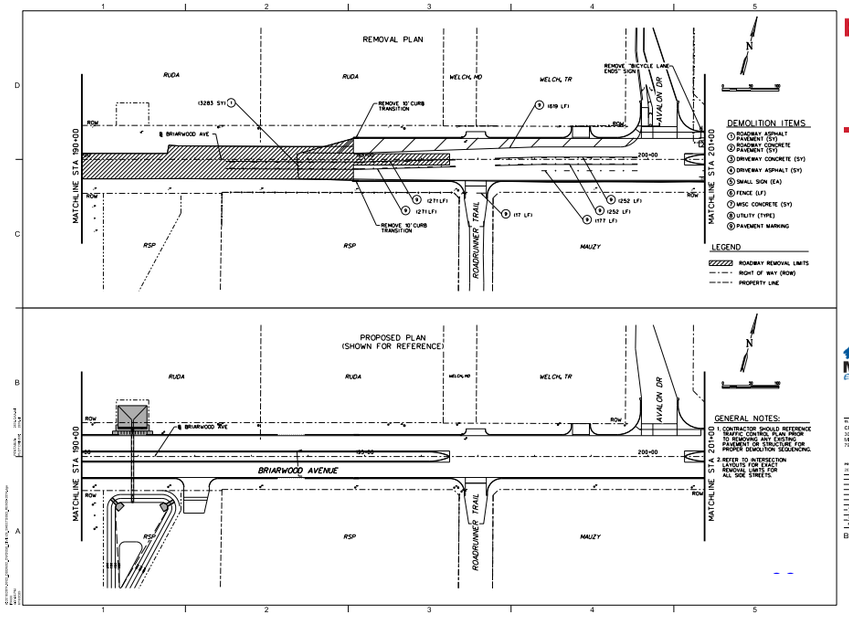
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From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
REMOVAL PLAN
STA 179+00 TO
STA 190+00
SHEET 8 OF 10

062



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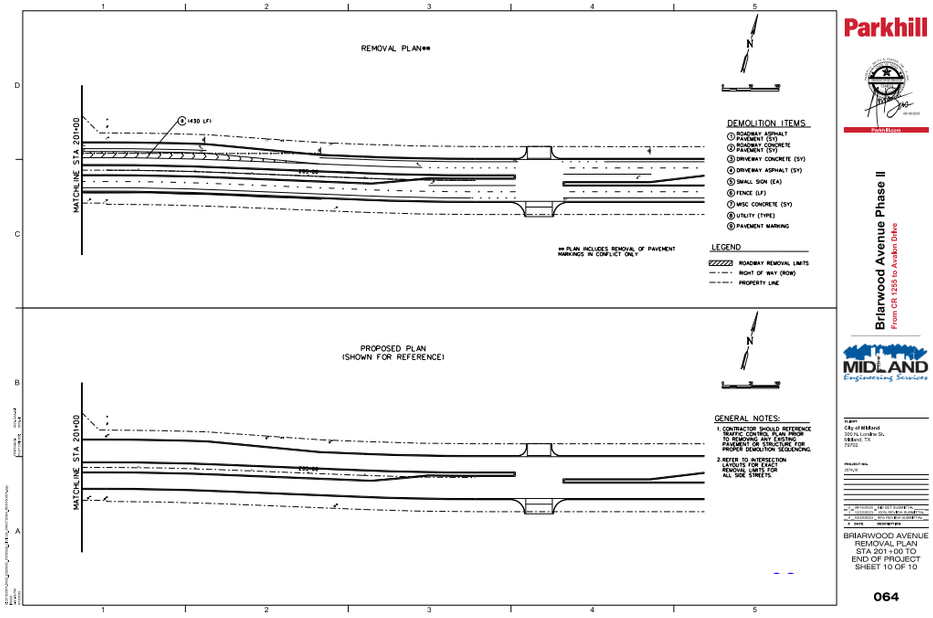
From CR 1255 to Avalon Drive

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Midland, TX
79702

BRIARWOOD AVENUE
REMOVAL PLAN
STA 190+00 TO
STA 201+00
SHEET 9 OF 10

063



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Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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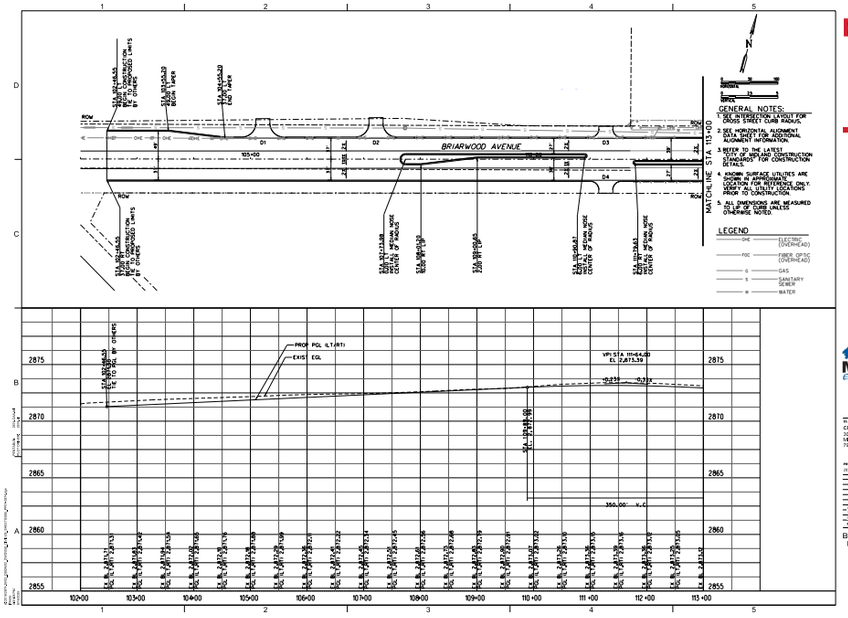
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300 N. Loraine St.
Midland, TX
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Project No.
067419

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
REMOVAL PLAN
STA 201+00 TO
END OF PROJECT
SHEET 10 OF 10

064



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Briarwood Avenue Phase II

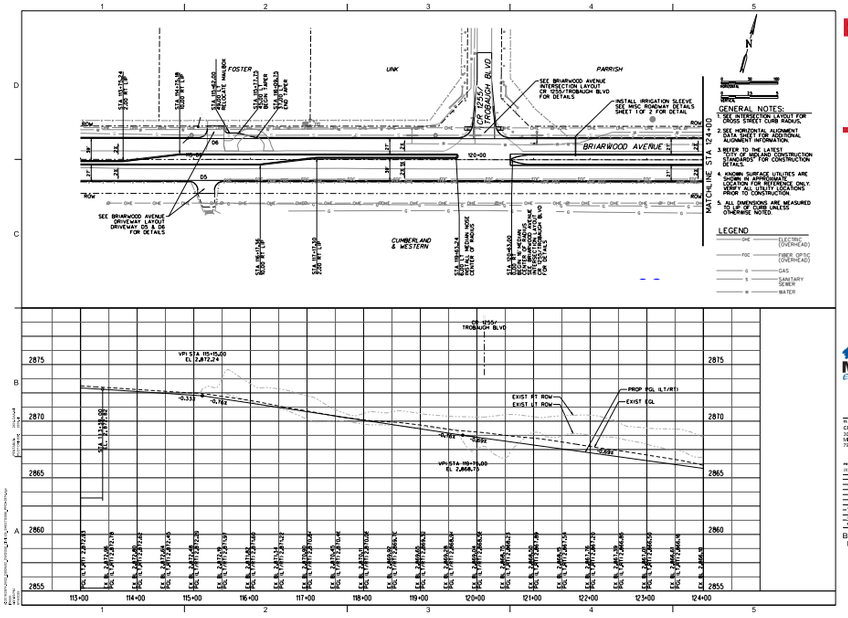
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Midland, TX
79702

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 102+00 TO
STA 113+00
SHEET 1 OF 9

065



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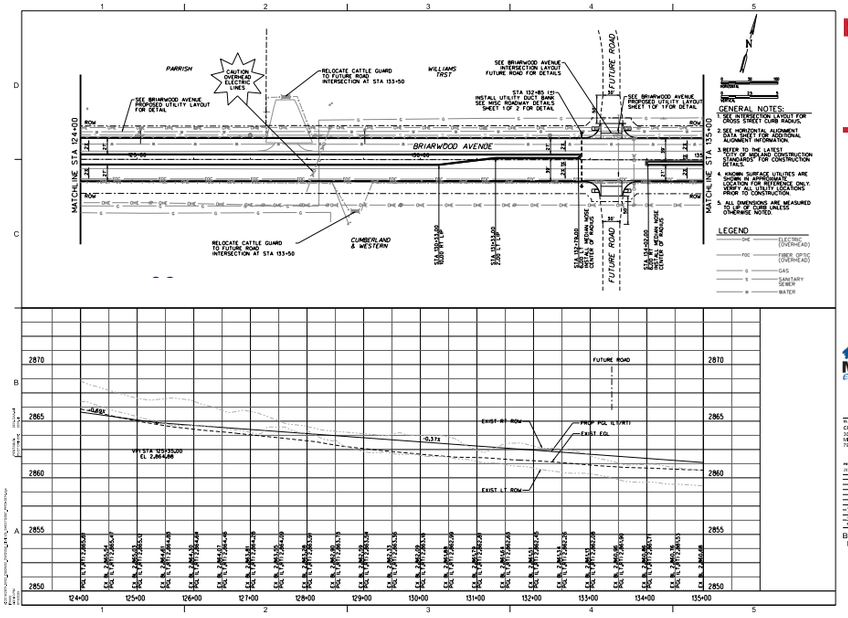
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 113+00 TO
STA 124+00
SHEET 2 OF 9

066



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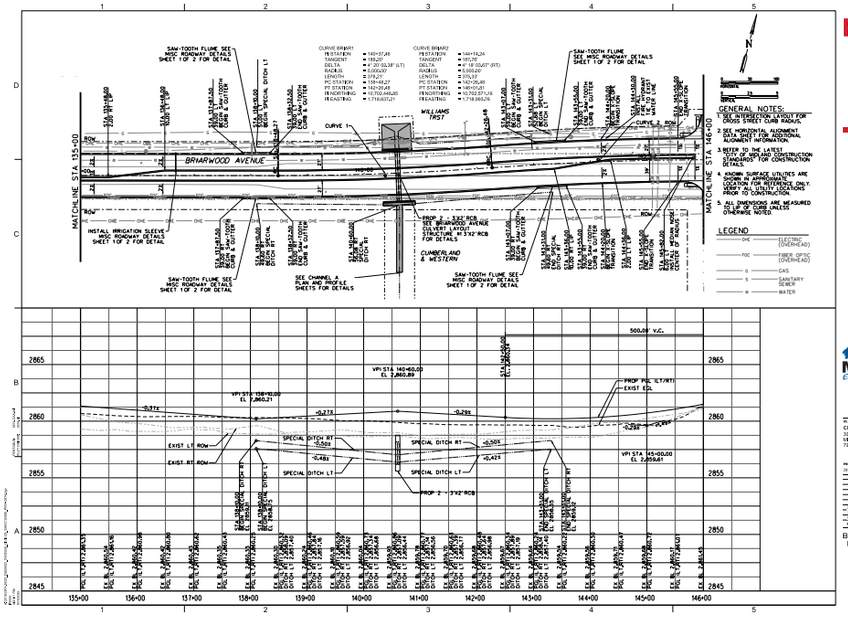
From CR 1250 to Avalon Drive

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BRIARWOOD AVENUE
PLAN AND PROFILE
STA 124+00 TO
STA 135+00
SHEET 3 OF 9

067



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From CR 1250 to Avalon Drive

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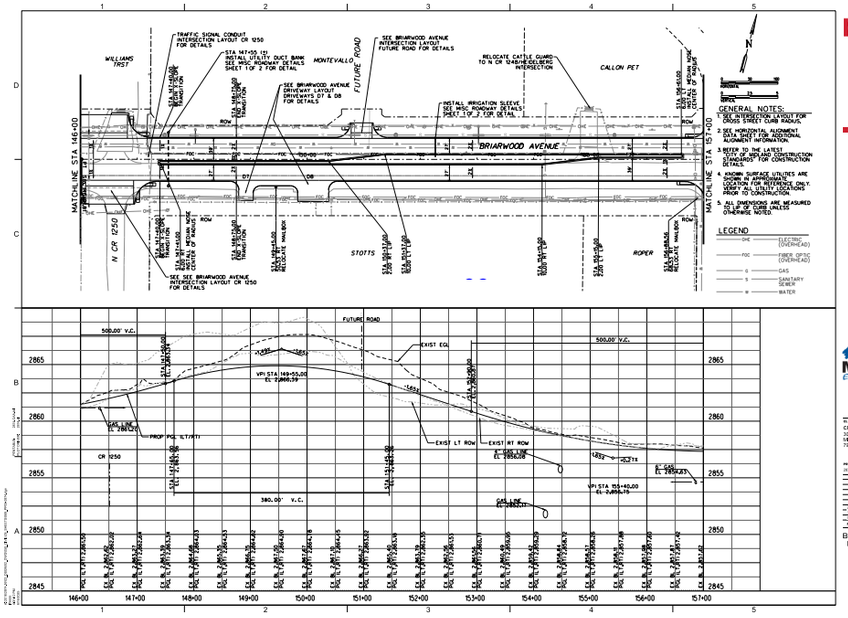
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300 N. Loraine St.
Midland, TX
79702

project no.
067419

#	DATE	DESCRIPTION
1	08/19/2025	AS SUBMITTED
2	09/02/2025	INITIAL SET TO CONTRACTOR
3	09/09/2025	INITIAL SET TO CONTRACTOR
4	09/16/2025	INITIAL SET TO CONTRACTOR

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 136+00 TO
STA 146+00
SHEET 4 OF 9

068



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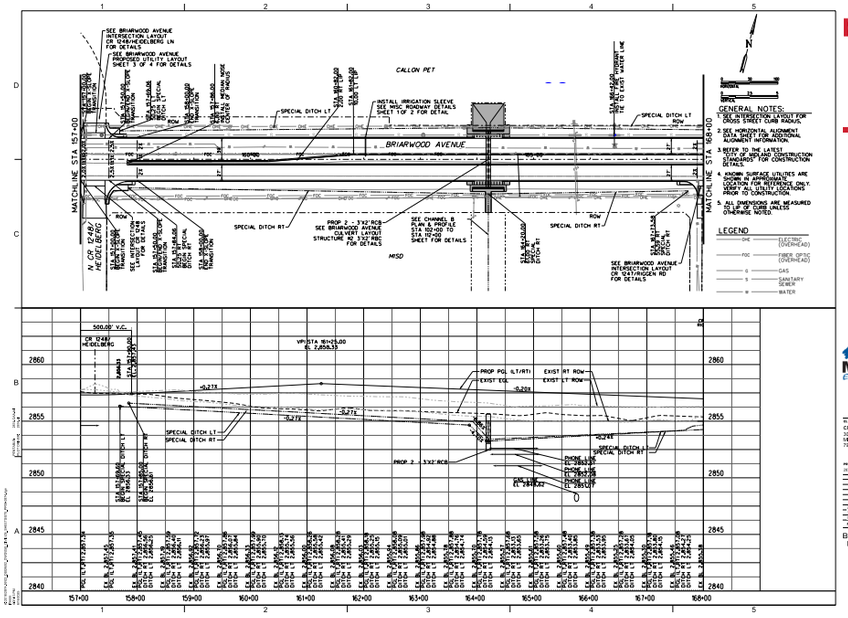
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 146+00 TO
STA 157+00
SHEET 5 OF 9

069



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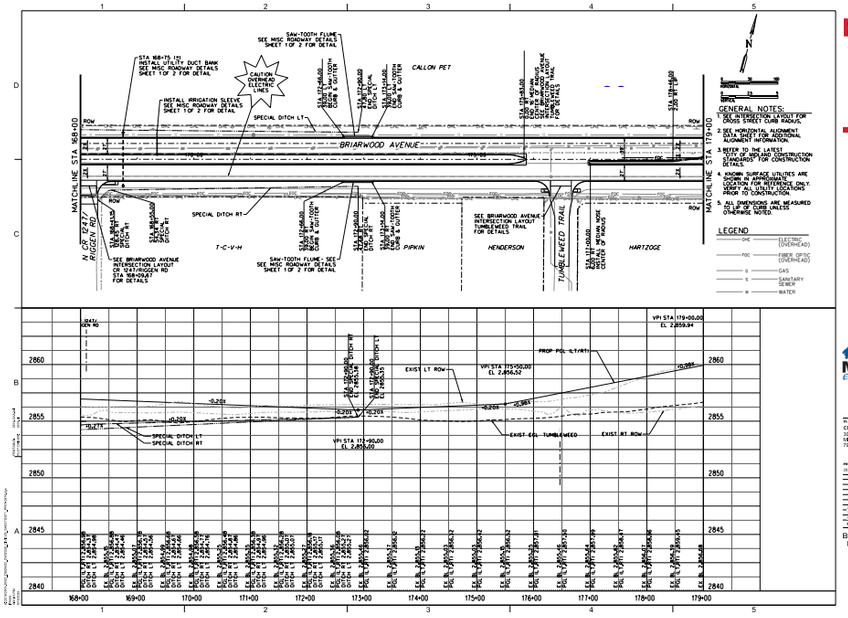
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
PLAN AND PROFILE
STA 157+00 TO
STA 168+00
SHEET 6 OF 9

070



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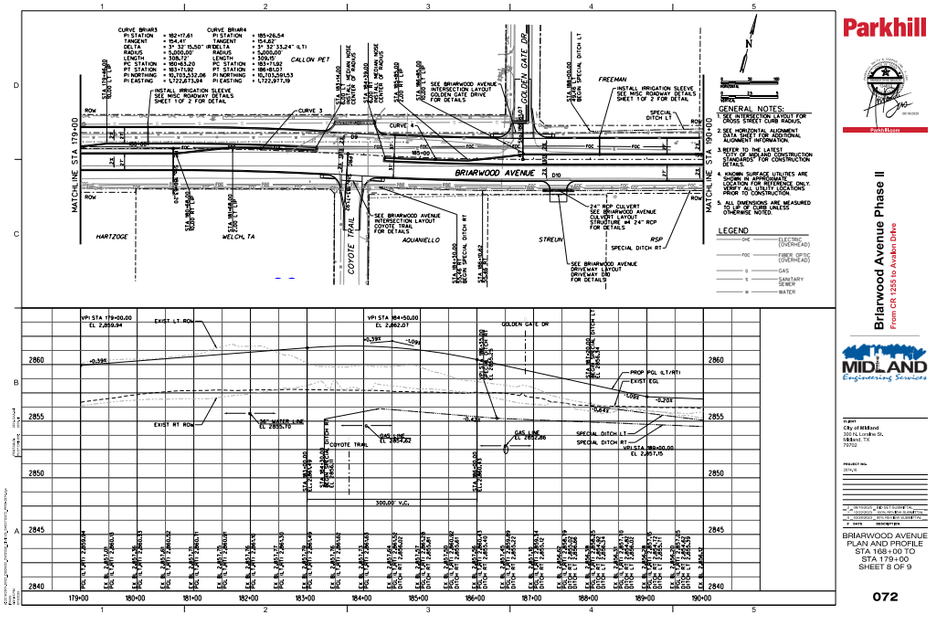
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BRIARWOOD AVENUE
PLAN AND PROFILE
STA 168+00 TO
STA 179+00
SHEET 7 OF 9

071



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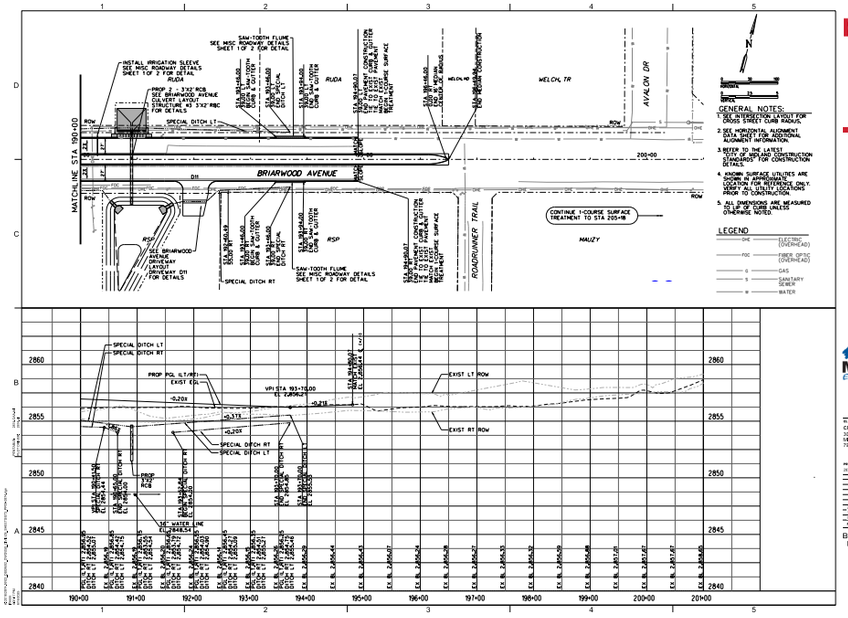
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
PLAN AND PROFILE
STA 168+00 TO
STA 179+00
SHEET 8 OF 9

072



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Briarwood Avenue Phase II

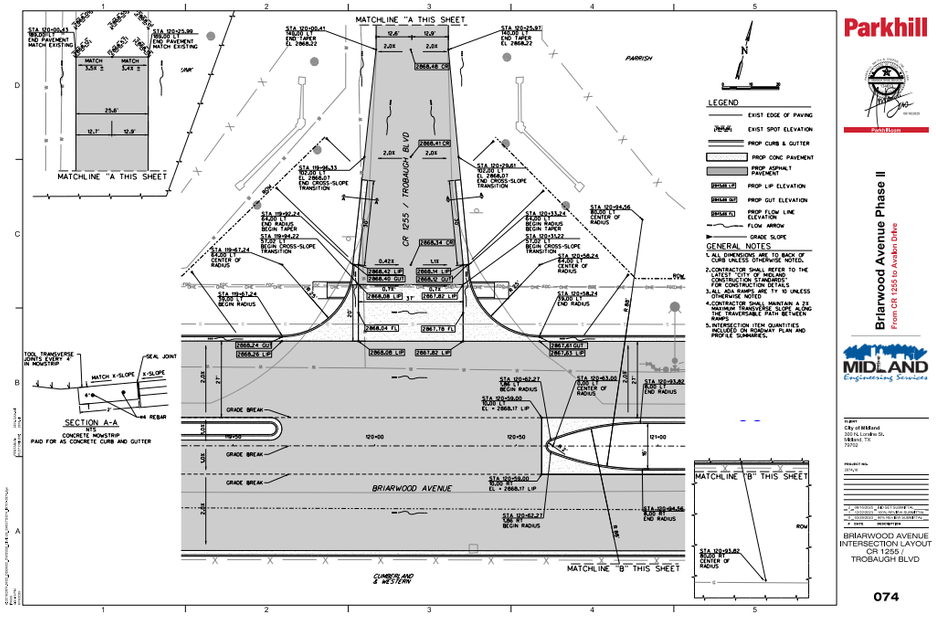
From CR 1250 to Avalon Drive

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BRIARWOOD AVENUE
PLAN AND PROFILE
STA 190+00 TO
STA 201+00
SHEET 9 OF 9

073



Parkhill

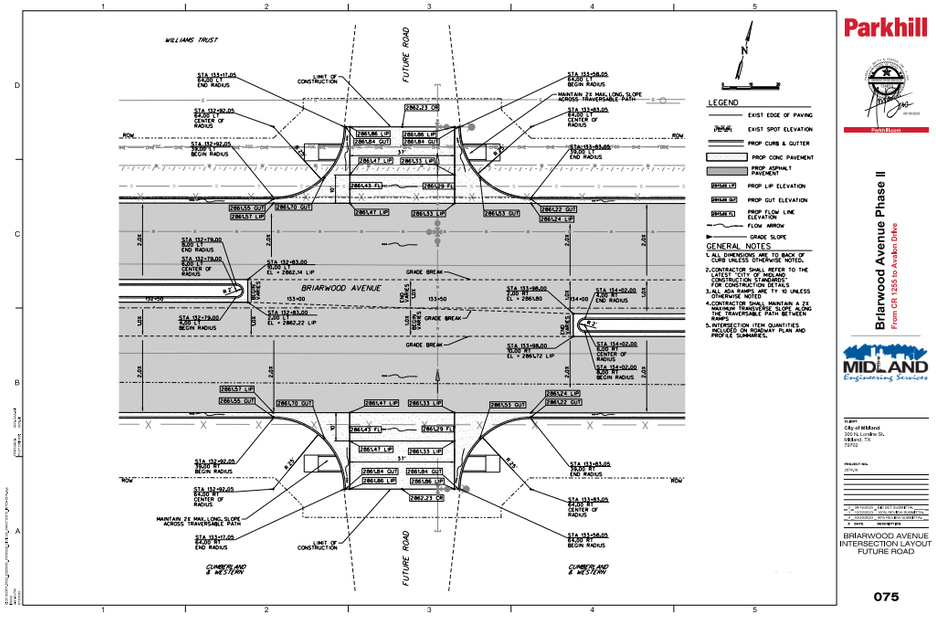
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE INTERSECTION LAYOUT CR 1255 / TROBAUGH BLVD

074



Parkhill

Briarwood Avenue Phase II

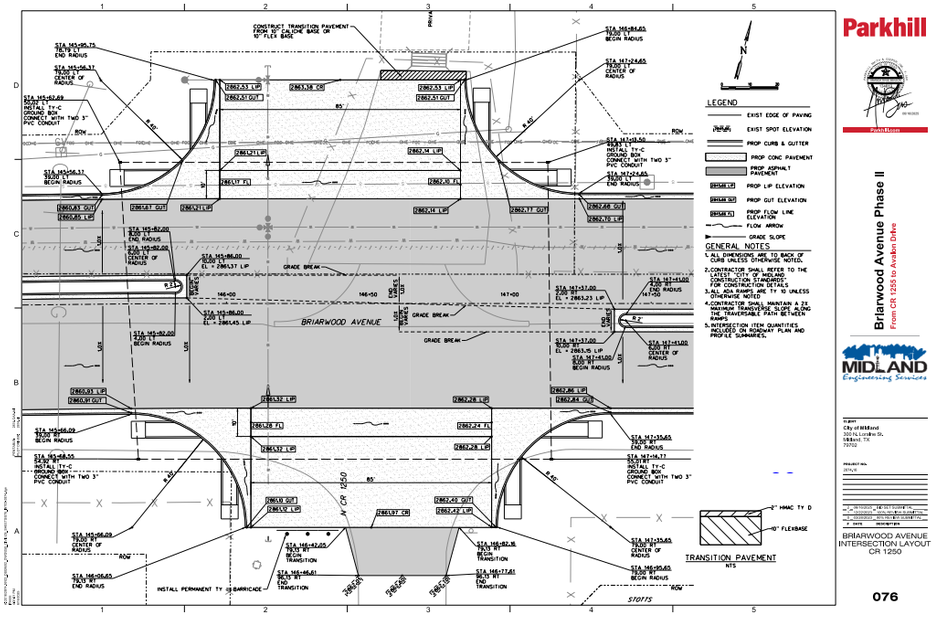
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
INTERSECTION LAYOUT
FUTURE ROAD

075



Parkhill

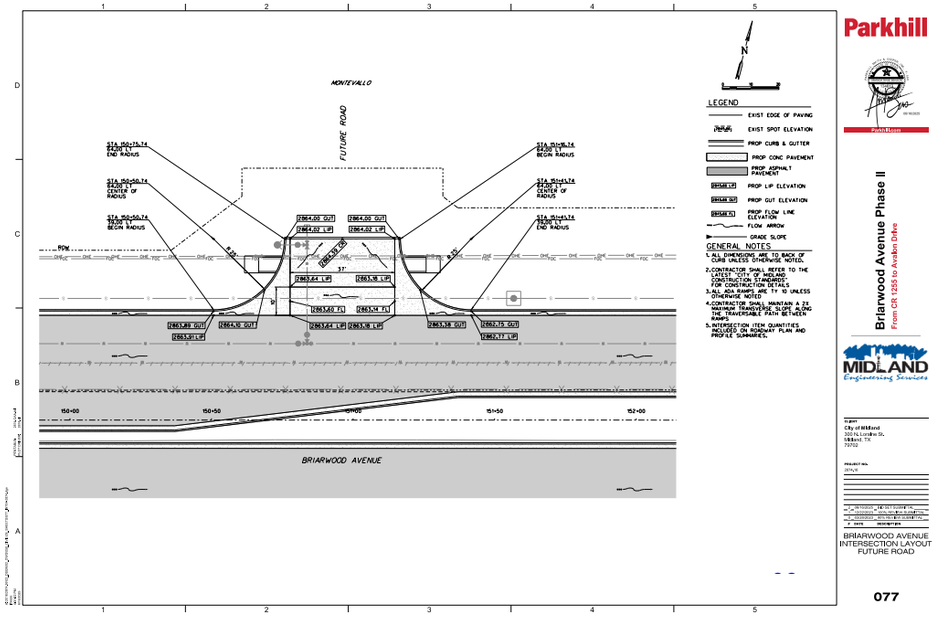
Briarwood Avenue Phase II

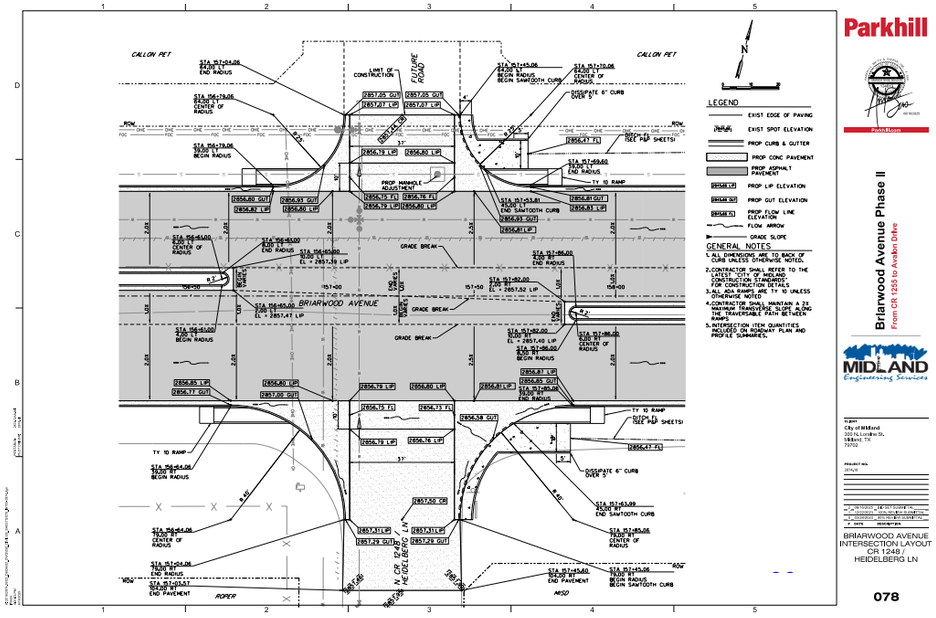
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE INTERSECTION LAYOUT CR 1250

076


MONTEVALLO
FUTURE ROAD
BRIARWOOD AVENUE
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
1. ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL REFER TO THE LATEST "CITY OF MIDLAND CONSTRUCTION STANDARDS".
3. ALL ADA RAMPS ARE TY 1 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG THE TRAVERSABLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE
INTERSECTION LAYOUT
FUTURE ROAD
077



Parkhill

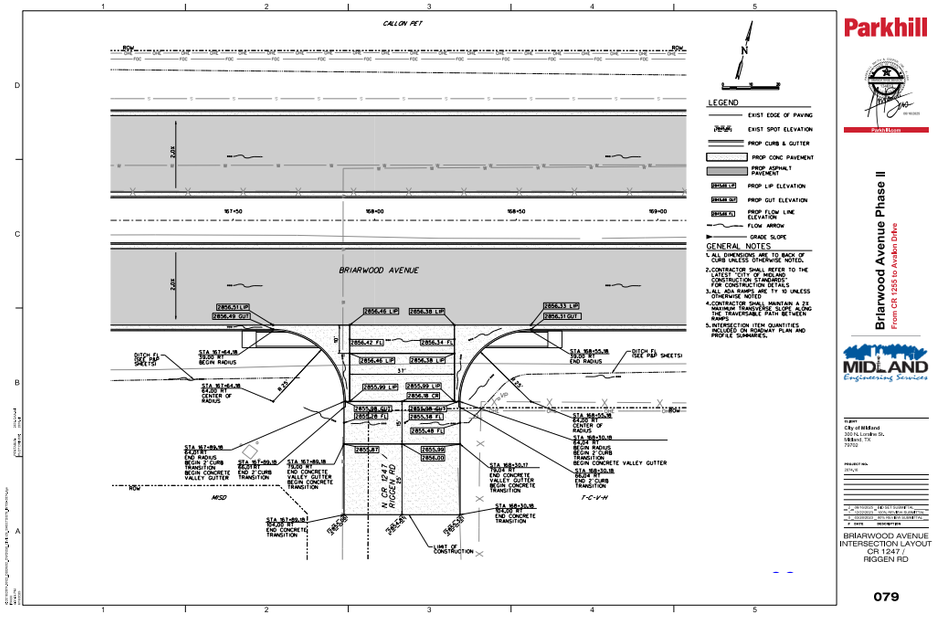
Briarwood Avenue Phase II

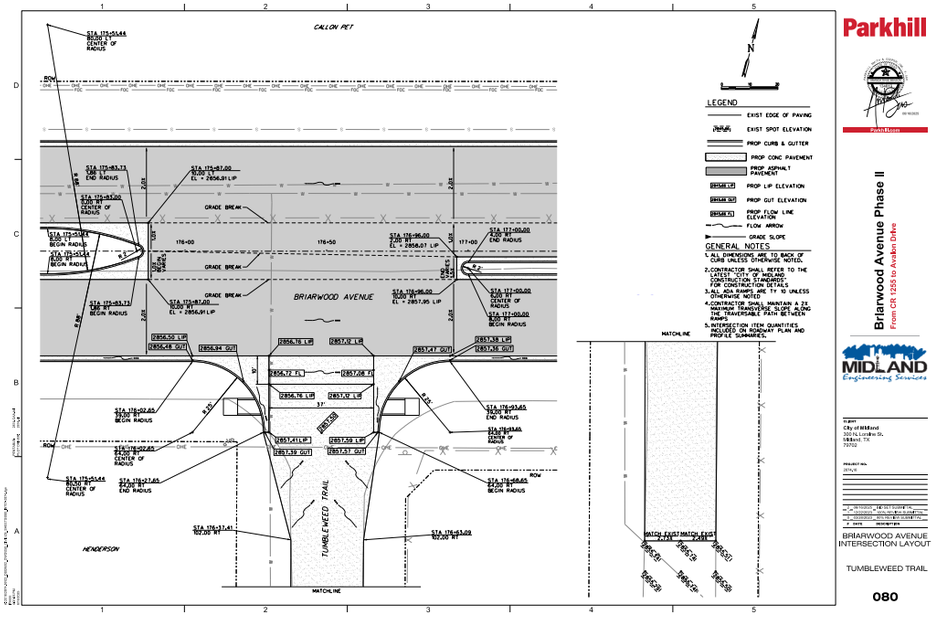
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE INTERSECTION LAYOUT CR 1248 / HEIDELBERG LN

078


CALON PET
BRIARWOOD AVENUE
N CR 1247
RIGGEN RD
MIDD
LIMIT OF CONSTRUCTION
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
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2. CONTRACTOR SHALL REFER TO THE LATEST "CITY OF MIDLAND CONSTRUCTION STANDARDS" FOR CONSTRUCTION DETAILS.
3. ALL ADA RAMPS ARE TY 1 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG ALL ACCESSIBLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE
INTERSECTION LAYOUT
CR 1247 /
RIGGEN RD
079



Parkhill

Briarwood Avenue Phase II

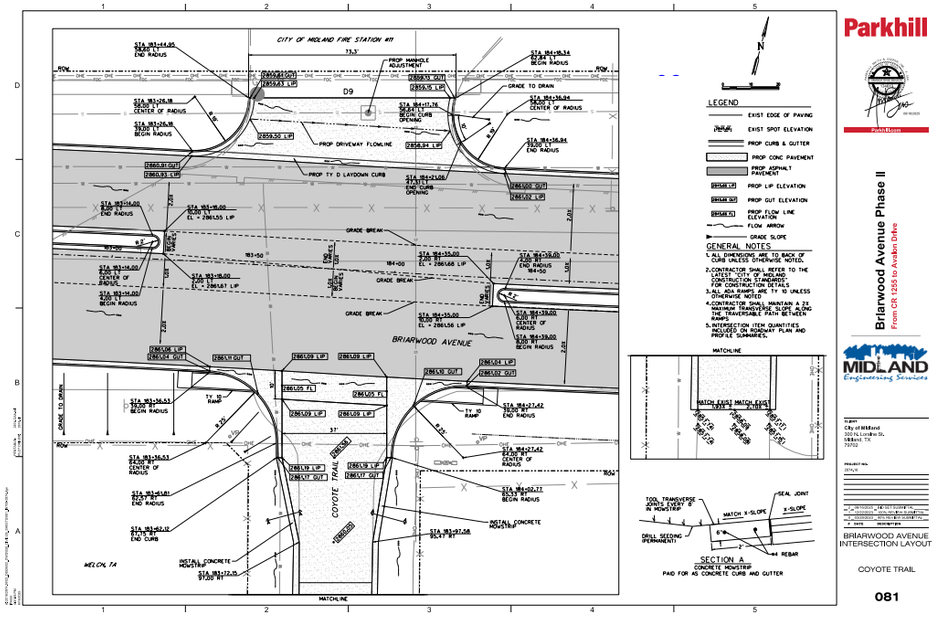
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE INTERSECTION LAYOUT

TUMBLEWEED TRAIL

080



Parkhill

John Rowe

Briarwood Avenue Phase II

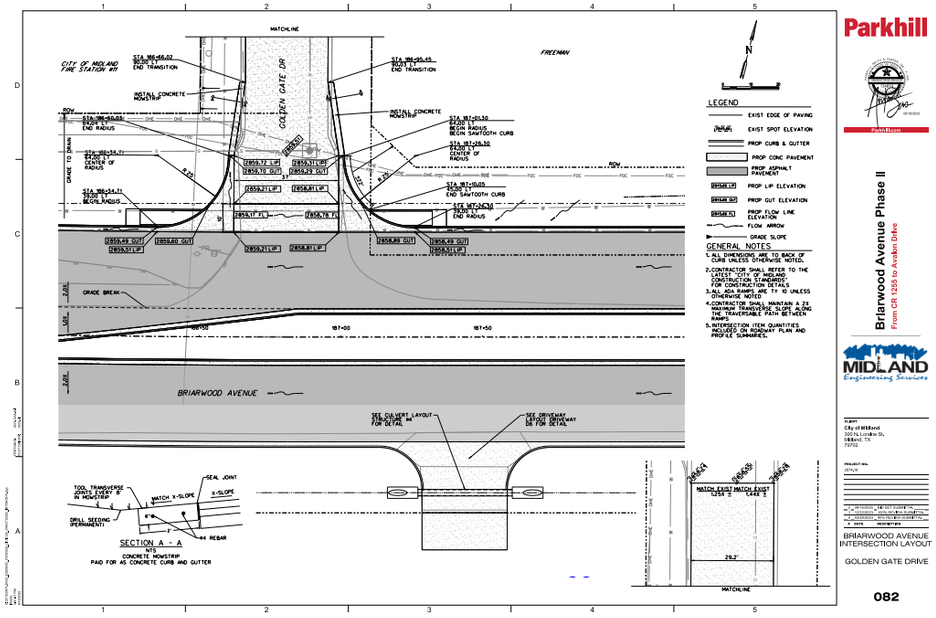
From CR 1255 to Avalon Drive

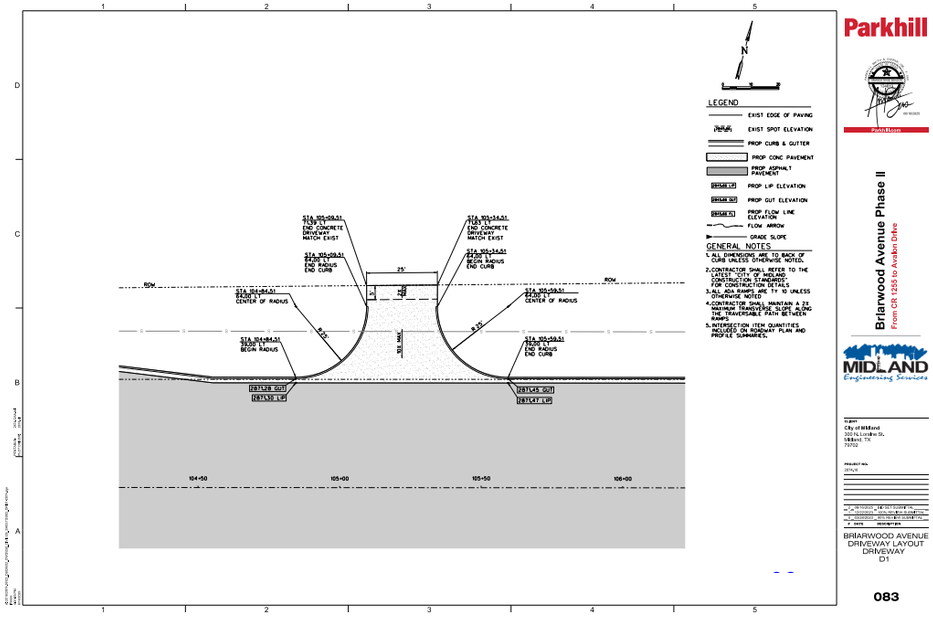
MIDLAND Engineering Services

BRIARWOOD AVENUE INTERSECTION LAYOUT

COYOTE TRAIL

081


MATCHLINE
CITY OF MIDLAND FIRE STATION #11
GOLDEN GATE DR
FREEMAN
BRIARWOOD AVENUE
GRADE BREAK
SEE CULVERT LAYOUT FOR DETAIL
SEE DRIVEWAY DETAIL FOR DETAIL
SECTION A - A
CONCRETE HOWSTRIP PAID FOR AS CONCRETE CURB AND GUTTER
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP L/P ELEVATION
PROP G/U ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
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4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG RAMP TO PROVIDE A TRAVERSABLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
BRIARWOOD AVENUE INTERSECTION LAYOUT
GOLDEN GATE DRIVE
082



Parkhill

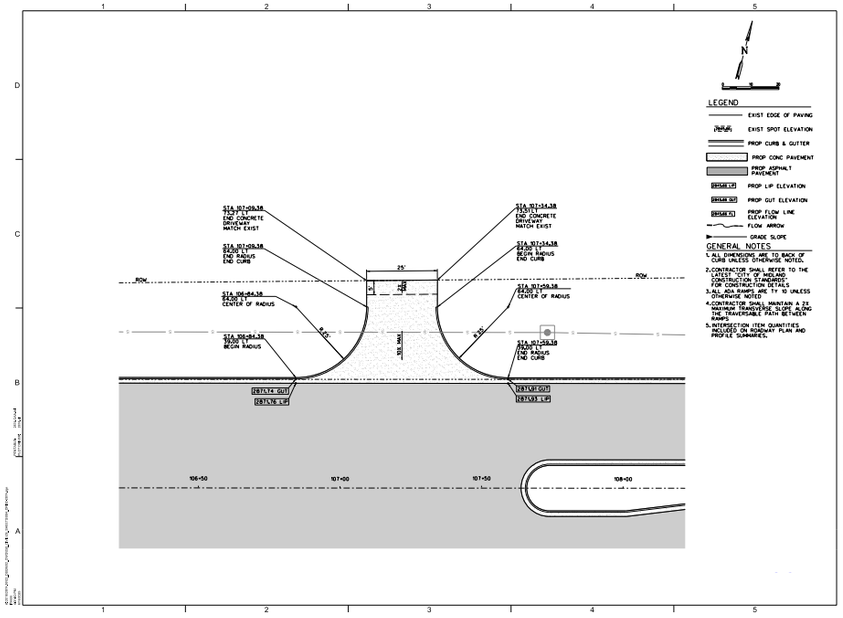
Briarwood Avenue Phase II

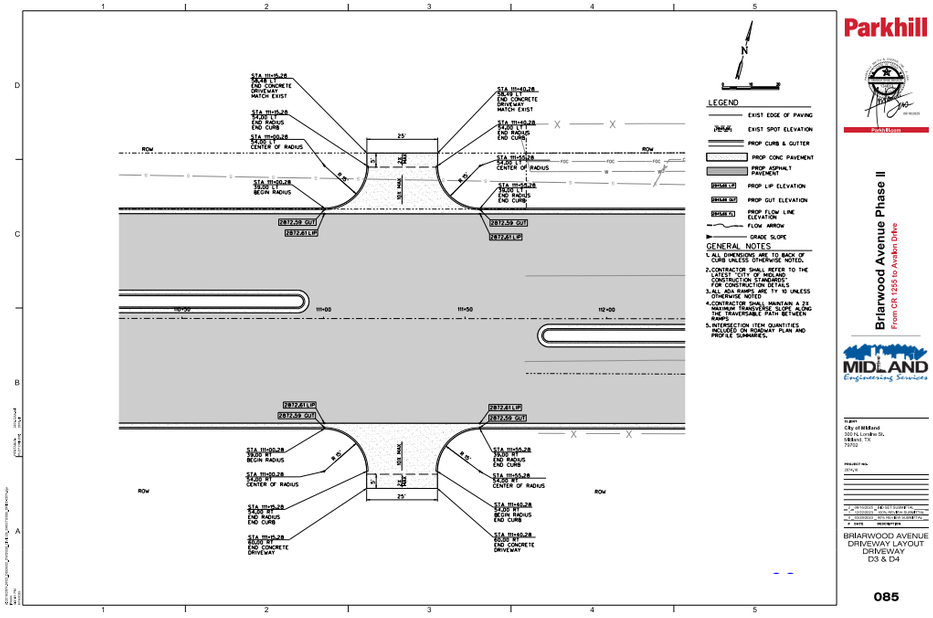
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D1

083


STA 107+09.38
15.2' LT
END CONCRETE
DRIVEWAY
MATCH EXIST
STA 107+09.38
30.00' LT
BEGIN RADIUS
END CURB
STA 106+64.38
30.00' LT
CENTER OF RADIUS
STA 106+54.38
30.00' LT
BEGIN RADIUS
END CURB
STA 107+34.38
15.2' LT
END CONCRETE
DRIVEWAY
MATCH EXIST
STA 107+14.38
30.00' LT
BEGIN RADIUS
END CURB
STA 107+59.38
30.00' LT
CENTER OF RADIUS
STA 107+59.38
30.00' LT
END RADIUS
END CURB
25'
ROW
ROW
9.0%
9.0%
106+50
107+00
107+50
108+00
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP L/P ELEVATION
PROP G/T ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
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Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79701
BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D2
084



Parkhill

John Rowe

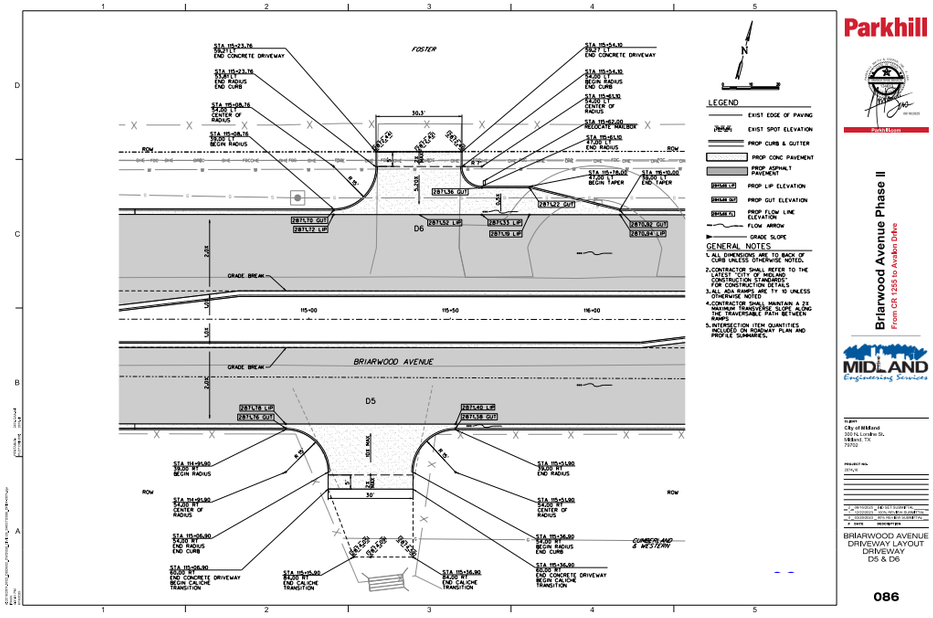
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D3 & D4

085



Parkhill

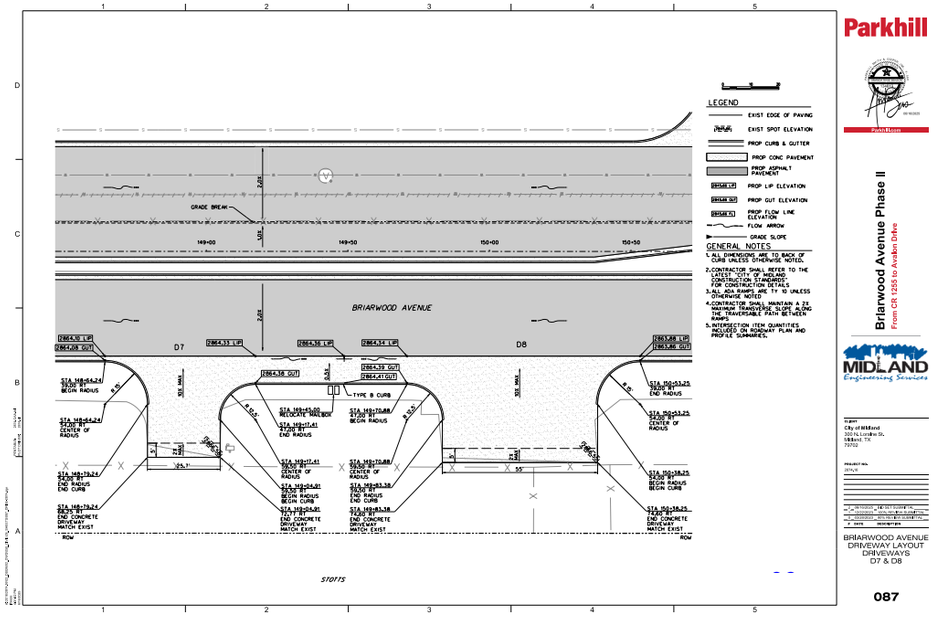
Briarwood Avenue Phase II

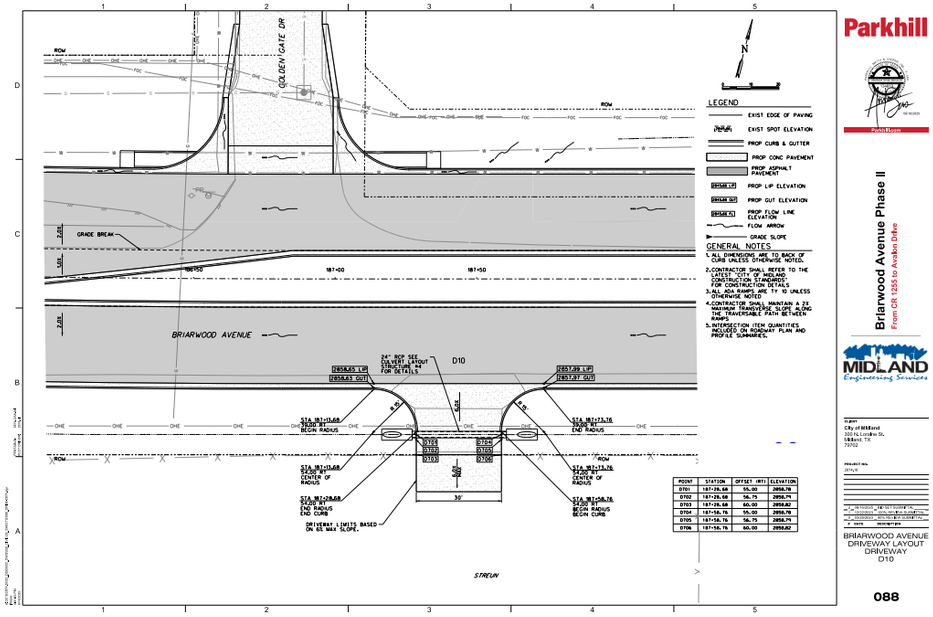
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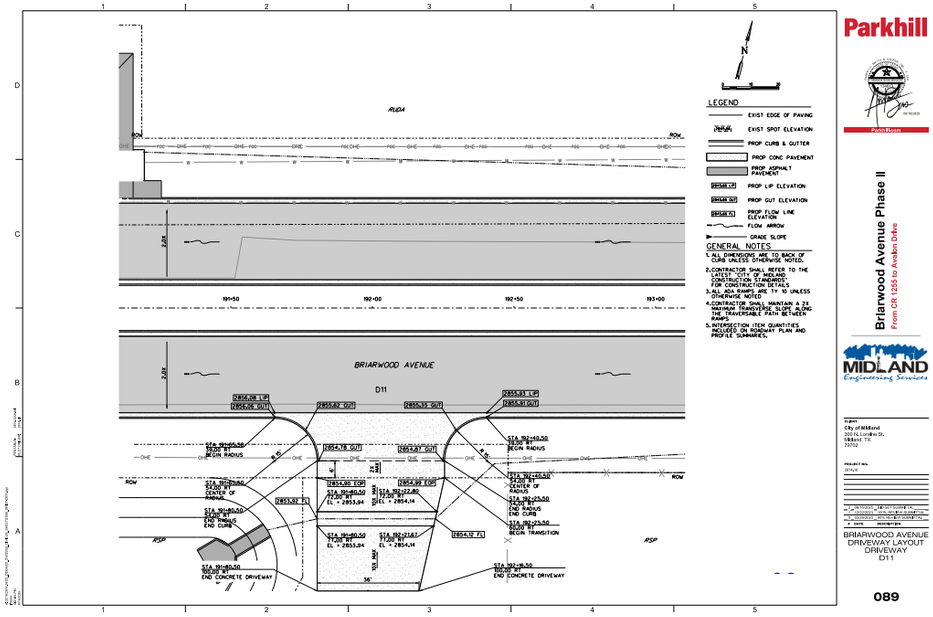
MIDLAND Engineering Services

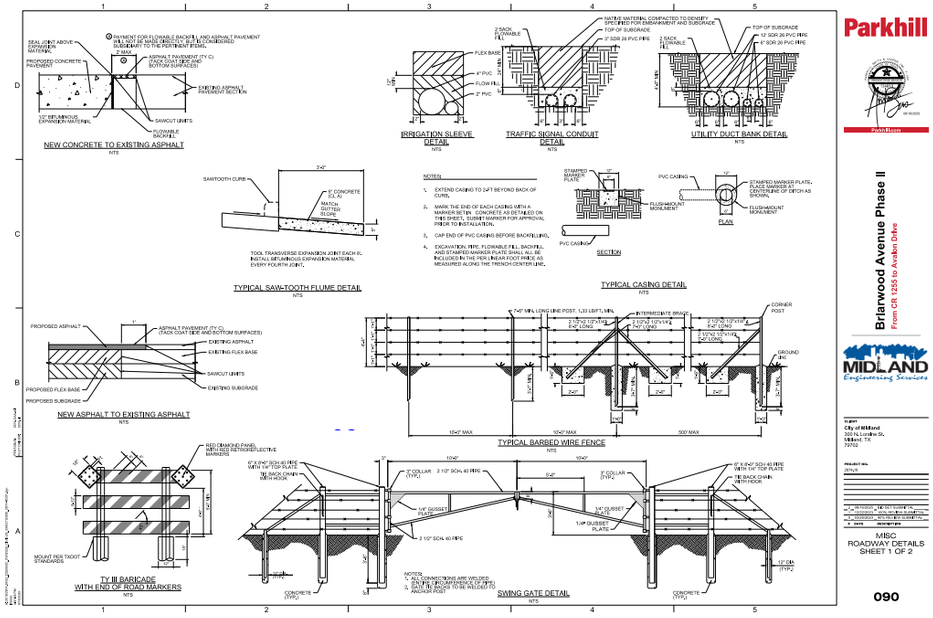
BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D5 & D6

086


BRIARWOOD AVENUE
D7
D8
GRADE BREAK
TYPE B CURB
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
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3. ALL ADA RAMPS ARE TY 1 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 22 MAXIMUM TRANSVERSE SLOPE ALONG THE TRAVERSABLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
BRIARWOOD AVENUE DRIVEWAY LAYOUT DRIVEWAYS D7 & D8
087


GOLDEN GATE DR
BRIARWOOD AVENUE
GRADE BREAK
D10
24' BOX SEE CULVERT LAYOUT STRUCTURE 148 FOR DETAILS
2858.63 LIP
2858.63 GUT
2857.89 LIP
2857.37 GUT
STA 187+13.68 30.00' RT BEGIN RADIUS
STA 187+28.68 END RADIUS END CURB
STA 187+73.76 30.00' RT END RADIUS
STA 187+58.76 BEGIN RADIUS BEGIN CURB
DRIVEWAY LIMITS BASED ON 8% MAX SLOPE.
STREAM
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
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3. ALL ADA RAMPS ARE TY 1 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG RAMP TO PROVIDE A TRAVERSABLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
POINT | STATION | OFFSET (RT) | ELEVATION
0701 | 187+28.68 | 55.00 | 2858.78
0702 | 187+28.68 | 56.75 | 2858.71
0703 | 187+28.68 | 60.00 | 2858.82
0704 | 187+58.76 | 55.00 | 2858.78
0705 | 187+58.76 | 56.75 | 2858.71
0706 | 187+58.76 | 60.00 | 2858.82
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D10
088


RUD4
BRIARWOOD AVENUE
D11
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
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5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
BRIARWOOD AVENUE DRIVEWAY LAYOUT DRIVEWAY D11
089



Parkhill

Briarwood Avenue Phase II

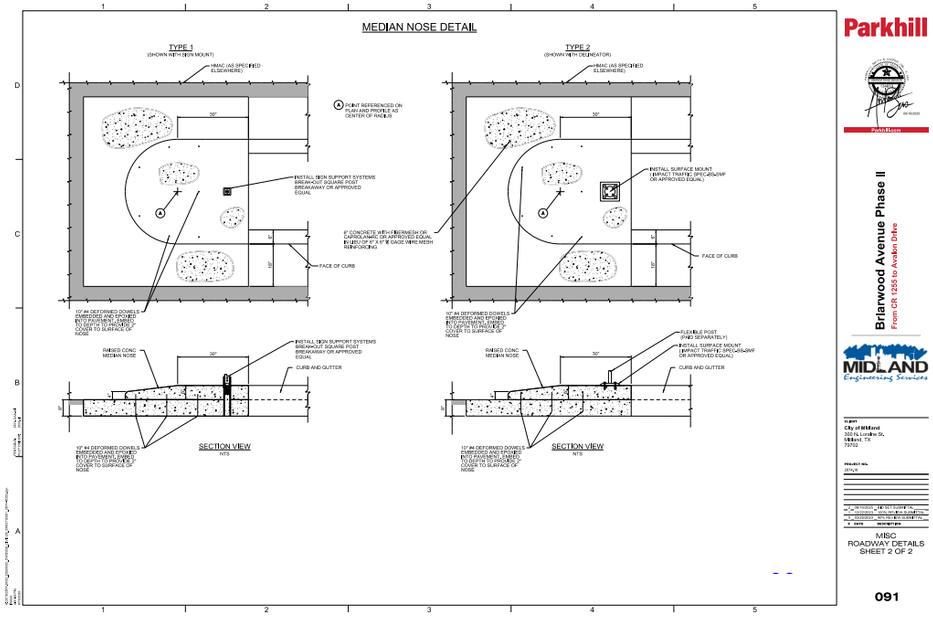
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

MISC
ROADWAY DETAILS
SHEET 1 OF 2

090



Parkhill

John Rowe

Briarwood Avenue Phase II

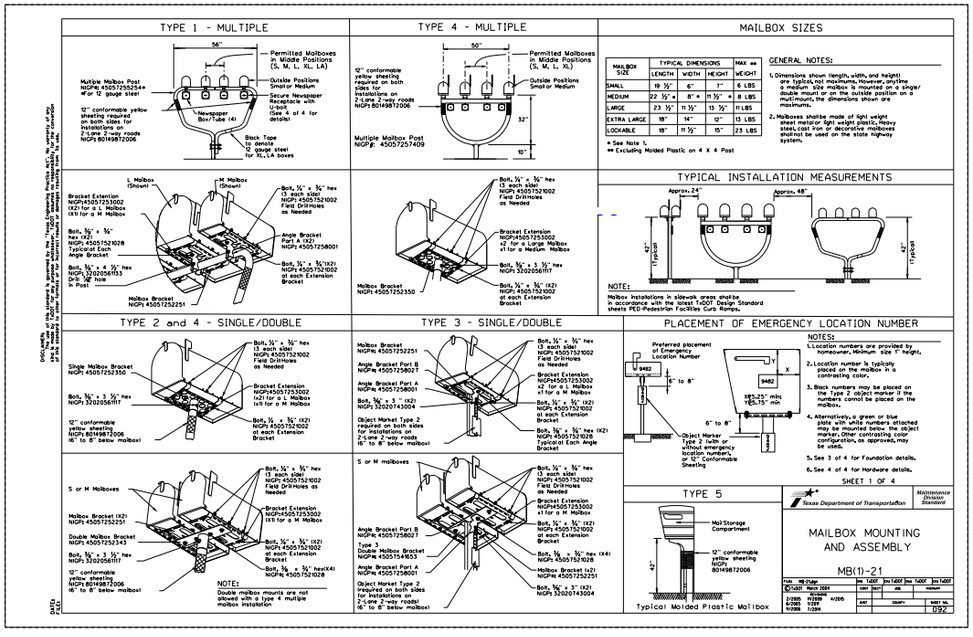
From CR 1255 to Avalon Drive

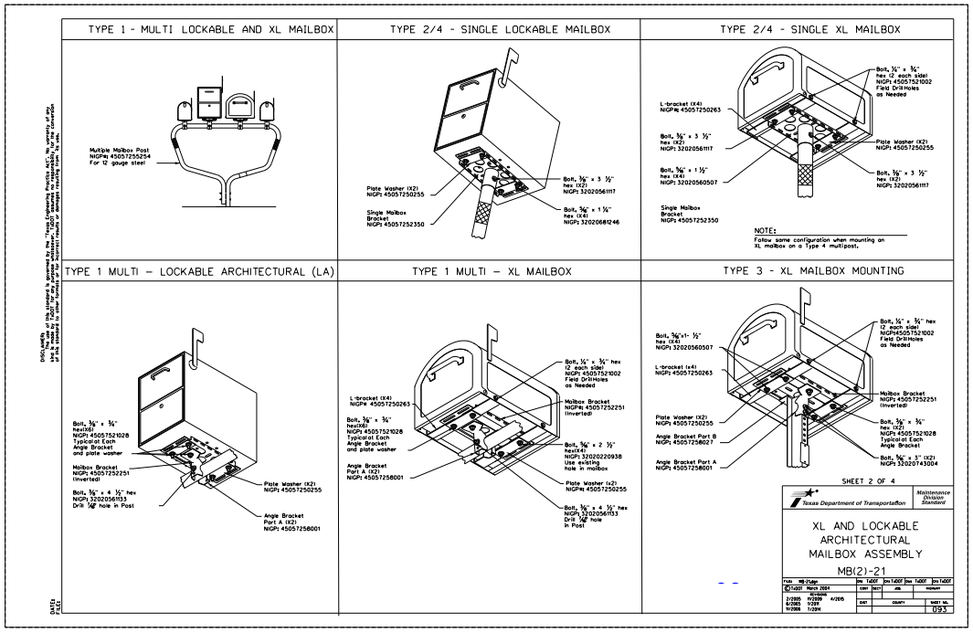
MIDLAND Engineering Services

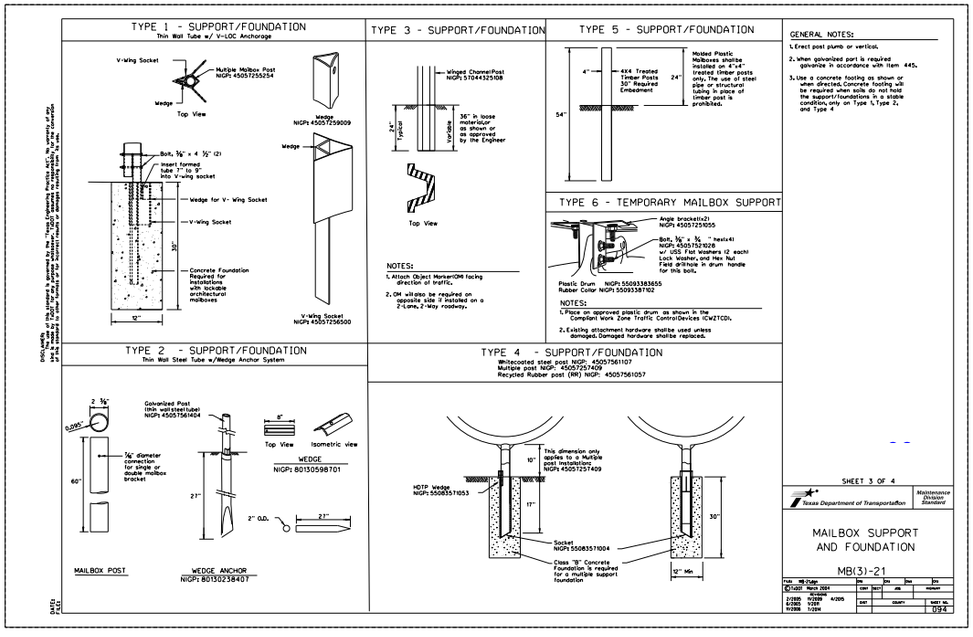
City of Midland
300 N. Loraine St.
Midland, TX
79702

MBC
ROADWAY DETAILS
SHEET 2 OF 2

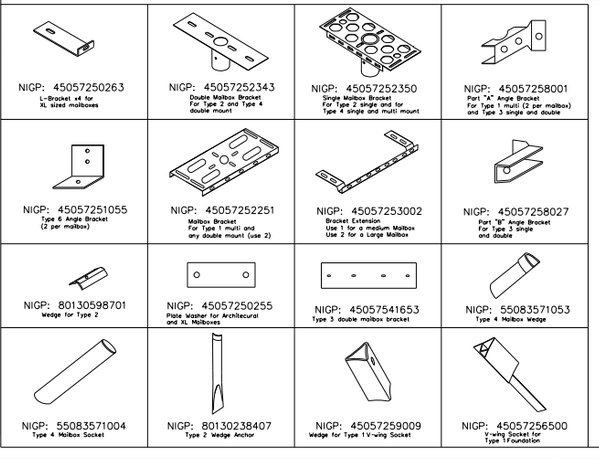
091


TYPE 1 - MULTIPLE
TYPE 4 - MULTIPLE
MAILBOX SIZES
GENERAL NOTES:
TYPICAL INSTALLATION MEASUREMENTS
TYPE 2 and 4 - SINGLE/DOUBLE
TYPE 3 - SINGLE/DOUBLE
PLACEMENT OF EMERGENCY LOCATION NUMBER
TYPE 5
Typical Molded Plastic Mailbox
MAILBOX MOUNTING AND ASSEMBLY
MB(1)-21
SHEET 1 OF 4


TYPE 1 - MULTI LOCKABLE AND XL MAILBOX
Multiple Mailbox Post
NIGP#: 45057255254
For 12 gauge steel
TYPE 2/4 - SINGLE LOCKABLE MAILBOX
Plate Washer (X2)
NIGP: 45057250255
Single Mailbox
Bracket
NIGP: 45057252350
Bolt, ½" x 3 ½"
hex (X2)
NIGP: 32020561117
Bolt, ⅜" x 1 ½"
hex (X4)
NIGP: 32020681246
TYPE 2/4 - SINGLE XL MAILBOX
L-bracket (X4)
NIGP#: 45057250263
Bolt, ½" x 3 ½"
hex (X2)
NIGP: 32020561117
Bolt, ⅜" x 1 ½"
hex (X4)
NIGP: 32020560507
Single Mailbox
Bracket
NIGP: 45057252350
Bolt, ½" x ½"
hex (2 each side)
NIGP: 45057521002
Field Drill Holes
as Needed
Plate Washer (X2)
NIGP: 45057250255
Bolt, ½" x 3 ½"
hex (X2)
NIGP: 32020561117
NOTE:
Follow same configuration when mounting an
XL mailbox on a Type 4 multipost.
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)
Bolt, ⅜" x ¾"
hex(X8)
NIGP: 45057521028
Typical of Each
Angle Bracket
and plate washer
Mailbox Bracket
NIGP: 45057252251
Inverted!
Bolt, ½" x 4 ½" hex
NIGP: 32020561113
Drill ⅝" hole in Post
Plate Washer (X2)
NIGP: 45057250255
Angle Bracket
Part A (X2)
NIGP: 45057256001
TYPE 1 MULTI – XL MAILBOX
L-bracket (X4)
NIGP#: 45057250263
Bolt, ½" x ¾"
hex(X8)
NIGP: 45057521028
Typical of Each
Angle Bracket
and plate washer
Angle Bracket
Part A (X2)
NIGP: 45057256001
Bolt, ½" x ½" hex
(2 each side)
NIGP: 45057521002
Field Drill Holes
as Needed
Mailbox Bracket
NIGP#: 45057252251
Inverted!
Bolt, ½" x 2 ½"
hex(X4)
NIGP: 32020220938
Use existing
hole in mailbox
Plate Washer (x2)
NIGP#: 45057250255
Bolt, ½" x 4 ½" hex
NIGP: 32020561113
Drill ⅝" hole
in Post
TYPE 3 - XL MAILBOX MOUNTING
Bolt, ⅜"x1- ½"
hex (X4)
NIGP: 32020560507
L-bracket (x4)
NIGP: 45057250263
Plate Washer (X2)
NIGP: 45057250255
Angle Bracket Part B
NIGP: 45057258027
Angle Bracket Part A
NIGP: 45057258001
Bolt, ½" x ½" hex
(2 each side)
NIGP#45057521002
Field Drill Holes
as Needed
Mailbox Bracket
NIGP: 45057252251
Inverted!
Bolt, ½" x ¾"
hex (X2)
NIGP: 45057521028
Typical of Each
Angle Bracket
Bolt, ⅜" x 3" (X2)
NIGP: 32020743004
SHEET 2 OF 4
Texas Department of Transportation
Maintenance Division Standard
XL AND LOCKABLE
ARCHITECTURAL
MAILBOX ASSEMBLY
MB(2)-21
DATE
FILE:


TYPE 1 - SUPPORT/FOUNDATION
Thin Wall Tube w/ V-LOC Anchorage
V-Wing Socket
Multiple Mailbox Post NIGP: 45057255234
Wedge
Top View
Wedge NIGP: 45057259009
Wedge
Bolt, ⅜" x 4 ½" (2)
Insert formed tube 7" to 9" into V-wing socket
Wedge for V- Wing Socket
V-Wing Socket
30"
Concrete Foundation Required for installations with lockable architectural mailboxes
12"
V-Wing Socket NIGP: 45057256500
TYPE 3 - SUPPORT/FOUNDATION
Winged ChannelPost NIGP: 51044325108
42" typical
36" in loose material or as shown or as approved by the Engineer
Top View
NOTES:
1. Attach Object Marker/OM facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.
TYPE 5 - SUPPORT/FOUNDATION
4"
4X4 Treated Timber Posts 30" Required Embedment
24"
54"
Molded Plastic Mailboxes shall be installed on 4"x4" treated timber posts only. The use of steel pipe or structural tubing in place of timber post is prohibited.
TYPE 6 - TEMPORARY MAILBOX SUPPORT
Angle bracket(s)(2) NIGP: 45057259055
Bolt, ⅜" x ¾" - 7 nuts(4) NIGP: 45057257828 w/ USS Flat washers (2 each) Lock washers, and Hex Nut Field drill hole in drum handle for this bolt.
Plastic Drum Rubber Collar NIGP: 55093383655 NIGP: 55093387102
NOTES:
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.
GENERAL NOTES:
1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. Use a concrete footing as shown or when directed. Concrete footing will not be required when soils do not hold the support foundations in a stable condition, only on Type 1, Type 2, and Type 4
TYPE 2 - SUPPORT/FOUNDATION
Thin Wall Steel Tube w/Wedge Anchor System
2 ½"
0.095"
Galvanized Post (thin wall steel tube) NIGP: 45057561404
⅝" diameter connection for single or double mailbox bracket
60"
21"
6"
Top View
Isometric view
WEDGE
NIGP: 80130598701
2" O.D.
21"
MAILBOX POST
WEDGE ANCHOR
NIGP: 80130238407
TYPE 4 - SUPPORT/FOUNDATION
Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057
This dimension only applies to a Multiple post installation NIGP: 45057257409
10"
HDTP Wedge NIGP: 55083571053
17"
30"
Socket NIGP: 55083571004
Class "B" Concrete Foundation is required for a multiple support foundation
12" Min
SHEET 3 OF 4
Texas Department of Transportation
Maintenance Division Standard
MAILBOX SUPPORT AND FOUNDATION
MB(3)-21
FILE: MB21x8d
DATE: March 2024
FED.RD. DIV. NO. 6
STATE: TEXAS
DIST. COUNTY SHEET NO.
DFN

TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Positions: S or M Inside Positions: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M, L, XL, or LA	SS, SM, or MM	Outside Position: S or M Inside Position: S, M, L, or XL	Molded Plastic	S, or M
Mailbox Post NIGP #	45057255254 (Galvanized Multiple)	45057561404 (Thin Walled Gavanize)	57044325108 (Wing Channel Post)	45057561107 (Thin walled white powder coated) 45057561057 (Recycled Rubber Post: S or M only)	45057561107 (Thin Walled White Powder Coated)	45057257409 (White Powder Coated Multiple)	4x4 Timber	Construction Barrel
Post and Mailbox Hardware NIGP #	45057259009 (Wedge) 45057256500 (V-Wing Socket) 45057253002 (Bracket Extension) 45057252251 (Mailbox Bracket) 45057258001 (Part A Angle Bracket x2) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	80130598701 (Wedge) 80130238407 (Wedge Anchor) 45057253002 (Bracket Extension) 45057253343 (Double MB Bracket) 45057252350 (S. Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	45057541653 (Type 3 Double Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057253002 (Bracket Extension) 45057258001 (Part A Angle Bracket) 45057258027 (Part B Angle Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253350 (Single Mailbox Bracket) 45057253002 (Bracket Extension) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252343 (Double Mount Bracket) 45057252251 (Mailbox Bracket x2)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252350 (Single Mount Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	None	45057251055 Angle Bracket (x2)
Foundation Used	Class B Concrete (Required for LA Mailboxes)	Class B Concrete (Required for LA Mailboxes)	None	Class B Concrete (not used with recycled rubber post, required for LA Mailboxes)	Class B Concrete (not required)	Class B Concrete	None	None



NIGP: 45057250263
L-Bracket x4 for XL sized mailboxes

NIGP: 45057252343
Double Mailbox Bracket For Type 2 and Type 4 double mount

NIGP: 45057252350
Single Mailbox Bracket For Type 2 single and for Type 4 single and multi mount

NIGP: 45057258001
Part "A" Angle Bracket For Type 1 multi (2 per mailbox) and Type 3 single and double

NIGP: 45057251055
Type 6 Angle Bracket (2 per mailbox)

NIGP: 45057252251
Mailbox Bracket For Type 1 multi and any double mount (use 2)

NIGP: 45057253002
Bracket Extension Use 1 for a medium Mailbox Use 2 for a Large Mailbox

NIGP: 45057258027
Part "B" Angle Bracket For Type 3 single and double

NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

NIGP: 55083571053
Type 4 Mailbox Wedge

NIGP: 55083571004
Type 4 Mailbox Socket

NIGP: 80130238407
Type 2 wedge Anchor

NIGP: 45057259009
Wedge for Type 1 V-wing Socket

NIGP: 45057256500
V-wing Socket for Type 1 Foundation

NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 OM 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 OM 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Retlective Yellow Sheeting for Flexible Posts

NOTES:

1. Type 2 object marker in accordance with Traffic Engineering Standard Delineators & Object Markers.
2. A light weight receptacle for newspaper delivery can be attached to mailbox posts if the receptacle does not touch the mailbox presents a hazard to traffic or delivery of the mail, excludes access to the mailbox, or display advertising, except the publication title.

BID CODES FOR CONTRACTS

MB-(X) ASSM TY (XXX) (X)

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- MP = Molded Plastic

Type of Post
- WC = Winged Channel Post
- RM = Recycled Rubber
- TWW = Thin Walled White Tubing
- TWG = Thin Walled Galvanized Tubing
- TIM = Timber

Type of Foundation
- Ty 1 = V-Loc
- Ty 2 = Wedge Anchor Steel System
- Ty 3 = Winged Channel post
- Ty 4 = Wedge Anchor Plastic System
- Ty 5 = 4 X 4 Post

SHEET 4 OF 4

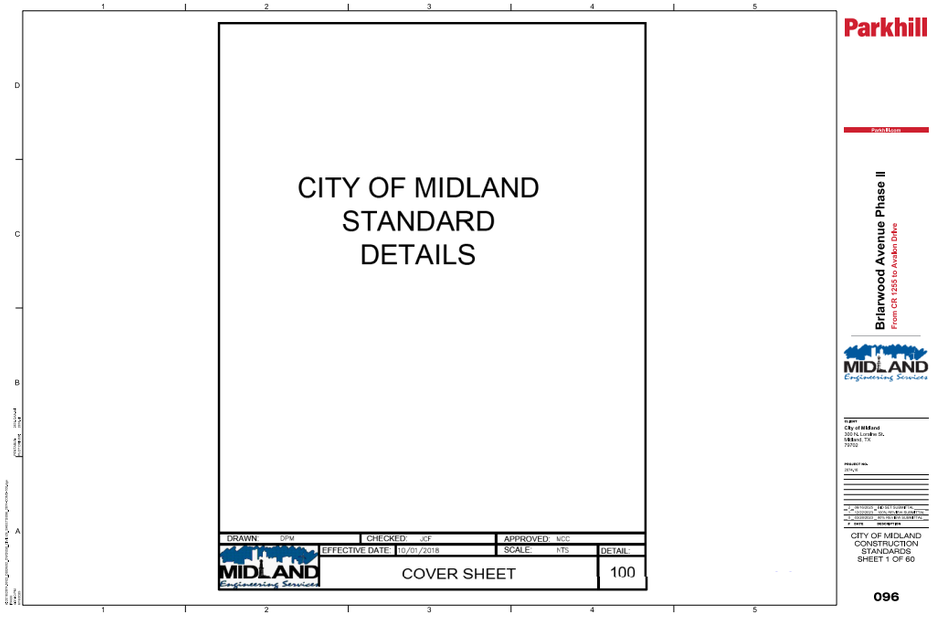
Texas Department of Transportation — Maintenance Division Standard

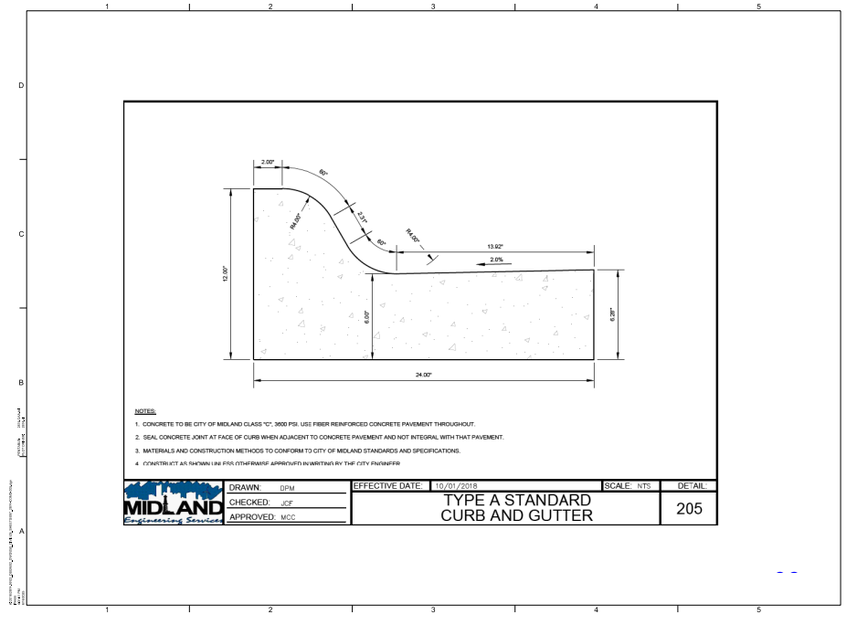
NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

FILE: MB-21.dgn			DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004			CONT	SECT	JOB	HIGHWAY
DATE REVISIONS						
2/2005	9/2009	4/2015				
6/2005	1/2011		DIST	COUNTY		SHEET NO.
9/2006	1/2014					0297

DATE PLOTTED


CITY OF MIDLAND
STANDARD
DETAILS
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
COVER SHEET
100
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND Engineering Services
CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 1 OF 60
096



NOTES:

1. CONCRETE TO BE CITY OF MIDLAND CLASS "C", 3600 PSI, USS FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT.
2. SEAL CONCRETE JOINT AT FACE OF CURB WHEN ADJACENT TO CONCRETE PAVEMENT AND NOT INTEGRAL WITH THAT PAVEMENT.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONTRACTOR AS SHOWN LINE FOR OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER

DRAWN: BPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	TYPE A STANDARD CURB AND GUTTER		205
APPROVED: MCC			

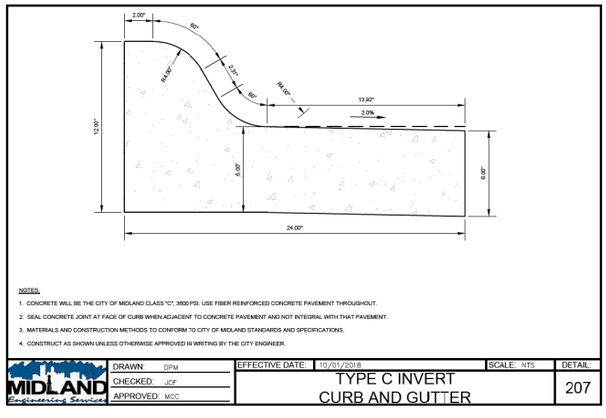
Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION STANDARDS
SHEET 2 OF 60

097



NOTES:

1. CONCRETE WILL BE THE CITY OF MIDLAND CLASS "C", 3600 PSI. USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT.
2. SEAL CONCRETE JOINT AT FACE OF CURB WHEN ADJACENT TO CONCRETE PAVEMENT AND NOT INTEGRAL WITH THAT PAVEMENT.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MSC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL: 207
		TYPE C INVERT CURB AND GUTTER		

Parkhill

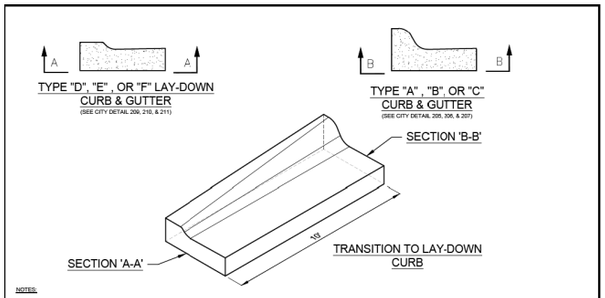
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 3 OF 60

098



NOTES:

1. CONCRETE TO BE CITY OF MIDLAND CLASS "C", 3600 PSI, USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT.
2. SEAL CONCRETE JOINT AT FACE OF CURB WHEN ADJACENT TO CONCRETE PAVEMENT AND NOT INTEGRAL WITH THAT PAVEMENT.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONTRACT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MCC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL
		TRANSITION TO LAY-DOWN CURB		208

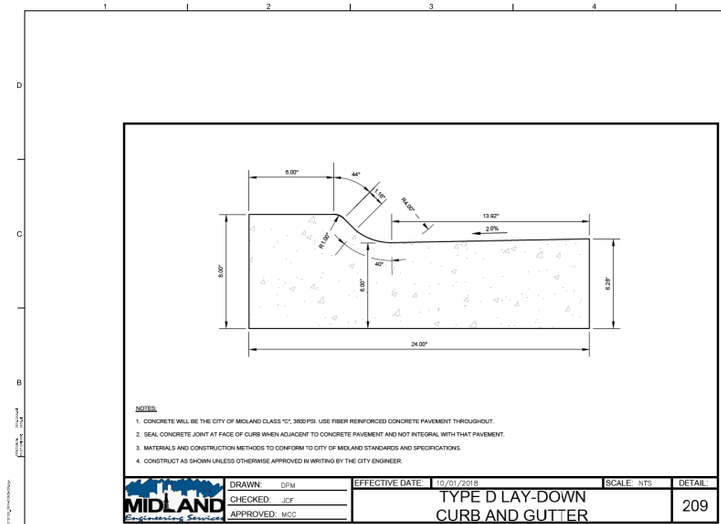
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Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 4 OF 60

099



NOTES:

1. CONCRETE WILL BE THE CITY OF MIDLAND CLASS "C", 3600 PSI. USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT.
2. SEAL CONCRETE JOINT AT FACE OF CURB WHEN ADJACENT TO CONCRETE PAVEMENT AND NOT INTEGRAL WITH THAT PAVEMENT.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MSC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL: 209
		TYPE D LAY-DOWN CURB AND GUTTER		

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Briarwood Avenue Phase II

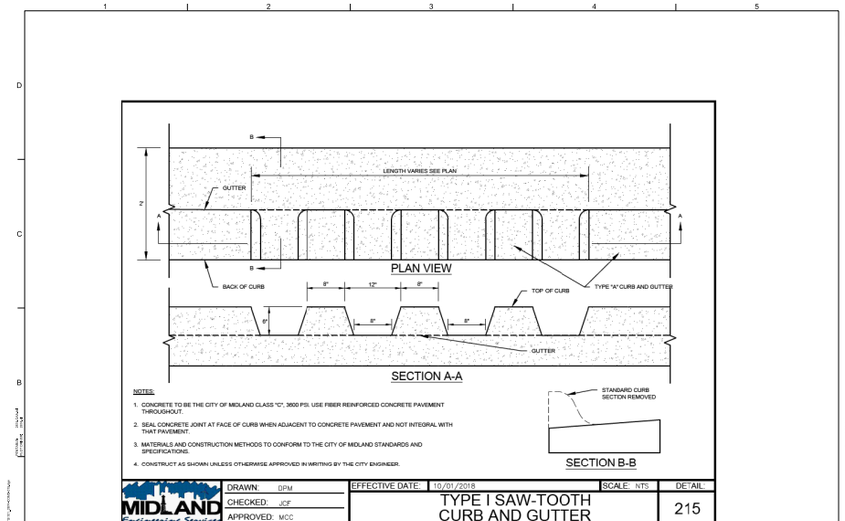
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 5 OF 60

100



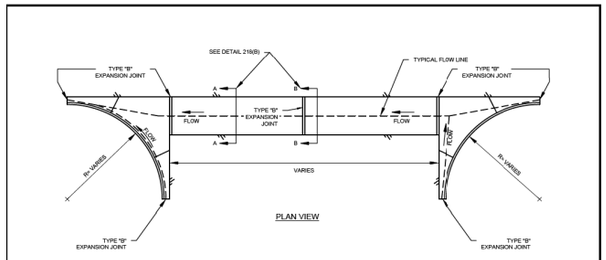
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Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION STANDARDS
SHEET 6 OF 60

101



PLAN VIEW

NOTES:

1. CONCRETE TO BE CITY OF MIDLAND CLASS "C", 3600 PSI. USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT.
2. CONCRETE FILLET AREA TO BE PLACED WITH INTEGRAL CURB.
3. SEAL ALL CONCRETE JOINTS.
4. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
6. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

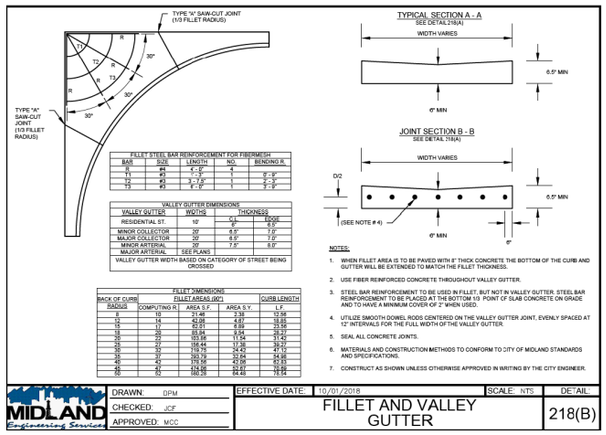
DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	FILLET AND VALLEY GUTTER		218(A)
APPROVED: MCC			

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Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 7 OF 60

102



FILLET STEEL BAR REINFORCEMENT FOR FIBERMESH

BAR	SIZE	LENGTH	NO.	BENDING R.
T1	#4	4'-0"	1	
T2	#3	4'-0"	1	6"-3"
T3	#3	3'-7.5"	1	2'-3"
T4	#3	4'-0"	1	3'-3"

VALLEY GUTTER DIMENSIONS

VALLEY GUTTER	WIDTH	THICKNESS	
		C.L.	EDGE
RESIDENTIAL ST.	10'	6.5"	6"
MINOR COLLECTOR	20'	6.5"	7.0"
MAJOR COLLECTOR	20'	6.5"	7.0"
MINOR ARTERIAL	20'	7.5"	8.0"
MAJOR ARTERIAL	SEE PLANS		

VALLEY GUTTER WIDTH BASED ON CATEGORY OF STREET BEING CROSSED

FILLET DIMENSIONS

BACK OF CURB RADIUS	FILLET AREAS (SF)			CURB LENGTH
	COMPUTING R.	AREA S.F.	AREA S.Y.	L.F.
6	10	21.46	2.39	12.56
12	14	42.96	4.87	18.85
15	17	42.61	6.69	23.56
18	20	85.84	9.54	28.27
20	22	103.68	11.74	31.42
25	27	156.44	14.45	39.27
30	32	199.73	17.75	47.12
35	37	242.79	22.64	54.98
40	42	370.56	42.96	62.83
45	47	474.66	52.67	70.68
50	52	588.39	64.48	78.54

NOTES:

1. WHEN FILLET AREA IS TO BE PAVED WITH 6" THICK CONCRETE THE BOTTOM OF THE CURB AND GUTTER WILL BE EXTENDED TO MATCH THE FILLET THICKNESS.
2. USE FIBER REINFORCED CONCRETE THROUGHOUT VALLEY GUTTER.
3. STEEL BAR REINFORCEMENT TO BE USED IN FILLET, BUT NOT IN VALLEY GUTTER. STEEL BAR REINFORCEMENT TO BE PLACED AT THE BOTTOM 1/3 POINT OF SLAB CONCRETE ON GRADE AND TO HAVE A MINIMUM COVER OF 2" WHEN USED.
4. UTILIZE SMOOTH DOWEL RODS CENTERED ON THE VALLEY GUTTER JOINT, EVENLY SPACED AT 12" INTERVALS FOR THE FULL WIDTH OF THE VALLEY GUTTER.
5. SEAL ALL CONCRETE JOINTS.
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	FILLET AND VALLEY GUTTER		218(B)
APPROVED: MCC			

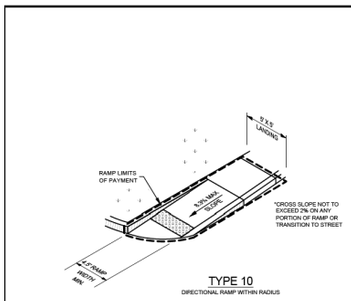
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Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 8 OF 60

103



TYPE 10

DIRECTIONAL RAMP WITHIN RADIUS

CURB RAMP NOTES:

1. ADJUST CURB RAMP LOCATION AND OR TYPE SO THAT NO OBSTRUCTION IS LOCATED WITHIN THE LANDING AREA.
2. ALL SLOPES ARE MAXIMUM ALLOWABLE. THE LEAST POSSIBLE SLOPE SHALL BE USED.
3. LANDINGS SHALL BE 5'X 5' MINIMUM WITH A MAXIMUM 2% SLOPE IN ANY DIRECTION. WHERE OBSTRUCTIONS EXIST, THERE SHALL BE A 3' MINIMUM CLEARANCE IN WIDTH AND LENGTH OF THE LANDING.
4. MANEUVERING SPACE AT THE BOTTOM OF CURB RAMPS SHALL BE A MINIMUM OF 4'X4' WHOLLY CONTAINED WITHIN THE CROSSWALK AND TO THE ENTIRE OUTSIDE OF THE PARALLEL VEHICULAR TRAVEL PATH.
5. MAXIMUM ALLOWABLE CROSS SLOPE ON SIDEWALK AND CURB RAMP SURFACES IS 2%.
6. CURB RAMPS WITH RETURNED CURBS MAY BE USED ONLY WHERE PEDESTRIANS WOULD NOT NORMALLY WALK ACROSS THE RAMP, EITHER BECAUSE THE ADJACENT SURFACE IS PLANTING OR OTHER NON-WALKING SURFACE OR BECAUSE THE SIDE APPROACH IS SUBSTANTIALLY OBSTRUCTED. OTHERWISE, PROVIDE FLARED SIDES.
7. ADDITIONAL INFORMATION ON CURB RAMP LOCATION, DESIGN, LIGHT REFLECTIVE VALUE AND TEXTURE MAY BE FOUND IN THE CURRENT EDITION OF THE TEXAS ACCESSIBILITY STANDARDS (TAS) AND 16 TAC 68.102.
8. AT INTERSECTIONS WHERE CROSSWALK MARKINGS ARE NOT REQUIRED, CURB RAMPS SHALL BE ALIGNED WITH THEORETICAL CROSSWALKS,OR AS DIRECTED BY THE ENGINEER.
9. PROVIDE A SMOOTH TRANSITION WHERE THE CURB RAMPS CONNECT TO THE STREET.
10. FLARE SLOPE SHALL NOT EXCEED 10% MEASURED ALONG CURB LINE.
11. ALL RAMPS AND LANDINGS WITH A CONCRETE SURFACE SHALL HAVE A COURSE BROOM FINISH OR OTHER ROUGH NON-SKID TYPE FINISH AS APPROVED BY THE ENGINEER.
12. PLACE 6"-0F CONCRETE IN RAMPS, LANDINGS, AND FLARES THAT ARE LOCATED AT THE RETURNS ADJACENT TO THE BACK OF CURB OF ARTERIAL STREETS AND COMMERCIAL SITES.

GENERAL NOTES:

1. CONCRETE TO BE CITY OF MIDLAND CLASS "A" WITH A MINIMUM28 DAY COMPRESSION STRENGTH OF 3000 PS. USE FIBER REINFORCED CONCRETE THROUGHOUT.
2. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO THE CITY OF MIDLAND STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE DIRECTED BY ADA STANDARDS AND RESOURCES.

DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	DIRECTIONAL RAMP WITHIN RADIUS		231
APPROVED: MCC			

Parkhill

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 19 OF 60

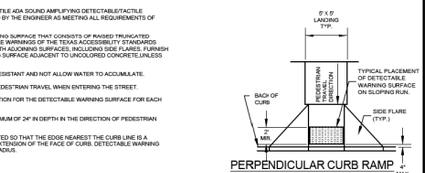
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DETECTABLE WARNING SURFACE NOTES:

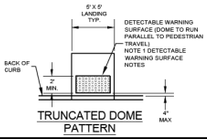
1. DETECTABLE WARNING SURFACE SUCH AS ARMOR-TILE ADA SOUND AMPLIFYING DETECTABLE/TACTILE WARNING SURFACE TILE OR EQUAL AND APPROVED BY THE ENGINEER AS MEETING ALL REQUIREMENTS OF ASTM C-936, C-33.
2. CURB RAMPS MUST CONTAIN A DETECTABLE WARNING SURFACE THAT CONSISTS OF RAISED TRUNCATED DOMES COMPLYING WITH SECTION 7.08 DETACHABLE WARNINGS OF THE TEXAS ACCESSIBILITY STANDARDS (TAS). THE SURFACE MUST CONTRAST VISUALLY WITH ADJOINING SURFACES, INCLUDING SIDE FLARES. FURNISH DARK BROWN OR DARK RED DETECTABLE WARNING SURFACE ADJACENT TO UNCOLORED CONCRETE,UNLESS SPECIFIED ELSEWHERE IN THE PLANS.
3. DETECTABLE WARNING SURFACES MUST BE SLIP RESISTANT AND NOT ALLOW WATER TO ACCUMULATE.
4. ALIGN TRUNCATED DOMES IN THE DIRECTION OF PEDES"RIAN TRAVEL WHEN ENTERING THE STREET.
5. SHADED AREAS INDICATE THE APPROXIMATE LOCATION FOR THE DETECTABLE WARNING SURFACE FOR EACH CURB RAMP TYPE.
6. DETECTABLE WARNING SURFACES SHALL BE A MINIMUM OF 24" IN DEPTH IN THE DIRECTION OF PEDESTRIAN TRAVEL.
7. DETECTABLE WARNING SURFACES SHALL BE LOCATED SO THAT THE EDGE NEAREST THE CURB LINE IS A MINIMUM OF 6" AND A MAXIMUM OF 15" FROM THE EXTENSION OF THE FACE OF CURB. DETECTABLE WARNING SURFACES MAY BE CURVED ALONG THE CORNER RADIUS.
8. SINGLE TILE PLATES COLONIAL RED COLOR.

GENERAL NOTES:

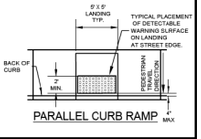
1. CONCRETE TO BE CITY OF MIDLAND CLASS "A" WITH A MINIMUM 28 DAY COMPRESSION STRENGTH OF 3000 PSI. USE FIBER REINFORCED CONCRETE THROUGHOUT.
2. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO THE CITY OF MIDLAND STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE DIRECTED BY ADA STANDARDS AND RESOURCES.



PERPENDICULAR CURB RAMP



TRUNCATED DOME PATTERN



PARALLEL CURB RAMP

DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL
CHECKED: JCF	DETECTABLE WARNING SURFACE		233
APPROVED: MCC			

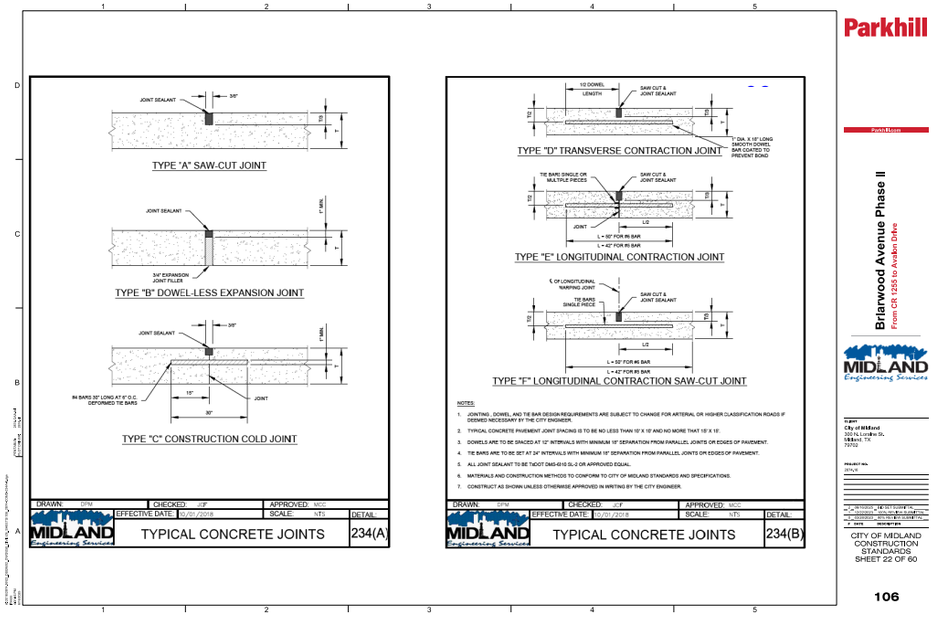
Parkhill

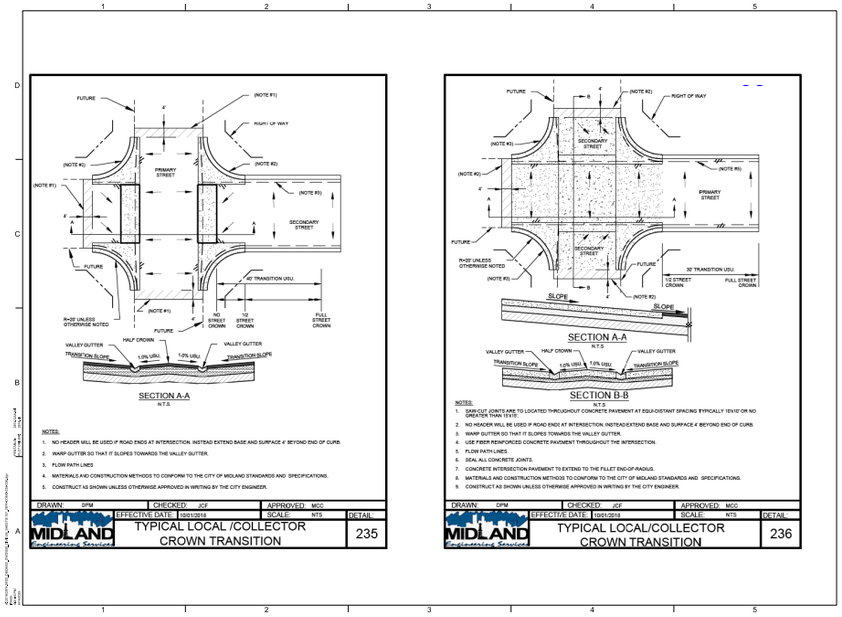
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

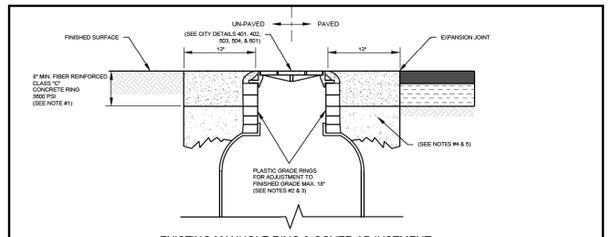
City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 21 OF 60

105


TYPE "A" SAW-CUT JOINT
JOINT SEALANT
TYPE "B" DOWEL-LESS EXPANSION JOINT
3/4" EXPANSION JOINT FILLER
TYPE "C" CONSTRUCTION COLD JOINT
#4 BARS 30" LONG AT 6" O.C. DEFORMED TIE BARS
JOINT
TYPE "D" TRANSVERSE CONTRACTION JOINT
1/2 DOWEL LENGTH
SAW CUT & JOINT SEALANT
1" DIA. X 18" LONG SMOOTH DOWEL BAR COATED TO PREVENT BOND
TYPE "E" LONGITUDINAL CONTRACTION JOINT
TIE BARS SINGLE OR MULTIPLE PIECES
L = 50" FOR #5 BAR
L = 42" FOR #5 BAR
TYPE "F" LONGITUDINAL CONTRACTION SAW-CUT JOINT
℄ OF LONGITUDINAL WARPING JOINT
TIE BARS SINGLE PIECE
L = 50" FOR #6 BAR
L = 42" FOR #5 BAR
NOTES:
1. JOINTING, DOWEL, AND TIE BAR DESIGN REQUIREMENTS ARE SUBJECT TO CHANGE FOR ARTERIAL OR HIGHER CLASSIFICATION ROADS IF DEEMED NECESSARY BY THE CITY ENGINEER.
2. TYPICAL CONCRETE PAVEMENT JOINT SPACING IS TO BE NO LESS THAN 10' X 10' AND NO MORE THAT 15' X 15'.
3. DOWELS ARE TO BE SPACED AT 12" INTERVALS WITH MINIMUM 15" SEPARATION FROM PARALLEL JOINTS OR EDGES OF PAVEMENT.
4. TIE BARS ARE TO BE SET AT 24" INTERVALS WITH MINIMUM 15" SEPARATION FROM PARALLEL JOINTS OR EDGES OF PAVEMENT.
5. ALL JOINT SEALANT TO BE TxDOT DMS-6310 SL-2 OR APPROVED EQUAL.
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL: 234(A)
TYPICAL CONCRETE JOINTS
DETAIL: 234(B)
TYPICAL CONCRETE JOINTS
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 22 OF 60
106


FUTURE
(NOTE #1)
RIGHT OF WAY
(NOTE #2)
PRIMARY STREET
(NOTE #3)
SECONDARY STREET
40' TRANSITION U/DJ.
R=25' UNLESS OTHERWISE NOTED
NO STREET CROWN
1/2 STREET CROWN
FULL STREET CROWN
HALF CROWN
VALLEY GUTTER
TRANSITION SLOPE
1.0% U/DJ.
7.0% U/DJ.
SECTION A-A
N.T.S.
NOTES:
1. NO HEADER WILL BE USED IF ROAD ENDS AT INTERSECTION. INSTEAD EXTEND BASE AND SURFACE 4' BEYOND END OF CURB.
2. WARP GUTTER SO THAT IT SLOPES TOWARDS THE VALLEY GUTTER.
3. FLOW PATH LINES
4. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO THE CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
5. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
TYPICAL LOCAL /COLLECTOR CROWN TRANSITION
235
SECONDARY STREET
PRIMARY STREET
SLOPE
30' TRANSITION U/DJ.
SECTION B-B
N.T.S
NOTES:
1. SAW-CUT JOINTS ARE TO LOCATED THROUGHOUT CONCRETE PAVEMENT AT EQUI-DISTANT SPACING TYPICALLY 10'x10' OR NO GREATER THAN 15'x15'.
2. NO HEADER WILL BE USED IF ROAD END AT INTERSECTION. INSTEAD EXTEND BASE AND SURFACE 4' BEYOND END OF CURB.
3. WARP GUTTER SO THAT IT SLOPES TOWARDS THE VALLEY GUTTER.
4. USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT THE INTERSECTION.
5. FLOW PATH LINES.
6. SEAL ALL CONCRETE JOINTS.
7. CONCRETE INTERSECTION PAVEMENT TO EXTEND TO THE FILLET END-OF-RADIUS.
8. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO THE CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
9. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
236
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND CONSTRUCTION STANDARDS SHEET 23 OF 60
107



EXISTING MANHOLE RING & COVER ADJUSTMENT

NOTES:

1. INSTALL 12" MIN. FIBER REINFORCED CLASS "C" CONCRETE RING, 3650 PSI, WHEN MANHOLE IS LOCATED IN AN ARTERIAL R.O.W.
2. GRADE RINGS TO MEET ASTM STANDARD A48 AND TO BE 2", 4", OR 6" THICKNESS AS REQUIRED. INSTALL ASPHALT TAR IN THICK, UNIFORM COATING OVER ALL OUTER ADJUSTMENT RING SURFACES AND JOINTS.
3. ENGINEERING SERVICES REPRESENTATIVE AND UTILITY SERVICES REPRESENTATIVE MAY ALLOW GREATER ADJUSTMENT RING DEPTH TO ACCOMMODATE PAVING STRUCTURES.
4. REMOVE ALL MATERIAL EXCAVATED FROM SITE AND EXCAVATION.
5. FILL ANY OVER-EXCAVATION WITH FLOWABLE FILL 2-SACK (2-SACK = 188 LBS/CY, PORTLAND CEMENT).
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	EXISTING MANHOLE RING & COVER ADJUSTMENT		319
APPROVED: MCC			

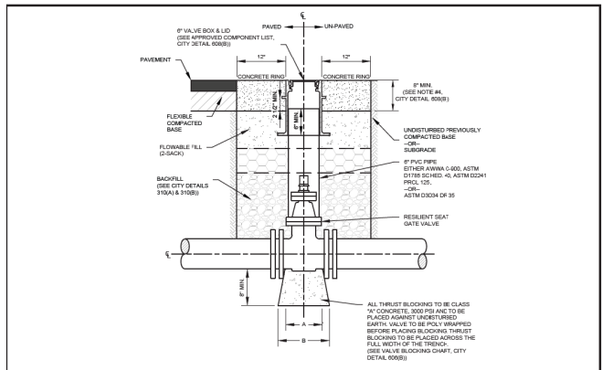
Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 36 OF 60

108



MIDLAND Engineering Services	DRAWN: GPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS
	CHECKED: JCF	TYPICAL VALVE AND VALVE BOX	DETAIL: 608(A)
	APPROVED: MCC		

Parkhill

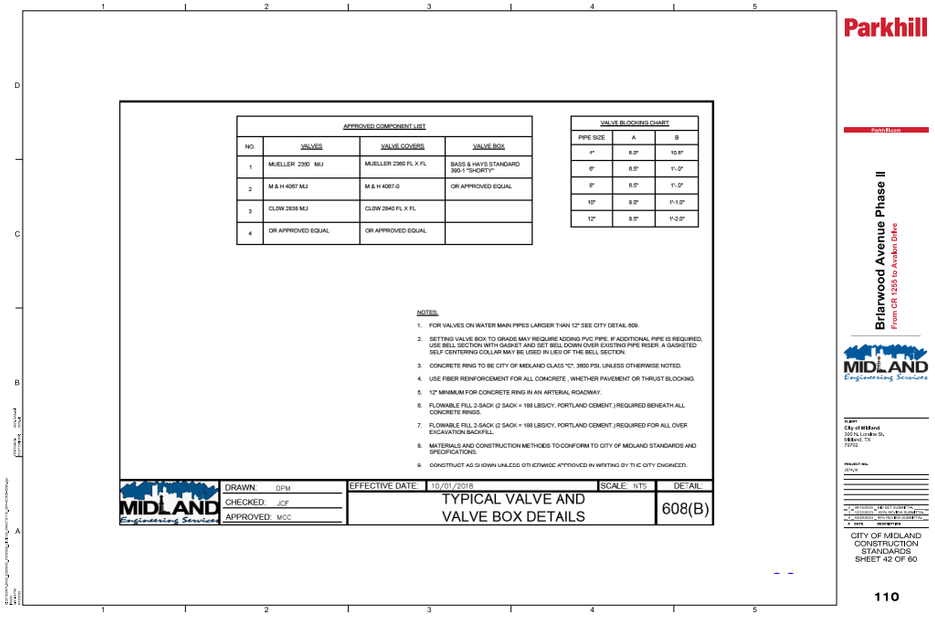
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 41 OF 60

109



APPROVED COMPONENT LIST			
NO.	VALVES	VALVE COVERS	VALVE BOX
1	MUELLER 2360 MJ	MUELLER 2360 FL X FL	BASS & HAYS STANDARD 300-1 "SHORTY"
2	M & H 4067 MJ	M & H 4067-0	OR APPROVED EQUAL
3	CLOW 2838 MJ	CLOW 2840 FL X FL	
4	OR APPROVED EQUAL	OR APPROVED EQUAL	

VALVE BLOCKING CHART		
PIPE SIZE	A	B
4"	6.0"	10.8"
6"	6.5"	1'-0"
8"	6.5"	1'-3"
10"	8.0"	1'-1.5"
12"	8.5"	1'-2.5"

NOTES:

1. FOR VALVES ON WATER MAIN PIPES LARGER THAN 12" SEE CITY DETAIL 609.
2. SETTING VALVE BOX TO GRADE MAY REQUIRE ADDING PVC PIPE. IF ADDITIONAL PIPE IS REQUIRED, USE BELL SECTION WITH GASKET AND SET BELL DOWN OVER EXISTING PIPE RISER. A GASKETED SELF CENTERING COLLAR MAY BE USED IN LIEU OF THE BELL SECTION.
3. CONCRETE RING TO BE CITY OF MIDLAND CLASS "C", 3600 PSI, UNLESS OTHERWISE NOTED.
4. USE FIBER REINFORCEMENT FOR ALL CONCRETE , WHETHER PAVEMENT OR THRUST BLOCKING.
5. 12" MINIMUM FOR CONCRETE RING IN AN ARTERIAL ROADWAY.
6. FLOWABLE FILL 2-SACK (2 SACK = 188 LBS/CY, PORTLAND CEMENT,) REQUIRED BENEATH ALL CONCRETE RINGS.
7. FLOWABLE FILL 2-SACK (2 SACK = 188 LBS/CY, PORTLAND CEMENT,) REQUIRED FOR ALL OVER EXCAVATION BACKFILL.
8. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
9. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	TYPICAL VALVE AND VALVE BOX DETAILS		608(B)
APPROVED: MCC			

Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

Engineering Services

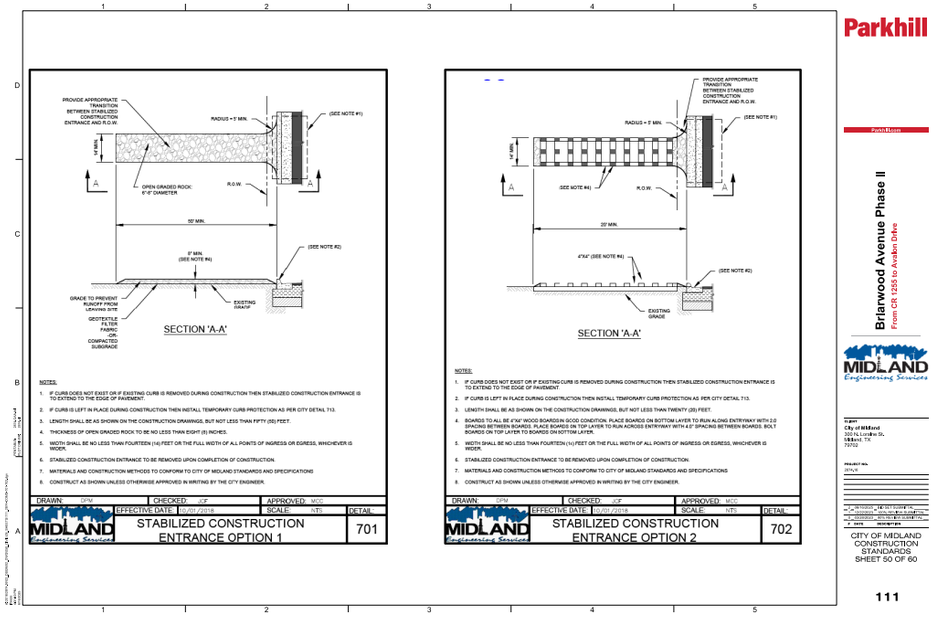
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

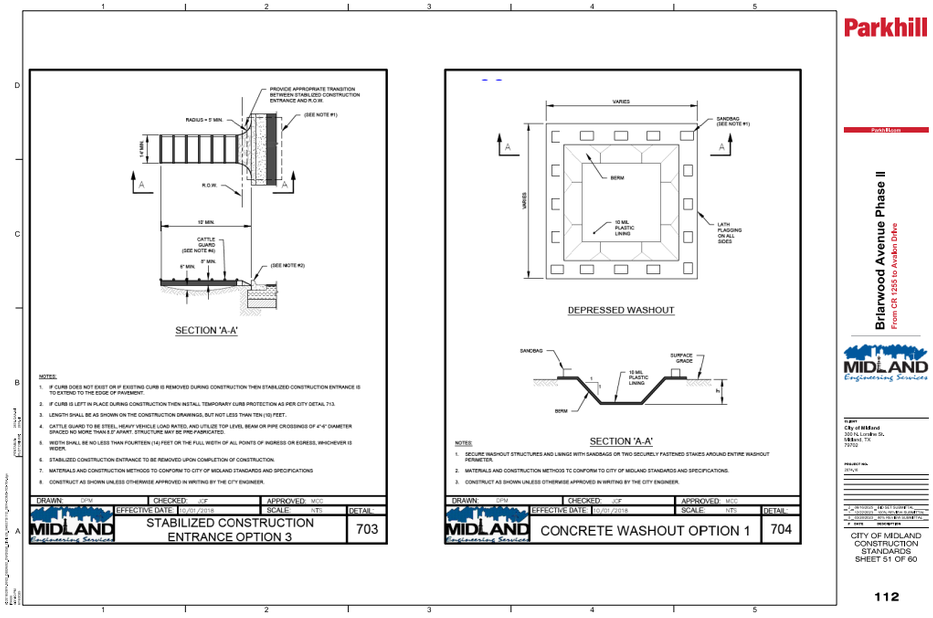
Project No.
007419

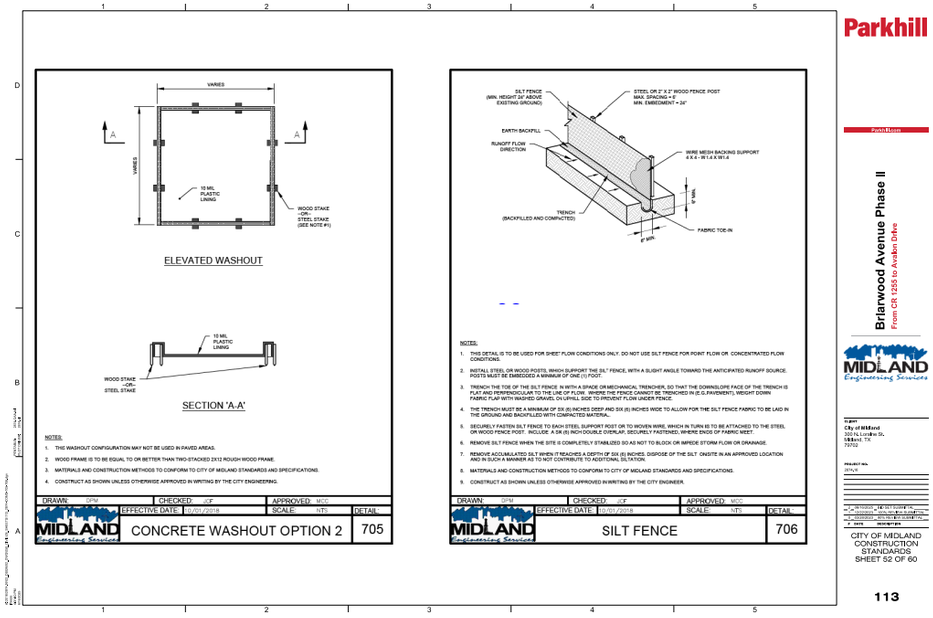
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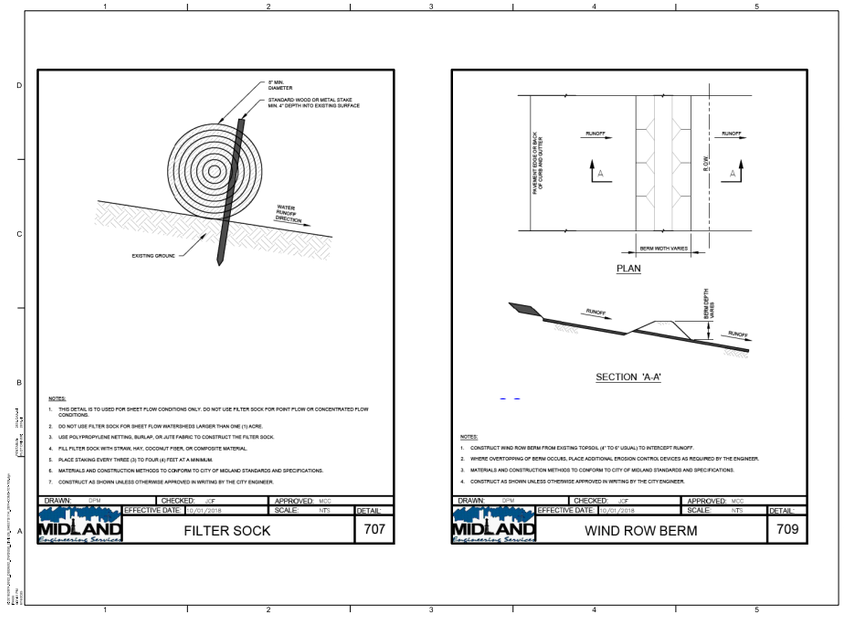
CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 42 OF 60

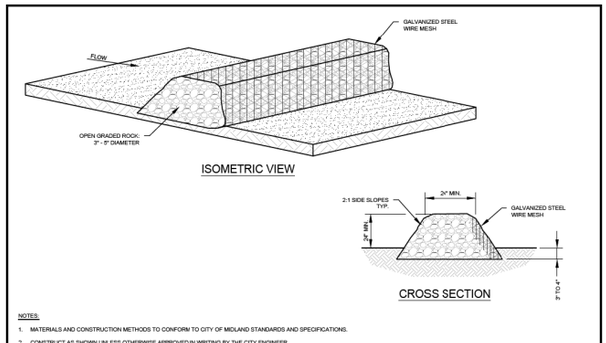
110


PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND R.O.W.
RADIUS = 5' MIN.
(SEE NOTE #1)
6" MIN.
A
OPEN GRADED ROCK: 6"-8" DIAMETER
R.O.W.
50' MIN.
8" MIN. (SEE NOTE #4)
(SEE NOTE #2)
GRADE TO PREVENT RUNOFF FROM LEAVING SITE
EXISTING GRADE
GEOTEXTILE FILTER FABRIC OR COMPACTED SUBGRADE
SECTION 'A-A'
NOTES:
1. IF CURB DOES NOT EXIST OR IF EXISTING CURB IS REMOVED DURING CONSTRUCTION THEN STABILIZED CONSTRUCTION ENTRANCE IS TO EXTEND TO THE EDGE OF PAVEMENT.
2. IF CURB IS LEFT IN PLACE DURING CONSTRUCTION THEN INSTALL TEMPORARY CURB PROTECTION AS PER CITY DETAIL 713.
3. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN FIFTY (50) FEET.
4. THICKNESS OF OPEN GRADED ROCK TO BE NO LESS THAN EIGHT (8) INCHES.
5. WIDTH SHALL BE NO LESS THAN FOURTEEN (14) FEET OR THE FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS, WHICHEVER IS WIDER.
6. STABILIZED CONSTRUCTION ENTRANCE TO BE REMOVED UPON COMPLETION OF CONSTRUCTION.
7. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS
8. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2019
SCALE: NTS
DETAIL: 701
MIDLAND Engineering Services
STABILIZED CONSTRUCTION ENTRANCE OPTION 1
PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND R.O.W.
RADIUS = 5' MIN.
(SEE NOTE #1)
6" MIN.
A
(SEE NOTE #4)
R.O.W.
20' MIN.
4"X4" (SEE NOTE #4)
(SEE NOTE #2)
EXISTING GRADE
SECTION 'A-A'
NOTES:
1. IF CURB DOES NOT EXIST OR IF EXISTING CURB IS REMOVED DURING CONSTRUCTION THEN STABILIZED CONSTRUCTION ENTRANCE IS TO EXTEND TO THE EDGE OF PAVEMENT.
2. IF CURB IS LEFT IN PLACE DURING CONSTRUCTION THEN INSTALL TEMPORARY CURB PROTECTION AS PER CITY DETAIL 713.
3. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN TWENTY (20) FEET.
4. BOARDS TO ALL BE 4"X4" WOOD BOARDS IN GOOD CONDITION. PLACE BOARDS ON BOTTOM LAYER TO RUN ALONG ENTRYWAY WITH 2.0 SPACING BETWEEN BOARDS. PLACE BOARDS ON TOP LAYER TO RUN ACROSS ENTRYWAY WITH 4.0" SPACING BETWEEN BOARDS. BOLT BOARDS ON TOP LAYER TO BOARDS ON BOTTOM LAYER.
5. WIDTH SHALL BE NO LESS THAN FOURTEEN (14) FEET OR THE FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS, WHICHEVER IS WIDER.
6. STABILIZED CONSTRUCTION ENTRANCE TO BE REMOVED UPON COMPLETION OF CONSTRUCTION.
7. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS
8. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2019
SCALE: NTS
DETAIL: 702
MIDLAND Engineering Services
STABILIZED CONSTRUCTION ENTRANCE OPTION 2
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND Engineering Services
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702
Project No.
25747
DATE DESCRIPTION
CITY OF MIDLAND CONSTRUCTION STANDARDS SHEET 50 OF 60
111


PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND R.O.W.
RADIUS = 5' MIN.
(SEE NOTE #1)
4" MIN.
R.O.W.
12' MIN.
CATTLE GUARD (SEE NOTE #4)
6" MIN.
8" MIN.
(SEE NOTE #2)
SECTION 'A-A'
NOTES:
1. IF CURB DOES NOT EXIST OR IF EXISTING CURB IS REMOVED DURING CONSTRUCTION THEN STABILIZED CONSTRUCTION ENTRANCE IS TO EXTEND TO THE EDGE OF PAVEMENT.
2. IF CURB IS LEFT IN PLACE DURING CONSTRUCTION THEN INSTALL TEMPORARY CURB PROTECTION AS PER CITY DETAIL 713.
3. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN TEN (10) FEET.
4. CATTLE GUARD TO BE STEEL, HEAVY VEHICLE LOAD RATED, AND UTILIZE TOP LEVEL BEAM OR PIPE CROSSINGS OF 4"-6" DIAMETER SPACED NO MORE THAN 6" APART. STRUCTURE MAY BE PRE-FABRICATED.
5. WIDTH SHALL BE NO LESS THAN FOURTEEN (14) FEET OR THE FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS, WHICHEVER IS WIDER.
6. STABILIZED CONSTRUCTION ENTRANCE TO BE REMOVED UPON COMPLETION OF CONSTRUCTION.
7. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS
8. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
STABILIZED CONSTRUCTION ENTRANCE OPTION 3
703
VARIES
SANDBAG (SEE NOTE #1)
BERM
VARIES
10 MIL PLASTIC LINING
LATH FLAGGING ON ALL SIDES
DEPRESSED WASHOUT
SANDBAG
SURFACE GRADE
10 MIL PLASTIC LINING
BERM
SECTION 'A-A'
NOTES:
1. SECURE WASHOUT STRUCTURES AND LININGS WITH SANDBAGS OR TWO SECURELY FASTENED STAKES AROUND ENTIRE WASHOUT PERIMETER.
2. MATERIALS AND CONSTRUCTION METHODS TC CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
3. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
CONCRETE WASHOUT OPTION 1
704
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND Engineering Services
client
City of Midland
300 N. Loraine St.
Midland, TX
79702
project no.
DATE
DESCRIPTION
CITY OF MIDLAND CONSTRUCTION STANDARDS
SHEET 51 OF 60
112


VARIES
VARIES
A
A
10 MIL PLASTIC LINING
WOOD STAKE -OR- STEEL STAKE (SEE NOTE #1)
ELEVATED WASHOUT
10 MIL PLASTIC LINING
WOOD STAKE -OR- STEEL STAKE
SECTION 'A-A'
NOTES:
1. THIS WASHOUT CONFIGURATION MAY NOT BE USED IN PAVED AREAS.
2. WOOD FRAME IS TO BE EQUAL TO OR BETTER THAN TWO-STACKED 2X12 ROUGH WOOD FRAME.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEERING.
DRAWN: DPM
CHECKED: JDF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
CONCRETE WASHOUT OPTION 2
705
SILT FENCE (MIN. HEIGHT 24" ABOVE EXISTING GROUND)
STEEL OR 2" X 2" WOOD FENCE POST MAX. SPACING = 8' MIN. EMBEDMENT = 24"
EARTH BACKFILL
RUNOFF FLOW DIRECTION
WIRE MESH BACKING SUPPORT 6 G A - W 1.4 X W1.4
6" MIN.
TRENCH (BACKFILLED AND COMPACTED)
8" MIN.
FABRIC TOE-IN
NOTES:
1. THIS DETAIL IS TO BE USED FOR SHEET FLOW CONDITIONS ONLY. DO NOT USE SILT FENCE FOR POINT FLOW OR CONCENTRATED FLOW CONDITIONS.
2. INSTALL STEEL OR WOOD POSTS, WHICH SUPPORT THE SILT FENCE, WITH A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POSTS MUST BE EMBEDDED A MINIMUM OF ONE (1) FOOT.
3. TRENCH THE TOE OF THE SILT FENCE IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW. WHERE THE FENCE CANNOT BE TRENCHED IN (E.G.PAVEMENT), WEIGHT DOWN FABRIC FLAP WITH WASHED GRAVEL ON UPHILL SIDE TO PREVENT FLOW UNDER FENCE.
4. THE TRENCH MUST BE A MINIMUM OF SIX (6) INCHES DEEP AND SIX (6) INCHES WIDE TO ALLOW FOR THE SILT FENCE FABRIC TO BE LAID IN THE GROUND AND BACKFILLED WITH COMPACTED MATERIA...
5. SECURELY FASTEN SILT FENCE TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE, WHICH IN TURN IS TO BE ATTACHED TO THE STEEL OR WOOD FENCE POST. INCLUDE A 04 (6) INCH DOUBLE OVERLAP, SECURELY FASTENED, WHERE ENDS OF FABRIC MEET.
6. REMOVE SILT FENCE WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. REMOVE ACCUMULATED SILT WHEN IT REACHES A DEPTH OF SIX (6) INCHES. DISPOSE OF THE SILT ONSITE IN AN APPROVED LOCATION AND IN SUCH A MANNER AS TO NOT CONTRIBUTE TO ADDITIONAL SILTATION.
8. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
9. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JDF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
SILT FENCE
706
Parkhill
Briarwood Avenue Phase II
From CR 1325 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND CONSTRUCTION STANDARDS SHEET 52 OF 60
113


5" MIN. DIAMETER
STANDARD WOOD OR METAL STAKE MIN. 4" DEPTH INTO EXISTING SURFACE
WATER RUNOFF DIRECTION
EXISTING GROUND
NOTES:
1. THIS DETAIL IS TO USED FOR SHEET FLOW CONDITIONS ONLY. DO NOT USE FILTER SOCK FOR POINT FLOW OR CONCENTRATED FLOW CONDITIONS.
2. DO NOT USE FILTER SOCK FOR SHEET FLOW WATERSHEDS LARGER THAN ONE (1) ACRE.
3. USE POLYPROPYLENE NETTING, BURLAP, OR JUTE FABRIC TO CONSTRUCT THE FILTER SOCK.
4. FILL FILTER SOCK WITH STRAW, HAY, COCONUT FIBER, OR COMPOSITE MATERIAL.
5. PLACE STAKING EVERY THREE (3) TO FOUR (4) FEET AT A MINIMUM.
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JDF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL: 707
FILTER SOCK
RUNOFF
PAVEMENT EDGE OR BACK OF CURB AND GUTTER
A
5' TYP.
BERM WIDTH VARIES
PLAN
MAX DEPTH VARIES
SECTION 'A-A'
NOTES:
1. CONSTRUCT WIND ROW BERM FROM EXISTING TOPSOIL (4" TO 6" USUAL) TO INTERCEPT RUNOFF.
2. WHERE OVERTOPPING OF BERM OCCURS, PLACE ADDITIONAL EROSION CONTROL DEVICES AS REQUIRED BY THE ENGINEER.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JDF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL: 709
WIND ROW BERM
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 53 OF 60
114



ISOMETRIC VIEW

CROSS SECTION

NOTES:

1. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
2. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MSC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL: 708
		ROCK FILTER DAM		

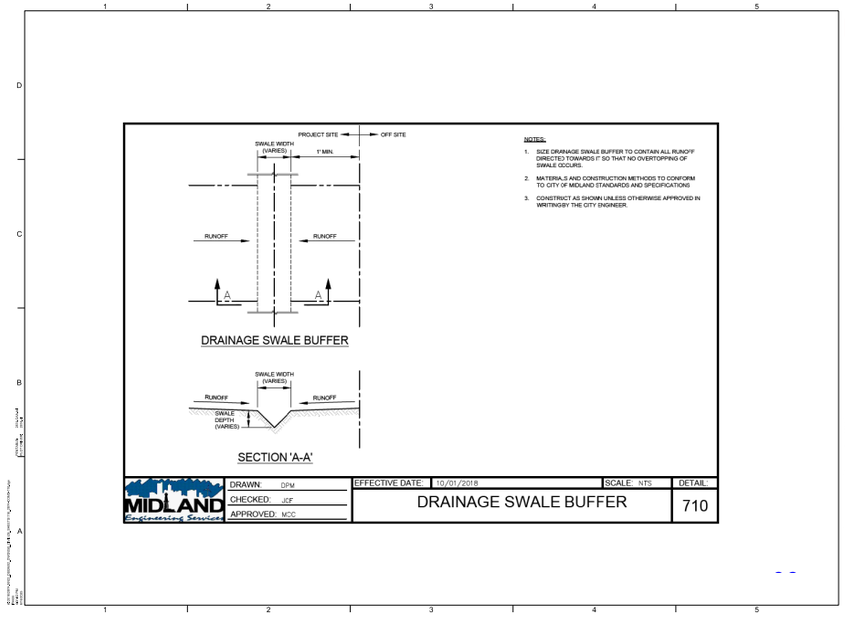
Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION STANDARDS
SHEET 54 OF 60

115



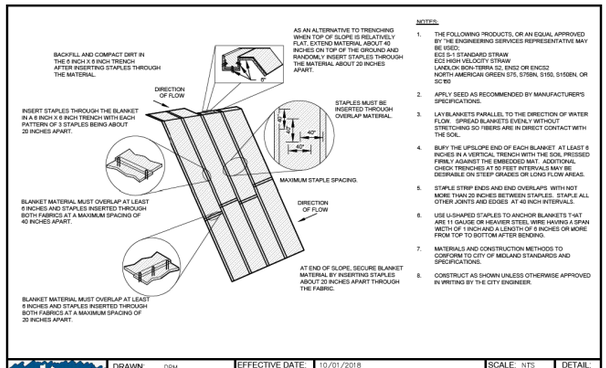
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Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 56 OF 60

116



NOTES:

1. THE FOLLOWING PRODUCTS, OR AN EQUAL APPROVED BY THE ENGINEERING SERVICES REPRESENTATIVE MAY BE USED:
   ECS S-1 STANDARD STRAW
   ECS HIGH VELOCITY STRAW
   LANDLOK BON-TERRA S2, ENS2 OR ENCS2
   NORTH AMERICAN GREEN S75, S75BN, S150, S150BN, OR SC150
2. APPLY SEED AS RECOMMENDED BY MANUFACTURER'S SPECIFICATIONS.
3. LAY BLANKETS PARALLEL TO THE DIRECTION OF WATER FLOW. SPREAD BLANKETS EVENLY WITHOUT STRETCHING SO FIBERS ARE IN DIRECT CONTACT WITH THE SOIL.
4. BURY THE UPSLOPE END OF EACH BLANKET AT LEAST 6 INCHES IN A VERTICAL TRENCH WITH THE SOIL PRESSED FIRMLY AGAINST THE EMBEDDED MAT. ADDITIONAL CHECK TRENCHES AT 50 FEET INTERVALS MAY BE DESIRABLE ON STEEP GRADES OR LONG FLOW AREAS.
5. STAPLE STRIP ENDS AND END OVERLAPS WITH NOT MORE THAN 20 INCHES BETWEEN STAPLES. STAPLE ALL OTHER JOINTS AND EDGES AT 40 INCH INTERVALS.
6. USE U-SHAPED STAPLES TO ANCHOR BLANKETS THAT ARE 11 GAUGE OR HEAVIER STEEL WIRE HAVING A SPAN WIDTH OF 1 INCH AND A LENGTH OF 8 INCHES OR MORE FROM TOP TO BOTTOM AFTER BENDING.
7. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
8. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JDF APPROVED: MSC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL: 711

EROSION CONTROL
BLANKET AND VEGETATION

Parkhill

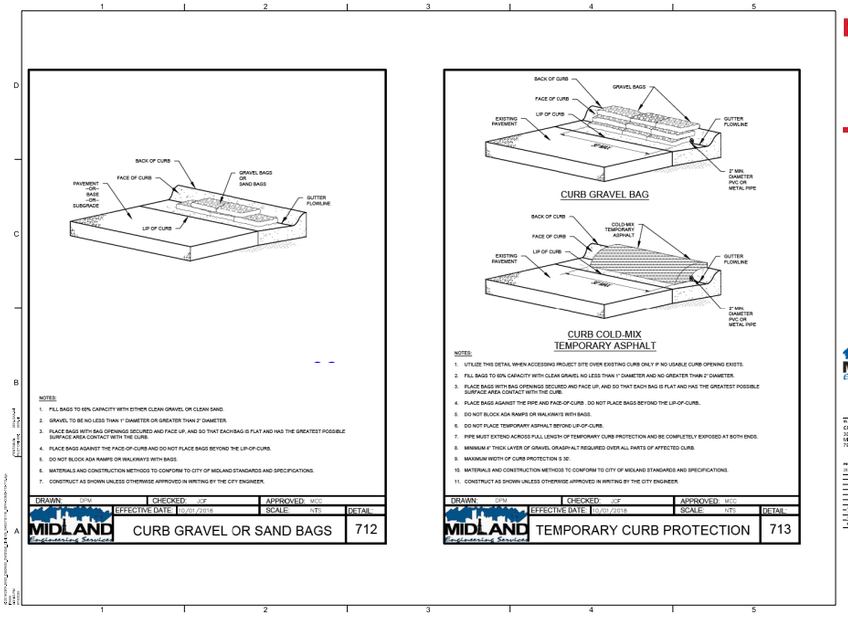
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

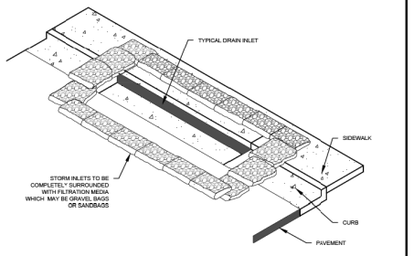
MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 56 OF 60

117


BACK OF CURB
FACE OF CURB
PAVEMENT (ASPHALT, CONCRETE) -OR- SUBGRADE
LIP OF CURB
GRAVEL BAGS OR SAND BAGS
GUTTER FLOWLINE
NOTES:
1. FILL BAGS TO 60% CAPACITY WITH EITHER CLEAN GRAVEL OR CLEAN SAND.
2. GRAVEL TO BE NO LESS THAN 1" DIAMETER OR GREATER THAN 2" DIAMETER.
3. PLACE BAGS WITH BAG OPENINGS SECURED AND FACE UP, AND SO THAT EACH BAG IS FLAT AND HAS THE GREATEST POSSIBLE SURFACE AREA CONTACT WITH THE CURB.
4. PLACE BAGS AGAINST THE FACE-OF-CURB AND DO NOT PLACE BAGS BEYOND THE LIP-OF-CURB.
5. DO NOT BLOCK ADA RAMPS OR WALKWAYS WITH BAGS.
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/20 /2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
CURB GRAVEL OR SAND BAGS
712
BACK OF CURB
GRAVEL BAGS
FACE OF CURB
LIP OF CURB
EXISTING PAVEMENT
GUTTER FLOWLINE
2" MIN. DIAMETER PVC OR METAL PIPE
CURB GRAVEL BAG
COLD-MIX TEMPORARY ASPHALT
CURB COLD-MIX TEMPORARY ASPHALT
NOTES:
1. UTILIZE THIS DETAIL WHEN ACCESSING PROJECT SITE OVER EXISTING CURB ONLY IF NO USABLE CURB OPENING EXISTS.
2. FILL BAGS TO 60% CAPACITY WITH CLEAN GRAVEL NO LESS THAN 1" DIAMETER AND NO GREATER THAN 2" DIAMETER.
3. PLACE BAGS WITH BAG OPENINGS SECURED AND FACE UP, AND SO THAT EACH BAG IS FLAT AND HAS THE GREATEST POSSIBLE SURFACE AREA CONTACT WITH THE CURB.
4. PLACE BAGS AGAINST THE PIPE AND FACE-OF-CURB . DO NOT PLACE BAGS BEYOND THE LIP-OF-CURB.
5. DO NOT BLOCK ADA RAMPS OR WALKWAYS WITH BAGS.
6. DO NOT PLACE TEMPORARY ASPHALT BEYOND LIP-OF-CURB.
7. PIPE MUST EXTEND ACROSS FULL LENGTH OF TEMPORARY CURB PROTECTION AND BE COMPLETELY EXPOSED AT BOTH ENDS.
8. MINIMUM 4" THICK LAYER OF GRAVEL OR ASPH ALT REQUIRED OVER ALL PARTS OF AFFECTED CURB.
9. MAXIMUM WIDTH OF CURB PROTECTION S 30'.
10. MATERIALS AND CONSTRUCTION METHODS TC CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
11. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/20 /2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
TEMPORARY CURB PROTECTION
713
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND CONSTRUCTION STANDARDS SHEET 57 OF 60
118



GRAVEL BAGS OR SANDBAGS

NOTES:

1. FILL BAGS TO 60% CAPACITY WITH CLEAN GRAVEL OR CLEAN SAND.
2. PLACE BAGS WITH BAG OPENINGS SECURED AND FACE UP, AND SO THAT EACH BAG IS FLAT AND HAS THE GREATEST POSSIBLE SURFACE AREA CONTACT WITH THE SURFACE.
3. GRAVEL TO BE NO LESS THAN 1" DIAMETER OR GREATER THAN 2" DIAMETER.
4. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS
5. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

DRAWN: DPM	CHECKED: JCF	APPROVED: MCC
EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL: 714

CURB INLET PROTECTION

Parkhill

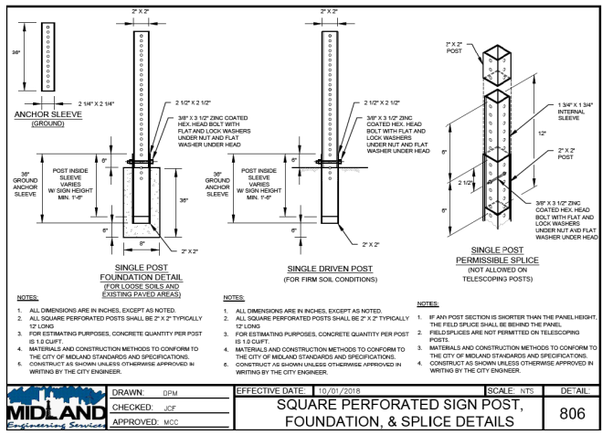
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 58 OF 60

119



Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 59 OF 60

120



Parkhill

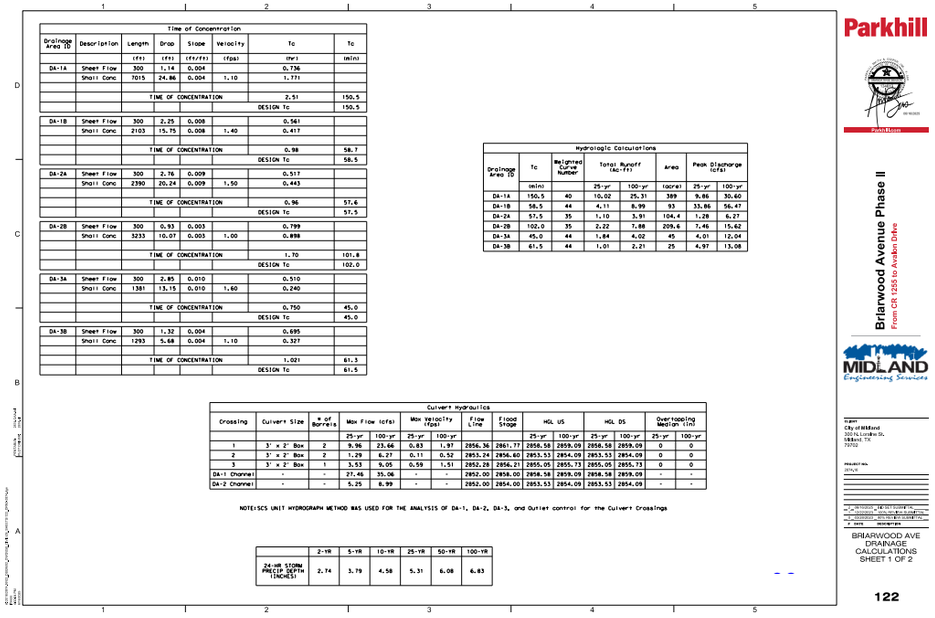
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE DRAINAGE AREA MAP

121



Time of Concentration

Drainage Area ID	Description	Length (ft)	Drop (ft)	Slope (ft/ft)	Velocity (fps)	Tc (hr)	Tc (min)
DA-1A	Sheet Flow	300	1.14	0.004		0.736	
	Shall Conc	7015	24.86	0.004	1.10	1.771	
				TIME OF CONCENTRATION		2.51	150.5
						DESIGN Tc	150.5
DA-1B	Sheet Flow	300	2.25	0.008		0.561	
	Shall Conc	2103	15.75	0.008	1.40	0.417	
				TIME OF CONCENTRATION		0.98	58.7
						DESIGN Tc	58.5
DA-2A	Sheet Flow	300	2.76	0.009		0.517	
	Shall Conc	2390	20.24	0.009	1.50	0.443	
				TIME OF CONCENTRATION		0.96	57.6
						DESIGN Tc	57.5
DA-2B	Sheet Flow	300	0.93	0.003		0.799	
	Shall Conc	3233	10.07	0.003	1.00	0.898	
				TIME OF CONCENTRATION		1.70	101.8
						DESIGN Tc	102.0
DA-3A	Sheet Flow	300	2.85	0.010		0.510	
	Shall Conc	1381	13.15	0.010	1.60	0.240	
				TIME OF CONCENTRATION		0.750	45.0
						DESIGN Tc	45.0
DA-3B	Sheet Flow	300	1.32	0.004		0.695	
	Shall Conc	1293	5.68	0.004	1.10	0.327	
				TIME OF CONCENTRATION		1.021	61.3
						DESIGN Tc	61.5

Hydrologic Calculations

Drainage Area ID	Tc (min)	Weighted Curve Number	Total Runoff (Ac-ft) 25-yr	Total Runoff (Ac-ft) 100-yr	Area (acres)	Peak Discharge (cfs) 25-yr	Peak Discharge (cfs) 100-yr
DA-1A	150.5	40	10.02	25.31	389	9.86	30.60
DA-1B	58.5	44	4.11	8.99	93	33.86	56.47
DA-2A	57.5	35	1.10	3.91	104.4	1.28	6.27
DA-2B	102.0	35	2.22	7.88	209.6	7.45	15.62
DA-3A	45.0	44	1.84	4.02	45	4.01	12.04
DA-3B	61.5	44	1.01	2.21	25	4.97	13.08

Culvert Hydraulics

Crossing	Culvert Size	# of Barrels	Max Flow (cfs) 25-yr	Max Flow (cfs) 100-yr	Max Velocity (fps) 25-yr	Max Velocity (fps) 100-yr	Flow Line	Flood Stage	HGL US 25-yr	HGL US 100-yr	HGL DS 25-yr	HGL DS 100-yr	Overtopping Section (ft) 25-yr	Overtopping Section (ft) 100-yr
1	3' x 2' Box	2	9.96	23.66	0.83	1.97	2856.36	2861.77	2858.58	2859.09	2858.58	2859.09	0	0
2	3' x 2' Box	2	1.29	6.27	0.11	0.52	2853.24	2856.60	2853.53	2854.09	2853.53	2854.09	0	0
3	3' x 2' Box	1	3.53	9.05	0.59	1.51	2852.28	2856.21	2855.05	2855.73	2855.05	2855.73	0	0
DA-1 Channel	-	-	27.46	35.06	-	-	2852.00	2858.00	2858.58	2859.09	2858.58	2859.09	-	-
DA-2 Channel	-	-	5.25	8.99	-	-	2852.00	2854.00	2853.53	2854.09	2853.53	2854.09	-	-

NOTE:SCS UNIT HYDROGRAPH METHOD WAS USED FOR THE ANALYSIS OF DA-1, DA-2, DA-3, and Outlet control for the Culvert Crossings

	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
24-HR STORM PRECIP DEPTH (INCHES)	2.74	3.79	4.58	5.31	6.08	6.83

Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
207619

#	Date	Description

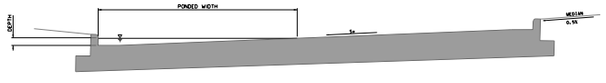
BRIARWOOD AVE
DRAINAGE
CALCULATIONS
SHEET 1 OF 2

122

PONDED WIDTH CALCULATIONS (LEFT AND RIGHT GUTTER)

STA.	to/from	STA.	Area (AC)	CONTRIBUTING AREA	Q10 (CFS)	Q100 (CFS)	MANNING'S n	Sw (FT/FT)	S (FT/FT)	10-YR PONDED DEPTH (FT)	10-YR PONDED WIDTH (FT)	100-YR PONDED DEPTH (FT)	100-YR PONDED WIDTH (FT)
110+27	from	111+04	1.23	ROW/PAVE	5.80	16.32	0.02	0.02	0.0333	0.36	15.4	0.44	19.07
111+04	to	108+37	1.23	ROW/PAVE	20.57	16.32	0.02	0.02	0.0333	0.36	15.4	0.44	19.07
108+37	from	107+80	0.16	PAVE	1.21	2.27	0.02	0.02	0.0037	0.25	10.1	0.29	14.28
180+82	to	183+31	0.71	PAVE	1.24	2.82	0.02	0.02	0.0084	0.25	10.3	0.29	13.97
183+17	from	188+55	1.26	ROW/PAVE	7.44	17.09	0.02	0.02	0.0119	0.42	15.9	0.47	19.51
188+55	to	191+25	1.26	ROW/PAVE	20.57	17.09	0.02	0.02	0.0333	0.37	15.7	0.44	19.46
191+25	to	191+53	0.16	ROW/PAVE	4.28	7.26	0.02	0.02	0.0333	0.27	11.2	0.32	15.00
191+25	to	192+83	0.76	ROW/PAVE	6.84	8.87	0.02	0.02	0.0333	0.31	13.7	0.38	18.03
191+84	to	192+87	0.76	ROW/PAVE	6.84	8.87	0.02	0.02	0.0333	0.31	13.7	0.38	18.03
172+87	from	169+72	1.42	ROW/PAVE	11.49	17.31	0.02	0.02	0.0083	0.44	23.1	0.49	25.81
169+72	to	169+37	1.42	ROW/PAVE	9.21	14.50	0.02	0.02	0.0104	0.41	20.3	0.46	23.30
169+10	from	164+80	0.72	ROW/PAVE	4.21	7.23	0.02	0.02	0.0031	0.21	10.9	0.25	13.42

NOTES: HEIGHT OF CURB = 6" ABOVE LIP 7" ABOVE GUTTER
MAX ALLOW PONDED DEPTH = APPRX. 0.58'
S = LONGITUDINAL SLOPE
Sw = PAVEMENT CROSS SLOPE



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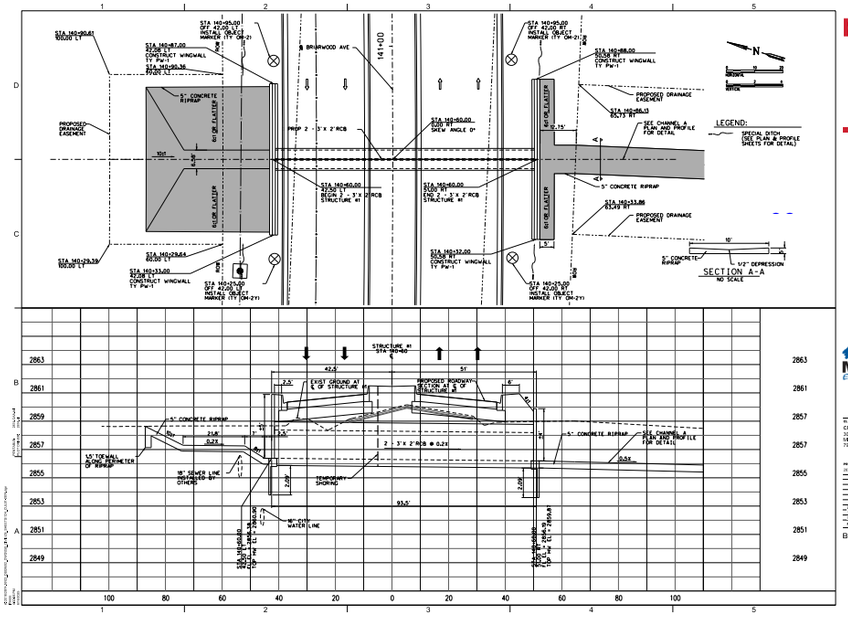
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
DRAINAGE
CALCULATIONS
SHEET 2 OF 2

123



Parkhill

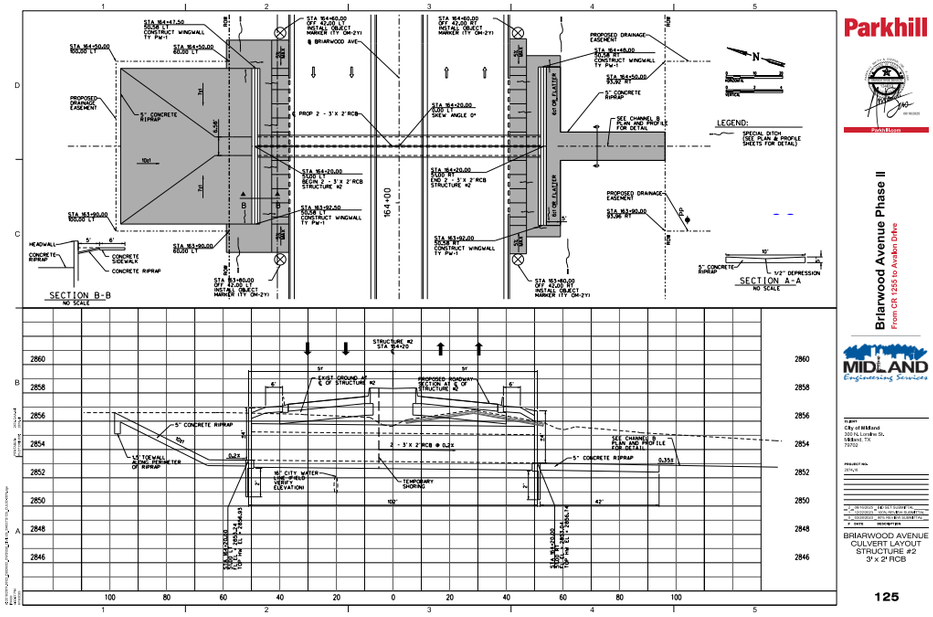
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
CULVERT LAYOUT
STRUCTURE #1
3' x 2' RCB

124



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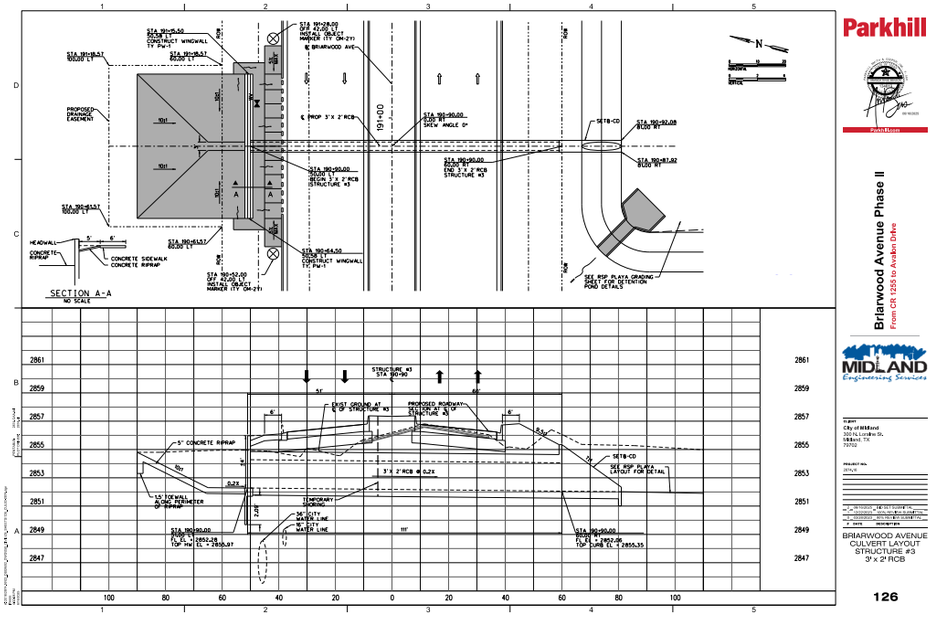
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
CULVERT LAYOUT
STRUCTURE #2
3' x 2' RCB

125



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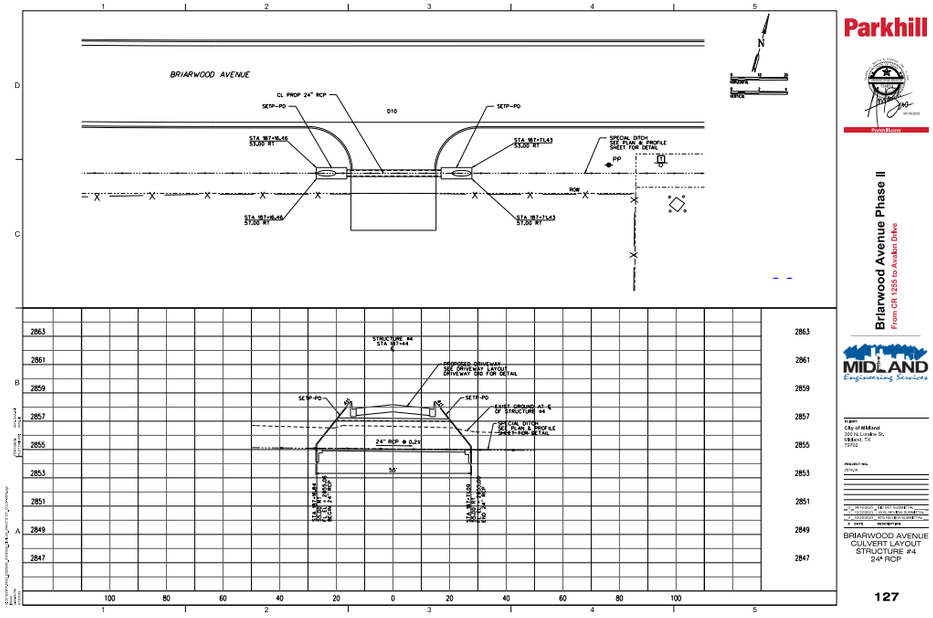
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
CULVERT LAYOUT
STRUCTURE #3
3' x 2' RCB

126



Parkhill

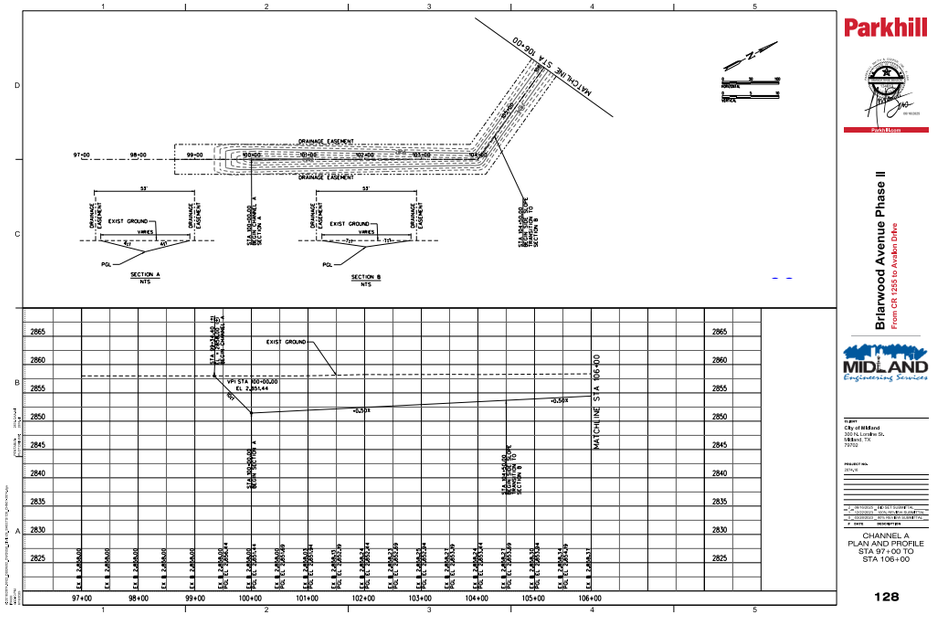
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
CULVERT LAYOUT
STRUCTURE #4
24" RCP

127



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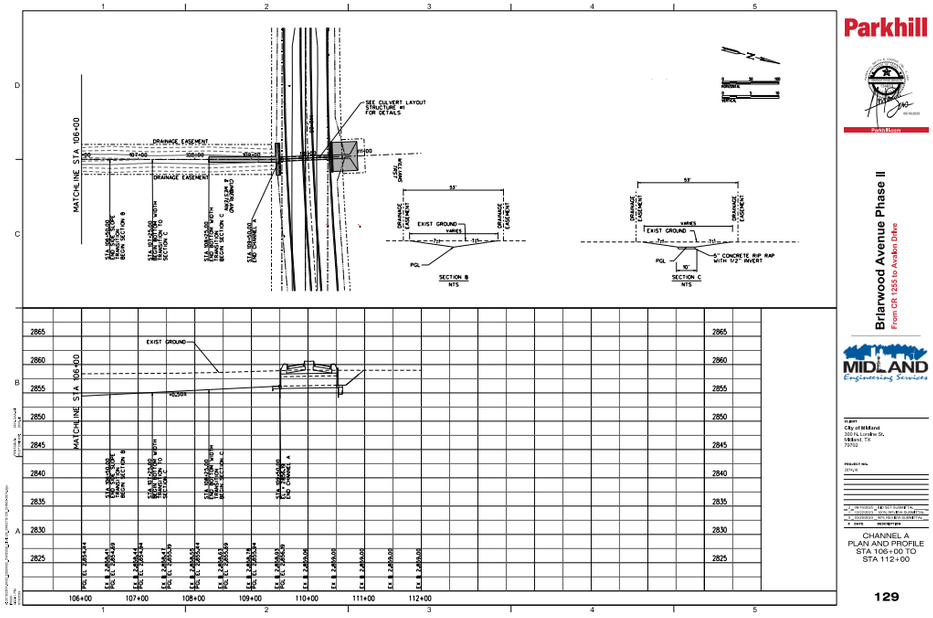
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CHANNEL A
PLAN AND PROFILE
STA 97+00 TO
STA 106+00

128



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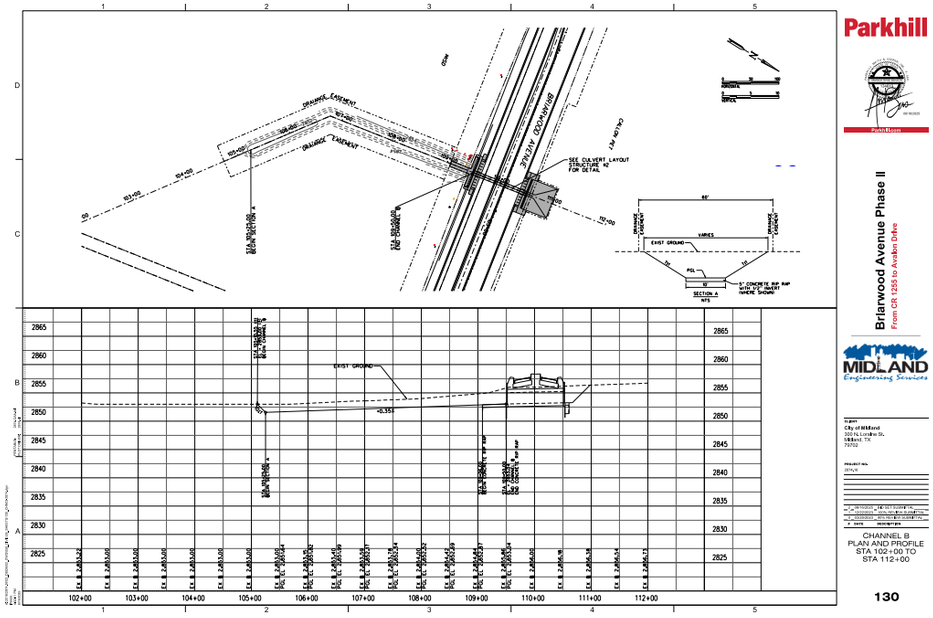
Briarwood Avenue Phase II

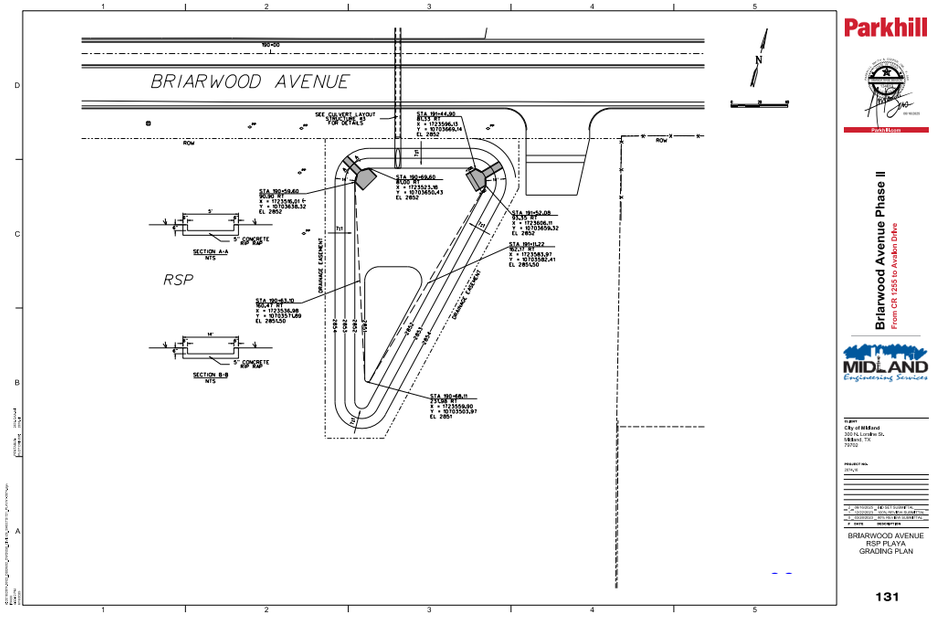
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CHANNEL A
PLAN AND PROFILE
STA 106+00 TO
STA 112+00

129


Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
CHANNEL B
PLAN AND PROFILE
STA 102+00 TO
STA 112+00
130



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Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND
Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
RSP PLAYA
GRADING PLAN

131

Culvert Station and/or Creek Name Followed by applicable end (L, R, or Both)	Description of Box Culvert No. Spans - Span X Height	Bar Fill Height (Ft)	Applicable Box Culvert Standard ①	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (in)	U Culvert Wall Thickness (in)	C Estimated Curb Height (Ft)	Hw ① Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" ② Conc (Curb) (CY)	Class "C" ② Conc (Wingwall) (CY)	Total Wingwall Area (SF)
Structure #1 STA 140+60 (LT)	2 – 3' x 2'	3'	MC-3-23	PW-1	0°	6:1	8"	7"	1.000'	3.667'	N/A	N/A	22.000'	7.750'	N/A	0.0	0.6	19.2	297
Structure #1 STA 140+60 (Rt)	2 – 3' x 2'	3'	MC-3-23	PW-1	0°	6:1	8"	7"	1.000'	3.667'	N/A	N/A	22.000'	7.750'	N/A	0.0	0.3	12.3	181
Structure #2 STA 184+20 (Both)	2 – 3' x 2'	3'	MC-3-23	PW-1	0°	6:1	8"	7"	1.000'	3.667'	N/A	N/A	22.000'	7.750'	N/A	0.0	0.6	24.6	322
Structure #3 STA 190+90 (LT)	1 – 3' x 2'	3'	SCC•3&4	PW-1	0°	6:1	6"	7"	1.000'	3.667'	N/A	N/A	22.000'	4.167'	N/A	0.0	0.2	12.0	181
Structure #3 STA 190+90 (Rt)	1 – 3' x 2'	3'	SCC•3&4	SETB•CO	0°	6:1	8"	7"	0.750'	3.167'	N/A	N/A	17.000'	N/A	4.167'	0.0	0.1	2.9	N/A

① Round the wall heights shown to the nearest foot for bidding purposes.

② Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (BCRM) standard sheet, the volume shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

③ Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

④ Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to furnish precast culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

NOTES:
Skew = 0° on SW-0, FW-0, SETB-CO, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment.

SL:1 = Horizontal : 1 Vertical
- Side slope at culvert for flared or straight wingwalls.
- Channel slope for parallel wingwalls.
- Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only)
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

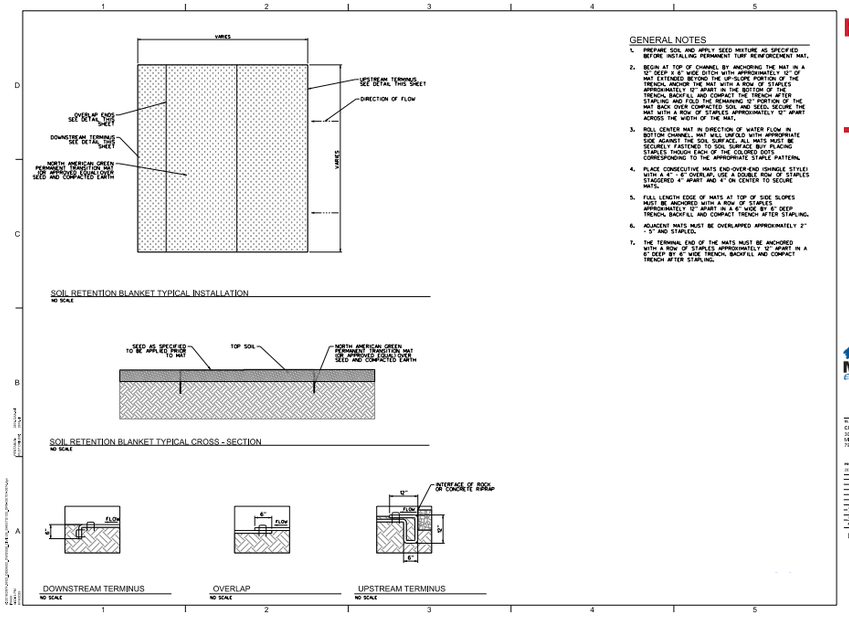
BCS

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TxDOT February 2010	DC	BC	CK
07/21/25			

FILE	CONT	SHEET NO.
		132

PRELIMINARY
This draft has not been submitted to the Texas Engineering Practice Act. Do not use for construction purposes.

DATE PLOTTED



GENERAL NOTES

1. PREPARE SOIL AND APPLY SEED MIXTURE AS SPECIFIED BEFORE INSTALLING PERMANENT TURF REINFORCEMENT MAT.
2. BEGIN AT TOP OF CHANNEL BY ANCHORING THE MAT IN A 12" DEEP X 6" WIDE DITCH WITH APPROXIMATELY 12" OF MAT EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE MAT WITH A ROW OF STAPLES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING AND FOLD THE REMAINING 12" PORTION OF THE MAT BACK OVER COMPACTED SOIL AND SEED. SECURE THE MAT WITH A ROW OF STAPLES APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE MAT.
3. ROLL CENTER MAT IN DIRECTION OF WATER FLOW IN BOTTOM CHANNEL. MAT WILL UNFOLD WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL MATS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES IN APPROPRIATE LOCATIONS AS SHOWN AND CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. PLACE CONSECUTIVE MATS END-OVER-END (SHINGLE STYLE) WITH A 4" - 6" OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER TO SECURE MATS.
5. FILL LENGTH EDGE OF MATS AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES APPROXIMATELY 12" APART IN A 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT TRENCH AFTER STAPLING.
6. ADJACENT MATS MUST BE OVERLAPPED APPROXIMATELY 2" - 5" AND STAPLED.
7. THE TERMINAL END OF THE MATS MUST BE ANCHORED WITH A ROW OF STAPLES APPROXIMATELY 12" APART IN A 6" DEEP BY 6" WIDE TRENCH. BACKFILL AND COMPACT TRENCH AFTER STAPLING.

Parkhill

John Rowe

Briarwood Avenue Phase II

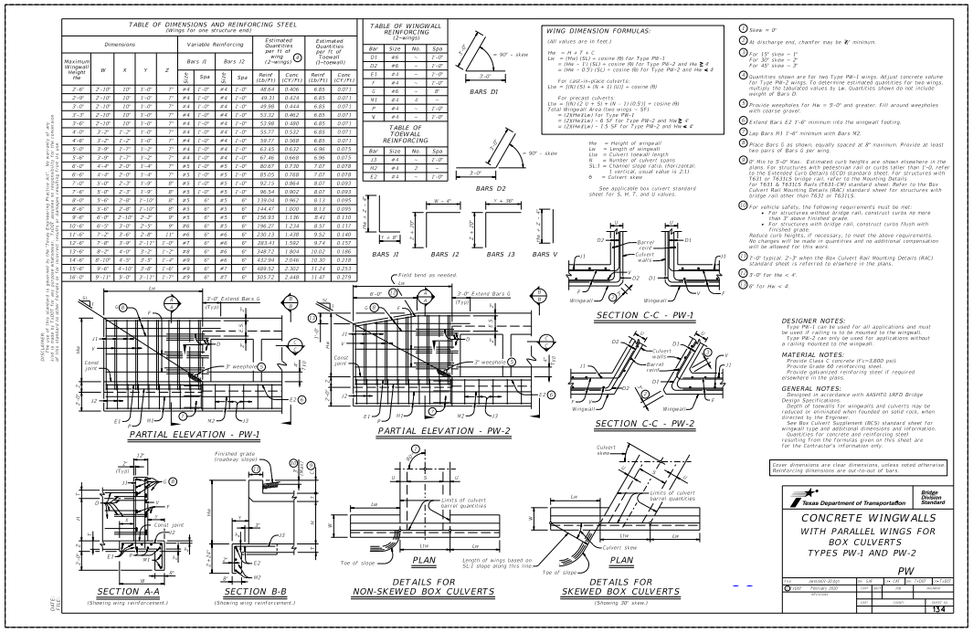
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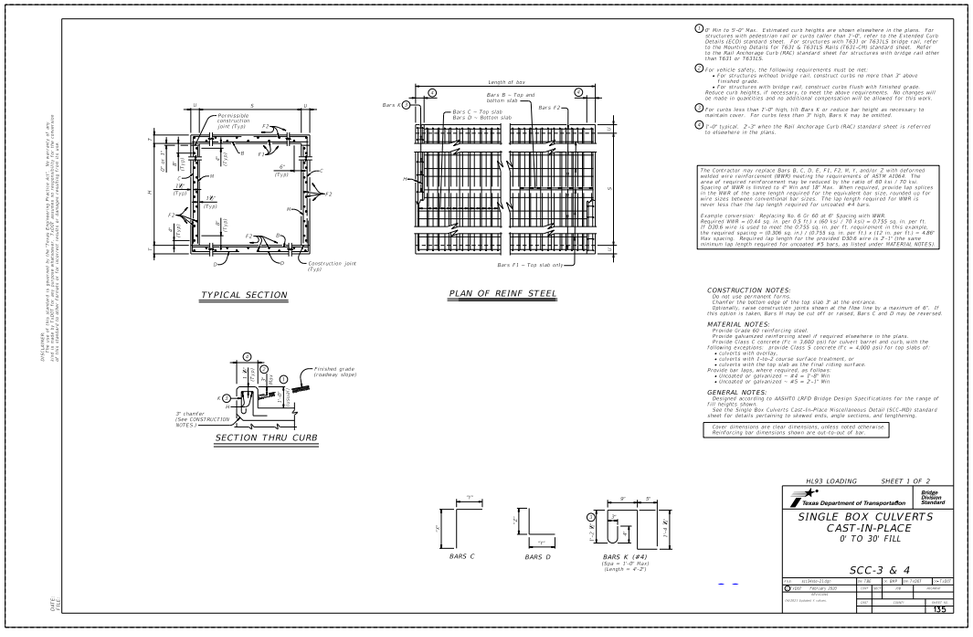
MIDLAND Engineering Services

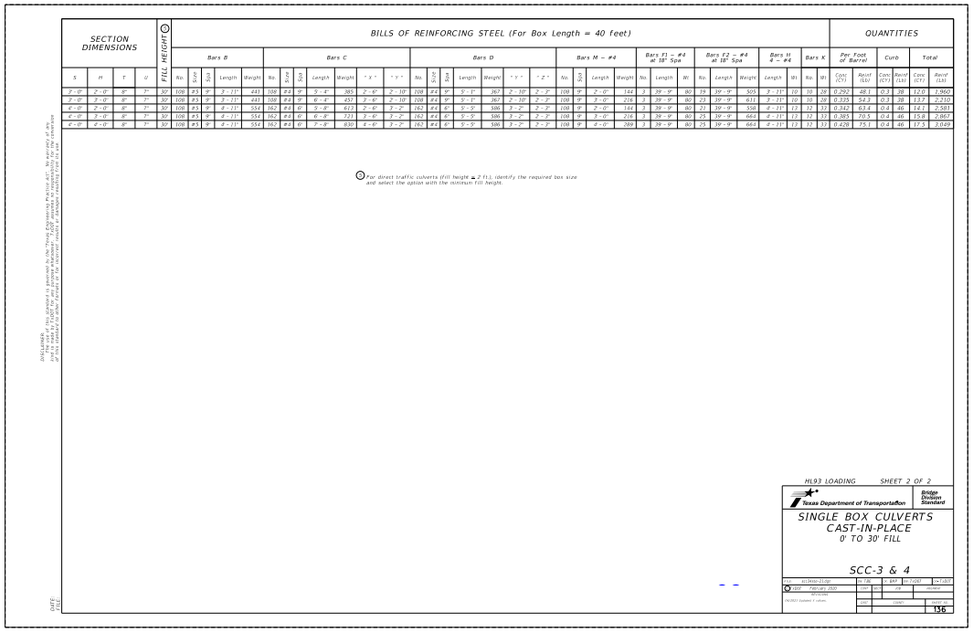
City of Midland
300 N. Loraine St.
Midland, TX
79702

DRAINAGE DETAILS
STONE RIPRAP
&
SOIL RETENTION
BLANKET

133


TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)
TABLE OF WINGWALL REINFORCING
(2 wings)
TABLE OF TOEWALL REINFORCING
WING DIMENSION FORMULAS:
DESIGNER NOTES:
MATERIAL NOTES:
GENERAL NOTES:
PARTIAL ELEVATION - PW-1
PARTIAL ELEVATION - PW-2
SECTION C-C - PW-1
SECTION C-C - PW-2
SECTION A-A
SECTION B-B
PLAN
DETAILS FOR NON-SKEWED BOX CULVERTS
DETAILS FOR SKEWED BOX CULVERTS
CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR
BOX CULVERTS
TYPES PW-1 AND PW-2
PW
Texas Department of Transportation
Bridge Division Standard
134


TYPICAL SECTION
PLAN OF REINF STEEL
SECTION THRU CURB
BARS C
BARS D
BARS K (#4)
(Spa. = 1'-0" Max)
(Length = 4'-2")
CONSTRUCTION NOTES:
Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars H may be cut off or raised, Bars C and D may be reversed.
MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class S concrete (f'c = 4,500 psi) for top slab, bottom slab and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
• culverts with overlay,
• culverts with 2-lift-2 course surface treatment, or
• culverts with the top slab as the final riding surface.
Provide the following minimum cover for rebar:
• Uncoated or galvanized – #4 or #5 Bar – 1" Min
• Uncoated or galvanized – #6 – 2-1" Min
GENERAL NOTES:
Design is according to AASHTO LRFD Bridge Design Specifications for the range of Fill heights shown.
See the Single Box Culverts Cast-In-Place Miscellaneous Detail (SCC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.
HL93 LOADING
SHEET 1 OF 2
Texas Department of Transportation
Bridge Division Standard
SINGLE BOX CULVERTS
CAST-IN-PLACE
0' TO 30' FILL
SCC-3 & 4
FILE: bc3460-22.dgn
DN: TxDOT
CK: MK
DW: MAP
CK: TxDOT
FEBRUARY 2020
CONT
SECT
JOB
HIGHWAY
DISTRICT
COUNTY
SHEET NO.
135



SECTION DIMENSIONS

S	H	T	U
2'-0"	2'-0"	8"	7"
2'-0"	3'-0"	8"	7"
2'-0"	4'-0"	8"	7"
2'-0"	5'-0"	8"	7"
2'-0"	6'-0"	8"	7"
2'-0"	7'-0"	8"	7"

FILL HEIGHT ①

BILLS OF REINFORCING STEEL (For Box Length = 40 feet)

Bars B					Bars C						Bars D						Bars M — #4				Bars F1 — #4 at 18" Spa		Bars F2 — #4 at 18" Spa		Bars H 4 — #4		Bars X		QUANTITIES Per Foot of Barrel		Curb		Total	
No.	Size (in)	Spa (in)	Length	Weight	No.	Size (in)	Spa (in)	Length	Weight	"Y"	"Y'"	No.	Size (in)	Spa (in)	Length	Weight	"Y'"	"Z'"	No.	Size (in)	Length	Wt.	No.	Length	Weight	Length	Wt.	No.	Wt.	Conc (CY)	Reinf (LB)	Conc (CY)	Reinf (LB)	Conc (CY)	Reinf (LB)
108	#5	9"	9'-11"	448	108	#8	9"	5'-4"	305	2'-6"	2'-10"	108	#4	9"	5'-1"	367	2'-10"	2'-3"	108	9"	2'-0"	144	3	39'-9"	80	39'-9"	505	9'-11"	10	10	0.292	48.1	0.3	28	12.0	1.960
108	#5	9"	9'-11"	448	108	#8	9"	6'-4"	457	3'-6"	3'-10"	108	#4	9"	5'-1"	367	2'-10"	2'-3"	108	9"	2'-0"	216	3	39'-9"	80	39'-9"	611	9'-11"	10	10	0.325	54.3	0.3	28	13.7	2.210
108	#5	9"	9'-11"	554	162	#8	6"	5'-8"	613	2'-6"	3'-2"	162	#4	6"	5'-5"	506	3'-2"	2'-3"	108	9"	2'-0"	144	3	39'-9"	80	39'-9"	550	9'-11"	13	13	0.362	63.4	0.4	46	14.1	2.581
108	#5	9"	9'-11"	554	162	#8	6"	6'-8"	723	3'-6"	3'-7"	162	#4	6"	5'-5"	506	3'-2"	2'-3"	108	9"	3'-0"	216	3	39'-9"	80	39'-9"	664	9'-11"	13	13	0.385	70.5	0.4	46	15.8	2.867
108	#5	9"	9'-11"	554	162	#8	6"	7'-8"	832	4'-6"	3'-7"	162	#4	6"	5'-5"	506	3'-2"	2'-3"	108	9"	4'-0"	288	3	39'-9"	80	39'-9"	664	9'-11"	13	13	0.428	75.1	0.4	46	17.5	3.049

① For direct traffic culverts (Fill height ≤ 2 Ft), identify the required box size and select the option with the minimum Fill height.

QUANTITIES

DESIGNED
DETAILED
CHECKED
QUANTITIES
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DATE FILE

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS
CAST-IN-PLACE
0' TO 30' FILL

SCC-3 & 4

FED.RD. DIV.NO.	STATE	DISTRICT	COUNTY
6	TEX.	ALL	ALL

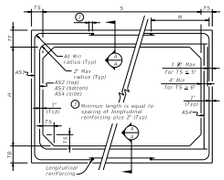
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		136

BOX DATA

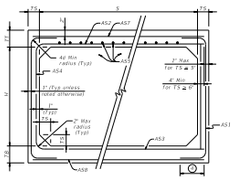
SECTION DIMENSIONS					Fill Height	W (Min)	REINFORCING (sq. in. / ft.) [1]						[2] Unit Weight
S (ft.)	H (ft.)	T1 (in.)	T2 (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
3	2	7	6	4	< 2	-	0.17	0.25	0.16	0.10	0.17	0.17	0.14	3.3
3	2	4	4	4	2 < 3	31	0.13	0.19	0.16	0.10	-	-	-	2.4
3	2	4	4	4	3 < 5	31	0.10	0.11	0.12	0.10	-	-	-	2.4
3	2	4	4	4	5	31	0.10	0.10	0.10	0.10	-	-	-	2.4
3	2	4	4	4	15	31	0.10	0.13	0.13	0.10	-	-	-	2.4
3	2	4	4	4	20	31	0.11	0.17	0.17	0.10	-	-	-	2.4
3	2	4	4	4	25	31	0.14	0.21	0.21	0.10	-	-	-	2.4
3	2	4	4	4	30	31	0.17	0.25	0.25	0.10	-	-	-	2.4
3	2	4	4	4	35	31	0.20	0.29	0.30	0.10	-	-	-	2.4
3	3	7	6	4	< 2	-	0.17	0.27	0.17	0.10	0.17	0.17	0.14	3.7
3	3	4	4	4	2 < 3	31	0.10	0.22	0.21	0.10	-	-	-	2.8
3	3	4	4	4	3 < 5	31	0.10	0.14	0.14	0.10	-	-	-	2.8
3	3	4	4	4	10	31	0.10	0.11	0.11	0.10	-	-	-	2.8
3	3	4	4	4	15	31	0.10	0.14	0.15	0.10	-	-	-	2.8
3	3	4	4	4	20	31	0.10	0.18	0.19	0.10	-	-	-	2.8
3	3	4	4	4	25	31	0.10	0.23	0.23	0.10	-	-	-	2.8
3	3	4	4	4	30	31	0.12	0.27	0.28	0.10	-	-	-	2.8
3	3	4	4	4	35	31	0.14	0.32	0.32	0.10	-	-	-	2.8

[1] For box length = 8'-0"

[2] AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.

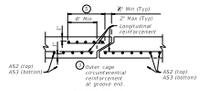


FILL HEIGHT 2 FT. AND GREATER



FILL HEIGHT LESS THAN 2 FT

[4] Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top slab detail, inlet joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f'c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard for wing, headwall, and flared end details.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

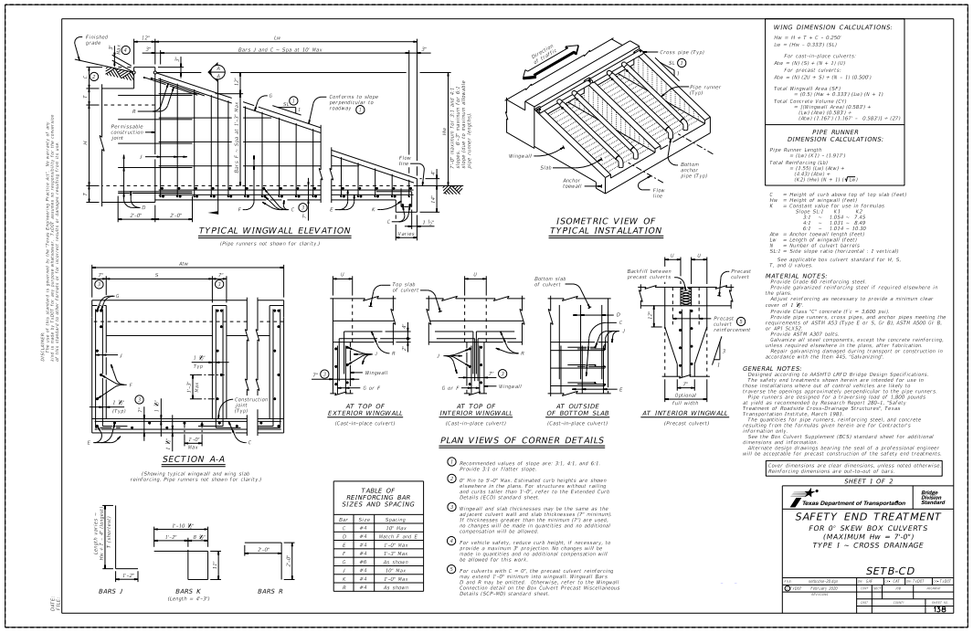
3'-0" SPAN

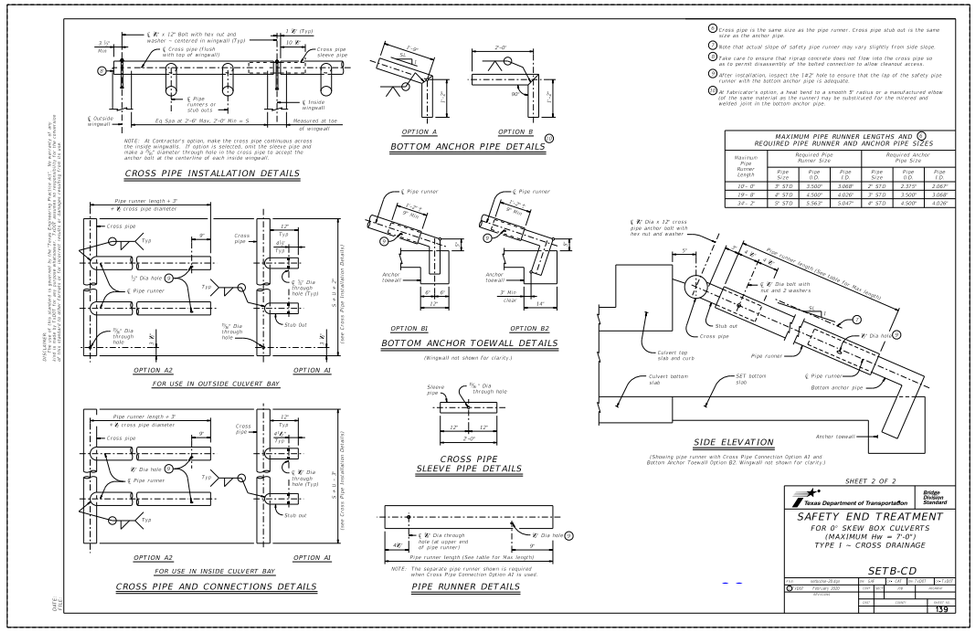
SCP-3

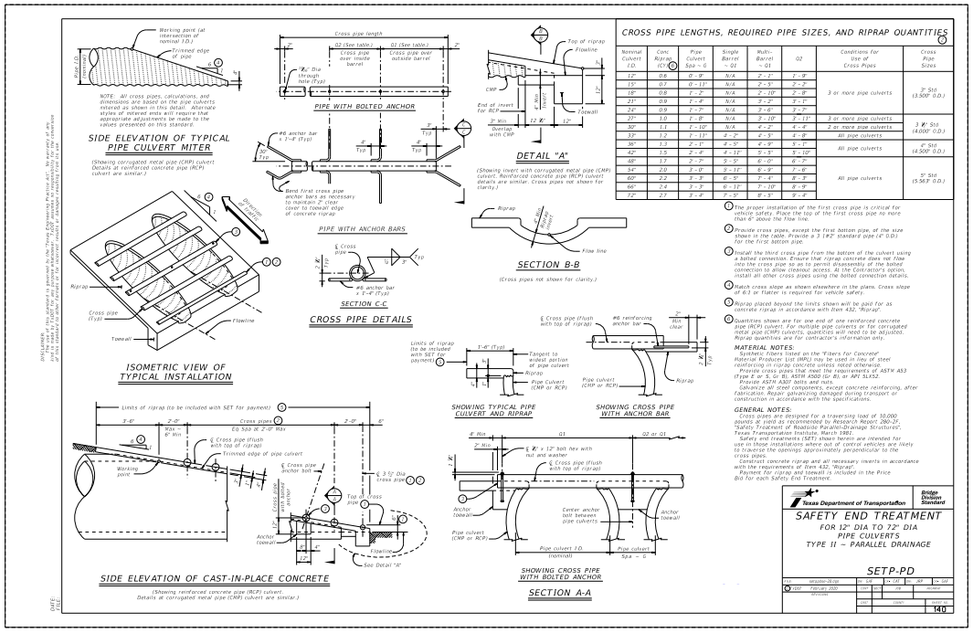
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© TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		DIST	COUNTY		SHEET NO.

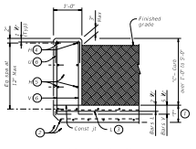
137

DATE:


TYPICAL WINGWALL ELEVATION
(Pipe runners not shown for clarity.)
ISOMETRIC VIEW OF TYPICAL INSTALLATION
WING DIMENSION CALCULATIONS:
PIPE RUNNER DIMENSION CALCULATIONS:
MATERIAL NOTES:
GENERAL NOTES:
SECTION A-A
(Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)
AT TOP OF EXTERIOR WINGWALL
(Cast-in-place culvert)
AT TOP OF INTERIOR WINGWALL
(Cast-in-place culvert)
AT OUTSIDE OF BOTTOM SLAB
(Cast-in-place culvert)
AT INTERIOR WINGWALL
(Precast culvert)
PLAN VIEWS OF CORNER DETAILS
TABLE OF REINFORCING BAR SIZES AND SPACING
BARS J
BARS K
(Length = 4'-3")
BARS R
SHEET 1 OF 2
Texas Department of Transportation
Bridge Division Standard
SAFETY END TREATMENT
FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE 1 — CROSS DRAINAGE
SETB-CD
FILE: setbcdm-08.dgn
DATE: 2007
FEBRUARY 2020
CONT
SECT
JOB
HIGHWAY
DIST
COUNTY
SHEET NO.
138

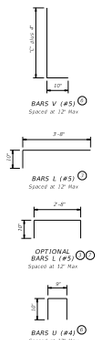

CROSS PIPE INSTALLATION DETAILS
BOTTOM ANCHOR PIPE DETAILS
OPTION A
OPTION B
BOTTOM ANCHOR TOEWALL DETAILS
OPTION B1
OPTION B2
CROSS PIPE SLEEVE PIPE DETAILS
CROSS PIPE AND CONNECTIONS DETAILS
FOR USE IN OUTSIDE CULVERT BAY
FOR USE IN INSIDE CULVERT BAY
OPTION A1
OPTION A2
PIPE RUNNER DETAILS
SIDE ELEVATION
MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES
SAFETY END TREATMENT
FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE 1 – CROSS DRAINAGE
SETB-CD
SHEET 2 OF 2
Texas Department of Transportation
Bridge Division Standard
DATE: 2/22
139


SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER
(Showing corrugated metal pipe (CMP) culvert. Details at reinforced concrete pipe (RCP) culvert are similar.)
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts retained as shown in this detail. Alternate styles of retained ends will require that appropriate adjustments be made to the values presented in this standard.
PIPE WITH BOLTED ANCHOR
PIPE WITH ANCHOR BARS
DETAIL "A"
(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)
SECTION B-B
(Cross pipes not shown for clarity.)
SECTION C-C
CROSS PIPE DETAILS
ISOMETRIC VIEW OF TYPICAL INSTALLATION
SHOWING TYPICAL PIPE CULVERT AND RIPRAP
SHOWING CROSS PIPE WITH ANCHOR BAR
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE
(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)
SHOWING CROSS PIPE WITH BOLTED ANCHOR
SECTION A-A
CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES
Nominal Culvert I.D.
Conc Riprap (CY)
Pipe Culvert Size = S
Single Barrel - Q1
Multi-Barrel - Q1
Q2
Conditions for Use of Cross Pipes
Cross Pipe Sizes
12" 0.6 0' - 9" N/A 2' - 1" 1' - 9"
15" 0.7 0' - 11" N/A 2' - 5" 2' - 2"
18" 0.8 1' - 2" N/A 2' - 10" 2' - 8"
21" 0.9 1' - 4" N/A 3' - 2" 3' - 1"
24" 0.9 1' - 7" N/A 3' - 6" 3' - 7"
27" 1.0 1' - 9" N/A 3' - 10" 3' - 11"
30" 1.1 1' - 10" N/A 4' - 2" 4' - 4"
33" 1.2 1' - 11" 4' - 2" 4' - 5" 4' - 9"
36" 1.3 2' - 1" 4' - 5" 4' - 9" 5' - 1"
42" 1.5 2' - 4" 4' - 11" 5' - 5" 5' - 10"
48" 1.7 2' - 7" 5' - 5" 6' - 0" 6' - 7"
54" 2.0 2' - 0" 5' - 11" 6' - 9" 7' - 6"
60" 2.2 3' - 3" 6' - 5" 7' - 4" 8' - 3"
66" 2.4 3' - 9" 6' - 11" 7' - 10" 8' - 9"
72" 2.7 3' - 11" 7' - 5" 8' - 5" 9' - 4"
3 or more pipe culverts
2 or more pipe culverts
All pipe culverts
3 @ 6" Std (3.500" O.D.)
4" Std (4.000" O.D.)
5" Std (5.563" O.D.)
1 For proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.
2 Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 (#2" standard pipe (4" O.D.) for the first bottom pipe.
3 Install the third cross pipe from the bottom of the culvert using a 12" long bolt with nut and washer through the bolt hole in the cross pipe so as to permit disassembly of the bolted connection to allow clearout access. At the Contractor's option, install all other cross pipes using the bolted connection details.
4 Match cross slope as shown elsewhere in the plans. Cross slope of 4:1 or flatter is required for vehicle safety.
5 Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".
6 Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.
MATERIAL NOTES:
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Furnish anchor bolts and nuts conforming to ASTM A53 (Type E or S, Gr. B), ASTM A500 Gr. B), or API 5L/5Z. Provide ASTM A307 bolts and nuts.
Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.
GENERAL NOTES:
Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures". Treatments that meet the Test Level 3 (TL-3) "Safety and Performance Standard for Highway Appurtenances" (SPS) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.
Construct concrete riprap and all necessary inserts in accordance with the requirements of Item 432, "Riprap".
Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.
Texas Department of Transportation
Bridge Division Standard
SAFETY END TREATMENT
FOR 12" DIA TO 72" DIA PIPE CULVERTS
TYPE II – PARALLEL DRAINAGE
SETP-PD
FILE: setptdne-19.dgn
DN: TxDOT
CK: TxDOT
DW: TxDOT
CK: TxDOT
©TxDOT February 2020
DATE REVISIONS
CONT SECT JOB HIGHWAY
DIST COUNTY SHEET NO.
14.0



TYPICAL SECTION

Used for curbs over 1'-0" to 5'-0"



BARS V (#5) ⓒ
Spaced at 12" Max

BARS L (#5) ⓕ
Spaced at 12" Max

OPTIONAL BARS L (#5) ⓐ ⓔ
Spaced at 12" Max

BARS U (#4) ⓒ
Spaced at 12" Max

ⓐ "T" is equal to the culvert top slab thickness. For precast boxes with slabs less than 9" thick, see SCP-MD standard for additional details.

ⓑ Adjust normal culvert slab bars as necessary to clear obstructions.

ⓒ Place bars L as shown. T-lit hook as necessary to maintain cover.

ⓓ Place normal culvert curb bars M(#4) as shown. Adjust as necessary to clear obstructions.

ⓔ Additional bars M(#4) as required to maintain 12" Max spacing.

ⓕ Replace normal culvert curb bars K with one bar U and two bars V as shown spaced at 12" Max. Adjust length of bars V as necessary to maintain clear cover.

ⓖ Optional bars L are to be used only for precast box culverts with 3'-0" closure pour.

ⓗ Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The value in table can be interpolated for intermediate values of curb height, "C". Quantity includes bars K (when applicable).

TABLE OF ESTIMATED CURB QUANTITIES ⓗ

Curb Height "C"	Conc (CY/LF)	Reinf Steel (LB/LF)
1'-0"	0.037	10.4
1'-6"	0.056	14.5
2'-0"	0.074	19.0
2'-6"	0.093	18.0
3'-0"	0.111	19.0
3'-6"	0.130	21.1
4'-0"	0.148	22.4
4'-6"	0.167	24.6
5'-0"	0.185	25.9

CONSTRUCTION NOTES:
Adjust reinforcing steel as necessary to provide 1 ½" cover.
For vehicle safety, top of the curb must not project more than 3" above the finished grade.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the culvert.
Provide Class "C" concrete (f'_c = 3,600 psi) minimum for curbs.
Provide bar laps, where required, as follows:
- Uncoated or galvanized – #4 = 2'-0" Min

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
These extended curb details have sufficient strength to allow for future retrofit of Type T631 or T631S railing. Anchorage for Type T631 railing is provided by dowel #R3 Type CRS. These details are not suitable for the retrofitting of other rail types. For new construction using T631 or T631S railing, use the T631-CPI standard.
This Curb is considered as part of the Box Culvert for payment.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation | Bridge Division Standard

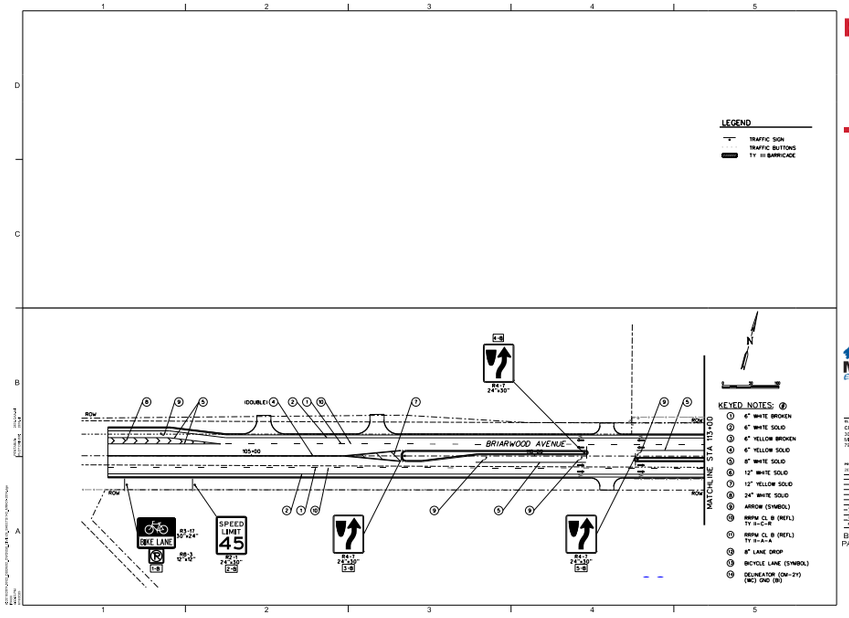
EXTENDED CURB DETAILS
FOR BOX CULVERTS WITH
CURBS OVER 1'-0" TO 5'-0" TALL

ECD

c: SP-PM(JU)(JU)-Strgs	fc: 4ksi	fy: 60ksi	fc: f'c(SP)	f: ksi
USCP February 2020 Revisions	CHK	DSN	DTL	HIGHWAY
	DATE	CHECK		SHEET NO. 141

DESIGNER
The use of this standard is governed by the "Texas Engineering Practice Act". No liability of any kind is implied or imposed by the release of this standard. The designer is responsible for the suitability of this standard for any project application. Submit design changes to the Bridge Division Standards Engineer for consideration of changes deemed appropriate for inclusion in this standard.

DATE
FILE:



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

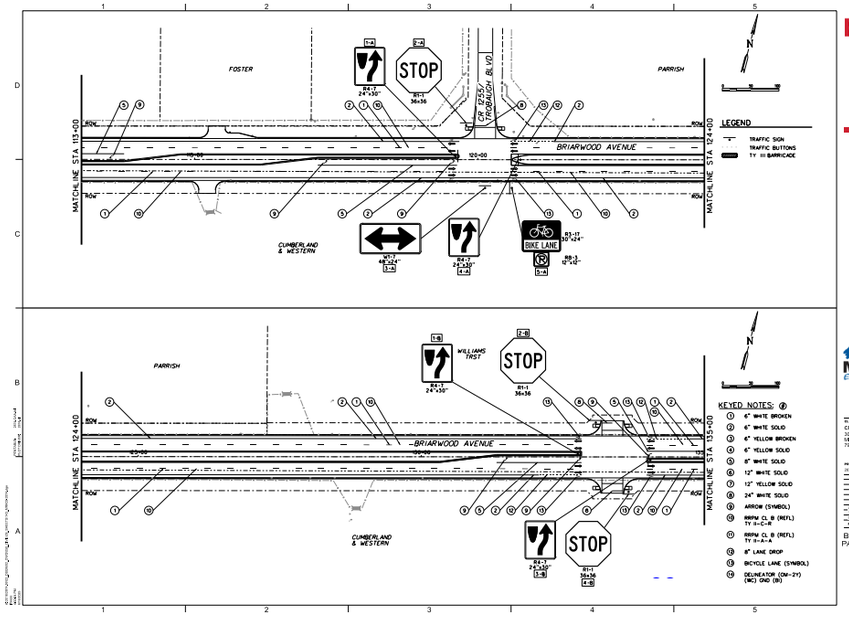
Client
City of Midland
300 N. Loraine St.
Midland, TX
79701

PROJECT No.
007419

NO.	DATE	DESCRIPTION
1	08/19/2025	AS SUBMITTED
2	09/09/2025	INITIAL SUBMITTAL
3	09/09/2025	INITIAL SUBMITTAL
A	DATE	DESCRIPTION

BRIARWOOD AVENUE
PAVEMENT MARKINGS
AND SIGNS
STA 102+00 TO
STA 113+00
SHEET 1 OF 6

142



Parkhill

John Hunn

Briarwood Avenue Phase II

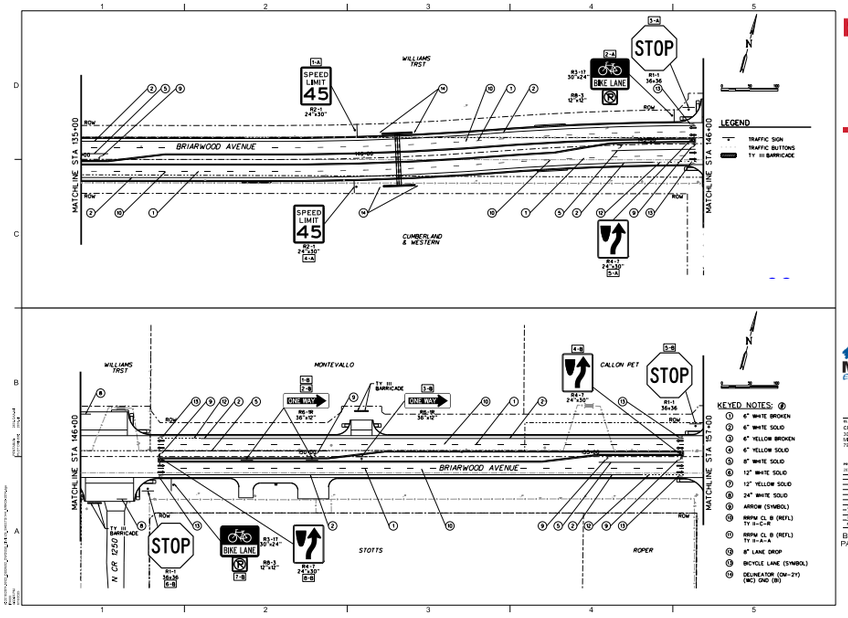
From CR 1225 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
PAVEMENT MARKINGS
AND SIGNS
STA 113+00 TO
STA 135+00
SHEET 1 OF 6

143



Parkhill

John Rowe

Briarwood Avenue Phase II

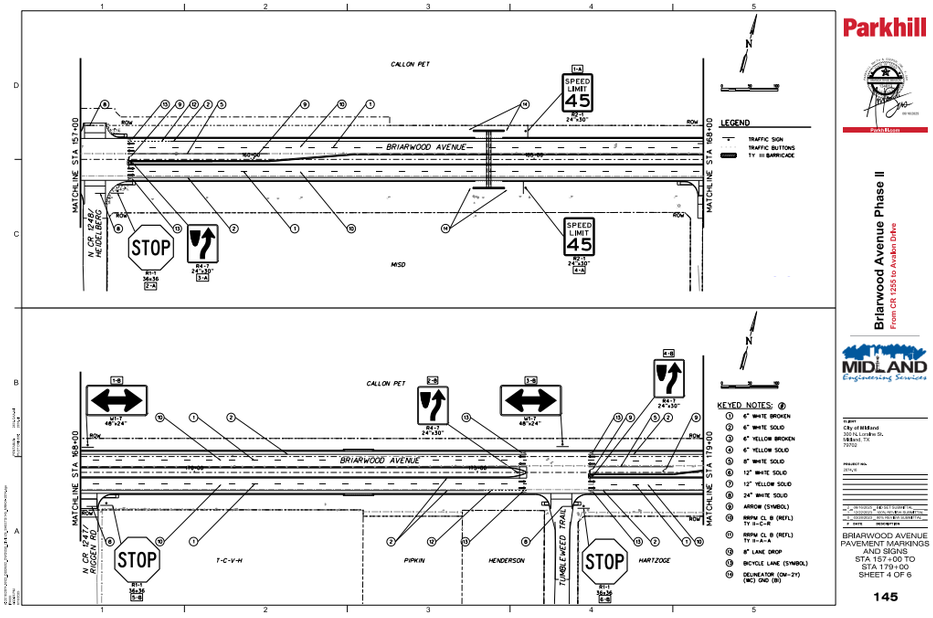
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
PAVEMENT MARKINGS
AND SIGNS
STA 135+00 TO
STA 157+00
SHEET 3 OF 6

144



Parkhill

John Rowe

Briarwood Avenue Phase II

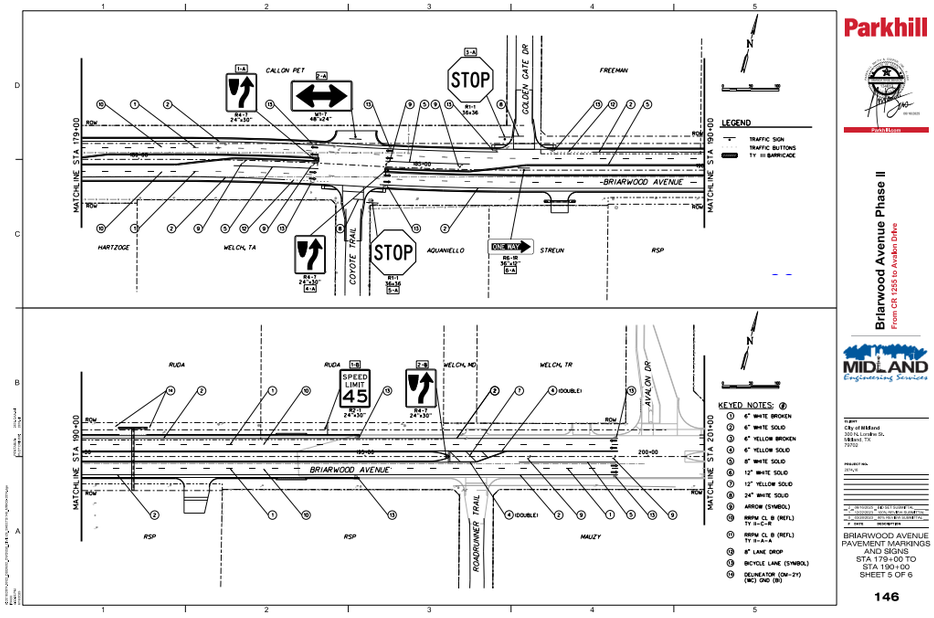
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
PAVEMENT MARKINGS
AND SIGNS
STA 157+00 TO
STA 179+00
SHEET 4 OF 6

145



Parkhill

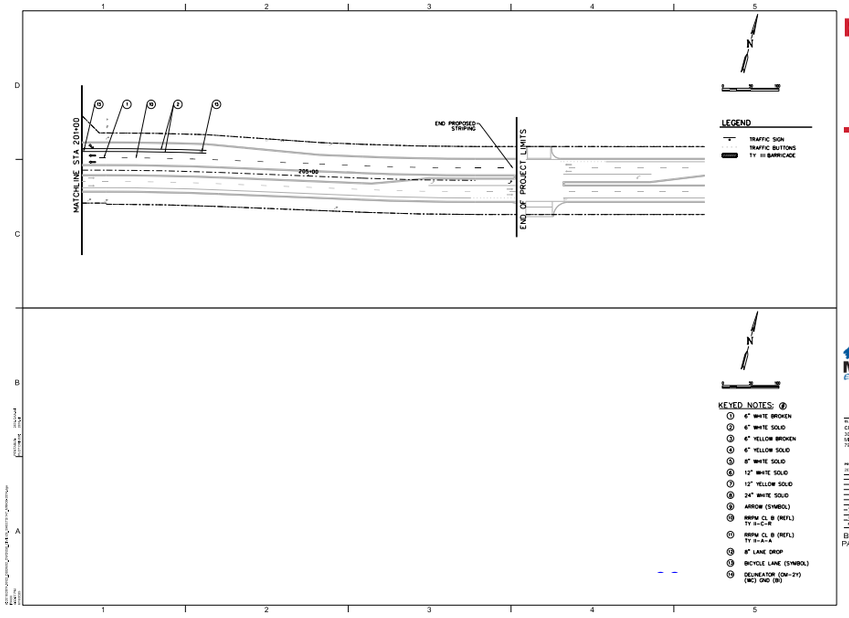
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PAVEMENT MARKINGS
AND SIGNS
STA 179+00 TO
STA 190+00
SHEET 5 OF 6

146



Parkhill

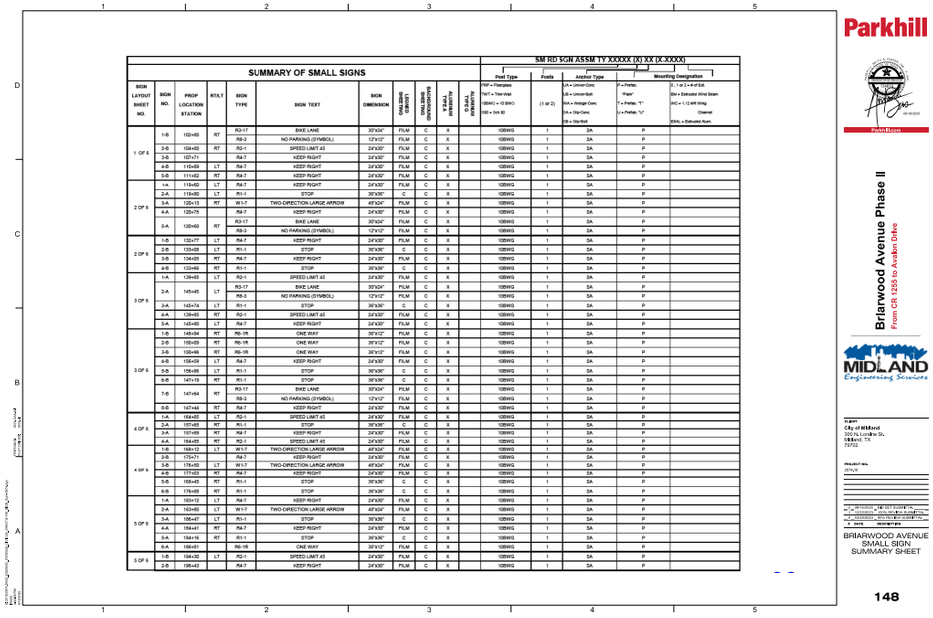
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PAVEMENT MARKINGS
AND SIGNS
STA 201+00 TO
END OF PROJECT
SHEET 6 OF 6

147



SUMMARY OF SMALL SIGNS

SIGN LAYOUT SHEET NO.	SIGN NO.	PROP LOCATION STATION	RT/LT	SIGN TYPE	SIGN TEXT	SIGN DIMENSION	COLLEGE STATION STANDARDS	TXDOT STANDARDS	ALTERNATE TYPE B	SM RD SGN ASSM TY XXXXXX (X) XX (X-XXXX)				
										Post Type TSP = Triangular TWT = Tree Wrap TSHC = 12 SHC SS = Sch 80	Posts (1 or 2)	Anchor Type UA = Union Conc US = Union Soil NA = Integr Conc SA = Slip Conc SB = Slip Bolt	Mounting Designation P = Perfab. "Plain" T = Perfab. "T" L = Perfab. "L"	S = Str 2 or 3 # of Ext BW = Extruded Wind Beam NC = 1-1/2 #40 Wing Channel EWL = Extruded Num.
1 OF 5	1-B	102+80	RT	R3-17	BIKE LANE	30"X24"	FILM	C	X		10BWG	1	SA	P	
	2-B	104+00	RT	R3-3	NO PARKING (SYMBOL)	12"X12"	FILM	C	X		10BWG	1	SA	P	
	3-B	107+71		R1-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10BWG	1	SA	P	
	4-B	110+89	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	5-B	111+82	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
2 OF 5	1-A	119+82	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	2-A	119+90	LT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	3-A	120+13	RT	W1-7	TWO-DIRECTION LARGE ARROW	48"X24"	FILM	C	X		10BWG	1	SA	P	
	4-A	120+75		R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	5-A	120+92	RT	R3-17	BIKE LANE	30"X24"	FILM	C	X		10BWG	1	SA	P	
				R3-3	NO PARKING (SYMBOL)	12"X12"	FILM	C	X		10BWG	1	SA	P	
2 OF 5	1-B	132+77	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	2-B	133+08	LT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	3-B	134+05	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	4-B	133+66	RT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
3 OF 5	1-A	139+65	LT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10BWG	1	SA	P	
	2-A	145+45	LT	R3-17	BIKE LANE	30"X24"	FILM	C	X		10BWG	1	SA	P	
				R3-3	NO PARKING (SYMBOL)	12"X12"	FILM	C	X		10BWG	1	SA	P	
	3-A	145+74	LT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	4-A	139+65	RT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10BWG	1	SA	P	
	5-A	145+65	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
3 OF 5	1-B	149+94	RT	R6-1R	ONE WAY	36"X12"	FILM	C	X		10BWG	1	SA	P	
	2-B	150+09	RT	R6-1R	ONE WAY	36"X12"	FILM	C	X		10BWG	1	SA	P	
	3-B	150+46	RT	R6-1R	ONE WAY	36"X12"	FILM	C	X		10BWG	1	SA	P	
	4-B	156+59	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	5-B	156+66	LT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	6-B	147+19	RT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	7-B	147+64	RT	R3-17	BIKE LANE	30"X24"	FILM	C	X		10BWG	1	SA	P	
				R3-3	NO PARKING (SYMBOL)	12"X12"	FILM	C	X		10BWG	1	SA	P	
	8-B	147+44	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
4 OF 5	1-A	164+65	LT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10BWG	1	SA	P	
	2-A	167+45	RT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	3-A	167+69	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	4-A	164+65	RT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10BWG	1	SA	P	
4 OF 5	1-B	169+12	LT	W1-7	TWO-DIRECTION LARGE ARROW	48"X24"	FILM	C	X		10BWG	1	SA	P	
	2-B	173+71		R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	3-B	176+50	LT	W1-7	TWO-DIRECTION LARGE ARROW	48"X24"	FILM	C	X		10BWG	1	SA	P	
	4-B	177+63	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	5-B	165+45	RT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	6-B	178+68	RT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
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	2-A	183+40	LT	W1-7	TWO-DIRECTION LARGE ARROW	48"X24"	FILM	C	X		10BWG	1	SA	P	
	3-A	186+47	LT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	4-A	184+41	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	
	5-A	184+16	RT	R1-1	STOP	30"X30"	C	C	X		10BWG	1	SA	P	
	6-A	186+61		R6-1R	ONE WAY	36"X12"	FILM	C	X		10BWG	1	SA	P	
5 OF 5	1-B	194+30	LT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10BWG	1	SA	P	
	2-B	196+43		R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10BWG	1	SA	P	

Parkhill

John Rowe

Briarwood Avenue Phase II

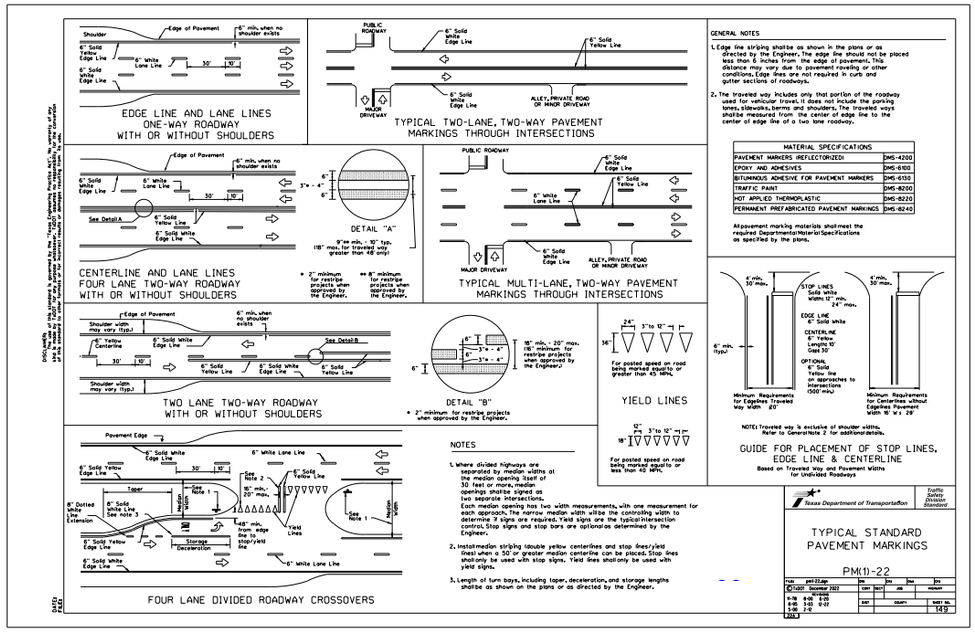
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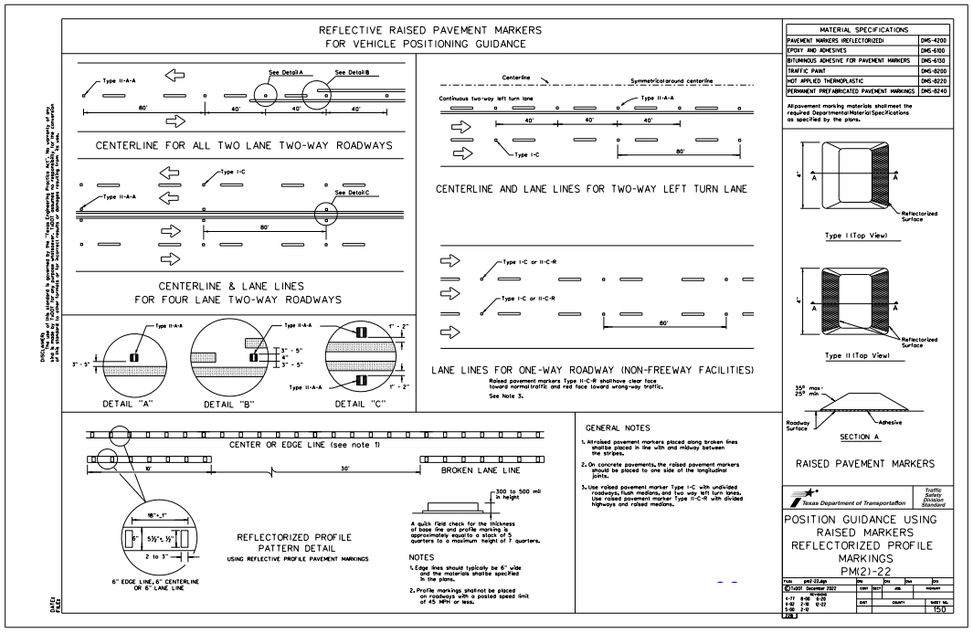
MIDLAND Engineering Services

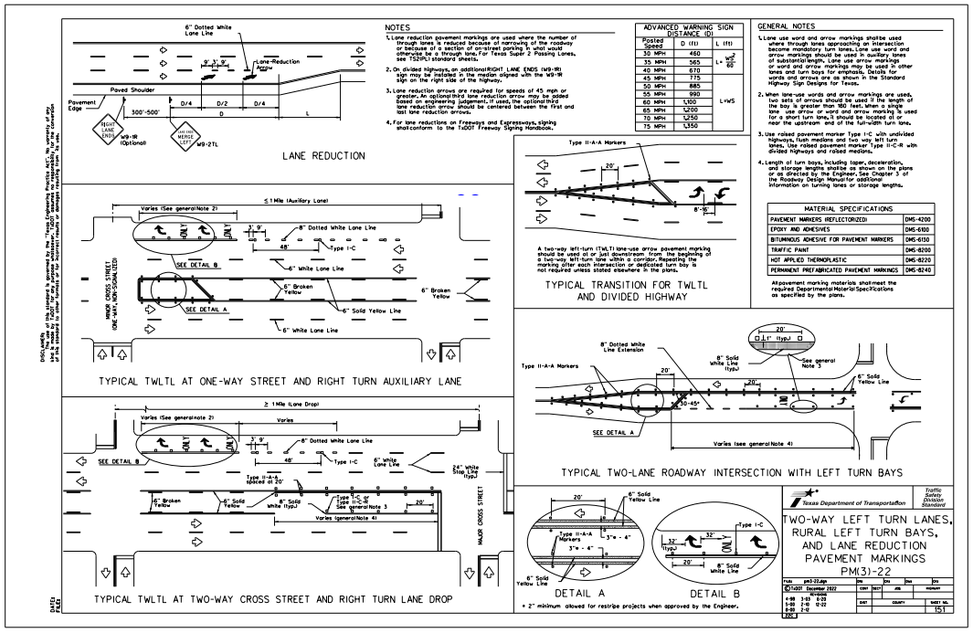
City of Midland
300 N. Loraine St.
Midland, TX
79702

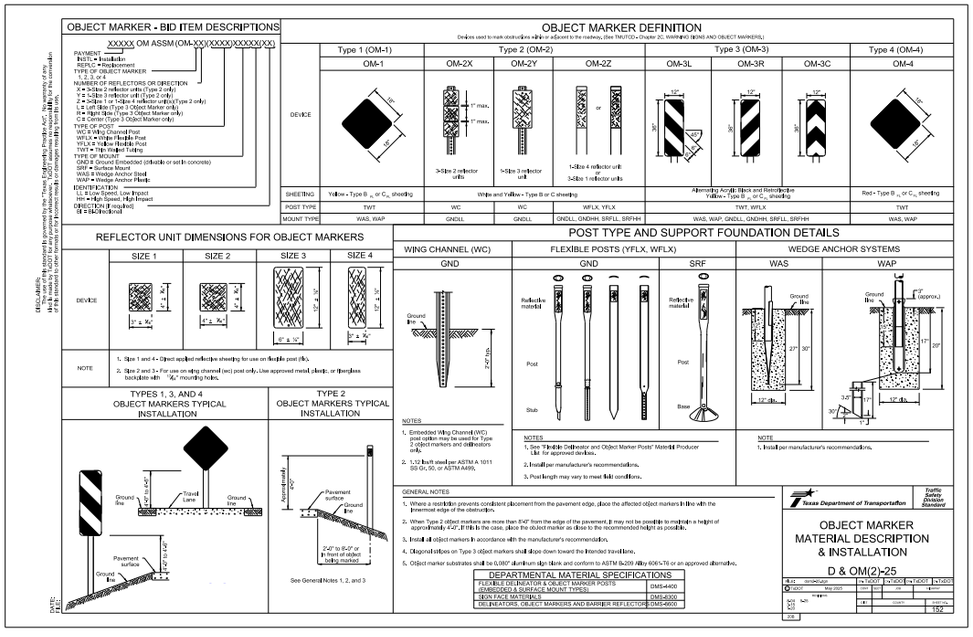
BRIARWOOD AVENUE
SMALL SIGN
SUMMARY SHEET

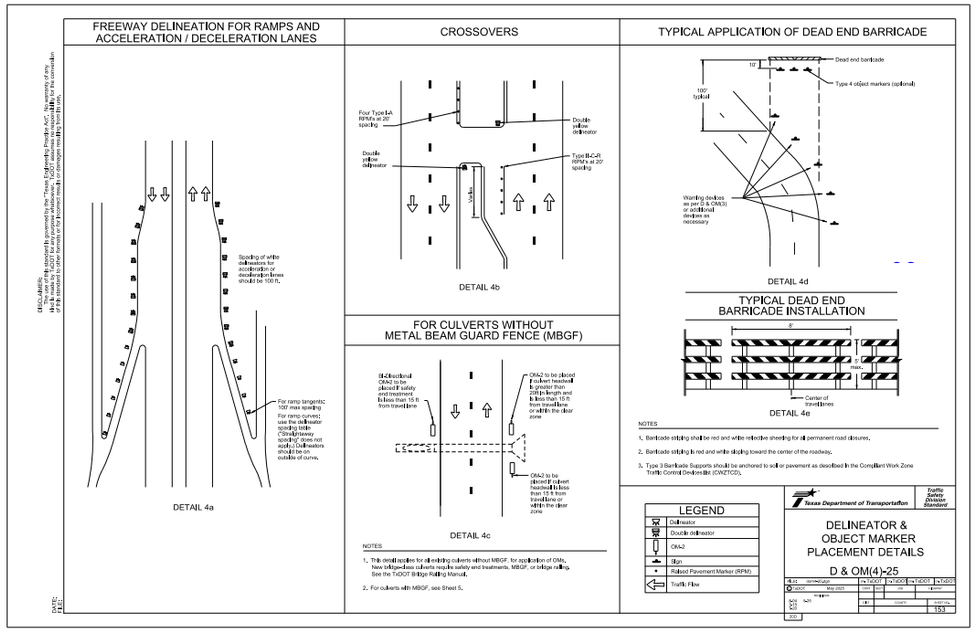
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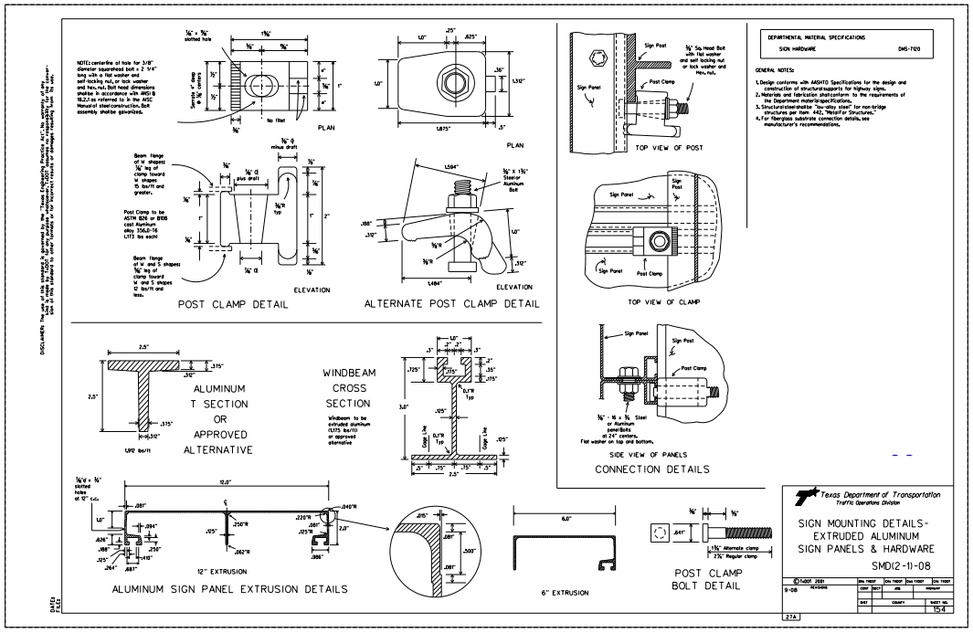

EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS
TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS
GENERAL NOTES
1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.
MATERIAL SPECIFICATIONS
PAVEMENT MARKERS (REFLECTORIZED) DMS-4200
EPOXY AND ADHESIVES DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS DMS-6150
TRAFFIC PAINT DMS-8200
HOT APPLIED THERMOPLASTIC DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS DMS-8240
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS
DETAIL "A"
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS
TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS
DETAIL "B"
YIELD LINES
GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE
Based on Traveled Way and Pavement Widths
for Undivided Roadways
FOUR LANE DIVIDED ROADWAY CROSSOVERS
NOTES
1. Where divided highways are separated by median widths of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.
Texas Department of Transportation
Traffic Safety Division Standard
TYPICAL STANDARD
PAVEMENT MARKINGS
PM(1)-22
DATED JUNE 2022

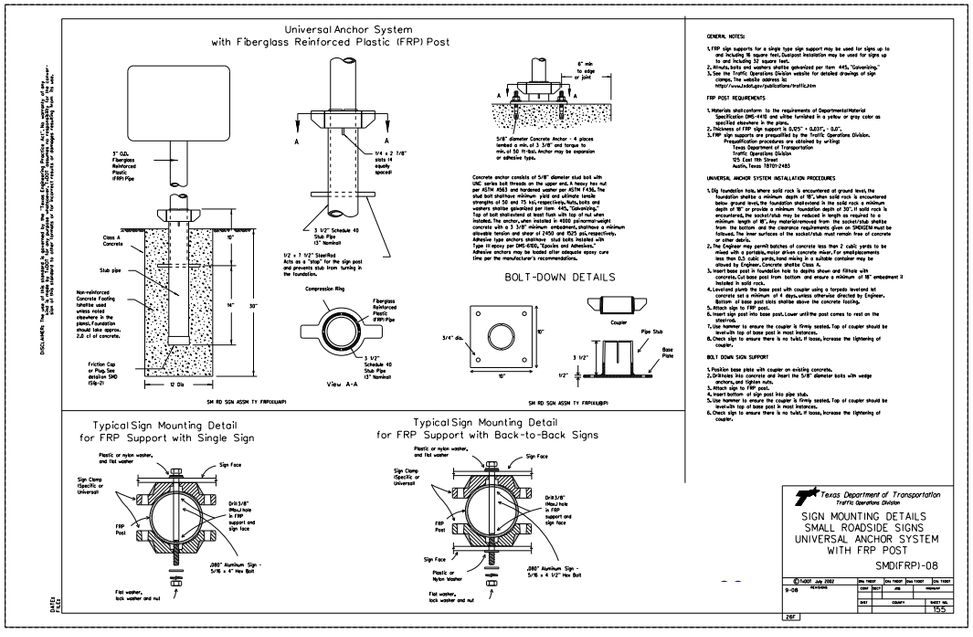

REFLECTIVE RAISED PAVEMENT MARKERS
FOR VEHICLE POSITIONING GUIDANCE
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS
CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY ROADWAYS
CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)
DETAIL "A"
DETAIL "B"
DETAIL "C"
CENTER OR EDGE LINE (see note 1)
BROKEN LANE LINE
REFLECTORIZED PROFILE
PATTERN DETAIL
USING REFLECTIVE PROFILE PAVEMENT MARKINGS
GENERAL NOTES
NOTES
MATERIAL SPECIFICATIONS
PAVEMENT MARKERS (REFLECTORIZED) DMS-4200
EPOXY AND ADHESIVES DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS DMS-6150
TRAFFIC PAINT DMS-8200
HOT APPLIED THERMOPLASTIC DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS DMS-8240
Type I (Top View)
Type II (Top View)
SECTION A
RAISED PAVEMENT MARKERS
Texas Department of Transportation
POSITION GUIDANCE USING
RAISED MARKERS
REFLECTORIZED PROFILE
MARKINGS
PM(2)-22

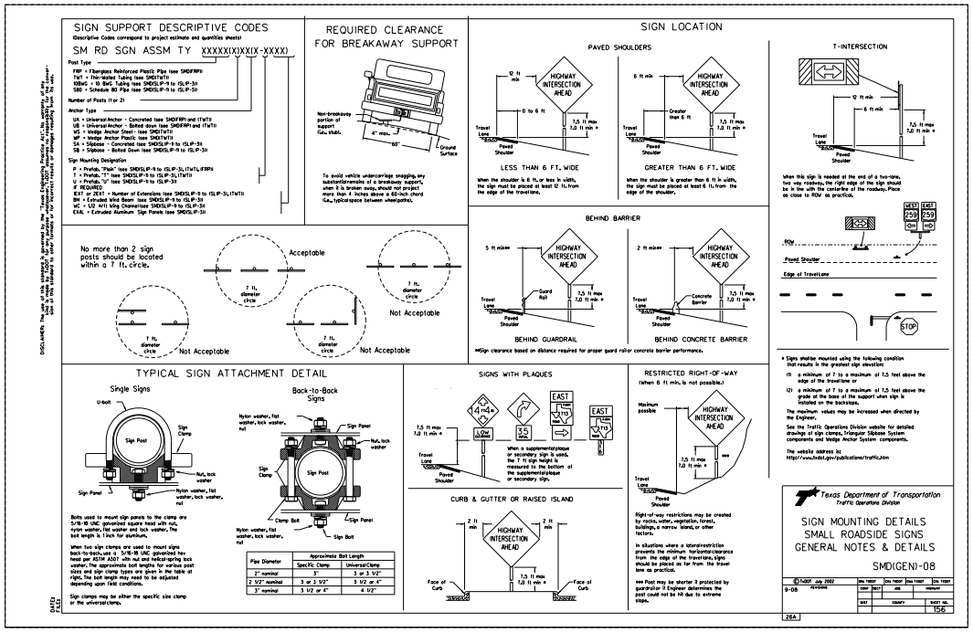

LANE REDUCTION
NOTES
1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because a lane is dropped. Lane reduction marking is not to be used for a through lane, or Texas Super 7 Passing Lanes, see TSOPM1 standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be placed on the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.
ADVANCED WARNING SIGN DISTANCE (D)
Posted Speed | D (ft) | L (ft)
30 MPH | 450 | L= WS/60
35 MPH | 565
40 MPH | 670
45 MPH | 775
50 MPH | 885 | L=WS
55 MPH | 990
60 MPH | 1,100
65 MPH | 1,200
70 MPH | 1,250
75 MPH | 1,350
GENERAL NOTES
1. Lane use word and arrow markings shallbe used where through lanes approaching an intersection become mandatory. Where lane use word and arrow markings are used, they shall be placed at a point of substantial length. Lane use arrow markings or word and arrow markings may be used to other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow word and arrow marking is used in a turn bay, it should be placed 20 feet from or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, non-median and two-way left turn highways, and median applications. Use Type II-C-R with divided highways and raised median.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as shown in Chapter 3 of the Roadway Design Manual. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.
MATERIAL SPECIFICATIONS
PAVEMENT MARKERS REFLECTORIZED | DMS-4200
EPOXY AND ADHESIVES | DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS | DMS-6150
TRAFFIC PAINT | DMS-6120
HOT APPLIED THERMOPLASTIC | DMS-6220
PERMANENT PREFABRICATED PAVEMENT MARKINGS | DMS-8240
All pavement marking materials shallmeet the required Departmental Material Specifications as specified by the plans.
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE
TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP
DETAIL A
DETAIL B
Texas Department of Transportation
Traffic Safety Division Standard
TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS
PM(3)-22

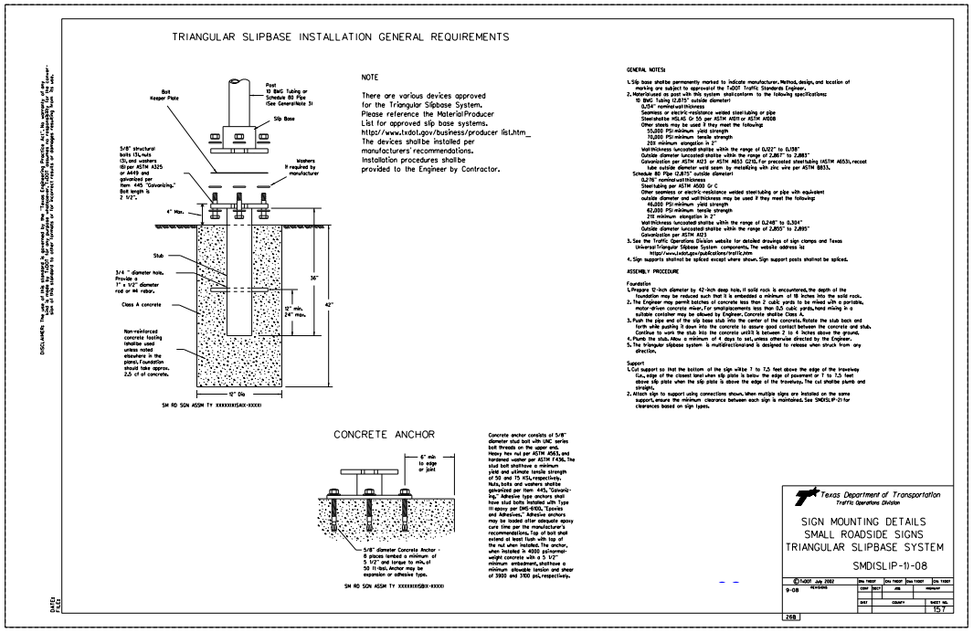

OBJECT MARKER - BID ITEM DESCRIPTIONS
XXXXX OM ASSM(OM-XX)(XXXX)(XXXX)(XX)
PAYMENT
INSTL = Installation
REPLC = Replacement
TYPE OF OBJECT MARKER
1, 2, 3, or 4
NUMBER OF REFLECTORS OR DIRECTION
1 = Single reflector units (Type 2 only)
Y = 2-Slim 3 reflector unit (Type 2 only)
Z = 2-Slim 1 or 1-Slim 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)
TYPE OF POST
GND = Ground Mounted Post
WFLX = White Flexible Post
YFLX = Yellow Flexible Post
TWT = Thin Walled Tubing
TYPE OF MOUNT
GNDI = Ground Embedded (driveable or set in concrete)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic
IDENTIFICATION
LL = Low Speed, Low Impact
HH = High Speed, High Impact
DIRECTION (if required)
BI = Bi-Directional
OBJECT MARKER DEFINITION
Devices used to mark obstructions within or adjacent to the roadway (See TMUTCD, Chapter 2C, WARNING SIGNS AND OBJECT MARKERS)
Type 1 (OM-1)
Type 2 (OM-2)
Type 3 (OM-3)
Type 4 (OM-4)
OM-1
OM-2X
OM-2Y
OM-2Z
OM-3L
OM-3R
OM-3C
OM-4
DEVICE
3-Slim 2 reflector units
3-Slim 3 reflector unit
1-Slim 4 reflector unit or 3-Slim 1 reflector units
SHEETING
Yellow = Type B or C sheeting
White and Yellow = Type B or C sheeting
Alternating Acrylic Black and Retroreflective Yellow = Type B or C sheeting
Red = Type B or C sheeting
POST TYPE
TWT
WC
WFLX, YFLX
TWT, WFLX
TWT
MOUNT TYPE
WAS, WAP
GNDLL
GNDLL, GNDHH, SRFLL, SRFHH
WAS, WAP, GNDLL, GNDHH, SRFLL, SRFHH
WAS, WAP
REFLECTOR UNIT DIMENSIONS FOR OBJECT MARKERS
SIZE 1
SIZE 2
SIZE 3
SIZE 4
DEVICE
NOTE
1. Size 1 and 4 - Object applied reflective sheeting for use on flexible post (fb).
2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic, or fiberglass backplate with 9/16" mounting holes.
POST TYPE AND SUPPORT FOUNDATION DETAILS
WING CHANNEL (WC)
FLEXIBLE POSTS (YFLX, WFLX)
WEDGE ANCHOR SYSTEMS
GND
GND
SRF
WAS
WAP
Ground line
Reflective material
Post
Stub
Base
NOTES
1. Embedded Wing Channel (WC) post option may be used for Type 2 object markers and delineators only.
2. 1-1/2 lbs/ft steel per ASTM A 1011 SS Gr. 55, or ASTM A499.
NOTES
1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
NOTE
1. Install per manufacturer's recommendations.
TYPES 1, 3, AND 4 OBJECT MARKERS TYPICAL INSTALLATION
TYPE 2 OBJECT MARKERS TYPICAL INSTALLATION
Ground line
Travel Lane
Pavement surface
Pavement surface
Ground line
See General Notes 1, 2, and 3
GENERAL NOTES
1. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
2. When Type 2 object markers are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker as close to the recommended height as possible.
3. Install all object markers in accordance with the manufacturer's recommendation.
4. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.
5. Object marker substrates shall be 0.080" aluminum sign blank and conform to ASTM B-209 Alloy 6061-T6 or an approved alternative.
DEPARTMENTAL MATERIAL SPECIFICATIONS
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES): DMS-4400
SIGN FACE MATERIALS: DMS-4300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS: DMS-4600
Texas Department of Transportation
Traffic Safety Division Standard
OBJECT MARKER MATERIAL DESCRIPTION & INSTALLATION
D & OM(2)-25
FILE: dom2-25.dgn
DN: TxDOT
CK: TxDOT
DW: TxDOT
CK: TxDOT
©TxDOT May 2025
CONT
SECT
JOB
HIGHWAY
DIST
COUNTY
SHEET NO.
152
DATE:
FHWA:
DESCRIPTION:
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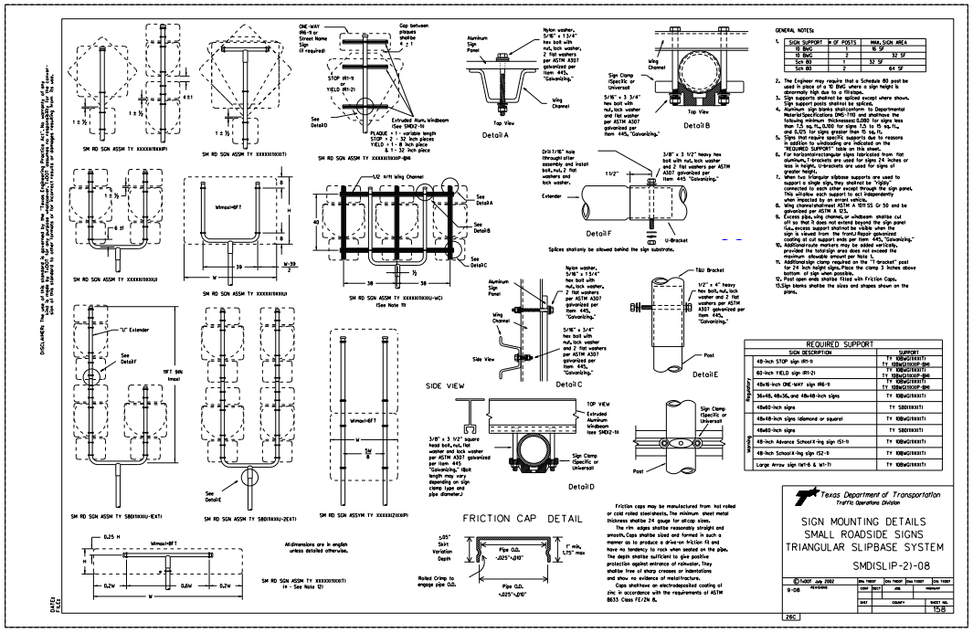

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION / DECELERATION LANES
Spacing of white delineators for acceleration or deceleration lanes should be 100 ft.
For ramp tangents: 100' max spacing
For ramp curves: use the delineator spacing table (Straight/Inner Curve) that may not apply. Delineators should be on outside of curve.
DETAIL 4a
CROSSOVERS
Four Type I-A (RPMs at 20' spacing
Double yellow delineator
Double yellow delineator
Type II-C-R (RPMs at 20' spacing
Varies
DETAIL 4b
FOR CULVERTS WITHOUT METAL BEAM GUARD FENCE (MBGF)
Bi-Directional OMA2 to be placed if safety end treatment is less than 15 ft from travel lane.
OMA2 to be placed if culvert headwall is greater than 20 ft in length and is less than 15 ft from travel lane or within the clear zone
OMA2 to be placed if culvert headwall is less than 15 ft from travel lane or within the clear zone
DETAIL 4c
NOTES
1. This detail applies for all existing culverts without MBGF, for application of OMs. New bridge-class culverts require safety end treatments, MBGF, or bridge railing. See the TxDOT Bridge Railing Manual.
2. For culverts with MBGF, see Sheet 5.
TYPICAL APPLICATION OF DEAD END BARRICADE
10'
Dead end barricade
Type 4 object markers (optional)
100' typical
Warning devices as per D & OM(3) or additional devices as necessary
DETAIL 4d
TYPICAL DEAD END BARRICADE INSTALLATION
8'
4' max.
Center of travel lanes
DETAIL 4e
NOTES
1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in the Compliant Work Zone Traffic Control Devices list (CWZTCD).
LEGEND
Delineator
Double delineator
OMA2
Sign
Raised Pavement Marker (RPM)
Traffic Flow
Texas Department of Transportation
Traffic Safety Division Standard
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS
D & OM(4)-25
FILE: dom4d25.dgn
DN: TxDOT
CK: TxDOT
DW: TxDOT
CK: TxDOT
©TxDOT May 2025
CONT
SECT
JOB
HIGHWAY
DIST
COUNTY
SHEET NO.
153
DATE:
FED.RD. DIV. NO.
FILE:
DESCRIPTION
1) The use of this standard is governed by the "Texas Engineering Practice Act". Any modification of this standard, including the deletion of details, notes or dimensions, shall release the engineer of record preparing the modified design document from responsibility for the use of this standard and shall indemnify and hold harmless the Texas Department of Transportation for all claims, damages, losses and expenses arising out of or resulting therefrom.

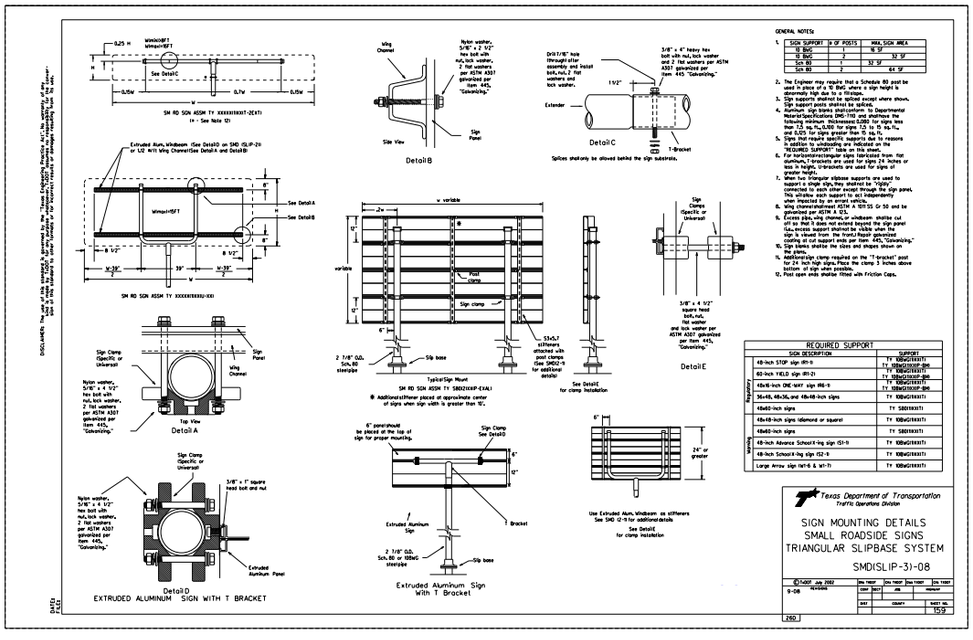

POST CLAMP DETAIL
ELEVATION
PLAN
ALTERNATE POST CLAMP DETAIL
ELEVATION
PLAN
TOP VIEW OF POST
TOP VIEW OF CLAMP
SIDE VIEW OF PANELS
CONNECTION DETAILS
DEPARTMENTAL MATERIAL SPECIFICATIONS
SIGN HARDWARE
DMS-7109
GENERAL NOTES:
ALUMINUM
T SECTION
OR
APPROVED
ALTERNATIVE
WINDBEAM
CROSS
SECTION
12" EXTRUSION
ALUMINUM SIGN PANEL EXTRUSION DETAILS
6" EXTRUSION
POST CLAMP
BOLT DETAIL
Texas Department of Transportation
Traffic Operations Division
SIGN MOUNTING DETAILS-
EXTRUDED ALUMINUM
SIGN PANELS & HARDWARE
SMD(2-1)-08
9-08
27A


Universal Anchor System
with Fiberglass Reinforced Plastic (FRP) Post
BOLT-DOWN DETAILS
GENERAL NOTES:
FRP POST REQUIREMENTS
UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES
BOLT DOWN SIGN SUPPORT
Typical Sign Mounting Detail
for FRP Support with Single Sign
Typical Sign Mounting Detail
for FRP Support with Back-to-Back Signs
Texas Department of Transportation
Traffic Operations Division
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
UNIVERSAL ANCHOR SYSTEM
WITH FRP POST
SMD(FRP)-08

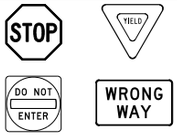

SIGN SUPPORT DESCRIPTIVE CODES
SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT
SIGN LOCATION
PAVED SHOULDERS
LESS THAN 6 FT. WIDE
GREATER THAN 6 FT. WIDE
T-INTERSECTION
BEHIND BARRIER
BEHIND GUARDRAIL
BEHIND CONCRETE BARRIER
No more than 2 sign posts should be located within a 7 ft. circle.
Acceptable
Not Acceptable
TYPICAL SIGN ATTACHMENT DETAIL
Single Signs
Back-to-Back Signs
SIGNS WITH PLAQUES
CURB & GUTTER OR RAISED ISLAND
RESTRICTED RIGHT-OF-WAY
Texas Department of Transportation
Traffic Operations Division
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
GENERAL NOTES & DETAILS
SMD(GEN)-08


TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS
NOTE
There are various devices approved for the Triangular Slipbase System. Please reference the MaterialProducer List for approved slip base systems. http://www.txdot.gov/business/producer lists.htm The devices shallbe installed per manufacturers' recommendations. Installation procedures shallbe provided to the Engineer by Contractor.
GENERAL NOTES:
ASSEMBLY PROCEDURE
Foundation
Support
CONCRETE ANCHOR
Texas Department of Transportation
Traffic Operations Division
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM
SMD(SLIP-1)-08


SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM
SMDISLIP-2)-08
FRICTION CAP DETAIL
SIDE VIEW
TOP VIEW
GENERAL NOTES:
REQUIRED SUPPORT
Texas Department of Transportation
Traffic Operations Division


SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM
SMDISLIP-3)-08
Texas Department of Transportation
Traffic Operations Division
GENERAL NOTES:
REQUIRED SUPPORT
Detail A
Detail B
Detail C
Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET
Detail E
Typical Sign Mount
Extruded Aluminum Sign With T Bracket

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND/BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND/BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND/BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shallbe as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shalluse the FederalHighway Administration (FHwA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shallprovide a balanced appearance when spacing is not shown.
4. Black legend and borders shallbe applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shallbe applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shallbe applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shallbe any materialthat meets the DepartmentalMaterial Specification requirements of DMS-7110 or approved alternatives.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

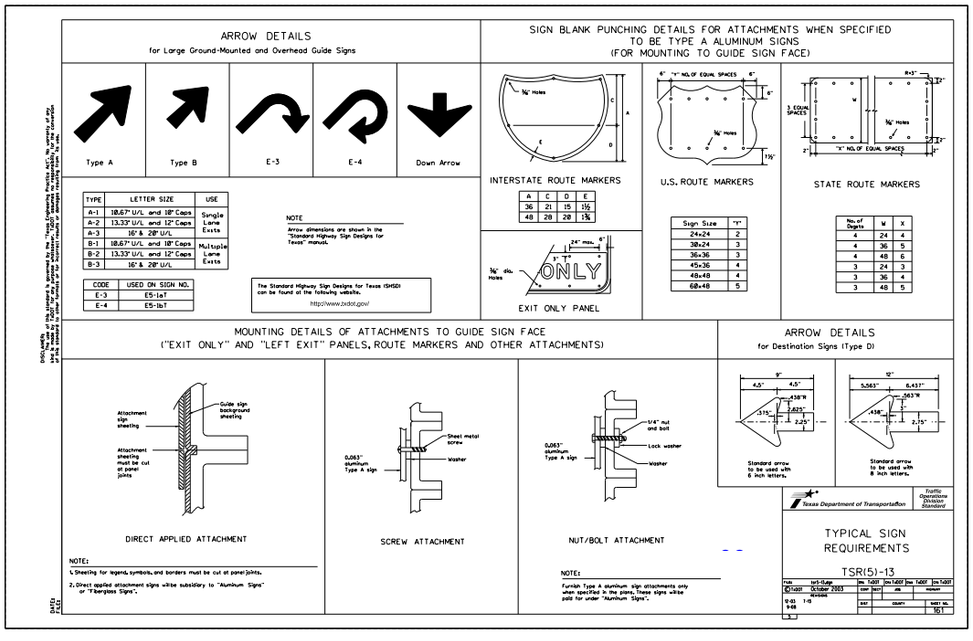
TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS				
8-03 7-13	DIST	COUNTY		SHEET NO.
5-98				167

DESIGNED
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DETAILED
CHECKED



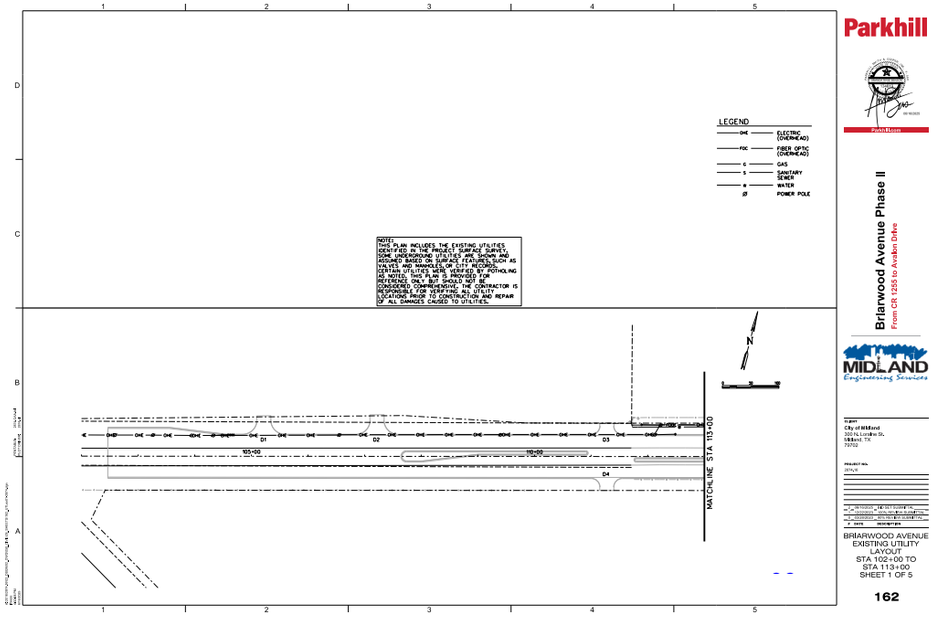
TYPE	LETTER SIZE	USE
A-1	18.67" U/L and 18" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 28" U/L	
B-1	18.67" U/L and 18" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 28" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

A	C	D	E
36	21	15	1½
48	28	20	1¾

Sign Size	"Y"
24×24	2
30×24	3
36×36	3
45×36	4
48×48	4
60×48	5

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5



Parkhill

Briarwood Avenue Phase II

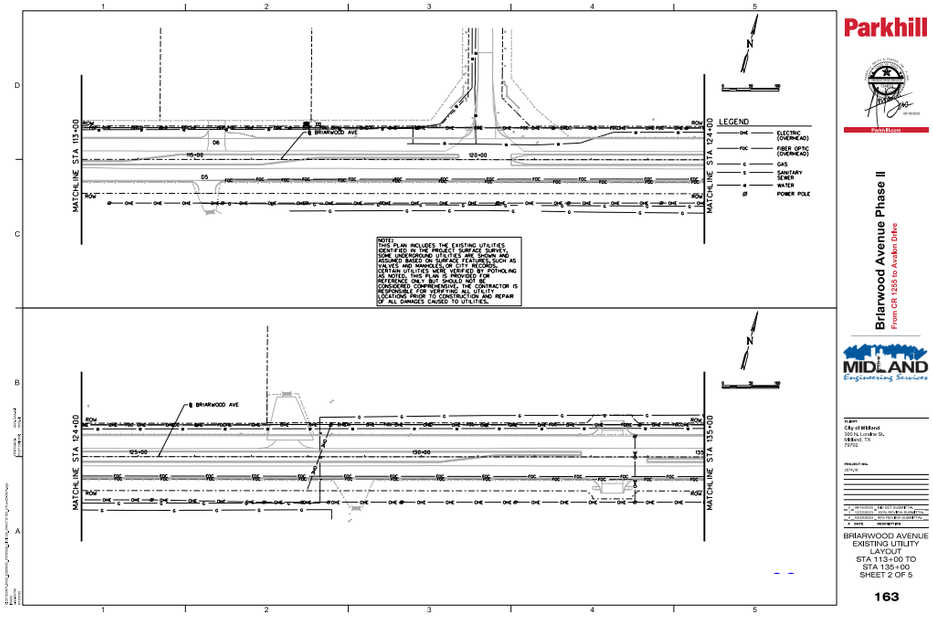
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
EXISTING UTILITY
LAYOUT
STA 102+00 TO
STA 113+00
SHEET 1 OF 5

162



Parkhill

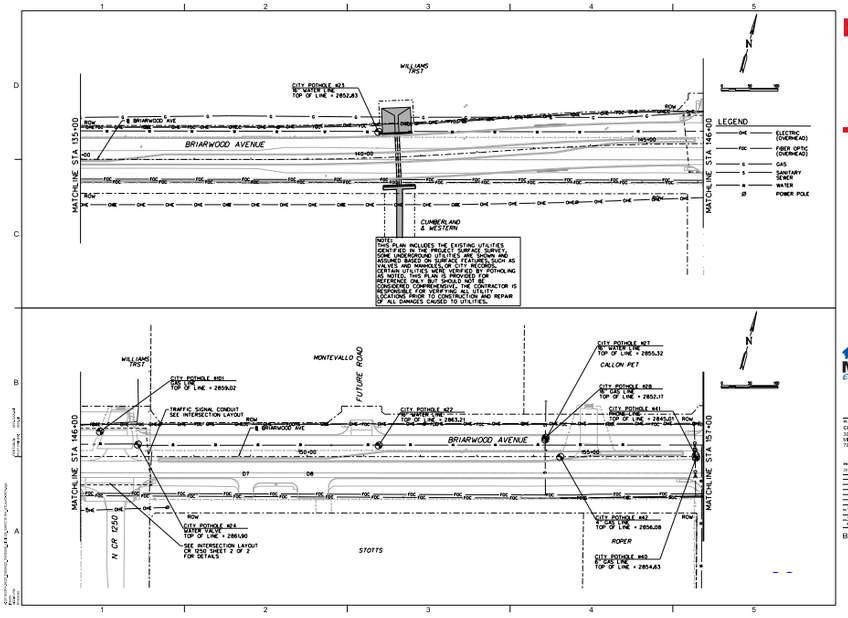
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EXISTING UTILITY
LAYOUT
STA 113+00 TO
STA 135+00
SHEET 2 OF 5

163



Parkhill

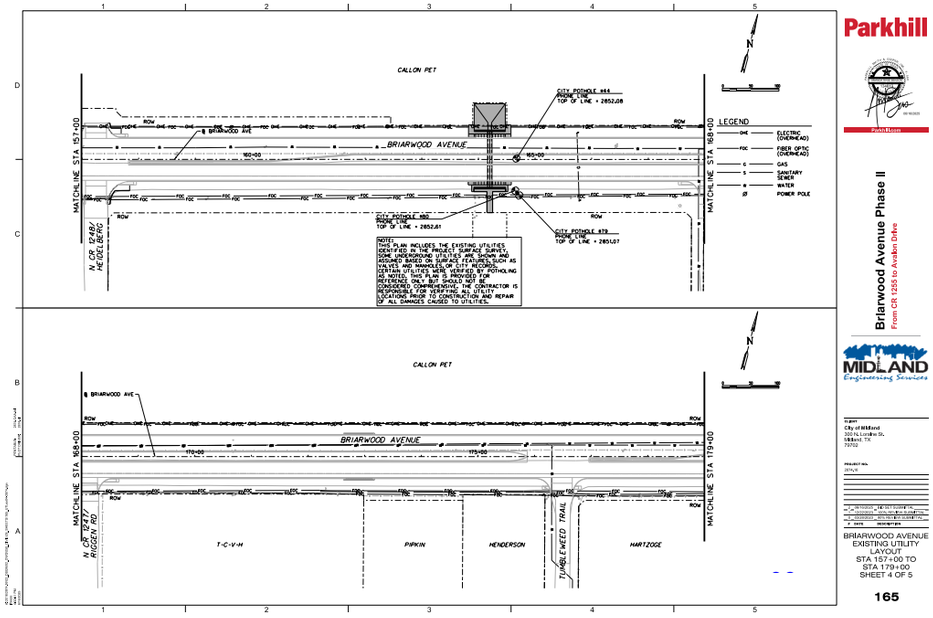
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EXISTING UTILITY LAYOUT
STA 135+00 TO STA 157+00
SHEET 3 OF 5

164



Parkhill

John Hoos

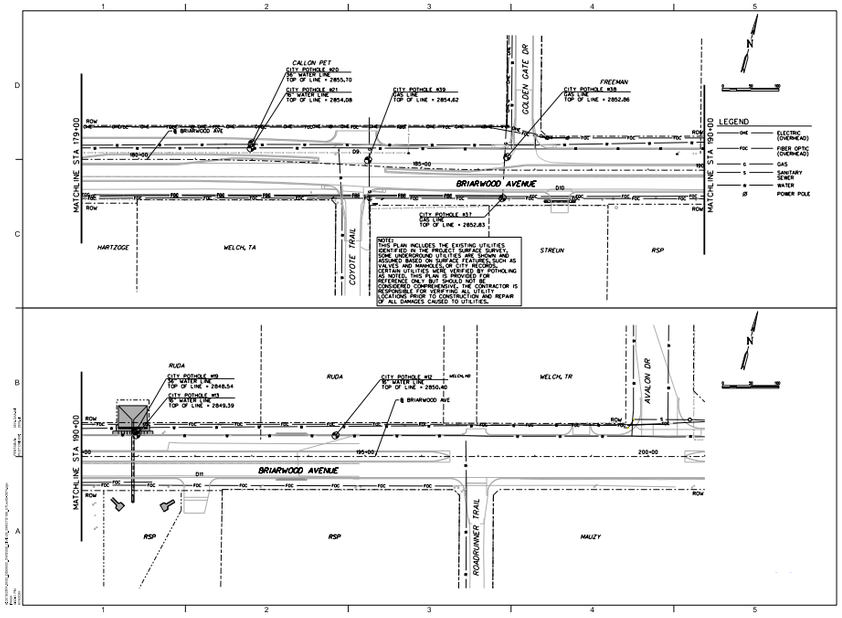
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EXISTING UTILITY
LAYOUT
STA 157+00 TO
STA 179+00
SHEET 4 OF 5

165



Parkhill

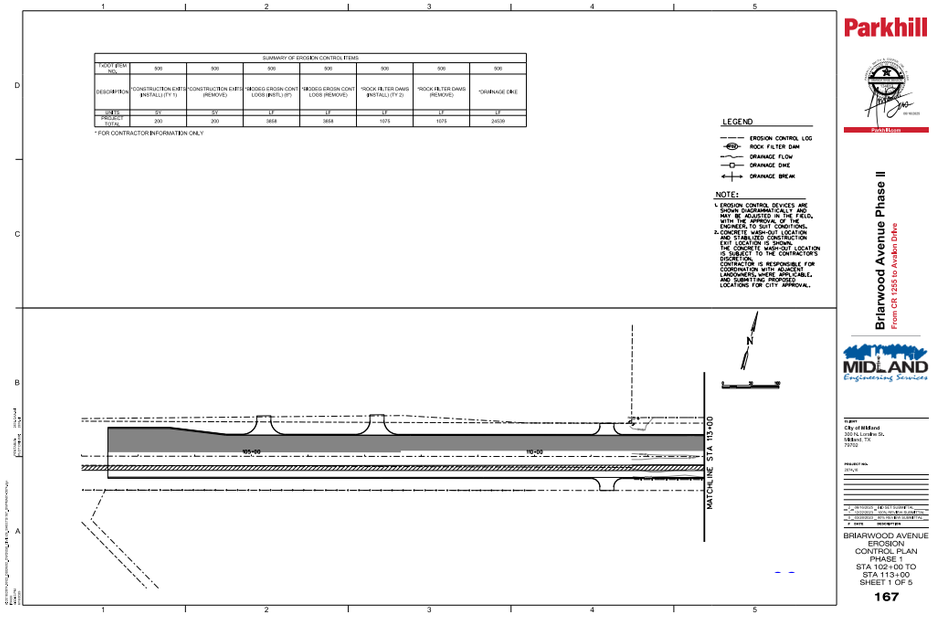
Briarwood Avenue Phase II

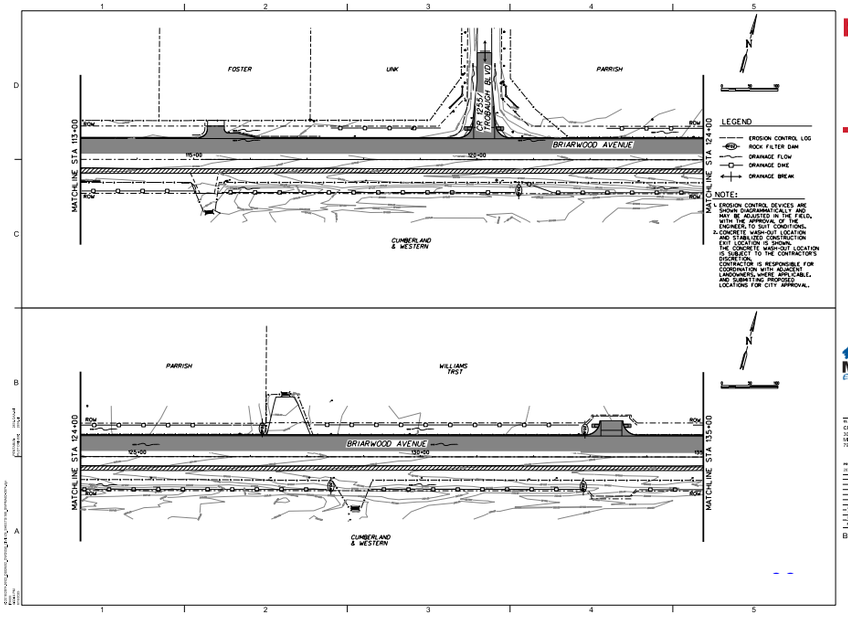
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EXISTING UTILITY
LAYOUT
STA 179+00 TO
END OF PROJECT
SHEET 5 OF 5

166


SUMMARY OF EROSION CONTROL ITEMS
TxDOT ITEM NO.
DESCRIPTION
*CONSTRUCTION EXITS (INSTALL) (TY 1)
*CONSTRUCTION EXITS (REMOVE)
*BIODEG EROSION CONT LOGS (INSTL) (9")
*BIODEG EROSION CONT LOGS (REMOVE)
*ROCK FILTER DAMS (INSTALL) (TY 2)
*ROCK FILTER DAMS (REMOVE)
*DRAINAGE DIKE
UNITS
PROJECT TOTAL
EA
200
LF
9658
1075
24039
* FOR CONTRACTOR INFORMATION ONLY
LEGEND
EROSION CONTROL LOG
ROCK FILTER DAM
DRAINAGE FLOW
DRAINAGE DIKE
DRAINAGE BREAK
NOTE:
1. EROSION CONTROL DEVICES ARE SHOWN DIAGRAMMATICALLY AND MAY BE ADJUSTED IN THE FIELD, BY THE CONTRACTOR OR THE ENGINEER, TO SUIT CONDITIONS.
2. CONCRETE WASH-OUT LOCATION AND STABILIZED CONSTRUCTION EXIT LOCATIONS SHOWN ON THE CONCRETE WASH-OUT LOCATION IS SUBJECT TO THE CONTRACTOR'S DISCRETION.
CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH ADJACENT LANDOWNERS, WHERE APPLICABLE, AND SUBMITTING PROPOSED LOCATIONS FOR CITY APPROVAL.
N
105-00
110-00
MATCHLINE STA 113+00
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 1
STA 102+00 TO
STA 113+00
SHEET 1 OF 5
167



Parkhill

John Rowe

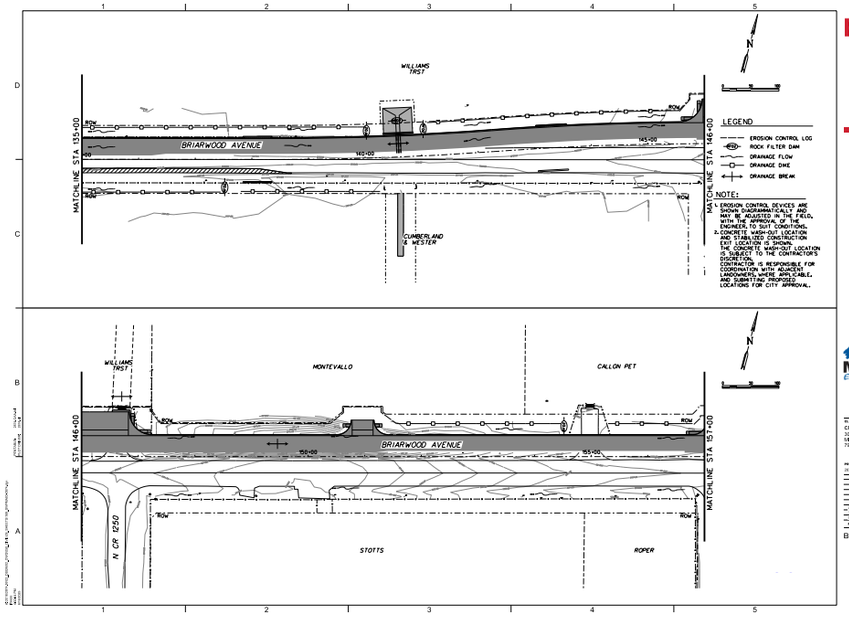
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 1
STA 113+00 TO
STA 135+00
SHEET 2 OF 5

168



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

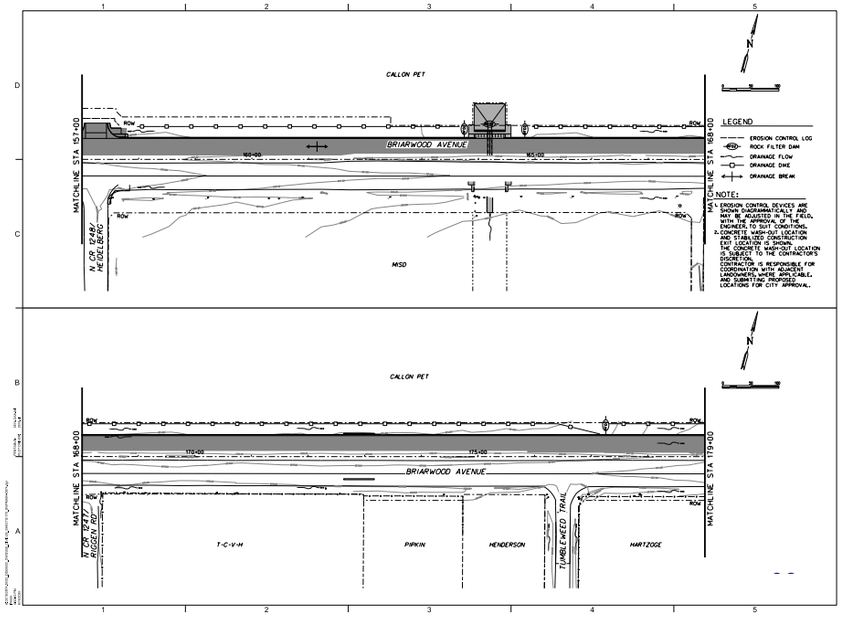
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

PROJECT No.

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 1
STA 135+00 TO
STA 157+00
SHEET 3 OF 5

169



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

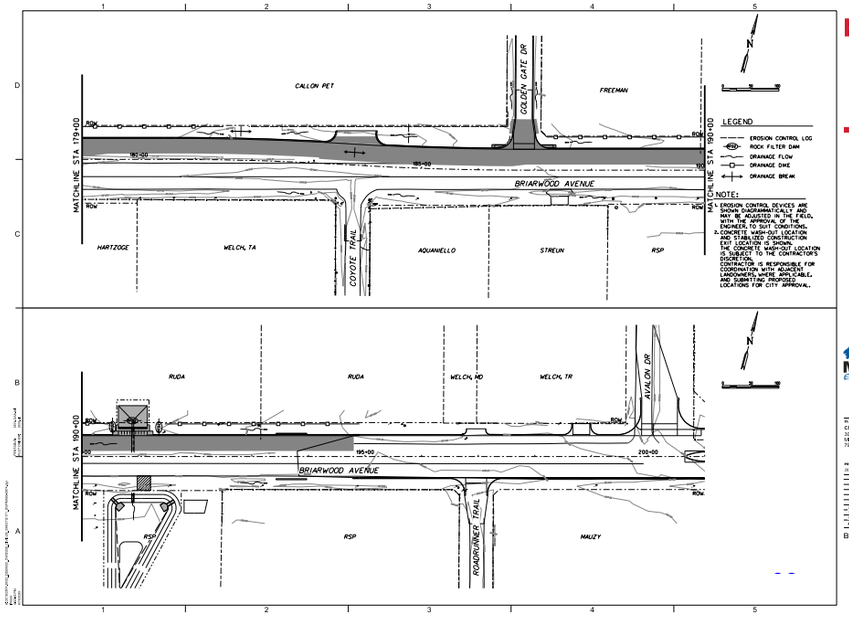
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007619

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 1
STA 157+00 TO
STA 179+00
SHEET 4 OF 5

170



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

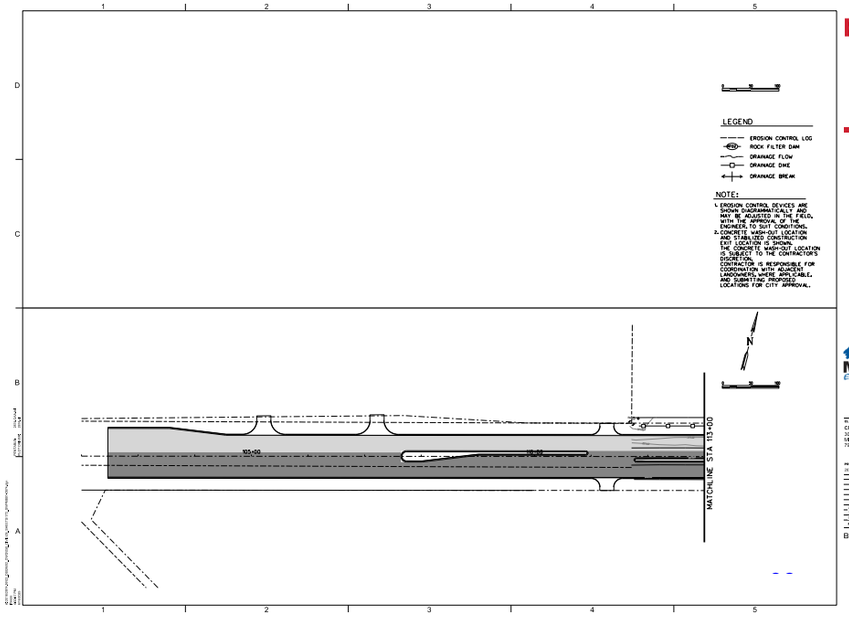
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

PROJECT NO.
067619

#	DATE	DESCRIPTION
1	08/19/2025	AS-BUILT CORRECTIONS
2	03/20/2025	INITIAL SUBMISSION
3	04/09/2025	REVISED PER CITY COMMENTS

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 1
STA 179+00 TO
END OF PROJECT
SHEET 5 OF 5

171



Parkhill

John Rowe

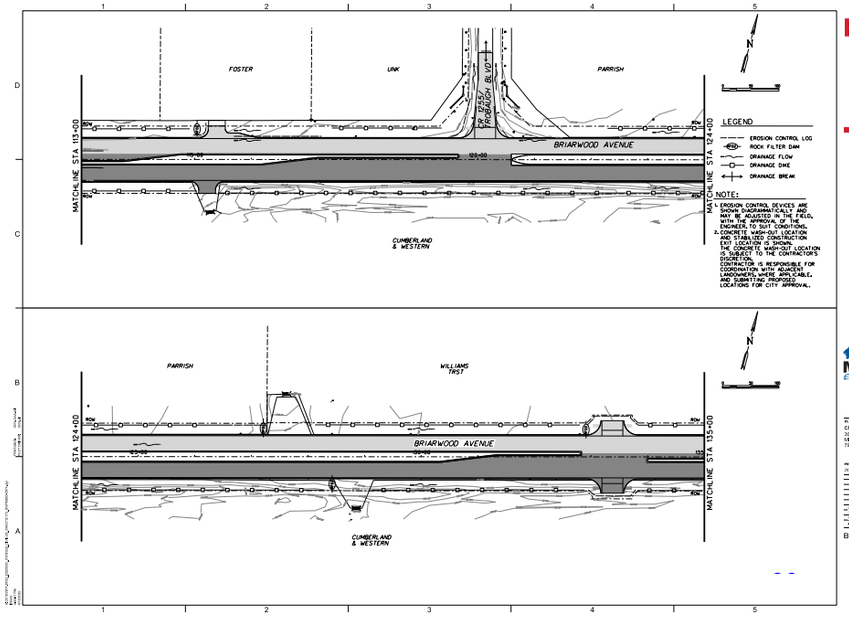
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 102+00 TO
STA 113+00
SHEET 1 OF 5

172



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

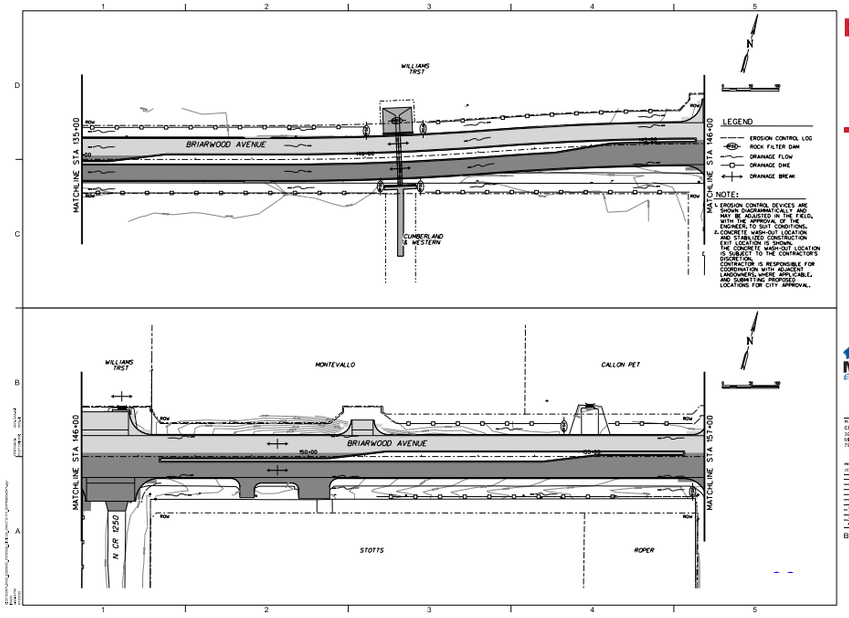
Client
City of Midland
300 N. Loraine St.
Midland, TX
79701

Project No.
067419

#	DATE	DESCRIPTION
1	08/19/2025	AS BUILT CORRECTIONS
2	08/20/2025	INSTALLED BY CONTRACTOR
3	08/20/2025	INSTALLED BY CONTRACTOR

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 113+00 TO
STA 135+00
SHEET 2 OF 5

173



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

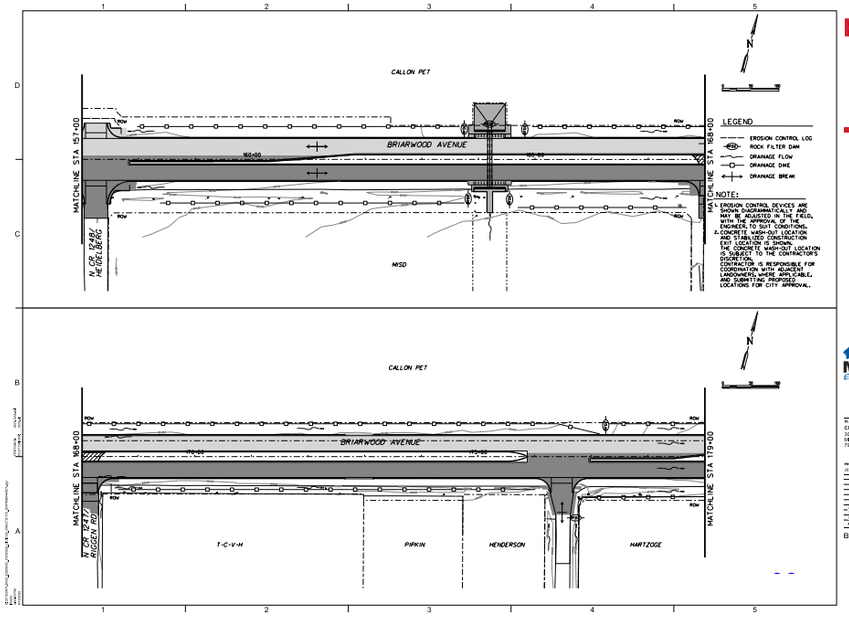
MIDLAND Engineering Services

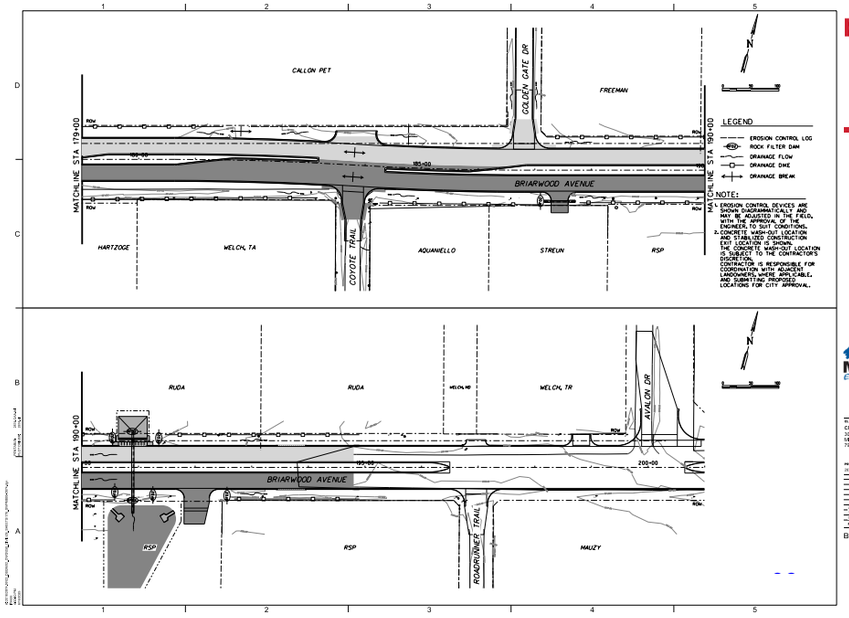
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 135+00 TO
STA 157+00
SHEET 3 OF 5

174


CALLON PET
BRIARWOOD AVENUE
MATCHLINE STA 157+00
MATCHLINE STA 168+00
N CR 1248/ HEIDELBERG
MSD
LEGEND
EROSION CONTROL LOG
ROCK FILTER DAM
DRAINAGE FLOW
DRAINAGE DIKE
DRAINAGE BREAK
MATCHLINE NOTE:
1. EROSION CONTROL DEVICES ARE SHOWN DIAGRAMMATICALLY AND MAY BE ADJUSTED IN THE FIELD, BY THE CONTRACTOR OR THE ENGINEER, TO SUIT CONDITIONS.
2. CONCRETE WASH-OUT LOCATION AND STABILIZED CONSTRUCTION ENTRANCE LOCATION SHOWN ON THE CONCRETE WASH-OUT LOCATION IS SUBJECT TO THE CONTRACTOR'S DISCRETION.
3. CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH ADJACENT LANDOWNERS, WHERE APPLICABLE, AND SUBMITTING PROPOSED LOCATIONS FOR CITY APPROVAL.
CALLON PET
BRIARWOOD AVENUE
MATCHLINE STA 168+00
MATCHLINE STA 179+00
N CR 1248/ RIDGEN RD
T-C-V-H
PIPKIN
HENDERSON
HARTZOGE
Parkhill
John Rowe
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND
Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 157+00 TO
STA 179+00
SHEET 4 OF 5
175



Parkhill

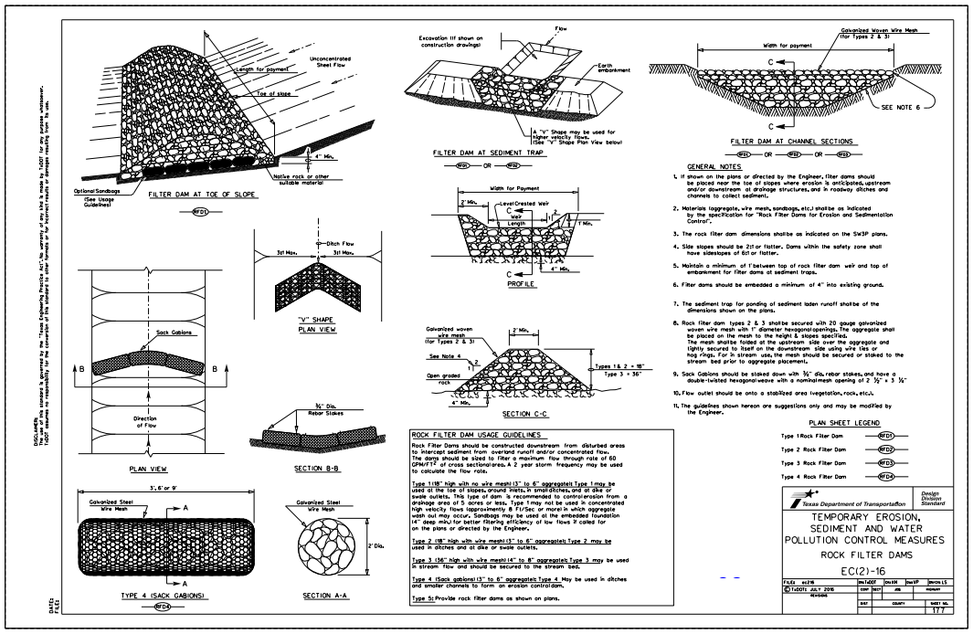
Briarwood Avenue Phase II

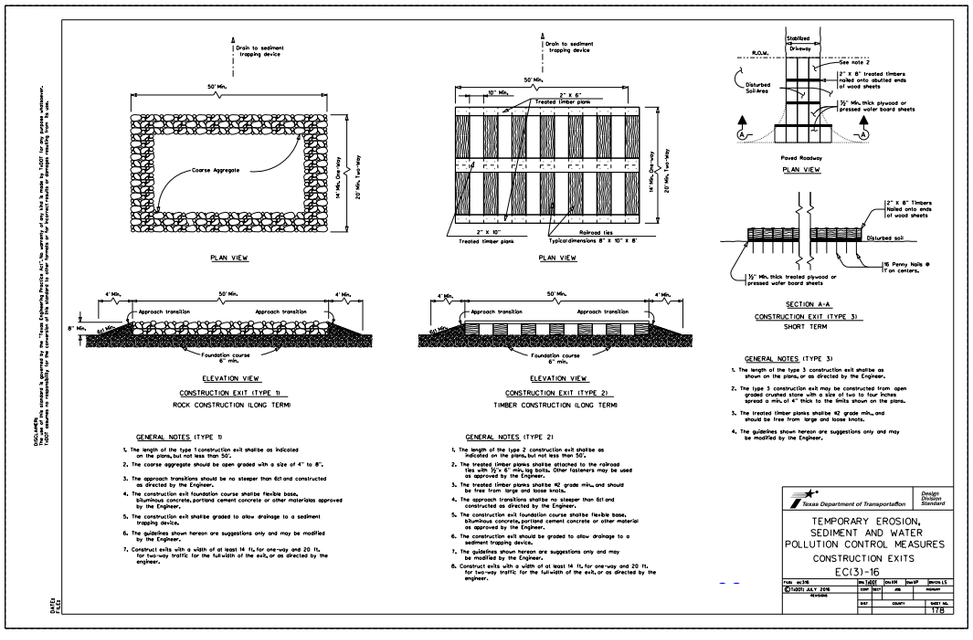
From CR 1250 to Avalon Drive

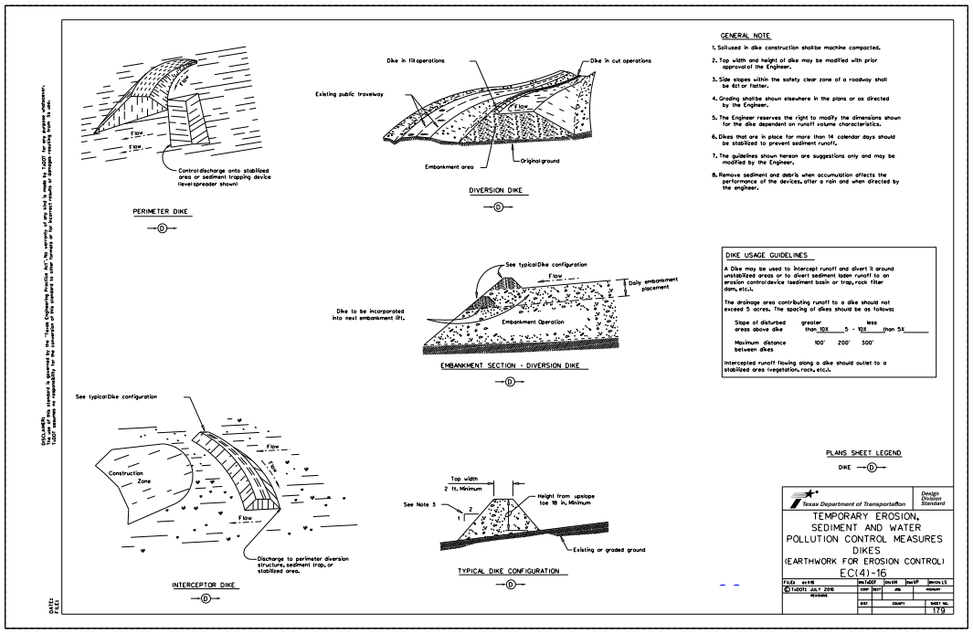
MIDLAND Engineering Services

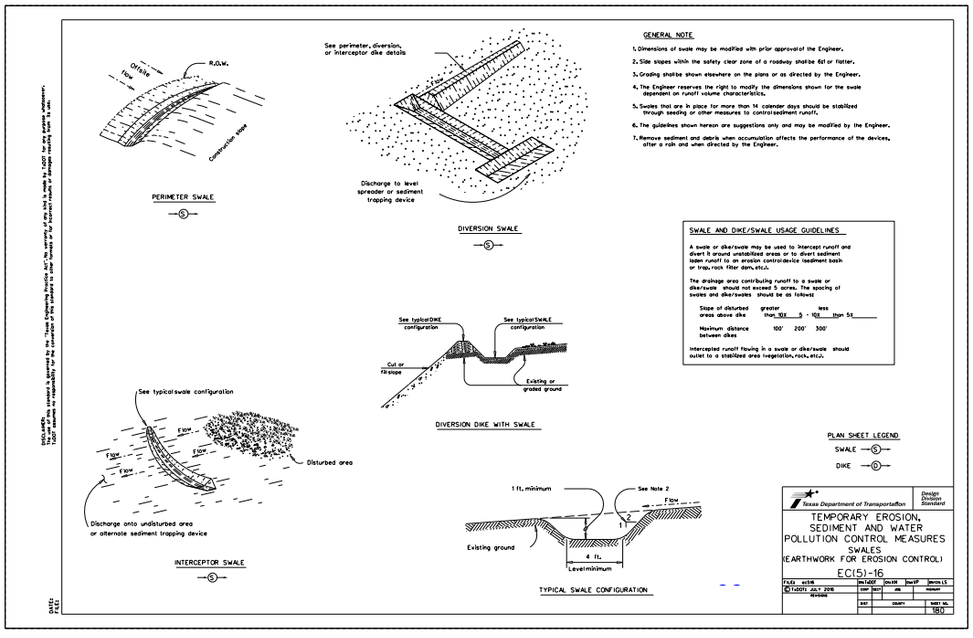
BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 179+00 TO
END OF PROJECT
SHEET 5 OF 5

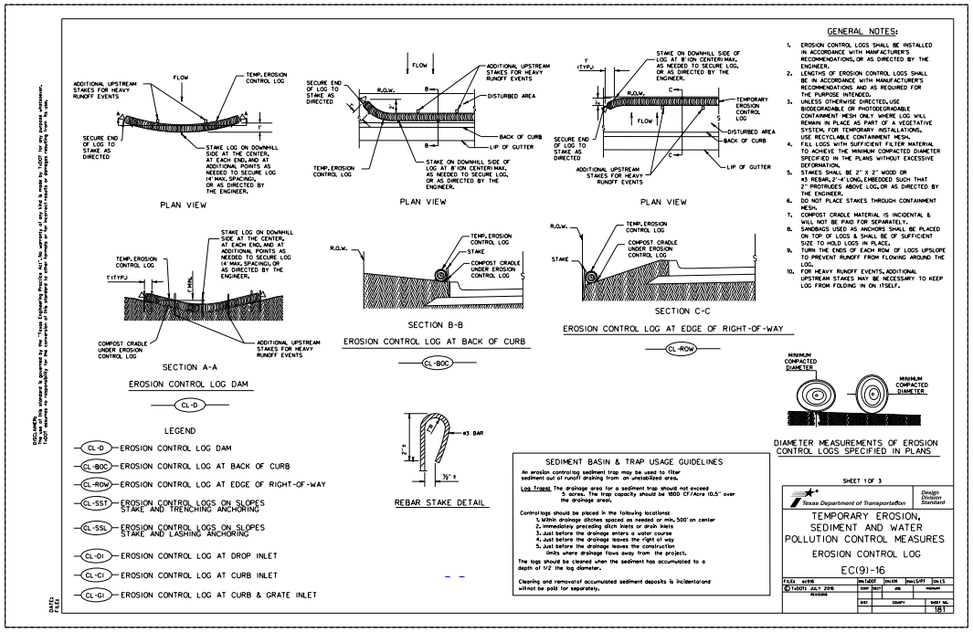
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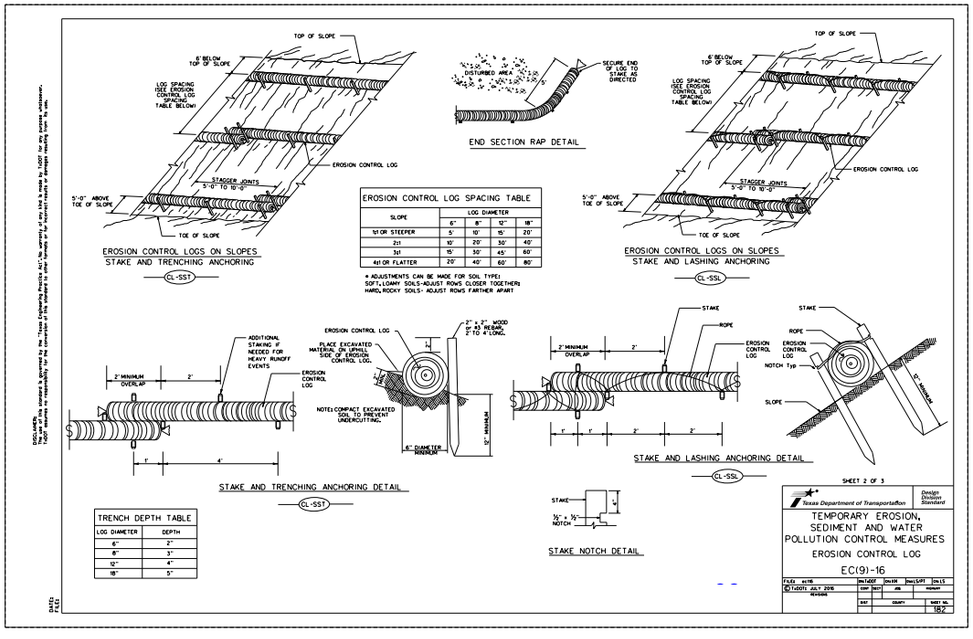

Width for payment
Unconcentrated Sheet Flow
Toe of slope
4" Min.
Native rock or other suitable material
Optional Sandbags (See Usage Guidelines)
FILTER DAM AT TOE OF SLOPE
WFD
Excavation (if shown on construction drawings)
Flow
Earth embankment
A "V" Shape may be used for higher velocity flows. (See "V" Shape Plan View below)
FILTER DAM AT SEDIMENT TRAP
WFD OR WFD
Width for Payment
2' Min.
Level Crested Weir
C
LENGTH
H
1' Min.
4" Min.
PROFILE
Ditch Flow
3:1 Max.
3:1 Max.
"V" SHAPE
PLAN VIEW
Sack Gabions
B
B
Direction of Flow
PLAN VIEW
½" Dia. Rebar Stakes
SECTION B-B
3', 6' or 9'
Galvanized Steel Wire Mesh
A
A
TYPE 4 (SACK GABIONS)
Galvanized Steel Wire Mesh
2' Dia.
SECTION A-A
Galvanized Woven wire mesh (for Types 2 & 3)
2' Min.
See Note 4
1
2
Open graded rock
Types 1 & 2 = 18"
Type 3 = 36"
4" Min.
SECTION C-C
Galvanized Woven Wire Mesh (for Types 2 & 3)
Width for payment
C
SEE NOTE 6
C
FILTER DAM AT CHANNEL SECTIONS
WFD OR WFD OR WFD
GENERAL NOTES
1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream of drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized wire mesh on the upstream face of the aggregate. The aggregate shall be placed on the mesh to the height & shape specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ⅜" dia. rebar stakes, and have a double-twisted hexagonal-weave with a nominal mesh opening of 2 ⅞" x 3 ¼".
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
ROCK FILTER DAM USAGE GUIDELINES
Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT² of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.
Type 1 (18" high with no wire mesh) (3" to 6" aggregate) Type 1 may be used at the toe of slopes, around inlets, in small ditches, and in dry or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximately 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency at low flows if called for on the plans or directed by the Engineer.
Type 2 (18" high with wire mesh) (3" to 6" aggregate) Type 2 may be used in ditches and at dike or swale outlets.
Type 3 (36" high with wire mesh) (4" to 8" aggregate) Type 3 may be used in stream flow and should be secured to the stream bed.
Type 4 (Sack gabions) (3" to 6" aggregate) Type 4 May be used in ditches and smaller channels to form an erosion control dam.
Type 5: Provide rock filter dams as shown on plans.
PLAN SHEET LEGEND
Type 1 Rock Filter Dam WFD
Type 2 Rock Filter Dam WFD
Type 3 Rock Filter Dam WFD
Type 4 Rock Filter Dam WFD
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
ROCK FILTER DAMS
EC(2)-16
FILE: ec216
DN: TxDOT
CK: TxDOT
DW: JBT
CK: JRS
DW: JP
CK:
DC&S: LS
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SHEET NO.
117
DGN: tx4ec16
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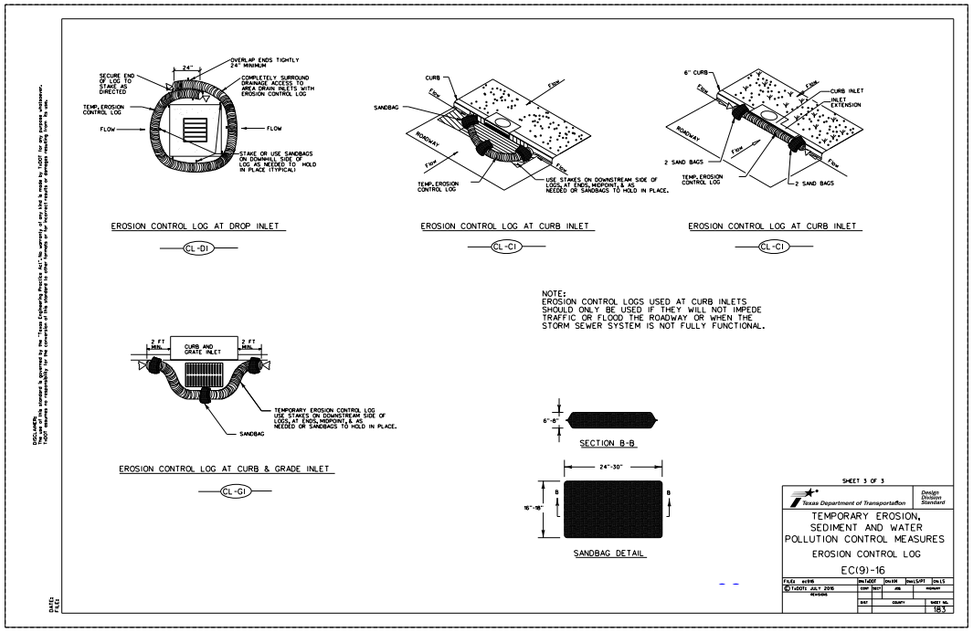

Drain to sediment trapping device
50' Min.
Coarse Aggregate
14' Min. One-way
20' Min. Two-way
PLAN VIEW
4' Min.
Approach transition
8" Min.
Foundation course 6" min.
ELEVATION VIEW
CONSTRUCTION EXIT (TYPE 1)
ROCK CONSTRUCTION ILONG TERM
10' Min.
2" X 6"
Treated timber plans
2" X 10"
Railroad ties
Typical dimensions 8" X 10" X 8'
ELEVATION VIEW
CONSTRUCTION EXIT (TYPE 2)
TIMBER CONSTRUCTION ILONG TERM
Stabilized Driveway
R.O.W.
Disturbed Soil Area
See note 2
Paved Roadway
PLAN VIEW
Disturbed soil
16 Penny Nails @ 1' on centers.
SECTION A-A
CONSTRUCTION EXIT (TYPE 3)
SHORT TERM
GENERAL NOTES (TYPE 1)
1. The length of the type 1 construction exit shallbe as indicated on the plans,but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shallbe flexible base, bituminous concrete,portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shallbe graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit,or as directed by the engineer.
GENERAL NOTES (TYPE 2)
1. The length of the type 2 construction exit shallbe as indicated on the plans,but not less than 50'.
2. The treated timber planks shallbe attached to the railroad ties with 7/2 x 6" min.lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shallbe #2 grade min., and should be free from large and loose knots.
4. The approach transitions shallbe no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shallbe flexible base, bituminous concrete,portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.
GENERAL NOTES (TYPE 3)
1. The length of the type 3 construction exit shallbe as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shallbe #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
CONSTRUCTION EXITS
EC(3)-16
FILE: ec316
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REVISIONS
DN: TxDOT
CK: TxDOT
DW: JRS
CK: MONAHY
DIST
COUNTY
SHEET NO.
118
DATE/ FILE


PERIMETER DIKE
Flow
Flow
Control discharge onto stabilized area or sediment trapping device (level spreader shown)
DIVERSION DIKE
Dike in fill operations
Dike in cut operations
Existing public traveway
Flow
Embankment area
Original ground
EMBANKMENT SECTION - DIVERSION DIKE
See typical Dike configuration
Flow
Daily embankment placement
Dike to be incorporated into next embankment lift.
Embankment Operation
INTERCEPTOR DIKE
See typical Dike configuration
Construction Zone
Flow
Flow
Discharge to perimeter diversion structure, sediment trap, or stabilized area.
TYPICAL DIKE CONFIGURATION
Top width 2' 11, Minimum
See Note 3
2
1
Height from upslope toe 18 in, Minimum
Existing or graded ground
GENERAL NOTE
1. Soil used in dike construction shall be machine compacted.
2. Top width and height of dike may be modified with prior approval of the Engineer.
3. Side slopes within the safety clear zone of a roadway shall be 6:1 or flatter.
4. Grading shall be shown elsewhere in the plans or as directed by the Engineer.
5. The Engineer reserves the right to modify the dimensions shown for the dike dependent on runoff volume characteristics.
6. Dikes that are in place for more than 14 calendar days should be stabilized to prevent sediment runoff.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Remove sediment and debris when accumulation affects the performance of the devices, after a rain and when directed by the engineer.
DIKE USAGE GUIDELINES
A Dike may be used to intercept runoff and divert it around unstabilized areas or to divert sediment laden runoff to an erosion control device (sediment basin or trap, rock filter dam, etc.).
The drainage area contributing runoff to a dike should not exceed 5 acres. The spacing of dikes should be as follows:
Slope of disturbed areas above dike: greater than 10:1 | 5 - 10:1 | less than 5:1
Maximum distance between dikes: 100' | 200' | 300'
Intercepted runoff flowing along a dike should outlet to a stabilized area (vegetation, rock, etc.).
PLANS SHEET LEGEND
DIKE
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
DIKES
(EARTHWORK FOR EROSION CONTROL)
EC(4)-16
FILE: ec416
DN: TxDOT
CK: TxDOT
DW: TxDOT
CK: TxDOT
DC&S: TxDOT
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REVISIONS
SHEET NO.
119
DATE:
FILE:


R.O.W.
Offsite flow
Construction slope
PERIMETER SWALE
See perimeter, diversion, or interceptor dike details
Flow
Discharge to level spreader or sediment trapping device
DIVERSION SWALE
See typicalDIKE configuration
See typicalSWALE configuration
Cut or fill slope
Existing or graded ground
DIVERSION DIKE WITH SWALE
See typicalswale configuration
Flow
Disturbed area
Discharge onto undisturbed area or alternate sediment trapping device
INTERCEPTOR SWALE
1 ft. minimum
See Note 2
Existing ground
4 ft.
Levelminimum
TYPICAL SWALE CONFIGURATION
GENERAL NOTE
1. Dimensions of swale may be modified with prior approval of the Engineer.
2. Side slopes within the safety clear zone of a roadway shall be 6:1 or flatter.
3. Grading shall be shown elsewhere on the plans or as directed by the Engineer.
4. The Engineer reserves the right to modify the dimensions shown for the swale dependent on runoff volume characteristics.
5. Swales that are in place for more than 14 calendar days should be stabilized through seeding or other measures to control sediment runoff.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Remove sediment and debris when accumulation affects the performance of the devices, after a rain and when directed by the Engineer.
SWALE AND DIKE/SWALE USAGE GUIDELINES
A swale or dike/swale may be used to intercept runoff and divert it around unstabilized areas or to divert sediment laden runoff to an erosion control device (sediment basin or trap, rock filter dam, etc.).
The drainage area contributing runoff to a swale or dike/swale should not exceed 5 acres. The spacing of swales and dike/swales should be as follows:
Slope of disturbed area above dike: greater than 10:1 | 5 - 10:1 | less than 5:1
Maximum distance between dikes: 100' | 200' | 300'
Intercepted runoff flowing in a swale or dike/swale should outlet to a stabilized area (vegetation, rock, etc.).
PLAN SHEET LEGEND
SWALE
DIKE
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
SWALES
(EARTHWORK FOR EROSION CONTROL)
EC(5)-16
FILE: ec516
DN:TxDOT
CK: TxDOT
DW: JOB
CK: MANUAL
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SHEET NO.
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DATE:
FILE:


ADDITIONAL UPSTREAM STAKES FOR HEAVY RUNOFF EVENTS
FLOW
TEMP. EROSION CONTROL LOG
SECURE END OF LOG TO STAKE AS DIRECTED
STAKE LOG ON DOWNHILL SIDE AT THE CENTER, AT EACH ENDS AND AT ADDITIONAL POINTS AS NEEDED TO SECURE LOG 14' MAX. SPACING, OR AS DIRECTED BY THE ENGINEER.
PLAN VIEW
SECURE END OF LOG TO STAKE AS DIRECTED
R.O.W.
ADDITIONAL UPSTREAM STAKES FOR HEAVY RUNOFF EVENTS
DISTURBED AREA
BACK OF CURB
LIP OF GUTTER
TEMP. EROSION CONTROL LOG
STAKE LOG ON DOWNHILL SIDE OF LOG AT 8'-10'± CENTERS MAX. AS NEEDED TO SECURE LOG, OR AS DIRECTED BY THE ENGINEER.
PLAN VIEW
STAKE LOG ON DOWNHILL SIDE OF LOG AT 8'-10'± CENTERS MAX. AS NEEDED TO SECURE LOG, OR AS DIRECTED BY THE ENGINEER.
TEMPORARY EROSION CONTROL LOG
DISTURBED AREA
BACK OF CURB
LIP OF GUTTER
SECURE END OF LOG TO STAKE AS DIRECTED
ADDITIONAL UPSTREAM STAKES FOR HEAVY RUNOFF EVENTS
FLOW
PLAN VIEW
STAKE LOG ON DOWNHILL SIDE AT THE CENTER, AT EACH ENDS AND AT ADDITIONAL POINTS AS NEEDED TO SECURE LOG 14' MAX. SPACING, OR AS DIRECTED BY THE ENGINEER.
TEMP. EROSION CONTROL LOG
COMPOST CRADLE UNDER EROSION CONTROL LOG
ADDITIONAL UPSTREAM STAKES FOR HEAVY RUNOFF EVENTS
SECTION A-A
EROSION CONTROL LOG DAM
CL-D
R.O.W.
TEMP. EROSION CONTROL LOG
STAKE
COMPOST CRADLE UNDER EROSION CONTROL LOG
SECTION B-B
EROSION CONTROL LOG AT BACK OF CURB
CL-BOC
R.O.W.
TEMP. EROSION CONTROL LOG
STAKE
COMPOST CRADLE UNDER EROSION CONTROL LOG
SECTION C-C
EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
CL-ROW
#3 BAR
2"±
36"±
REBAR STAKE DETAIL
MINIMUM COMPACTED DIAMETER
MINIMUM COMPACTED DIAMETER
DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS
GENERAL NOTES:
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.
LEGEND
CL-D EROSION CONTROL LOG DAM
CL-BOC EROSION CONTROL LOG AT BACK OF CURB
CL-ROW EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
CL-SST EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
CL-SSL EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
CL-DI EROSION CONTROL LOG AT DROP INLET
CL-CI EROSION CONTROL LOG AT CURB INLET
CL-GI EROSION CONTROL LOG AT CURB & GRATE INLET
SEDIMENT BASIN & TRAP USAGE GUIDELINES
An erosion controlling sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).
Control logs should be placed in the following locations:
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the projects.
The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.
Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.
SHEET 1 OF 3
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16
FILE: ec916
DN: TxDOT
CK: TxDOT
DW: KSH
CK: LAT
CK: LS
©TxDOT: JULY 2016
REVISIONS
CONT
SECT
JOB
HIGHWAY
DIST
COUNTY
SHEET NO.
181
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DATED: FEB 15


TOP OF SLOPE
6' BELOW TOP OF SLOPE
LOG SPACING (SEE EROSION CONTROL LOG SPACING TABLE BELOW)
EROSION CONTROL LOG
STAGGER JOINTS 5'-0" TO 10'-0"
5'-0" ABOVE TOE OF SLOPE
TOE OF SLOPE
EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING
CL-SST
DISTURBED AREA
SECURE END OF LOG TO STAKE AS DIRECTED
END SECTION RAP DETAIL
EROSION CONTROL LOG SPACING TABLE
SLOPE
LOG DIAMETER
6" 8" 12" 18"
1:1 OR STEEPER 5' 10' 15' 20'
2:1 10' 20' 30' 40'
3:1 15' 30' 45' 60'
4:1 OR FLATTER 20' 40' 60' 80'
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPES: SOFT, LOAMY SOILS- ADJUST ROWS CLOSER TOGETHER; HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART
EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING
CL-SSL
ADDITIONAL STAKING IF NEEDED FOR HEAVY RUNOFF EVENTS
2' MINIMUM OVERLAP
2'
EROSION CONTROL LOG
1'
4'
STAKE AND TRENCHING ANCHORING DETAIL
CL-SST
EROSION CONTROL LOG
PLACE EXCAVATED MATERIAL ON UPHILL SIDE OF EROSION CONTROL LOG.
2" x 2" WOOD or #3 REBAR 2' TO 4' LONG
NOTE: COMPACT EXCAVATED SOIL TO PREVENT UNDERCUTTING.
4" DIAMETER MINIMUM
12" MINIMUM
STAKE
ROPE
2' MINIMUM OVERLAP
2'
EROSION CONTROL LOG
1'
1'
2'
2'
STAKE AND LASHING ANCHORING DETAIL
CL-SSL
STAKE
ROPE
EROSION CONTROL LOG
NOTCH Typ
SLOPE
12" MINIMUM
TRENCH DEPTH TABLE
LOG DIAMETER DEPTH
6" 2"
8" 3"
12" 4"
18" 5"
STAKE
½" x ½" NOTCH
STAKE NOTCH DETAIL
SHEET 2 OF 3
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16
FILE: ec16
DN: TxDOT
CK:
DW:
CK:
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REVISIONS
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DATE:
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OVERLAP ENDS TIGHTLY 24" MINIMUM
SECURE END OF LOG TO STAKE AS DIRECTED
COMPLETELY SURROUND DRAINAGE ACCESS TO AREA DRAIN INLETS WITH EROSION CONTROL LOG
TEMP. EROSION CONTROL LOG
FLOW
FLOW
STAKE OR USE SANDBAGS ON DOWNHILL SIDE OF LOG AS NEEDED TO HOLD IN PLACE (TYPICAL)
EROSION CONTROL LOG AT DROP INLET
CL-D1
CURB
SANDBAG
ROADWAY
TEMP. EROSION CONTROL LOG
USE STAKES ON DOWNSTREAM SIDE OF LOGS AT ENDS, MIDPOINT & AS NEEDED OR SANDBAGS TO HOLD IN PLACE.
EROSION CONTROL LOG AT CURB INLET
CL-C1
6" CURB
CURB INLET
INLET EXTENSION
ROADWAY
2 SAND BAGS
TEMP. EROSION CONTROL LOG
2 SAND BAGS
EROSION CONTROL LOG AT CURB INLET
CL-C1
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.
2 FT MIN.
CURB AND GRATE INLET
2 FT MIN.
TEMPORARY EROSION CONTROL LOG USE STAKES ON DOWNSTREAM SIDE OF LOGS AT ENDS, MIDPOINT & AS NEEDED OR SANDBAGS TO HOLD IN PLACE.
SANDBAG
EROSION CONTROL LOG AT CURB & GRADE INLET
CL-G1
6"-8"
SECTION B-B
24"-30"
B
L
16"-18"
B
J
SANDBAG DETAIL
SHEET 3 OF 3
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16
FILE: ec916
DN:TxDOT
CK:
DW:
CK:
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REVISIONS
CONT
SECT
JOB
HIGHWAY
DIST
COUNTY
SHEET NO.
183
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DATE:
FILE:

CITY OF MIDLAND, TEXAS

Plans for the Construction of

AVALON DRIVE & BRIARWOOD AVE.
TRAFFIC SIGNAL PROJECT

MAYOR

LORI BLONG

COUNCIL MEMEBERS

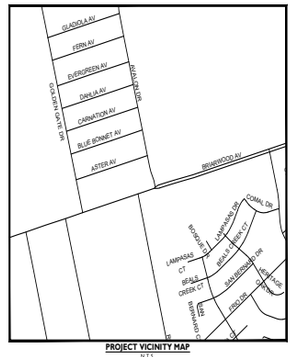
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CITY MANAGER
TOMMY GONZALEZ

ENGINEERING SERVICE DIRECTOR
GABE McCLELLAND
OFFICE: (432) 685-7983

CITY OF MIDLAND, 300 N. LORAINE ST., MIDLAND, TX 79702

100% SUBMITTAL



PROJECT VICINITY MAP
N.T.S.

MIDLAND
Engineering Services

FEBRUARY 2025

FINAL PLANS	
CONTRACTOR	
DATE CONTRACTOR BEGAN WORK	

AS BUILT	
DATE WORK WAS COMPLETED	
DATE WORK WAS ACCEPTED	
FINAL CONTRACT COST	

INDEX OF SHEET

SHEET NUMBER	SHEET TITLE
C100	COVER SHEET
C110	GENERAL NOTES
C120	QUANTITY SUMMARY
C130	CONDUIT PLANS
C131	CONDUIT TABLES
C140	SIGNAL LAYOUT PLANS
C141	SIGNAL TABLES
C150	PAVEMENT MARKING PLANS
C200	TX DOT DETAIL ED (1) - H
C201	TX DOT DETAIL ED (2) - H
C202	TX DOT DETAIL ED (3) - H
C203	TX DOT DETAIL ED (4) - H
C204	TX DOT DETAIL ED (5) - H
C205	TX DOT DETAIL ED (6) - H
C206	TX DOT DETAIL ED (7) - H
C207	TX DOT DETAIL ED (11) - H
C208	TX DOT DETAIL ED (12) - H
C209	TX DOT DETAIL RP (1) - H
C210	TX DOT DETAIL RP (2) - H
C211	TX DOT DETAIL RP (3) - H
C212	TX DOT DETAIL RP (4) - H
C213	TX DOT DETAIL SMD - TC
C214	TX DOT DETAIL PM - SD (1) - 12
C215	TX DOT DETAIL PM - SD (2) - 12
C216	TX DOT DETAIL PM - C - 12
C217	TX DOT DETAIL PM - CD(PB) - 12
C218	TX DOT DETAIL PM - D - 12
C219	TX DOT DETAIL TS - SD - 12
C220	TX DOT DETAIL SUP - A - 12
C221	TX DOT DETAIL TS - CP - 21
C222	TX DOT DETAIL PM - SPM - 21
C223	TX DOT DETAIL TS - BP - 21

ANDREW L. MELLEN, P.E.
PROJECT ENGINEER

TAHA SARKANI P.E.
CITY TRAFFIC ENGINEER, CITY OF MIDLAND

JOSE E. ORTIZ P.E.
ASSISTANT CITY ENGINEER

MAVERICK
TRANSPORTATION, LLC
TBPE FIRM #F-14642
TBPLS FIRM #10194382

Know what's below.
Call before you dig.

COVER SHEET
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF MIDLAND, MIDLAND COUNTY, TEXAS

09/30/2025

C100

PROJECT OVERVIEW

All work and materials shall conform to the Texas Department of Transportation (TxDOT) "Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges", 2024 edition, unless otherwise indicated in these plans or directed by the Engineer. All items numbers referenced in the plans refer to TxDOT specifications.

The City of Midland (City) will furnish various items to the contractor as listed under item 6RB.

Contact the Traffic Signal Shop at 432-685-7508 prior to the start of any service work to schedule a city representative to attend a pre-construction meeting.

Underground utilities may be present within the right-of-way on the project. Contact Texas 811 a minimum of two business days prior to excavating.

The locations of all signal-related items, pavement markings, signing, etc., are diagrammatic only and may be shifted to accommodate field conditions under as directed by the Engineer.

ITEM 416: DRILLED SHAFT FOUNDATIONS

Locations of foundations shown on the plans are diagrammatic only and may be shifted to meet local conditions, subject to approval by the inspector. The Contractor shall stake all foundation locations and have them approved by the inspector before excavating. The Contractor shall ensure that all poles and luminaires are clear of overhead lines and underground utilities before excavating.

The Inspector, together with the Contractor, will calculate the vertical signal head clearance before placing any traffic signal pole foundation.

The Contractor shall notify the Inspector at least 48 hours prior to forming and placing concrete for any signal pole and controller foundation. The Inspector will determine the depth of drilled shaft foundations based on the Contractor's test embedment and provide adequate notice so arrive at the job site may result in removing and replacing the foundation at the Contractor's expense.

ITEM 449: ANCHOR BOLTS

A pipe joint waterproof shim is set electrically conducting protective thread lubricant shall be used on the foundation anchor bolts for the traffic signal poles. (Crown Hardy R.S.L. (512) Kolorbe 315, Thomas & Betts Kopr-Shield, or equal).

ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING

Use Temporary Traffic Control (TTC) for this project as detailed on the latest TxDOT Barricade and Construction (BC) standard plan sheets. Work Zone standard plan sheets 'WZ (BTS-1 and BTS-2)', and as provided for in Part VI of the latest edition of the "Texas Manual on Uniform Traffic Control Devices".

In addition to the TTC and WZ standard plan sheets, install barricades and warning signs, as appropriately, to adequately warn motorists.

Existing signs are to remain as long as they do not interfere with construction and do not conflict with the traffic control plan.

Permanent signs may be installed when construction in an area is complete and they will not be in conflict with the traffic control plan for the remainder of the job.

Cover or remove any work zone signs when the work or condition referenced is not occurring.

When traffic is interrupted, arrange warning devices in accordance with examples provided in the latest edition of the "Texas Manual on Uniform Control Devices".

No work will be permitted to commence on the road before noon. Work shall be scheduled such that all machinery and/or equipment shall be away from the roadway and stored near the right-of-way line by noon. Any operations requiring lane closures shall not begin before 9:00 A.M. or continue past 4:00 P.M., unless otherwise approved by the City in advance.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets. Provide access to all driveways during all phases of construction.

Locations used for storing construction equipment and materials of any type within the right-of-way shall be approved by the inspector. Use of the right-of-way for these purposes will be restricted to locations where driver sight distance to businesses and side-street intersections is not obstructed and so other business where an unsightly appearance will not result, as determined by the inspector.

Remove any obstructions to existing drainage due to the Contractor's operations, as required, at the Contractor's expense.

ITEM 551: SIDEWALKS

The curb ramp and pedestrian pushbutton locations shown in the plans have taken into account the geometric features of the intersections, TxDOT standards, and pedestrian crossing markings. If any changes occur during construction, the location of these features must be adjusted to ensure that meets TDLR/ADAAG requirements.

ITEM 618: CONDUIT

When conduit must be placed by trenching on paved areas, cut and restore pavement in accordance with Item 400 and as shown in the plans. Cut pavement using only approved saws. Cutting and restoring pavement will not be paid for directly but will be subsidiary to this item.

Ensure only a Buy high tensile strength polyester fiber pull rope is used for pulling conductors through the PVC conduit systems.

The locations of conduit and ground boxes are diagrammatic only and may be shifted to accommodate field conditions as directed.

ITEM 620: ELECTRICAL CONDUCTORS

Terminate all electrical conductors from the controller at the termination block in the traffic signal pole hand hole whether in use or not.

All wiring not covered by the plans and specifications shall be in accordance with the National Electric Code (NEC).

When the specifications for electrical items require UL listed products, it will be construed to mean UL listed or CSA listed.

Bond together any grounding conductors that share the same conduit, junction box, ground box, or structure, at every accessible point in accordance with the National Electrical Code (NEC).

ITEM 621: TRAY CABLE

All proposed tray cable and number of conductors required shall be as shown on the plans. No splices shall be allowed.

ITEM 624: GROUND BOXES

Locations of ground boxes are approximate. Final locations will be as approved by the Inspector. Provide an apron for ground boxes as shown on plan 624(4)-14.

ITEM 628: ELECTRICAL SERVICES

Contact the Electric Utility Company (Oncor) to make all necessary arrangements to provide power for the electrical services shown on the plans in accordance with Item 628 and the Electrical Details, except that the City of Midland will make applications to the Electric Utility Company for service (See note below).

Before fabricating the electrical service, contact the City of Midland Traffic Signal Supervisor (phone 432-685-7508) to make application (billing arrangements) for service with Oncor.

Time-charge suspension due to the availability of a power shall not be considered unless all arrangements for power have been submitted within fifteen (15) days after principal work has begun.

ITEM 656: FOUNDATIONS FOR TRAFFIC CONTROL DEVICES

The foundations for the traffic signal controller is subsidiary to Item 6RB.

Locations of foundations shown on the plans are diagrammatic only and may be shifted to meet local conditions, subject to approval by the Inspector. The Contractor shall stake all foundation locations and have them approved by the Inspector before excavating. The Contractor shall ensure that all luminaires and mast arms are clear of all overhead lines and underground utilities before excavating.

The Inspector, together with the Contractor, will calculate the vertical signal head clearance before placing any traffic signal pole foundation.

Install traffic signal controller foundation to accommodate cabinet pedestal base provided by City. Extend the slab at least 36 inches beyond the pedestal base on the front and back sides of the cabinet to provide an all-weather surface at each cabinet door.

ITEM 680: INSTALLATION OF HIGHWAY TRAFFIC SIGNALS

The Project shall consist of the installation of all equipment and materials necessary for a complete traffic signal system, as follows:

1. Provide submittal literature for all traffic signal equipment before installation. Equipment will not be accepted for delivery or any payment made until the equipment, material lists, and shop drawings have been approved by the Engineer. Approval by the Engineer does not relieve the Contractor of his responsibilities to meet the requirements of the specifications and plans. All submitted literature shall be approved and one-half (½) of the furnished traffic signal equipment prior to its installation.

2. The City will furnish the following items to the Contractor for installation on this project:
   - *(1) City/Traffic detection system with VIVID cameras, cable, processor and mounting brackets.*
   - *(1) Clarecon GPS system, including cable, processor, and mounting brackets*
   - *(1) 336 S6 cabinet with associated racks*
   - *(4) Internally lighted street name (S)(W) sign*
   - *(1) R10-27k traffic sign*

   Contact the City of Midland Signal Shop at 432-685-7508 to coordinate a pick-up time for City-supplied items. Once the City has delivered the material, the Contractor shall be responsible for properly receiving and safeguarding all such items until project completion by the city.

   Contractor furnished and installed items shall include all signal and lighting poles and posts as shown in th plans, including anchor bolts, as per TxDOT specifications. The Contractor shall also furnish and install the following items as per the specifications and plans. Provide the following items:
   - *(1) Traffic signal cabinet, NEMA TS2, 16 channel, dual door*
   - *(1) Traffic signal controller, Q-Free 816-1, NEMA TS2, Type 1*
   - *(1) Malfunction management unit, 16 channel*
   - *(1) Battery backup system, self-contained in backpack cabinet.*

   The City shall furnish and install a communication radio, network switch, and related accessories after the completion of construction and activation of the signal. The Contractor shall furnish and install the CAT 5 Ethernet cable for the radio as called for in the plans.

3. The locations shown on the plans for foundations, conduit and other items may be adjusted for better fit field conditions if needed due to conflicts with utilities, as approved by the Inspector.

4. Accomplish the erection of poles and luminaires located over any overhead electrical lines using established industry and utility safety practices. Consult with the appropriate utility company before beginning such work, as needed.

5. Provide vibration dampers for mast arms 28 feet long and longer. Use dampers "(Fuller" for arms up to 40 feet long, and (4") adp" for longer mast arms. Install using Astro-Brac sign brackets, 3/4dia aluminum channel, or equal, at a maximum of 12 feet from the end of the mast arms.

6. Wire the signal installation to operate in accordance with phase diagrams in these plans. Timing and phasing will be maintained City of Midland Traffic Operations after activation of the signal. A copy of all revisions to the original timing and phasing plans shall be delivered to City of Midland Traffic Operations, and a new copy shall be placed in the controller cabinet at the completion of the project.

7. The City of Midland Signal Shop will not assume responsibility for the maintenance of the traffic signals until the project is completed and accepted.

8. Project inspection: For electrical project inspection, contact the City of Midland Signal Shop at 432-685-7508 at least 48 hours in advance of needed inspection. At the time of the final electrical inspection, the City will create a punch list of discrepancies to be corrected before signal is put into flash mode.

9. Provide qualified technician on the project site to place the traffic signal in full operation.

10. Signal Turn-On: Place the traffic signal into operation only after all required striping is complete and all conflicting signing is removed. Notify the City of Midland Signal Shop approximately 48 hours in advance of the signal turn-on. Signal technicians from the City must be present when the signals are placed in full operation. Unless otherwise directed, place the signal in full operation between 9:00 AM and 12:00 NOON on Tuesdays or Wednesdays only.

11. Two Period Set Signals. The signals shall operate continuously for a minimum of thirty (30) calendar days in a satisfactory manner. Equipment failures during these 30 days will cause the test period to start over.

    During the thirty-day test period, the City of Midland Signal Shop will be the First Responders to all trouble calls. They will, in turn, contact the Contractor. The Contractor shall:

    - Provide qualified personnel to respond to all trouble calls and diagnose and repair any malfunctions to signal equipment supplied for the project.
    - Provide a local telephone number not subject to frequent changes and available to receive calls on a 24-hour basis.
    - Respond to trouble calls within two hours. Provide trouble-shoot times but not more than 2 hours maximum.
    - Make appropriate repairs within 24 hours.
    - Place a logbook in the controller cabinet and keep a record of each trouble call reported. Notify the Engineer of each trouble call.
    - The error-log in the MMU shall not be cleared during the thirty-day test period without approval.

    If the Contractor fails to respond to trouble calls as specified, or if the equipment cannot be maintained in order to return the signals to normal operation, the City will replace the equipment with like-kind equipment until the original equipment is repaired and replaced.

ITEM 682: VEHICLE AND PEDESTRIAN SIGNAL HEADS

Provide all signal heads from the same manufacturer.

Provide all LED traffic signal lamp units with corresponding signal head components.

Vehicle signal heads shall have yellow aluminum housings with black aluminum vented back plates with a 1-4" visible yellow retro reflective border.

Pedestrian signal heads shall have yellow aluminum housing with LED "Walking Person" and "Hand" icon pedestrian signal modules with countdown feature.

Signal heads mounted on poles and mast arms shall be level and plumb and oriented as directed.

Vehicle signal heads shall be mounted using Astro-Brac mounting brackets or approved equal.

Cover all signal faces until placed in operation.

ITEM 684: TRAFFIC SIGNAL CABLES

Include service cable length in each run to provide adequate slack, at each ground box, foundation and signal head. Provide no excess 10 feet for each cable terminated in the controller cabinet. As per Section 684(1), "Cables used for inside signal heads and controllers or coils in ground boxes, on pole bases, and on span wires will not be paid for directly, but will be subsidiary to pertinent items."

Identify each cable as shown on the plans (cable 1, etc.) with plastic pre-numbered identification tags, tape or marking labels at each signal head, ground box, terminal block, pole base and controller.

All cables shall be continuous without splices from terminal point to terminal point unless otherwise directed or approved by the inspector.

All proposed signal cables and number of conductors required shall be as shown on the plans unless otherwise approved by the inspector. All proposed signal cables shall be #14 AWG stranded copper unless otherwise indicated.

Terminate all electrical conductors from the controller at the termination block in the signal pole hand hole whether in use or not.

ITEM 688: PEDESTRIAN AND VEHICLE DETECTORS

Provide Accessible Pedestrian Signal (APS) pedestrian detector units in accordance with TxDOT Departmental Materials Specification (DMS-11.02).

MAVERICK
TEXAS REGISTERED ENGINEERING FIRM F-14781
2 NW 10th St, Ste. "A", Midland, TX 79701
(432) 687-0865 FAX (432) 687-0868
CA-NV-OR-WA-HI-AZ-NM-CO-UT-WY-MT-ID-AK-TX-OK-KS-NE-SD-ND-MN-IA-MO-AR-LA-MS-AL-GA-FL-SC-NC-VA-WV-KY-TN-IL-IN-MI-OH-PA-NY-NJ-DE-MD-DC-CT-RI-MA-VT-NH-ME
CERTIFICATE OF AUTHORIZATION NO. F-14781

NO.	DESCRIPTION	DATE
1		
2		
3		
4		
5		
6		

DESIGNED BY: MAVERICK
DRAWN BY: MAVERICK
CHECKED BY: MAVERICK
APPROVED BY: MAVERICK

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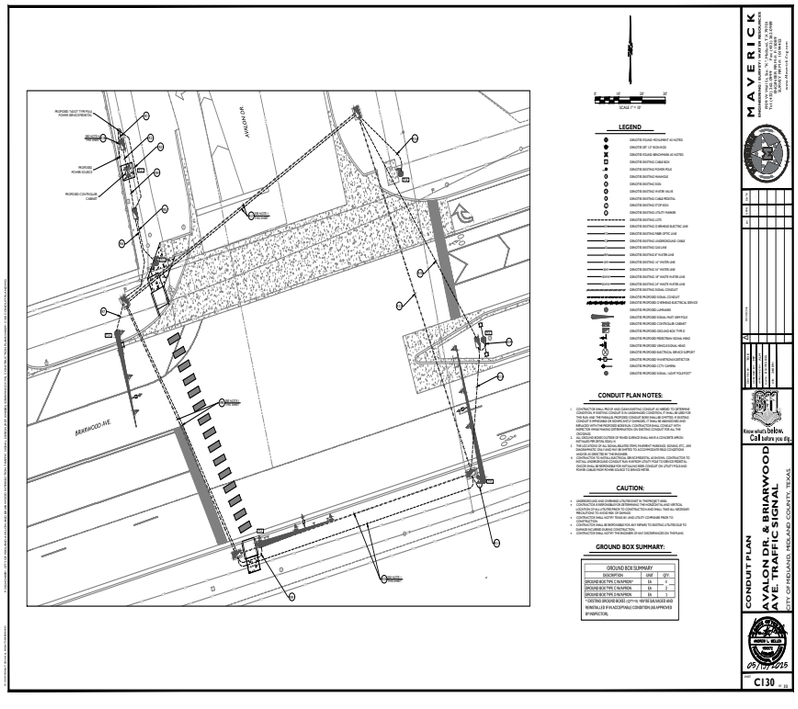
GENERAL NOTES
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF MIDLAND, MIDLAND COUNTY, TEXAS

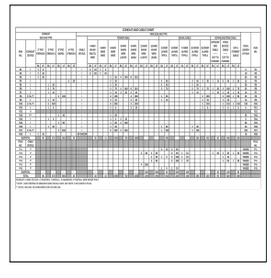
09/19/2025

SHEET C110 OF 32

ESTIMATE OF QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
416 0540	DRILL SHAFT (DRIVEN PILING) (24"D)	LF	0
416 7606	DRILL SHAFT (RT SH 71/FM 2222) (36)	LF	1056
416 7612	DRILL SHAFT (RT SH 71/FM 2222) (42)	LF	1056
416 7648	DRILL SHAFT (RT SH 71/FM 2222) (48)	LF	1320
3003 0001	TEMPORARY EROSION CONTROL (LS)	LS	1
6 0470	TY. B.W.L.P.T.W.I.M.R.A.S.S.D.M.T.E.L.E.D.	EA	2
610 7001	LIGHT POLE (TYPE SSP) (40')	EA	2
610 7003	LIGHT POLE (TYPE SSP) (50')	EA	2
610 7007	LIGHT POLE (TYPE SSP) (70')	EA	2
610 7008	LIGHT POLE (TYPE SSP) (80')	EA	2
610 7009	LIGHT POLE (TYPE SSP) (90')	EA	2
610 7010	LIGHT POLE (TYPE SSP) (100')	EA	2
610 7011	LIGHT POLE (TYPE SSP) (110')	EA	2
610 7012	LIGHT POLE (TYPE SSP) (120')	EA	2
610 7013	LIGHT POLE (TYPE SSP) (130')	EA	2
610 7014	LIGHT POLE (TYPE SSP) (140')	EA	2
610 7015	LIGHT POLE (TYPE SSP) (150')	EA	2
610 7016	LIGHT POLE (TYPE SSP) (160')	EA	2
610 7017	LIGHT POLE (TYPE SSP) (170')	EA	2
610 7018	LIGHT POLE (TYPE SSP) (180')	EA	2
610 7019	LIGHT POLE (TYPE SSP) (190')	EA	2
610 7020	LIGHT POLE (TYPE SSP) (200')	EA	2
610 7021	LIGHT POLE (TYPE SSP) (210')	EA	2
610 7022	LIGHT POLE (TYPE SSP) (220')	EA	2
610 7023	LIGHT POLE (TYPE SSP) (230')	EA	2
610 7024	LIGHT POLE (TYPE SSP) (240')	EA	2
610 7025	LIGHT POLE (TYPE SSP) (250')	EA	2
610 7026	LIGHT POLE (TYPE SSP) (260')	EA	2
610 7027	LIGHT POLE (TYPE SSP) (270')	EA	2
610 7028	LIGHT POLE (TYPE SSP) (280')	EA	2
610 7029	LIGHT POLE (TYPE SSP) (290')	EA	2
610 7030	LIGHT POLE (TYPE SSP) (300')	EA	2
610 7031	LIGHT POLE (TYPE SSP) (310')	EA	2
610 7032	LIGHT POLE (TYPE SSP) (320')	EA	2
610 7033	LIGHT POLE (TYPE SSP) (330')	EA	2
610 7034	LIGHT POLE (TYPE SSP) (340')	EA	2
610 7035	LIGHT POLE (TYPE SSP) (350')	EA	2
610 7036	LIGHT POLE (TYPE SSP) (360')	EA	2
610 7037	LIGHT POLE (TYPE SSP) (370')	EA	2
610 7038	LIGHT POLE (TYPE SSP) (380')	EA	2
610 7039	LIGHT POLE (TYPE SSP) (390')	EA	2
610 7040	LIGHT POLE (TYPE SSP) (400')	EA	2
610 7041	LIGHT POLE (TYPE SSP) (410')	EA	2
610 7042	LIGHT POLE (TYPE SSP) (420')	EA	2
610 7043	LIGHT POLE (TYPE SSP) (430')	EA	2
610 7044	LIGHT POLE (TYPE SSP) (440')	EA	2
610 7045	LIGHT POLE (TYPE SSP) (450')	EA	2
610 7046	LIGHT POLE (TYPE SSP) (460')	EA	2
610 7047	LIGHT POLE (TYPE SSP) (470')	EA	2
610 7048	LIGHT POLE (TYPE SSP) (480')	EA	2
610 7049	LIGHT POLE (TYPE SSP) (490')	EA	2
610 7050	LIGHT POLE (TYPE SSP) (500')	EA	2
610 7051	LIGHT POLE (TYPE SSP) (510')	EA	2
610 7052	LIGHT POLE (TYPE SSP) (520')	EA	2
610 7053	LIGHT POLE (TYPE SSP) (530')	EA	2
610 7054	LIGHT POLE (TYPE SSP) (540')	EA	2
610 7055	LIGHT POLE (TYPE SSP) (550')	EA	2
610 7056	LIGHT POLE (TYPE SSP) (560')	EA	2
610 7057	LIGHT POLE (TYPE SSP) (570')	EA	2
610 7058	LIGHT POLE (TYPE SSP) (580')	EA	2
610 7059	LIGHT POLE (TYPE SSP) (590')	EA	2
610 7060	LIGHT POLE (TYPE SSP) (600')	EA	2
610 7061	LIGHT POLE (TYPE SSP) (610')	EA	2
610 7062	LIGHT POLE (TYPE SSP) (620')	EA	2
610 7063	LIGHT POLE (TYPE SSP) (630')	EA	2
610 7064	LIGHT POLE (TYPE SSP) (640')	EA	2
610 7065	LIGHT POLE (TYPE SSP) (650')	EA	2
610 7066	LIGHT POLE (TYPE SSP) (660')	EA	2
610 7067	LIGHT POLE (TYPE SSP) (670')	EA	2
610 7068	LIGHT POLE (TYPE SSP) (680')	EA	2
610 7069	LIGHT POLE (TYPE SSP) (690')	EA	2
610 7070	LIGHT POLE (TYPE SSP) (700')	EA	2
610 7071	LIGHT POLE (TYPE SSP) (710')	EA	2
610 7072	LIGHT POLE (TYPE SSP) (720')	EA	2
610 7073	LIGHT POLE (TYPE SSP) (730')	EA	2
610 7074	LIGHT POLE (TYPE SSP) (740')	EA	2
610 7075	LIGHT POLE (TYPE SSP) (750')	EA	2
610 7076	LIGHT POLE (TYPE SSP) (760')	EA	2
610 7077	LIGHT POLE (TYPE SSP) (770')	EA	2
610 7078	LIGHT POLE (TYPE SSP) (780')	EA	2
610 7079	LIGHT POLE (TYPE SSP) (790')	EA	2
610 7080	LIGHT POLE (TYPE SSP) (800')	EA	2
610 7081	LIGHT POLE (TYPE SSP) (810')	EA	2
610 7082	LIGHT POLE (TYPE SSP) (820')	EA	2
610 7083	LIGHT POLE (TYPE SSP) (830')	EA	2
610 7084	LIGHT POLE (TYPE SSP) (840')	EA	2
610 7085	LIGHT POLE (TYPE SSP) (850')	EA	2
610 7086	LIGHT POLE (TYPE SSP) (860')	EA	2
610 7087	LIGHT POLE (TYPE SSP) (870')	EA	2
610 7088	LIGHT POLE (TYPE SSP) (880')	EA	2
610 7089	LIGHT POLE (TYPE SSP) (890')	EA	2
610 7090	LIGHT POLE (TYPE SSP) (900')	EA	2
610 7091	LIGHT POLE (TYPE SSP) (910')	EA	2
610 7092	LIGHT POLE (TYPE SSP) (920')	EA	2
610 7093	LIGHT POLE (TYPE SSP) (930')	EA	2
610 7094	LIGHT POLE (TYPE SSP) (940')	EA	2
610 7095	LIGHT POLE (TYPE SSP) (950')	EA	2
610 7096	LIGHT POLE (TYPE SSP) (960')	EA	2
610 7097	LIGHT POLE (TYPE SSP) (970')	EA	2
610 7098	LIGHT POLE (TYPE SSP) (980')	EA	2
610 7099	LIGHT POLE (TYPE SSP) (990')	EA	2
610 7100	LIGHT POLE (TYPE SSP) (1000')	EA	2
610 7101	LIGHT POLE (TYPE SSP) (1010')	EA	2
610 7102	LIGHT POLE (TYPE SSP) (1020')	EA	2
610 7103	LIGHT POLE (TYPE SSP) (1030')	EA	2
610 7104	LIGHT POLE (TYPE SSP) (1040')	EA	2
610 7105	LIGHT POLE (TYPE SSP) (1050')	EA	2
610 7106	LIGHT POLE (TYPE SSP) (1060')	EA	2
610 7107	LIGHT POLE (TYPE SSP) (1070')	EA	2
610 7108	LIGHT POLE (TYPE SSP) (1080')	EA	2
610 7109	LIGHT POLE (TYPE SSP) (1090')	EA	2
610 7110	LIGHT POLE (TYPE SSP) (1100')	EA	2
610 7111	LIGHT POLE (TYPE SSP) (1110')	EA	2
610 7112	LIGHT POLE (TYPE SSP) (1120')	EA	2
610 7113	LIGHT POLE (TYPE SSP) (1130')	EA	2
610 7114	LIGHT POLE (TYPE SSP) (1140')	EA	2
610 7115	LIGHT POLE (TYPE SSP) (1150')	EA	2
610 7116	LIGHT POLE (TYPE SSP) (1160')	EA	2
610 7117	LIGHT POLE (TYPE SSP) (1170')	EA	2
610 7118	LIGHT POLE (TYPE SSP) (1180')	EA	2
610 7119	LIGHT POLE (TYPE SSP) (1190')	EA	2
610 7120	LIGHT POLE (TYPE SSP) (1200')	EA	2
610 7121	LIGHT POLE (TYPE SSP) (1210')	EA	2
610 7122	LIGHT POLE (TYPE SSP) (1220')	EA	2
610 7123	LIGHT POLE (TYPE SSP) (1230')	EA	2
610 7124	LIGHT POLE (TYPE SSP) (1240')	EA	2
610 7125	LIGHT POLE (TYPE SSP) (1250')	EA	2
610 7126	LIGHT POLE (TYPE SSP) (1260')	EA	2
610 7127	LIGHT POLE (TYPE SSP) (1270')	EA	2
610 7128	LIGHT POLE (TYPE SSP) (1280')	EA	2
610 7129	LIGHT POLE (TYPE SSP) (1290')	EA	2
610 7130	LIGHT POLE (TYPE SSP) (1300')	EA	2
610 7131	LIGHT POLE (TYPE SSP) (1310')	EA	2
610 7132	LIGHT POLE (TYPE SSP) (1320')	EA	2
610 7133	LIGHT POLE (TYPE SSP) (1330')	EA	2
610 7134	LIGHT POLE (TYPE SSP) (1340')	EA	2
610 7135	LIGHT POLE (TYPE SSP) (1350')	EA	2
610 7136	LIGHT POLE (TYPE SSP) (1360')	EA	2
610 7137	LIGHT POLE (TYPE SSP) (1370')	EA	2
610 7138	LIGHT POLE (TYPE SSP) (1380')	EA	2
610 7139	LIGHT POLE (TYPE SSP) (1390')	EA	2
610 7140	LIGHT POLE (TYPE SSP) (1400')	EA	2
610 7141	LIGHT POLE (TYPE SSP) (1410')	EA	2
610 7142	LIGHT POLE (TYPE SSP) (1420')	EA	2
610 7143	LIGHT POLE (TYPE SSP) (1430')	EA	2
610 7144	LIGHT POLE (TYPE SSP) (1440')	EA	2
610 7145	LIGHT POLE (TYPE SSP) (1450')	EA	2
610 7146	LIGHT POLE (TYPE SSP) (1460')	EA	2
610 7147	LIGHT POLE (TYPE SSP) (1470')	EA	2
610 7148	LIGHT POLE (TYPE SSP) (1480')	EA	2
610 7149	LIGHT POLE (TYPE SSP) (1490')	EA	2
610 7150	LIGHT POLE (TYPE SSP) (1500')	EA	2
610 7151	LIGHT POLE (TYPE SSP) (1510')	EA	2
610 7152	LIGHT POLE (TYPE SSP) (1520')	EA	2
610 7153	LIGHT POLE (TYPE SSP) (1530')	EA	2
610 7154	LIGHT POLE (TYPE SSP) (1540')	EA	2
610 7155	LIGHT POLE (TYPE SSP) (1550')	EA	2
610 7156	LIGHT POLE (TYPE SSP) (1560')	EA	2
610 7157	LIGHT POLE (TYPE SSP) (1570')	EA	2
610 7158	LIGHT POLE (TYPE SSP) (1580')	EA	2
610 7159	LIGHT POLE (TYPE SSP) (1590')	EA	2
610 7160	LIGHT POLE (TYPE SSP) (1600')	EA	2
610 7161	LIGHT POLE (TYPE SSP) (1610')	EA	2
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610 7165	LIGHT POLE (TYPE SSP) (1650')	EA	2
610 7166	LIGHT POLE (TYPE SSP) (1660')	EA	2
610 7167	LIGHT POLE (TYPE SSP) (1670')	EA	2
610 7168	LIGHT POLE (TYPE SSP) (1680')	EA	2
610 7169	LIGHT POLE (TYPE SSP) (1690')	EA	2
610 7170	LIGHT POLE (TYPE SSP) (1700')	EA	2
610 7171	LIGHT POLE (TYPE SSP) (1710')	EA	2
610 7172	LIGHT POLE (TYPE SSP) (1720')	EA	2
610 7173	LIGHT POLE (TYPE SSP) (1730')	EA	2
610 7174	LIGHT POLE (TYPE SSP) (1740')	EA	2
610 7175	LIGHT POLE (TYPE SSP) (1750')	EA	2
610 7176	LIGHT POLE (TYPE SSP) (1760')	EA	2
610 7177	LIGHT POLE (TYPE SSP) (1770')	EA	2
610 7178	LIGHT POLE (TYPE SSP) (1780')	EA	2
610 7179	LIGHT POLE (TYPE SSP) (1790')	EA	2
610 7180	LIGHT POLE (TYPE SSP) (1800')	EA	2
610 7181	LIGHT POLE (TYPE SSP) (1810')	EA	2
610 7182	LIGHT POLE (TYPE SSP) (1820')	EA	2
610 7183	LIGHT POLE (TYPE SSP) (1830')	EA	2
610 7184	LIGHT POLE (TYPE SSP) (1840')	EA	2
610 7185	LIGHT POLE (TYPE SSP) (1850')	EA	2
610 7186	LIGHT POLE (TYPE SSP) (1860')	EA	2
610 7187	LIGHT POLE (TYPE SSP) (1870')	EA	2
610 7188	LIGHT POLE (TYPE SSP) (1880')	EA	2
610 7189	LIGHT POLE (TYPE SSP) (1890')	EA	2
610 7190	LIGHT POLE (TYPE SSP) (1900')	EA	2
610 7191	LIGHT POLE (TYPE SSP) (1910')	EA	2
610 7192	LIGHT POLE (TYPE SSP) (1920')	EA	2
610 7193	LIGHT POLE (TYPE SSP) (1930')	EA	2
610 7194	LIGHT POLE (TYPE SSP) (1940')	EA	2
610 7195	LIGHT POLE (TYPE SSP) (1950')	EA	2
610 7196	LIGHT POLE (TYPE SSP) (1960')	EA	2
610 7197	LIGHT POLE (TYPE SSP) (1970')	EA	2
610 7198	LIGHT POLE (TYPE SSP) (1980')	EA	2
610 7199	LIGHT POLE (TYPE SSP) (1990')	EA	2
610 7200	LIGHT POLE (TYPE SSP) (2000')	EA	2
610 7201	LIGHT POLE (TYPE SSP) (2010')	EA	2
610 7202	LIGHT POLE (TYPE SSP) (2020')	EA	2
610 7203	LIGHT POLE (TYPE SSP) (2030')	EA	2
610 7204	LIGHT POLE (TYPE SSP) (2040')	EA	2
610 7205	LIGHT POLE (TYPE SSP) (2050')	EA	2
610 7206	LIGHT POLE (TYPE SSP) (2060')	EA	2
610 7207	LIGHT POLE (TYPE SSP) (2070')	EA	2
610 7208	LIGHT POLE (TYPE SSP) (2080')	EA	2
610 7209	LIGHT POLE (TYPE SSP) (2090')	EA	2
610 7210	LIGHT POLE (TYPE SSP) (2100')	EA	2
610 7211	LIGHT POLE (TYPE SSP) (2110')	EA	2
610 7212	LIGHT POLE (TYPE SSP) (2120')	EA	2
610 7213	LIGHT POLE (TYPE SSP) (2130')	EA	2
610 7214	LIGHT POLE (TYPE SSP) (2140')	EA	2
610 7215	LIGHT POLE (TYPE SSP) (2150')	EA	2
610 7216	LIGHT POLE (TYPE SSP) (2160')	EA	2
610 7217	LIGHT POLE (TYPE SSP) (2170')	EA	2
610 7218	LIGHT POLE (TYPE SSP) (2180')	EA	2
610 7219	LIGHT POLE (TYPE SSP) (2190')	EA	2
610 7220	LIGHT POLE (TYPE SSP) (2200')	EA	2
610 7221	LIGHT POLE (TYPE SSP) (2210')	EA	2
610 7222	LIGHT POLE (TYPE SSP) (2220')	EA	2
610 7223	LIGHT POLE (TYPE SSP) (2230')	EA	2
610 7224	LIGHT POLE (TYPE SSP) (2240')	EA	2
610 7225	LIGHT POLE (TYPE SSP) (2250')	EA	2
610 7226	LIGHT POLE (TYPE SSP) (2260')	EA	2
610 7227	LIGHT POLE (TYPE SSP) (2270')	EA	2
610 7228	LIGHT POLE (TYPE SSP) (2280')	EA	2
610 7229	LIGHT POLE (TYPE SSP) (2290')	EA	2
610 7230	LIGHT POLE (TYPE SSP) (2300')	EA	2
610 7231	LIGHT POLE (TYPE SSP) (2310')	EA	2
610 7232	LIGHT POLE (TYPE SSP) (2320')	EA	2
610 7233	LIGHT POLE (TYPE SSP) (2330')	EA	2
610 7234	LIGHT POLE (TYPE SSP) (2340')	EA	2
610 7235	LIGHT POLE (TYPE SSP) (2350')	EA	2
610 7236	LIGHT POLE (TYPE SSP) (2360')	EA	2
610 7237	LIGHT POLE (TYPE SSP) (2370')	EA	2
610 7238	LIGHT POLE (TYPE SSP) (2380')	EA	2
610 7239	LIGHT POLE (TYPE SSP) (2390')	EA	2
610 7240	LIGHT POLE (TYPE SSP) (2400')	EA	2
610 7241	LIGHT POLE (TYPE SSP) (2410')	EA	2
610 7242	LIGHT POLE (TYPE SSP) (2420')	EA	2
610 7243	LIGHT POLE (TYPE SSP) (2430')	EA	2
610 7244	LIGHT POLE (TYPE SSP) (2440')	EA	2
610 7245	LIGHT POLE (TYPE SSP) (2450')	EA	2
610 7246	LIGHT POLE (TYPE SSP) (2460')	EA	2
610 7247	LIGHT POLE (TYPE SSP) (2470')	EA	2
610 7248	LIGHT POLE (TYPE SSP) (2480')	EA	2
610 7249	LIGHT POLE (TYPE SSP) (2490')	EA	2
610 7250	LIGHT POLE (TYPE SSP) (2500')	EA	2
610 7251	LIGHT POLE (TYPE SSP) (2510')	EA	2
610 7252	LIGHT POLE (TYPE SSP) (2520')	EA	2
610 7253	LIGHT POLE (TYPE SSP) (2530')	EA	2
610 7254	LIGHT POLE (TYPE SSP) (2540')	EA	2
610 7255	LIGHT POLE (TYPE SSP) (2550')	EA	2
610 7256	LIGHT POLE (TYPE SSP) (2560')	EA	2
610 7257	LIGHT POLE (TYPE SSP) (2570')	EA	2
610 7258	LIGHT POLE (TYPE SSP) (2580')	EA	2
610 7259	LIGHT POLE (TYPE SSP) (2590')	EA	2
610 7260	LIGHT POLE (TYPE SSP) (2600')	EA	2
610 7261	LIGHT POLE (TYPE SSP) (2610')	EA	2
610 7262	LIGHT POLE (TYPE SSP) (2620')	EA	2
610 7263	LIGHT POLE (TYPE SSP) (2630')	EA	2
610 7264	LIGHT POLE (TYPE SSP) (2640')	EA	2
610 7265	LIGHT POLE (TYPE SSP) (2650')	EA	2
610 7266	LIGHT POLE (TYPE SSP) (2660')	EA	2
610 7267	LIGHT POLE (TYPE SSP) (2670')	EA	2
610 7268	LIGHT POLE (TYPE SSP) (2680')	EA	2
610 7269	LIGHT POLE (TYPE SSP) (2690')	EA	2
610 7270	LIGHT POLE (TYPE SSP) (2700')	EA	2
610 7271	LIGHT POLE (TYPE SSP) (2710')	EA	2
610 7272	LIGHT POLE (TYPE SSP) (2720')	EA	2
610 7273	LIGHT POLE (TYPE SSP) (2730')	EA	2
610 7274	LIGHT POLE (TYPE SSP) (2740')	EA	2
610 7275	LIGHT POLE (TYPE SSP) (2750')	EA	2
610 7276	LIGHT POLE (TYPE SSP) (2760')	EA	2
610 7277	LIGHT POLE (TYPE SSP) (2770')	EA	2
610 7278	LIGHT POLE (TYPE SSP) (2780')	EA	2
610 7279	LIGHT POLE (TYPE SSP) (2790')	EA	2
610 7280	LIGHT POLE (TYPE SSP) (2800')	EA	2
610 7281	LIGHT POLE (TYPE SSP) (2810')	EA	2
610 7282	LIGHT POLE (TYPE SSP) (2820')	EA	2
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610 7284	LIGHT POLE (TYPE SSP) (2840')	EA	2
610 7285	LIGHT POLE (TYPE SSP) (2850')	EA	2
610 7286	LIGHT POLE (TYPE SSP) (2860')	EA	2
610 7287	LIGHT POLE (TYPE SSP) (2870')	EA	2
610 7288	LIGHT POLE (TYPE SSP) (2880')	EA	2
610 7289	LIGHT POLE (TYPE SSP) (2890')	EA	2
610 7290	LIGHT POLE (TYPE SSP) (2900')	EA	2
610 7291	LIGHT POLE (TYPE SSP) (2910')	EA	2
610 7292	LIGHT POLE (TYPE SSP) (2920')	EA	2
610 7293	LIGHT POLE (TYPE SSP) (2930')	EA	2
610 7294	LIGHT POLE (TYPE SSP) (2940')	EA	2
610 7295	LIGHT POLE (TYPE SSP) (2950')	EA	2
610 7296	LIGHT POLE (TYPE SSP) (2960')	EA	2
610 7297	LIGHT POLE (TYPE SSP) (2970')	EA	2
610 7298	LIGHT POLE (TYPE SSP) (2980')	EA	2
610 7299	LIGHT POLE (TYPE SSP) (2990')	EA	2
610 7300	LIGHT POLE (TYPE SSP) (3000')	EA	2
610 7301	LIGHT POLE (TYPE SSP) (3010')	EA	2
610 7302	LIGHT POLE (TYPE SSP) (3020')	EA	2
610 7303	LIGHT POLE (TYPE SSP) (3030')	EA	2
610 7304	LIGHT POLE (TYPE SSP) (3040')	EA	2
610 7305	LIGHT POLE (TYPE SSP) (3050')	EA	2
610 7306	LIGHT POLE (TYPE SSP) (3060')	EA	2
610 7307	LIGHT POLE (TYPE SSP) (3070')	EA	2
610 7308	LIGHT POLE (TYPE SSP) (3080')	EA	2
610 7309	LIGHT POLE (TYPE SSP) (3090')	EA	2
610 7310	LIGHT POLE (TYPE SSP) (3100')	EA	2
610 7311	LIGHT POLE (TYPE SSP) (3110')	EA	2
610 7312	LIGHT POLE (TYPE SSP) (3120')	EA	2
610 7313	LIGHT POLE (TYPE SSP) (3130')	EA	2
610 7314	LIGHT POLE (TYPE SSP) (3140')	EA	2
610 7315	LIGHT POLE (TYPE SSP) (3150')	EA	2
610 7316	LIGHT POLE (TYPE SSP) (3160')	EA	2
610 7317	LIGHT POLE (TYPE SSP) (3170')	EA	2
610 7318	LIGHT POLE (TYPE SSP) (3180')	EA	2
610 7319	LIGHT POLE (TYPE SSP) (3190')	EA	2
610 7320	LIGHT POLE (TYPE SSP) (3200')	EA	2
610 7321	LIGHT POLE (TYPE SSP) (3210')	EA	2
610 7322	LIGHT POLE (TYPE SSP) (3220')	EA	2
610 7323	LIGHT POLE (TYPE SSP) (3230')	EA	2
610 7324	LIGHT POLE (TYPE SSP) (3240')	EA	2
610 7325	LIGHT POLE (TYPE SSP) (3250')	EA	2
610 7326	LIGHT POLE (TYPE SSP) (3260')	EA	2
610 7327	LIGHT POLE (TYPE SSP) (3270')	EA	2
610 7328	LIGHT POLE (TYPE SSP) (3280')	EA	2
610 7329	LIGHT POLE (TYPE SSP) (3290')	EA	2
610 7330	LIGHT POLE (TYPE SSP) (3300')	EA	2
610 7331	LIGHT POLE (TYPE SSP) (3310')	EA	2
610 7332	LIGHT POLE (TYPE SSP) (3320')	EA	2
610 7333	LIGHT POLE (TYPE SSP) (3330')	EA	2
610 7334	LIGHT POLE (TYPE SSP) (3340')	EA	2
610 7335	LIGHT POLE (TYPE SSP) (3350')	EA	2
610 7336	LIGHT POLE (TYPE SSP) (3360')	EA	2
610 7337	LIGHT POLE (TYPE SSP) (3370')	EA	2
610 7338	LIGHT POLE (TYPE SSP) (3380')	EA	2
610 7339	LIGHT POLE (TYPE SSP) (3390')	EA	2
610 7340	LIGHT POLE (TYPE SSP) (3400')	EA	2
610 7341	LIGHT POLE (TYPE SSP) (3410')	EA	2
610 7342	LIGHT POLE (TYPE SSP) (3420')	EA	2
610 7343	LIGHT POLE (TYPE SSP) (3430')	EA	2
610 7344	LIGHT POLE (TYPE SSP) (3440')	EA	2
610 7345	LIGHT POLE (TYPE SSP) (3450')	EA	2
610 7346	LIGHT POLE (TYPE SSP) (3460')	EA	2
610 7347	LIGHT POLE (TYPE SSP) (3470')	EA	2
610 7348	LIGHT POLE (TYPE SSP) (3480')	EA	2
610 7349	LIGHT POLE (TYPE SSP) (3490')	EA	2
610 7350	LIGHT POLE (TYPE SSP) (3500')	EA	2
610 7351	LIGHT POLE (TYPE SSP) (3510')	EA	2
610 7352	LIGHT POLE (TYPE SSP) (3520')	EA	2
610 7353	LIGHT POLE (TYPE SSP) (3530')	EA	2
610 7354	LIGHT POLE (TYPE SSP) (3540')	EA	2
610 7355	LIGHT POLE (TYPE SSP) (3550')	EA	2
610 7356	LIGHT POLE (TYPE SSP) (3560')	EA	2
610 7357	LIGHT POLE (TYPE SSP) (3570')	EA	2
610 7358	LIGHT POLE (TYPE SSP) (3580')	EA	2
610 7359	LIGHT POLE (TYPE SSP) (3590')	EA	2
610 7360	LIGHT POLE (TYPE SSP) (3600')	EA	2
610 7361	LIGHT POLE (TYPE SSP) (3610')	EA	2
610 7362	LIGHT POLE (TYPE SSP) (3620')	EA	2
610 7363	LIGHT POLE (TYPE SSP) (3630')	EA	2
610 7364	LIGHT POLE (TYPE SSP) (3640')	EA	2
610 7365	LIGHT POLE (TYPE SSP) (3650')	EA	2
610 7366	LIGHT POLE (TYPE SSP) (3660')	EA	2
610 7367	LIGHT POLE (TYPE SSP) (3670')	EA	2
610 7368	LIGHT POLE (TYPE SSP) (3680')	EA	2
610 7369	LIGHT POLE (TYPE SSP) (3690')	EA	2
610 7370	LIGHT POLE (TYPE SSP) (3700')	EA	2
610 7371	LIGHT POLE (TYPE SSP) (3710')	EA	2
610 7372	LIGHT POLE (TYPE SSP) (3720')	EA	2
610 7373	LIGHT POLE (TYPE SSP) (3730')	EA	2
610 7374	LIGHT POLE (TYPE SSP) (3740')	EA	2
610 7375	LIGHT POLE (TYPE SSP) (3750')	EA	2
610 7376	LIGHT POLE (TYPE SSP) (3760')	EA	2
610 7377	LIGHT POLE (TYPE SSP) (3770')	EA	2
610 7378	LIGHT POLE (TYPE SSP) (3780')	EA	2
610 7379	LIGHT POLE (TYPE SSP) (3790')	EA	2
610 7380	LIGHT POLE (TYPE SSP) (3800')	EA	2
610 7381	LIGHT POLE (TYPE SSP) (3810')	EA	2
610 7382	LIGHT POLE (TYPE SSP) (3820')	EA	2
610 7383	LIGHT POLE (TYPE SSP) (3830')	EA	2
610 7384	LIGHT POLE (TYPE SSP) (3840')	EA	2
610 7385	LIGHT POLE (TYPE SSP) (3850')	EA	2
610 7386	LIGHT POLE (TYPE SSP) (3860')	EA	2
610 7387	LIGHT POLE (TYPE SSP) (3870')	EA	2
610 7388	LIGHT POLE (TYPE SSP) (3880')	EA	2
610 7389	LIGHT POLE (TYPE SSP) (3890')	EA	2
610 7390	LIGHT POLE (TYPE SSP) (3900')	EA	2
610 7391	LIGHT POLE (TYPE SSP) (3910')	EA	2
610 7392	LIGHT POLE (TYPE SSP) (3920')	EA	2
610 7393	LIGHT POLE (TYPE SSP) (3930')	EA	2
610 7394	LIGHT POLE (TYPE SSP) (3940')	EA	2
610 7395	LIGHT POLE (TYPE SSP) (3950')	EA	2
610 7396	LIGHT POLE (TYPE SSP) (3960')	EA	2
610 7397	LIGHT POLE (TYPE SSP) (3970')	EA	2
610 7398	LIGHT POLE (TYPE SSP) (3980')	EA	2
610 7399	LIGHT POLE (TYPE SSP) (3990')	EA	2
610 7400	LIGHT POLE (TYPE SSP) (4000')	EA	2
610 7401	LIGHT POLE (TYPE SSP) (4010')	EA	2
610 7402	LIGHT POLE (TYPE SSP) (4020')	EA	2
610 7403	LIGHT POLE (TYPE SSP) (4030')	EA	2
610 7404	LIGHT POLE (TYPE SSP) (4040')	EA	2
610 7405	LIGHT POLE (TYPE SSP) (4050')	EA	2
610 7406	LIGHT POLE (TYPE SSP) (4060')	EA	2
610 7407	LIGHT POLE (TYPE SSP) (4070')	EA	2
610 7408	LIGHT POLE (TYPE SSP) (4080')	EA	2
610 7409	LIGHT POLE (TYPE SSP) (4090')	EA	2
610 7410	LIGHT POLE (TYPE SSP) (4100')	EA	2
610 7411	LIGHT POLE (TYPE SSP) (4110')	EA	2
610 7412	LIGHT POLE (TYPE SSP) (4120')	EA	2
610 7413	LIGHT POLE (TYPE SSP) (4130')	EA	2
610 7414	LIGHT POLE (TYPE SSP) (4140')	EA	2
610 7415	LIGHT POLE (TYPE SSP) (4150')	EA	2
610 7416	LIGHT POLE (TYPE SSP) (4160')	EA	2
610 7417	LIGHT POLE (TYPE SSP) (4170')	EA	2
610 7418	LIGHT POLE (TYPE SSP) (4180')	EA	2
610 7419	LIGHT POLE (TYPE SSP


AVALON DR
BRIARWOOD AVE
LEGEND
CONDUIT PLAN NOTES
CAUTION:
GROUND BOX SUMMARY:
GROUND BOX SUMMARY
DESCRIPTION
UNIT
QTY.
GROUND BOX TYPE 3 (NAMPER)
Ea.
4
GROUND BOX TYPE 5 (NAMPER)
Ea.
2
GROUND BOX TYPE 7 (NAMPER)
Ea.
1
MAVERICK
CONDUIT PLAN
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLANDS RANCH, DOUGLAS COUNTY, COLORADO
05/19/2025
C130



HOME RUN CABLE TERMINATION CHART

CNDR NO.	CONDUCTOR COLOR	CABLE 1 to MMU (CHOOSE ONE) N to N/TB	CABLE 2 to MMU (CHOOSE ONE) N to N/TB	CABLE 3 to MMU (CHOOSE ONE) N to N/TB	CABLE 4 to MMU (CHOOSE ONE) N to N/TB	CABLE 5 to MMU (CHOOSE ONE) N to N/TB
1	BLACK	SPARE	SPARE	SPARE	SPARE	SPARE
2	WHITE	SH CDH	SH CDH	SH CDH	SH CDH	SH CDH
3	RED	SH C SH A	SH 1,2,3 SH 1,2,3	SH 1,2,3 SH 1,2,3	SH 1,2,3,4,5 SH 1,2,3,4,5	SH 4 SH 4
4	GREEN	SH C SH A	SH 1,2,3 SH 1,2,3	SH 1,2,3 SH 1,2,3	SH 1,2,3,4,5 SH 1,2,3,4,5	SH 4 SH 4
5	ORANGE	SPARE	SH 1,2,3 SH1	SH 1,2,3 SH1	SH 1,2,3,4,5 SH1	SPARE
6	BLUE	SPARE	SPARE	SPARE	SPARE	SPARE
7	WHITE/BLACK	SPARE	SPARE	SPARE	SPARE	SPARE
8	RED/BLACK	SH C SH AM	SPARE	SPARE	SPARE	SPARE
9	GREEN/BLACK	SH C SH A	SH 1 SH 1	SH1 SH 1 ETC.	SPARE	SPARE
10	ORANGE/BLACK	SPARE	SH 1 SH 1	SH1 CLA1%	SPARE	SPARE
11	BLUE/BLACK				SPARE	SPARE
12	BLUE/WHITE				SPARE	SH 1/2 SLC 1/2
13	RED/WHITE				SPARE SH AM	SH 1/2 ST 1/2
14	GREEN/WHITE				SPARE SH AM	SH 1/2 ST 1/2
15	BLUE/WHITE				SPARE	SH 1/2 ST 1/2
16	BLACK/RED				SPARE	SPARE
17	WHITE/RED				SPARE	SPARE
18	ORANGE/RED				SPARE	SPARE
19	BLUE/RED				SPARE	SPARE
20	RED/GREEN				SPARE	SPARE

NOTE: ACTUAL CABLES MAY VARY.

NOTE: INDICATIONS, CABLES FROM CONTROLLER CABINET(CPOS20P1) (CABLE#5), PLACED #10 POWERPOST BOTTOMS.

MAVERICK
TRAFFIC SYSTEMS, INC.
2501 W. Hwy 6 & Rte. 14 • Fairfield, IL 62837
618-847-7000 • Fax 618-847-7001
Toll Free 800-252-3741
E-MAIL: mail@maverick-inc.com
WEBSITE: www.maverick-inc.com

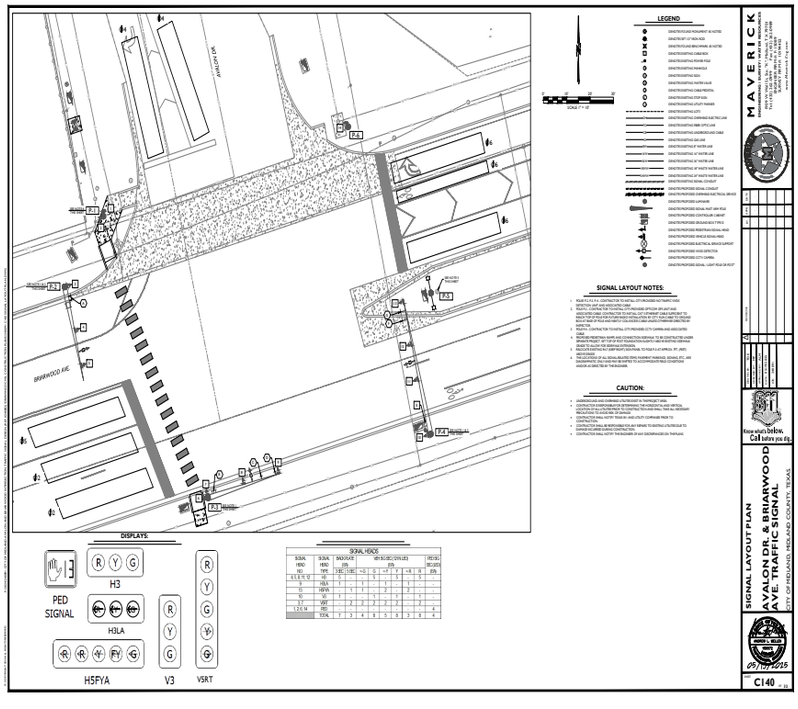
NO.	DATE	BY	DESCRIPTION
1	05/19/2025		

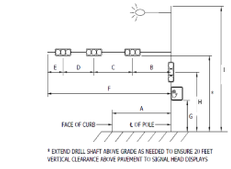
Know what's below.
Call before you dig.

CONDUIT TABLES
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND, MADISON COUNTY, ILLINOIS

05/19/2025

CI31 of 33


AVALON DR.
BRIARWOOD AVE.
LEGEND
SIGNAL LAYOUT NOTES
CAUTION
DISPLAYS
H3
PED SIGNAL
H3LA
H5FYA
V3
VSRT
SIGNAL HEADS
MAVERICK
SIGNAL LAYOUT PLAN
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND VILLAGE, DENTON COUNTY, TEXAS
05/19/2025
C140



* EXTEND DRILL SHAFT ABOVE GRADE AS NEEDED TO ENSURE 20 FEET VERTICAL CLEARANCE ABOVE PAVEMENT TO SIGNAL HEAD DISPLAYS

SIGNAL HEADS AND POLE PLACEMENT

POLE NO.	SIGNAL HEADS	MPS	NPS	CPS	BPS	EPS	TPS	RPS	HPS	SPS	NO. OF HEADS (UPWARDS)	NO. OF HEADS (DOWN)	FOUNDATION TYPE (STATE-WIDE STD.)
P-1	1	21,24		PEDESTRIAN SIGNAL POST				8.0	-	10.0	-	-	24-4
P-2	1	20,24	18,19	10-4	10-4	-	6.0	10.0	-	14.0	10.0	2	1	10-4
P-3	1	19,24	17,19	10-4	10-4	-	-	8.0	6.0	14.0	10.0	2	-	10-4
P-4	1	19,24	19,22	10-4	10-4	10-4	11.0	48.0	-	14.0	10.0	2	-	10-4
P-5	1	-	-	REMOVE EXISTING SIGNAL HEAD				-	-	-	10.0	-	2	10 SIGHT
P-6	1	19,24	19,22	PEDESTRIAN SIGNAL POST				8.0	-	10.0	-	-	-	24-4

SIGNAL POLE DESIGN - MODEL 1 TUBULAR, NON-SPREAD, 7 METAL, WITH BATTALION

* INCLUDES OVERHEAD MARKS ONLY (DIAGONAL/CABLE SUPPORTS, POLE MOUNT OR PEDESTRIAN SIGNAL HEADS)

SIGNAL HEADS

SIGNAL HEAD NO.	SIGNAL HEAD TYPE	BACK PLATE (DB)		VEHICLE INDICATIONS (DN)						PEDESTRIAN INDICATIONS (DT)	
		(DBT)	(DBS)	+R	S	+Y	Y	+G	S	DC	DC
4, 5, 6, 11, 12	HD	S	-	-	S	-	S	-	S	-	-
7	HDFA	S	-	-	-	-	-	-	-	-	-
8	HDFA	S	-	-	-	-	S	-	S	-	-
10	VI	S	-	-	S	-	S	-	S	-	-
9,7	VAR	-	3	3	3	3	3	-	3	-	3
1, 2, 3, 14	PED	-	-	-	-	-	-	-	-	-	3
[illegible]	TYPA	3	3	4	3	3	3	3	3	3	3

ILSN DETAILS

POLE NO.	SIDE (TRAFFIC DIR.)	STREET NAME	SUFFIX & BLOCK
P-2	RIGHT (WESTBND)	AVALON	DR 4000
	BACK (EASTBND)	AVALON	DR 4000
P-3	RIGHT (SOUTHBND)	BRIARWOOD	AVE. 6400
	BACK	[NAME]	
P-4	RIGHT (WESTBND)	AVALON	DR 4000
	BACK (EASTBND)	AVALON	DR 4000

OVERHEAD SIGN SUMMARY

NO.	TYPE	DESCRIPTION	SIZE	LOCATION
A	12SP	AVALON DR STREET NAME SIGN	—	P-2 ILSN 6FM
B	12SP	BRIARWOOD AVE STREET NAME SIGN	—	P-3 ILSN 6FM
C	R3-8LR	LEFT LANE ONLY/ RIGHT TURN ONLY	36 X 36	P-2 SIGNAL ASM
D	R3-5	NO U-TURN	30 X 30	P-3 SIGNAL ASM
E	12SP	AVALON DR STREET NAME SIGN	—	P-4 ILSN 6FM
F	R3-5	NO U-TURN	30 X 30	P-4 SIGNAL ASM
G	R3-17C	LEFT TURN YIELD ON FLASHING YELLOW ARROW	—	P-4 SIGNAL ASM

* R3-17C INCLUDES LAND USE CONTINUATION TO ADD ALL R3-8, R3-5 AND ILSN SIGNS.

APS MESSAGE CHART

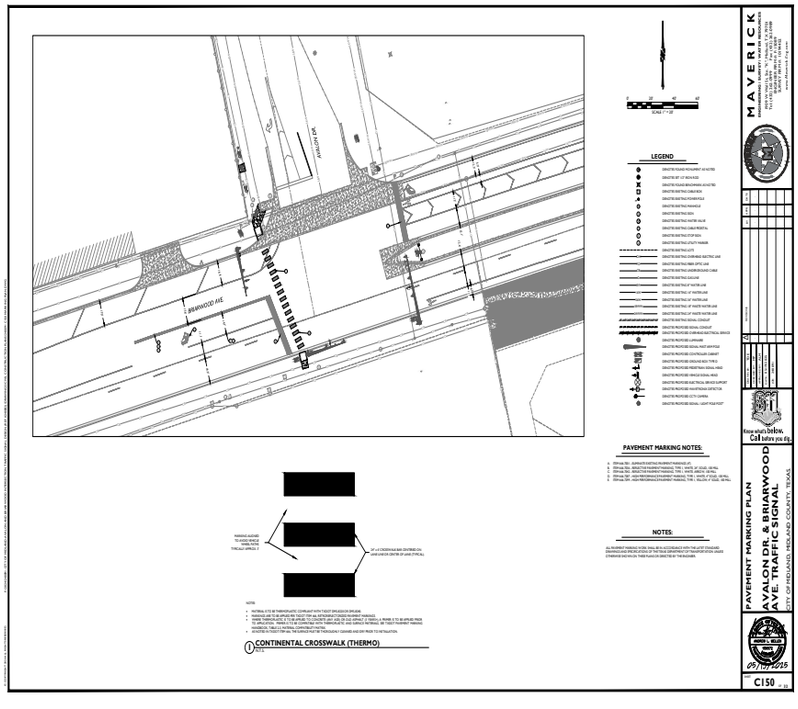
POLE NO.	PUSHBUTTON/ SIGN/FACE	FUNCTION	SPEECH MESSAGE / SIGN/ DECIBELS
P-1	PHASE 6	PUSH-BUTTON ON P/M	WAIT TO CROSS AVALON DRIVE
		EXTENDED WAIT BUTTON PUSH	WAIT TO CROSS AVALON DRIVE
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	WALK TO CROSS, WALK SIGNS ON TO CROSS AVALON DRIVE
P-2	PHASE 4	PUSH-BUTTON ON P/M	WAIT TO CROSS BRIARWOOD AVENUE
		EXTENDED WAIT BUTTON PUSH	WAIT TO CROSS BRIARWOOD AVENUE
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	BRIARWOOD AVENUE, WALK SIGN IS ON TO CROSS BRIARWOOD AVENUE
P-3	PHASE 4	PUSH-BUTTON ON P/M	WAIT TO CROSS BRIARWOOD AVENUE
		EXTENDED WAIT BUTTON PUSH	WAIT TO CROSS BRIARWOOD AVENUE
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	BRIARWOOD AVENUE, WALK SIGN IS ON TO CROSS BRIARWOOD AVENUE
P-4	PHASE 8	PUSH-BUTTON ON P/M	WAIT TO CROSS AVALON DRIVE
		EXTENDED WAIT BUTTON PUSH	WAIT TO CROSS AVALON DRIVE
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	AVALON DRIVE, WALK SIGNS ON TO CROSS AVALON DRIVE

ELECTRICAL SERVICE DATA

ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUCTOR SIZE	SERVICE CONDUCTOR MATERIAL	SERVICE DISTRIBUTION WIRE	SERVICE GROUND WIRE	TEST POLE CONDUCTOR	PANEL BOX LOAD CENTER	SERVICE CIRCUIT BREAKER	SERVICE CIRCUIT BREAKER	ESU MAX
P-1 120/240 VAC 100 AMP, SERVICE	3 AWG	3 CONDUCTOR, 2 LEADS THHN/THWN-2 COPPER	#6	#8	3P100	3R	100	100A, 2POLE 120/240VAC	1 ESU

ELECTRICAL SERVICE DATA

ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUCTOR SIZE	SERVICE CONDUCTOR MATERIAL	SERVICE DISTRIBUTION WIRE	SERVICE GROUND WIRE	TEST POLE CONDUCTOR	PANEL BOX LOAD CENTER	SERVICE CIRCUIT BREAKER	SERVICE CIRCUIT BREAKER	ESU MAX



LEGEND

PAVEMENT MARKING NOTES:

NOTES:

CONTINENTAL CROSSWALK (THERMO)

MAVERICK

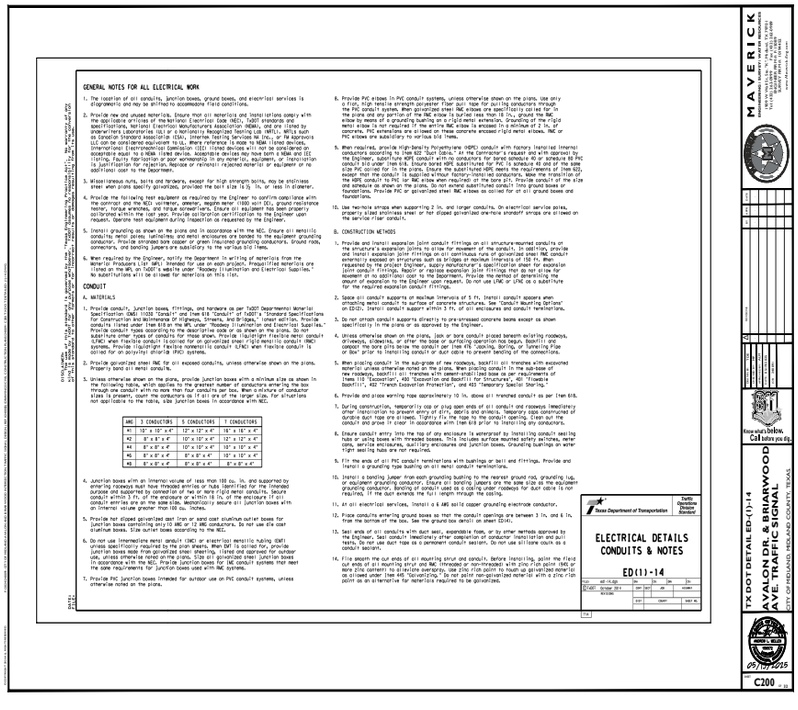
PAVEMENT MARKING PLAN

AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL

CITY OF HIGHLAND VILLAGE, DENTON COUNTY, TEXAS

05/19/2025

C150



GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and encroachment services is diagrammatic and may be shifted to accommodate field conditions.
2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable portions of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Ltd., or MET Laboratories, Inc. are acceptable. Devices that are manufactured to comply with International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any materials, equipment, or installation is justification for rejection. Replace or remove all rejected materials or equipment at no additional cost to the Department.
3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is 5/8 in. or less in diameter.
4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter 1000 volt DC), ground-resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated by a NIST traceable calibration service within the past 12 months when upon request. Operate test equipment during inspection as requested by the Engineer.
5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits, metal poles, luminaires, and metal enclosures are bonded to the equipment grounding conductor. Ground all transformers, service equipment, and electrical enclosures. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.
6. When required by the Engineer, notify the Department in writing of materials from the Materials Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL under Item 610, "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification DMS 11028 "Conduit" and Item 618 "Conduit" of TxDOT's Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges," latest edition. Provide PVC conduit that is Type EPC-40 for all bid items, unless otherwise noted on the plans. Provide conduit types according to the description code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized sheet rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.
2. Provide galvanized sheet RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.
3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is contained in a box, refer to the largest conductor in the box. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#6	10" x 10" x 4"	12" x 12" x 4"	14" x 14" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	6" x 6" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	6" x 6" x 4"	6" x 6" x 4"	8" x 8" x 4"

4. Junction boxes with an interior volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.
5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only #6 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.
6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes according to the NEC. Do not use aluminum junction boxes. Provide systems that meet the same requirements for junction boxes used with RMC systems.
7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.
8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a rigid, high tensile strength polyester fiber duct tape for pulling conductors through the PVC conduit system. When galvanized sheet RMC elbows are specifically called for in the PVC conduit system, provide a transition from the PVC conduit to the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.
9. When required, provide high-density polyethylene (HDPE) conduit with factory installed internal conductors according to Item 620 "Duct Cable." At the Contractor's request and with approval by the Engineer, the Department will allow substitution of HDPE conduit for PVC or RMC conduit 3/4 conduit and under, Item 618. Ensure bored HDPE substitutes for PVC in schedule #2 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 620, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC or RMC elbow when required at the bore pit. Provide conduit of the size and type called for in the plans for the portion of conduit installed above ground or in foundations. Provide PVC or galvanized steel RMC elbows as called for on all ground boxes and foundations.
10. Use heatshrink straps when supporting 2 in. and larger conduits. On electrician service poles, securely bind stainless steel or hot dipped galvanized premade standoff straps one at bend on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits or the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized sheet RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint fittings. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.
2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.
3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specified in the plans or as approved by the Engineer.
4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or other the base or surfacing operation has begun. Backfill and compact the bore pits before the conduit per Item 416 "Drilling, Boring, or Tunneling Pilot or Box" prior to installing conduit or duct cable to prevent bending of the connections.
5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material, compacted in accordance with Item 132 "Embankment." When placing conduit in the base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."
6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.
7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.
8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted battery switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on either type sealing hubs are not required.
9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.
10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a coring under roadways for duct cable is not required. If the duct extends the full length through the coring.
11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.
12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box details on sheet ED(4).
13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.
14. File smooth the cut ends of all reaming burrs and conduit. Before installing, paint the field cut ends of galvanized RMC conduit with a rich zinc paint. Use paint containing not less than 94 percent zinc content to galvanize overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS
CONDUITS & NOTES
ED(1)-14

FILE:	ed1-14.dgn	DN:	CK:	DW:	CK:
© TxDOT	October 2014	DIST	COUNTY		SHEET NO.
	REVISIONS				
		6.01	COUNTY		SHEET NO.

TYP

MAVERICK
TRAFFIC SIGNAL & LIGHTING, LLC
1309 MAVERICK DR. • PFLUGERVILLE, TX 78660
(512) 251-3220 • FAX (512) 251-3221
TBPE FIRM REGISTRATION #F-13040
TBPELS FIRM REGISTRATION #10018000

NO.	DESCRIPTION	DATE
1		
2		
3		
4		
5		
6		

Know what's below. Call before you dig.

TX DOT DETAIL ED-(1)-14
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOLLAND, WILLIAMSON COUNTY, TEXAS

05/19/2025

C200 of 22

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11043 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors as follows: Phase conductors shall be black, red, or blue with matching or white insulation. Identify grounding conductors ground wires with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the entire system. Identify conductors # American Wire Gauge (AWG) and smaller by continuous color insulation. Identify conductors larger than # AWG by color insulation, colored tape (taken or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper # AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS-11045. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by connecting a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two arrows, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in pull boxes and 3 ft. minimum, 5 ft. maximum length for each conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical service enclosures. Use only compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight seal. Use heat shrink tubing with a minimum 3:1 shrinkage at 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the heat shrink tubing and the conductor. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for # AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking, cutting, or damaging the strands. Conductors with nicked, cut, or damaged individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not reuse damaged conductors with duct tape, electrician tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors #4 and smaller whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions for installation. Use a calibrated torque wrench to achieve proper torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings to match the openings factory sealed. Use prequalified breakaway connectors as shown on the QPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGC's are continuous and terminated at each accessible location. For metallic conduit installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors on grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 18 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile communication equipment, ensure the conductors are buried a minimum of 12 in. deep or installed at the next lower point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS-11045 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual pole data sheets. Provide additional grounding electrodes as called for in specific locations including electrical service, see individual pole sheets.

B. CONSTRUCTION METHODS

1. Function auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

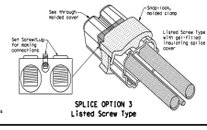
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

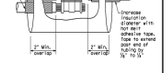
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

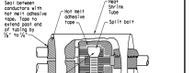
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 3
Listed Screw Type



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type

Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

DGN	ed(3)-14.dgn	3w	TxDOT 2w	TxDOT 3w	TxDOT 2w-7202
©TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		DIST	COUNTY		SHEET NO.

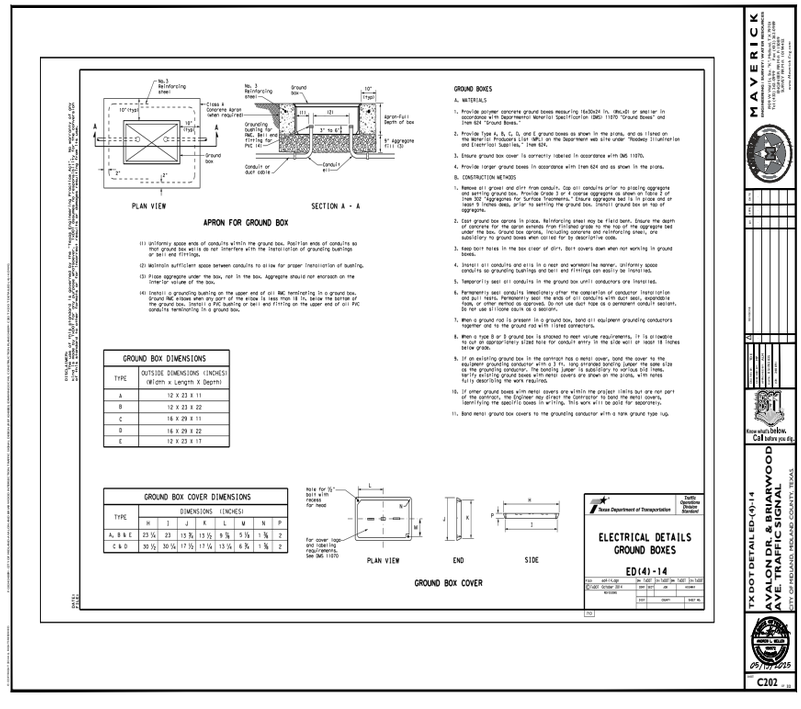
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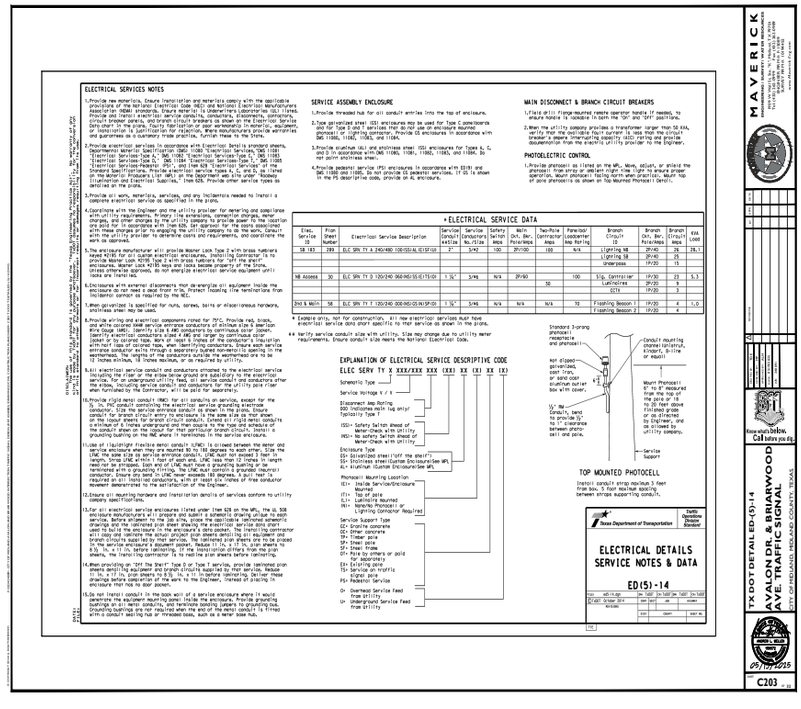
Know what's below. Call before you dig.

TX DOT DETAIL ED(3)-14
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOUSTON, HARRIS COUNTY, TEXAS

05/19/2025

C201


No. 3 Reinforcing steel
10" (typ)
Cross A Concrete Apron when required
Ground Box
Grounding bushing on RMC. Bell end fitting for PVC (4)
Conduit or duct cable
Conduit (4)
apron-full Depth of box
6" aggregate Fill (2)
PLAN VIEW
SECTION A - A
APRON FOR GROUND BOX
(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.
(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Where the conduit stub-up from the ground the elbow is less than 18 in. below the bottom of the ground box, install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.
GROUND BOXES
A. MATERIALS
1. Provide polymer concrete ground boxes measuring 16x30x24 in. (HxLxD) or greater in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."
2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.
3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.
4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.
B. CONSTRUCTION METHODS
1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 5 or 6 coarse aggregate as shown in Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 6 inches deep, prior to setting the ground box. Install ground box on top of aggregate.
2. Open ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.
3. Keep dirt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.
4. Install all conduits and slip in a neat and workmanlike manner, uniformly space conduits so grounding bushings and bell end fittings can easily be installed.
5. Temporarily seal all conduits in the ground box until conductors are installed.
6. Permanently seal conduits immediately after the completion of conductor installation with duct seal, expanding foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.
7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.
8. When a type D or E ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.
9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 Ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.
10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.
11. Bond metal ground box covers to the grounding conductor with a new ground type lug.
GROUND BOX DIMENSIONS
TYPE | OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A | 12 X 23 X 11
B | 12 X 23 X 22
C | 16 X 29 X 11
D | 16 X 29 X 22
E | 12 X 23 X 17
GROUND BOX COVER DIMENSIONS
TYPE | DIMENSIONS (INCHES)
H | J | J | K | L | M | N | P
A, B & E | 23 ½ | 23 | 15 ⅜ | 13 ½ | 9 ⅜ | 5 ⅛ | 1 ⅜ | 2
C & D | 30 ½ | 30 ¾ | 17 ½ | 17 ¼ | 13 ¼ | 6 ⅜ | 1 ⅜ | 2
Note for ⅜" bolt slot in cover for head
For cover logo and labeling requirements, see DMS 11070
PLAN VIEW
END
SIDE
GROUND BOX COVER
Texas Department of Transportation
Traffic Operations Division Standard
ELECTRICAL DETAILS
GROUND BOXES
ED(4)-14
ed4-14.dgn
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REVISIONS
DATE | GRID | DESIGNED | CHECKED
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TXDOT DETAIL ED-(4)-14
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND VILLAGE DENTON COUNTY, TEXAS
05/19/2025
C202



ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide electrical service equipment, including meter socket enclosures, service disconnects, circuit breaker panels, and branch circuits breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation will be sufficient reason for rejection. Provide materials that are warrantied and guaranteed as a customary trade practice, furnish these to the State.

2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services, TMG 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal IP31," and then 626 "Electrical Services" of the Texas Department of Transportation Standard Specifications. Refer to the "Materials" on the Materials Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," then 626. Provide other service types as specified on the plans.

3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4. Coordinate with the Engineer and the utility provider for metering and compliance with the utility company's service drop requirements. Provide and install any transformer, and other services, as may the utility company, to provide power to the location are paid for in accordance with Item 626. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers for "Off the Shelf" enclosures. Master Lock will provide Type 2 with brass tumblers to provide Master Lock #2700 Type 2 with brass tumblers for "Off the shelf" enclosures. Master Lock #2191 keys and locks become property of the State. Provide keys to the Engineer, do not energize electrical service equipment until locks are installed.

6. Enclosures with exterior disconnects must de-energize all equipment inside the enclosure do not need a dead front. In lie, protect exposing the terminations from incidental contact as required by the NEC.

7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8. Provide wiring and electrical components rated for 75°C. Provide red, black, white, and green insulated copper conductors, sized as shown in the plans, No. 6 AWG wire Gauge (AWG). Identify size 6 AWG conductors by continuous color (green). Identify electrical conductors sized 4 AWG and larger by continuous color (black, white, or red) along the entire length of the conductor. Provide each design with hot tape of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately pulled nonmetallic opening in the service disconnect. Ensure the wire bending space at terminations is to be 12 inches minimum, 18 inches maximum, or as required by utility.

9. All electrical service conduit and conductors attached to the electrical service including that on or the wires below ground are subsidiary to the electrical service. The Contractor is responsible for all electrical service conductors, connecting the wires, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10. Provide rigid metal conduit (RMC) for all conduits on service, except for the 3/4 inch PVC conduit containing the electrical service grounding electrode conductor. Ensure the minimum conduit size for service entrance and branch conduit for branch circuit entry to enclosure is the size as is not shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits to the bottom of the service enclosure. Increase the size of the conductors and the conduit shown on the layout for that particular branch circuits. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11. Use of liquidtight flexible metal conduit (LFMC) is to road between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Torque LFMC within 1 foot of each end. LFMC less than 12 inches in length must be bonded with bonding jumper. Ensure LFMC is terminated with a fitting. The LFMC must contain a grounded neutral conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull rest 24 inches in length is required between bends. Ensure the flexibleness of three conductor movement demonstrated to the satisfaction of the Engineer.

12. Ensure all mounting hardware and installation details of services conform to utility company specifications.

13. For all electrical service enclosures listed under Item 626 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable reinforced schematic drawings and the customized plan sheets showing the electrical service data chart used to build the enclosure in the enclosure's data packet. The installing contractor is to install the schematic drawing on the inside door of the enclosure to identify branch circuits supplied by that service. The reinforced plan sheets are to be placed in the service enclosure's document packet. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in. before inserting. Deliver these drawings to the Engineer. Instead of providing 11 in. x 17 in. plan sheets, the installing contractor is to redline plan sheets before delivering.

14. When providing an "Off The Shelf" Type D or Type T service, provide reinforced plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in before inserting. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pockets.

15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings for all conduits. Ensure grounding bushings are bonded. Ensure bonding grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.

2. Type galvanized sheet (GS) enclosures may be used for Type C pedestals and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3. Provide stainless (SS) and aluminum sheet (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless sheet.

4. Provide pedestal service (PS) enclosures in accordance with 626(6) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is capable to turn the "On" and "Off" positions.

2. When the utility company provides a transformer larger than 50 kVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Mount, adjust, or shield the photocell to ensure that it does not light more than an ambient proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

ELECTRICAL SERVICE DATA

Elec. Service ID	Prin Sheet Number	Electrical Service Description	Service Conduit Existing	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Poles/Amps	Two-Pole Contractor Amps	Panelboard/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Poles/Amps	Branch Circuit* Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 120/240-3L 60 SP-GS	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	24	28.1
									Lighting SB	2P/40	25	
									Underpasses	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 3W-HG-3S-E1-TS-GS	1 ¼"	3/#6	N/A	2P/60		100	¼ SL Controller Luminaires	1P/20	22	5.3
							30			2P/20	10	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY 1 120/240 3DB-HG-2S-N1-SP-GS	1 ½"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility owner requirements. Ensure conduit size meets the National Electrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

- Schematic Type
- Service Voltage X / X
- Disconnect Amp Rating
  - 000 Indicates meter lug only
  - Typically Type T
- (GS)= Safety Switch Ahead of Meter-Check with Utility
- (NS)= No safety Switch Ahead of Meter-Check with Utility
- Enclosure Type
  - GS= Galvanized steel (Off the shelf)
  - SS= Stainless steel (Custom Enclosure-See MPL
  - AL= Aluminum (Custom Enclosure-See MPL
- Photocell Mounting Location
  - IS1= Inside Service/Enclosure Mounted
  - IT1= Top of pole
  - TL1= Luminaire Mounted
  - IN1= Remote Photocell or Lighting Contractor Relayed
- Service Support Type
  - CC= Granite concrete
  - DC= Other concrete
  - SW= Steel wide
  - SP= Steel pole
  - SF= Steel frame
  - OY= Pole by others or paid for separately
- Ess= Essential Service
- TS= Service on Priority signal pole
- PS= Pedestal Service
- O= Overhead Service Feed from Utility
- U= Underground Service Feed from Utility

TOP MOUNTED PHOTOCELL

Install conduit strap no more 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5)-14

FILE: ed5-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT: October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

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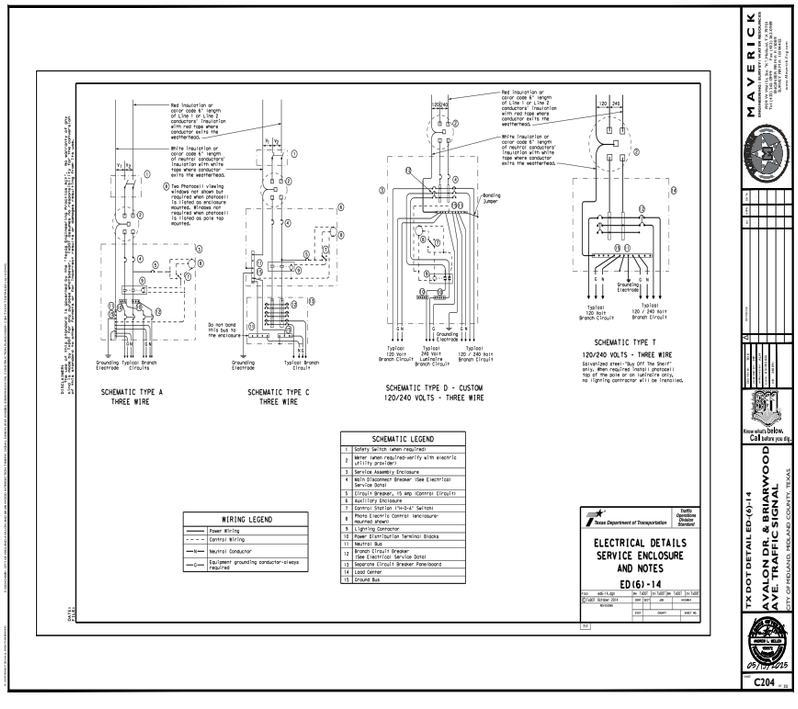
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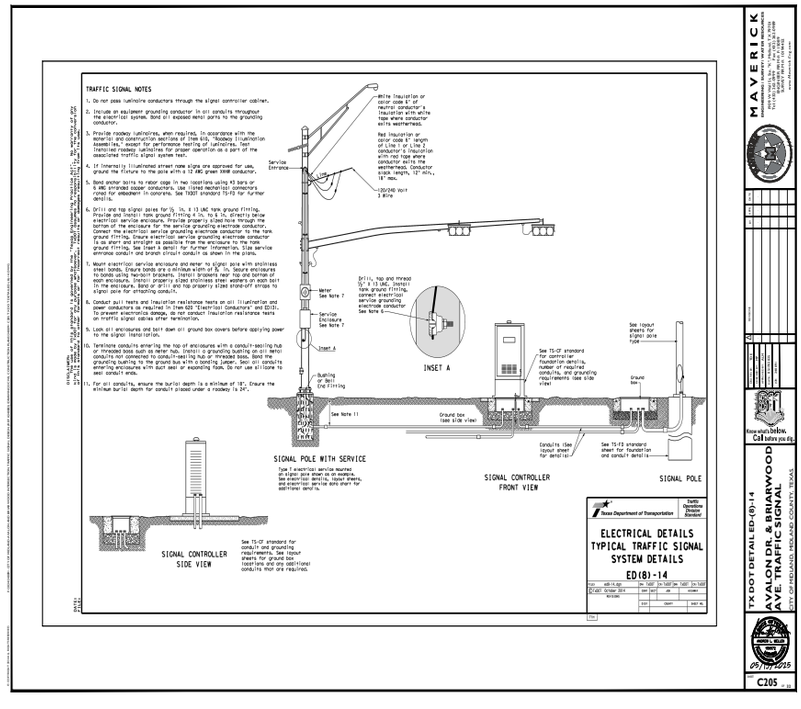
CITY OF HOLLAND, WILLIAMSON COUNTY, TEXAS

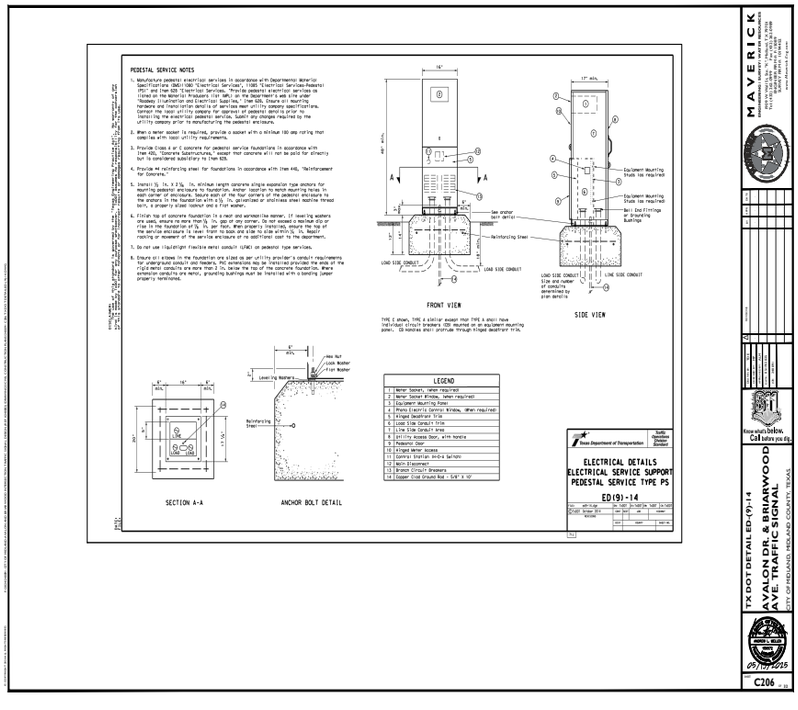
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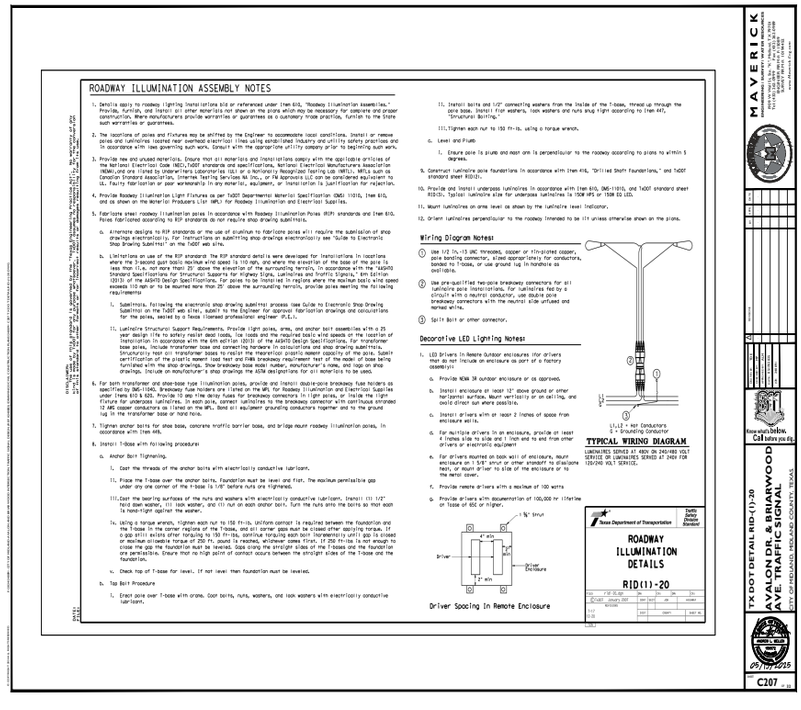
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TX DOT DETAIL ED-(6)-14
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOLLAND, MCLENNAN COUNTY, TEXAS
05/31/2025
C204


TRAFFIC SIGNAL NOTES
1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," and the details for mounting of luminaires. Test illuminated roadway luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rigged for embedment in concrete. See TXDOT standard TS-FD for further details.
6. Drill and tap signal poles for ½ in. X 13 UNC tank ground fitting. Drill, tap and thread a hole in the pole for the tank ground fitting. Route electrical service entrance/grounding cable through a sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is sized per the NEC and connected to the pole using the tank ground fitting. See Sheet 6 details for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands using two-hole straps. Install grounding bushing on all conduits to bands using two-hole brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Bond or drill and tap properly sized stand-off straps to signal pole for grounding conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and Ed(1). To prevent electrical damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".
White insulation or color code 'K' for neutral conductor & insulation with white tape where conductor exits weatherhead.
Red insulation or color code 'K' (ORGN OF LINE 2 conductor & insulation with red tape where conductor exits the weatherhead. Conductor tape lengths, 12"-inch., typ.
Service Entrance
120/240 Volt 3 Wire
Meter See Note 7
Service Enclosure See Note 7
Inset A
Bushing or Bell (no fitting
Drill, tap and thread a hole in the pole for tank ground fitting, connect electrical service grounding electrode conductor See Note 6.
INSET A
See TS-07 standard for controller foundation details, conduit sizing, conduit, and grounding requirements (see side view)
See layout sheets for signal pole type
Ground box
See Note 11
Ground box (see side view)
Conduits (see layout sheet for details)
See TS-FD standard sheet for foundation and conduit details.
SIGNAL POLE WITH SERVICE
Type 7 electrical service mounted on signal pole shown as an example. See Sheet 6 for wiring diagrams, and electrical service data sheet for additional details.
SIGNAL CONTROLLER FRONT VIEW
SIGNAL POLE
SIGNAL CONTROLLER SIDE VIEW
See TS-07 standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.
Texas Department of Transportation
Traffic Operations Division Standard
ELECTRICAL DETAILS
TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS
ED(8)-14
FILE: ed8-14.dgn
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REVISIONS
DIST COUNTY SHEET NO.
MAVERICK
TXDOT DETAIL ED(8)-14
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOLLAND'S WOODS COUNTY, TEXAS
05/17/2025
C205


PEDESTAL SERVICE NOTES
1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS) 1080 "Electrical Services", 1085 "Electrical Services-Pedestal ITC" and Item 620 "Electrical Services." Provide pedestal electrical services listed on the Material Producers List (MPL) or the Department's web site under Electrical Services-Pedestal ITC. Ensure that all MPL listed items, including hardware and installation details of services meet utility company specifications. Contact the local utility company for approval of pedestal details prior to manufacturing the pedestal and incorporate any changes required by the utility company prior to manufacturing the pedestal and enclosure.
2. When a meter socket is required, provide a socket with a minimum 100 amp rating that complies with local utility requirements.
3. Provide Class A or C concrete for pedestal service foundations in accordance with Item 420, "Concrete Substructures," except that concrete will not be paid for directly but is considered subsidiary to Item 620.
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."
5. Install (3) 1/2 in. X 13 in. minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to foundation with 1/2 in. diameter by 12 in. long galvanized or stainless steel machine thread bolts, a washer & allen cadmium and a flat washer.
6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than 1/2 in. gap at any corner. Do not exceed a maximum slope of 1/8 in. in the foundation within 12 in. of the anchor bolts, ensuring that the top of the service enclosure is never more than a slope one side within 1/2 in. Repair cracking or movement of the service enclosure at no additional cost to the department.
7. Do not use rigid/right flexible metal conduit (LFMC) on pedestal type services.
8. Ensure all stubs in the foundation are sized as per utility provider's conduit requirements for underground conduit and headers. PVC connections may be restricted provided the ends of the rigid metal conduits are more than 2 in. below the top of the concrete foundation. Where expansion conduits are metal, grounding bushings must be installed with a bonding jumper properly terminated.
FRONT VIEW
SIDE VIEW
Equipment Mounting Studs (as required)
Ball End Fittings or Grounding Bushings
Reinforcing Steel
See anchor bolt detail
LOAD SIDE CONDUIT
LINE SIDE CONDUIT
Size and number of conduits determined by plan details
TYPE S shown. TYPE A shall be used when TYPE A electrical service equipment is mounted on an equipment-mounting pole. (2) handles shall protrude through hinged deadfront trim.
SECTION A-A
ANCHOR BOLT DETAIL
Hex Nut
Lock Washer
Flat Washer
Leveling Washers
Reinforcing Steel
LEGEND
1 Meter Socket, when required
2 Meter Socket Window, when required
3 Equipment Mounting Panel
4 Service Disconnect Window, when required
5 Hinged Deadfront Trim
6 Load Side Conduit Trim
7 Line Side Conduit Area
8 Utility Access Door, with handle
9 Pedestal Door
10 Hinged Meter Access
11 Equipment Station Ground System
12 Main Disconnect
13 Branch Circuit Breakers
14 Copper Clad Ground Rod - 5/8" x 10'
Texas Department of Transportation
Traffic Operations Division Standard
ELECTRICAL DETAILS
ELECTRICAL SERVICE SUPPORT
PEDESTAL SERVICE TYPE PS
ED(9)-14
FILE: ed9-14.dgn
DN: TxDOT
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REVISIONS
07/31/2025
MAVERICK
TX DOT DETAIL ED-(9)-14
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOLLAND, WILLIAMSON COUNTY, TEXAS
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C206



ROADWAY ILLUMINATION ASSEMBLY NOTES

1. Details apply to roadway lighting installations bid or referenced under Item 618, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.

2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA),and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any materials, equipment, or installation is justification for rejection.

4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.

5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.

   a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web sites.

   b. Limitations on use of the RIP standards: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than 11 ft, not more than 25' above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) or the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25' above the surrounding terrain, provide poles meeting the following requirements:

      I. Submittals, following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web sites), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).

      II. Luminaire Structural Support Requirements. Provide slip joints, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, provide transformer bases and connecting hardware in accordance with shop drawing submittals. Submit certification of the anchor bolt assembly fatigue life in accordance with the AASHTO Design Specifications. Submit certification of the plastic support load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.

6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 each time delay fuses for breakaway connectors. Slip joints, or fixture the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.

7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.

8. Install T-Base with following procedure:

   a. Anchor Bolt Tightening.

      I. Coat the threads of the anchor bolts with electrically conductive lubricant.

      II. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the T-base is 1/8" before nuts are tightened.

      III. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hard down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.

      IV. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.

      V. Check top of T-base for level. If not level then foundation must be leveled.

   b. Top Bolt Procedure

      I. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

      II. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."

      III. Tighten each nut to 150 ft-lb, using a torque wrench.

   c. Level and Plumb

      I. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.

9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(3).

10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.

11. Mount luminaires on arms level as shown by the luminaire level indicator.

12. Orient luminaires perpendicular to the roadway (mounted to be ↕↕ unless otherwise shown on the plans.

Wiring Diagram Notes:

1. Use 1/2 IN.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.
2. Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.
3. Split bolt or other connector.

L1,L2 = Hot Conductors
G = Grounding Conductor

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V OR 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):
   a. Provide NEMA 3R outdoor enclosure or as approved.
   b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.
   c. Install drivers with at least 2 inches of space from enclosure walls.
   d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronics equipment
   e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.
   f. Provide remote drivers with a maximum of 100 watts
   g. Provide drivers with documentation of 100,000 hr lifetime or Tcase of 65C or higher.

Driver Spacing in Remote Enclosure

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS

RID(1)-20

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GENERAL NOTICE					
CONT	SECT	JOB		HIGHWAY	
DIST	COUNTY			SHEET NO.	

DATE: 08/01/20

MAVERICK
TEXAS REGISTERED ENGINEERING FIRM F-14322
2929 Briarpark Dr., Ste. 600 Houston, TX 77042
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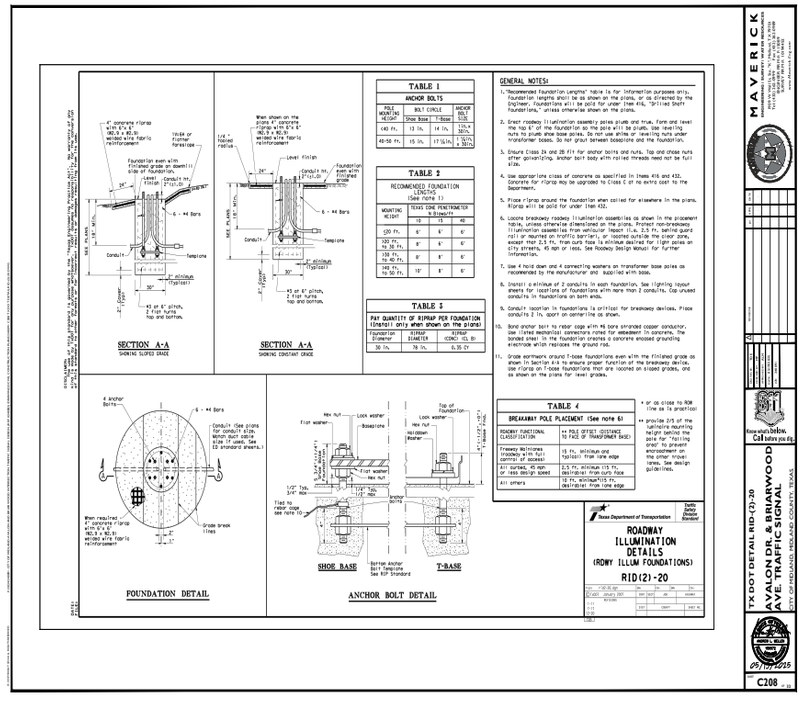
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1	08/25	JW	REVISED PER CITY COMMENTS

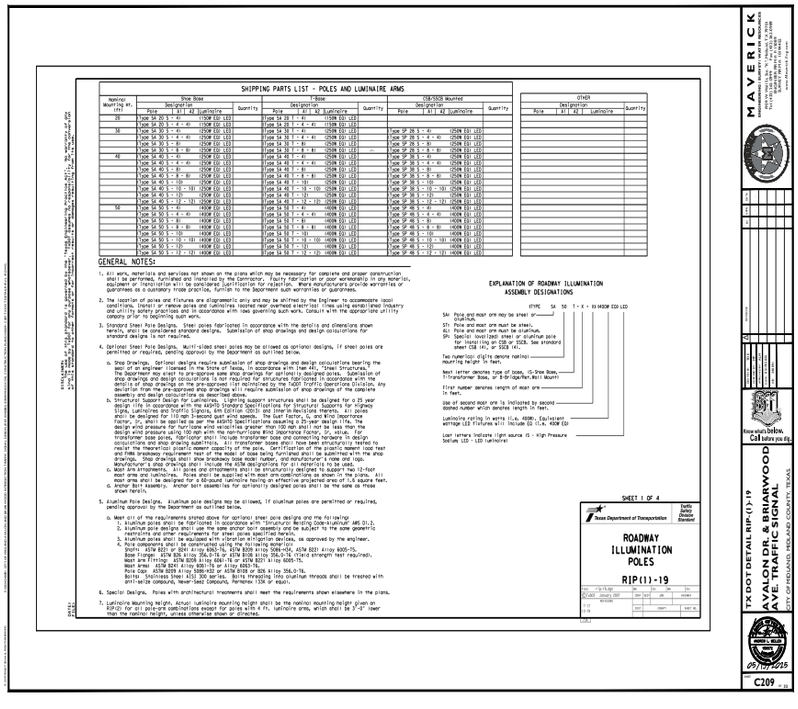
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CITY OF HOUSTON, HARRIS COUNTY, TEXAS

05/19/2025

C207 of 22


SECTION A-A
SHOWING SLOPED GRADE
SECTION A-A
SHOWING CONSTANT GRADE
FOUNDATION DETAIL
ANCHOR BOLT DETAIL
SHOE BASE
T-BASE
TABLE 1
ANCHOR BOLTS
TABLE 2
RECOMMENDED FOUNDATION LENGTHS (See note 1)
TABLE 3
PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)
GENERAL NOTES:
TABLE 4
BREAKAWAY POLE PLACEMENT (See note 6)
ROADWAY ILLUMINATION DETAILS
(RDWY ILLUM FOUNDATIONS)
RID(2)-20
MAVERICK
TX DOT DETAIL RID(2)-20
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOLLAND, WILLIAMSON COUNTY, TEXAS
05/19/2025
C208



SHIPPING PARTS LIST - POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base Designation				Qty	T-Base Designation				Qty	CSB/SSB Mounted Designation				Qty	OTHER Designation				Qty
	Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire	
30	Type SA 30 S - 4 - 41			110W EDI LED		Type SA 30 T - 4 - 41			110W EDI LED											
	Type SA 30 S - 4 - 41	4'	4'	120W EDI LED		Type SA 30 T - 4 - 41	4'	4'	120W EDI LED											
	Type SA 30 S - 4 - 41	4'	4'	125W EDI LED		Type SA 30 T - 4 - 41	4'	4'	125W EDI LED		Type SP 30 S - 4 - 41	4'	4'	125W EDI LED						
	Type SA 30 S - 8 - 81	8'	8'	125W EDI LED		Type SA 30 T - 8 - 81	8'	8'	125W EDI LED		Type SP 30 S - 8 - 81	8'	8'	125W EDI LED						
40	Type SA 40 S - 4 - 41			125W EDI LED		Type SA 40 T - 4 - 41			125W EDI LED		Type SP 30 S - 4 - 41			125W EDI LED						
	Type SA 40 S - 4 - 41	4'	4'	120W EDI LED		Type SA 40 T - 4 - 41	4'	4'	120W EDI LED		Type SP 30 S - 4 - 41	4'	4'	120W EDI LED						
	Type SA 40 S - 8 - 81	8'	8'	125W EDI LED		Type SA 40 T - 8 - 81	8'	8'	125W EDI LED		Type SP 30 S - 8 - 81	8'	8'	125W EDI LED						
	Type SA 40 S - 10 - 101	10'	10'	125W EDI LED		Type SA 40 T - 10 - 101	10'	10'	125W EDI LED		Type SP 30 S - 10 - 101	10'	10'	125W EDI LED						
	Type SA 40 S - 10 - 101	10'	10'	170W EDI LED		Type SA 40 T - 10 - 101	10'	10'	170W EDI LED		Type SP 30 S - 10 - 101	10'	10'	170W EDI LED						
	Type SA 40 S - 12 - 121	12'	12'	170W EDI LED		Type SA 40 T - 12 - 121	12'	12'	170W EDI LED		Type SP 30 S - 12 - 121	12'	12'	170W EDI LED						
	Type SA 40 S - 12 - 121	12'	12'	250W EDI LED		Type SA 40 T - 12 - 121	12'	12'	250W EDI LED		Type SP 30 S - 12 - 121	12'	12'	250W EDI LED						
50	Type SA 50 S - 4 - 41			140W EDI LED		Type SA 50 T - 4 - 41			140W EDI LED		Type SP 40 S - 4 - 41			140W EDI LED						
	Type SA 50 S - 4 - 41	4'	4'	140W EDI LED		Type SA 50 T - 4 - 41	4'	4'	140W EDI LED		Type SP 40 S - 4 - 41	4'	4'	140W EDI LED						
	Type SA 50 S - 8 - 81	8'	8'	140W EDI LED		Type SA 50 T - 8 - 81	8'	8'	140W EDI LED		Type SP 40 S - 8 - 81	8'	8'	140W EDI LED						
	Type SA 50 S - 8 - 81	8'	8'	170W EDI LED		Type SA 50 T - 8 - 81	8'	8'	140W EDI LED		Type SP 40 S - 8 - 81	8'	8'	140W EDI LED						
	Type SA 50 S - 10 - 101	10'	10'	140W EDI LED		Type SA 50 T - 10 - 101	10'	10'	140W EDI LED		Type SP 40 S - 10 - 101	10'	10'	140W EDI LED						
	Type SA 50 S - 10 - 101	10'	10'	170W EDI LED		Type SA 50 T - 10 - 101	10'	10'	140W EDI LED		Type SP 40 S - 10 - 101	10'	10'	140W EDI LED						
	Type SA 50 S - 12 - 121	12'	12'	140W EDI LED		Type SA 50 T - 12 - 121	12'	12'	140W EDI LED		Type SP 40 S - 12 - 121	12'	12'	140W EDI LED						
	Type SA 50 S - 12 - 121	12'	12'	170W EDI LED		Type SA 50 T - 12 - 121	12'	12'	140W EDI LED		Type SP 40 S - 12 - 121	12'	12'	140W EDI LED						

GENERAL NOTES:

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, shall be replaced by the Contractor at his own expense. Contractor shall furnish all manufacturer's warranties or guarantees as a customary trade practice, furnish to the Department such warranties or guarantees.

2. The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry safe practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.

4. Optional Steel Pole Designs. Multi-sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.

   a. Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal and signature of a Professional Engineer registered in the State of Texas for approval by the Engineer. The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete structure for approval by the Engineer before fabrication.
   b. Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition, 2013 and Interim Specifications. Poles and mast arms shall be designed for 110 mph 3-second gust wind speeds. The Gust Factor, G_f, and Wind Importance Factor, I_r, shall be applied as per the AASHTO Specifications assuming a 25-year design life. The design wind pressure for hurricane wind velocities greater than 100 mph shall not be less than the design wind pressure using 100 mph with the non-hurricane Wind Importance Factor, I_r, value. For hurricane wind velocities greater than 100 mph, the Wind Importance Factor, I_r, shall be applied in the design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and the breakaway design shall be submitted for approval. Base coupling furnished shall be compatible with the shop drawings. Design shall meet the requirements of the AASHTO Standard Specifications.
   c. Manufacturer's shop drawing shall include the ASTM designations for all materials to be used.
   d. Mast arm Arrangements. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 60-pound luminaire having an effective projected area of 1.5 square feet.
   e. Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.

5. Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.

   a. Meet all of the requirements stated above for optional steel pole designs and the following:
      1. Aluminum pole designs shall be designed in accordance with AASHTO LTS-6 (latest) and AWS D1.2.
      2. Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
      3. Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
      4. Pole components shall be constructed using the following materials:
      Pole: ASTM B241 Alloy 6005-T5, 6061-T6 or ASTM B221 Alloy 6005-T5.
      Base Flanges: ASTM B26 Alloy 356.0-T6 or ASTM B108 Alloy 356.0-T6 if yield strength test required.
      Mast arm Fittings: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
      Mast Arms: ASTM B241 Alloy 6005-T5 or Alloy 6061-T6.
      Handhole Frame and Cover: ASTM B26 Alloy 356.0-T6, ASTM B26 Alloy 356.0-T6.
      Bolts: Stainless Steel 316 300 series. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133A or equal.

6. Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.

7. Luminaire Mounting Height. Actual luminaire mounting height shall be the nominal mounting height given on RIP(2) for all pole-arm combinations except for poles with 4 ft. luminaire arms, which shall be 3'-0" lower than the nominal height, unless otherwise shown or directed.

EXPLANATION OF ROADWAY ILLUMINATION ASSEMBLY DESIGNATIONS

TYPE SA 50 T - X - 10 140W EDI LED

- SA: Pole and mast arm may be steel or aluminum.
- ST: Pole and mast arm must be steel.
- AL: Pole and mast arm must be aluminum.
- SPs: Special (overlap) steel or aluminum pole for mounting an CSB or SSB. See standard sheet CSB (4)-, or SSB (4)-.
- Two numerical digits denote nominal mounting height in feet.
- Next letter denotes type of base, (S-Shoe Base, T-Transformer Base, or B-Bridge/Pier, Wall Mount)
- Final number denotes length of mast arm in feet.
- Use of second mast arm is indicated by second dashed number which denotes length in feet.
- Luminaire rating in watts (i.e. 400W., Equivalent wattage LED Fixtures will include ED (i.e. 400W ED)
- Last letters indicate light source (S - High Pressure Sodium, LED - LED Luminaire)

SHEET 1 OF 4

Texas Department of Transportation — Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(1)-19

FILE: rip19-20.dgn	DN:	CK:	DW:	CK:
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REVISIONS				
5-21	DIST	COUNTY		SHEET NO.
8-24				

DISTRICT

MAVERICK
Maverick Signal Systems, LLC
Texas Registered Engineering Firm F-20000
2010 Hwy 83 Bus. N. • Pharr, TX 78577
Phone: (956) 787-2030 • Fax: (956) 787-2035
Scott Parker, P.E. 124705

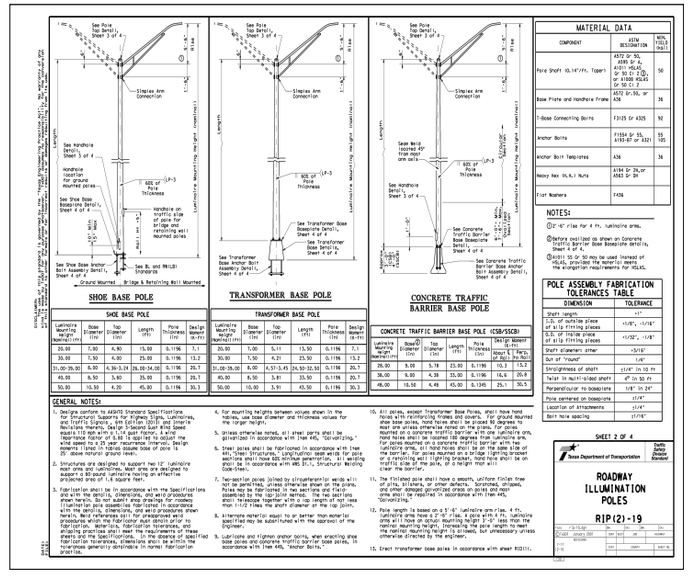
TX DOT DETAIL RIP-(1)-19

AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL

CITY OF MISSION, HIDALGO COUNTY, TEXAS

05/19/2025

C209



SHOE BASE POLE

Luminaire Mounting Height (nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Weight (lb/ft)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.90	25.00	0.1196	13.2
31.00-35.00	8.00	4.39-3.39	28.00-34.00	0.1196	20.7
40.00	8.50	3.80	35.00	0.1196	25.1
50.00	10.50	4.20	45.00	0.1196	30.3

TRANSFORMER BASE POLE

Luminaire Mounting Height (nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Weight (lb/ft)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-35.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	25.1
50.00	10.00	3.91	43.50	0.1196	30.3

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)

Luminaire Mounting Height (nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (kip-ft) Mast Arm Length (ft)	
					Square & Para. to Roll	Roll
25.00	9.00	5.78	23.00	0.1196	10.3	13.2
30.00	9.00	4.38	33.00	0.1196	16.6	20.8
40.00	10.50	4.48	45.00	0.1345	25.1	30.5

GENERAL NOTES:

1. Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. Design 3-Second Gust Wind Speed supporting the luminaire and signal arm is 90 mph. Design wind speed for 1.33 gust factor, adjusted for wind speed to a 25 year recurrence interval. Design moments timed in ridrop assume base of pole is 25' above natural ground level.
2. Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a 6 square foot sign panel on an effective projected area of 1.4 square feet.
3. Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown on the plans. The Fabricator shall submit working drawings of luminaire pole assemblies fabricated in accordance with the details, dimensions, and weld procedures shown on the plans. Working drawings shall include welding procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of these sheets and the Specifications. In the absence of specified tolerances, the Fabricator shall follow the most rigorous tolerances generally obtainable in normal fabrication practice.
4. For mounting heights between values shown in the table, interpolate between diameter and thickness values for the larger height.
5. Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."
6. Steel poles shall be fabricated in accordance with Item 441, "Steel Structures." Longitudinal seam welds for pole shafts shall be complete joint penetration (CJP) groove welds and shall be in accordance with AWS D1.1, Structural Welding Code-Steel.
7. Telescoping poles joined by slip-fit connection welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the Installation Contractor. The two sections shall be telescoped a minimum of 1.5 times, but not more than 1-1/2 times the shaft diameter at the top joint.
8. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
9. Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."
10. All poles, except Transformer Base Poles, shall have hand holes and reinforcing. For luminaire poles with slip-fitter shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with two luminaire arms, hand holes shall be placed 180 degrees from luminaire arms. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or retaining wall, all hand holes shall be placed on the traffic side of the pole, at a height that will clear the barrier.
11. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratches, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."
12. Pole length is based on a 5'-6" luminaire arm-rise. A 7'-6" luminaire arm-rise may be used. Poles for 7'-6" luminaire arms will have an actual mounting height 2'-0" less than the nominal mounting height, increasing the pole length to meet the nominal mounting height is attained, but unnecessary unless otherwise directed by the engineer.
13. Erect transformer base poles in accordance with sheet RIC(11).

MATERIAL DATA

COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft- (0.14"/Ft. Taper)	A572 Gr 50, A595 Gr A, A1011 Gr 50 or 55 CL 2 (3), or A1008 HSLAS Gr 50 CL 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T-Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H,or A563 Gr DH	
Flat Washers	F436	

NOTES:

(1) 5'-6" rise for 4 Ft. luminaire arms.

(2) Before oscillized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.

(3) A1011 SS Gr 50 may be used instead of A572 Gr 50 provided it also meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE

DIMENSION	TOLERANCE
Shaft length	±1"
O.D. of outside piece at slip fitting pieces	+1/8", -1/16"
O.D. of inside piece at slip fitting pieces	+1/32", -1/8"
Shaft diameter other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 Ft
Twist in multi-sided shaft	4° in 10 Ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of attachments	±1/4"
Bolt hole spacing	±1/16"

SHEET 2 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(2)-19

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2-19				

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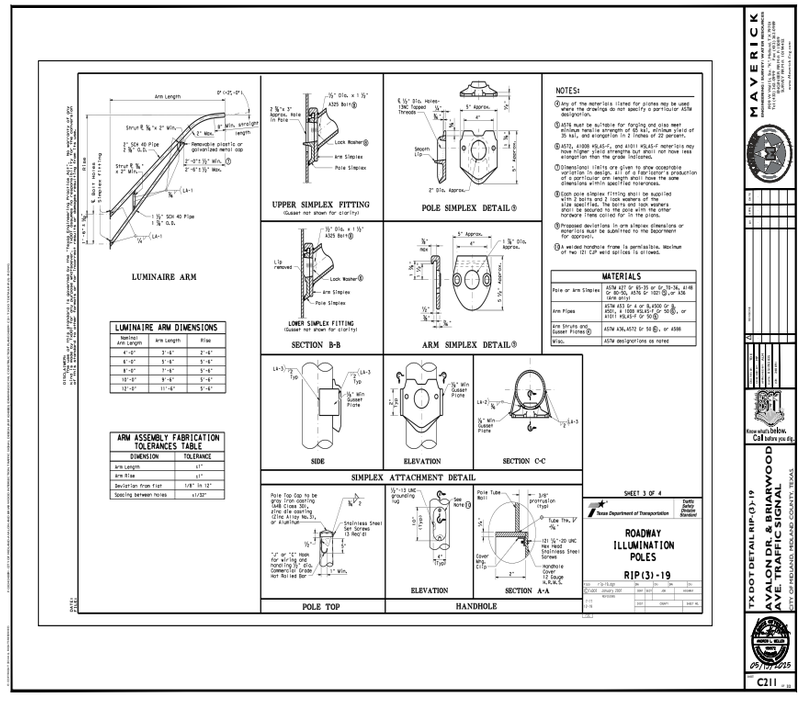
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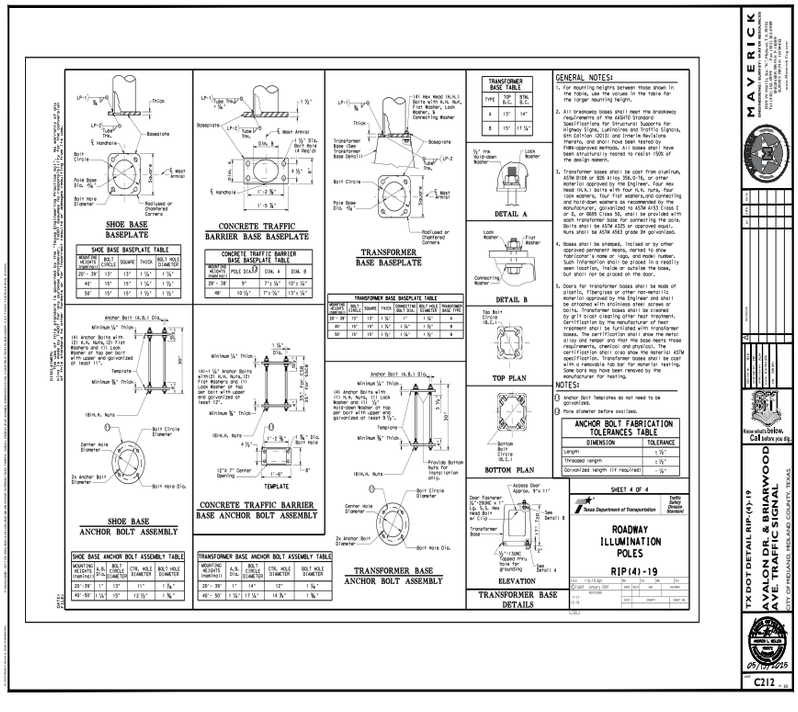
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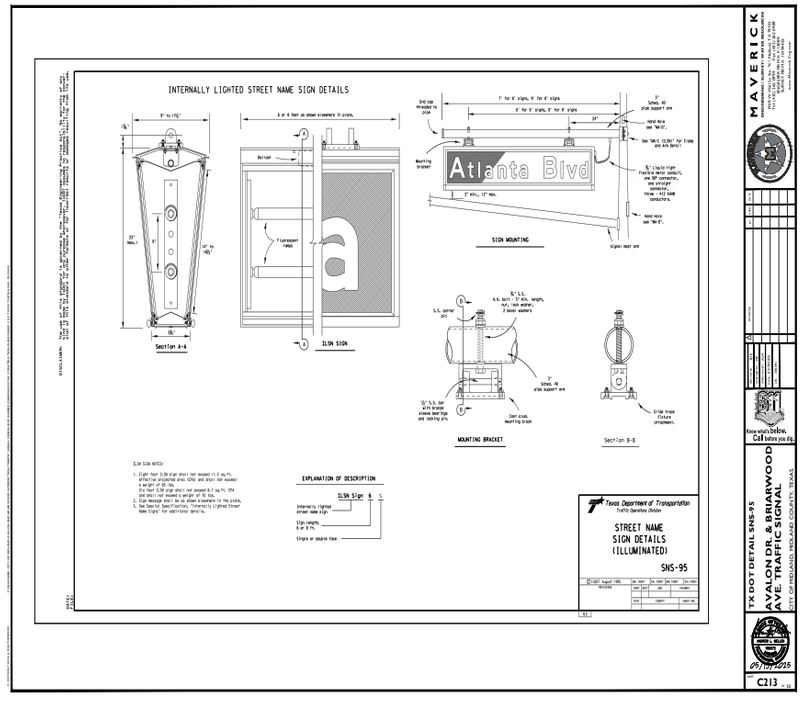
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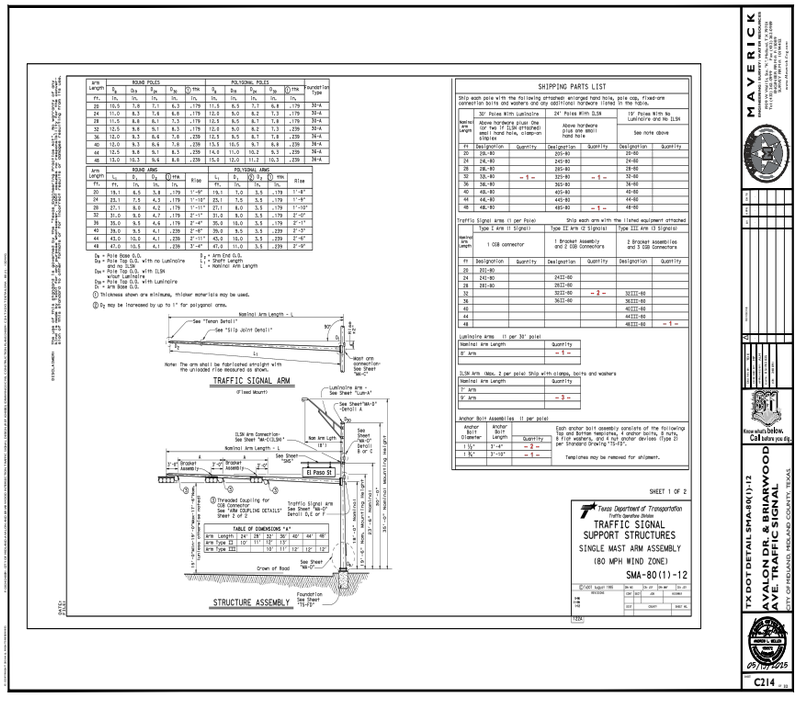


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SHOE BASE BASEPLATE
SHOE BASE BASEPLATE TABLE
CONCRETE TRAFFIC BARRIER BASE BASEPLATE
CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE
TRANSFORMER BASE BASEPLATE
TRANSFORMER BASE BASEPLATE TABLE
TRANSFORMER BASE TABLE
GENERAL NOTES:
NOTES:
ANCHOR BOLT FABRICATION TOLERANCES TABLE
SHOE BASE ANCHOR BOLT ASSEMBLY
SHOE BASE ANCHOR BOLT ASSEMBLY TABLE
CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY
TEMPLATE
TRANSFORMER BASE ANCHOR BOLT ASSEMBLY
TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE
DETAIL A
DETAIL B
TOP PLAN
BOTTOM PLAN
ELEVATION
TRANSFORMER BASE DETAILS
SHEET 4 OF 4
ROADWAY ILLUMINATION POLES
RIP(4)-19
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TX DOT DETAIL RIP(4)-19
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOLLAND, WILLIAMSON COUNTY, TEXAS
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C212



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CITY OF HIGHLAND VILLAGE, DENTON COUNTY, TEXAS
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C213



Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{TA}	D_{TB}	D_W	① t=in	D_B	D_{TA}	D_{TB}	D_W	① t=in	
Ft	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	
20	10.5	5.8	5.1	6.3	.179	11.5	6.5	5.7	6.8	.179	SV-A
24	11.0	6.3	5.6	6.8	.179	12.0	6.0	6.2	7.3	.179	SV-A
28	11.5	6.8	6.1	7.3	.179	12.5	6.5	6.7	7.8	.179	SV-A
32	12.5	6.8	6.1	8.3	.179	12.8	6.0	6.2	7.3	.239	SV-A
36	13.0	6.3	5.6	7.8	.239	13.5	6.5	6.7	7.8	.239	SV-A
40	13.0	6.3	6.6	7.8	.239	13.5	10.5	9.3	6.8	.239	SV-A
44	12.5	6.8	6.1	8.3	.239	14.0	11.0	10.2	8.3	.239	SV-A
48	13.0	10.3	6.6	8.8	.239	15.8	12.0	11.2	10.3	.239	SV-A

Arm Length	ROUND ARMS					POLYGONAL ARMS					
	L_1	D_1	D_2	① t=in	Rise	L_1	D_1	D_2	① t=in	Rise
Ft	Ft	In.	In.	In.		Ft.	In.	In.	In.	
20	19.1	6.5	5.4	.179	1'-6"	19.1	7.0	5.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	5.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	5.5	.179	1'-10"
32	31.0	8.0	4.7	.179	2'-1"	31.0	8.0	5.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	5.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-6"	39.0	9.5	5.5	.239	2'-3"
44	43.0	10.5	4.1	.239	2'-11"	43.0	10.0	5.5	.239	2'-6"
48	47.0	10.5	4.1	.239	3'-4"	47.0	11.0	5.5	.239	2'-6"

D_B = Pole Base O.D.
D_{TA} = Pole Top O.D. with no Luminaire and no SLSA
D_{TB} = Pole Top O.D. with SLSA and/or Luminaire
D_W = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.
② D_2 may be increased by up to 1" for polygonal arms.

Nominal Arm Length - L
See "Tenon Detail"
See "Slip Joint Detail"
D_2
D_1
Mast arm connection- See Sheet "MA-D"
Note: The arm shall be fabricated straight with the unloaded rise measured as shown.

TRAFFIC SIGNAL ARM
(Flared Mount)

Luminaire arm - See Sheet "Lum-A"
See Sheet "MA-D" Detail A
SLSA Arm Connection - See Sheet "MA-C1,SA"
See Sheet "MA-D" Detail C & D
Nominal Arm Length - L
See Sheet "SMS"
3'-6" Bracket Assembly
2'-0" Bracket Assembly
2'-0"
El Paso St
Traffic Signal Arm See Sheet "MA-D" Detail D,E or F
Threaded Coupling for GSB Connector See "ARM COUPLING DETAILS" Sheet 2 of 2
TABLE OF DIMENSIONS "A"

Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type 1&2	2'-0"	2'-1"	1'-9"	1'-5"	1'-2"		
Arm Type 3&4			1'-9"	1'-1"	1'-2"	1'-2"	1'-2"

See Sheet "MA-D"
Crown of Road
Foundation See Sheet "FD-23"
STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-one connection bolts and washers and any additional hardware listed in the table.

Nominal Arm Length	30' Poles With Luminaire Above Hardware (plus) One for 14' SLSA attached) small hand hole, clamp-on Stiffner		24' Poles With SLSA Above Hardware (plus) One small hand hole		19' Poles With No Luminaire and No SLSA See note above	
Ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-80		20S-80		20-60	
24	24L-80		24S-80		24-60	
28	28L-80		28S-80		28-60	
32	32L-80	– 1 –	32S-80	– 1 –	32-60	
36	36L-80		36S-80		36-60	
40	40L-80		40S-80		40-60	
44	44L-80		44S-80		44-60	
48	48L-80		48S-80	– 1 –	48-60	

Traffic Signal Arms (1 per Pole): Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal) 1 GSB connector		Type II Arm (2 Signals) 1 Bracket Assembly and 2 GSB Connectors		Type III Arm (3 Signals) 2 Bracket Assemblies and 3 GSB Connectors	
Ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20S-80					
24	24S-80		24SS-60			
28	28S-80		28SS-60			
32			32SS-60	– 2 –	32SS-60	
36			36SS-60		36SS-60	
40					40SS-60	
44					44SS-60	
48					48SS-60	– 1 –

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	– 1 –

SLSA Arms (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
5' Arm	
8' Arm	– 3 –

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity	Each anchor bolt assembly consists of the following: Top and Bottom hexagonal, 4 anchor bolts, 8 nuts, 8 washers, 1 template for anchor bolts (Type 2) per Standard Sheet "TS-FD"
1 1/2"	3'-4"	– 2 –	
1 3/4"	3'-10"	– 1 –	Templates may be removed for shipment.

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division
TRAFFIC SIGNAL SUPPORT STRUCTURES
SINGLE MAST ARM ASSEMBLY (80 MPH WIND ZONE)
SMA-80(1)-12

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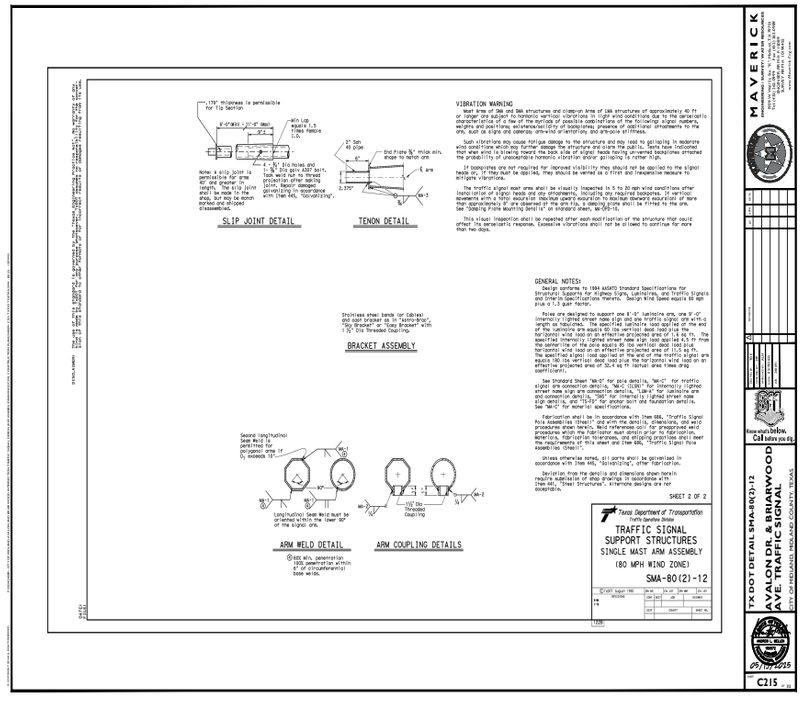
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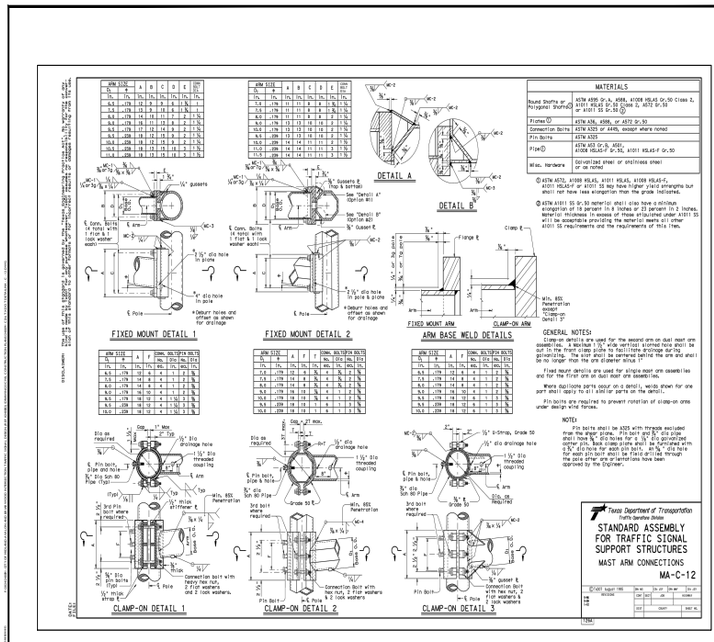
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.179" minimum is permissible for Tip Section
Min Lap equals 1.5 times Handle O.D.
Make a slip joint is permissible for arms 40' and greater in length. The slip joint shall be a snug fit and, but may be sanded, ground and stripped if necessary.
2" Sch 40 pipe
End Plate ¾" minimum thick, shape to match arm
SLIP JOINT DETAIL
TENON DETAIL
VIBRATION WARNING
Stainless steel bands for Cabinet and sign bracket as in "Luminaire and Sign Bracket Assembly Detail" with 1 ½" Dia Threaded Coupling.
BRACKET ASSEMBLY
GENERAL NOTES:
Second Longitudinal Seam Weld is permitted for Tapered Poles if D, exceeds 18"
Longitudinal Seam Weld must be performed within the lower 90° of the signal arm.
1½" Dia Threaded Coupling
ARM WELD DETAIL
ARM COUPLING DETAILS
SHEET 2 OF 2
Texas Department of Transportation
Traffic Operations Division
TRAFFIC SIGNAL SUPPORT STRUCTURES
SINGLE MAST ARM ASSEMBLY
(80 MPH WIND ZONE)
SMA-80(2)-12
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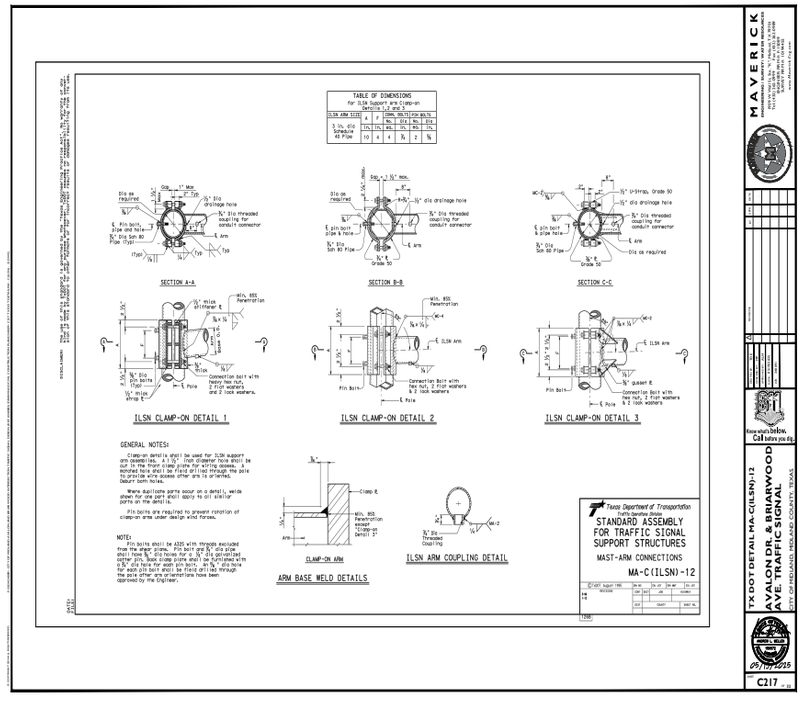


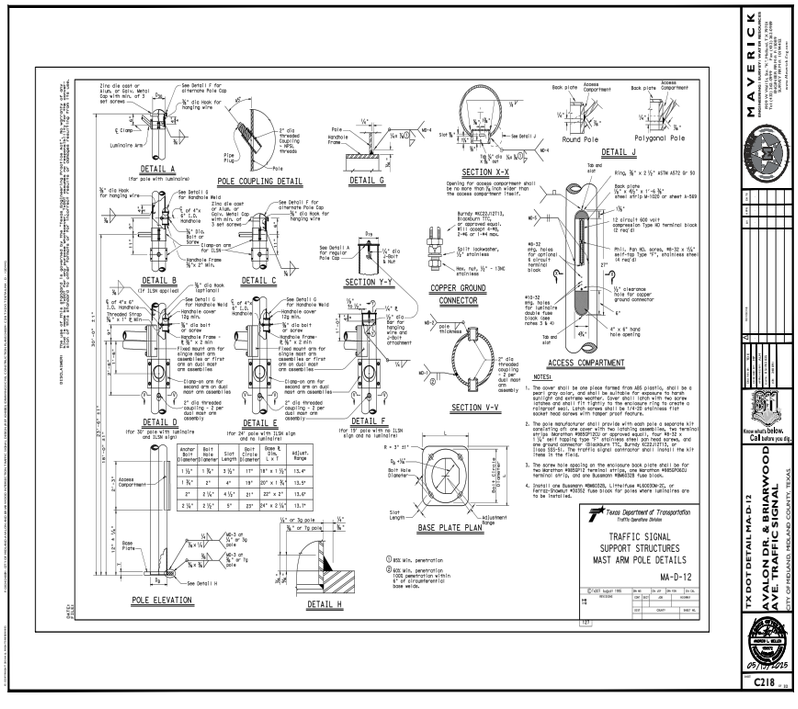
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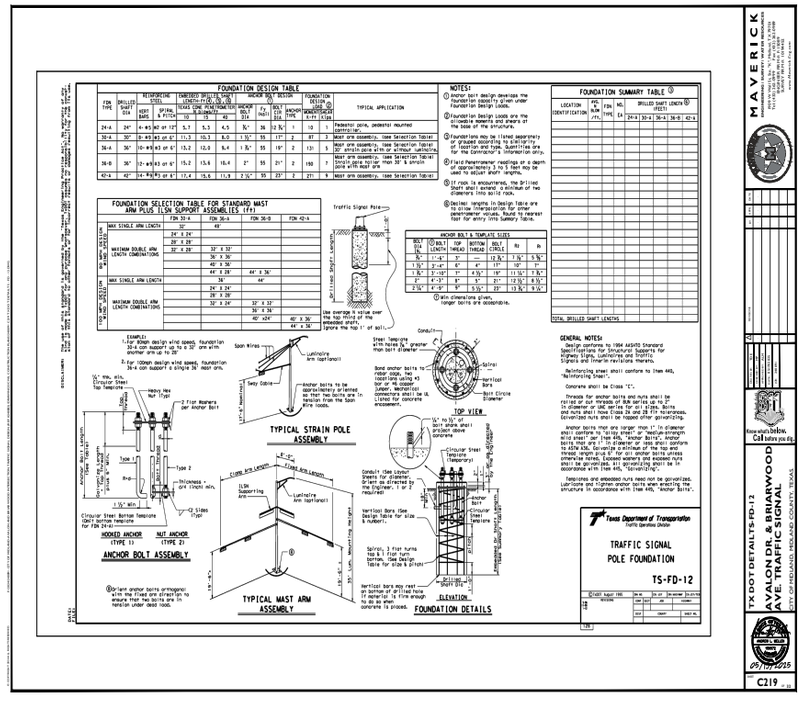
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CITY OF HOUSTON, HARRIS COUNTY, TEXAS

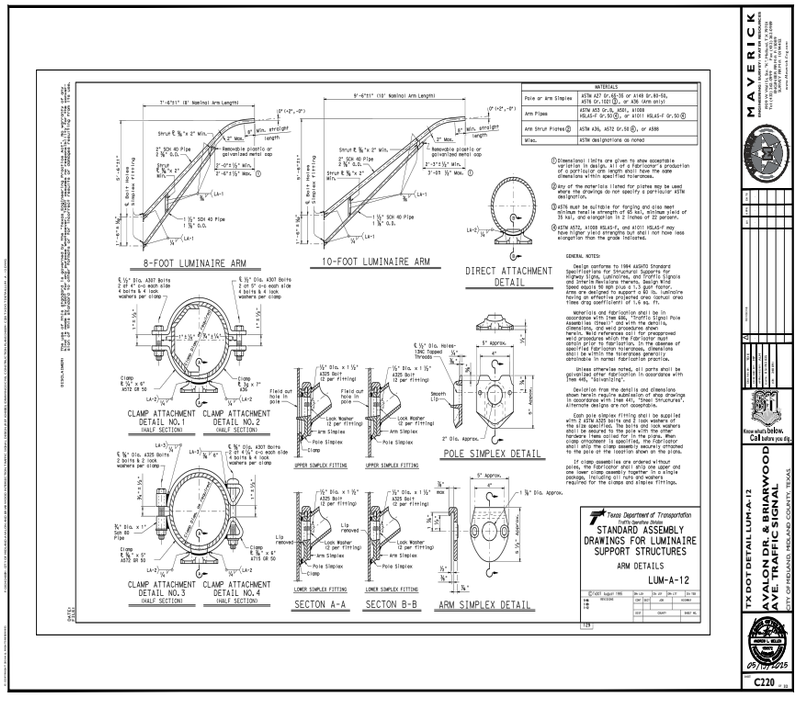
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C216


TABLE OF DIMENSIONS
for ILSN Support arm Clamp-on
Support arm Base
ILSN ARM SIZE
A
F
(SMA, 490/70) Min BOLTS
No. Size
No. Size
5 3/8 dia Schedule 40 Pipe
10
4
4
3/4
2
3/4
SECTION A-A
SECTION B-B
SECTION C-C
ILSN CLAMP-ON DETAIL 1
ILSN CLAMP-ON DETAIL 2
ILSN CLAMP-ON DETAIL 3
GENERAL NOTES:
Clamp-on detail shall be used for ILSN support arm assemblies. A 1 1/2" min diameter hole shall be drilled in the pole for wiring. The 1 1/2" diameter hole shall have a field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.
Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the details.
Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.
NOTES:
Pin bolts shall be A325 with threads excluded from the shear plane. The 490 bolt and nut shall have 3/4" dia holes for a 3/4" dia galvanized cotter pin. Base clamp plate shall be furnished with 1 1/2" dia hole for wiring access. The 1 1/2" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.
CLAMP-ON ARM
ARM BASE WELD DETAILS
ILSN ARM COUPLING DETAIL
Texas Department of Transportation
Traffic Operations Division
STANDARD ASSEMBLY
FOR TRAFFIC SIGNAL
SUPPORT STRUCTURES
MAST-ARM CONNECTIONS
MA-C(ILSN)-12
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CITY OF HIGHLAND VILLAGE, DENTON COUNTY, TEXAS
05/19/2025
C217


DETAIL A
DETAIL B
DETAIL C
DETAIL D
DETAIL E
DETAIL F
DETAIL G
DETAIL H
DETAIL J
POLE COUPLING DETAIL
POLE ELEVATION
BASE PLATE PLAN
SECTION X-X
SECTION Y-Y
SECTION V-V
COPPER GROUND CONNECTOR
ACCESS COMPARTMENT
Round Pole
Polygonal Pole
NOTES:
Texas Department of Transportation
TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS
MA-D-12
MAVERICK
TX DOT DETAIL MA-D-12
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CITY OF HOLLAND, WILLIAMSON COUNTY, TEXAS
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FOUNDATION DESIGN TABLE
FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)
NOTES:
FOUNDATION SUMMARY TABLE
ANCHOR BOLT & TEMPLATE SIZES
GENERAL NOTES:
TYPICAL STRAIN POLE ASSEMBLY
TYPICAL MAST ARM ASSEMBLY
ANCHOR BOLT ASSEMBLY
FOUNDATION DETAILS
TOP VIEW
ELEVATION
TRAFFIC SIGNAL
POLE FOUNDATION
TS-FD-12
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C219

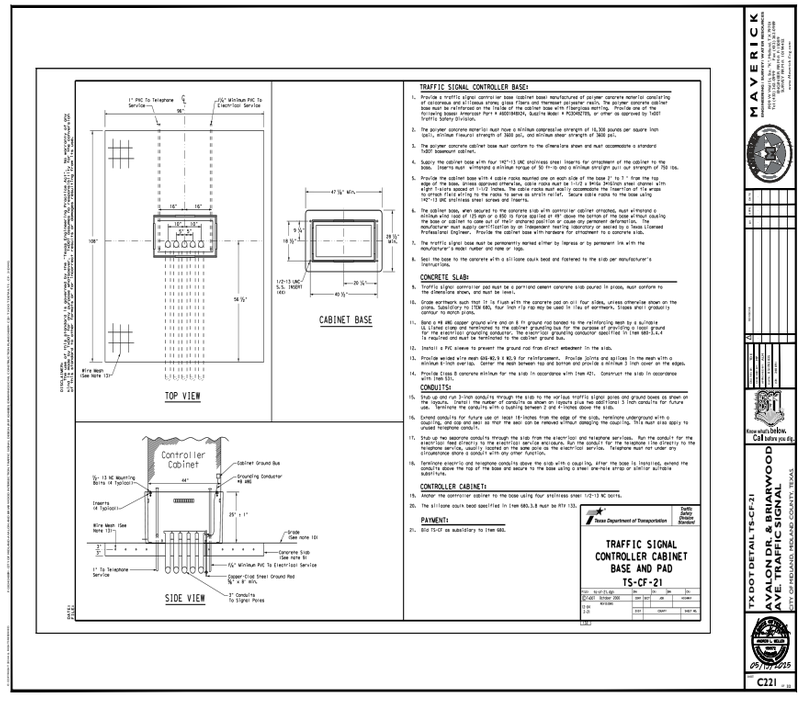


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CITY OF MIDLAND, MIDLAND COUNTY, TEXAS

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C220



TRAFFIC SIGNAL CONTROLLER BASE:

1. Provide a traffic signal control box (cabinet base) manufactured of polymer concrete material consisting of aggregates, resins, and reinforcing fibers. Provide a cabinet base that is one piece. The cabinet base must be reinforced on the inside of the cabinet base with fiberglass matting. Provide one of the following bases: Ameridan Part # A60018482H, Suddle Model # PC30482TBS, or other as approved by TxDOT Traffic Safety Division.
2. The polymer concrete material must have a minimum compressive strength of 10,300 pounds per square inch (psi), minimum flexural strength of 3600 psi, and minimum shear strength of 3600 psi.
3. The polymer concrete cabinet base must conform to the dimensions shown and must accommodate a standard TxDOT basement cabinet.
4. Supply the cabinet base with four 1¼"-13 UNC stainless steel inserts for attachment of the cabinet to the base. Inserts must withstand a minimum torque of 50 ft-lb and a minimum straight pull out strength of 750 lbs.
5. Provide the cabinet base with 4 cable risers mounted one on each side of the base 3" to 5" from the top edge of the base, unless approved otherwise. Cable risers must be 1-1/2 x 9¼in 3¼in inch steel channel with eight 1-slots spaced at 1-1/2 inches. The cable risers must easily accommodate the insertion of tie wraps to attach field wiring to the risers to serve as strain relief. Secure cable risers to the base using 1¼"-13 UNC stainless steel screws and inserts.
6. The cabinet base, when secured to the concrete slab with controller cabinet attached, must withstand a minimum wind load of 125 mph or a 300 lb force applied at 48" above the bottom of the base without causing the base or cabinet to come out of their anchored position or cause any permanent deformation. The manufacturer must provide a letter certifying this requirement, signed and sealed by a Texas licensed Professional Engineer. Provide the cabinet base with hardware for attachment to a concrete slab.
7. The traffic signal base must be permanently marked either by ingress or by permanent ink with the manufacturer's model number and date of mfgr.
8. Seal the base to the concrete with a silicone caulk bead and fastened to the slab per manufacturer's instructions.

CONCRETE SLAB:

9. Traffic signal controller pad must be a portland cement concrete slab poured in place, must conform to the dimensions shown, and must be level.
10. Grade earthwork such that it is flush with the concrete pad on all four sides, unless otherwise shown on the plans. Satisfactory to ITEM 680, four inch rip rap may be used in lieu of earthwork. Slopes shall gradually contour to match grade.
11. Bond a #6 AWG copper ground wire and an 8 ft ground rod bonded to the reinforcing mesh by a suitable UL listed clamp and terminated to the cabinet grounding bus for the purpose of providing a local ground for the electrician grounding conductor. The electrician grounding conductor specified in Item 680-2.6.4 is required and must be terminated to the cabinet ground bus.
12. Install a PVC sleeve to prevent the ground rod from direct embedment in the slab.
13. Provide welded wire mesh 6X6-W2.9 X W2.9 for reinforcement. Provide joints and splices in the mesh with a minimum 6-inch overlap. Center the mesh between top and bottom and provide a minimum 3 inch cover on the edges.
14. Provide Class B concrete minimum for the slab in accordance with Item 421. Construct the slab in accordance with Item 531.

CONDUITS:

15. Stub up and run 3-inch conduits through the slab for the various traffic signal poses and ground boxes as shown on the layouts. Install the number of conduits as shown in layouts plus two additional 2 inch conduits for future use. Terminate the conduits with a bushing between 2 and 4 inches above the slab.
16. Extend conduits for future use at least 18 inches from the edge of the slab, terminate underground with a coupling and plug or cap so that the end can be reused without damaging the coupling. Tape duct plug apply to unused telephone conduit.
17. Stub up two separate conduits through the slab from the electrician and telephone services. Run the conduit for the electrician feed directly to the electrician service enclosure. Run the conduit for the telephone line directly to the telephone service, usually located on the same pole as the electrician service. Telephone must not under any circumstance share a conduit with any other function.
18. Terminate electric and telephone conduits above the slab with a coupling. After the base is installed, extend the conduits above the top of the base and secure to the base using a sheet stainless strap or similar suitable substitute.

CONTROLLER CABINET:

19. Anchor the controller cabinet to the base using four stainless steel 1/2-13 NC bolts.
20. The silicone caulk bead specified in Item 680.3.8 must be RTV 133.

PAYMENT:

21. Bid TS-CF as subsidiary to Item 680.

Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC SIGNAL CONTROLLER CABINET BASE AND PAD

TS-CF-21

FILE: ts-cf-21.dgn	DN:	CK:	DW:	CK:
©TxDOT: October 2012	CONT	SECT	JOB	HIGHWAY
12-06: REVISED				
13-21:	DIST	COUNTY		SHEET NO.

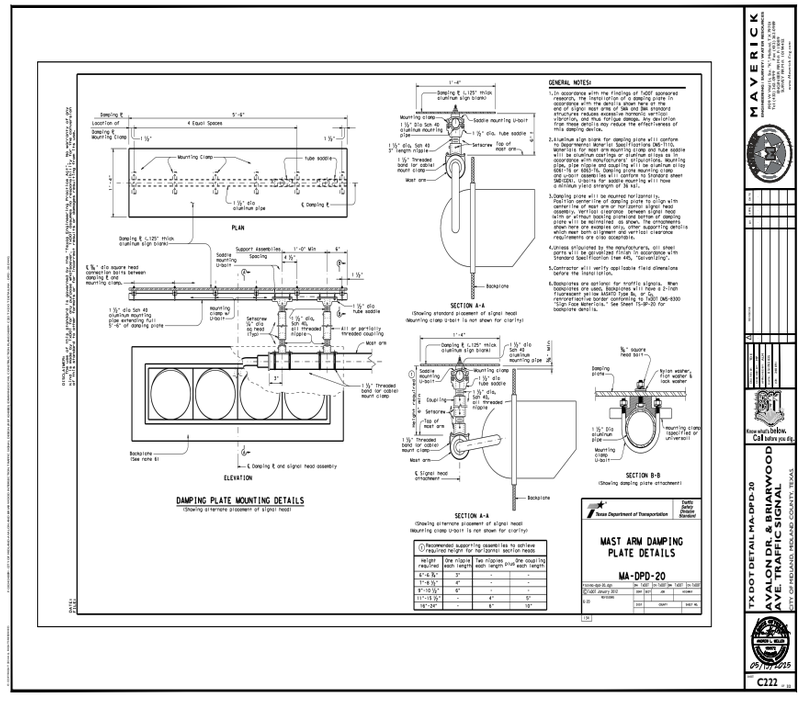
MAVERICK
TBPE FIRM REGISTRATION #: F-23003
TBPLS FIRM REGISTRATION #: 10194482
2929 Briarpark Dr., Ste. 600, Houston, TX 77042
Phone: 713.783.1550 Fax: 713.783.2126
SURVEY PROJECT NO. 24-2000

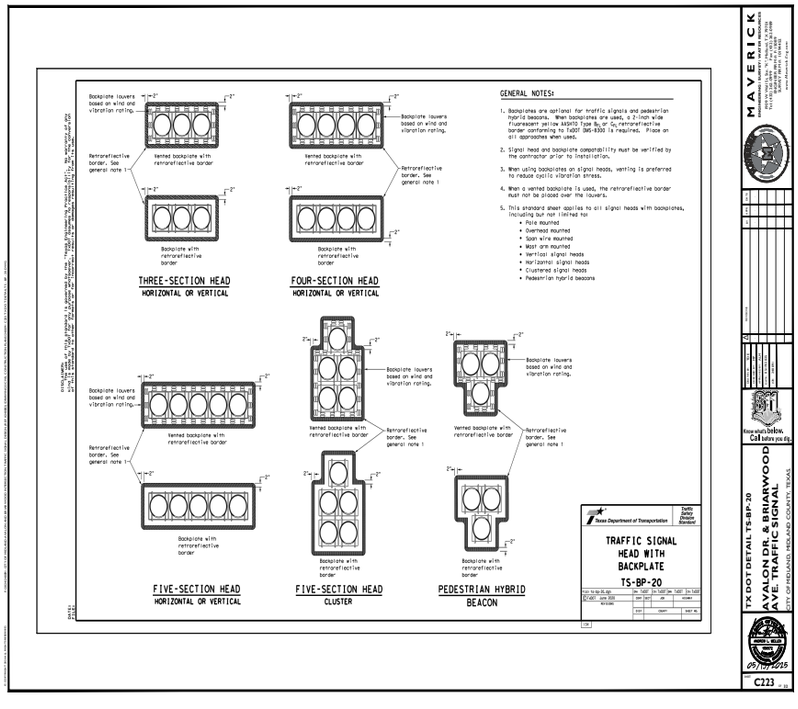
Know what's below. Call before you dig.

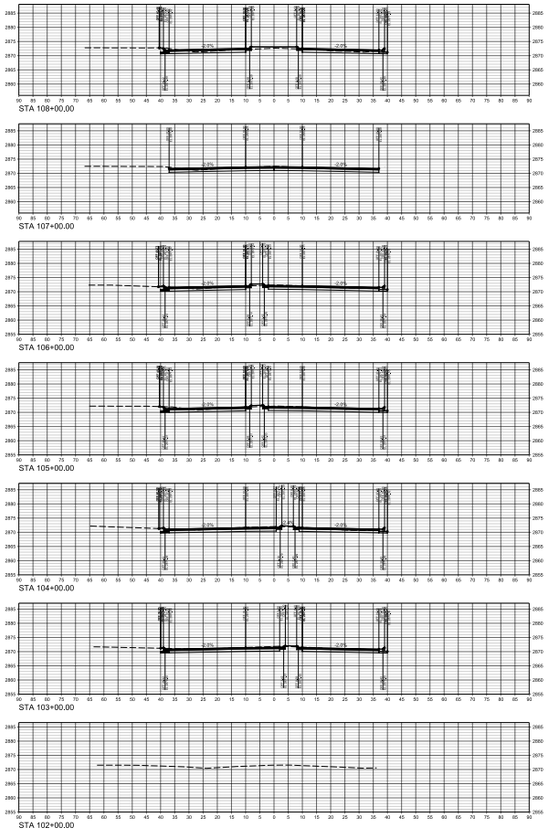
TX DOT DETAIL TS-CF-21
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOUSTON, HARRIS COUNTY, TEXAS

09/19/2025

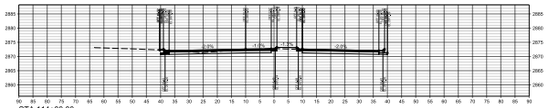
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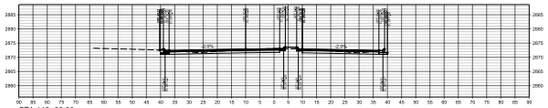

DAMPING PLATE MOUNTING DETAILS
(Showing alternate placement of signal head)
PLAN
ELEVATION
SECTION A-A
(Showing standard placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)
SECTION A-A
(Showing alternate placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)
SECTION B-B
(Showing damping plate attachment)
GENERAL NOTES:
MAST ARM DAMPING PLATE DETAILS
MA-DPD-20
MAVERICK
TX DOT DETAIL MA-DPD-20
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOLLAND, MIDLAND COUNTY, TEXAS
C222

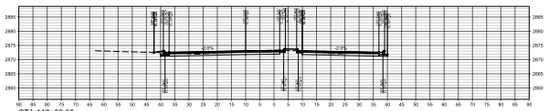

Backplate louvers based on wind and vibration rating.
Retroreflective border. See general note 1
Vented backplate with retroreflective border
Backplate with retroreflective border
THREE-SECTION HEAD
HORIZONTAL OR VERTICAL
FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL
FIVE-SECTION HEAD
HORIZONTAL OR VERTICAL
FIVE-SECTION HEAD
CLUSTER
PEDESTRIAN HYBRID
BEACON
GENERAL NOTES:
1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type B_F or C_{FO} retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatibility must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
• Pole mounted
• Overhead mounted
• Span wire mounted
• Mast arm mounted
• Vertical signal heads
• Horizontal signal heads
• Clustered signal heads
• Pedestrian hybrid beacons
Texas Department of Transportation
Traffic Safety Division Standard
TRAFFIC SIGNAL HEAD WITH BACKPLATE
TS-BP-20
MAVERICK
TX DOT DETAIL TS-BP-20
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND VILLAGE, DENTON COUNTY, TEXAS
05/19/2025
C223

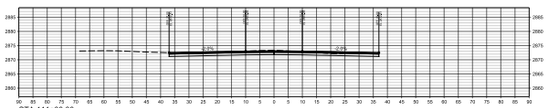

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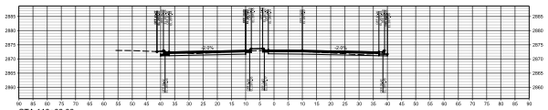
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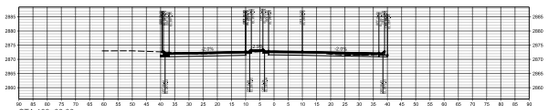

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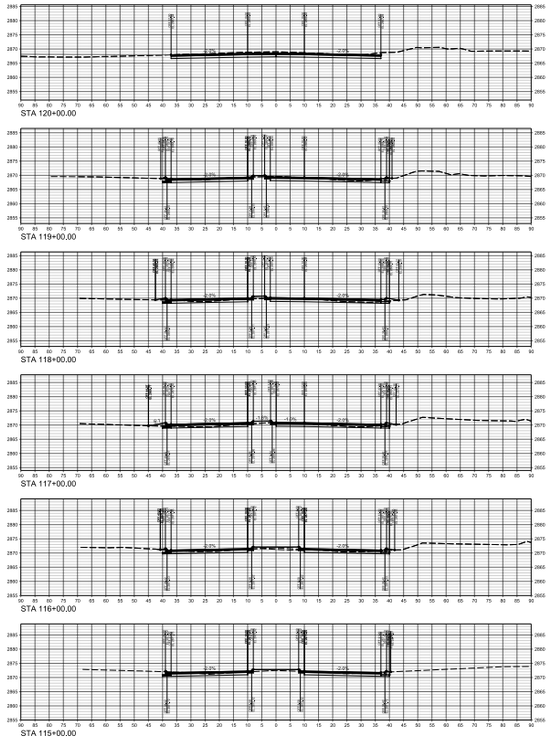

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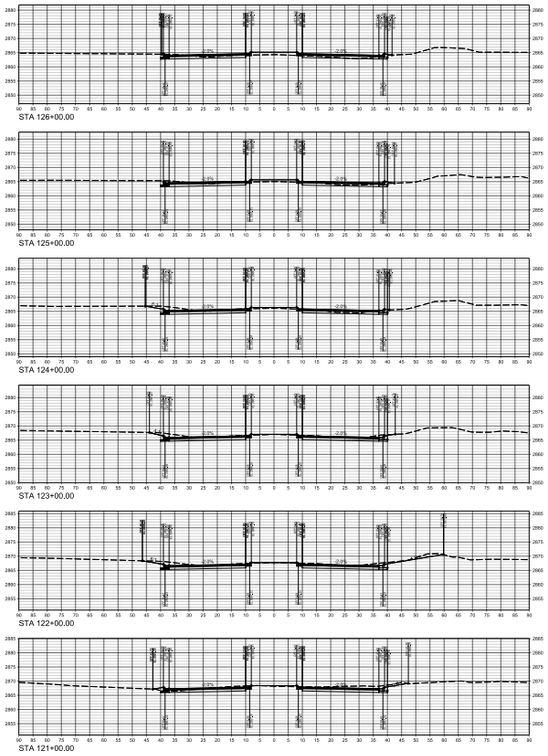

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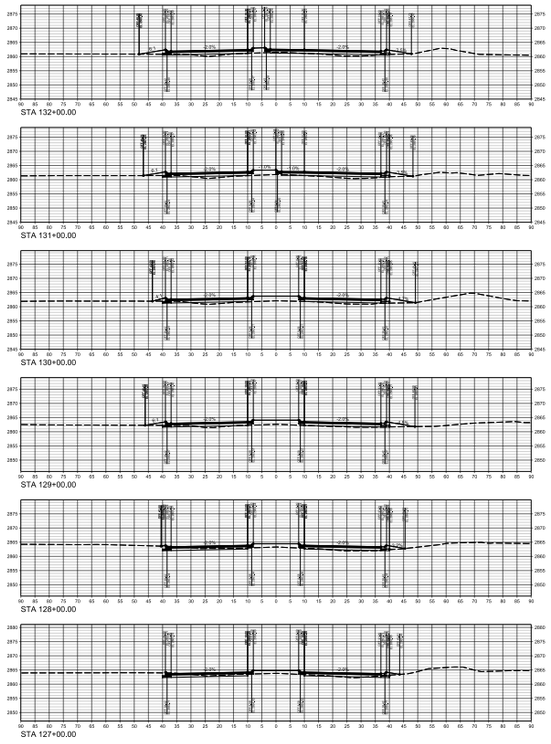
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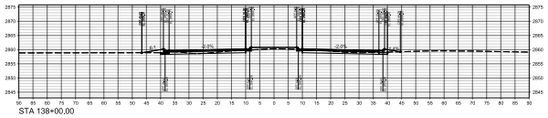
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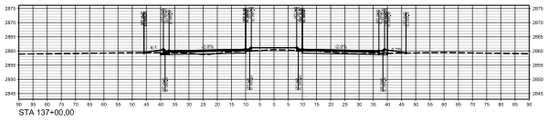

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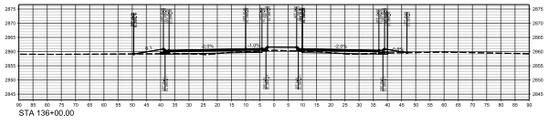
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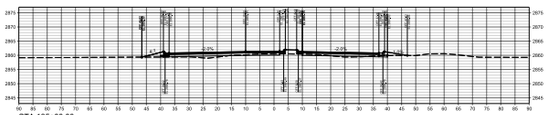

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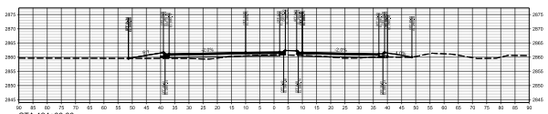
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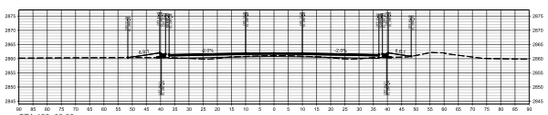

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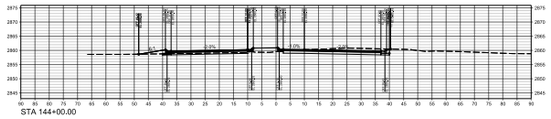

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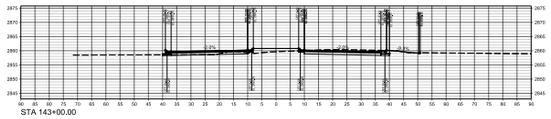

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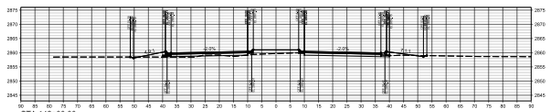

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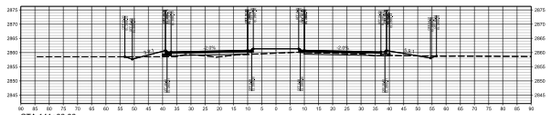

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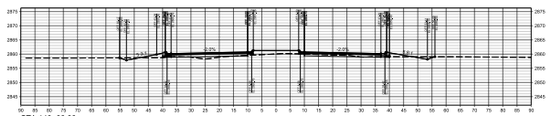
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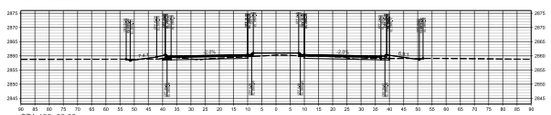

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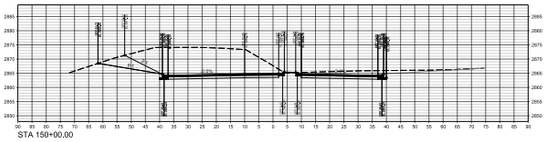

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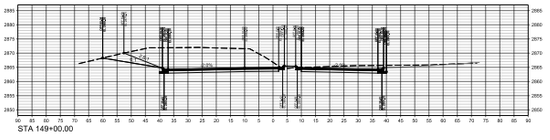

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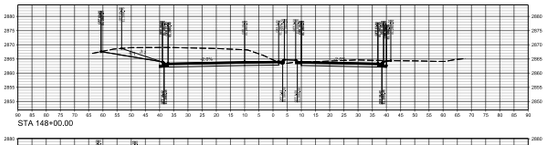

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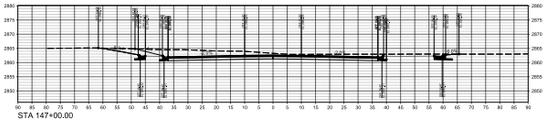

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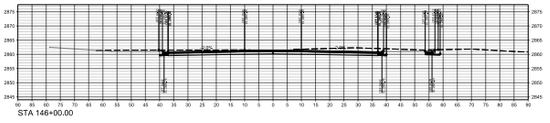
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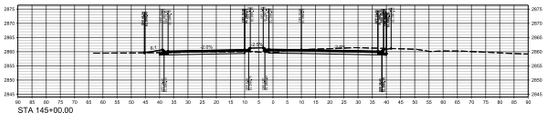

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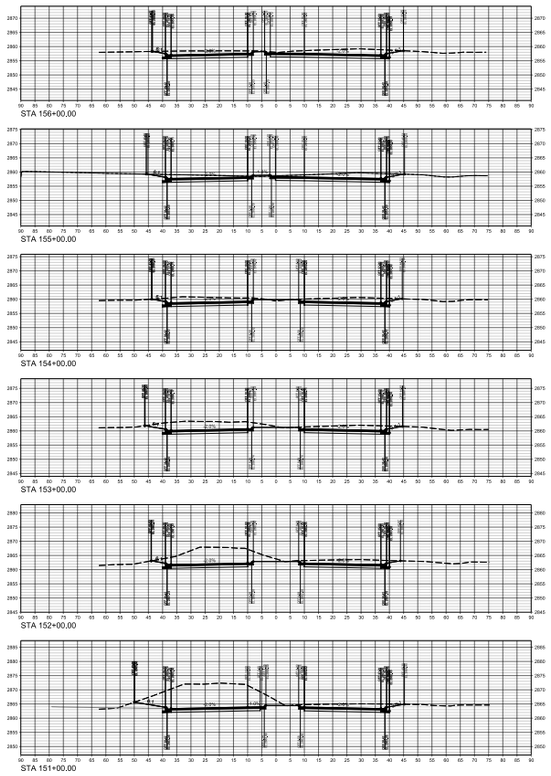

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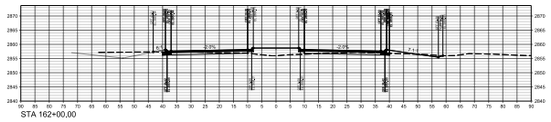

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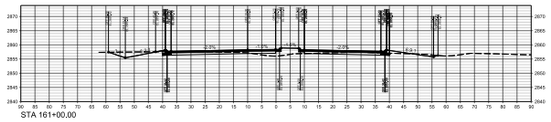

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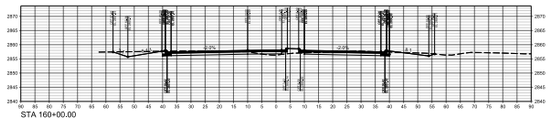
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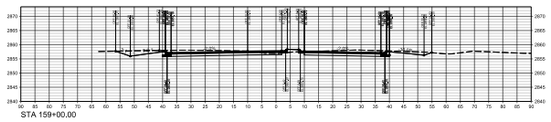

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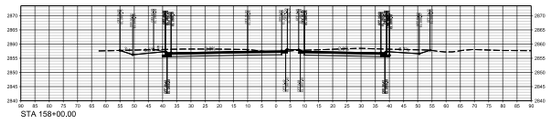
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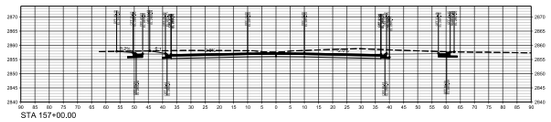

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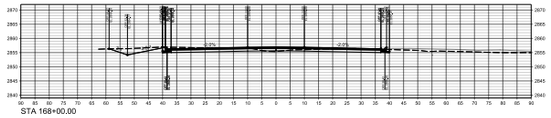

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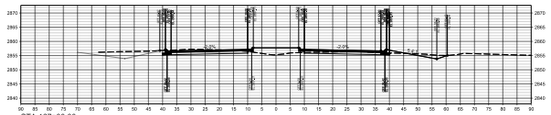

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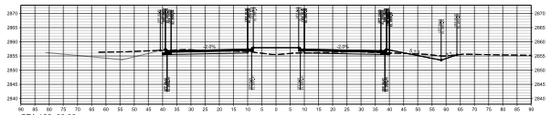

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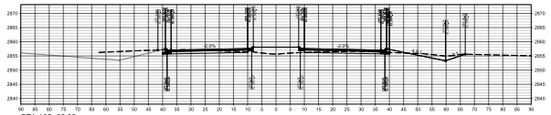

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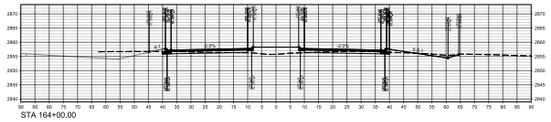
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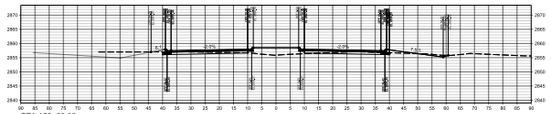

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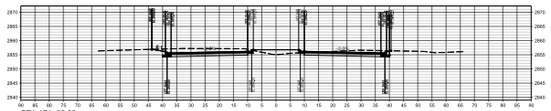

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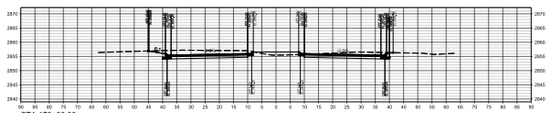

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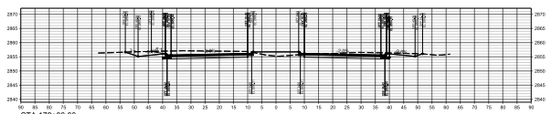

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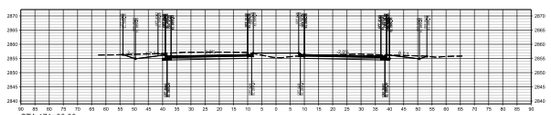

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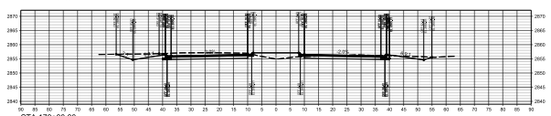
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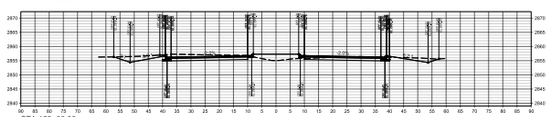

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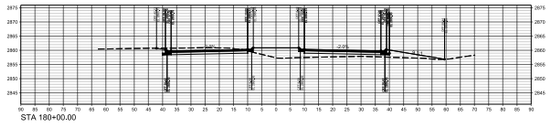

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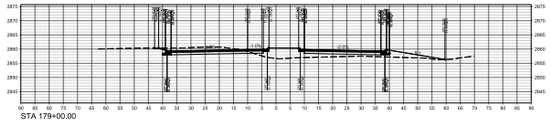

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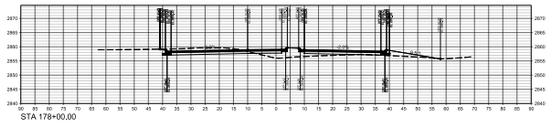

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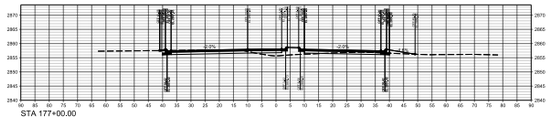

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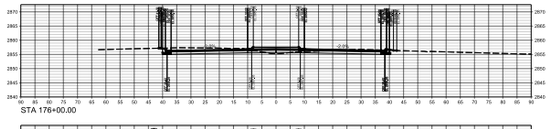
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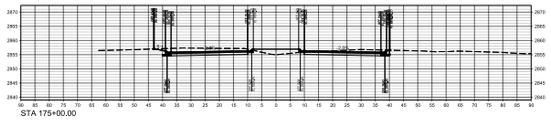

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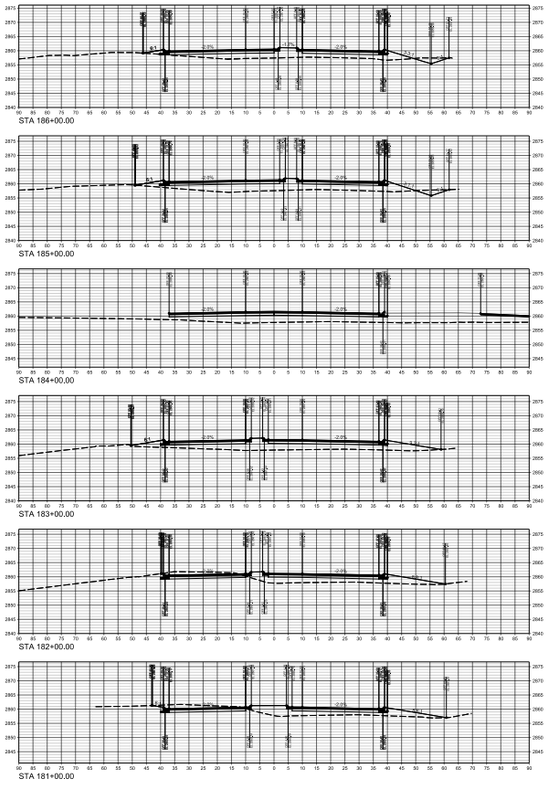

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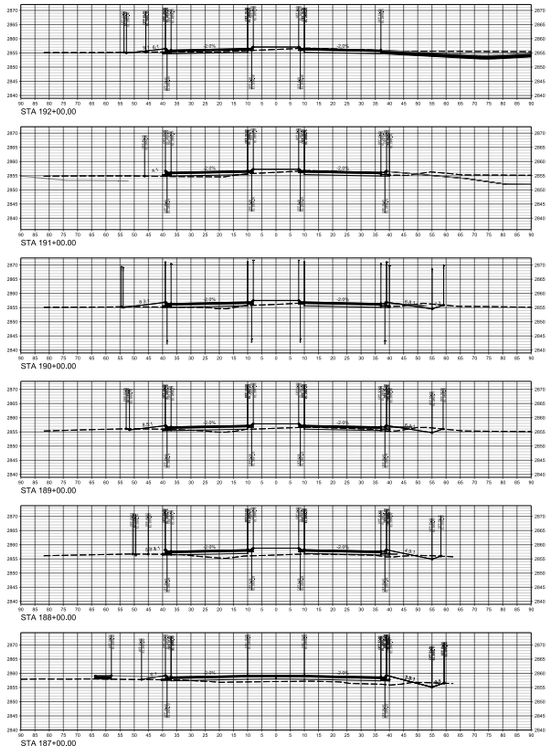

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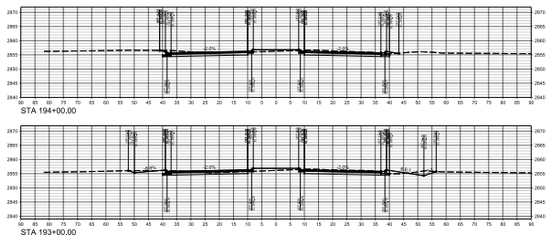
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City of Midland Traffic Signal Material Specification

1. **Cabinet**
    - Type: 16-Channel Henke Double Door Cabinet
2. **Controller**
    - Model: Q-Free XN-2 ATC Controller
3. **Conflict Monitor**
    - Model: EDI 16-Channel LEIP Smart Monitor
4. **Battery Backup System**
    - Manufacturer: Alpha
    - Battery Type: 240XTV Batteries
5. **Detection**
    - Type: No Traffic Detection
6. **Signal Heads**
    - Material: Polycarbonate
    - Backplates: Yellow reflective backplates
7. **Push Buttons**
    - Type: 2-wire
8. **Street Name Signs & Luminaires**
    - Requirement: All signal installations shall include Internally Illuminated Street Name Signs (ILSN) and luminaires unless an overhead conflict exists.
9. **ILSN Arm & Mounting**
    - Arm Length: 9 feet
    - ILSN Specifications:
        - Must include the City of Midland logo
        - Double-sided and mounted on the pole unless an overhead conflict exists

- If an overhead conflict exists, the ILSN shall be one-sided and mounted on the arm

10. **Ground Box**

- A ground box shall be installed between the electric service and the cabinet.

DURALIGHT® LED ILSNS

Front:



Back:



City	Midland			**PO#**	Sample		
Sign Size	96” X 22” X 2.5”			**Frame Width**	2”	**Frame Color**	Black
Face Color	Green EC Film over high-intensity translucent reflective white sheeting on UV Lexan						
Mounting	Top	**Faces**	Double	**# of Signs**	1	**Border**	N/A
Font & Size	Series C		St. Name 12”	St. Type 6”	Block# 4”	Logo 18”x18”	
Designed by	TraStar, Inc	**Sign Type**	LED	**Revision**	V2	**Date**	3.7.2025

1

BID ITEMS

(See Proposal sheet for additional information.)

Project Name: BRIARWOOD AVE PHASE II
Project Number: P21-06
BASE BID

Miscellaneous Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Mobilization, furnished, installed, complete and in place.	1	LS	M1	$_____	$_____
2)	Line Item Removed					
3)	3" PVC Pipe Conduit (Schedule 40 Electric), furnished, installed, complete and in place.	501	LF	M3	$_____	$_____
4)	Erosion/Sediment Control, furnished, installed, complete and in place.	1	LS	M4	$_____	$_____
5)	Traffic Control, furnished, installed, complete and in place.	1	LS	M5	$_____	$_____
6)	Job Site Safety, furnished, installed, complete and in place.	1	LS	M6	$_____	$_____
7)	Seeded Erosion Control Mats, furnished, installed, complete and in place.	10577	SY	M7	$_____	$_____
8)	Seeding & Stabilization, furnished, installed, complete and in place.	10000	SY	M8	$_____	$_____
9)	Spray Watering, furnished, installed, complete and in place.	1	LS	M9	$_____	$_____
Total Miscellaneous Items 1 - 9		$_____				

Demolition Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Preparation of Right-of-Way, furnished, installed, complete and in place.	30	ACRE	D1	$_____	$_____
2)	Unclassified Roadway Excavation (Base Removal, Depth ≤ 14”), complete and in place.	45890	SY	D2	$_____	$_____
3)	Unclassified Roadway Excavation (Non Pavement & Base Removal), complete and in place.	37500	SY	D3	$_____	$_____
4)	Unclassified Basin & Channel Excavation, complete and in place.	4300	CY	D4	$_____	$_____
5)	Removal & Dispose of Existing Unclassified Pavement, complete and in place.	45890	SY	D5	$_____	$_____
6)	Removal & Disposal of Existing Miscellaneous Concrete, complete and in place.	1095	SY	D6	$_____	$_____
7)	Removal & Disposal of Existing Fence And Gate, complete and in place.	10854	LF	D7	$_____	$_____
Total Demolition Items 1 - 7		$_____				

Storm Drain Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	3'x2' Reinforced Concrete Box Culvert furnished, installed, complete and in place.	502	LF	SD1	$_____	$_____
2)	24" Reinforced Concrete Pipe (RCP), furnished, installed, complete and in place.	55	LF	SD2	$_____	$_____
3)	Reinforced Concrete Headwall (Wingwall, PW-1, HW=4', furnished, installed, complete and in place.	4	EA	SD3	$_____	$_____
4)	Reinforced Concrete Headwall (Wingwall, PW-1, HW=5'), furnished, installed, complete and in place.	1	EA	SD3	$_____	$_____
5)	Headwall Safety End Treatment (Type I), furnished, installed, complete and in place.	1	EA	SD4	$_____	$_____
6)	Headwall Safety End Treatment (Type 2), furnished, installed, complete and in place.	2	EA	SD4	$_____	$_____
7)	Open Trenching of Storm Drain, furnished, installed, complete and in place.	557	LF	SD5	$_____	$_____
8)	5" Concrete Rip-Rap, furnished, installed, complete and in place.	1300	SY	SD6	$_____	$_____
Total Storm Drain Items 1 - 8		$_____				

Structural Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Barbed-Wire Fence, furnished, installed, complete and in place.	200	LF	ST1	$_____	$_____
2)	Swing Gate, furnished, installed, complete and in place.	1	EA	ST2	$_____	$_____
3)	Line Item Removed					
4)	24' Cattle Guard Relocation, furnished, complete and in place.	3	EA	ST4	$_____	$_____
5)	Knox Lock, furnished, installed, complete and in place.	1	EA	ST5	$_____	$_____
6)	Relocate Mailbox Foundation, furnished, installed, complete and in place.	4	EA	ST6	$_____	$_____
Total Structural Items 1 - 6		$_____				

Paving Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Subgrade Preparation (Depth ≤ 6”), furnished, installed, complete and in place.	86159	SY	P1	$_____	$_____
2)	Unclassified Embankment (Density Controlled), furnished, installed, complete and in place.	11500	CY	P2	$_____	$_____
3)	8” Jointed Concrete Pavement, furnished, installed, complete and in place.	2276	SY	P3	$_____	$_____
4)	2” Type D HMAC Asphalt Pavement Surface Course (PG70-22, 110 LBS / SY @ 1” Thick), furnished, installed, complete and in place.	65536	SY	P4	$_____	$_____
5)	3” Type C HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1” Thick), furnished, installed, complete and in place.	65536	SY	P5	$_____	$_____
6)	6” Temporary Type B HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1” Thick), furnished, installed, complete and in place.	3427	SY	P6	$_____	$_____
7)	10” Flexible Base (Type A, Grade 4), furnished, installed, complete and in place.	82732	SY	P7	$_____	$_____
8)	Bituminous Prime Coat (MC-30, 0.20 Gal / SY), furnished, installed, complete and in place.	22421	GAL	P8	$_____	$_____
9)	Tack Coat (MC-30, 0.10 Gal / SY), furnished, installed, complete and in place.	6554	GAL	P9	$_____	$_____
10)	4” Stamped Concrete Median, furnished, installed, complete and in place.	10633	SY	P10	$_____	$_____
11)	4” Concrete Median, furnished, installed, complete and in place.	995	SY	P11	$_____	$_____
12)	8” Concrete Fillet, furnished, installed, complete and in place.	815	SY	P12	$_____	$_____
13)	8” Concrete Valley Gutter, furnished, installed, complete and in place.	641	SY	P13	$_____	$_____
14)	6” Concrete Driveway Approach, furnished, installed, complete and in place.	1700	SY	P14	$_____	$_____
15)	Type A Concrete Curb & Gutter, furnished, installed, complete and in place.	18154	LF	P15	$_____	$_____
16)	Type C Concrete Curb & Gutter, furnished, installed, complete and in place.	15784	LF	P15	$_____	$_____
17)	Type I Concrete Curb & Gutter, furnished, installed, complete and in place.	629	LF	P15	$_____	$_____

18)	Concrete Pedestrian Access Ramp, furnished, installed, complete and in place.	327	SY	P16	$_____	$_____
19)	Manhole Ring & Cover Adjustment, furnished, installed, complete and in place.	18	EA	P17	$_____	$_____
20)	Water Valve Box Ring & Cover Adjustment, furnished, installed, complete and in place.	28	EA	P17	$_____	$_____
21)	6" Temporary Flexible Base (Type A, Grade 4), furnished, installed, complete and in place.	356	SY	P7	$_____	$_____
Total Paving Items 1 - 21		$_____				

Traffic Control Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Eliminate Existing Pavement Markings and Markers (Line Markings), furnished, installed, complete and in place.	66995	LF	T1	$	$
2)	Retroreflectorized Pavement Markings, TxDOT Item 666 (24" White, Solid), furnished, installed, complete and in place.	318	LF	T2	$	$
3)	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, Solid), furnished, installed, complete and in place.	2813	LF	T2	$	$
4)	Retroreflectorized Pavement Markings, TxDOT Item 666 (12" Yellow, Solid), furnished, installed, complete and in place.	112	LF	T2	$	$
5)	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, LNDP), furnished, installed, complete and in place.	250	LF	T2	$	$
6)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Solid), furnished, installed, complete and in place.	17857	LF	T3	$	$
7)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Broken), furnished, installed, complete and in place.	4630	LF	T3	$	$
8)	Thermoplastic Pavement Markings, TxDOT Item 666 (6" Yellow, Solid), furnished, installed, complete and in place.	2027	LF	T3	$	$
9)	Prefabricated Pavement Markings, TxDOT Item 666 (White, Arrow Symbol), furnished, installed, complete and in place.	27	EA	T4	$	$
10)	Prefabricated Pavement Markings, TxDOT Item 666 (White, Bike Lane Symbol), furnished, installed, complete and in place.	36	EA	T4	$	$
11)	In Road Sign Assembly (SUP&AM [Type S80(1)SB(p)]), furnished, installed, complete and in place.	45	EA	T5	$	$
12)	Remove Sign Assembly, furnished, installed, complete and in place.	12	EA	T6	$	$
13)	Retroreflective Raised Pavement Marker (Type II-C-R), furnished, installed, complete and in place.	463	EA	T7	$	$
14)	Utility Duct Bank, furnished, installed, complete and in place.	288	LF	T8	$	$
15)	Type C Ground Box (162911) With Apron, furnished, installed, complete and in place.	4	EA	T9	$	$
16)	Delineator Assembly (OM-2Y)(WC)GND(BI), furnished, installed, complete and in place.	10	EA	T10	$	$
17)	Delineator Assembly (8' Permenant Type III Barricade), furnished, installed, complete and in place.	6	EA	T10	$	$
18)	Temporary Workzone Pavement Markings, furnished, installed, complete and in place.	1	LS	T11	$	$
Total Traffic Control Items 1 - 18		$				

Price For:	
1. Miscellaneous Items	$
2. Demolition Items	$
3. Storm Drain Items	$
4. Structural Items	$
5. Paving Items	$
6. Traffic Control Items	$
Total Price	$

PAY NOTES

P21-06

BRIARWOOD AVE PHASE II

BASE BID

Bid Item		Pay Quantity Note
Miscellaneous Items		
1	Mobilization	M1
2	Pay Note Removed	
3	3" PVC Pipe Conduit (Schedule 40 Electric)	M3
4	Erosion/Sediment Control	M4
5	Traffic Control	M5
6	Job Site Safety	M6
7	Seeded Erosion Control Mats	M7
8	Seeding & Stabilization	M8
9	Spray Watering	M9
Demolition Items		
1	Preparation of Right-of-Way	D1
2	Unclassified Roadway Excavation (Base Removal, Depth ≤ 14")	D2
3	Unclassified Roadway Excavation (Non Pavement & Base Removal)	D3
4	Unclassified Excavation (Basin & Channel)	D4
5	Removal & Disposal of Existing Unclassified Pavement	D5
6	Removal & Disposal of Existing Miscellaneous Concrete	D6
7	Removal & Disposal of Existing Fence And Gate	D7
Storm Drain Items		
1	3'x2' Reinforced Concrete Box Culvert	SD1
2	24" Reinforced Concrete Pipe (RCP)	SD2
3	Reinforced Concrete Headwall (Wingwall, PW-1, HW=4')	SD3
4	Reinforced Concrete Headwall (Wingwall, PW-1, HW=5')	SD3
5	Headwall Safety End Treatment (Type I)	SD4
6	Headwall Safety End Treatment (Type II)	SD4
7	Open Trenching of Storm Drain	SD5
8	5" Concrete Rip-Rap	SD6
Structural Items		
1	Barbed-Wire Fence	ST1
2	Swing Gate	ST2
3	Pay Note Removed	
4	24' Cattle Guard Relocation	ST4
5	Knox Lock	ST5
6	Relocate Mailbox Foundation	ST6

Paving Items

1	Subgrade Preparation (Depth ≤ 6")	P1
2	Unclassified Embankment (Density Controlled)	P2
3	8" Jointed Concrete Pavement	P3
4	2" Type D HMAC Asphalt Pavement Surface Course (PG70-22, 110 LBS / SY @ 1" Thick)	P4
5	3" Type C HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick)	P5
6	6" Temporary Type B HMAC Asphalt Pavement Surface Course (PG64-22, 110 LBS / SY @ 1" Thick)	P6
7	10" Flexible Base (Type A, Grade 4)	P7
8	Bituminous Prime Coat (MC-30, 0.20 Gal / SY)	P8
9	Tack Coat (MC-30, 0.10 Gal / SY)	P9
10	4" Stamped Concrete Median	P10
11	4" Concrete Median	P11
12	8" Concrete Fillet	P12
13	8" Concrete Valley Gutter	P13
14	6" Concrete Driveway Approach	P14
15	Type A Concrete Curb & Gutter	P15
16	Type C Concrete Curb & Gutter	P15
17	Type I Concrete Curb & Gutter	P15
18	Concrete Pedestrian Access Ramp	P16
19	Manhole Ring & Cover Adjustment	P17
20	Water Valve Box Ring & Cover Adjustment	P17
21	6" Temporary Flexible Base (Type A, Grade 4)	P7

Traffic Items

1	Eliminate Existing Pavement Markings and Markers (Line Markings)	T1
2	Retroreflectorized Pavement Markings, TxDOT Item 666 (24" White, Solid)	T2
3	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, Solid)	T2
4	Retroreflectorized Pavement Markings, TxDOT Item 666 (12" Yellow, Solid)	T2
5	Retroreflectorized Pavement Markings, TxDOT Item 666 (8" White, LNDP)	T2
6	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Solid)	T3
7	Thermoplastic Pavement Markings, TxDOT Item 666 (6" White, Broken)	T3
8	Thermoplastic Pavement Markings, TxDOT Item 666 (6" Yellow, Solid)	T3
9	Prefabricated Pavement Markings (White, Arrow Symbol)	T4
10	Prefabricated Pavement Markings (White, Bike Lane Symbol)	T4
11	In Road Sign Assembly (SUP&AM [Type S80(1)SB(p)])	T5
12	Remove Sign Assembly	T6
13	Retroreflective Raised Pavement Marker (Type II-C-R)	T7
14	Utility Duct Bank	T8
15	Type C Ground Box (162911) With Apron	T9
16	Delineator Assembly (OM-2Y)(WC)GND(BI)	T10
17	Delineator Assembly (8' Permenant Type III Barricade)	T10
18	Temporary Workzone Pavement Markings	T11

PAY QUANTITY NOTES

M1 Includes the necessary equipment, labor, materials, and incidentals for all Mobilization to the job site complete and in place. Measurement and payment to be made per lump sum.

M2

Pay Note Removed

M3 Includes the necessary equipment, labor, materials, and incidentals for the installation of Pipe Conduit per the construction drawings and City of Midland standards and specifications, including all trenching, embedment, backfill, and appurtenances. Measurement and payment to be per linear foot measured along the ground surface following the pipe centerline through all boxes, fittings, structures, and appurtenances.

M4 Includes the necessary equipment, labor, materials, and incidentals to implement the Erosion Control Plan per the construction drawings and City of Midland standards and specifications. Measurement and payment to be made per lump sum.

M5 Includes the necessary equipment, labor, materials, and incidentals to implement the Traffic Control per the approved Traffic Control Plan. Any required traffic control devices are to meet the City of Midland Traffic Division Standards. Measurement and payment to be made per lump sum.

M6 Includes the necessary equipment, labor, materials, and incidentals to implement Job Site Safety and to provide a safe work environment for the project work area (including all personal protection equipment, trench safety, etc.) per the construction drawings and in compliance with all applicable Federal, State, and Local requirements or regulations including those of OSHA and the City of Midland. JOB SITE SAFETY IS THE RESPONSABILITY OF THE CONTRACTOR. Measurement and payment to be made per lump sum.

M7 Includes the necessary equipment, labor, materials, and incidentals for Seeded Erosion Control Mats per the construction drawings and City of Midland standards and specifications, including all removal, storage, and replacement of existing topsoil as well as all mats, seeding, staking, and appurtenances. Watering is addressed in a separate pay note. Measurement and payment to be made per square yard measured along the ground surface.

M8 Includes the necessary equipment, labor, materials, and incidentals for Seeding & Stabilization per the construction drawings and City of Midland standards and specifications, including all removal, storage, and replacement of existing topsoil as well as all seeding and appurtenances. Watering is addressed in a separate pay note. Measurement and payment to be made per square yard measured along the ground surface.

M9 Includes the necessary equipment, labor, materials, and incidentals for Spray Watering per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per lump sum.

D1 Includes the necessary equipment, labor, materials, and incidentals for Preparation of Right-of-Way per the construction drawings and City of Midland standards and specifications including removal and disposal of all obstructions from the right-of-way and easements where removal of such obstructions is not indicated in the consturction drawings, all scraping and preservation of top soil, and including all clearing, grubbing, and appurtenances. Measurement and payment to be made per acre measured along the ground surface.

D2 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per square yard measured along the ground surface.

D3 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per square yard of material removed.

D4 Includes the necessary equipment, labor, materials, and incidentals for Unclassified Excavation per the construction drawings and City of Midland standards and specifications including all existing pavement and sub-structure removal, unclassified excavation, material removal, and appurtenances. Measurment and payment to be per cubic yard of material removed.

D5 Includes the necessary equipment, labor, materials, and incidentals for the Removal & Disposal of Existing Unclassified Pavement per the construction drawings and City of Midland standards and specifications including all pavement removal, saw-cutting, and appurtenances. Depths given are approximate and pavement material is to be removed in its entirety. No additional compensation will be made for increased pavement depth removal. Measurement and payment to be made per square yard measured along the ground surface.

D6 Includes the necessary equipment, labor, materials, and incidentals for the Removal & Disposal of Existing Miscellaneous Concrete per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

D7 Includes the necessary equipment, labor, materials, and incidentals to Remove & Dispose of Existing Fence And Gate per the construction drawings and City of Midland standards and specifications, including removal of all, columns, posts, foundations, anchors, gates, frames, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per linear foot measures along the ground surface following the fence centerline through all structures and appurtenances.

SD1 Includes the necessary equipment, labor, materials, and incidentals for the installation of Reinforced Concrete Box Culvert per the construction drawings and City of Midland standards and specifications, including all embedment, detector wire, tracer tape, necessary testing, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the box culvert centerline through all structures and appurtenances.

SD2 Includes the necessary equipment, labor, materials, and incidentals for the installation of Storm Drains per the construction drawings and City of Midland standards and specifications, including all embedment, detector wire, tracer tape, necessary testing, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the pipe centerline through all structures and appurtenances.

SD3 Includes the necessary equipment, labor, materials, and incidentals for the installation of a Reinforced Concrete Headwall per the construction drawings and City of Midland standards and specifications, including all forms, reinforcment, placement, sealing, finishing, and appurtenances. Measurement and payment to be made per each concrete headwall installed.

SD4 Includes the necessary equipment, labor, materials, and incidentals for the installation of a Headwall Safety End Treatment per the construction drawings and City of Midland standards and specifications, including all forms, reinforcment, placement, sealing, finishing, and appurtenances. Measurement and payment to be made per each headwall safety end treatment installed.

SD5 Includes the necessary equipment, labor, materials, and incidentals for Open Trenching of Storm Drain per the construction drawings and City of Midland standards and specifications, including all unclassified excavation, backfill not including flowable fill backfill, providing trench safety and protection for workers to install pipe, structures, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the pipe centerline through all structures, fittings, and appurtenances.

SD6 Includes the necessary equipment, labor, materials, and incidentals for the installation of Concrete Rip-Rap per the consturction drawings and City of Midland standards and specifications, including all excavation, forms, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

ST1 Includes the necessary equipment, labor, materials, and incidentals to install a Fence per the construction drawings and City of Midland standards and specifications, including all columns, posts, foundations, anchors, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per linear foot measured along the ground surface following the fence centerline through all structures and appurtenances.

ST2 Includes the necessary equipment, labor, materials, and incidentals to install a Fence Gate per the construction drawings and City of Midland standards and specifications, including all columns, posts, foundations, anchors, frames, attachments, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per each gate installed.

ST3

Pay Note Removed

ST4 Includes the necessary equipment, labor, materials, and incidentals to relocate a Cattle Guard per the construction drawings and City of Midland standards and specifications, including all beams, foundations, anchors, frames, attachments, and structures as well as all excavation, backfill, cutting, and appurtenances. Measurement and payment to be made per each cattle guard installed.

ST5 Includes the necessary equipment, labor, materials, and incidentals to install a Knox Lock per the construction drawings and City of Midland standards and specifications, including all posts, foundations, anchors, frames, safe or box, attachments, and structures as well as all appurtenances. Measurement and payment to be made per each knox lock installed.

ST6 Includes the necessary equipment, labor, materials, and incidentals to Relocate Mailbox Foundation per the construction drawings and City of Midland standards and specifications, including all structure removal, foundation placement, and appurtenances. Measurement and payment to be made per each existing mailbox foundation removed and new mailbox foundation set.

P1 Includes the necessary equipment, labor, materials, and incidentals for Subgrade Preparation per the construction drawings and City of Midland standards and specifications, including all proof-rollling, sub-grade reworking, scarifying, compaction, and appurtenances. Measurement and payment to be made per square yard measured along the ground surface.

P2 Includes the necessary equipment, labor, materials, and incidentals for placement of Unclassified Embankment per the construction drawings and City of Midland standards and specifications, including all sprinkling, rolling, correction of soft spots, grading, sloping, compaction, and appurtenances. Measurement and payment to be made per each cubic yard placed.

P3 Includes the necessary equipment, labor, materials, and incidentals for placement of Jointed Concrete Pavement per the construction drawings and City of Midland standards and specifications, including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P4 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "D" HMAC Asphalt Pavement Surface Course (PG 70-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P5 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "C" HMAC Asphalt Pavement Surface Course (PG 64-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P6 Includes the necessary equipment, labor, materials, and incidentals for the placement of Type "B" HMAC Asphalt Pavement Surface Course (PG 64-22, 110 LBS / SY at 1" thick) per the construction drawings and City of Midland standards and specifications, including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P7 Includes the necessary equipment, labor, materials, and incidentals for placement of Flexible Base compacted to 95% Density, ASTM D1557, per the construction drawings and City of Midland standards and specifications including all placement, compaction, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P8 Includes the necessary equipment, labor, materials, and incidentals for application of Bituminous Prime Coat (MC-30, 0.20 GAL / SY) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per gallon of material applied at the designated rate.

P9 Includes the necessary equipment, labor, materials, and incidentals for application of Tack Coat (MC-30, 0.10 GAL / SY) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per gallon of material applied at the designated rate.

P10 Includes the necessary equipment, labor, materials, and incidentals for placement of Stamped Concrete Median per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P11 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Median per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P12 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Fillet per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Curb section is formed and poured monolithically with fillet and is not a separate bid item. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P13 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Valley Gutter per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P14 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Driveway Approach per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, sealing, finishing, and appurtenances. Pedestrian access ramps at the driveway approach are considered part of the approach and are not a separate bid item. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P15 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Curb & Gutter per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, jointing, finishing, and appurtenances. Measurement and payment to be made per linear foot of material placed measured along the back-of-curb.

P16 Includes the necessary equipment, labor, materials, and incidentals for placement of Concrete Pedestrian Access Ramp per the construction drawings and City of Midland standards and specifications, including all forming, reinforcement, placement, jointing, finishing, and appurtenances. Measurement and payment to be made per square yard of material placed measured along the ground surface.

P17 Includes the necessary equipment, labor, materials, and incidentals for Ring & Cover Adjustment per the construction drawings and City of Midland standards and specifications including all forming, reinforcement, placement, flowable fill, jointing, sealing, finishing, and appurtenances. This includes a minimum 1.0' wide concrete collar whose width is measured from the outer edge of the cover to the outer edge of the concrete ring. Measurement and payment to be made per each adjustment made.

T1 Includes the necessary equipment, labor, materials, and incidentals to Eliminate Existing Pavement Markings and Markers (Line Marking) per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot eliminated.

T2 Includes the necessary equipment, labor, materials, and incidentals for the placement of Retroreflectorized Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed.

T3 Includes the necessary equipment, labor, materials, and incidentals for the placement of Thermoplastic Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed.

T4 Includes the necessary equipment, labor, materials, and incidentals for the placement of Prefabricated Pavement Markings per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each marking placed.

T5 Includes the necessary equipment, labor, materials, and incidentals for In Road Sign Assembly per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each sign assembled.

T6 Includes the necessary equipment, labor, materials, and incidentals to Remove Sign Assembly per the construction drawings and City of Midland standards and specifications, including all excavation, backfill, stabilization, foundations, bases, and appurtenances. Measurement and payment to be made per each existing sign assembly removed.

T7 Includes the necessary equipment, labor, materials, and incidentals for the placement of Retroreflective Raised Pavement Markers per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each marker placed.

T8 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Utility Duct Bank improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per linear foot placed measured along the ground surface.

T9 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Ground Box With Apron improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each ground box with apron placed.

T10 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Delineator Assembly improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per each delineator assembly placed.

T11 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of Temporary Workzone Pavement Markings improvements per the construction drawings and City of Midland standards and specifications, including all appurtenances. Measurement and payment to be made per lump sum.

BID ITEMS

(See Proposal sheet for additional information.)

Project Name: BRIARWOOD AVE PHASE II
Project Number: P21-06
ADDITIVE ALTERNATE BID 01

Traffic Control Items						
Item No.	Description	Quantity	Unit	Pay Note	Unit Price	Total Amount
1)	Intersection Signals & Electrical (Briarwood Drive & Avalon Drive), furnished, installed, complete and in place.	1	LS	T11	$_____	$_____
Total Traffic Control Items 1 - 1		$_____				

Price For:
6. Traffic Control Items $_____
Total Price $_____

PAY NOTES

P21-06

BRIARWOOD AVE PHASE II

ADDITIVE ALTERNATE BID 01

Bid Item		Pay Quantity Note
Traffic Items		
1	Intersection Signals & Electrical (Briarwood Drive & Avalon Drive)	T11

PAY QUANTITY NOTES

T11 Includes the necessary equipment, labor, materials, and incidentals for the placement and installation of all Intersection Signals & Electrical improvements per the construction drawings and City of Midland standards and specifications, including all lights, heads, fixtures, arms, poles, buttons, pedestals, foundations, wiring, cables, boxes, cabinets, and appurtenances. Measurement and payment to be made per lump sum for each street intersection where signal and electrical improvements are made.

BRIARWOOD AVE PHASE II
FROM 190' WEST OF SH 158 TO 500' WEST OF AVALON DRIVE
PROJECT NUMBER : P21-06

JUNE 2025

NET LENGTH OF ROADWAY = 9,245 LF

MAYOR

LORI BLONG

COUNCIL MEMBERS

BRIAN STUBBS	**DISTRICT 1**
JOHN NORMAN	**DISTRICT 2**
JACK LADD	**DISTRICT 3**
AMY STRETCHER BURKES	**DISTRICT 4**
JOHN BURKHOLDER	**AT LARGE**
ROBIN POOLE	**AT LARGE**

CITY MANAGER

TOMMY GONZALEZ

ASSISTANT CITY MANAGER

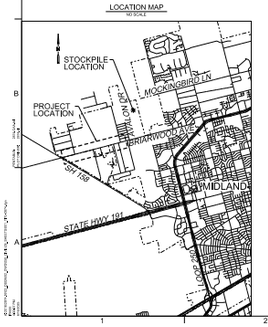
JOSE ORTIZ, P.E.

ENGINEERING SERVICES DIRECTOR

GABE McCLELLAND
OFFICE: (432)685-7983

REGISTERED ACCESSIBILITY SPECIALIST (RAS) INSPECTION
TDLR NO. EAB _____

LOCATION MAP



CITY OF MIDLAND, 300 N. LORAINE ST., MIDLAND TX 79702

MIDLAND Engineering Services

811 Know what's below. Call before you dig.

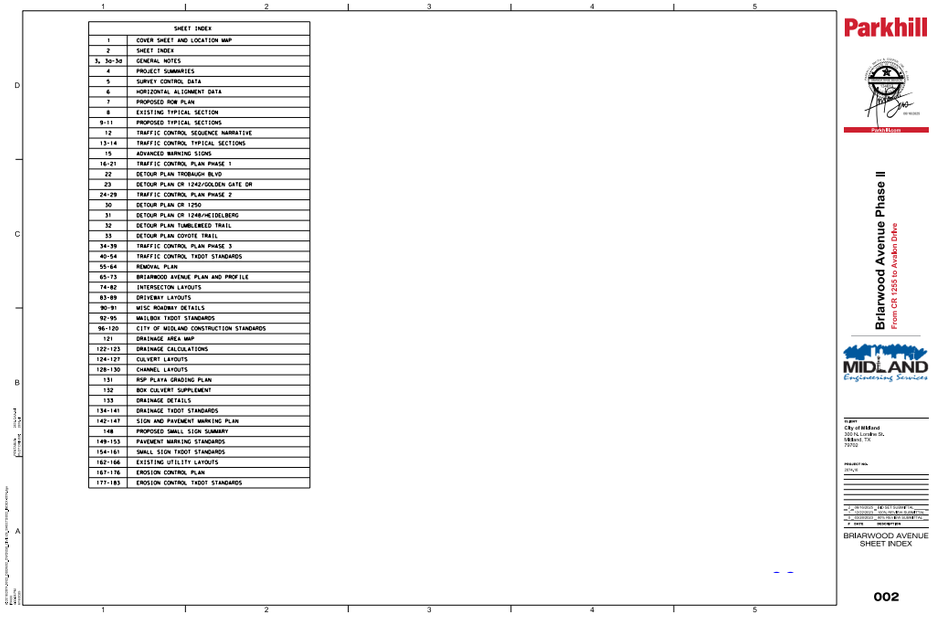
Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

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COVER SHEET AND LOCATION MAP

001



SHEET INDEX	
1	COVER SHEET AND LOCATION MAP
2	SHEET INDEX
3, 3a-3d	GENERAL NOTES
4	PROJECT SUMMARIES
5	SURVEY CONTROL DATA
6	HORIZONTAL ALIGNMENT DATA
7	PROPOSED ROW PLAN
8	EXISTING TYPICAL SECTION
9-11	PROPOSED TYPICAL SECTIONS
12	TRAFFIC CONTROL SEQUENCE NARRATIVE
13-14	TRAFFIC CONTROL TYPICAL SECTIONS
15	ADVANCED WARNING SIGNS
16-21	TRAFFIC CONTROL PLAN PHASE 1
22	DETOUR PLAN TROBAUGH BLVD
23	DETOUR PLAN CR 1242/GOLDEN GATE DR
24-29	TRAFFIC CONTROL PLAN PHASE 2
30	DETOUR PLAN CR 1250
31	DETOUR PLAN CR 1248/HEIDELBERG
32	DETOUR PLAN TUMBLEWEED TRAIL
33	DETOUR PLAN COYOTE TRAIL
34-39	TRAFFIC CONTROL PLAN PHASE 3
40-54	TRAFFIC CONTROL TXDOT STANDARDS
55-64	REMOVAL PLAN
65-73	BRIARWOOD AVENUE PLAN AND PROFILE
74-82	INTERSECTON LAYOUTS
83-89	DRIVEWAY LAYOUTS
90-91	MISC ROADWAY DETAILS
92-95	MAILBOX TXDOT STANDARDS
96-120	CITY OF MIDLAND CONSTRUCTION STANDARDS
121	DRAINAGE AREA MAP
122-123	DRAINAGE CALCULATIONS
124-127	CULVERT LAYOUTS
128-130	CHANNEL LAYOUTS
131	RSP PLAYA GRADING PLAN
132	BOX CULVERT SUPPLEMENT
133	DRAINAGE DETAILS
134-141	DRAINAGE TXDOT STANDARDS
142-147	SIGN AND PAVEMENT MARKING PLAN
148	PROPOSED SMALL SIGN SUMMARY
149-153	PAVEMENT MARKING STANDARDS
154-161	SMALL SIGN TXDOT STANDARDS
162-166	EXISTING UTILITY LAYOUTS
167-176	EROSION CONTROL PLAN
177-183	EROSION CONTROL TXDOT STANDARDS

Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND
Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
SHEET INDEX

002

BRIARWOOD AVENUE
GENERAL NOTES:

The technical specifications adopted by the Texas Department of Transportation (TxDOT) November 1, 2014, and titled "Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges" shall govern this project, except where superseded in the Plans and Contract Documents. This specification book may be purchased from the TxDOT or downloaded at:
http://www.txdot.gov/business/resources/txdot-specifications.html

For this project, any reference within the specification book to "Department," "Engineer," or "Owner" should be interpreted as the City of Midland Engineering staff, or their representatives.

General

All Bearings, Dimensions, and Topographic features shown in this Construction Drawing set are related the Texas State Plane Coordinate System, Texas Central Zone, North American Datum 1983. All elevations are related to North American Vertical Datum 1988.

Any issues, conflicts, or discrepancies encountered during construction that conflict with this Construction Drawing set shall be brought to the attention of the Engineer prior to making any design changes in the field.

Repair damage to the Right of Way to the satisfaction of the Owner. Restore all disturbed areas due to trenching or any construction activity to a condition equivalent to the original condition within 14 working days from the time work began in the area including all necessary seeding.

Coordinate street closures with the local fire, police, other emergency personnel, and transportation.

Maintain access to adjacent property at all times.

Notify, in writing, each residence and business 7 days prior to beginning construction of the phase/phases that are expected to affect their ingress and egress or any planned interruptions. This notice may be hand delivered or mailed.

OSHA requirements and all other applicable Federal, State, or City of Midland safety requirements shall be followed and complied with at all times.

Provide a lidded dumpster to be used by Contractor's personnel on the job site. This shall be considered subsidiary to the various bid items.

Dispose of all waste materials in compliance with local, state, and federal regulations.

Do not begin work before 7:00 A.M. or end work after 7:00 P.M. unless authorized by the Engineer and remove all equipment from the roadway prior to end of workday.

Perform any erosion control measures such as seeding or sodding before beginning the next phase, unless otherwise authorized by the Engineer.

All demolition dimensions are approximate based on the most reliable data available. Contractor shall field verify actual dimensions and notify Engineer of quantity increase or discrepancies.

Contractor shall notify Engineer of any conflicts or discrepancies before removal of any items not noted in Construction Drawings.

Hot Mix Basis of Estimate

ITEM	DESCRIPTION	*RATE (approx.)
3076	Dense-Graded HMA (TY C) (PG64-22)	345 LBS/SY
3076	Dense-Graded HMA (TY D) (PG70-22)	230 LBS/SY
508	HMAC for detour (TY B)	690 LBS/SY

*Actual rates will be determined by Engineer in Field

Surface Treatment Basis of Estimate

DESCRIPTION	PRIME	QCST
ASPH TYPE & GRADE	MC-30	CRS-1P OR CRS-2P (COOL) AC-20-5TR (WARM)
ASPH RATE (GAL/SY)	0.20	0.42
AGGR TYPE		PB
AGGR GRADE		4
AGGR RATE (CY/SY)		1/100

Utilities
Overhead and underground utility installations do exist within the project limits. Surface features, such as manholes and valve boxes, were identified in the topographic survey and may be used as an approximate location of where some utilities exist. Some utilities were potholed and are identified on the plans. These identified features should not be considered a thorough or exact marking of all existing utilities. The Contractor is responsible for following all location services protocol and for repairing any damages to utilities caused by the Contractor.

Contractor is to take all necessary precautions to protect all existing facilities that are encountered regardless of whether they appear in this Construction Drawing set.

All new or existing valve, manholes, and meter covers must be adjusted to finished grade regardless of whether the surface is paved or unpaved. Concrete collars shall be placed around all public infrastructure utility covers.

Item 100 – Preparing Right Of Way
Sprinkler systems shall be cut at the right-of-way line and restored to operating conditions using a licensed irrigator. Payment for this work shall be considered subsidiary.

Fence and gate removal not specifically identified on the Plans as a pay item shall be subsidiary to Preparing Right Of Way. Fence and gate materials shown to be removed shall be neatly stockpiled at a location designated by the landowner.

Item 105 – Removing Stabilized Treated and Untreated Base and Asphalt Pavement
Store salvaged material in stockpile(s), location(s) as directed by the Engineer.

All saw-cuts for pavement removal shall be cut in clean, straight lines.

Item 110 – Excavation
Broom the existing base or subgrade to remove any loose material dropped during excavation operations. This work is considered subsidiary to this item.

Item 160 - Topsoil
Salvage, windrow and stockpile topsoil from existing areas within the ROW. Maximum salvage depth is 6 inches, unless approved by the Engineer. Place a 6-inch layer of loosely compacted Topsoil in areas

Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND
Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007419

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 1 OF 5

003

designated on the plans. An adequate quantity of topsoil is available within the project limits. Payment for topsoil work is included in the embankment quantities and no separate payment will be made for this work.

If additional topsoil is determined to be required, provide material of equal quality to achieve a 6-inch minimum thickness throughout. The topsoil and its source will be approved by the Engineer.

Contractor may use stockpiled topsoil for areas where drainage dikes are called in Construction Drawings.

Item 164 – Seeding For Erosion Control
Provide seed according to Table 2 for the Odessa District, urban seed mix for sandy soils. Furnish seed tags from the seed supplier to the Engineer for verification of quantity and type. Submit an available substitution to the Engineer, for approval, if a grass variety is not available.

Notify the Engineer of scheduled seeding operations 24 hours prior to seeding applications. Do not begin seeding operations until the Engineer has approved seedbed preparations. Locate and flag all irrigation heads, valve covers, utility facility covers, etc. prior to commencing seed application operations.

Drill seed according to specifications. Use a pasture or rangeland type drill seed. Mulch is not required.

Do not disturb or drive on newly seeded areas. Repair any damage to the seeded areas to the satisfaction of the Engineer.

Revegetate all areas and surfaces disturbed by any construction activity outside of paved or other impervious areas.

Item 169 – Vegetative Watering
Water newly seeded grass areas evenly with a minimum of two-tenths (2/10) of an inch per day for 15 consecutive days or until 70% coverage has been achieved
Water from a tanked, spray-equipped vehicle capable of spraying water to all areas without driving of trailering the vehicle on said areas.

Vegetative Watering will not be paid for separately and will be considered subsidiary to Item 164.

Item 216 – Proof Rolling
Provide a 25-ton roller, or other equipment approved by the Engineer for proof rolling. Proof Roll all subgrade in the presence of the engineer, or as directed, prior to acceptance.

All subgrade and base courses shall be Proof Rolled in accordance with City of Midland Standards. No separate payment will be made for proof rolling.

Item 247 – Flexible Base
Use Flexible Base Ty A or B, Grade 4, with a minimum Plasticity Index of 6.

No salvaged base may be reused in the construction of new base but may be incorporated into the subgrade or embankment.

Item 302 – Aggregates for Surface Treatments
Use a Grade 4, Surface Aggregate Class B aggregate. Use an unmodified asphalt with a minimum performance grade of 64-16 (PG 64-16) or better for aggregate pre-coating. Precoat aggregate with 1.0 percent by weight of asphalt.

Use a liquid asphalt anti-stripping agent of a type and at a rate approved by the Engineer. The use of flux oil is not permitted.

Cure precoated aggregate a minimum of 72 hours before applying the aggregate to the roadway surface.

Item 310 – Prime Coat
Apply an MC-30 or AE-P prime coat to all finished treated base, new flexible base and salvage base due to receive asphaltic concrete pavement or surface treatments. Remove all loose and scabbed material from the surface prior to prime coat application.

Allow prime coat to penetrate and dry for a minimum of 72 hours before placing any asphaltic material on the primed surface, unless otherwise authorized by the Engineer.

Item 316 – Seal Coat
AC-20-5TR will be used during warm weather placement. CRS-1P or CRS-2P will be used for cool weather placement as directed by the Engineer.

Use medium pneumatic tire rollers, as directed by the Engineer. Do not use flat wheel rollers.

Item 341 – Dense-Graded Hot-Mix Asphalt
Binder:
Provide a binder with a Performance Grade of 64-22 (PG 64-22) for the Type C subsurface course.

Provide a binder with a Performance Grade of 70-22 (PG 70-22) for the Type D surface course.

Aggregate quality:
Provide coarse aggregate for all surface hotmix and overlays meeting a minimum Surface Aggregate Classification (SAC) of **B** as published in TxDOT's *AGGREGATE QUALITY MONITORING PROGRAM (QMP) RATED SOURCE QUALITY CATALOG*.

Mixture design:
The target laboratory molded density for mix will be 96.5 percent.

Test method Tex-530-C (Boil Test) will not be required.

Placement:
Semi-trailer type vehicles are prohibited from dumping directly into the finishing machine for the finished surface unless the trailer is equipped with an auger slatted chain or another approved conveyor.

No RAP will be allowed.

No RAS will be allowed.

Mineral filler will not be allowed.

Lime will not be allowed as an anti-stripping agent.

Provide trackless asphalt for tack coat at a rate of 0.10-0.13 gal/sy. Adjustments to the rate may be made in the field at the direction of the engineer. Apply tack coat uniformly to all intermediate asphalt pavement surfaces and all joints, including cold joints with mats previously laid and joints adjacent to concrete pavements.

Item 400 – Excavation and Backfill for Structures
Structural Excavation is subsidiary to the structures being installed. Where flowable fill is chosen to be used as backfill material by the Contractor's and for the Contractor's convenience, no additional payment will be made.

Construct fill over structures to plan grade before hauling with heavy equipment over structures.

Compact backfill used for structures, other than flowable backfill, to a minimum density of 95 percent. Use a template to secure reasonably accurate Class C shaping of the foundation material outside of cement stabilized areas.

Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007478

#	DATE	DESCRIPTION
1	08/15/2025	AS BUILT CORRECTIONS
0	03/20/2025	ISSUED FOR BIDDING

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 2 OF 5

003a

Contact the utility company and properly secure the utility poles prior to excavating next to the utility poles. The work and material used to secure the utility poles are subsidiary to the pertinent items. All trenching and backfill is subsidiary to the various culvert and headwall items.

Item 421 – Hydraulic Cement Concrete
All concrete shall be Class "C" (3600 psi) and maintain fiber reinforcement throughout, in addition to any steel reinforcement shown.

Use polypropylene fiber reinforcing at a minimum rate of 3 lbs/cy.

Furnish mix designs to the Engineer at least 48 hours prior to placing concrete. Provide an approved Private Laboratory Contractor to perform the needed concrete testing for mix design approval.

Fly ash will not be allowed in any mix design.

Engineer will provide quality assurance testing.

Provide air entrainment in all concrete except for concrete used in precast concrete members. Target an entrained air content of 4.0% for concrete pavement and 5.5% for all other concrete requiring air entrainment. Ensure the minimum entrained air content is at least 3.0% for all classes of concrete.

Place concrete pavement within 45 minutes of batching and use vibratory equipment to consolidate concrete. Do not use vibratory equipment to distribute concrete pavement. Segregated concrete is subject to rejection.

For this project, consider all concrete for culverts, culvert extensions, headwalls and wingwalls to be non-structural concrete.

All concrete pavement joints shall be sealed in compliances with City of Midland standards. This requirement does not apply to pedestrian access ramps, sidewalk, or curb joints.

Item 432 – Riprap
Provide 5-inch-thick concrete riprap, unless otherwise indicated in the plans.

In large areas of riprap, provide one-half (1/2)-inch thick expansion joint material at approximately 15-foot intervals, or as directed by the Engineer.

Use City of Midland approved expansion joint material and place between the proposed riprap and curb and gutter.

Reinforce all riprap on this project with No. 3 bars spaced 12 inches O.C.B.W. or No. 4 bars spaced at 18 inches O.C.B.W.

Broom-finish all riprap on this project unless otherwise directed.

In addition to reinforcing steel, polypropylene fiber is required at a rate of 3 lbs./cy. Polypropylene fiber may not be used in lieu of reinforcing steel.

Items 462 and 464 – Concrete Box Culvert and Reinforced Concrete Pipe
Join all concrete culverts with a cold-applied plastic joint gasket such as RAM-NEK or approved equal.

Maintain trench protection to protect Owner's representatives, inspectors, and Contractors during testing operations.

OSHA approved trench safety systems are required for all trenches 5.0' deep or greater.

All trenching and backfill is subsidiary to the various culvert and headwall items.

Item 466 – Headwalls and Wingwalls
Install reinforced concrete aprons on all headwalls and wingwalls, using reinforcing composed of #4 bars at 12-inch spacings, center-to-center, or as shown on the detail sheet.

Item 467 – Safety End Treatment
Provide shop drawings for pipe runners.

Item 479 – Adjusting Manholes and Inlets
Raise the manholes and water valves up to finished roadway elevation, matching the finish cross-slope.

Item 502 – Barricades, Signs and Traffic Handling
The work required for Item 502 will be paid for as a lump sum.

Prior to beginning construction, the Engineer shall approve the routing of traffic and sequence of work.

In addition to the Traffic Contro Plan (TCP) and the latest WZ standard plan sheets, install barricades and warning signs, as appropriate, to adequately warn motorists. Permanent signs may be installed when construction in an area is complete, anc they will not be in conflict with the traffic control plan for the remainder of the job.

This project has a regulatory work zone speed reduction within the project limits. The work zone speed limit is reduced from 60 mph to 35 mph. Placement of speed reduction zone signs shall comply with BC (3)-14. Speed resumption sign(s) is required atthe end of a speed reduction zone. Existing signs may remain in place durng the TCP period if they do not interfere with construction, and they do not conflict with the TCP plan.

Additional signs and barricades may be required, as directed by the Engineer, and shall be considered subsidiary to TCP.

Cover or remove any work zone signs when work or condition referenced is not occurring.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets. Provide access to all driveways during all phases of construction, unless otherwise directed on the plans.

All locations used for storing construction equipment and materials of any type within the right of way shall be approved by the Engineer. Use of the Right-of-Way for these purposes will be restricted to those locations where driver sight distance to businesses and side street intersections is not obstructed, public safety is not risked and at other locations where an unsightly appearance, as determined by the Engineer, will not exist.

No work will be permitted to commence on the road before 7:00 A.M. and shall be arranged so that all machinery and/or equipment shall be away from the roadway near the Right-of-Way line after 7:00 P.M.

Remove any obstructions to existing drainage due to the Contractor's operations as required, at the Contractors expense.

Wash the channelizing devices and barricades following each rainfall or snowfall event and at times deemed necessary by the Engineer.

To ensure the safety and convenience of traffic, flaggers may be required when construction machinery is being operated along, across, or adjacent to lanes carrying traffic. If considered necessary by the Engineer, supplemental signs and barricades may be required.

Fill any holes left by barricade or sign supports and restore the area to its original condition.

Barricades, Signs and Traffic Handling is a plan quantity item. If time is suspended, no additiona compensation will be made.

Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND
Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007419

No.	Description	Date

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 3 OF 5

003b

Traffic switches will not be permitted on Fridays or any working day preceding a holiday unless authorized by the Engineer.

Construct temporary ramps to maintain access to driveways and city streets as directed by the Engineer. Temporary ramp construction is subsidiary to TCP, unless otherwise shown on the plans.

The Contractor shall bid on the traffic control plan shown in the plans. Any proposed alterations to the TCP (combining work areas / phasing / etc.) shall be submitted to the Engineer at least 10 days prior to anticipated changes.

Square tubing sign supports may be used for temporary construction signs. Aluminum and wood signs may be mounted if the vertical supports are embedded into the ground. Square tubing supports on skids which are typically held in place with sandbags can only support signs made of light weight fluted plastic.

Any trench or drop off over 2" will require a safety slope of at least 3:1 and can be constructed out of RAP, embankment or other material approved by the Engineer. The placement, maintenance, and removal are the responsibility of the Contractor and is subsidiary to the various items.

Item 506 – Temporary Erosion, Sedimentation, and Environmental Controls
All erosion control measures shown in plans and required by the Engineer, including installation and removal upon completion of construction activity, will not be paid for separately and will be included under Item 506 on a lump sum basis.

Install erosion control measures prior to beginning any construction activity on project site.

Contractor shall maintain erosion control measures at all times. Repairs to existing measures shall be made immediately upon discovery.

All erosion control measures shall be inspected immediately following any storm event. Implement additional erosion control measures during storm events as needed or directed by the Engineer.

Contractor is to maintain a reasonable clean project site at all times. Any sediment, debris, etc. outside project site area shall be removed promptly.
All stockpiles will be surrounded by silt fence or equivalent measures as approved by the Engineer to properly control sediment runoff.

Contractor shall provide a concrete washout device meeting City of Midland specifications for all concrete washout activities. Contractor may not use any other areas within the project site for concrete washout activities under any circumstance.

Contractor is required to mitigate any damages to adjacent property or to receiving waters caused by improperly installed or poorly maintained erosion control measures.

Item 508 – Constructing Detours
Any drainage pipe or SETs required for detours are subsidiary to this Item. The minimum pipe size is 18 inches.

Item 529 – Concrete Curb, Gutter and Combined Curb and Gutter
Place one-half (1/2)-inch of approved, pre-molded expansion joint material at 40-foot intervals and at the beginning and end of all radii. Place 3/25-inch grooved or sawed construction joints, as directed by the Engineer, spaced equally, with the spacing not to exceed ten feet and no less than two feet between joints.

All concrete fillets are to be placed monolithically with adjacent concrete curb.

Item 531 – Curb Ramps
The curb ramp locations shown in the plans have considered the geometric features of the intersection, traffic signals, and the pavement markings. When field conditions, such as lack of right of way width or obstructions require, the ramp may be relocated within the right of way with the approval of the Engineer. In any case, construct curb ramps in conformance with the Texas Accessibility Standards (TAS) and the Americans with Disabilities Act Accessibility Guicelines (ADAAG). All deficient ramps will be removed and replaced at the Contractor's expense.

Use polypropylene fiber reinforcing at a minimum rate of 3 lbs./cy in lieu of wire reinforcing.
Form tooled joints on each side of the fire-foot wide ramp section, and at each break in ramp slope or geometry, and at five-foot intervals as if it were sidewalk. Place asphalt expansion joint material between proposed ramps and existing concrete.

Place asphalt expansion joint material between proposed sidewalk and utility poles, guy wires, vent pipes, standpipes and as directed.

All curbs on curb ramps will not be paid for directly but are considered subsidiary to the various bid items.

Item 585 – Ride Quality for Pavement Surfaces
Use Surface Test Type A to evaluate ride quality of travel lanes in accordance with item 585, "Ride Quality for Pavement Surfaces".

Corrective action, when required, shall be diamond grinding, as approved and directed by the Engineer. No Bonus Pay Adjustments will be made for low IRI results.

This item will be considered subsidiary to the various items.

Item 618 – Conduit
Do not place boring pits closer than 2 feet from the edge of the pavement unless otherwise directed. Do not use water jetting. When boring is used for under pavement conduit installations, the maximum allowable over-cut is 1" in diameter. When conduits are bored, do not exceed 18 inches in the vertical and horizontal tolerances as measured from the intendd target point.

Do not use a pneumatically driven devce for punching holes beneath the pavement (commony known as a "missile").

Use a colored cleaner-primer on all PVC-to-PVC joints before application of PVC cement.

Seal all conduit ends with a permanently soft, non-toxic duct seal. Use a duct seal that does not adversely affect other plastic materials or corrode metals.

Furnish and install non-metallic pull ropes in conduit installed for future use and cap using standard weather-tight conduit caps, as approved.

The locations of conduit and ground boxes are diagrammatic only and may be shifted to accommodate field conditions as directed by the Engineer.

Item 620 – Electrical Conductors
Terminate all electrical conductors from the controller at the termination block in the traffic signal pole hand hole whether in use or not.

All wiring not covered by the plans anc specifications shall be in accordance with the National Electric Code (NEC).

When the specifications for electrical items require UL listed products, it will be construed to mean UL listed or CSA listed.

Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Solutions

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007478

#	DATE	DESCRIPTION
1	08/15/2025	ADDENDUM #1
2	09/09/2025	ADDENDUM #2

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 4 OF 5

003c

Bond together any grounding conductors that share the same conduit, junction box, ground box, or structure, at every accessible point in accordance with the National Electrical Code (NEC).

Item 624 – Ground Boxes
Locations of ground boxes are approximate. Final locations will be as approved by Engineer. Provide an apron for ground boxes as shown on TxDOT Standard ED (4)-14.

Concrete removal required for installation of ground boxes will be subsidiary to Ground Boxes. Seal ground boxes with polyurethane foam that will not adversely affect other plastic materials or corrode metals (Froth-Pak 115 2.75 density 157833 or approved equal).

Item 644 – Small Roadside Sign Assemblies
All new sign supports for stop and yield signs will have a 12" red strip of Type C High Specific Intensity Reflective tape. Place the top of the tape 4' above the edge of the roadway. This work will not be paid for directly and will be subsidiary to the pertinent bid item.

For standard small sign details and dimensions, refer to the "Standard Highway Sign Designs for Texas (SHSD)"; a supplement to the Texas Manual on Uniform Traffic Control Devices (TMUTCD)".

Stake all sign locations, and receive approval from the Engineer, prior to sign placement.

Item 658 – Delineator and Object Marker Assemblies
Delineator and object marker assembly posts shall be composed of post-consumer recycled materials. Embedded stub shall be perforated square tubing.

Item 662 – Work Zone Pavement Markings
Materials used for non-removable work zone pavement markings will be paint and beads or other approved materials.

All removable work zone pavement markings placed on final surfaces shall consist of ceramic buttons and RPMs as shown on standard sheet BC (11). These shall be applied with a thermoplastic adhesive, unless otherwise directed by the Engineer. Buttons will be paid for by the linear foot of striping for which they represent.

Contractor is responsible for the removal of ceramic buttons, RPMs, and Adhesives as directed by the Engineer and before permanent striping is installed. Payment for this work will be paid for under Item 677.

Do not place guide markers on a finished surface unless they fall on a proposed lane line. Remove Stick-down markings prior to final marking. Remove tabs after the standard pavement markings have been placed.

The deviation rate in alignment shall not exceed one inch per 200 feet of roadway. The maximum deviation shall not exceed 2 inches, nor shall any deviation be abrupt. Striping not in conformance shall be removed and replaced at the Contractor's expense.

Item 666 – Reflectorized Pavement Markings
Type I markings shall meet the minimum retroreflectivity values defined by Article 4.4 Retroreflectivity Requirements.

Permanent pavement markings are to be thermoplastic in accordance with TxDOT Item 666 Type I specifications for long-line markings. Short-line and symbol markings will meet either TxDOT Item 666 Type I or Item 668 specifications.

Do not paint any pavement markings.

Item 677 – Eliminating Existing Pavement Markings and Markers
Submit eliminating plan for approval br the Engineer in accordance with Item 677.

Item 678 – Pavement Surface Preparation for Markings
Use dry sandblasting for pavement surface preparation for markings. This work will be considered subsidiary to the various items.

Item 734 – Litter Removal
Perform litter removal as necessary and before mowing. This work will be considered subsidiary to the various items.

Item 738 – Cleaning and Sweeping
Clean and sweep existing pavements as necessary and as directed by the Engineer. This work will be considered subsidiary to the various items.

Item 6001 - Portable Changeable Message Sign
Provide solar powered changeable message boards for this project. Modify the message as directed by the Engineer.

PCMS shall be placed in operation a minimum of one (1) week prior to construction. Location(s) and duration for PCMS shall be as directed by the Engineer.

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Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND
Engineering Services

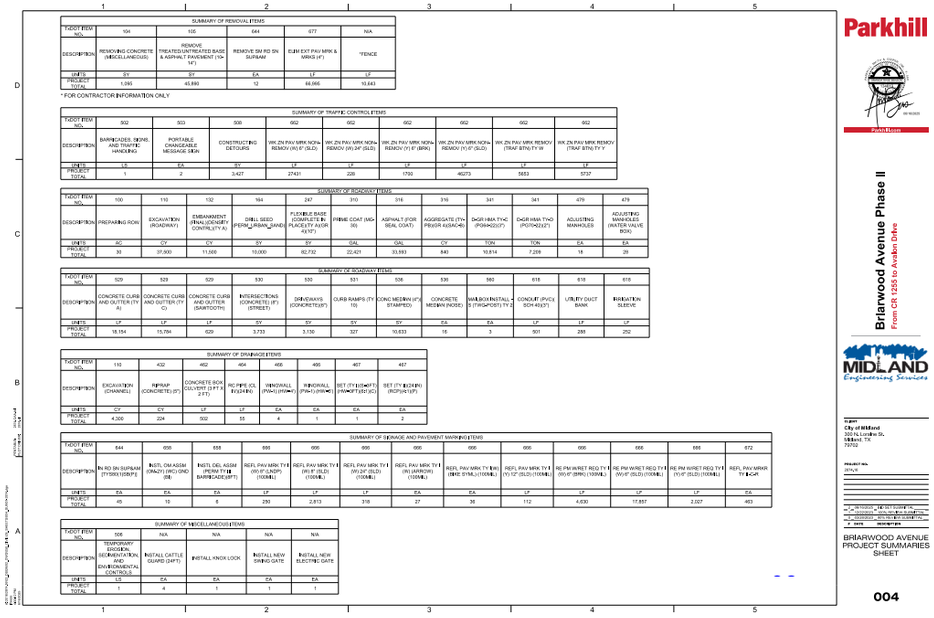
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007419

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
GENERAL NOTES
SHEET 5 OF 5

003d



SUMMARY OF REMOVAL ITEMS

TxDOT ITEM NO.	104	105	644	677	N/A
DESCRIPTION	REMOVING CONCRETE (MISCELLANEOUS)	REMOVE TREATED/UNTREATED BASE & ASPHALT PAVEMENT (10-14")	REMOVE SM RD SN SUPAM	ELIM EXT PAV MRK & MRKG (4")	*FENCE
UNITS	SY	SY	EA	LF	LF
PROJECT TOTAL	1,095	45,690	12	66,666	10,643

* FOR CONTRACTOR INFORMATION ONLY

SUMMARY OF TRAFFIC CONTROL ITEMS

TxDOT ITEM NO.	502	503	506	662	662	662	662	662	662
DESCRIPTION	BARRICADES, SIGNS AND TRAFFIC HANDLING	PORTABLE CHANGEABLE MESSAGE SIGN	CONSTRUCTING DETOURS	WK ZN PAV MRK NON-REMOV (W) 6" (SLD)	WK ZN PAV MRK NON-REMOV (W) 24" (SLD)	WK ZN PAV MRK NON-REMOV (Y) 6" (BRK)	WK ZN PAV MRK NON-REMOV (Y) 6" (SLD)	WK ZN PAV MRK REMOV (TRAF BTN) TY III	WK ZN PAV MRK REMOV (TRAF BTN) TY Y
UNITS	LS	EA	SY	LF	LF	LF	LF	LF	LF
PROJECT TOTAL	1	2	3,427	27431	228	1700	46273	5853	5737

SUMMARY OF ROADWAY ITEMS

TxDOT ITEM NO.	100	110	132	164	247	310	316	316	341	341	479	479
DESCRIPTION	PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENSITY CONTROL)(TY A)	DRILL SEED (PERM_URBAN_SAND)	FLEXIBLE BASE (COMPLETE & PLACE)(TY A)(GR 4)(10")	PRIME COAT (MAT)	ASPHALT (FOR SEAL COAT)	AGGREGATE (TY-PB)(GR A)(SAC-A)	D-GR HMA TY-C (PG64-22)(QY)	D-GR HMA TY-D (PG70-22)(QY)	ADJUSTING MANHOLES	ADJUSTING MANHOLES (WATER VALVE BOX)
UNITS	AC	CY	CY	SY	SY	GAL	GAL	CY	TON	TON	EA	EA
PROJECT TOTAL	30	37,000	11,000	10,000	82,732	22,421	33,593	840	16,814	7,209	18	29

SUMMARY OF ROADWAY ITEMS

TxDOT ITEM NO.	529	529	529	530	530	531	536	536	560	618	618	618
DESCRIPTION	CONCRETE CURB AND GUTTER (TY A)	CONCRETE CURB AND GUTTER (TY C)	CONCRETE CURB AND GUTTER (SAWTOOTH)	INTERSECTIONS (CONCRETE) (8") (STREET)	DRIVEWAYS (CONCRETE)(8")	CURB RAMPS (TY 10)	CONC MEDIAN (4") STAMPED	CONCRETE MEDIAN (NOSE)	MAILBOX INSTALL-S (TWG#*DIST) TY 2	CONDUIT (PVC) SCH 40(3")	UTILITY DUCT BANK	IRRIGATION SLEEVE
UNITS	LF	LF	LF	SY	SY	EA	SY	EA	EA	LF	LF	LF
PROJECT TOTAL	18,154	15,784	629	3,733	3,139	327	10,633	16	3	501	285	252

SUMMARY OF DRAINAGE ITEMS

TxDOT ITEM NO.	110	432	462	464	466	466	467	467
DESCRIPTION	EXCAVATION (CHANNEL)	RIPRAP (CONCRETE) (12")	CONCRETE BOX CULVERT (3 FT X 2 FT)	RC PIPE (CL III)(18")	HDWALL (TY=I)(SW=*)	HDWALL (TY=I)(SW=*)	SET (TY II)(24"W)(FT) (SW=FT SET)(SC)	SET (TY II)(18"W) (RCP)(S=%)(FT)
UNITS	CY	CY	LF	LF	EA	EA	EA	EA
PROJECT TOTAL	4,200	224	502	55	4	1	1	2

SUMMARY OF SIGNAGE AND PAVEMENT MARKING ITEMS

TxDOT ITEM NO.	644	658	658	666	666	666	666	666	666	666	666	672
DESCRIPTION	IN RD SN SUPAM (TY1S01)(SIZE)	INSTL GM ASSM (OM4ZY) (WO GND) (SB)	INSTL DEL ASSM (PERM TY III BARRICADE)(SFT)	REFL PAV MRK TY I (W) 8" (SLD)(P) (100MIL)	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	REFL PAV MRK TY I (W) (ARROW) (100MIL)	REFL PAV MRK TY I(W) (WORD SYM,L)(100MIL)	REFL PAV MRK TY I (Y) 12" (SLD) (100MIL)	RE PM W/RET REQ TY I (Y) 6" (BRK) (100MIL)	RE PM W/RET REQ TY I (Y) 6" (SLD) (100MIL)	RE PM W/RET REQ TY I (Y) 8" (SLD) (100MIL)	RE PM W/RET REQ TY I (Y) 24" (SLD) (100MIL)	REFL PAV MRKR TY II-C-R
UNITS	EA	EA	EA	LF	LF	LF	EA	EA	LF	LF	LF	LF	LF	EA
PROJECT TOTAL	45	15	6	250	2,613	318	27	36	112	4,630	17,857	2,027	463	

SUMMARY OF MISCELLANEOUS ITEMS

TxDOT ITEM NO.	506	N/A	N/A	N/A	N/A
DESCRIPTION	TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS	INSTALL CATTLE GUARD (SIFT)	INSTALL KNOX LOCK	INSTALL NEW SWING GATE	INSTALL NEW ELECTRIC GATE
UNITS	LS	EA	EA	EA	EA
PROJECT TOTAL	1	4	1	1	1

Parkhill

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

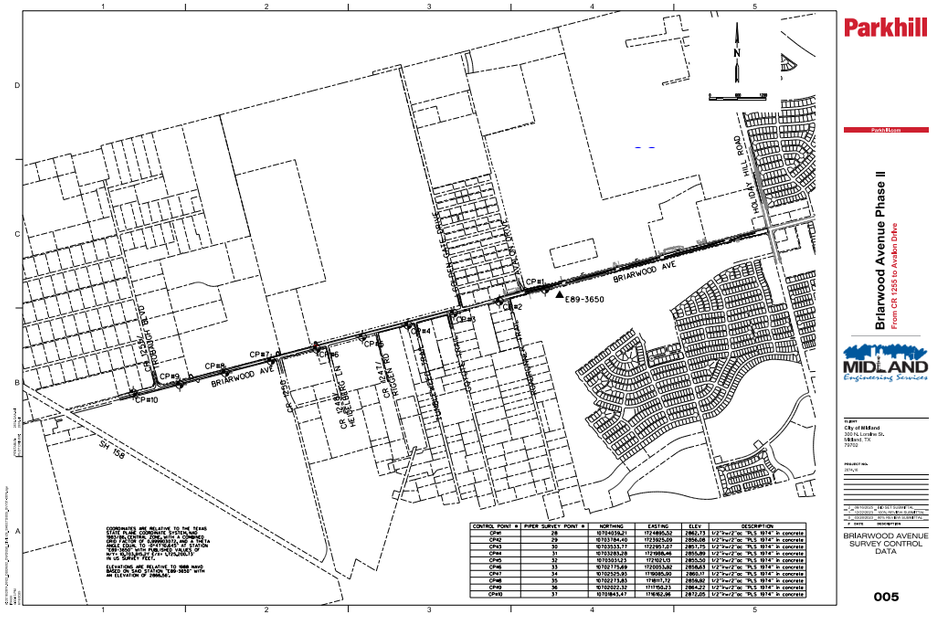
client
City of Midland
300 N. Loraine St.
Midland, TX
79702

project no.

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
PROJECT SUMMARIES
SHEET

004



CONTROL POINT #	PIPER SURVEY POINT #	NORTHING	EASTING	ELEV	DESCRIPTION
CP#1	28	10704059.21	1724885.52	2862.73	1/2"rw/2" sc. "PLS 5174" in concrete
CP#2	29	10703784.40	1723925.09	2856.06	1/2"rw/2" sc. "PLS 5174" in concrete
CP#3	30	10703533.17	1723151.27	2851.75	1/2"rw/2" sc. "PLS 5174" in concrete
CP#4	31	10703283.28	1722558.48	2853.90	1/2"rw/2" sc. "PLS 5174" in concrete
CP#5	32	10703051.73	1721921.13	2853.56	1/2"rw/2" sc. "PLS 5174" in concrete
CP#6	33	10702775.69	1720953.82	2858.63	1/2"rw/2" sc. "PLS 5174" in concrete
CP#7	34	10702575.93	1719995.50	2860.17	1/2"rw/2" sc. "PLS 5174" in concrete
CP#8	35	10702273.83	1718917.72	2858.92	1/2"rw/2" sc. "PLS 5174" in concrete
CP#9	36	10702027.32	1717952.23	2864.42	1/2"rw/2" sc. "PLS 5174" in concrete
CP#10	37	10701843.47	1716962.96	2872.05	1/2"rw/2" sc. "PLS 5174" in concrete

COORDINATES ARE RELATIVE TO THE NAD83 STATE PLANE COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), AS DERIVED FROM GPS OBSERVATIONS. DISTANCES SHOWN HEREON ARE SURFACE VALUES IN U.S. SURVEY FEET.

ELEVATIONS ARE RELATIVE TO NAVD 88(93), AS DERIVED FROM GPS OBSERVATIONS AND ARE ELEVATION OF GRADE.

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Briarwood Avenue Phase II

From CR 1225 to Avalon Drive

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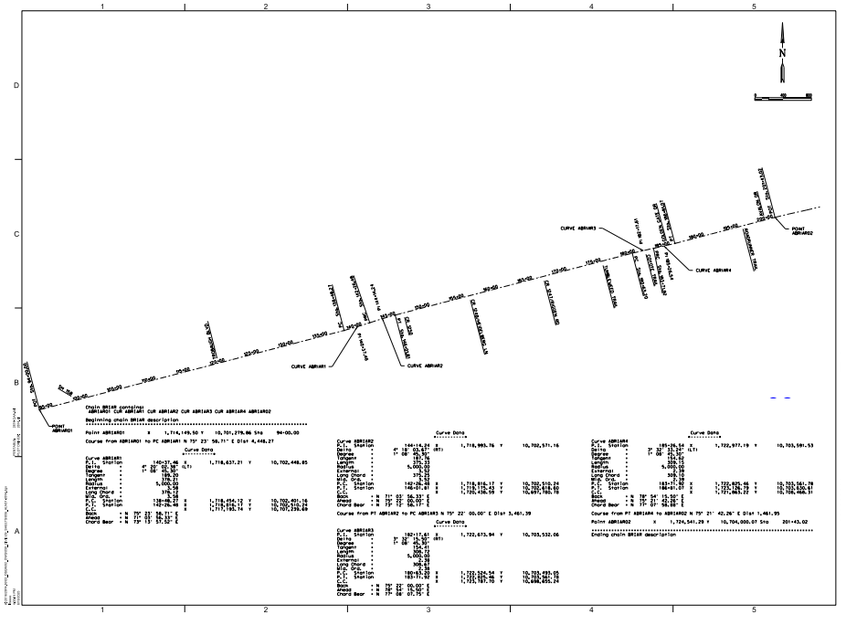
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Midland, TX
79701

Project No.

No.	Date	Description

BRIARWOOD AVENUE SURVEY CONTROL DATA

005



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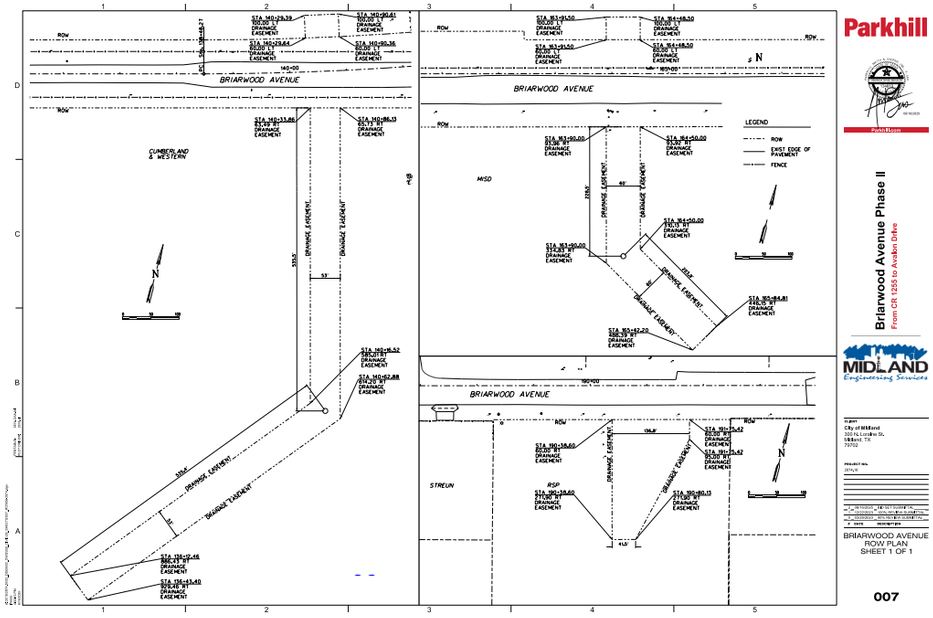
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE HORIZONTAL ALIGNMENT DATA

006



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John Rivers

Briarwood Avenue Phase II

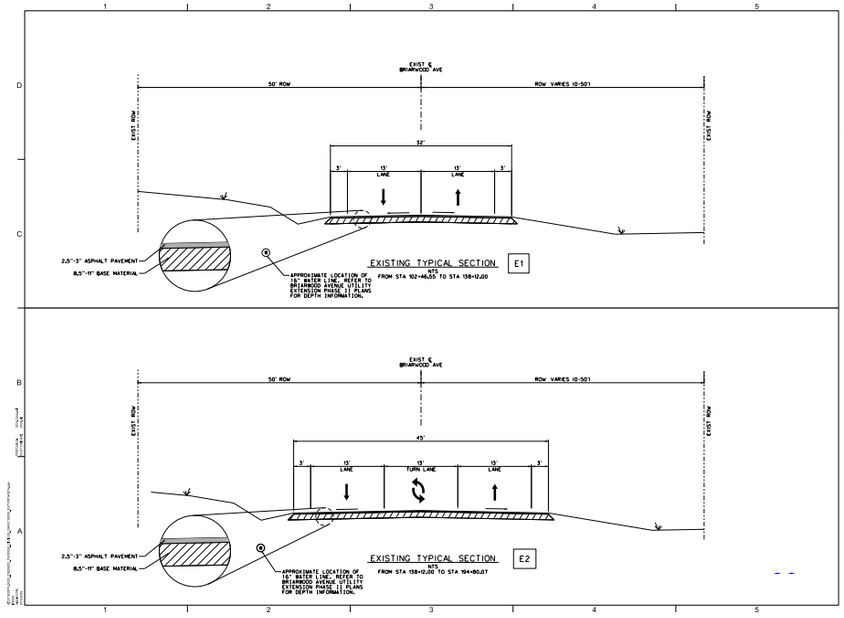
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79701

BRIARWOOD AVENUE
ROW PLAN
SHEET 1 OF 1

007



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John Rowe

Briarwood Avenue Phase II

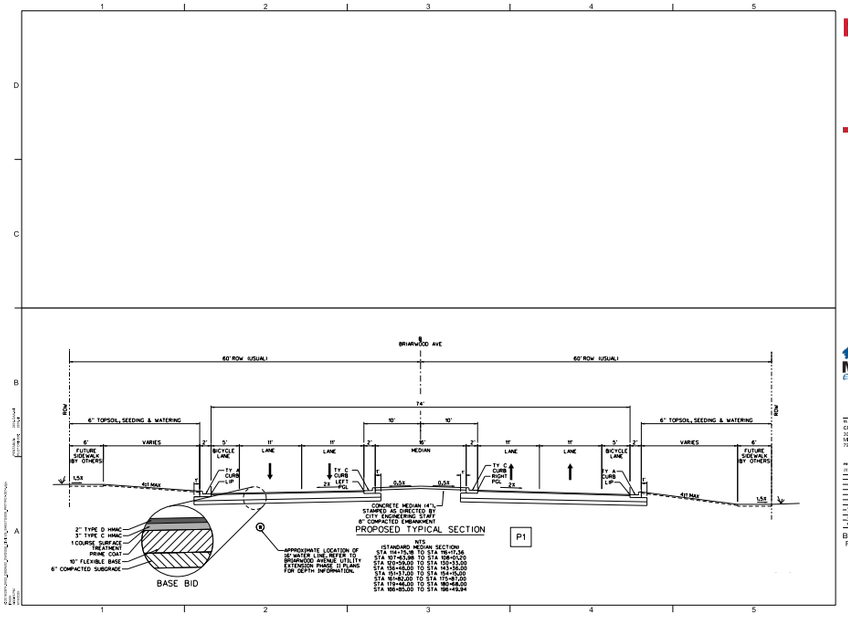
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
EXISTING TYPICAL
SECTION
SHEET 1 OF 1

008



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John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

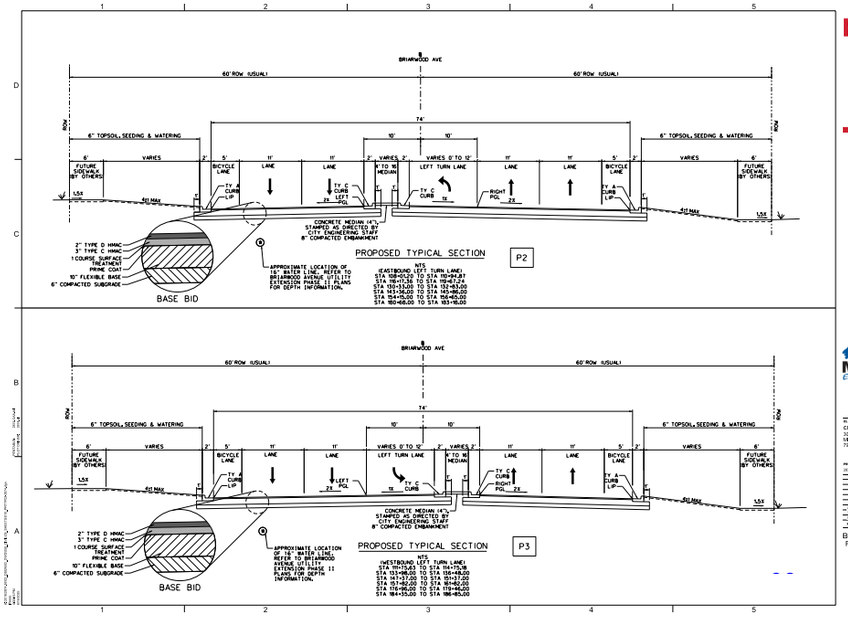
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City of Midland
300 N. Loraine St.
Midland, TX
79701

Project No.

No.	Date	Description

BRIARWOOD AVENUE
PROPOSED TYPICAL SECTIONS
SHEET 1 OF 3

009



Parkhill

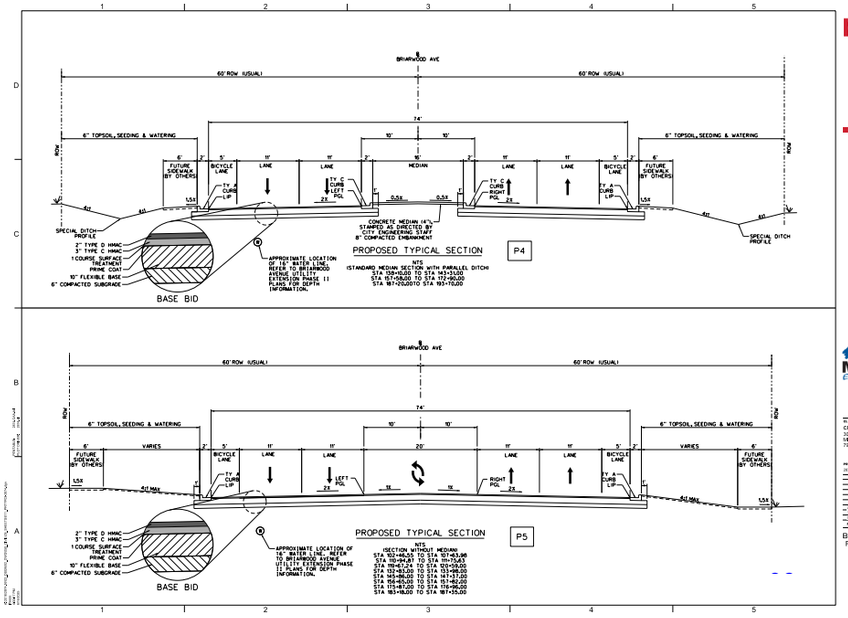
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PROPOSED TYPICAL SECTIONS
SHEET 2 OF 3

010



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John Rowe

Briarwood Avenue Phase II

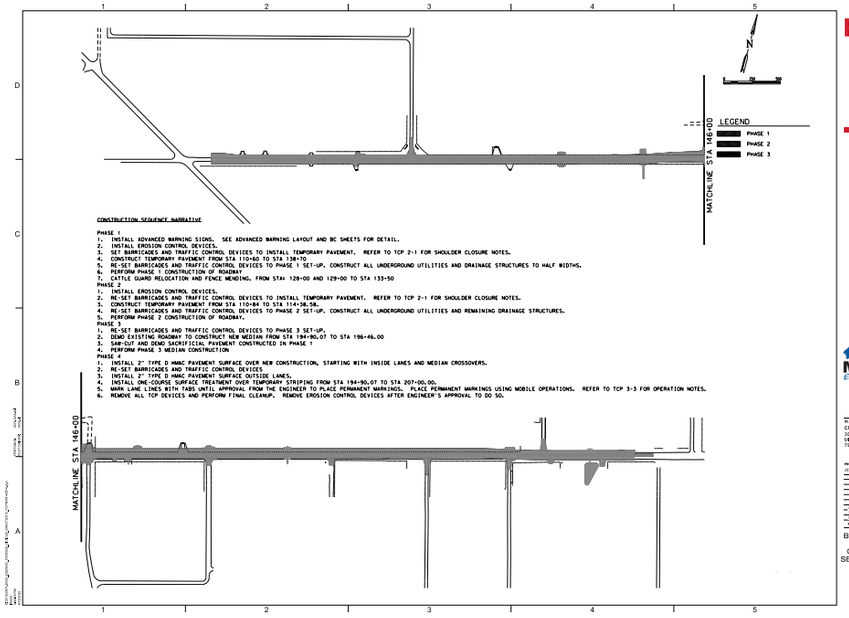
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79701

BRIARWOOD AVENUE
PROPOSED TYPICAL SECTIONS
SHEET 3 OF 3

011



CONSTRUCTION SEQUENCE NARRATIVE

PHASE 1
1. INSTALL ADVANCED WARNING SIGNS. SEE ADVANCED WARNING LAYOUT AND BC SHEETS FOR DETAIL.
2. INSTALL EROSION CONTROL DEVICES.
3. SET BARRICADES AND TRAFFIC CONTROL DEVICES TO INSTALL TEMPORARY PAVEMENT. REFER TO TCP 2-1 FOR SHOULDER CLOSURE NOTES.
4. CONSTRUCT TEMPORARY PAVEMENT FROM STA 110+60 TO STA 138+70
5. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES TO PHASE 1 SET-UP. CONSTRUCT ALL UNDERGROUND UTILITIES AND DRAINAGE STRUCTURES TO HALF WIDTHS.
6. PERFORM PHASE 1 CONSTRUCTION OF ROADWAY
7. CATTLE GUARD RELOCATION AND FENCE MENDING. FROM STA± 128+00 AND 129+00 TO STA 133+50

PHASE 2
1. INSTALL EROSION CONTROL DEVICES.
2. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES TO INSTALL TEMPORARY PAVEMENT. REFER TO TCP 2-1 FOR SHOULDER CLOSURE NOTES.
3. CONSTRUCT TEMPORARY PAVEMENT FROM STA 110+84 TO STA 114+38.56.
4. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES TO PHASE 2 SET-UP. CONSTRUCT ALL UNDERGROUND UTILITIES AND REMAINING DRAINAGE STRUCTURES.
5. PERFORM PHASE 2 CONSTRUCTION OF ROADWAY.

PHASE 3
1. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES TO PHASE 3 SET-UP.
2. DEMO EXISTING ROADWAY TO CONSTRUCT NEW MEDIAN FROM STA 194+90.07 TO STA 196+46.00
3. SAW-CUT AND DEMO SACRIFICIAL PAVEMENT CONSTRUCTED IN PHASE 1
4. PERFORM PHASE 3 MEDIAN CONSTRUCTION

PHASE 4
1. INSTALL 2" TYPE D HMAC PAVEMENT SURFACE OVER NEW CONSTRUCTION, STARTING WITH INSIDE LANES AND MEDIAN CROSSOVERS.
2. RE-SET BARRICADES AND TRAFFIC CONTROL DEVICES
3. INSTALL 2" TYPE D HMAC PAVEMENT SURFACE OUTSIDE LANES.
4. INSTALL ONE-COURSE SURFACE TREATMENT OVER TEMPORARY STRIPING FROM STA 194+90.07 TO STA 207+00.00.
5. MARK LANE LINES WITH TABS UNTIL APPROVAL FROM THE ENGINEER TO PLACE PERMANENT MARKINGS. PLACE PERMANENT MARKINGS USING MOBILE OPERATIONS. REFER TO TCP 3-3 FOR OPERATION NOTES.
6. REMOVE ALL TCP DEVICES AND PERFORM FINAL CLEANUP. REMOVE EROSION CONTROL DEVICES AFTER ENGINEER'S APPROVAL TO DO SO.

Parkhill

John Rowe

Briarwood Avenue Phase II

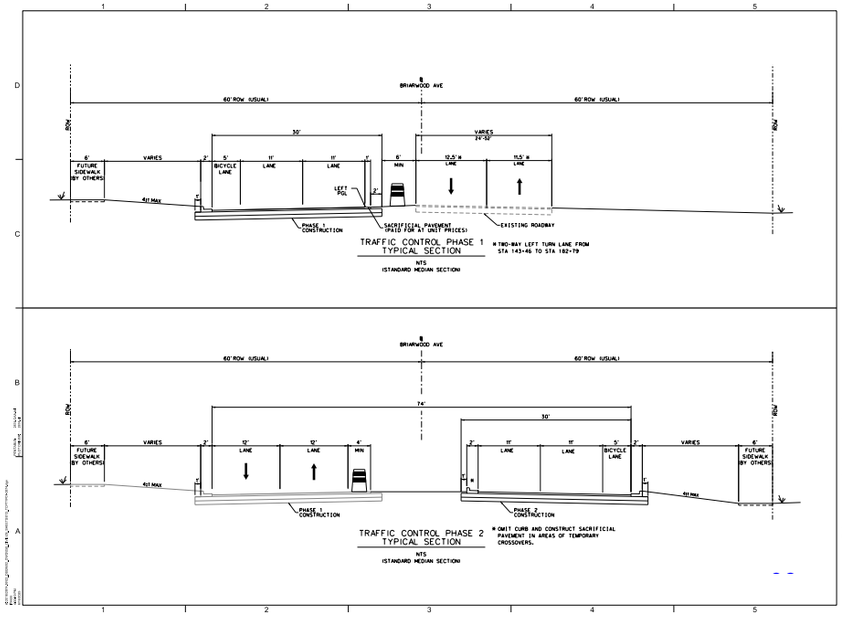
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
TRAFFIC CONTROL
OVERALL LAYOUT &
SEQUENCE NARRATIVE

012



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Briarwood Avenue Phase II

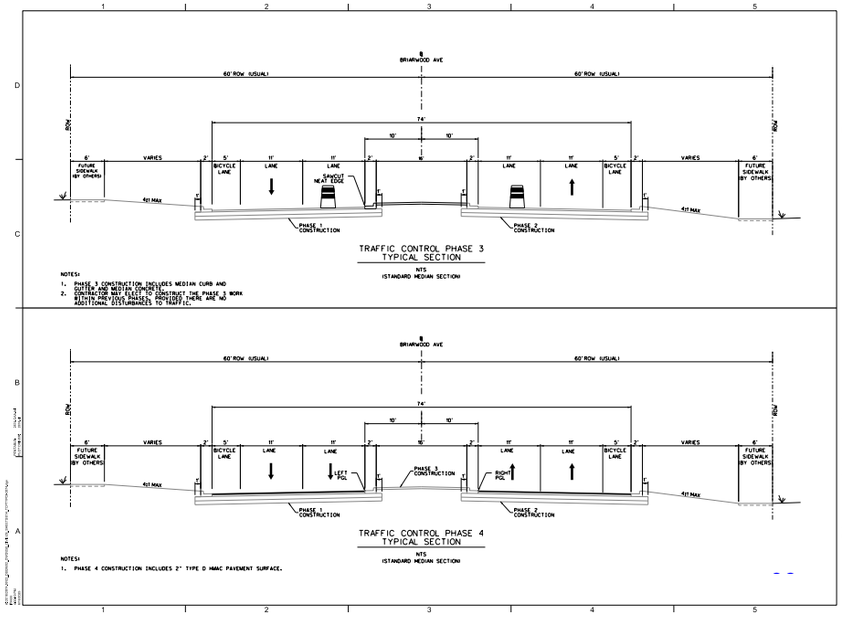
From CR 1250 to Avalon Drive

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Midland, TX
79701

BRIARWOOD AVENUE
TRAFFIC CONTROL
TYPICAL SECTIONS
SHEET 1 OF 2

013



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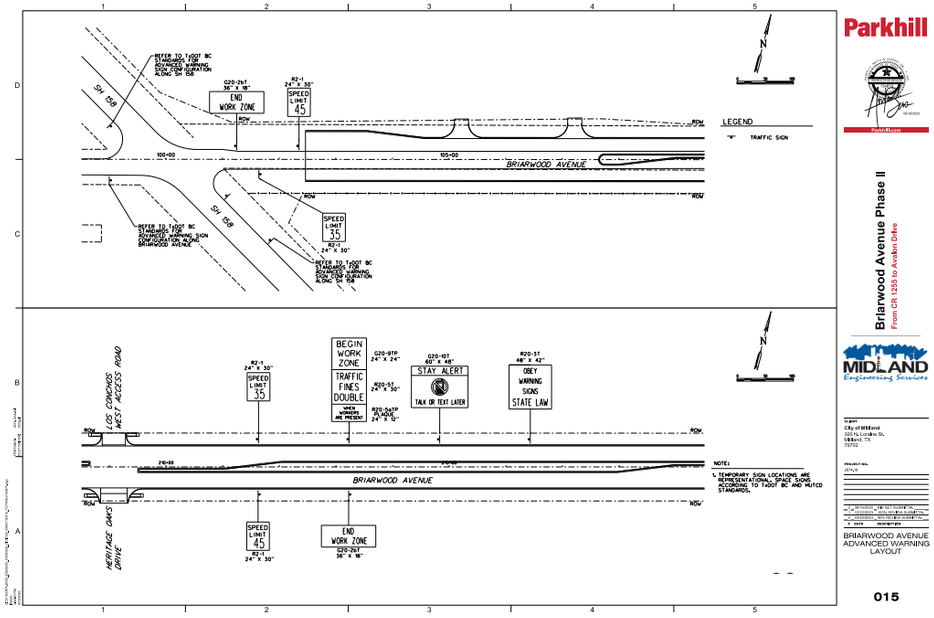
Briarwood Avenue Phase II

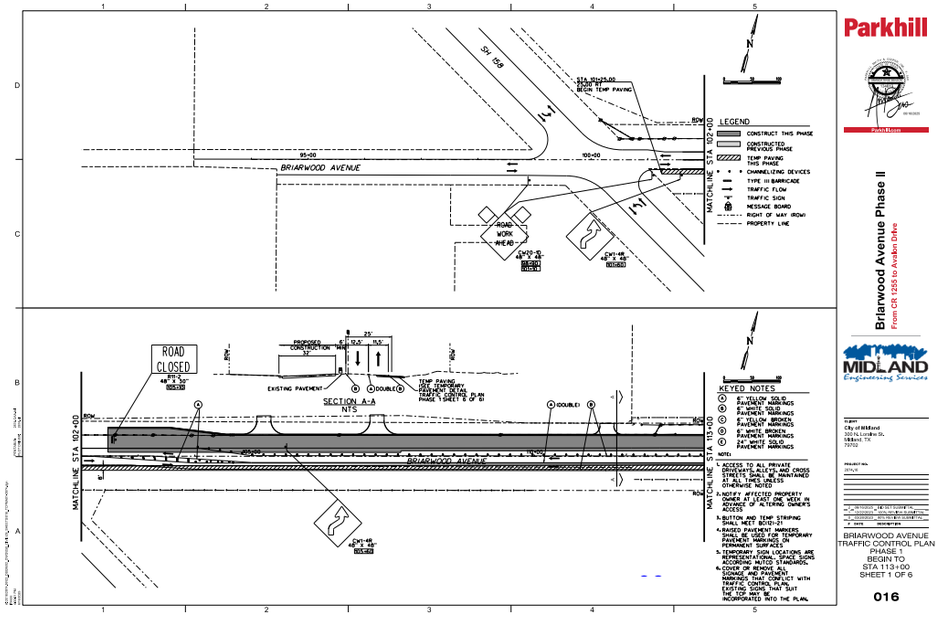
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BRIARWOOD AVENUE
TRAFFIC CONTROL
TYPICAL SECTIONS
SHEET 2 OF 2

014


REFER TO TXDOT BC STANDARDS FOR ADVANCED WARNING SIGN CONFIGURATION ALONG SH 158
G20-2b1 36" X 18"
END WORK ZONE
R2-1 24" X 30"
SPEED LIMIT 45
SH 158
BRIARWOOD AVENUE
ROW
100+00
105+00
LEGEND
"R" TRAFFIC SIGN
REFER TO TXDOT BC STANDARDS FOR ADVANCED WARNING SIGN CONFIGURATION ALONG BRIARWOOD AVENUE
SPEED LIMIT 35
REFER TO TXDOT BC STANDARDS FOR ADVANCED WARNING SIGN CONFIGURATION ALONG SH 158
LOS CONCHOS WEST ACCESS ROAD
BEGIN WORK ZONE
G20-9TP 24" X 24"
TRAFFIC FINES DOUBLE
WHEN WORKERS ARE PRESENT
R20-5(C) 24" X 30"
R20-5aTP (L) 24" X 12"
G20-10T 60" X 48"
STAY ALERT
TALK OR TEXT LATER
R20-3T 48" X 42"
OBEY WARNING SIGNS STATE LAW
210+00
215+00
NOTES:
1. TEMPORARY SIGN LOCATIONS ARE REPRESENTATIONAL. SPACE SIGNS ACCORDING TO TXDOT BC AND MUTCD STANDARDS.
HERITAGE OAKS DRIVE
SPEED LIMIT 45
END WORK ZONE
G20-2bT 36" X 18"
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Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79701
BRIARWOOD AVENUE ADVANCED WARNING LAYOUT
015



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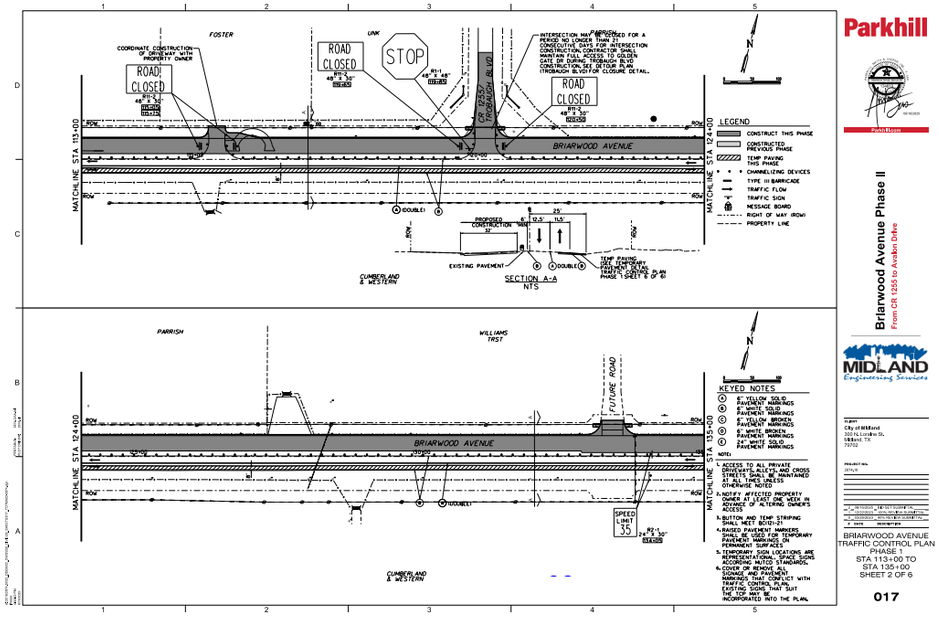
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 1
BEGIN TO
STA 113+00
SHEET 1 OF 6

016



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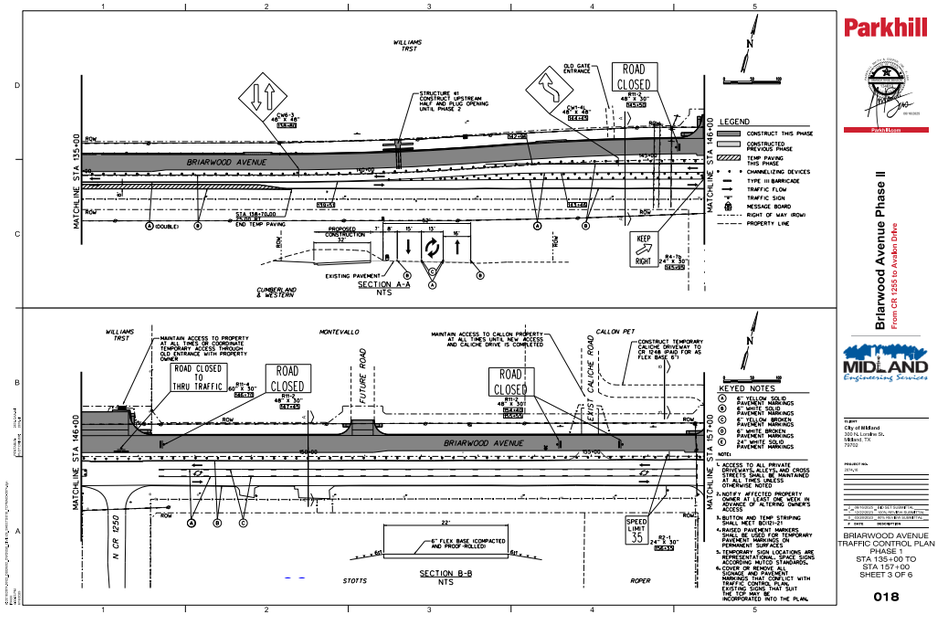
Briarwood Avenue Phase II

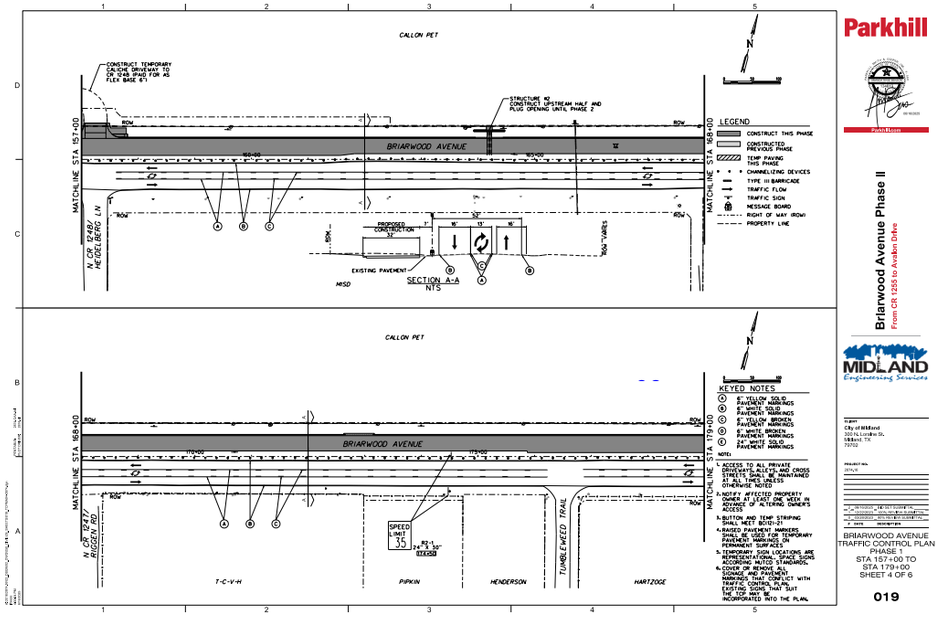
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BRIARWOOD AVENUE TRAFFIC CONTROL PLAN PHASE 1 STA 113+00 TO STA 135+00 SHEET 2 OF 6

017


WILLIAMS TRST
OLD GATE ENTRANCE
ROAD CLOSED
STRUCTURE #1 CONSTRUCT UPSTREAM HALF AND PLUG OPENING UNTIL PHASE 2
BRIARWOOD AVENUE
MATCHLINE STA 135+00
MATCHLINE STA 146+00
LEGEND
CONSTRUCT THIS PHASE
CONSTRUCTED PREVIOUS PHASE
TEMP PAVING THIS PHASE
CHANNELIZING DEVICES
TYPE III BARRICADE
TRAFFIC FLOW
TRAFFIC SIGN
MESSAGE BOARD
RIGHT OF WAY (ROW)
PROPERTY LINE
(DOUBLE)
END TEMP PAVING
PROPOSED CONSTRUCTION
EXISTING PAVEMENT
SECTION A-A
NTS
CUMBERLAND & WESTERN
KEEP RIGHT
WILLIAMS TRST
MAINTAIN ACCESS TO PROPERTY AT ALL TIMES UNLESS PRIVATE OLD ENTRANCE WITH PROPERTY OWNER
ROAD CLOSED TO THRU TRAFFIC
MONTEVALLO
FUTURE ROAD
MAINTAIN ACCESS TO CALLON PROPERTY AT ALL TIMES UNTIL NEW ACCESS AND CALICHE DRIVE IS COMPLETED
CALLON PET
CONSTRUCT TEMPORARY CALICHE DRIVEWAY TO CR 1248 (PAD FOR AS FLEX BASE 6")
CALICHE ROAD
EAST
KEYED NOTES
6" YELLOW SOLID PAVEMENT MARKINGS
6" WHITE SOLID PAVEMENT MARKINGS
6" YELLOW BROKEN PAVEMENT MARKINGS
6" WHITE BROKEN PAVEMENT MARKINGS
24" WHITE SOLID PAVEMENT MARKINGS
NOTES:
1. ACCESS TO ALL PRIVATE DRIVEWAYS, ALLEYS, AND CROSS STREETS SHALL BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE NOTED
2. NOTIFY AFFECTED PROPERTY OWNER AT LEAST ONE WEEK IN ADVANCE OF ALTERING OWNER'S ACCESS
3. BUTTON AND TEMP STRIPING PER SHEET BOTD-21
4. RAISED PAVEMENT MARKERS SHALL BE USED FOR TEMPORARY PAVEMENT MARKINGS ON PERMANENT SURFACES
5. TEMPORARY SIGN LOCATIONS ARE SHOWN FOR REFERENCE ONLY, ACCORDING TO TMUTCD STANDARDS.
6. COVER OR REMOVE ALL SIGNAGE AND PAVEMENT MARKINGS NOT CONFLICT WITH TRAFFIC CONTROL PLAN. EXISTING SIGNS THAT SUIT THE TCP SHALL BE INCORPORATED INTO THE PLAN.
N CR 1250
STOTTS
6" FLEX BASE (COMPACTED AND PROOF ROLLED)
SECTION B-B
NTS
ROPER
SPEED LIMIT 35
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND
Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 1
STA 135+00 TO
STA 157+00
SHEET 3 OF 6
018



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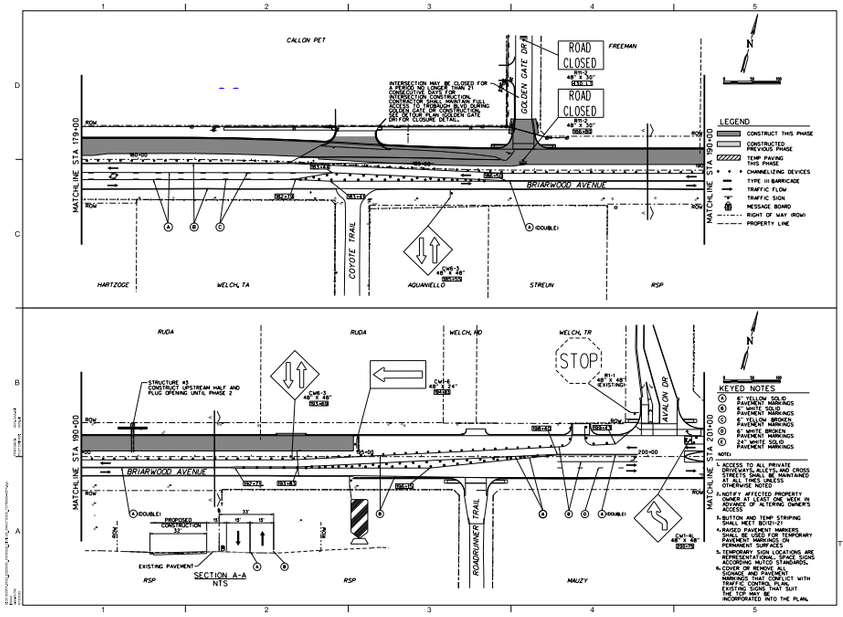
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 1
STA 157+00 TO
STA 179+00
SHEET 4 OF 6

019



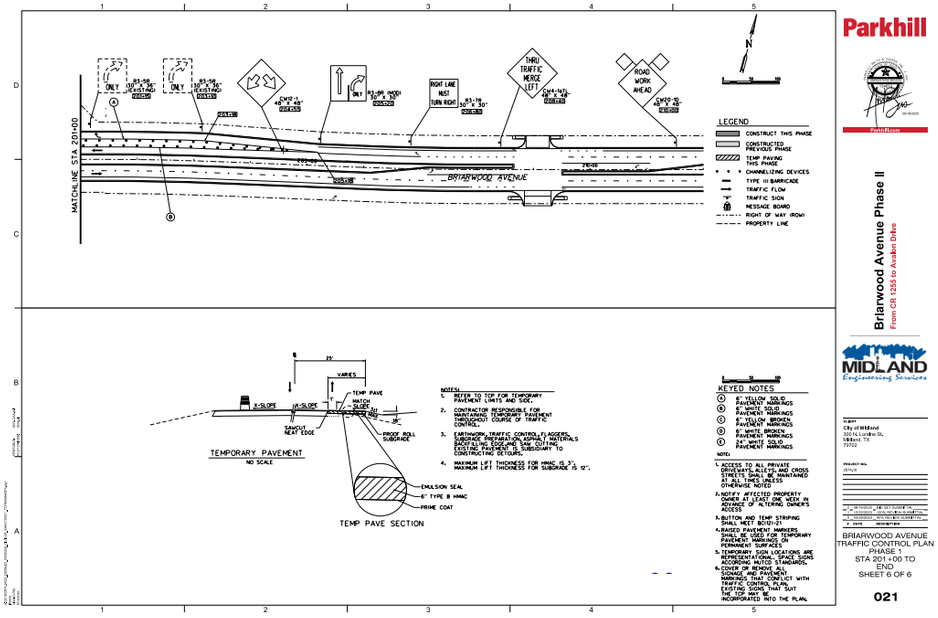
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Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE TRAFFIC CONTROL PLAN PHASE 1 STA 179+00 TO STA 201+00 SHEET 5 OF 6

020



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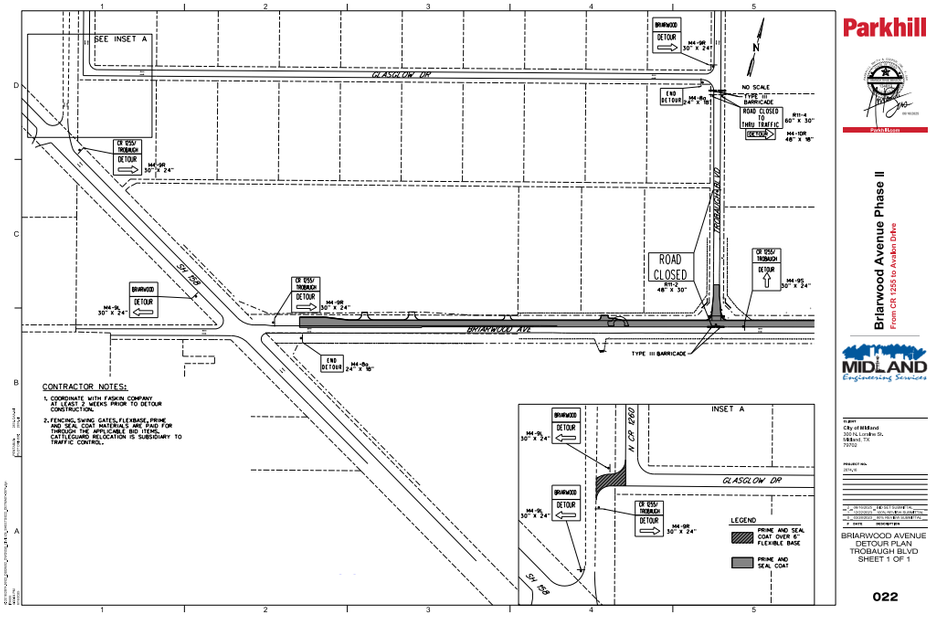
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 1
STA 201+00 TO
END
SHEET 6 OF 6

021



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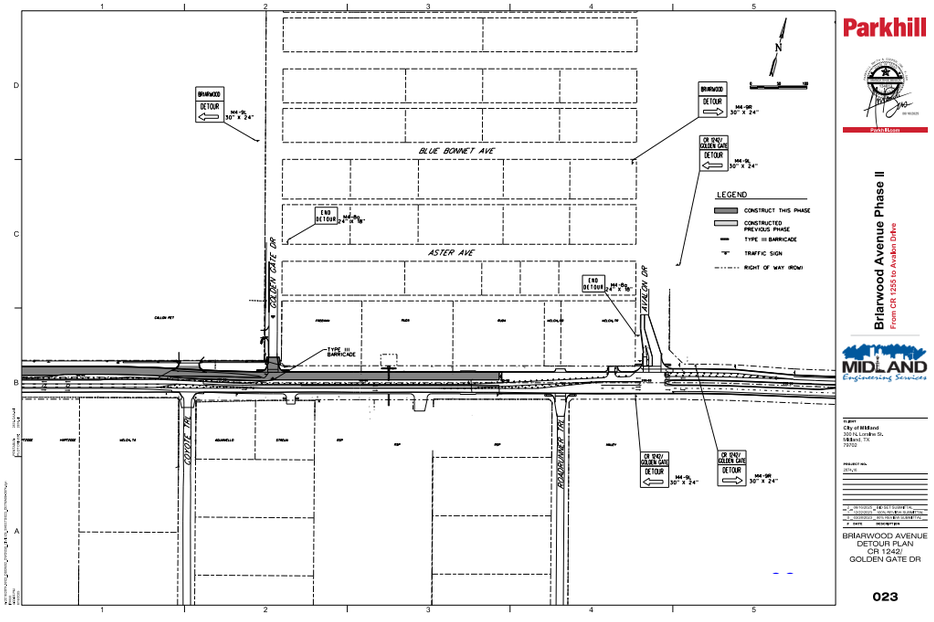
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DETOUR PLAN
TROBAUGH BLVD
SHEET 1 OF 1

022



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John Rowe

Briarwood Avenue Phase II

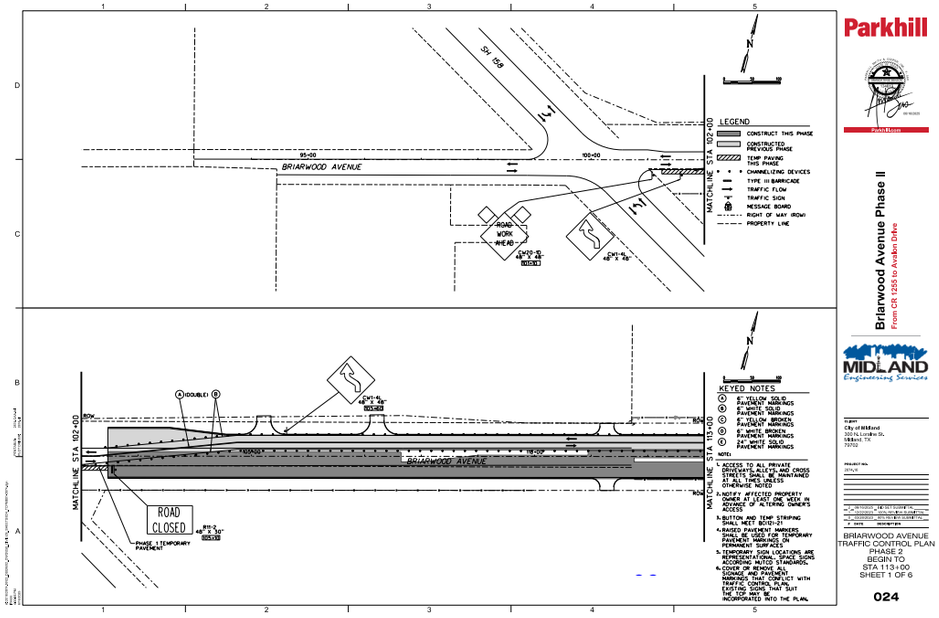
From CR 1250 to Avalon Drive

MIDLAND
Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
DETOUR PLAN
OR 1242/
GOLDEN GATE DR

023



Parkhill

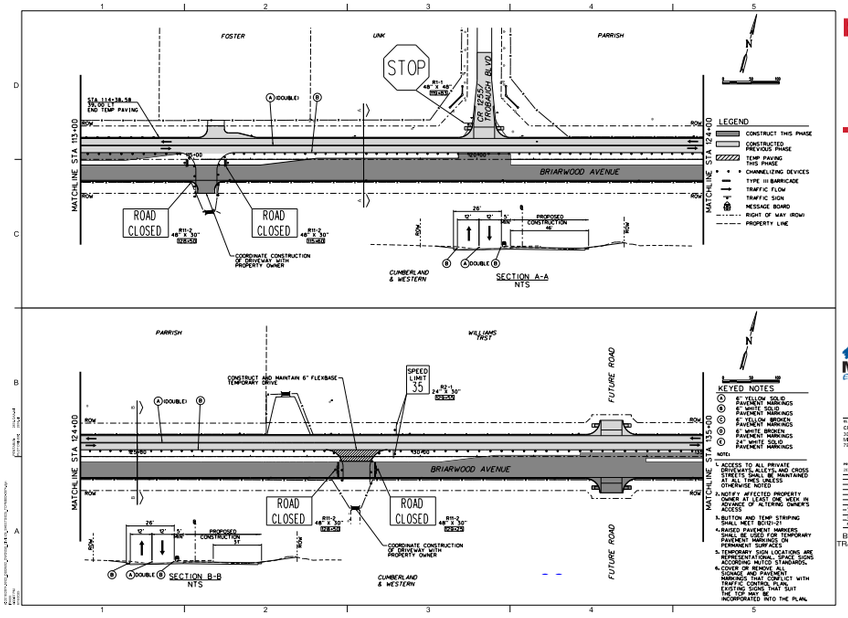
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 2
BEGIN TO
STA 113+00
SHEET 1 OF 6

024



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John Rowe

Briarwood Avenue Phase II

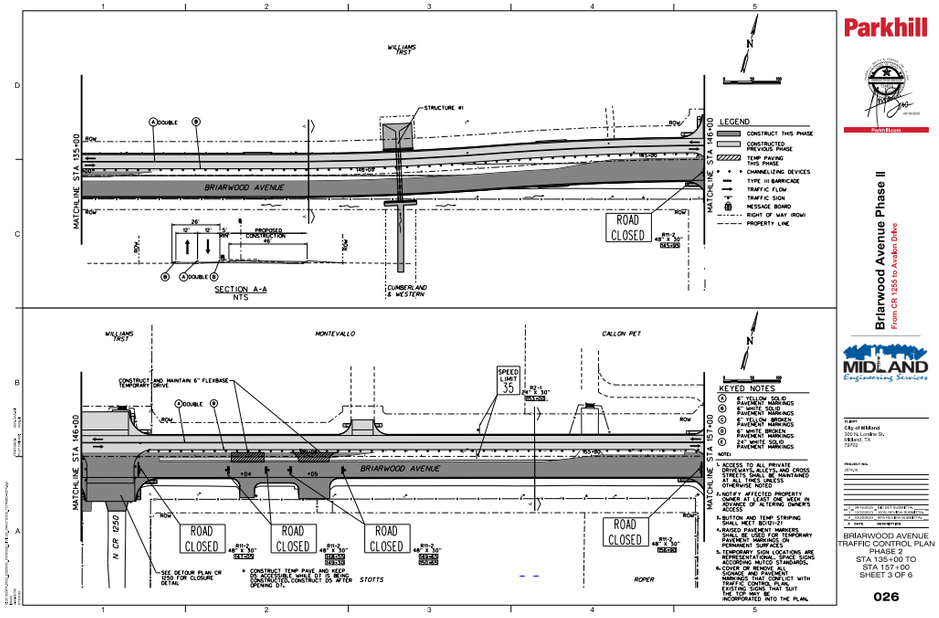
From CR 1255 to Avalon Drive

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BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 2
STA 113+00 TO
STA 135+00
SHEET 2 OF 6

025



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John Rowe

Briarwood Avenue Phase II

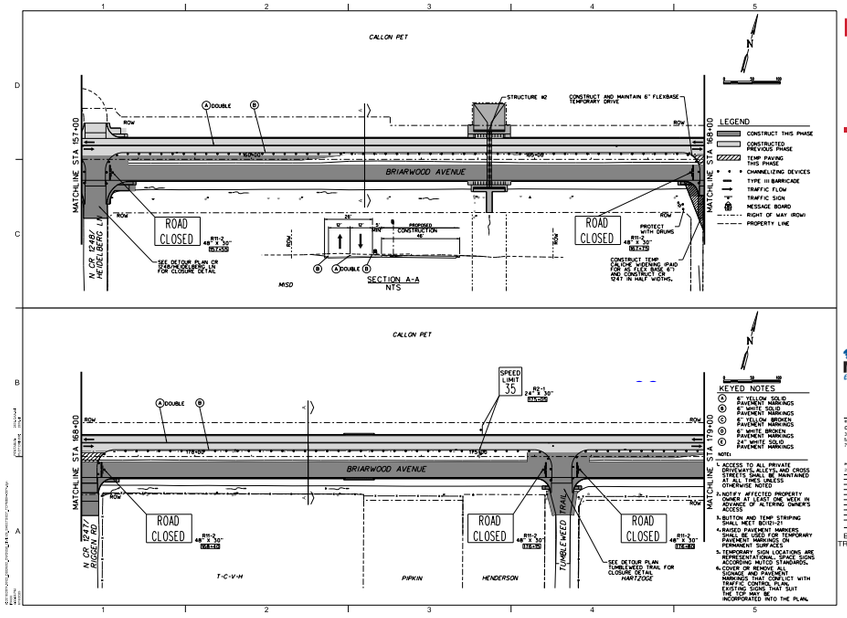
From CR 1250 to Avalon Drive

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Midland, TX
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BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 2
STA 135+00 TO
STA 157+00
SHEET 3 OF 6

026



Parkhill

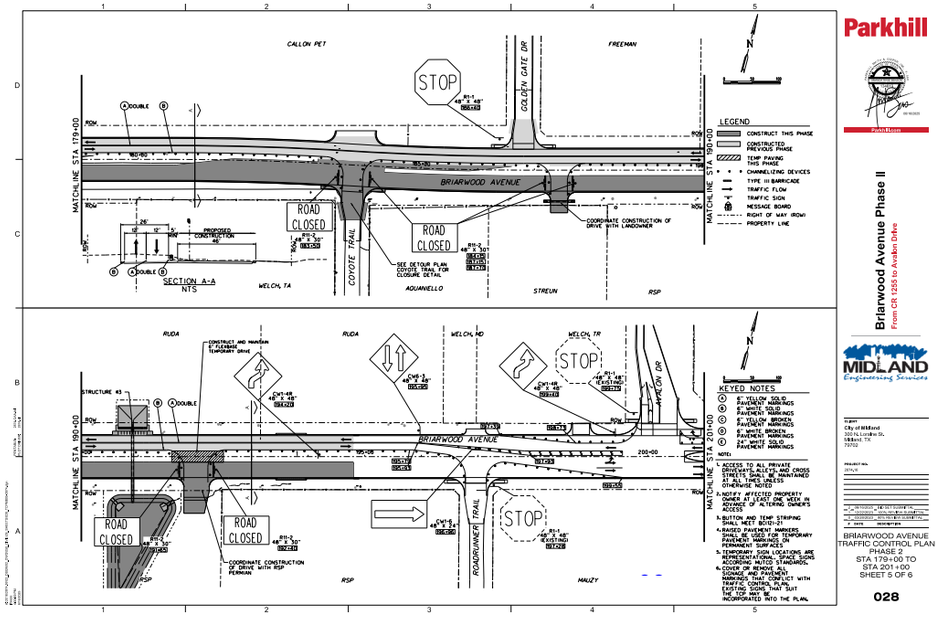
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE TRAFFIC CONTROL PLAN PHASE 2 STA 157+00 TO STA 179+00 SHEET 4 OF 6

027



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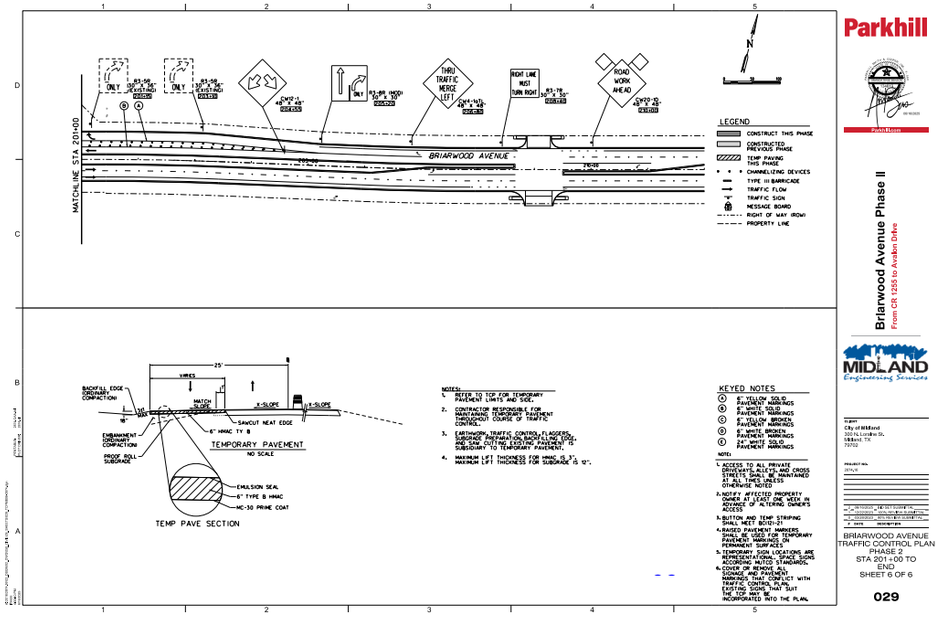
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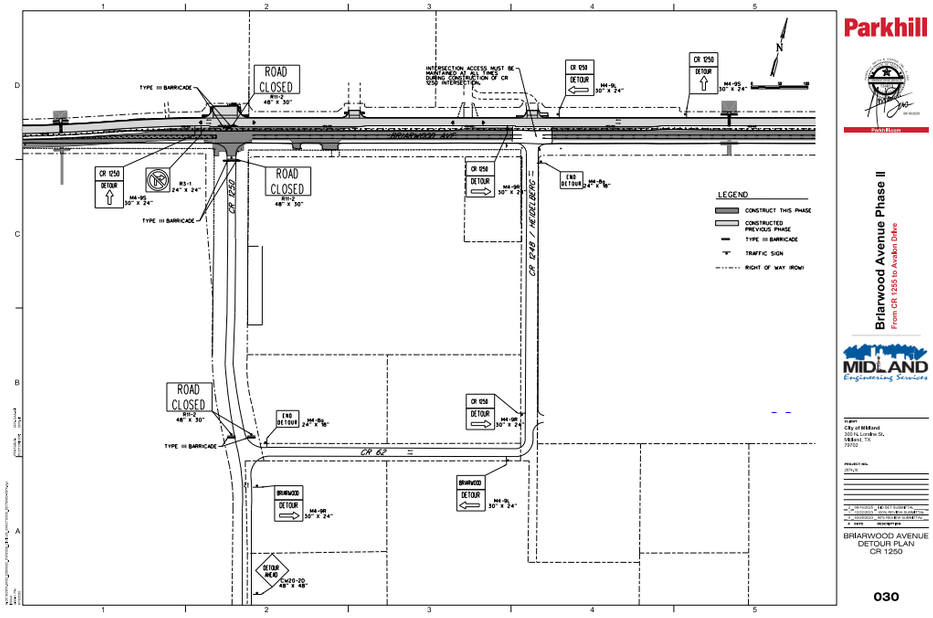
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE TRAFFIC CONTROL PLAN PHASE 2 STA 179+00 TO STA 201+00 SHEET 5 OF 6

028


MATCH LINE STA 201+00
BRIARWOOD AVENUE
ONLY
ONLY
THRU TRAFFIC MERGE LEFT
RIGHT LANE MUST TURN RIGHT
ROAD WORK AHEAD
LEGEND
CONSTRUCT THIS PHASE
CONSTRUCTED PREVIOUS PHASE
TEMP PAVING THIS PHASE
CHANNELIZING DEVICES
TYPE III BARRICADE
TRAFFIC FLOW
TRAFFIC SIGN
MESSAGE BOARD
RIGHT OF WAY (ROW)
PROPERTY LINE
25'
VARIES
MATCH X-SLOPE
X-SLOPE
SAWCUT NEAT EDGE
6" HMAC TY B
BACKFILL EDGE ORDINARY COMPACTION
EMBANKMENT ORDINARY COMPACTION
PROOF ROLL SUBGRADE
TEMPORARY PAVEMENT
NO SCALE
EMULSION SEAL
6" TYPE B HMAC
MC-30 PRIME COAT
TEMP PAVE SECTION
NOTES:
1. REFER TO TCP FOR TEMPORARY PAVEMENT LIMITS AND SIDE.
2. CONTRACTOR RESPONSIBLE FOR MAINTAINING TEMPORARY PAVEMENT THROUGHOUT COURSE OF TRAFFIC CONTROL.
3. EARTHWORK, TRAFFIC CONTROL, FLAGGERS, SUBGRADE PREPARATION, BACKFILLING EDGE, AND SAW CUTTING EXISTING PAVEMENT IS SUBSIDIARY TO TEMPORARY PAVEMENT.
4. MAXIMUM LIFT THICKNESS FOR HMAC IS 3"; MAXIMUM LIFT THICKNESS FOR SUBGRADE IS 12".
KEYED NOTES
6" YELLOW SOLID PAVEMENT MARKINGS
6" WHITE SOLID PAVEMENT MARKINGS
6" YELLOW BROKEN PAVEMENT MARKINGS
6" WHITE BROKEN PAVEMENT MARKINGS
24" WHITE SOLID PAVEMENT MARKINGS
NOTES:
1. ACCESS TO ALL PRIVATE DRIVEWAYS, ALLEYS, AND CROSS STREETS SHALL BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE NOTED
2. NOTIFY AFFECTED PROPERTY OWNER AT LEAST ONE WEEK IN ADVANCE OF ALTERING OWNER'S ACCESS
3. BUTTON AND TEMP STRIPING SHALL MEET BCHD-21
4. RAISED PAVEMENT MARKERS SHALL BE USED FOR TEMPORARY PAVEMENT MARKINGS ON PERMANENT SURFACES
5. TEMPORARY SIGN LOCATIONS ARE SHOWN FOR GENERAL GUIDANCE ACCORDING TMUTCD STANDARDS.
6. COVER OR REMOVE ALL SIGNAGE AND PAVEMENT MARKINGS NOT CONSISTENT WITH TRAFFIC CONTROL PLAN. EXISTING SIGNS THAT SUIT THE TCP WILL BE INCORPORATED INTO THE PLAN.
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 2
STA 201+00 TO
END
SHEET 6 OF 6
029



Parkhill

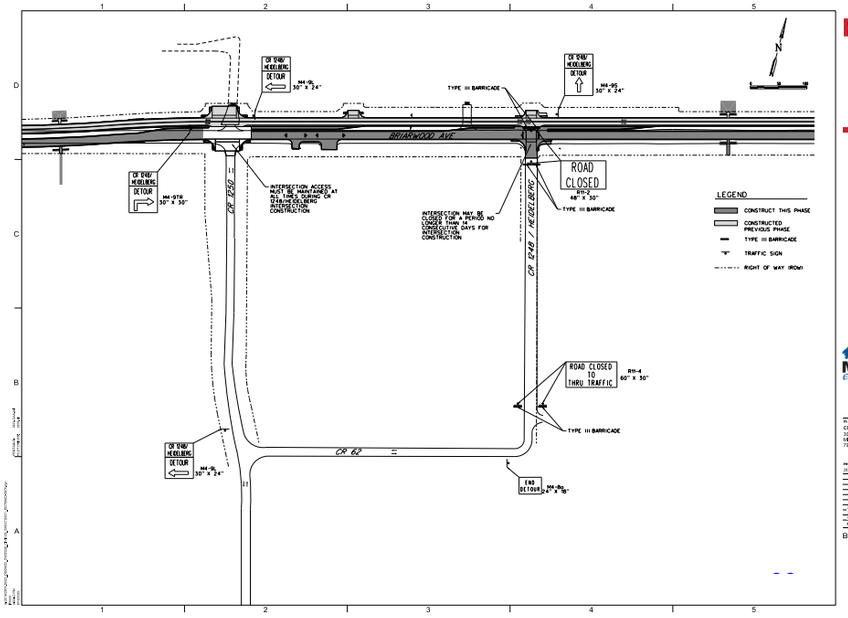
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DETOUR PLAN
CR 1250

030



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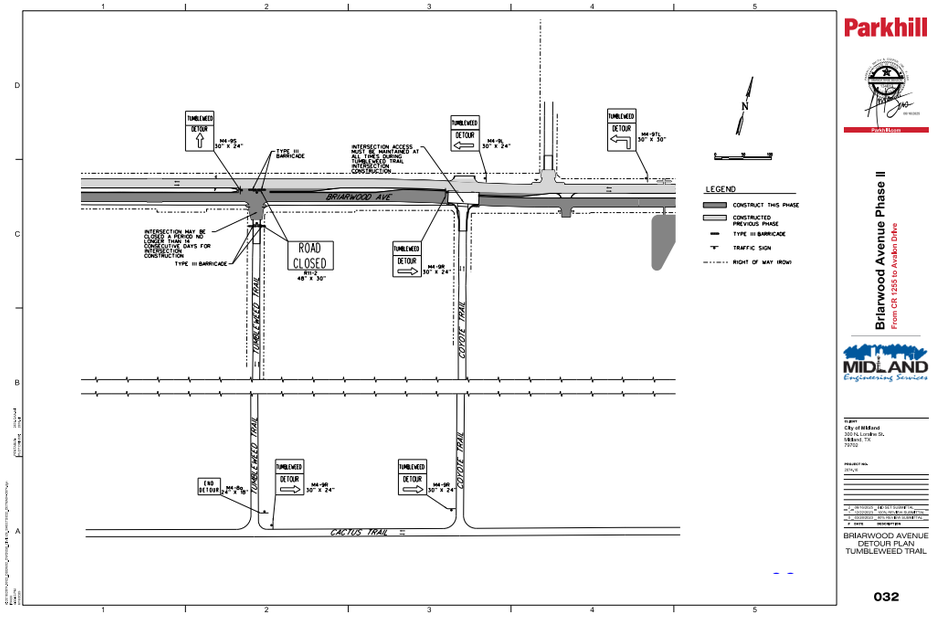
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DETOUR PLAN
CR 1240/
HEIDELBURG

031



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John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

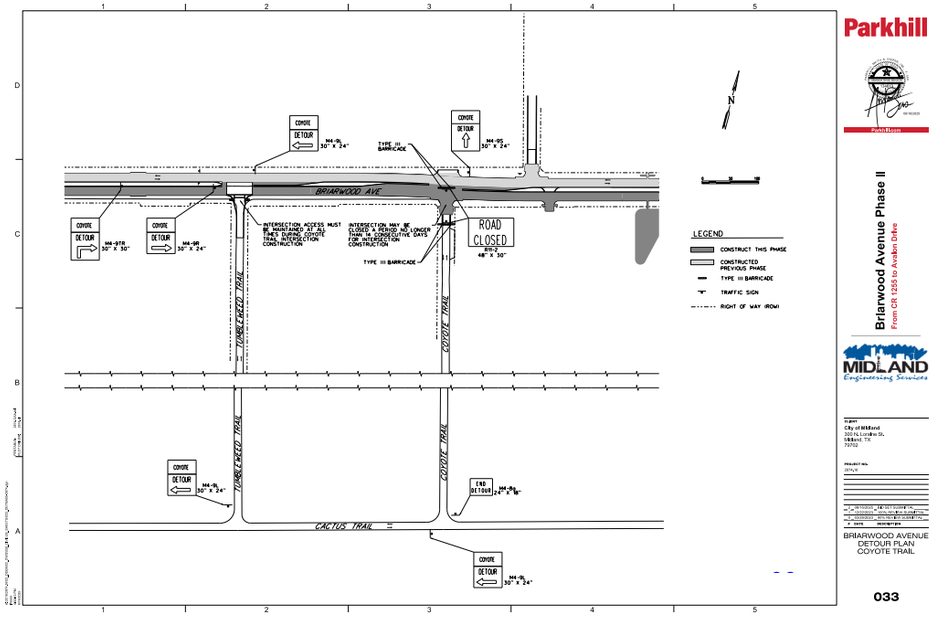
Client
City of Midland
300 N. Loraine St.
Midland, TX
79701

Project No.
067619

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
DETOUR PLAN
TUMBLEWEED TRAIL

032



Parkhill

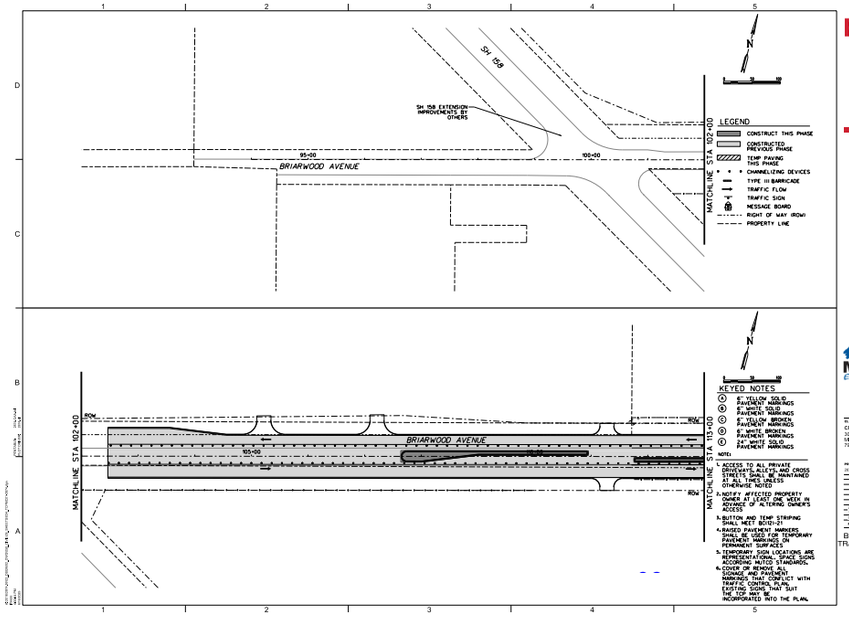
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DETOUR PLAN
COYOTE TRAIL

033



Parkhill

Briarwood Avenue Phase II

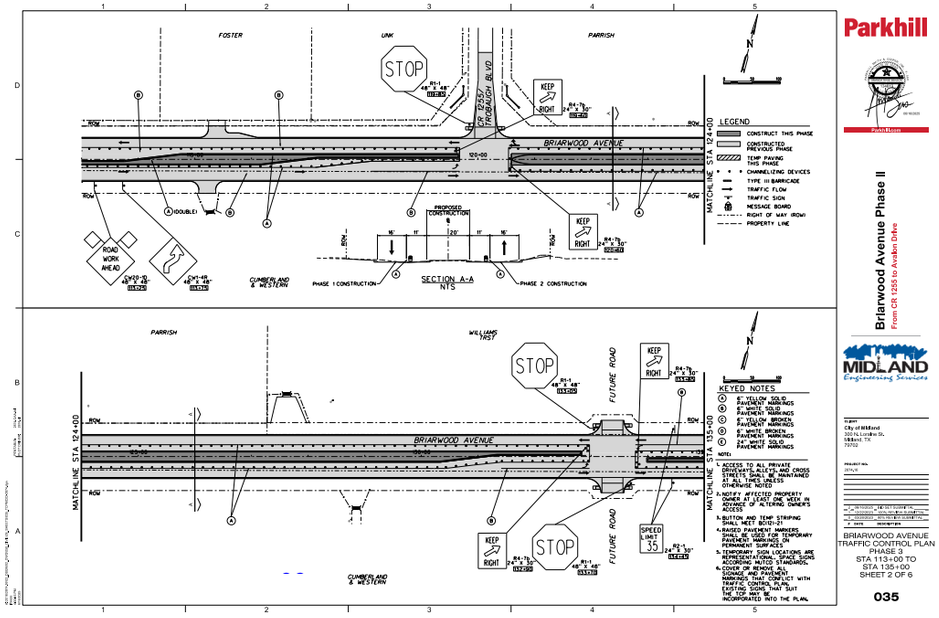
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
BEGIN TO
STA 113+00
SHEET 1 OF 6

034



Parkhill

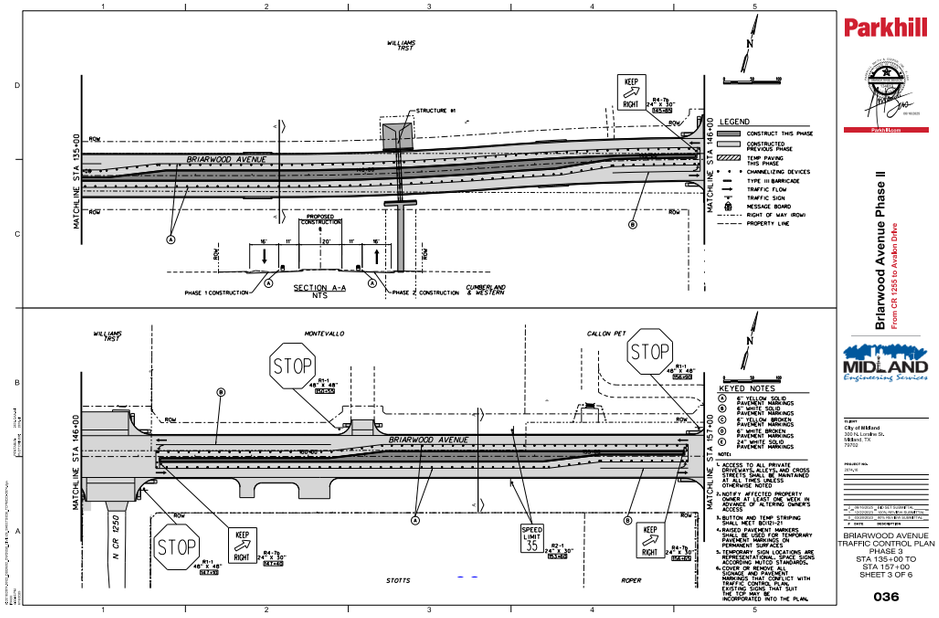
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 113+00 TO
STA 135+00
SHEET 2 OF 6

035



Parkhill

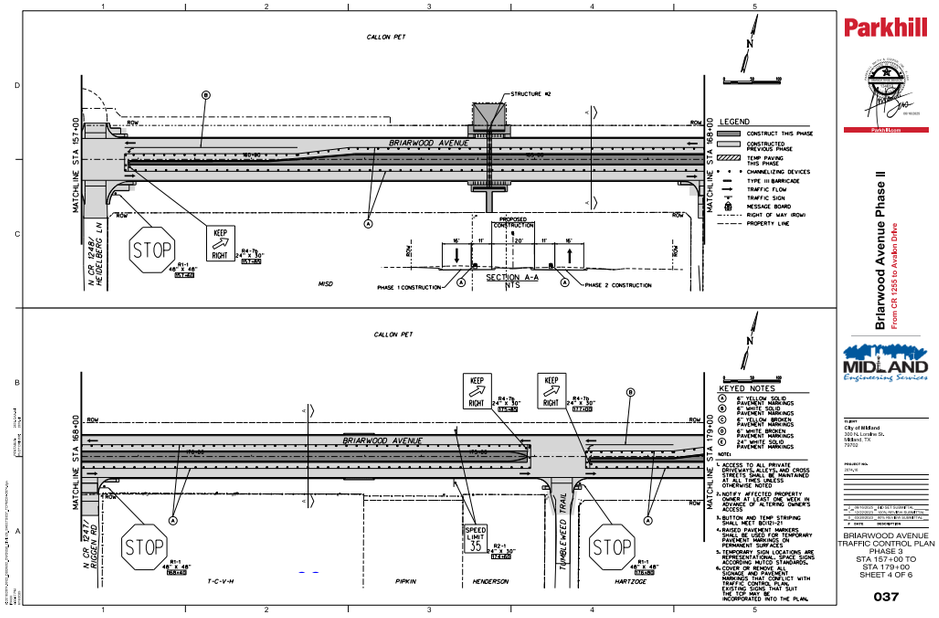
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 135+00 TO
STA 157+00
SHEET 3 OF 6

036



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John Rowe

Briarwood Avenue Phase II

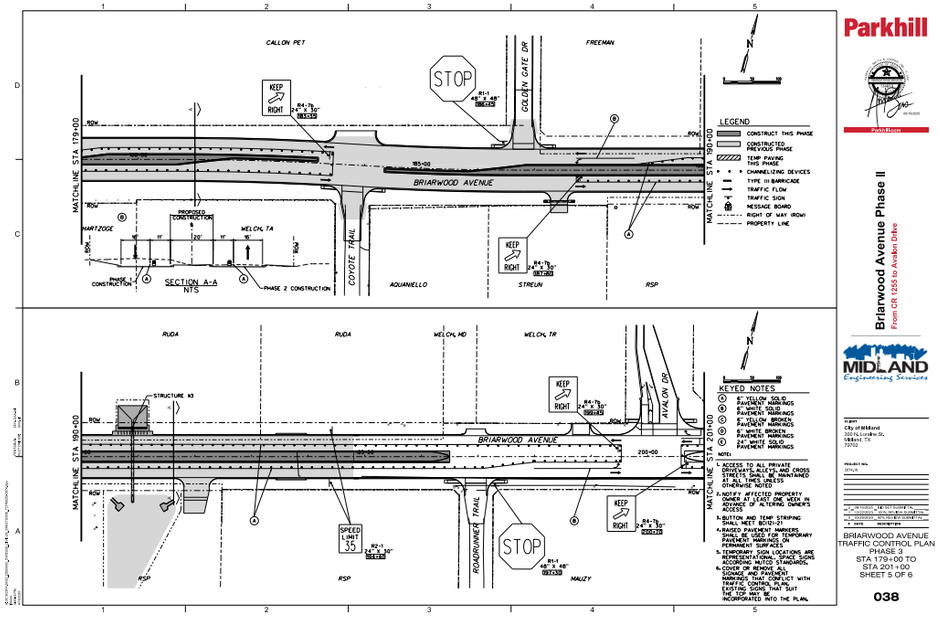
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 157+00 TO
STA 179+00
SHEET 4 OF 6

037



Parkhill

Briarwood Avenue Phase II

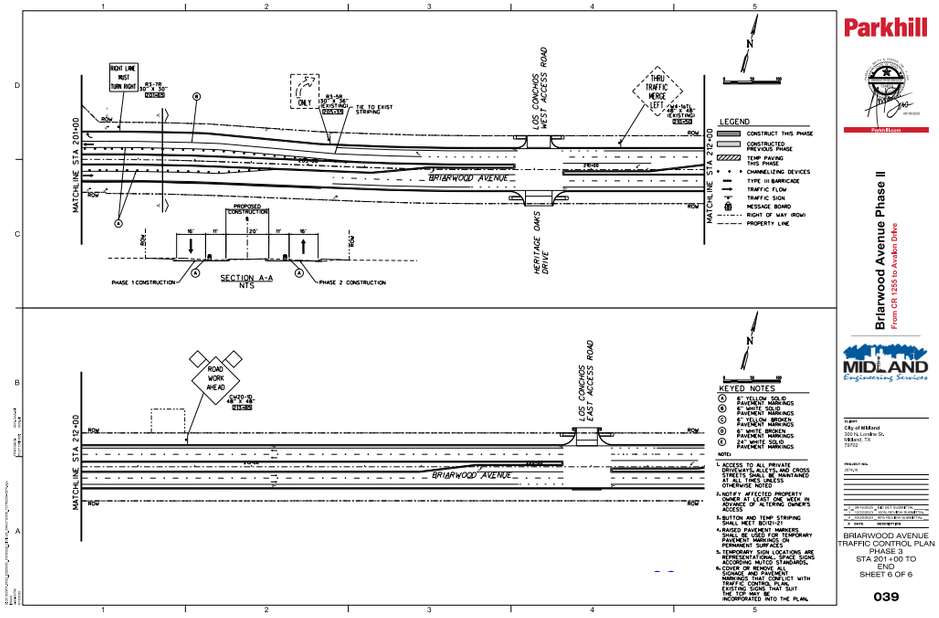
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 179+00 TO
STA 201+00
SHEET 5 OF 6

038



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

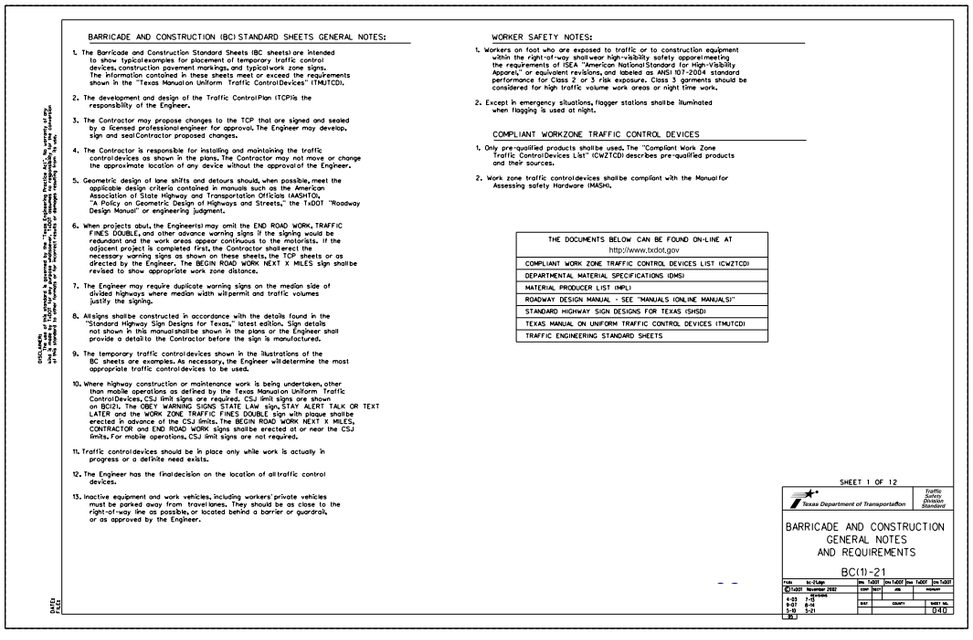
MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

NO.	DATE	DESCRIPTION
1	08/20/2025	AS BUILT CORRECTIONS
2	08/20/2025	INSTALLED BLUE MARKERS
3	08/20/2025	INSTALLED BLUE MARKERS

BRIARWOOD AVENUE
TRAFFIC CONTROL PLAN
PHASE 3
STA 201+00 TO
END
SHEET 6 OF 6

039



BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.

2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.

2. Work zone traffic control devices shall be compliant with the Manual for Assessing Safety Hardware (MASH).

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

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SHEET 1 OF 12

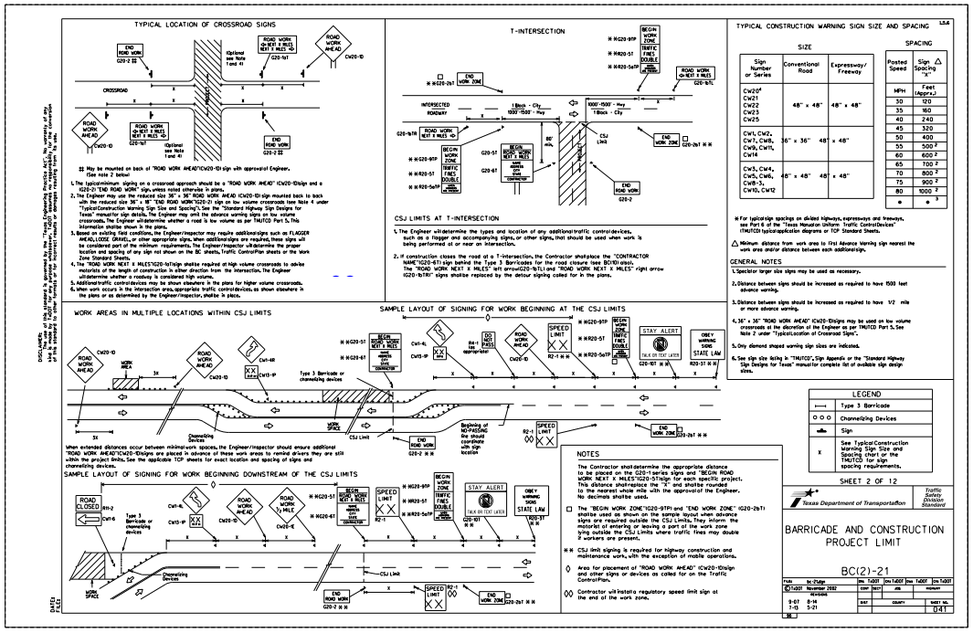
Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

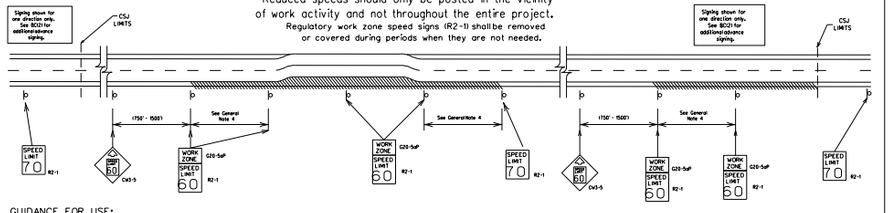
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TYPICAL LOCATION OF CROSSROAD SIGNS
T-INTERSECTION
TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING
CSJ LIMITS AT T-INTERSECTION
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS
SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS
SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS
GENERAL NOTES
NOTES
LEGEND
Type 3 Barricade
Channelizing Devices
Sign
See Typical Construction Warning Sign Size and Spacing Table for the TMUTCD for sign spacing requirements.
SHEET 2 OF 12
BARRICADE AND CONSTRUCTION PROJECT LIMIT
BC(2)-21

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.
Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic controlplans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic controlplans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.
(See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed controls of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater — 0.2 to 2 miles
   35 mph and less — 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the "ADVANCE SPEED LIMIT" (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (transi-radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #2014 in the TxDOT e-form system.

SHEET 3 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

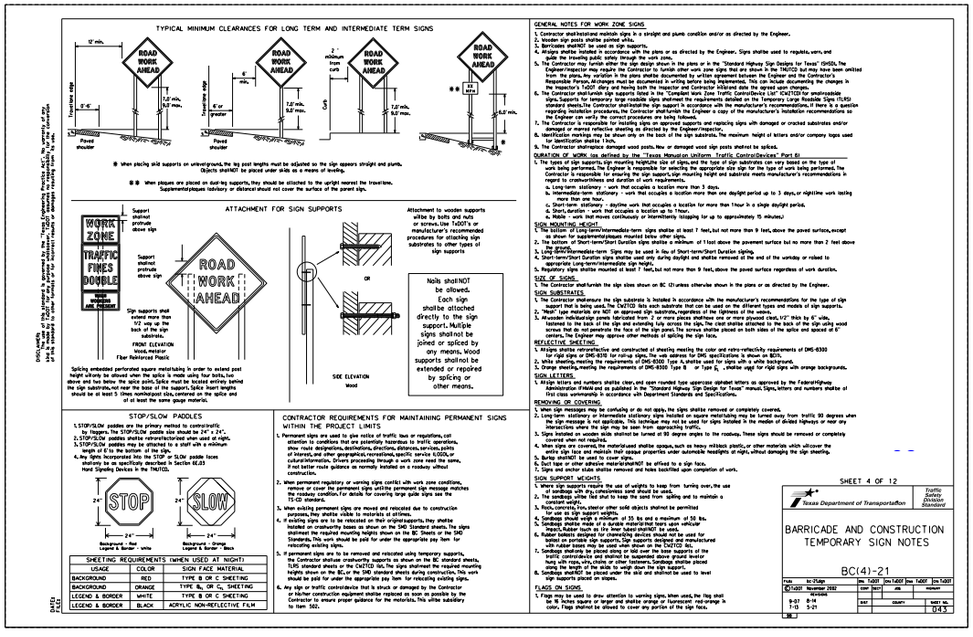
BARRICADE AND CONSTRUCTION
WORK ZONE SPEED LIMIT

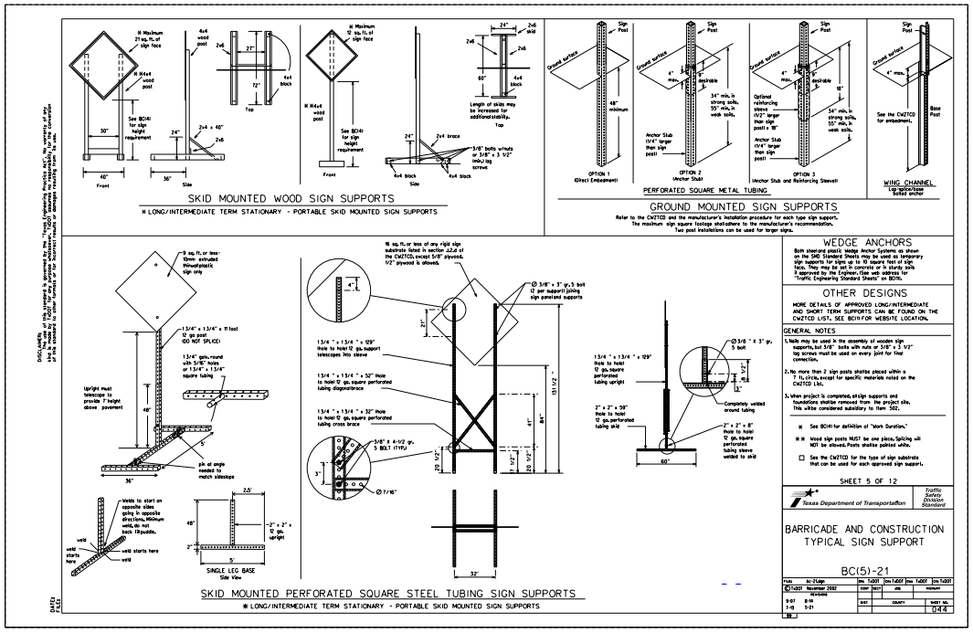
BC(3)-21

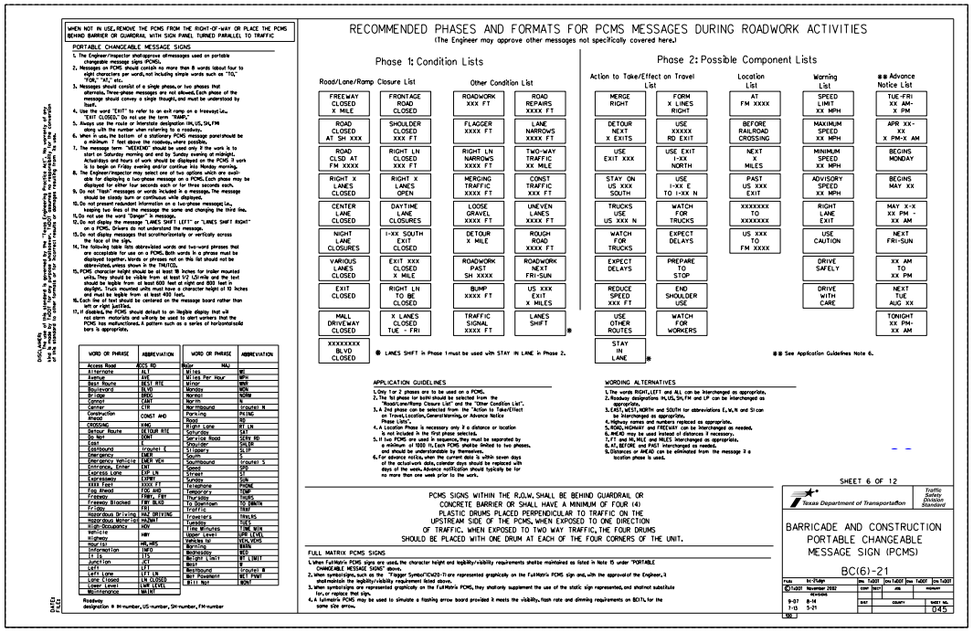
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DATES CE(2)


TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS
ROAD WORK AHEAD
12' min.
Traveled way
6'-6"
7.0' min.
6.0' min.
Paved shoulder
6' min.
6' or greater
2' minimum from curb
Curb
** 12 MAX
* When placing skid supports on unleveled ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.
** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the traveled way. Supplementary plaques (advisory or distance) should not cover the surface of the parent sign.
ATTACHMENT FOR SIGN SUPPORTS
WORK ZONE TRAFFIC FINES DOUBLE WHEN WORKERS ARE PRESENT
Support shall not protrude above sign
Support shall not protrude above sign
Sign supports shall extend more than 1/2 way up the back of the sign substrate.
FRONT ELEVATION
Wood, metal or Fiber Reinforced Plastic
Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the splice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.
OR
SIDE ELEVATION
Wood
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports
Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.
STOP/SLOW PADDLES
1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
2. STOP/SLOW paddles shall be retroreflectorized when used at night.
3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
4. Any signs incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.
STOP
SLOW
24"
Background = Red
Legend & Border = White
Background = Orange
Legend & Border = Black
SHEETING REQUIREMENTS (WHEN USED AT NIGHT)
USAGE | COLOR | SIGN FACE MATERIAL
BACKGROUND | RED | TYPE B OR C SHEETING
BACKGROUND | ORANGE | TYPE B, OR C_L SHEETING
LEGEND & BORDER | WHITE | TYPE B OR C SHEETING
LEGEND & BORDER | BLACK | ACRYLIC NON-REFLECTIVE FILM
CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS
1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, or other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the TS-CD standard.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, the SMD standard sheets, or the SMD standard sheets for permanent signs. The mounting height shall meet BC or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic control device that is struck or damaged by the Contractor or by other construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.
GENERAL NOTES FOR WORK ZONE SIGNS
1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may further alter the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish their own sign layout that as shown in the TMUTCD but may have been omitted from the plans. Any changes shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor Initialed date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for unattachable signs. Supports for temporary large mountable signs shall meet the requirements detailed on the Temporary Large Mountable Signs (TLMS) standard sheets. The Contractor shall install the sign supports in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall provide the Engineer a copy of the manufacturer's installation recommendations so that the Engineer can verify that the supports are being installed correctly.
7. It is the Contractor's responsibility to maintain signs and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.
DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6):
1. The types of sign supports, sign mounting heights, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for furnishing signs, sign supports, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
a. Long-term stationary - work that occupies a location more than 3 days.
b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
d. Short, duration - work that occupies a location up to 1 hour.
e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)
SIGN MOUNTING HEIGHT:
1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for Long-term/plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-term/Intermediate-term signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shall be removed during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.
SIZE OF SIGNS:
1. The Contractor shall furnish the sign sizes shown on BC (1) unless otherwise shown in the plans or as directed by the Engineer.
SIGN SUBSTRATES
1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Weak" type materials are NOT an approved sign substrate, regardless of the tightness of the wires.
3. All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.
REFLECTIVE SHEETING:
1. All signs shall be retroreflective and unilluminated. All sheeting shall have the color and retroreflectivity requirements of DMS-8300 for the sheeting type specified. The minimum sheeting requirements for various applications is shown on BC(1).
2. White sheeting meeting the requirements of DMS-8300 Type A shall be used for signs with a white background.
3. Orange sheeting meeting the requirements of DMS-8300 Type B or Type A_L shall be used for rigid signs with orange backgrounds.
SIGN LETTERS:
1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.
REMOVING OR COVERING
1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not in use.
4. When signs are covered, the material used shall be opaque, such as heavy mildew plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor slabs shall be removed and holes backfilled upon completion of work.
SIGN SUPPORT WEIGHTS
1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags shall be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material such as Burlap or Geotextile Fabric. Rubber mats or other types shall NOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the SMD standards.
7. Sandbags shall be placed on the ground at the base of the supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall not be placed under the skid and shall not be used to level sign supports placed on slopes.
FLAGS ON SIGNS
1. Flags may be used to draw attention to warning signs, when used, the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.
SHEET 4 OF 12
Texas Department of Transportation
Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES
BC(4)-21
FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT
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REVISIONS | 5-10 | 5-21 | DIST | COUNTY | SHEET NO.


SKID MOUNTED WOOD SIGN SUPPORTS
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS
PERFORATED SQUARE METAL TUBING
GROUND MOUNTED SIGN SUPPORTS
WING CHANNEL
WEDGE ANCHORS
OTHER DESIGNS
GENERAL NOTES
SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS
SINGLE LEG BASE
Side View
SHEET 5 OF 12
Texas Department of Transportation
Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT
BC(5)-21



WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/inspector shall approve all messages used on portable changeable message signs (PCMS).
2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
4. Do not use "EXIT" to refer to an exit ramp on a freeway i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM along with the number when referring to a roadway.
6. When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Otherwise, the days of the week should be specified, i.e., "FRI 9-5" is to begin on Friday evening and/or continue into Monday morning.
8. The Engineer/inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. Do not present redundant information on a two-phase message i.e., keeping two lines of the message the same and changing the third line, such as "RIGHT LANE CLOSED AHEAD."
11. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
12. Do not display messages that scroll vertically or vertically across the face of the sign.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the MUTCD.
15. Proportional characters should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 US-mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Trailer mounted units must have a character height of 12 inches and must be legible from at least 400 feet.
16. Each line of text should be centered on the message board rather than left or right justified.
17. If desired, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Hour	HR/HRS
Alternate	ALT	Ice	ICE
Avenue	AVE	Inches Per Hour	IPH
Be Advised	BE ADVISED	Left	LEFT
Boulevard	BLVD	Minutes	MIN
Bridge	BRDG	Normal	NORM
Cannot	CANT	North	N
Center	CTR	Northbound	Intrstate N
Construction	CONST AHD	Parking	PKING
Ahead		Road	RD
Crossing	XING	Right Lane	RT LN
Detour Route	DETOUR RTE	Slippery	SLIP
Do Not	DONT	Service Road	SERV RD
Ice	ICE	Shoulder	SHLDR
Eastbound	Intrstate E	Slippery	SLIP
Emergency	EMER	South	S
Emergency Vehicle	EMER VEH	Southbound	Intrstate S
Entrance, Enter	ENT	Speed	SPD
Express Lane	EXP LN	Street	ST
Expressway	EXPWY	Surplus	SURL
XXXX Feet	XXXX FT	Telephone	PHONE
Fog Ahead	FOG AHD	Temporary	TEMP
Freeway	FWY	Thursday	THURS
Freeway Blocked	FWY BLKD	To Downtown	TO DWNTN
Friday	FRI	Tuesday	TUES
Hazardous Driving	HAZ DRIVING	Traffic	TRFC
Hazardous Material	HAZMAT	Trailer	TRLR
High Occupancy	HOV	Traffic Signals	TRFC SIGS
Vehicle		Turn Left	TURN LEFT
Highway	HWY	Upper Level	UPR LEVEL
Hour	HR/HRS	Vehicles	VEHS
Information	INFO	Warning	WARN
I-XX	I-XX	Weather	WEA
Junction	JCT	Wednesday	WED
Left	LFT	West	W
Left Lane	LFT LN	Westbound	Intrstate W
Lane Closed	LN CLOSED	Wet Pavement	WET PVMT
Lower Level	LWR LEVEL	Will Not	WONT
Maintenance	MAINT		

Roadway designation: # = number, US = number, SH = number, FM = number

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DATE:
FILE:

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE
ROAD CLOSED AT SH XXX
ROAD CLSD AT FM XXXX
RIGHT X LANES CLOSED
CENTER LANE CLOSED
NIGHT LANE CLOSURES
VARIOUS LANES CLOSED
EXIT CLOSED
MALL DRIVEWAY CLOSED
XXXXXXXX BLVD CLOSED

FRONTAGE ROAD CLOSED
SHOULDER CLOSED XXX FT
RIGHT LN CLOSED XXX FT
RIGHT X LANES OPEN
DAYTIME LANE CLOSURES
I-XX SOUTH EXIT CLOSED
EXIT XXX CLOSED X MILE
RIGHT LN TO BE CLOSED
X LANES CLOSED TUE - FRI

Other Condition List

ROADWORK XXX FT
FLAGGER XXXX FT
RIGHT LN NARROWS XXXX FT
MERGING TRAFFIC XXXX FT
LOOSE GRAVEL XXXX FT
DETOUR X MILE
ROADWORK PAST SH XXXX
BUMP XXXX FT
TRAFFIC SIGNAL XXXX FT

ROAD REPAIRS XXXX FT
LANE NARROWS XXXX FT
TWO-WAY TRAFFIC XX MILE
CONST TRAFFIC XXX FT
UNEVEN LANES XXXX FT
ROUGH ROAD XXXX FT
ROADWORK NEXT FRI-SUN
US XXX EXIT X MILES
LANES SHIFT *

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

MERGE RIGHT
DETOUR NEXT X EXITS
USE EXIT XXX
STAY ON US XXX SOUTH
TRUCKS USE US XXX N
WATCH FOR TRUCKS
EXPECT DELAYS
REDUCE SPEED XXX FT
USE OTHER ROUTES
STAY IN LANE *

FORM X LINES RIGHT
USE XXXXX RD EXIT
USE EXIT I-XX NORTH
USE I-XX E TO I-XX N
WATCH FOR TRUCKS
EXPECT DELAYS
PREPARE TO STOP
END SHOULDER USE
WATCH FOR WORKERS

Location List

AT FM XXXX
BEFORE RAILROAD CROSSING
NEXT X MILES
PAST US XXX EXIT
XXXXXXX TO XXXXXXX
US XXX TO FM XXXX

Warning List

SPEED LIMIT XX MPH
MAXIMUM SPEED XX MPH
MINIMUM SPEED XX MPH
ADVISORY SPEED XX MPH
RIGHT LANE EXIT
USE CAUTION
DRIVE SAFELY
DRIVE WITH CARE

** Advance Notice List

TUE-FRI XX AM- X PM
APR XX-XX X PM-X AM
BEGINS MONDAY
BEGINS MAY XX
MAY X-X XX PM - XX AM
NEXT FRI-SUN
XX AM TO XX PM
NEXT TUE AUG XX
TONIGHT XX PM- XX AM

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only Tier 2 phases are to be used on a PCMS.
2. A Tier 2 phase can be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location phase is necessary only if a distance or location is needed for the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS phase limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Abbreviations IN, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH for abbreviations E, W, N and S can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AM and PM may be used instead of distances if necessary.
7. MILE and MILES can be interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC, WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When FullMatrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Trigger Symbol" (D4-2) (T) are represented graphically on the FullMatrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the FullMatrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for the static sign.
4. A FullMatrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

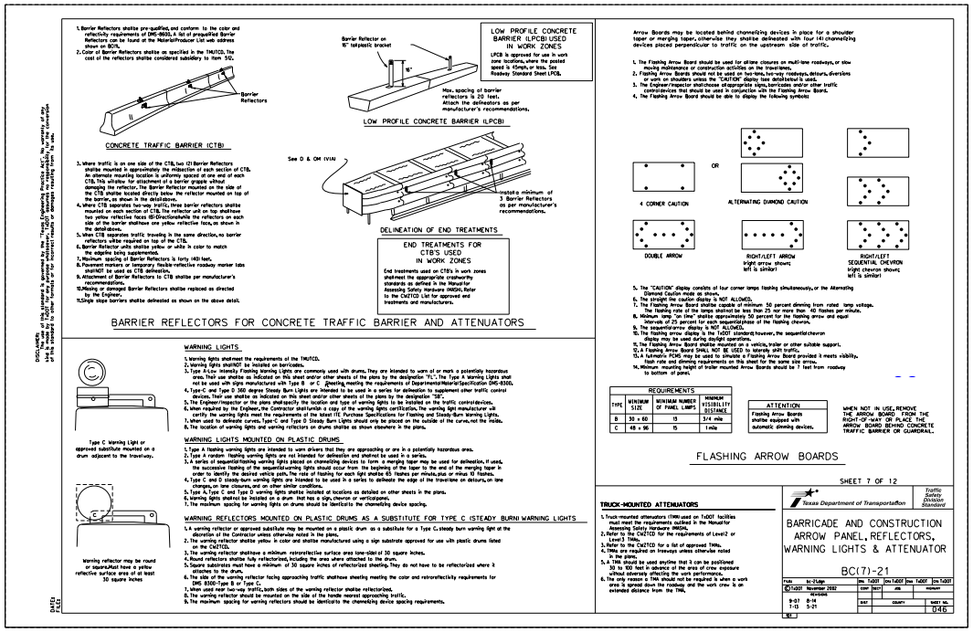
SHEET 6 OF 12

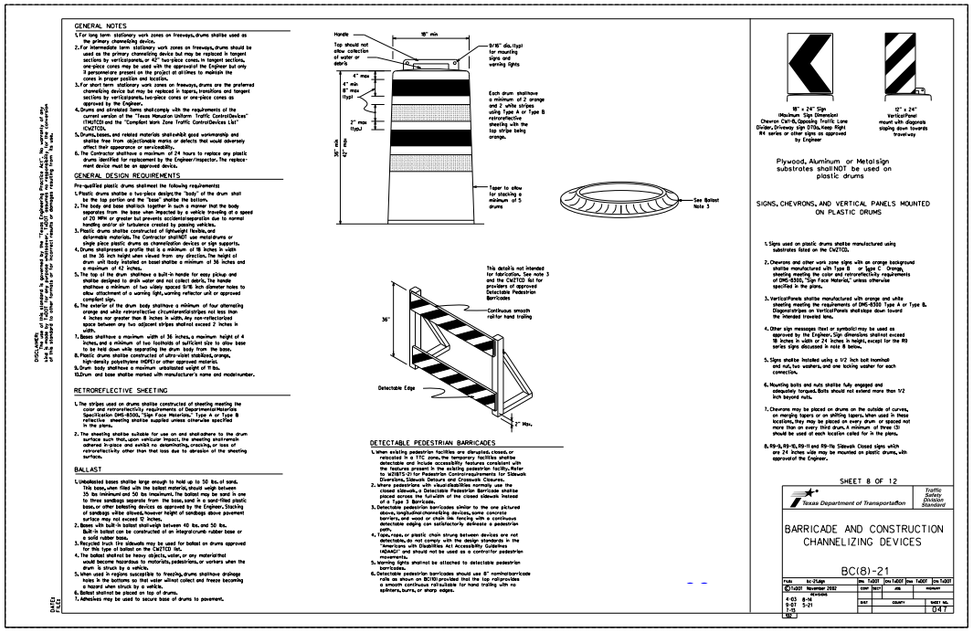
Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION
PORTABLE CHANGEABLE
MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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7-13 5-21				0445


1. Barrier Reflectors shallbe yellow in color and shall conform to the color and
2. Color of Barrier Reflectors shallbe as specified in the TMUTCD. The
CONCRETE TRAFFIC BARRIER (CTB)
3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors
4. Where CTB separates two-way traffic, three barrier reflectors shallbe
5. When CTB separates traffic traveling in the same direction, no barrier
6. Barrier Reflector units shallbe yellow or white in color to match
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Maximum spacing of Barrier Reflectors shallbe reflective roadway marker tabs
9. Attachment of Barrier Reflectors to CTB shallbe per manufacturer's
10. Missing or damaged Barrier Reflectors shallbe replaced as directed
11. Single slope barriers shallbe delineated as shown on the above detail.
Barrier Reflector on
10" tabletastic bracket
6"
Barrier Reflectors
Max. spacing of barrier
reflectors is 20 feet.
Attach the delineators as per
manufacturer's recommendations.
LOW PROFILE CONCRETE BARRIER (LPCB)
LOW PROFILE CONCRETE
BARRIER (LPCB) USED
IN WORK ZONES
LPCB is approved for use in work
zone locations, where the posted
speed is 45mph, or less. See
Roadway Standard Sheet LPCB.
See D & OM (VIII)
Install a minimum of
3 Barrier Reflectors
as per manufacturer's
recommendations.
DELINEATION OF END TREATMENTS
END TREATMENTS FOR
CTB'S USED
IN WORK ZONES
End treatments used on CTB's in work zones
shallmeet the appropriate crashworthy
standards as defined in the Manual for
Assessing Safety Hardware (MASH), Refer
to the CMTCD List for approved end
treatments and manufacturers.
BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS
Type C Warning Light or
approved substitute mounted on a
drum adjacent to the traveluay.
Warning reflector may be round
or square,that have a yellow
reflective surface area of at least
30 square inches
WARNING LIGHTS
1. Warning lights shallmeet the requirements of the TMUTCD.
2. Warning lights shallNOT be installed on barricades.
3. Type A Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous
4. Type C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control
5. The Engineer/Inspector or the plans shallspecify the location and type of warning lights to be installed on the traffic control devices.
6. When required by the Engineer, the Contractor shallfurnish a copy of the warning lights certification. The warning light manufacturer will
7. When used to delineate curves, Type C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
8. The location of warning lights and warning reflectors on drums shallbe as shown elsewhere in the plans.
WARNING LIGHTS MOUNTED ON PLASTIC DRUMS
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shallnot be used in a series.
3. A series of sequential flashing warning lights placed on channelizing devices in turns or merging taper may be used for delineation, if used,
4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travelane on detours, on lane
5. Type A, Type C and Type D warning lights shallbe installed at locations as detailed on other sheets in the plans.
6. Warning lights shallnot be installed on a drum that has a sign, chevron or reflectorized.
7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.
WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C STEADY BURN WARNING LIGHTS
1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C steady burn warning light at the
2. The warning reflector shallbe yellow in color and shallbe manufactured using a sign substrate approved for use with plastic drums listed
3. The warning reflector shallhave a minimum retroreflective surface area tone-sided of 30 square inches.
4. Only the reflective portion shallbe fully retroreflected, including the area where attached to the drum.
5. Square reflectors must have a minimum of 30 square inches of retroflectorized sheeting. They do not have to be retroflectorized where it
6. The side of the warning reflector facing approaching traffic shallhave sheeting meeting the color and retroreflectivity requirements for
7. When used near two-way traffic, both sides of the warning reflector shallbe retroflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identicalto the channelizing device spacing requirements.
Arrow Boards may be located behind channelizing devices in place for a shoulder
taper or merging taper, otherwise they shallbe delineated with four (4) channelizing
devices placed perpendicular to traffic on the upstream side of traffic.
1. The Flashing Arrow Board should be used for offlane closures on multi-lane roadways, or slow
moving maintenance or construction activities on the travelanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions
or work on shoulders unless the "CAUTION" display (see detailsheet) is used.
3. The Engineer/Inspector shallchoose all appropriate signs, barricades and/or other traffic
controldevices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbolic
4 CORNER CAUTION
OR
ALTERNATING DIAMOND CAUTION
DOUBLE ARROW
RIGHT/LEFT
Right arrow shown;
left is similar
RIGHT/LEFT
SEQUENTIAL CHEVRON
Right chevron shown;
left is similar
5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating
Diamond Caution mode, as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shallbe capable of minimum 50 percent dimming from rated lamp voltage.
The flashing rate of the lamps shallnot be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shallbe approximately 50 percent for the flashing arrow and equal
intervals of 25 percent for each sequentialphase of the flashing chevron.
9. The minimum number of lamps shall be 15.
10. The flashing arrow display is the TxDOT standard;however, the sequentialchevron
display may be used during daylight operations.
11. The Flashing Arrow Board shallbe mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A Flashing Arrow Board may be used for other than its intended purpose provided it meets visibility,
flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 1 feet from roadway
to bottom of panel.
REQUIREMENTS
TYPE | MINIMUM SIZE | MINIMUM NUMBER OF PANEL LAMPS | MINIMUM VISIBILITY DISTANCE
B | 30 x 60 | 15 | 3/4 mile
C | 48 x 96 | 15 | 1 mile
ATTENTION
Flashing Arrow Boards
shallbe equipped with
automatic dimming devices.
WHEN NOT IN USE, REMOVE
THE ARROW BOARD FROM THE
RIGHT-OF-WAY OR PLACE IT
BEHIND THE FACE OF CONCRETE
TRAFFIC BARRIER OR GUARDRAIL.
FLASHING ARROW BOARDS
TRUCK-MOUNTED ATTENUATORS
1. Truck mounted attenuators (TMA) used on TxDOT facilities
must meet the requirements outlined in the Manual for
Assessing Safety Hardware (MASH).
2. Refer to the CMTCD for the requirements of Level 2 or
Level 3 TMAs.
3. Refer to the CMTCD for a list of approved TMAs.
4. TMAs shallbe placed on freeways unless otherwise noted
in the plans.
5. A TMA should be used anytime that it can be positioned
30 to 100 feet in advance of the area of crew exposure
without adversely affecting the work performance.
6. A TMA should be positioned to protect the area from a work
area is spread above the roadway and the work crew is an
extended distance from the TMA.
SHEET 7 OF 12
Texas Department of Transportation
Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION
ARROW PANEL, REFLECTORS,
WARNING LIGHTS & ATTENUATOR
BC(7)-21
FILE: bc-21.dgn
DN: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT
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REVISIONS
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DATES
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GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and alternate items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drum that is damaged or unacceptable to the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall latch together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight flexible, long chain polymeric materials. The Contractor shall not use rigid plastics or other place holders that could become hazardous if struck by vehicles.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit body installed on base shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two safety spaces 5/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compatible device.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be tied down when separating the drum body from the base.
8. The drum body shall be constructed of virgin polyethylene, high-density polyethylene (HDPE) or other approved materials.
9. Drum body shall have a maximum unballasted weight of 9 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

RETROREFLECTIVE SHEETING

1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall be suitable for use on and shall adhere to the drum surface for the life expectancy of the drum. The sheeting shall remain adhered in place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

BALLAST

1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. The base, when filled with the ballast material, should weigh between 35 lbs minimum and 50 lbs maximum. The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or other approved material.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
5. When used in regions susceptible to freezing, drums shall have drainage holes in the base to prevent water from collecting and freeze becoming a hazard when struck by a vehicle.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.

DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with those existing prior to disruption in accordance with Chapter 6 of NCHRP 672 for Pedestrian Control Requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the entire width of the closed sidewalk instead of a Type 3 Barricade.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tapes, ropes, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a contractor pedestrian channelizer.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades should use 45° perpendicular cuts for the top and bottom rails and should not have rails with a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B or type C Orange, sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Materials," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R8 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (carriage) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers, when used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

SHEET 8 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

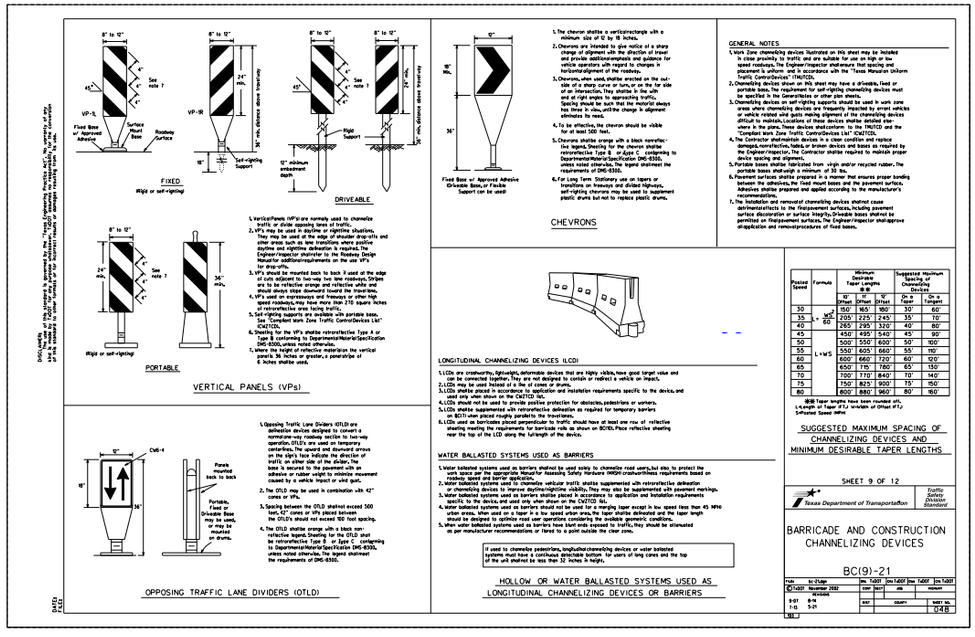
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

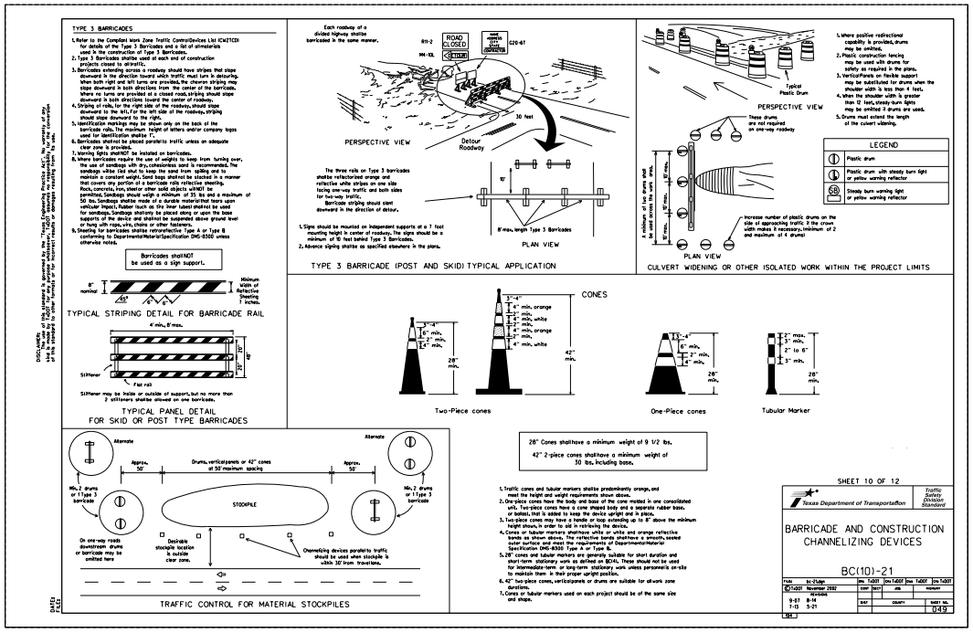
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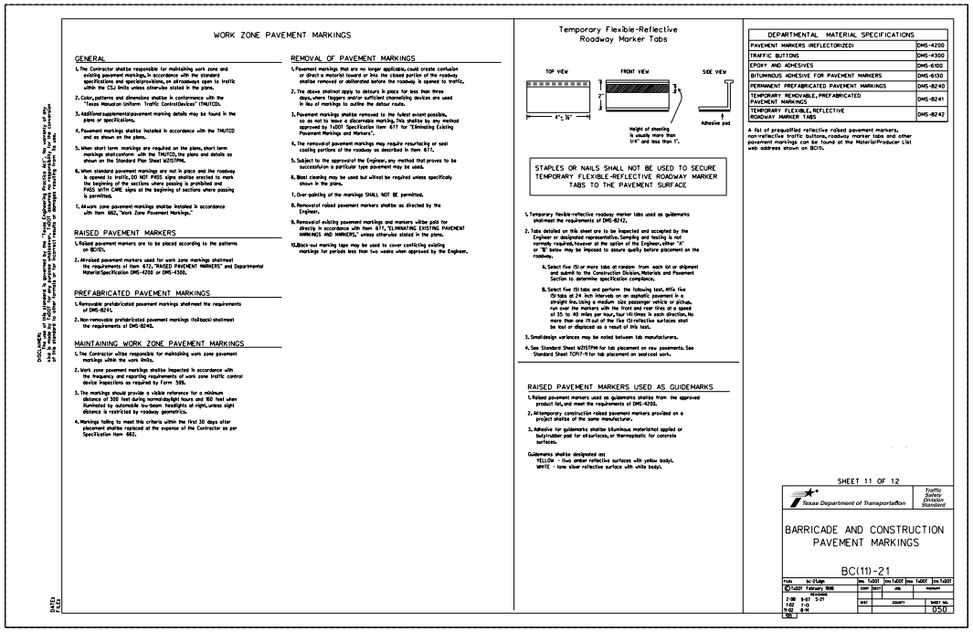
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8-18				

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DATES / FILE


8" to 12"
See note 7
VP-1L
VP-1R
Surface Mount Base
Roadway Surface
Fixed Base w/ Approved Adhesive
Self-righting Support
12" minimum embedment depth
Right Support
FIXED
Rigid or self-righting
DRIVEABLE
PORTABLE
VERTICAL PANELS (VPs)
CVB-4
Panels mounted back to back
Portable, Fixed or Driveable Base may be used, or may be mounted on drums.
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
Fixed Base w/ Approved Adhesive Driveable Base, or Flexible Support can be used
CHEVRONS
GENERAL NOTES
LONGITUDINAL CHANNELIZING DEVICES (LCD)
WATER BALLASTED SYSTEMS USED AS BARRIERS
HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS
Posted Speed
Formula
Minimum Desirable Taper Lengths ft
Suggested Maximum Spacing of Channelizing Devices ft
10' Offset
11' Offset
12' Offset
On a Taper
On a Tangent
L=WS
L=WS²/60
SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS
SHEET 9 OF 12
Texas Department of Transportation
Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES
BC(9)-21
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7-13 5-21
DIST
COUNTY
SHEET NO.
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TYPE 3 BARRICADES
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL
TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES
TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION
PERSPECTIVE VIEW
PLAN VIEW
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS
LEGEND
CONES
Two-Piece cones
One-Piece cones
Tubular Marker
TRAFFIC CONTROL FOR MATERIAL STOCKPILES
BARRICADE AND CONSTRUCTION
CHANNELIZING DEVICES
BC(10)-21
SHEET 10 OF 12



WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZSTPM.
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS with CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(11).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (thermo) shall meet the requirements of DMS-8240.

MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 1204.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 100 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernible marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers within gore and for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs

STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line, using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 25 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet WZSTPM for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4255.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous materials applied or butyl rubber pad for bituminous, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - Two amber reflective surfaces with yellow body.
WHITE - Two silver reflective surface with white body.

DEPARTMENTAL MATERIAL SPECIFICATIONS

PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

SHEET 11 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

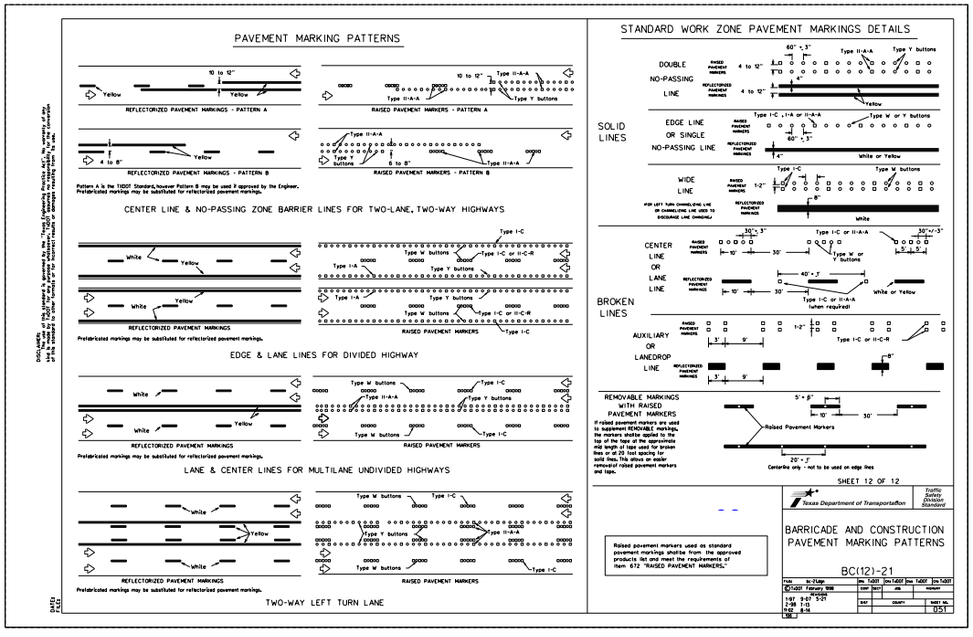
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

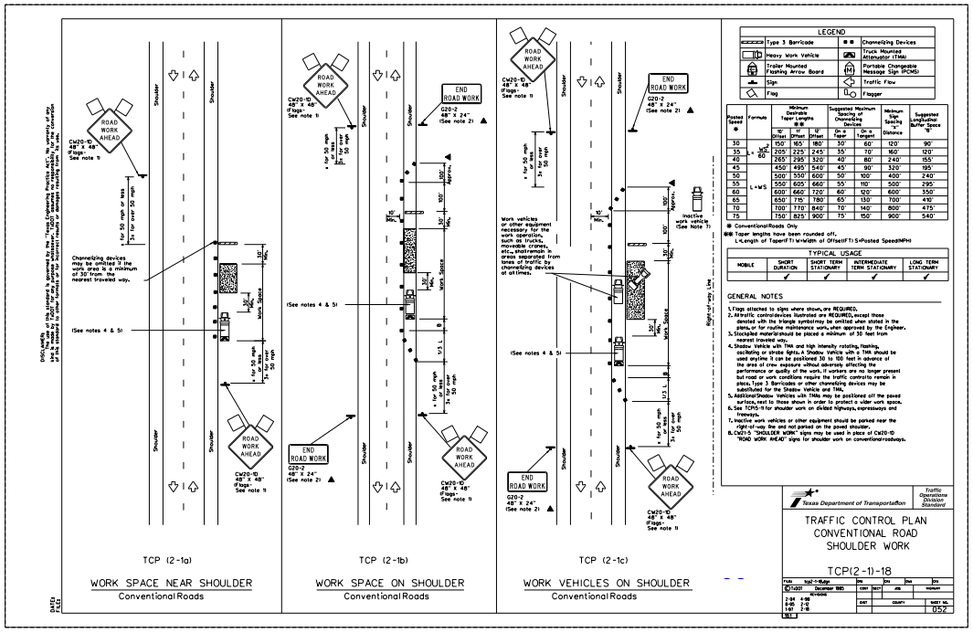
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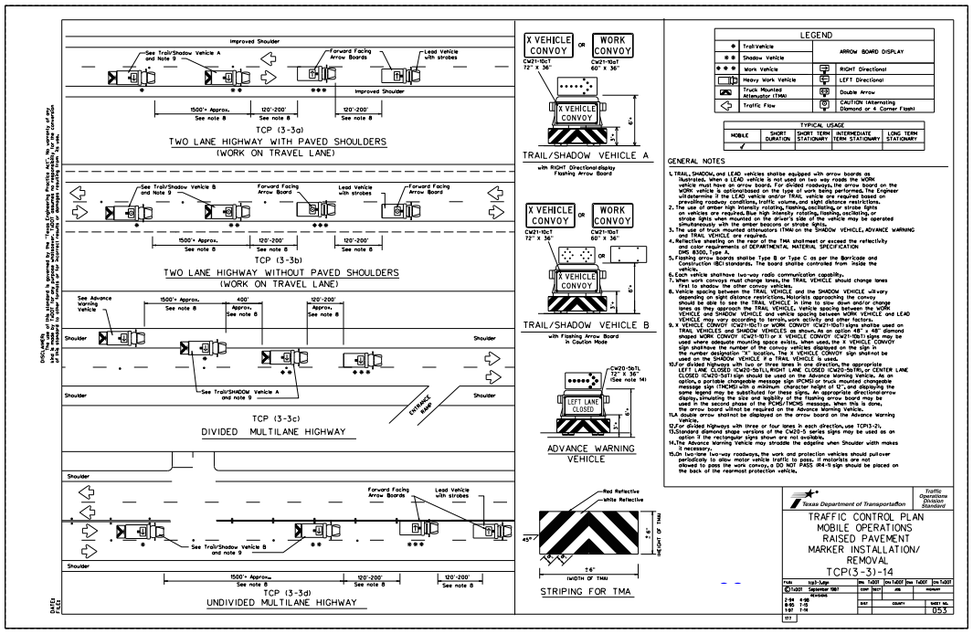
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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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7-13 8-14				1251

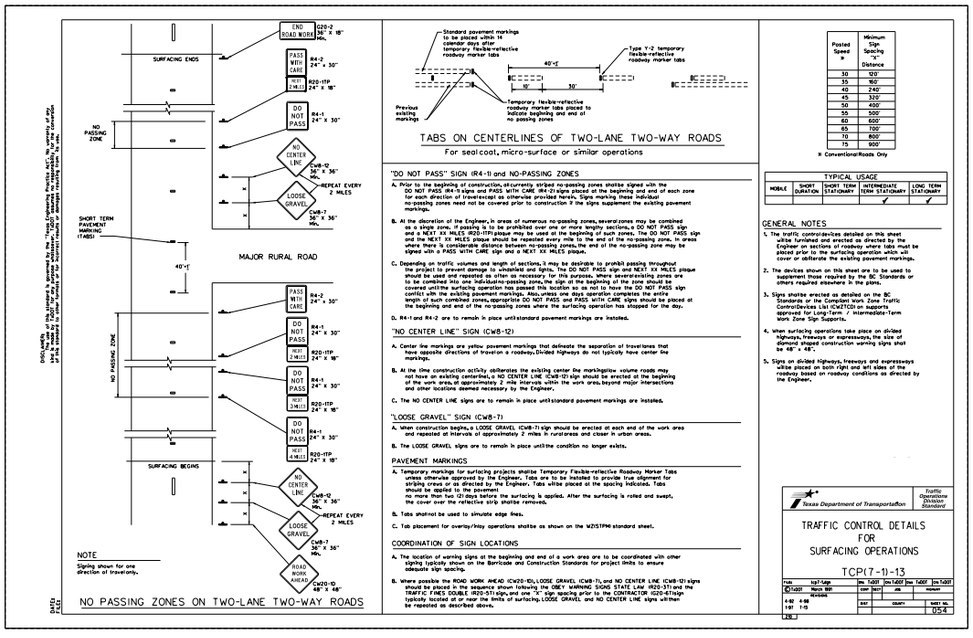
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by the Texas Department of Transportation for any purpose whatsoever. The Texas Department of Transportation assumes no responsibility for the accuracy or any errors that may appear in or from any electronic copy of this standard.

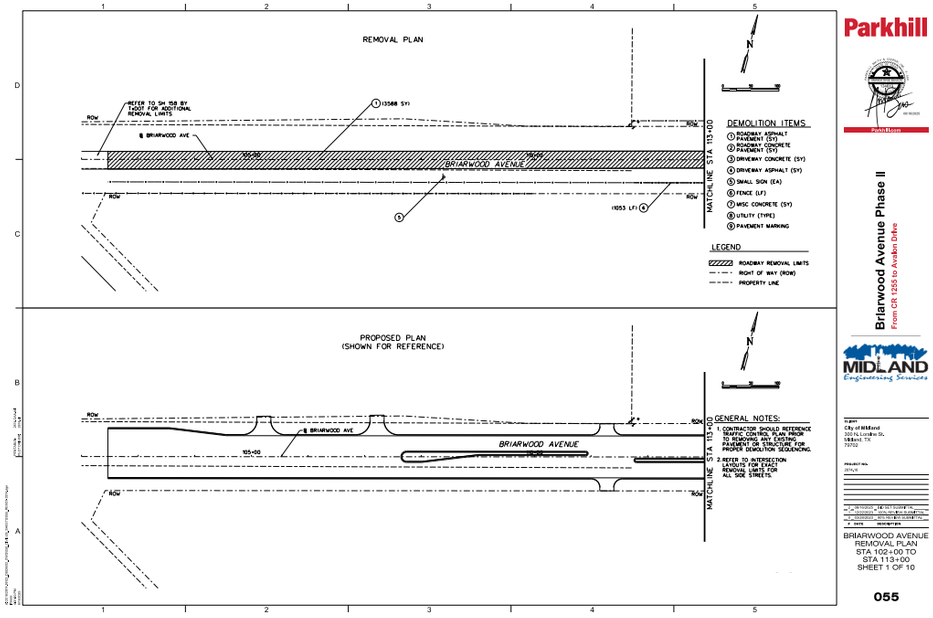
DATES:
FILE:


PAVEMENT MARKING PATTERNS
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A
RAISED PAVEMENT MARKERS - PATTERN A
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B
RAISED PAVEMENT MARKERS - PATTERN B
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS
REFLECTORIZED PAVEMENT MARKINGS
RAISED PAVEMENT MARKERS
EDGE & LANE LINES FOR DIVIDED HIGHWAY
REFLECTORIZED PAVEMENT MARKINGS
RAISED PAVEMENT MARKERS
LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS
REFLECTORIZED PAVEMENT MARKINGS
RAISED PAVEMENT MARKERS
TWO-WAY LEFT TURN LANE
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS
SOLID LINES
DOUBLE NO-PASSING LINE
EDGE LINE OR SINGLE NO-PASSING LINE
WIDE LINE
BROKEN LINES
CENTER LINE OR LANE LINE
AUXILIARY OR LANEDROP LINE
REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS
Raised Pavement Markers
Centerline only - not to be used on edge lines
Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."
SHEET 12 OF 12
Texas Department of Transportation
Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS
BC(12)-21


TCP (2-1a)
WORK SPACE NEAR SHOULDER
Conventional Roads
TCP (2-1b)
WORK SPACE ON SHOULDER
Conventional Roads
TCP (2-1c)
WORK VEHICLES ON SHOULDER
Conventional Roads
LEGEND
TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK
TCP(2-1)-18


TCP (3-3a)
TWO LANE HIGHWAY WITH PAVED SHOULDERS
(WORK ON TRAVEL LANE)
TCP (3-3b)
TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS
(WORK ON TRAVEL LANE)
TCP (3-3c)
DIVIDED MULTILANE HIGHWAY
TCP (3-3d)
UNDIVIDED MULTILANE HIGHWAY
TRAIL/SHADOW VEHICLE A
with RIGHT Directional display
Flashing Arrow Board
TRAIL/SHADOW VEHICLE B
with Flashing Arrow Board
in Caution Mode
ADVANCE WARNING
VEHICLE
STRIPING FOR TMA
LEGEND
TYPICAL USAGE
GENERAL NOTES
TRAFFIC CONTROL PLAN
MOBILE OPERATIONS
RAISED PAVEMENT
MARKER INSTALLATION/
REMOVAL
TCP(3-3)-14


END ROAD WORK
G20-2
36" X 18"
SURFACING ENDS
PASS WITH CARE
R4-2
24" X 30"
NEXT XX MILES
R20-1TP
24" X 18"
DO NOT PASS
R4-1
24" X 30"
NO PASSING ZONE
NO CENTER LINE
CWB-12
36" X 36"
LOOSE GRAVEL
CWB-7
36" X 36"
REPEAT EVERY 2 MILES
SHORT TERM PAVEMENT MARKING (TABS)
40'-t'
MAJOR RURAL ROAD
NO PASSING ZONE
SURFACING BEGINS
ROAD WORK AHEAD
CW20-1D
48" X 48"
NOTE
Signing shown for one direction of travel only.
NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS
Standard pavement markings to be placed within 14 calendar days after temporary flexible-retroactive roadway marker tabs
40'-t'
Type Y-2 temporary flexible-retroactive roadway marker tabs
BC
10'
30'
Temporary flexible-retroactive roadway marker tabs placed to indicate beginning and end of no passing zones
Previous existing markings
TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS
For seal coat, micro-surface or similar operations
"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES
A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.
B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is a considerable distance between passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.
C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to unstable soil and tabs. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to confuse the DO NOT PASS sign control with the existing pavement markings. Where several short non-passing zones are combined into a single long zone of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.
D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.
"NO CENTER LINE" SIGN (CWB-12)
A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.
B. At the time construction activity obliterates the existing center line markings, low volume roads may not have an existing centerline, a NO CENTER LINE (CWB-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.
C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.
"LOOSE GRAVEL" SIGN (CWB-7)
A. When construction begins, a LOOSE GRAVEL (CWB-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.
B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.
PAVEMENT MARKINGS
A. Temporary markings for surfacing projects shall be Temporary Flexible-retroactive Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping as shown or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should not be placed more than 120 days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the retroactive strip shall be removed.
B. Tabs shall not be used to simulate edge lines.
C. Tab placement for overlay/inlay operations shall be as shown on the WZSTPM4 standard sheet.
COORDINATION OF SIGN LOCATIONS
A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.
B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CWB-7), and NO CENTER LINE (CWB-12) signs should be placed in the sequence shown following the GREY WARNING SIGNS STATE LINE (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T) sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.
Posted Speed *
Minimum Sign Spacing "X" Distance
30 120'
35 160'
40 240'
45 320'
50 400'
55 500'
60 600'
65 700'
70 800'
75 900'
* Conventional Roads Only
TYPICAL USAGE
MOBILE
SHORT DURATION
SHORT TERM STATIONARY
INTERMEDIATE TERM STATIONARY ✓
LONG TERM STATIONARY ✓
GENERAL NOTES
1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards. Portable supplements to some Traffic Control Devices (i.e. ICW27CD) on supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of the required lane closed construction warning signs shall be 36" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.
Texas Department of Transportation
Traffic Operations Division Standard
TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS
TCP(7-1)-13
FILE: tcp7-1-13e
DN: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT
©TxDOT March 1991
CONT SECT JOB HIGHWAY
REVISIONS
4-92 4-98
1-97 1-13
DIST COUNTY SHEET NO.
105A



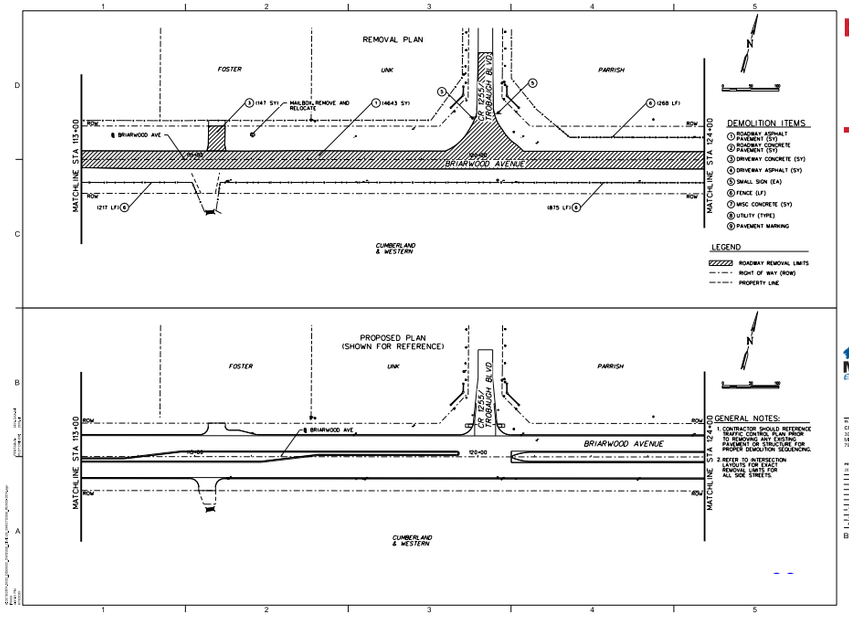
Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 102+00 TO
STA 113+00
SHEET 1 OF 10

055



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John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

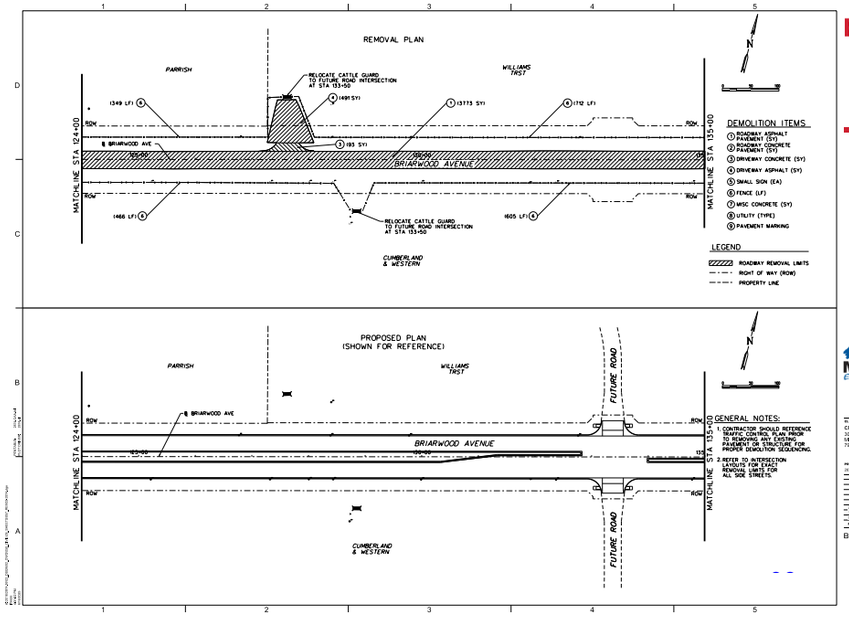
client
City of Midland
300 N. Loraine St.
Midland, TX
79702

PROJECT No.
067419

#	DATE	DESCRIPTION
1	08/19/2025	AS-BUILT CORRECTIONS
2	09/09/2025	ROW AND EASEMENTS
3	09/30/2025	ROW AND EASEMENTS
4	10/03/2025	ROW AND EASEMENTS

BRIARWOOD AVENUE
REMOVAL PLAN
STA 113+00 TO
STA 124+00
SHEET 2 OF 10

056



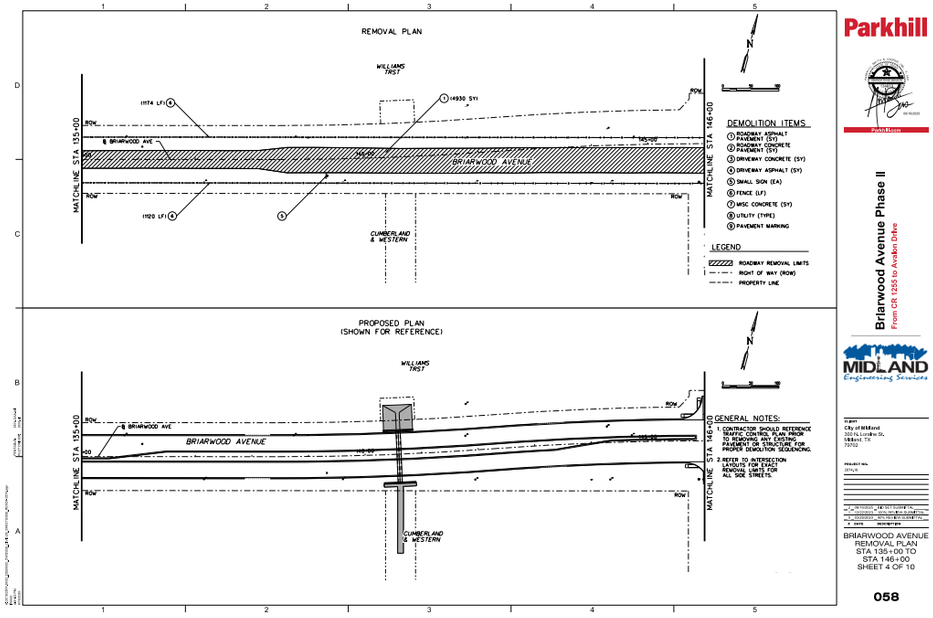
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Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 124+00 TO
STA 135+00
SHEET 3 OF 10

057



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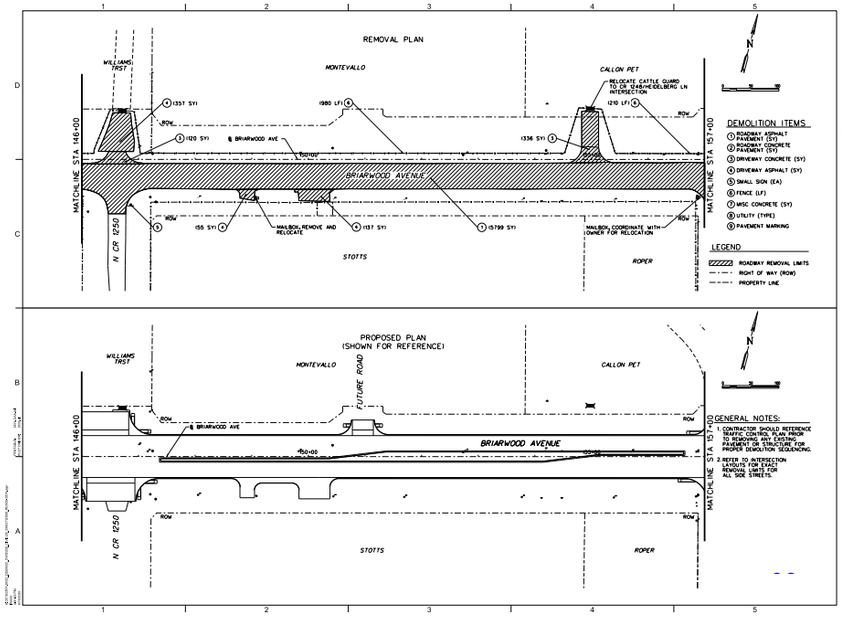
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 135+00 TO
STA 146+00
SHEET 4 OF 10

058



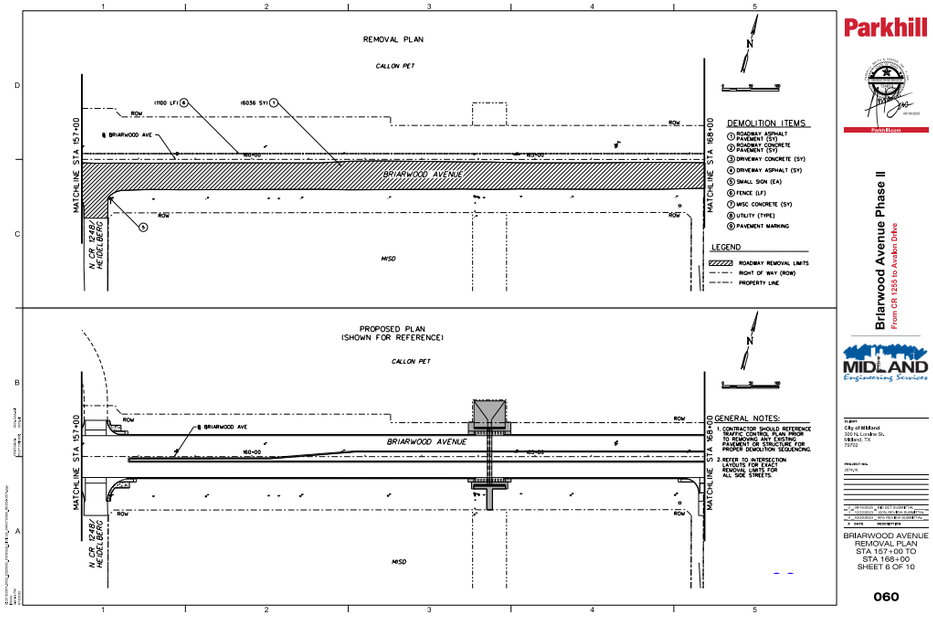
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Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND
Engineering Services

BRIARWOOD AVENUE
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STA 146+00 TO
STA 157+00
SHEET 5 OF 10

059



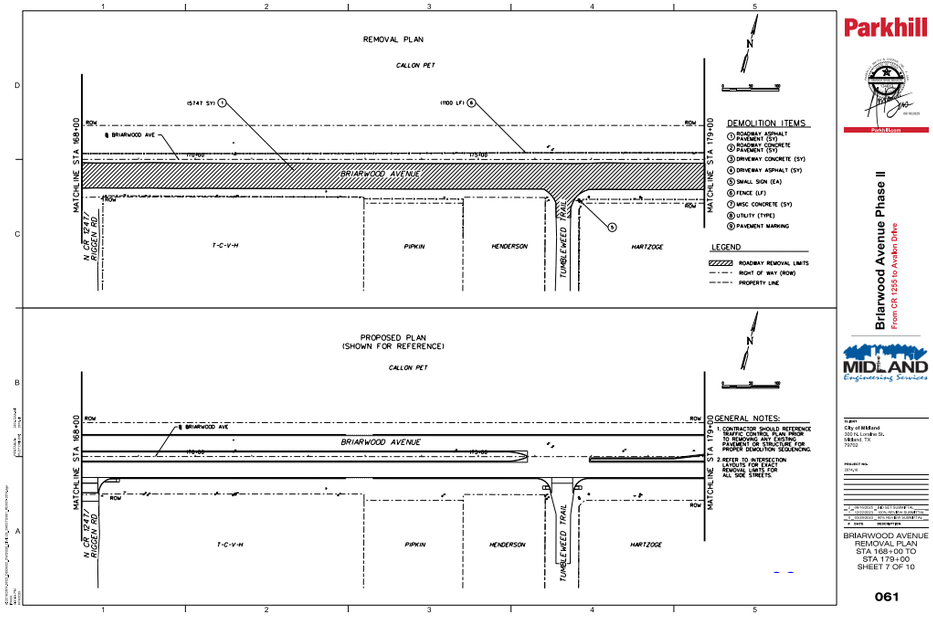
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Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

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Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 157+00 TO
STA 168+00
SHEET 6 OF 10

060



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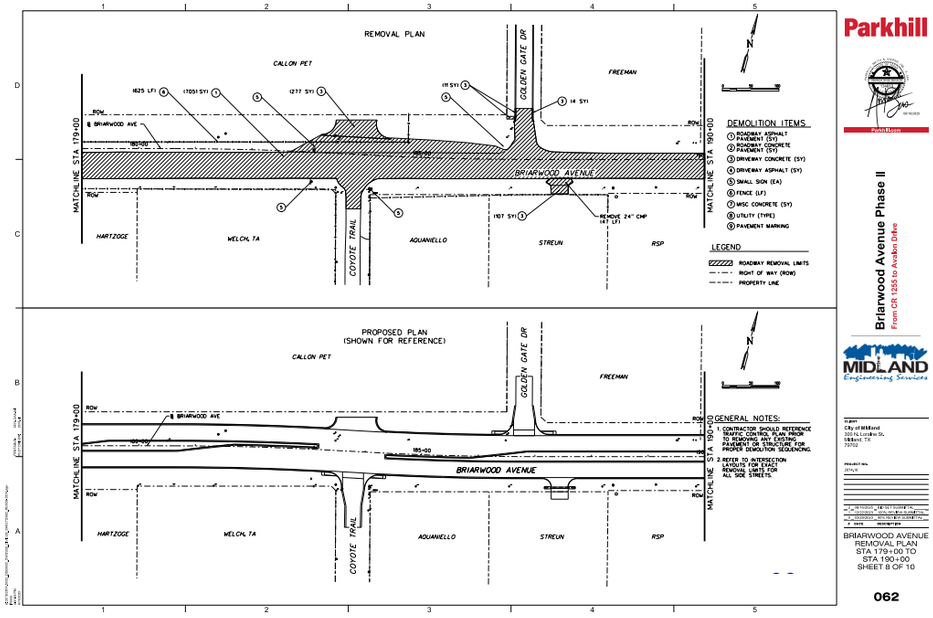
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
REMOVAL PLAN
STA 168+00 TO
STA 179+00
SHEET 7 OF 10

061



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Briarwood Avenue Phase II

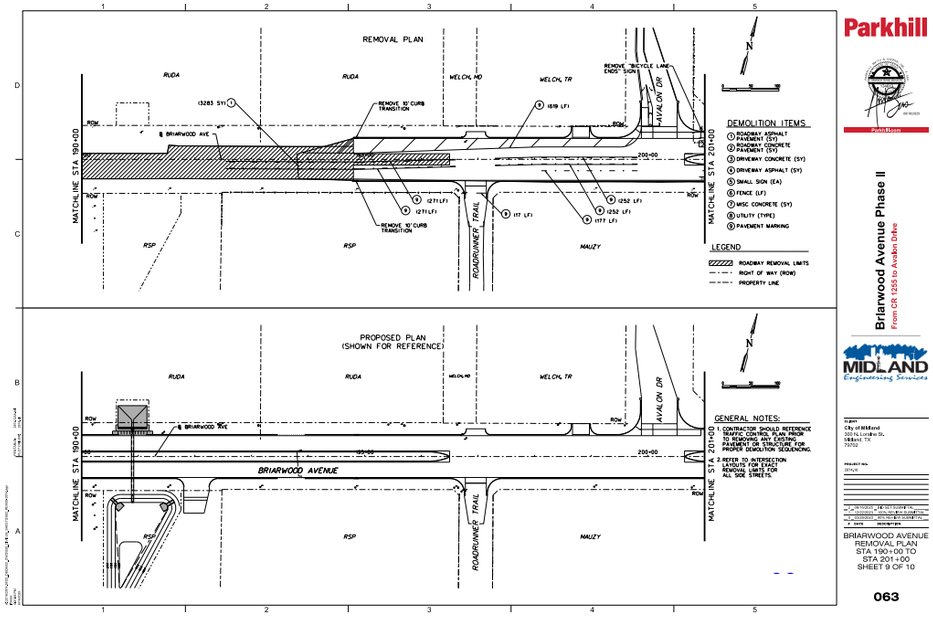
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MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
REMOVAL PLAN
STA 179+00 TO
STA 190+00
SHEET 8 OF 10

062



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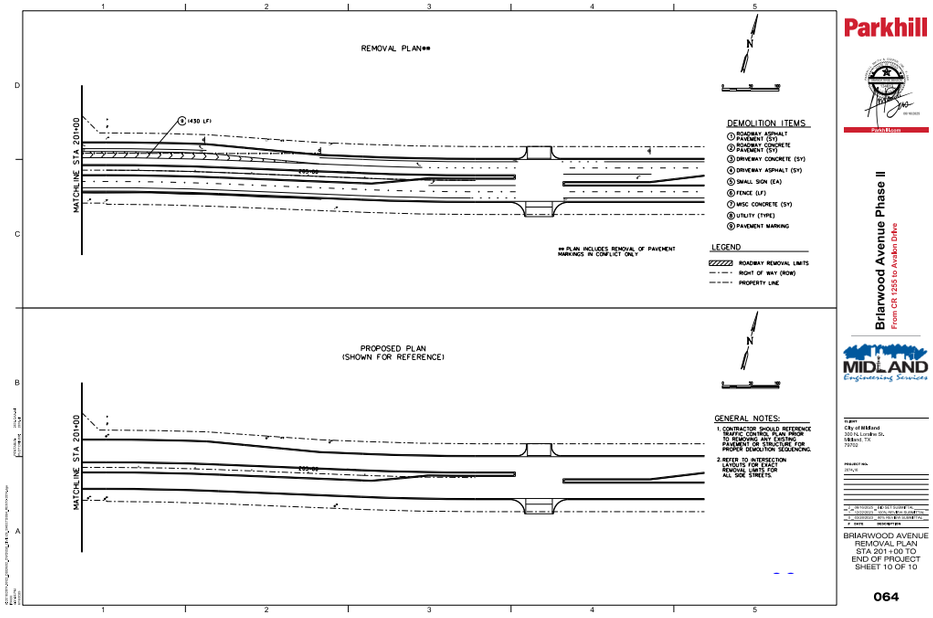
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
REMOVAL PLAN
STA 190+00 TO
STA 201+00
SHEET 9 OF 10

063



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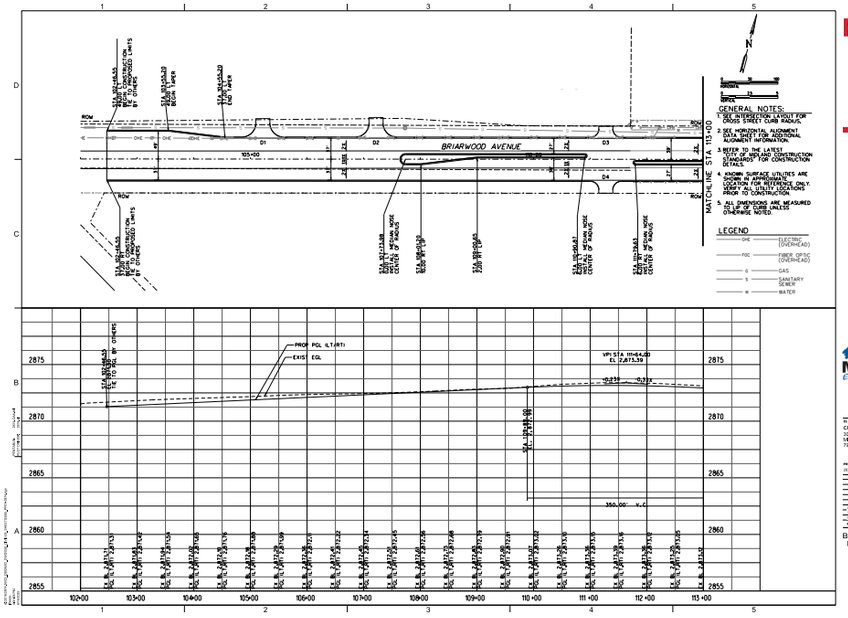
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
REMOVAL PLAN
STA 201+00 TO
END OF PROJECT
SHEET 10 OF 10

064



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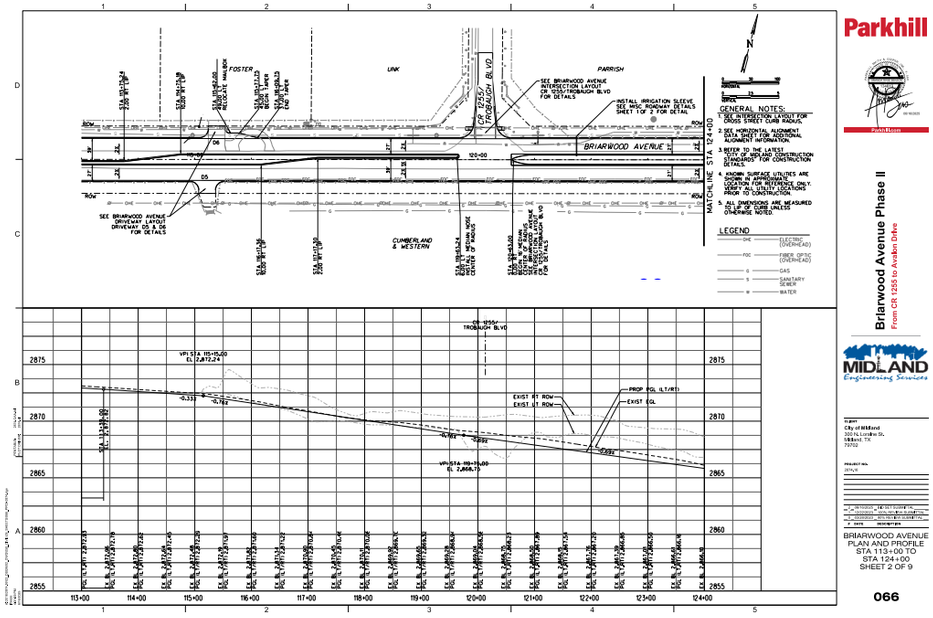
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 102+00 TO
STA 113+00
SHEET 1 OF 9

065



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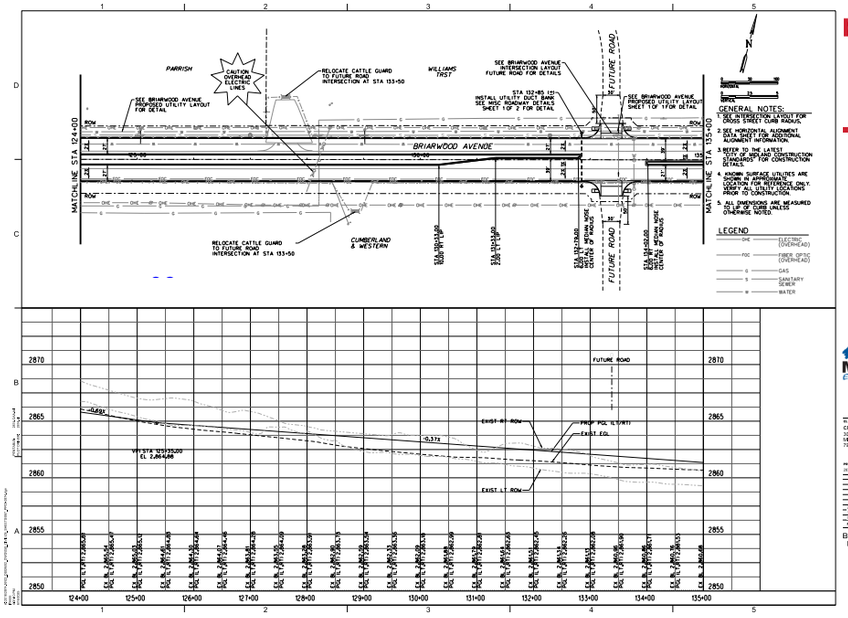
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 113+00 TO
STA 124+00
SHEET 2 OF 9

066



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John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND
Engineering Services

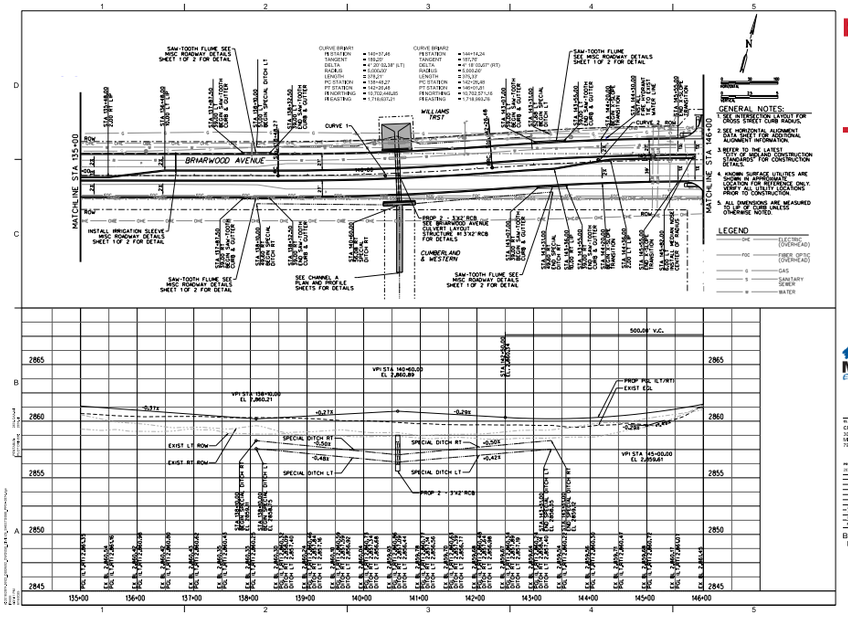
client
City of Midland
300 N. Loraine St.
Midland, TX
79702

project no.
DESIGN

no.	DATE	DESCRIPTION
1	08/19/2025	AS BUILT CONDITIONS
2	00/00/0000	INITIAL SUBMITTAL
3	00/00/0000	INITIAL SUBMITTAL
4	00/00/0000	INITIAL SUBMITTAL

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 124+00 TO
STA 135+00
SHEET 3 OF 9

067



Parkhill

Briarwood Avenue Phase II

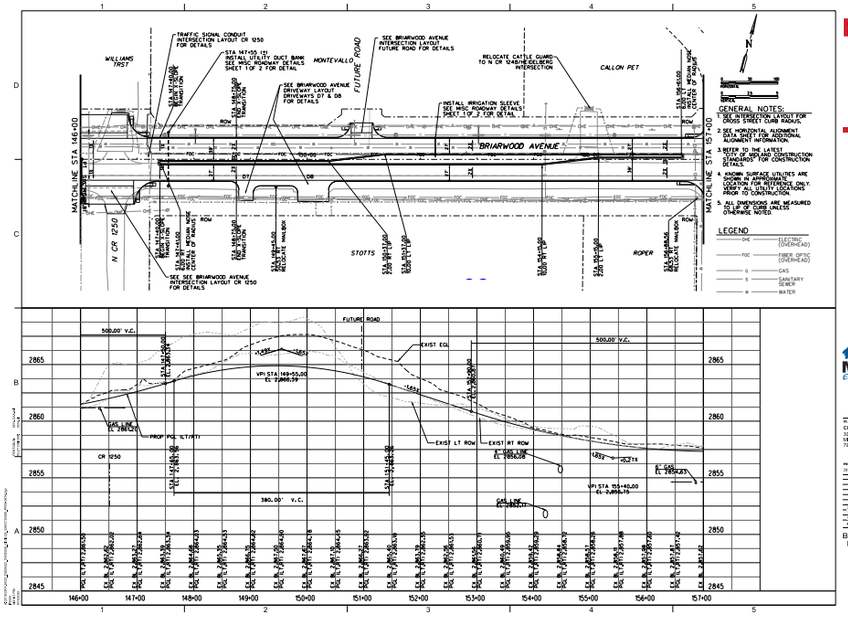
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 136+00 TO
STA 146+00
SHEET 4 OF 9

068



Parkhill

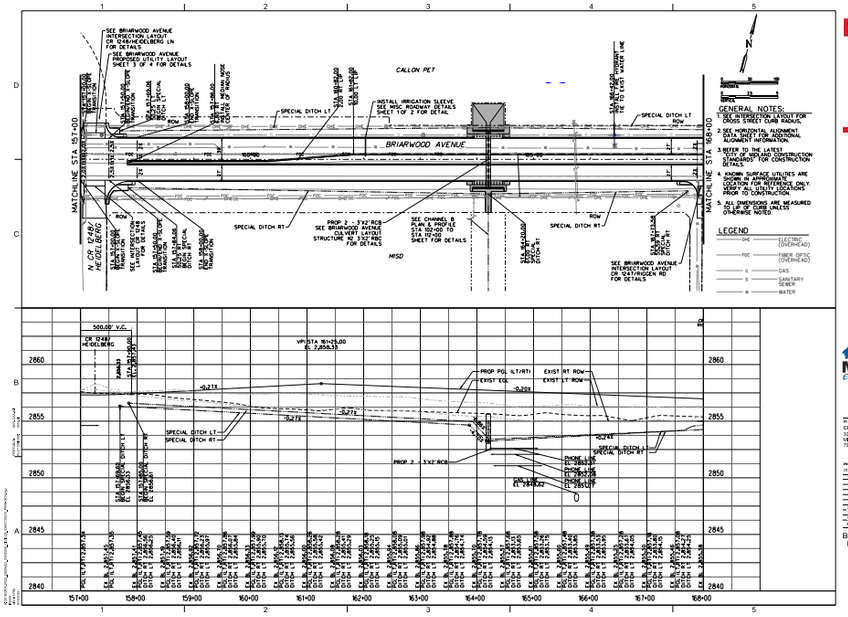
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 146+00 TO
STA 157+00
SHEET 5 OF 9

069



Parkhill

Briarwood Avenue Phase II

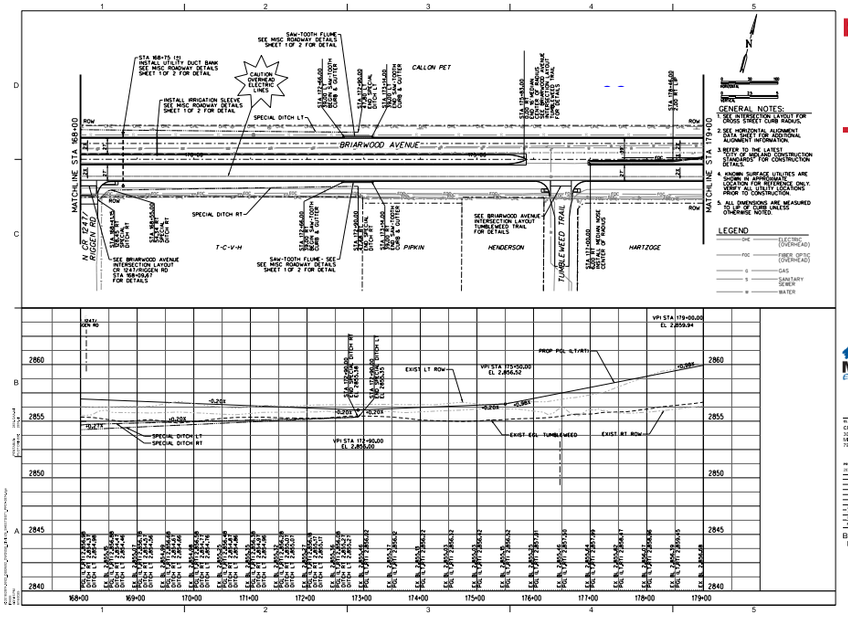
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 157+00 TO
STA 168+00
SHEET 6 OF 9

070



Parkhill

John Rowe

Briarwood Avenue Phase II

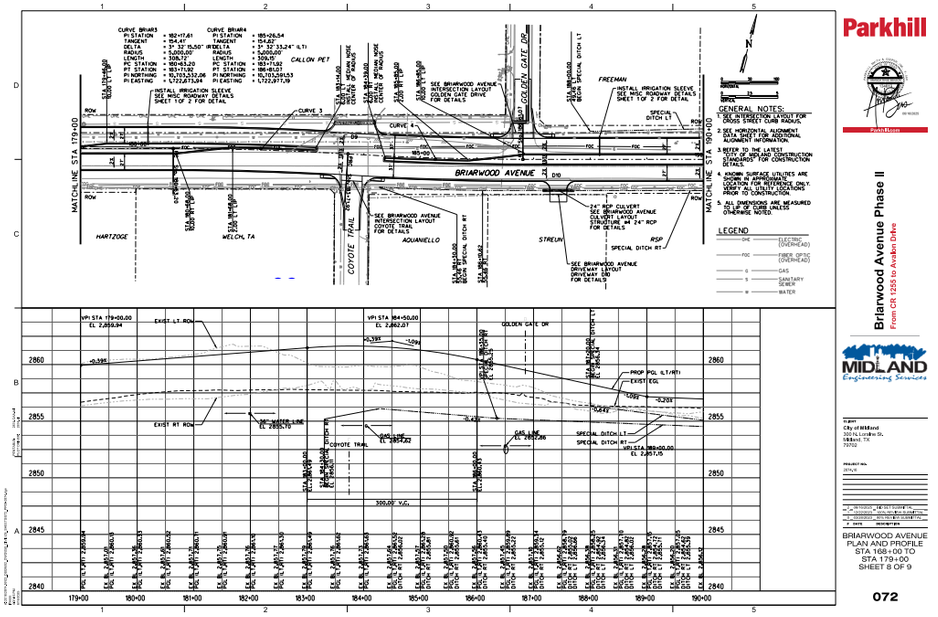
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 168+00 TO
STA 179+00
SHEET 7 OF 9

071



Parkhill

Briarwood Avenue Phase II

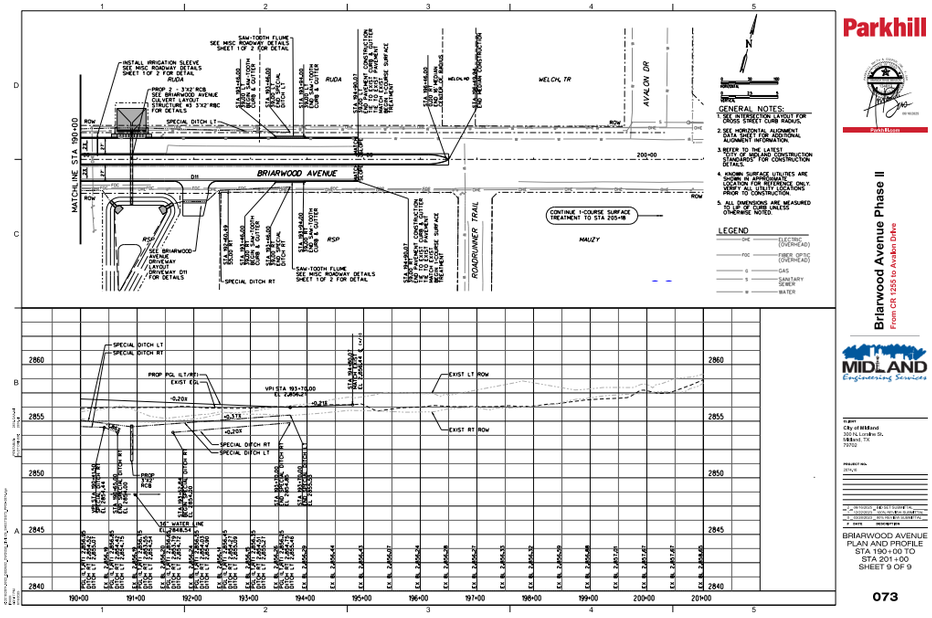
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 168+00 TO
STA 179+00
SHEET 8 OF 9

072



Parkhill

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

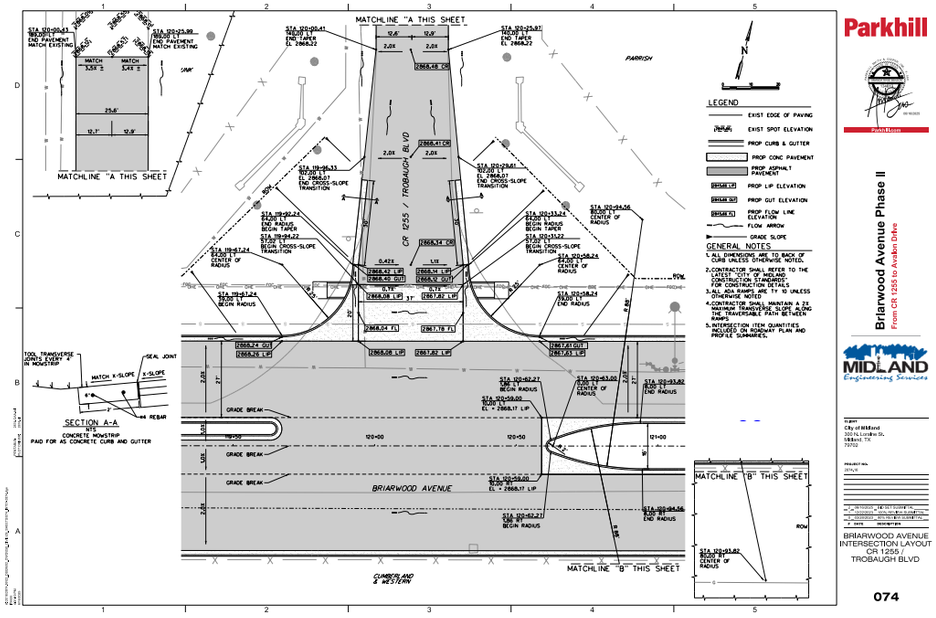
client
City of Midland
300 N. Loraine St.
Midland, TX
79702

project no.
069419

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
PLAN AND PROFILE
STA 190+00 TO
STA 201+00
SHEET 9 OF 9

073



Parkhill

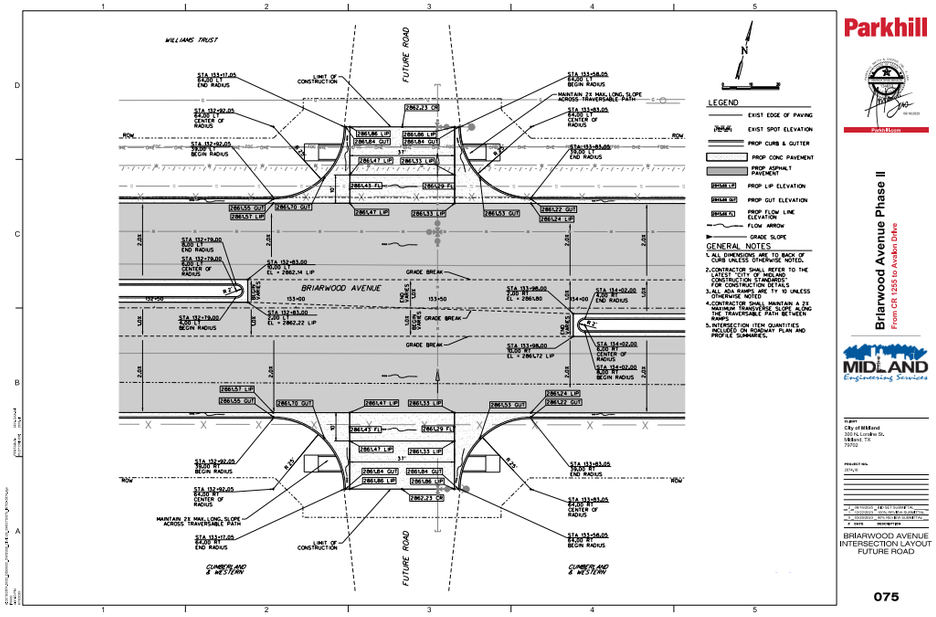
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE INTERSECTION LAYOUT CR 1255 / TROBAUGH BLVD

074



Parkhill

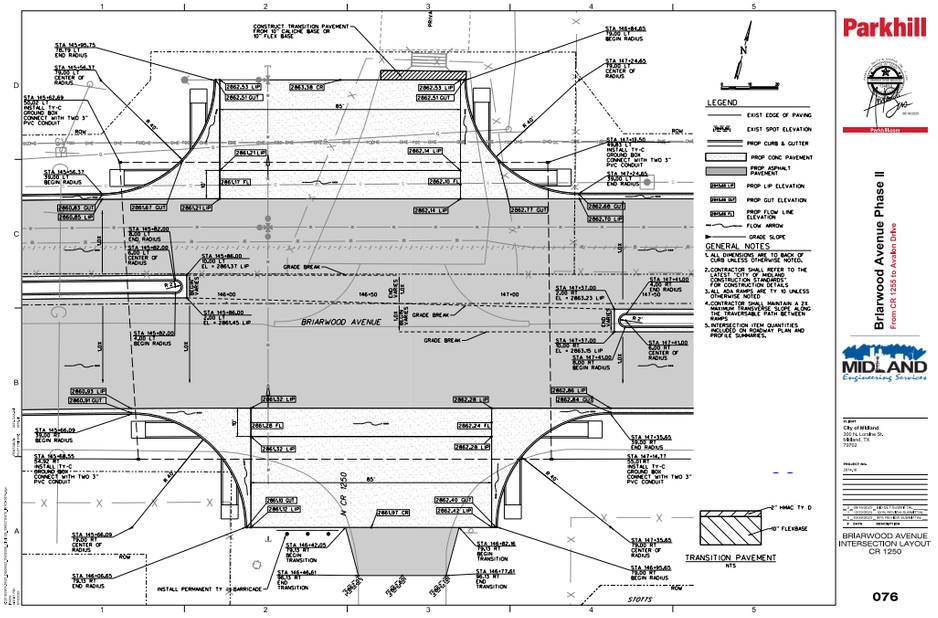
Briarwood Avenue Phase II

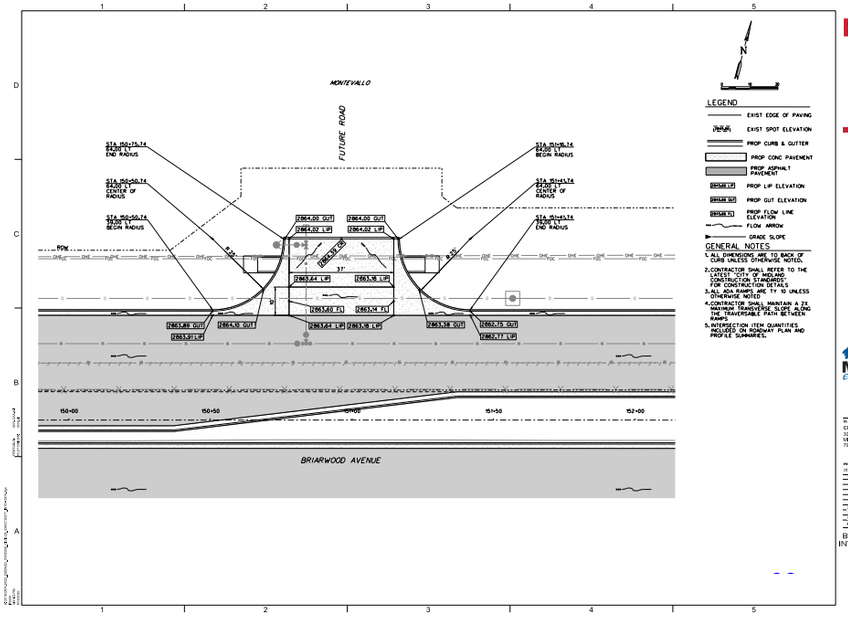
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE INTERSECTION LAYOUT FUTURE ROAD

075


BRIARWOOD AVENUE
N CR 1250
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
1. ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL REFER TO THE LATEST "CITY OF MIDLAND CONSTRUCTION STANDARDS".
3. ALL ADA RAMPS ARE TY 1 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG ALL ACCESSIBLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
TRANSITION PAVEMENT
NTS
INSTALL PERMANENT TY III BARRICADE
STOP
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE
INTERSECTION LAYOUT
CR 1250
076



Parkhill

John Rowe

Briarwood Avenue Phase II

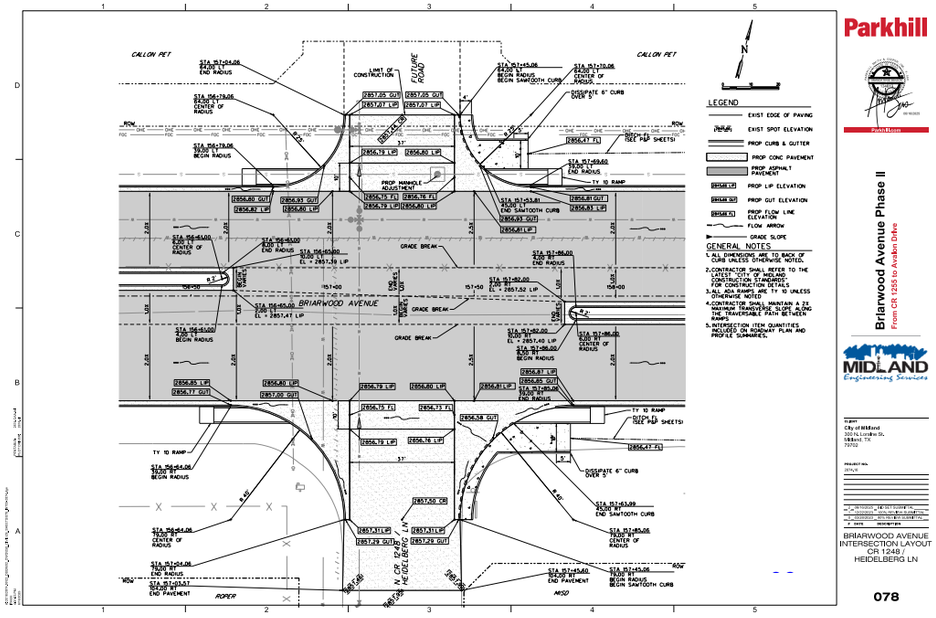
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79701

BRIARWOOD AVENUE INTERSECTION LAYOUT FUTURE ROAD

077



Parkhill

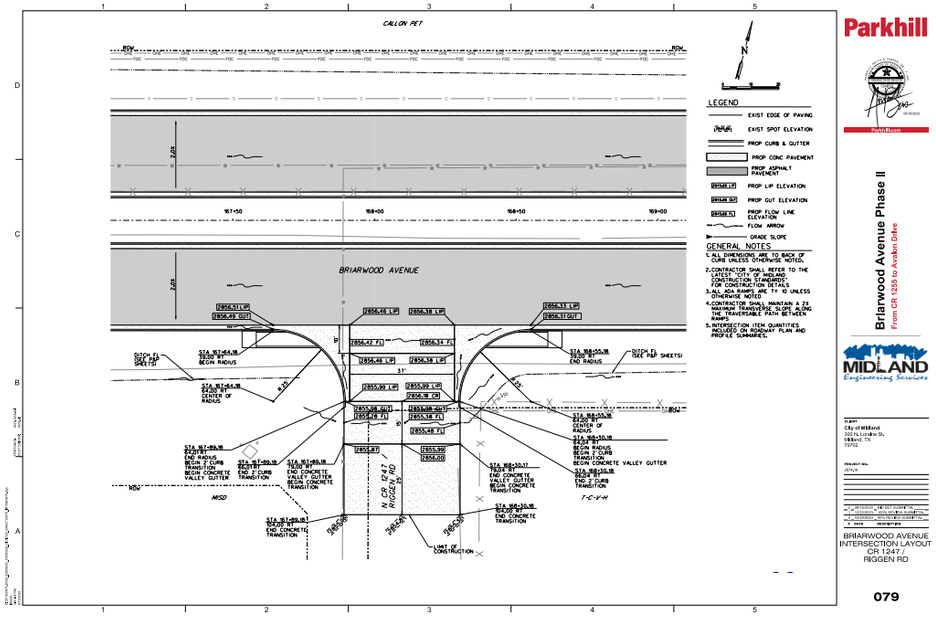
Briarwood Avenue Phase II

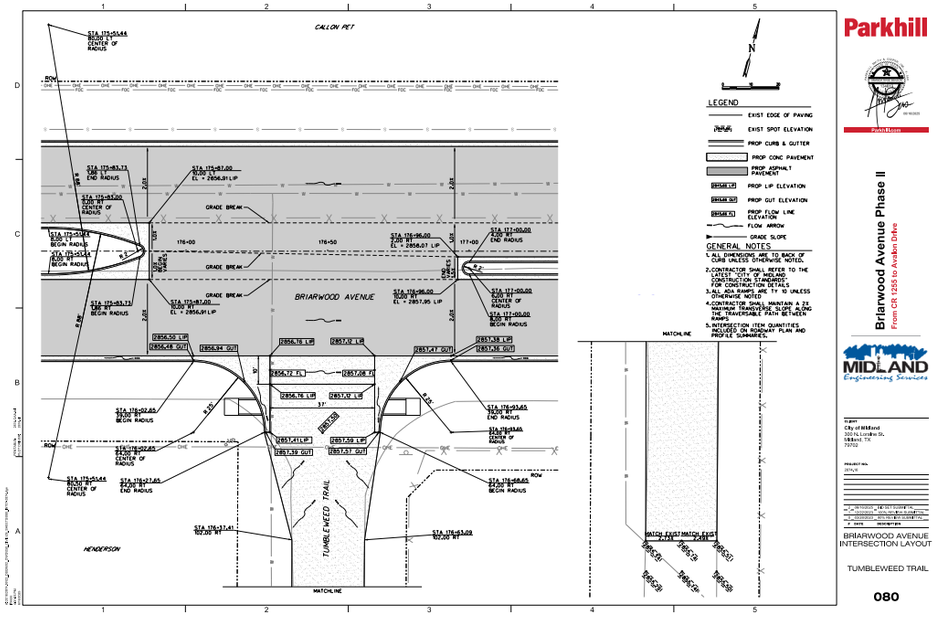
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE INTERSECTION LAYOUT CR 1248 / HEIDELBERG LN

078


CALON PET
BRIARWOOD AVENUE
N CR 1247
RIGGEN RD
MIDD
LIMIT OF CONSTRUCTION
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
1. ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL REFER TO THE LATEST "CITY OF MIDLAND CONSTRUCTION STANDARDS".
3. ALL ADA RAMPS ARE TY 1 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG THE TRAVERSABLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE
INTERSECTION LAYOUT
CR 1247 /
RIGGEN RD
079



Parkhill

Briarwood Avenue Phase II

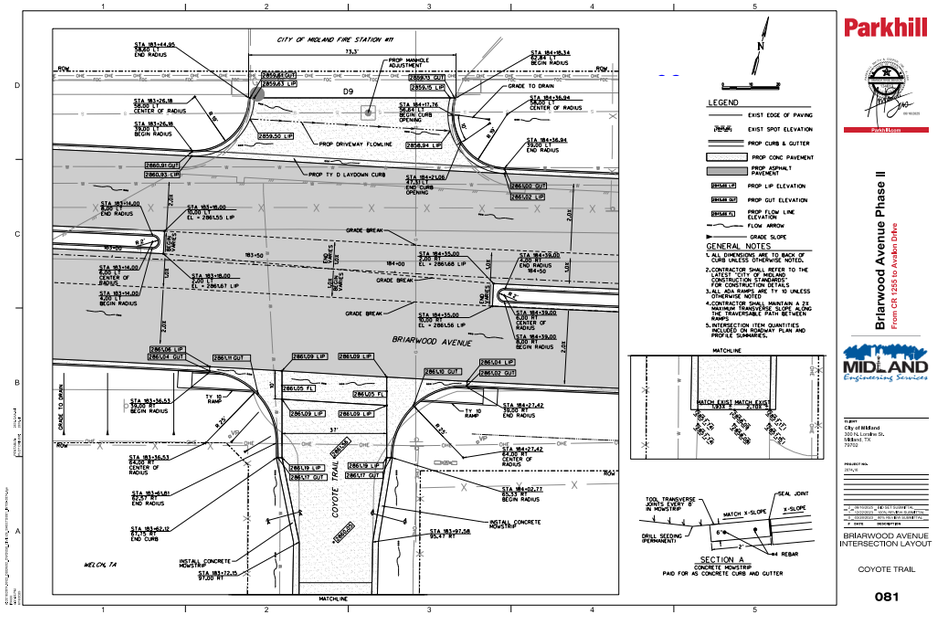
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE INTERSECTION LAYOUT

TUMBLEWEED TRAIL

080



Parkhill

Briarwood Avenue Phase II

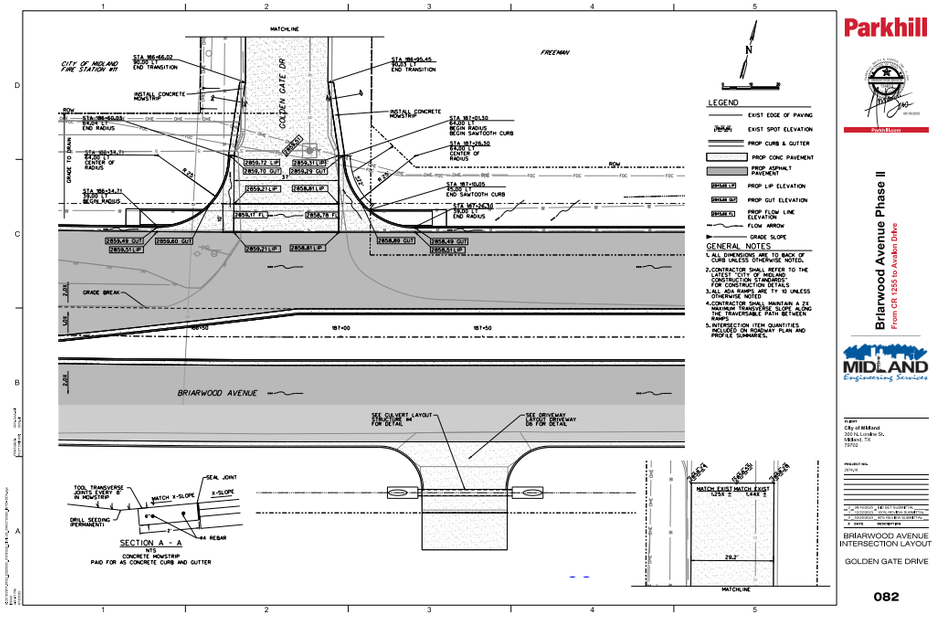
From CR 1250 to Avalon Drive

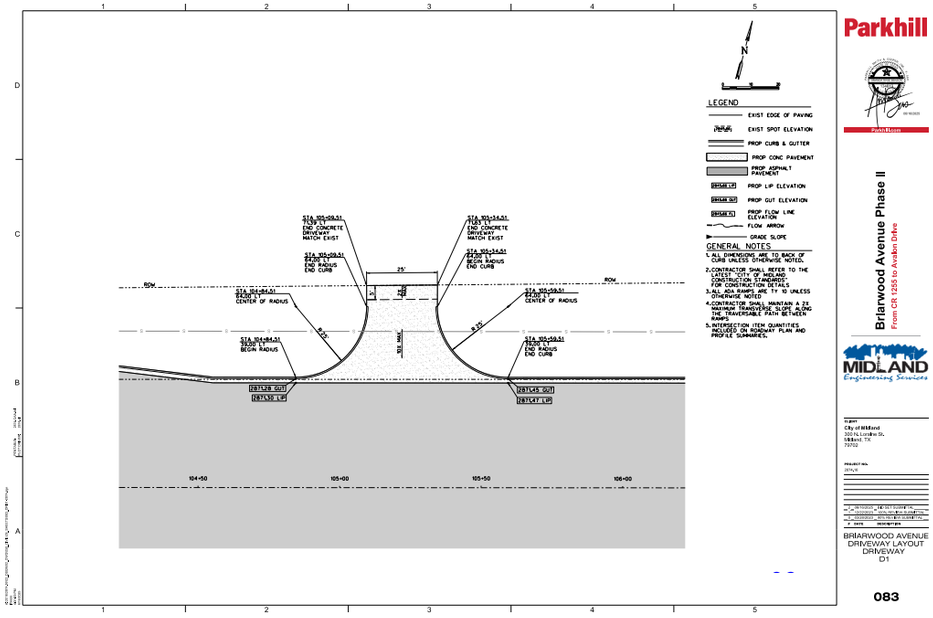
MIDLAND Engineering Services

BRIARWOOD AVENUE INTERSECTION LAYOUT

COYOTE TRAIL

081


MATCHLINE
CITY OF MIDLAND FIRE STATION #11
GOLDEN GATE DR
FREEMAN
BRIARWOOD AVENUE
GRADE BREAK
SEE CULVERT LAYOUT FOR DETAIL
SEE DRIVEWAY DETAIL FOR DETAIL
SECTION A - A
CONCRETE HOWSTRIP PAID FOR AS CONCRETE CURB AND GUTTER
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP L/P ELEVATION
PROP G/U ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
1. ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL REFER TO THE LATEST "CITY OF MIDLAND CONSTRUCTION STANDARDS".
3. ALL ADA RAMPS ARE TY 10 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG RAMP TO PROVIDE A TRAVERSABLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
BRIARWOOD AVENUE INTERSECTION LAYOUT
GOLDEN GATE DRIVE
082



Parkhill

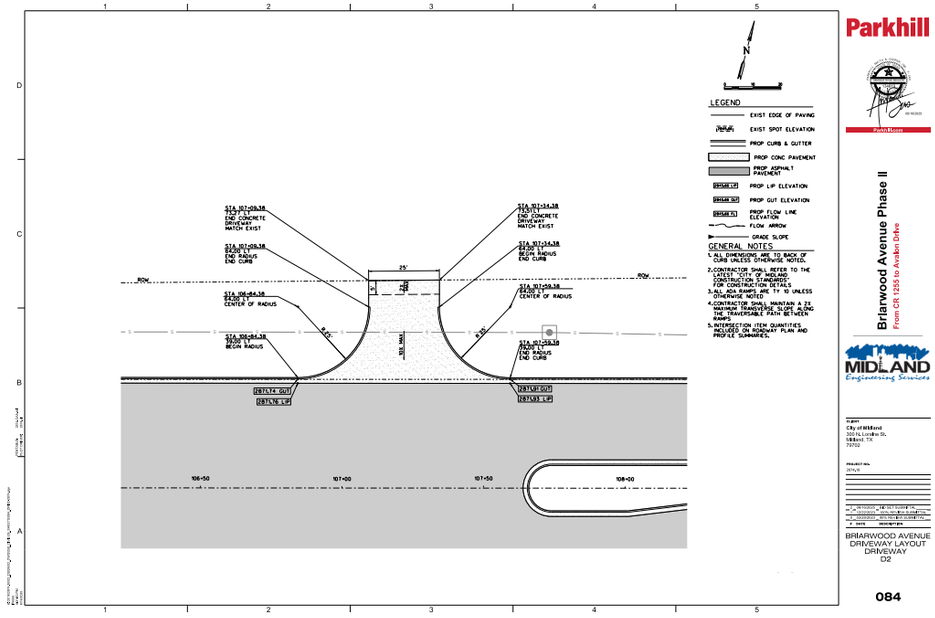
Briarwood Avenue Phase II

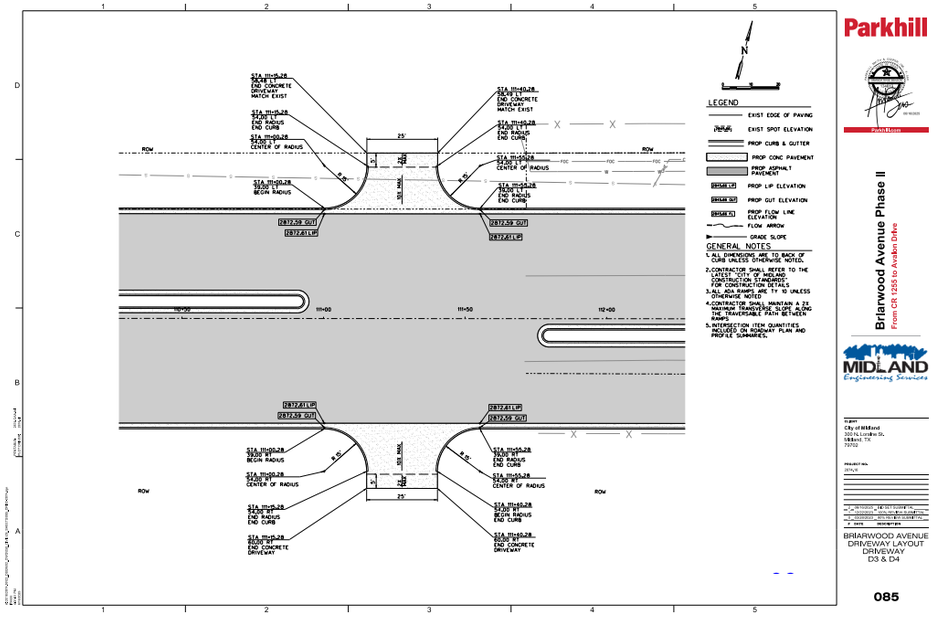
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D1

083


STA 107+09.38
15.2' LT
END CONCRETE
DRIVEWAY
MATCH EXIST
STA 107+09.38
30.00' LT
BEGIN RADIUS
END CURB
STA 106+64.38
30.00' LT
CENTER OF RADIUS
STA 106+64.38
30.00' LT
BEGIN RADIUS
END CURB
STA 107+34.38
15.2' LT
END CONCRETE
DRIVEWAY
MATCH EXIST
STA 107+34.38
30.00' LT
BEGIN RADIUS
END CURB
STA 107+59.38
30.00' LT
CENTER OF RADIUS
STA 107+59.38
30.00' LT
END RADIUS
END CURB
25'
ROW
ROW
9.0%
9.0%
106+50
107+00
107+50
108+00
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP L/P ELEVATION
PROP G/T ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
1. ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL REFER TO THE LATEST "CITY OF MIDLAND CONSTRUCTION STANDARDS".
3. ALL ADA RAMPS ARE TY 1 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG THE TRAVERSABLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D2
084



Parkhill

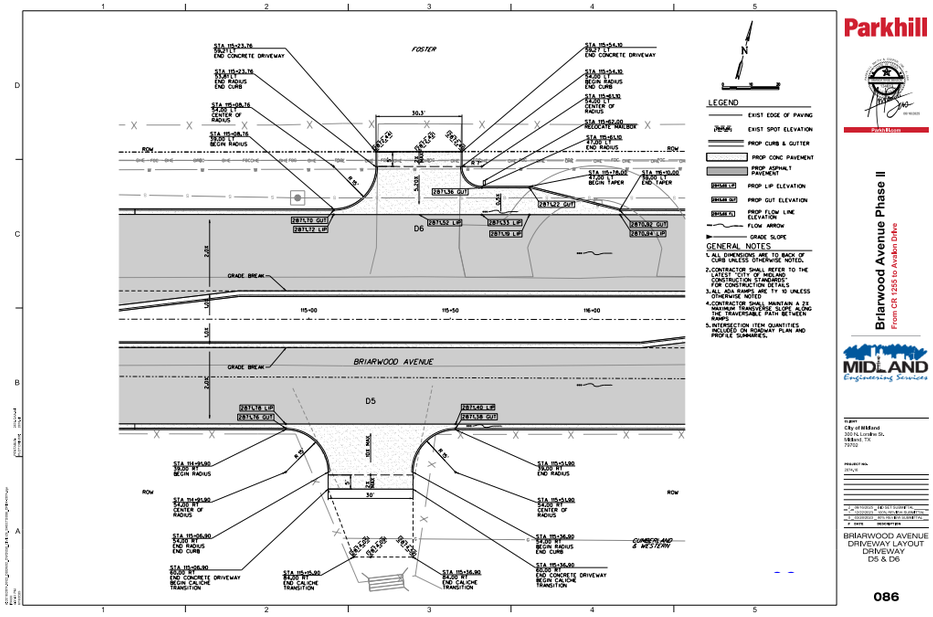
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D3 & D4

085



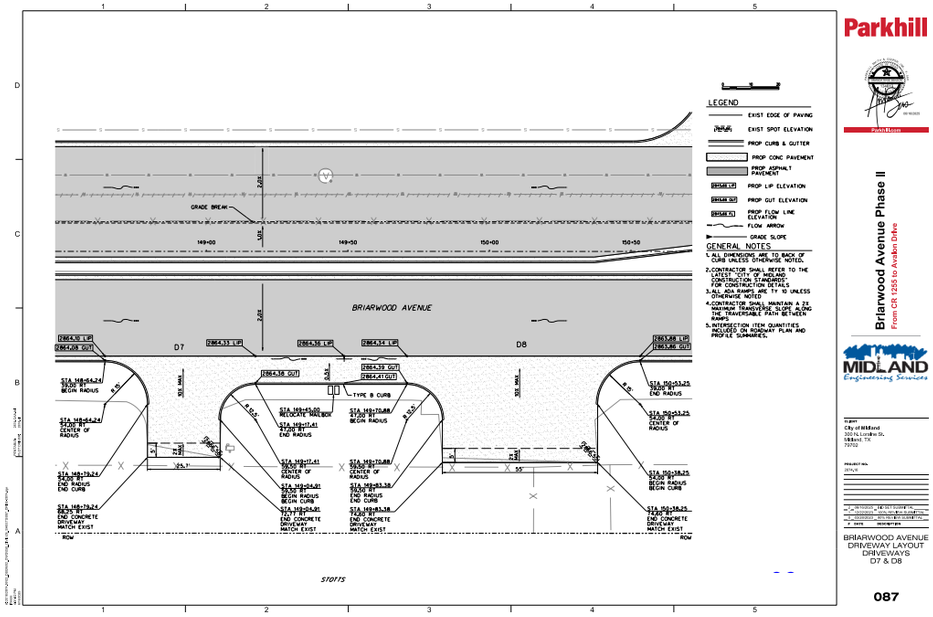
Parkhill

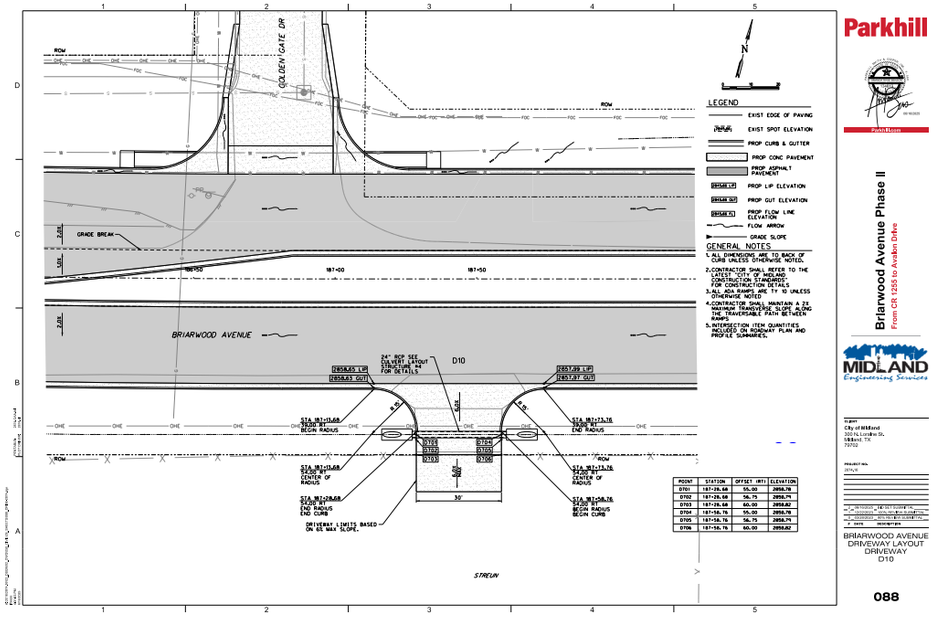
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

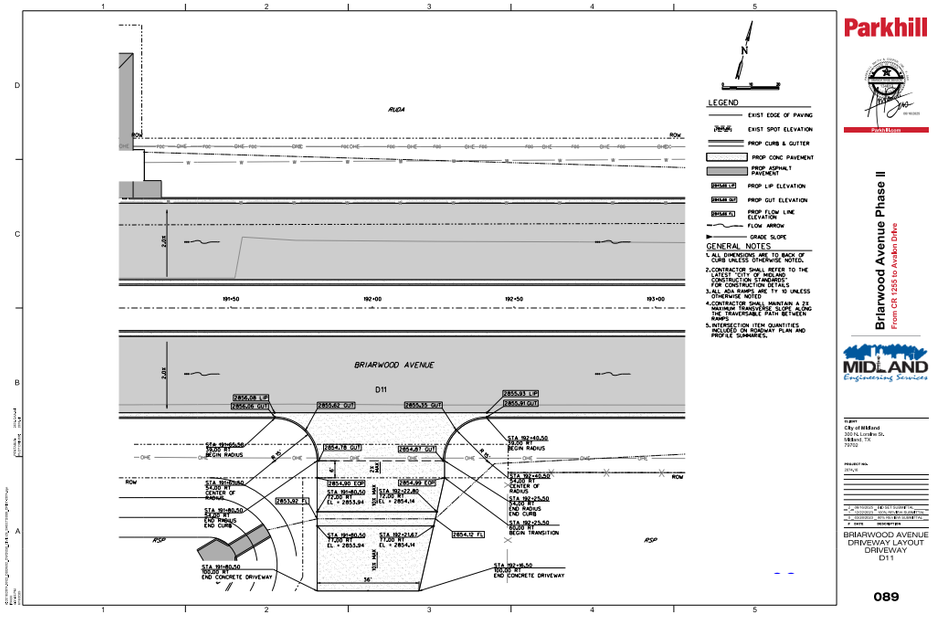
MIDLAND Engineering Services

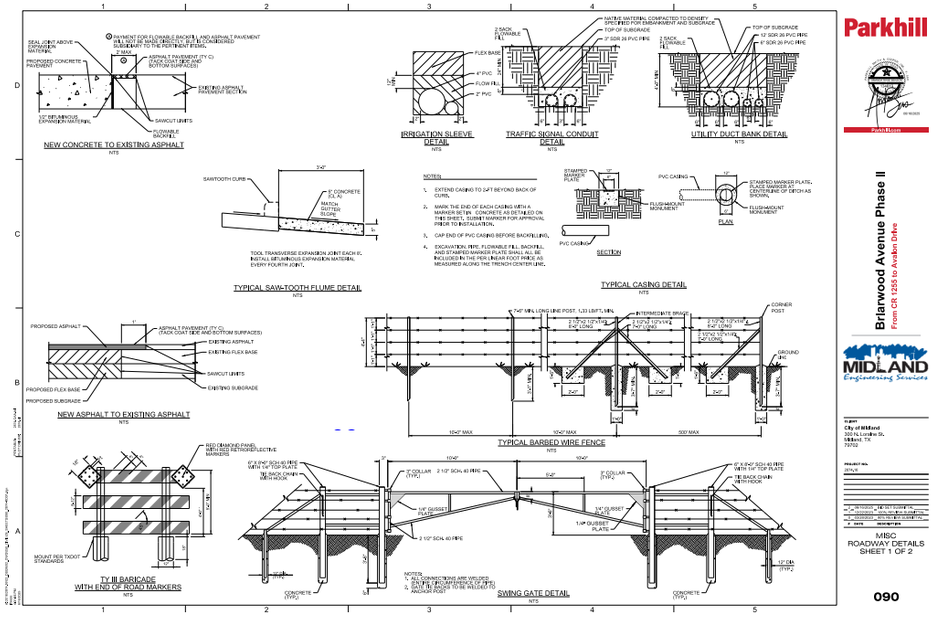
BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D5 & D6

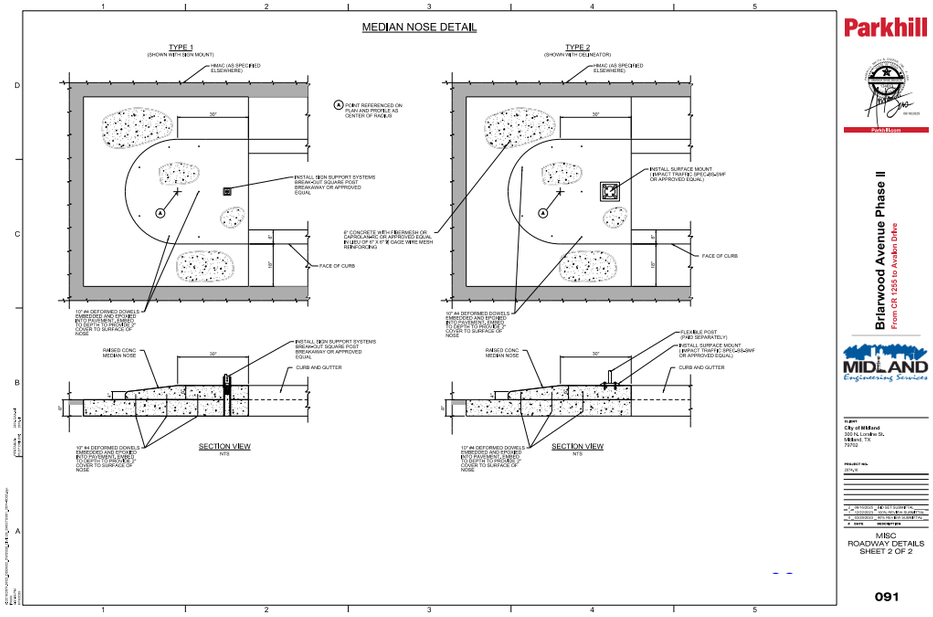
086


BRIARWOOD AVENUE
GRADE BREAK
D7
D8
TYPE B CURB
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
1. ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL REFER TO THE LATEST CITY OF MIDLAND CONSTRUCTION STANDARDS.
3. ALL ADA RAMPS ARE TY 1 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG THE ACCESSIBLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
BRIARWOOD AVENUE DRIVEWAY LAYOUT DRIVEWAYS D7 & D8
087


GOLDEN GATE DR
BRIARWOOD AVENUE
GRADE BREAK
ROW
D10
24' BOX SEE CULVERT LAYOUT STRUCTURE 148 FOR DETAILS
2858.63 LIP
2858.63 GUT
2857.89 LIP
2857.37 GUT
STA 187+13.68 30.00' RT BEGIN RADIUS
STA 187+13.76 30.00' RT END RADIUS
STA 187+13.68 30.00' RT CENTER OF RADIUS
STA 187+28.68 END RADIUS END CURB
STA 187+58.76 30.00' RT CENTER OF RADIUS
STA 187+58.76 BEGIN RADIUS BEGIN CURB
DRIVEWAY LIMITS BASED ON 8% MAX SLOPE.
30'
STREAM
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
GENERAL NOTES
1. ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL REFER TO THE LATEST "CITY OF MIDLAND CONSTRUCTION STANDARDS" FOR CONSTRUCTION DETAILS.
3. ALL ADA RAMPS ARE TY 1 UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL MAINTAIN A 2% MAXIMUM TRANSVERSE SLOPE ALONG RAMP TO PROVIDE A NON-CROSSABLE PATH BETWEEN RAMPS.
5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
POINT | STATION | OFFSET (RT) | ELEVATION
0701 | 187+28.68 | 55.50 | 2858.78
0702 | 187+28.68 | 56.75 | 2858.71
0703 | 187+28.68 | 60.00 | 2858.82
0704 | 187+58.76 | 55.50 | 2858.78
0705 | 187+58.76 | 56.75 | 2858.71
0706 | 187+58.76 | 60.00 | 2858.82
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D10
088


RUD4
BRIARWOOD AVENUE
D11
LEGEND
EXIST EDGE OF PAVING
EXIST SPOT ELEVATION
PROP CURB & GUTTER
PROP CONC PAVEMENT
PROP ASPHALT PAVEMENT
PROP LIP ELEVATION
PROP GUT ELEVATION
PROP FLOW LINE ELEVATION
FLOW ARROW
GRADE SLOPE
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5. INTERSECTION ITEM QUANTITIES INCLUDED ON ROADWAY PLAN AND PROFILE SUMMARIES.
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE
DRIVEWAY LAYOUT
DRIVEWAY
D11
089


NEW CONCRETE TO EXISTING ASPHALT
IRRIGATION SLEEVE DETAIL
TRAFFIC SIGNAL CONDUIT DETAIL
UTILITY DUCT BANK DETAIL
TYPICAL SAW-TOOTH FLUME DETAIL
TYPICAL CASING DETAIL
NEW ASPHALT TO EXISTING ASPHALT
TYPICAL BARBED WIRE FENCE
TY III BARRICADE WITH END OF ROAD MARKERS
SWING GATE DETAIL
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
MISC
ROADWAY DETAILS
SHEET 1 OF 2
090



Parkhill

Briarwood Avenue Phase II

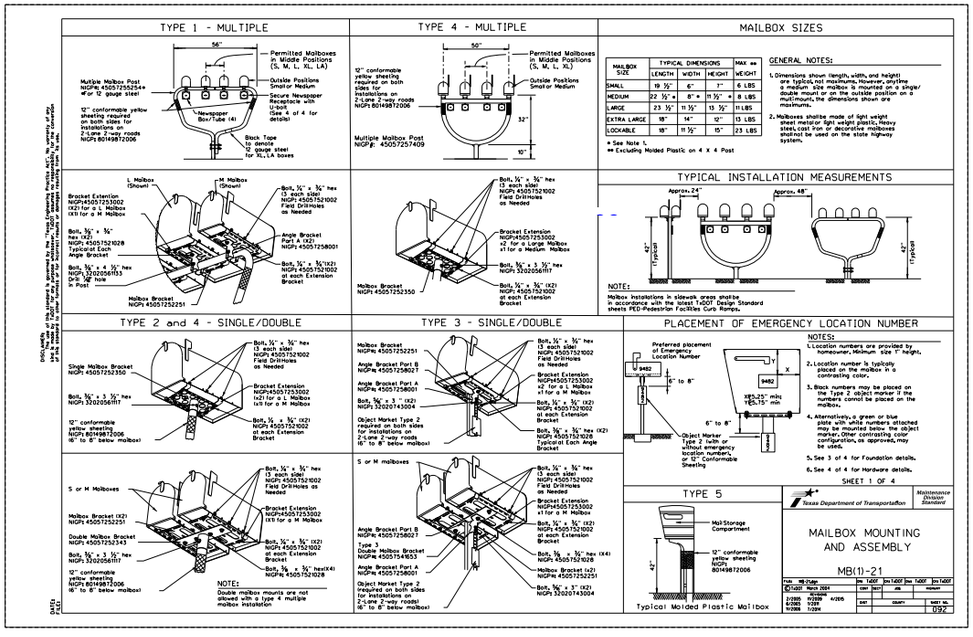
From CR 1255 to Avalon Drive

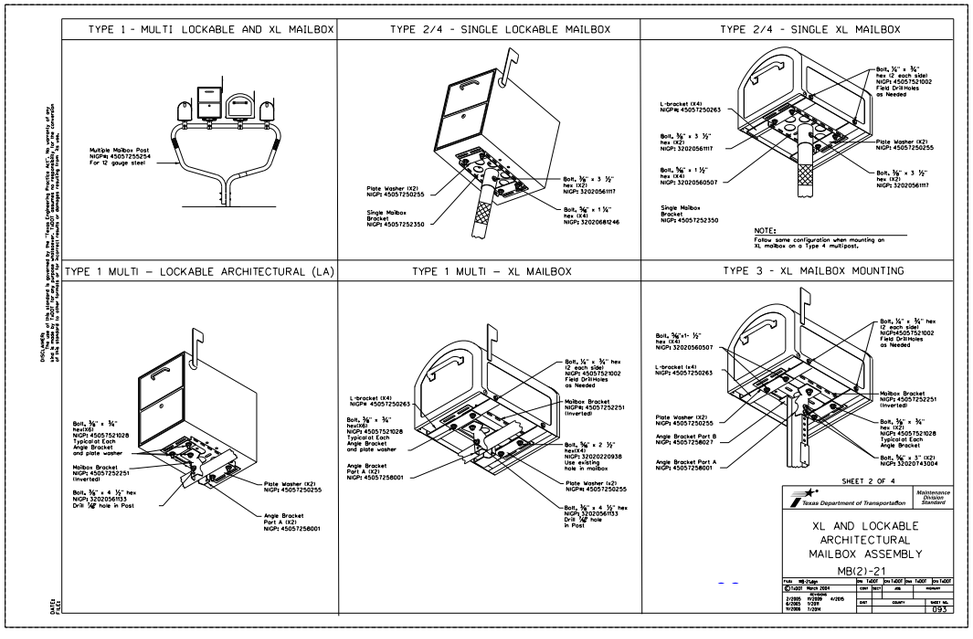
MIDLAND Engineering Services

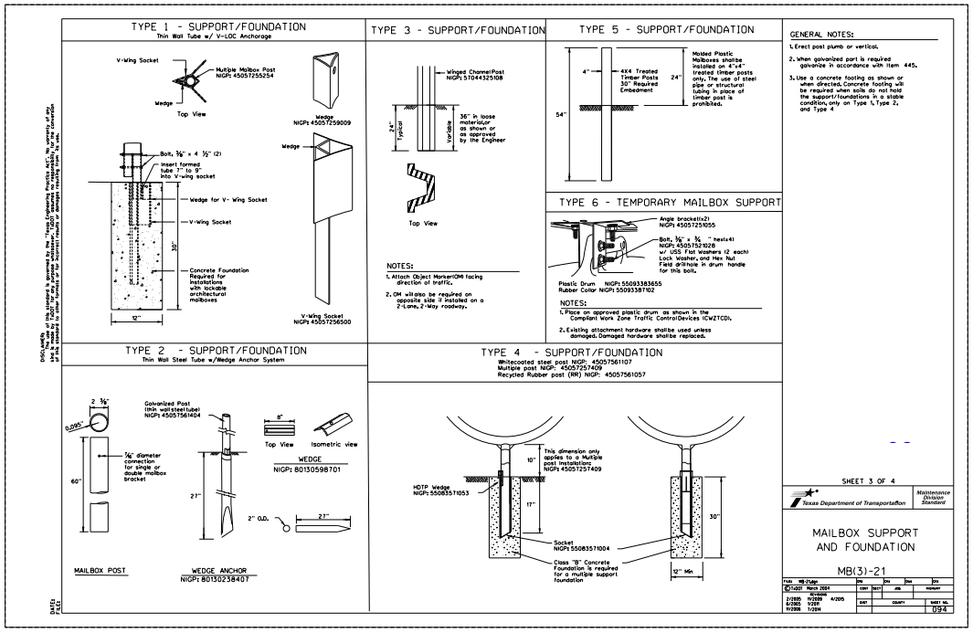
City of Midland
300 N. Loraine St.
Midland, TX
79702

MBC
ROADWAY DETAILS
SHEET 2 OF 2

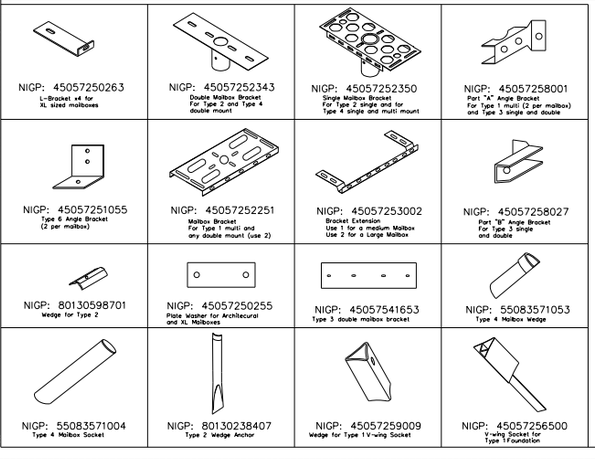
091


TYPE 1 - MULTIPLE
TYPE 4 - MULTIPLE
MAILBOX SIZES
GENERAL NOTES:
TYPICAL INSTALLATION MEASUREMENTS
TYPE 2 and 4 - SINGLE/DOUBLE
TYPE 3 - SINGLE/DOUBLE
PLACEMENT OF EMERGENCY LOCATION NUMBER
TYPE 5
Typical Molded Plastic Mailbox
MAILBOX MOUNTING AND ASSEMBLY
MB(1)-21
SHEET 1 OF 4


TYPE 1 - MULTI LOCKABLE AND XL MAILBOX
Multiple Mailbox Post
NIGP#: 45057255254
For 12 gauge steel
TYPE 2/4 - SINGLE LOCKABLE MAILBOX
Plate Washer (X2)
NIGP: 45057250255
Single Mailbox
Bracket
NIGP: 45057252350
Bolt, ⅜" x 3 ½"
hex (X2)
NIGP: 32020561117
Bolt, ⅜" x 1 ½"
hex (X4)
NIGP: 32020681246
TYPE 2/4 - SINGLE XL MAILBOX
L-bracket (X4)
NIGP#: 45057250263
Bolt, ⅜" x 3 ½"
hex (X2)
NIGP: 32020561117
Bolt, ⅜" x 1 ½"
hex (X4)
NIGP: 32020560507
Single Mailbox
Bracket
NIGP: 45057252350
Bolt, ½" x ⅜"
hex (2 each side)
NIGP: 45057521002
Field Drill Holes
as Needed
Plate Washer (X2)
NIGP: 45057250255
Bolt, ⅜" x 3 ½"
hex (X2)
NIGP: 32020561117
NOTE:
Follow same configuration when mounting an
XL mailbox on a Type 4 multipost.
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)
Bolt, ⅜" x ¾"
hex(X8)
NIGP: 45057521028
Typical of Each
Angle Bracket
and plate washer
Mailbox Bracket
NIGP: 45057252251
Inverted!
Bolt, ⅜" x 4 ½" hex
NIGP: 32020561113
Drill ⅝" hole in Post
Plate Washer (X2)
NIGP: 45057250255
Angle Bracket
Part A (X2)
NIGP: 45057256001
TYPE 1 MULTI – XL MAILBOX
L-bracket (X4)
NIGP#: 45057250263
Bolt, ⅜" x ¾"
hex(X8)
NIGP: 45057521028
Typical of Each
Angle Bracket
and plate washer
Angle Bracket
Part A (X2)
NIGP: 45057256001
Bolt, ½" x ½" hex
(2 each side)
NIGP: 45057521002
Field Drill Holes
as Needed
Mailbox Bracket
NIGP#: 45057252251
Inverted!
Bolt, ⅜" x 2 ½"
hex(X4)
NIGP: 32020220938
Use existing
hole in mailbox
Plate Washer (x2)
NIGP#: 45057250255
Bolt, ⅜" x 4 ½" hex
NIGP: 32020561113
Drill ⅝" hole
in Post
TYPE 3 - XL MAILBOX MOUNTING
Bolt, ⅜"x1- ½"
hex (X4)
NIGP: 32020560507
L-bracket (x4)
NIGP: 45057250263
Plate Washer (X2)
NIGP: 45057250255
Angle Bracket Part B
NIGP: 45057258027
Angle Bracket Part A
NIGP: 45057258031
Bolt, ½" x ⅜" hex
(2 each side)
NIGP#45057521002
Field Drill Holes
as Needed
Mailbox Bracket
NIGP: 45057252251
Inverted!
Bolt, ⅜" x ¾"
hex (X2)
NIGP: 45057521028
Typical of Each
Angle Bracket
Bolt, ⅜" x 3" (X2)
NIGP: 32020743004
SHEET 2 OF 4
Texas Department of Transportation
Maintenance Division Standard
XL AND LOCKABLE
ARCHITECTURAL
MAILBOX ASSEMBLY
MB(2)-21
FILE: MB(2)21 dn: TxDOT cw: TxDOT ck: TxDOT dw: TxDOT ck: TxDOT
©TxDOT March 2004
CONT SECT JOB HIGHWAY
2/2005 KSSW
6/2005 SDW 4/2015
11/2016 SDW
DIST COUNTY SHEET NO.
097
DATE
FILE:


TYPE 1 - SUPPORT/FOUNDATION
Thin Wall Tube w/ V-LOC Anchorage
V-Wing Socket
Multiple Mailbox Post NIGP: 45057255234
Wedge
Top View
Wedge NIGP: 45057259009
Wedge
Bolt, ⅜" x 4 ½" (2)
Insert formed tube 7" to 9" into V-wing socket
Wedge for V- Wing Socket
V-Wing Socket
30"
Concrete Foundation Required for installations with lockable architectural mailboxes
12"
V-Wing Socket NIGP: 45057256500
TYPE 3 - SUPPORT/FOUNDATION
Winged ChannelPost NIGP: 51044325108
42" typical
36" in loose material or as shown or as approved by the Engineer
Top View
NOTES:
1. Attach Object Marker/OM facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.
TYPE 5 - SUPPORT/FOUNDATION
4"
4X4 Treated Timber Posts 30" Required Embedment
24"
54"
Molded Plastic Mailboxes shall be installed on 4"x4" treated timber posts only. The use of steel pipe or structural tubing in place of timber post is prohibited.
TYPE 6 - TEMPORARY MAILBOX SUPPORT
Angle bracket(s)(2) NIGP: 45057259055
Bolt, ⅜" x 3½" - 7 nuts(4) NIGP: 45057257828 w/ USS Flat washers (2 each) Lock washers, and Hex Nut Field drill hole in drum handle for this bolt.
Plastic Drum Rubber Collar NIGP: 55093383655 NIGP: 55093387102
NOTES:
1. Place an approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.
GENERAL NOTES:
1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support foundations in a stable condition, only on Type 1, Type 2, and Type 4
TYPE 2 - SUPPORT/FOUNDATION
Thin Wall Steel Tube w/Wedge Anchor System
2 ½"
0.095"
Galvanized Post (thin wall steel tube) NIGP: 45057561404
⅝" diameter connection for single or double mailbox bracket
60"
27"
MAILBOX POST
WEDGE ANCHOR NIGP: 80130238407
6"
Top View
Isometric view
WEDGE NIGP: 80130598701
2" O.D.
27"
TYPE 4 - SUPPORT/FOUNDATION
Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057
HDTP Wedge NIGP: 55083571053
10"
This dimension only applies to a Multiple post installation NIGP: 45057257409
17"
Socket NIGP: 55083571004
Class "B" Concrete Foundation is required for a multiple support foundation
30"
12" Min
SHEET 3 OF 4
Texas Department of Transportation
Maintenance Division Standard
MAILBOX SUPPORT AND FOUNDATION
MB(3)-21
FILE: MB21dgn
DATE: 7/1/07 March 2024
CONT SECT JOB HIGHWAY
DISTRICT COUNTY SHEET NO.
DW

TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Positions S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M, L, XL, or LA	SS, SM, or MM	Outside Position: S or M Inside Position: S, M, L, or XL	Molded Plastic	S, or M
Mailbox Post NIGP #	45057255254 (Galvanized Multiple)	45057561404 (Thin Walled Gavanize)	57044325108 (Wing Channel Post)	45057561107 (Thin walled white powder coated) 45057561057 (Recycled Rubber Post: S or M only)	45057561107 (Thin Walled White Powder Coated)	45057257409 (White Powder Coated Multiple)	4x4 Timber	Construction Barrel
Post and Mailbox Hardware NIGP #	45057259009 (Wedge) 45057256500 (V-Wing Socket) 45057253002 (Bracket Extension) 45057253251 (Mailbox Bracket) 45057258001 (Part A Angle Bracket x2) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	80130598701 (Wedge) 80130238407 (Wedge Anchor) 45057253002 (Bracket Extension) 45057253343 (Double MB Bracket) 45057252350 (S. Mailbox Bracket) 45057253251 (Mailbox Bracket) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket forXL x4)	45057541653 (Type 3 Double Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057253002 (Bracket Extension) 45057258001 (Part A Angle Bracket) 45057258027 (Part B Angle Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253350 (Single Mailbox Bracket) 45057253002 (Bracket Extension) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252343 (Double Mount Bracket) 45057252251 (Mailbox Bracket x2)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252350 (Single Mount Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	None	45057251055 Angle Bracket (x2)
Foundation Used	Class B Concrete (Required for LA Mailboxes)	Class B Concrete (Required for LA Mailboxes)	None	Class B Concrete (not used with recycled rubber post, required for LA Mailboxes)	Class B Concrete (not required)	Class B Concrete	None	None



NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 OM 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 OM 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Reflective Yellow Sheeting for Flexible Posts

NOTES:

1. Type 2 object marker in accordance with Traffic Engineering Standard Delineators & Object Markers.
2. A light weight receptacle for newspaper delivery can be attached to mailbox posts if the receptacle does not touch the mailbox presented to traffic or delivery of the mail, excluding except as to location on mailbox, or display advertising, except the publication title.

BID CODES FOR CONTRACTS

MB-(X) ASSM TY (XXX) (X)

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- MP = Molded Plastic

Type of Post
- WC = Winged Channel Post
- RW = Recycled Rubber
- TWW = Thin Walled White Tubing
- TWG = Thin Walled Galvanized Tubing
- TIM = Timber

Type of Foundation
- Ty 1 = V-Loc
- Ty 2 = Wedge Anchor Steel System
- Ty 3 = Winged Channel post
- Ty 4 = Wedge Anchor Plastic System
- Ty 5 = 4 X 4 Post

SHEET 4 OF 4

Texas Department of Transportation — Maintenance Division Standard

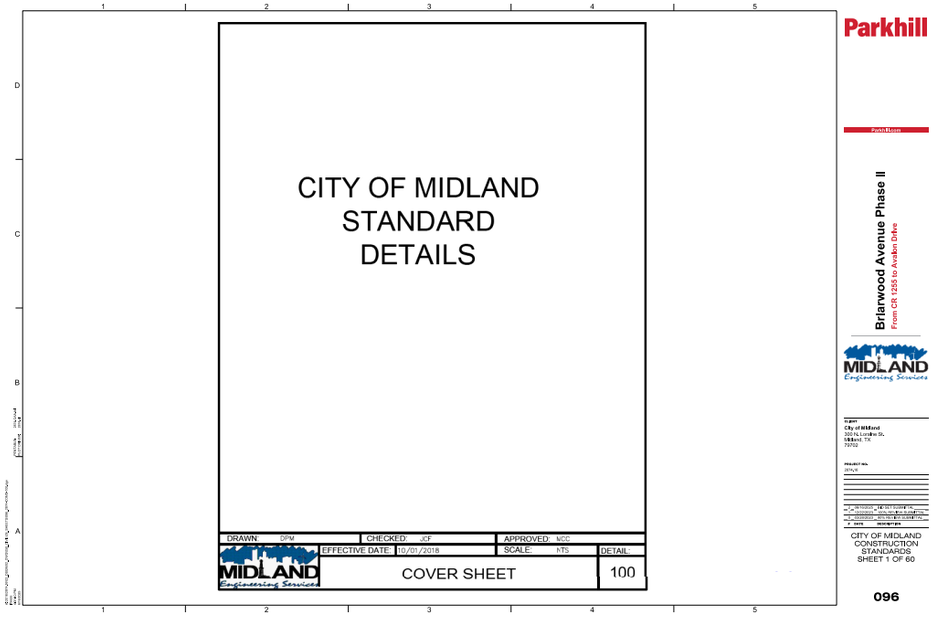
NIGP PARTS LIST AND COMPATIBILITY

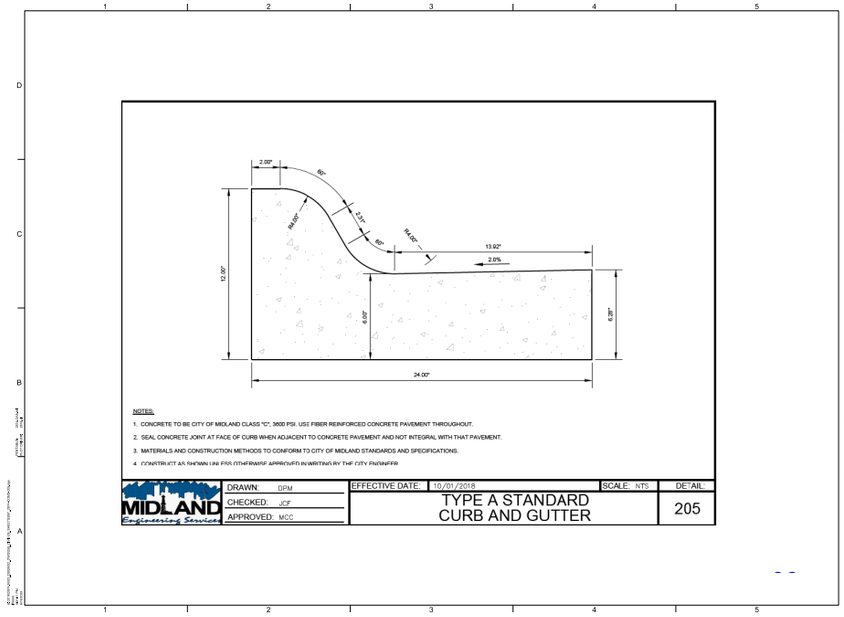
MB(4)-21

FILE: MB-21dgn			DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2024			CONT	SECT	JOB	HIGHWAY
DATE REVISIONS						
2/2005	11/09	4/2015				
6/2005	1/2011		DIST	COUNTY		SHEET NO.
11/2006	7/2014					0297

DATES / FILES

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by the Texas Department of Transportation for any setting determined by the use of this standard or any portion thereof. The Texas Department of Transportation shall not be liable for damages arising from the use of this standard or any portion thereof for incorrect results or incorrect design.


CITY OF MIDLAND
STANDARD
DETAILS
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
COVER SHEET
100
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND
Engineering Services
CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 1 OF 60
096



NOTES:

1. CONCRETE TO BE CITY OF MIDLAND CLASS "C", 3600 PSI, USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT.
2. SEAL CONCRETE JOINT AT FACE OF CURB WHEN ADJACENT TO CONCRETE PAVEMENT AND NOT INTEGRAL WITH THAT PAVEMENT.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER

DRAWN: BPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	TYPE A STANDARD CURB AND GUTTER		205
APPROVED: MCC			

Parkhill

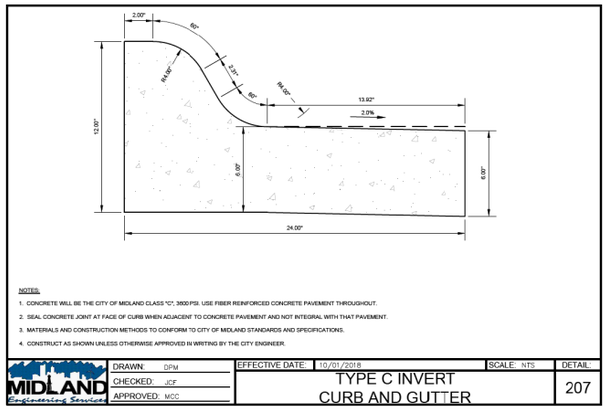
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 2 OF 60

097



NOTES:

1. CONCRETE WILL BE THE CITY OF MIDLAND CLASS "C", 3600 PSI. USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT.
2. SEAL CONCRETE JOINT AT FACE OF CURB WHEN ADJACENT TO CONCRETE PAVEMENT AND NOT INTEGRAL WITH THAT PAVEMENT.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MSC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL: 207

TYPE C INVERT
CURB AND GUTTER

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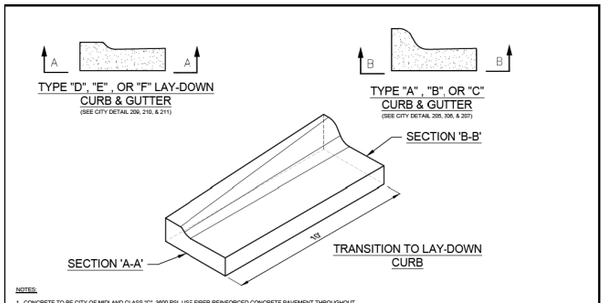
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 3 OF 60

098



NOTES:

1. CONCRETE TO BE CITY OF MIDLAND CLASS "C", 3600 PSI, USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT.
2. SEAL CONCRETE JOINT AT FACE OF CURB WHEN ADJACENT TO CONCRETE PAVEMENT AND NOT INTEGRAL WITH THAT PAVEMENT.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONTRACT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MCC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL
		TRANSITION TO LAY-DOWN CURB		208

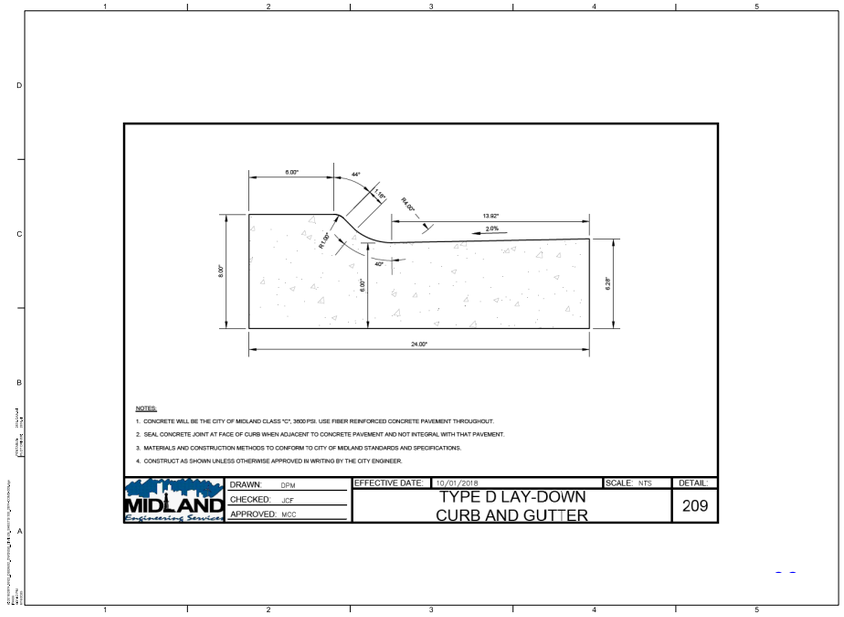
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Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 4 OF 60

099



NOTES:

1. CONCRETE WILL BE THE CITY OF MIDLAND CLASS "C", 3600 PSI. USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT.
2. SEAL CONCRETE JOINT AT FACE OF CURB WHEN ADJACENT TO CONCRETE PAVEMENT AND NOT INTEGRAL WITH THAT PAVEMENT.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MSC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL: 209
		TYPE D LAY-DOWN CURB AND GUTTER		

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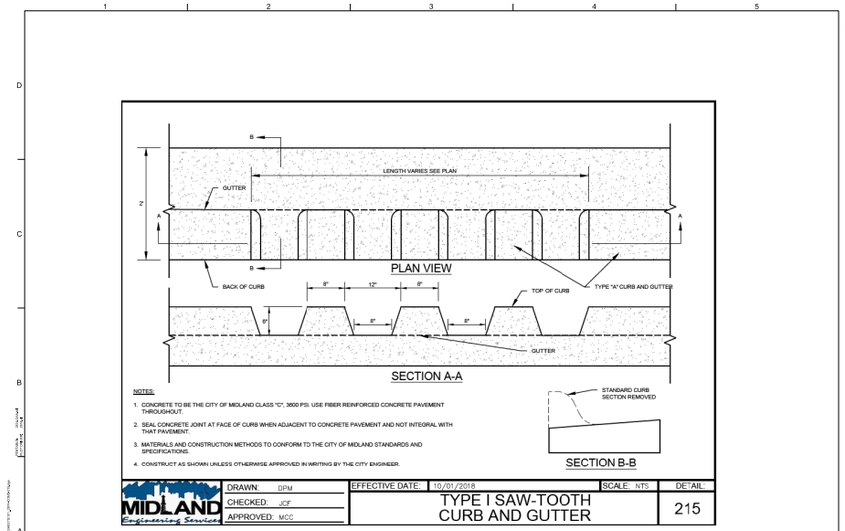
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 5 OF 60

100



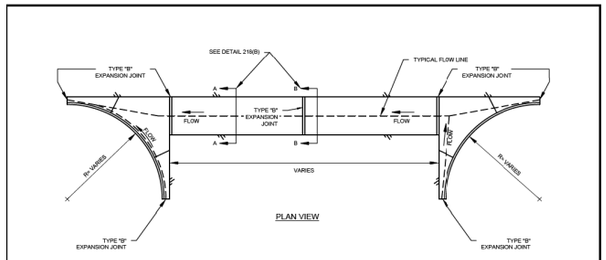
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Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND CONSTRUCTION STANDARDS SHEET 6 OF 60

101



PLAN VIEW

NOTES:

1. CONCRETE TO BE CITY OF MIDLAND CLASS "C", 3600 PSI. USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT.
2. CONCRETE FILLET AREA TO BE PLACED WITH INTEGRAL CURB.
3. SEAL ALL CONCRETE JOINTS.
4. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
6. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MCC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS
		FILLET AND VALLEY GUTTER	DETAIL: 218(A)

Parkhill

Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

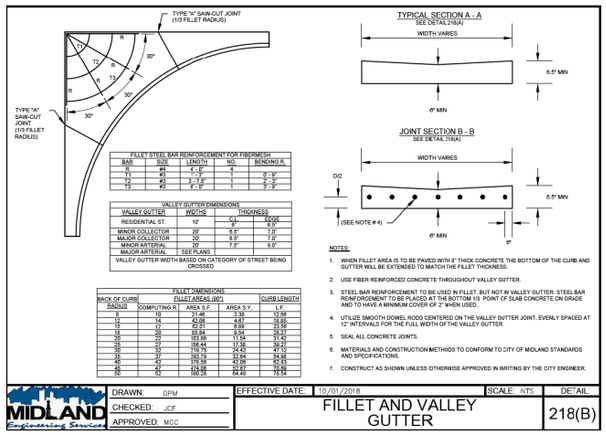
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007419

#	DATE	DESCRIPTION

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 7 OF 60

102



FILLET STEEL BAR REINFORCEMENT FOR FIBERMESH

BAR	SIZE	LENGTH	NO.	BENDING R.
T1	#4	4'-0"	1	
T2	#3	4'-0"	1	6"-3"
T3	#3	3'-7.5"	1	2'-3"
T4	#3	4'-0"	1	3'-3"

VALLEY GUTTER DIMENSIONS

VALLEY GUTTER	WIDTH	THICKNESS	
		C.L.	EDGE
RESIDENTIAL ST.	10'	6.5"	6"
MINOR COLLECTOR	20'	6.5"	7.0"
MAJOR COLLECTOR	20'	6.5"	7.0"
MINOR ARTERIAL	20'	7.5"	8.0"
MAJOR ARTERIAL	SEE PLANS		

VALLEY GUTTER WIDTH BASED ON CATEGORY OF STREET BEING CROSSED

FILLET DIMENSIONS

BACK OF CURB RADIUS	FILLET AREAS (SF)			CURB LENGTH
	COMPUTING R.	AREA S.F.	AREA S.Y.	L.F.
6	10	21.46	2.39	12.56
12	14	42.96	4.87	18.85
15	17	42.61	6.69	23.56
18	20	85.84	9.54	28.27
20	22	103.68	11.74	31.42
25	27	156.44	14.45	39.27
30	32	192.73	17.30	47.12
35	37	282.79	22.64	54.98
40	42	370.56	42.96	62.83
45	47	474.66	52.67	70.69
50	52	588.39	64.48	78.54

NOTES:

1. WHEN FILLET AREA IS TO BE PAVED WITH 6" THICK CONCRETE THE BOTTOM OF THE CURB AND GUTTER WILL BE EXTENDED TO MATCH THE FILLET THICKNESS.
2. USE FIBER REINFORCED CONCRETE THROUGHOUT VALLEY GUTTER.
3. STEEL BAR REINFORCEMENT TO BE USED IN FILLET, BUT NOT IN VALLEY GUTTER. STEEL BAR REINFORCEMENT TO BE PLACED AT THE BOTTOM 1/3 POINT OF SLAB CONCRETE ON GRADE AND TO HAVE A MINIMUM COVER OF 2" WHEN USED.
4. UTILIZE SMOOTH DOWEL RODS CENTERED ON THE VALLEY GUTTER JOINT, EVENLY SPACED AT 12" INTERVALS FOR THE FULL WIDTH OF THE VALLEY GUTTER.
5. SEAL ALL CONCRETE JOINTS.
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	FILLET AND VALLEY GUTTER		218(B)
APPROVED: MCC			

Parkhill

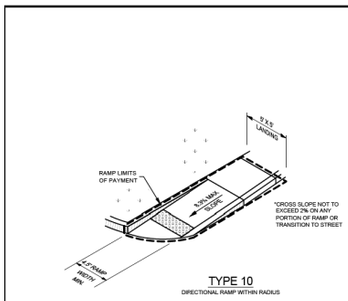
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 8 OF 60

103



TYPE 10

DIRECTIONAL RAMP WITHIN RADIUS

CURB RAMP NOTES:

1. ADJUST CURB RAMP LOCATION AND OR TYPE SO THAT NO OBSTRUCTION IS LOCATED WITHIN THE LANDING AREA.
2. ALL SLOPES ARE MAXIMUM ALLOWABLE. THE LEAST POSSIBLE SLOPE THAT MEETS THE REQUIREMENTS SHALL BE USED.
3. LANDINGS SHALL BE 5'X 5' MINIMUM WITH A MAXIMUM 2% SLOPE IN ANY DIRECTION. WHERE OBSTRUCTIONS EXIST, THERE SHALL BE A 3' MINIMUM CLEARANCE IN WIDTH AND LENGTH OF THE LANDING.
4. MANEUVERING SPACE AT THE BOTTOM OF CURB RAMPS SHALL BE A MINIMUM OF 4'X4' WHOLLY CONTAINED WITHIN THE CROSSWALK AND TO THE ENTIRE OUTSIDE OF THE PARALLEL VEHICULAR TRAVEL PATH.
5. MAXIMUM ALLOWABLE CROSS SLOPE ON SIDEWALK AND CURB RAMP SURFACES IS 2%.
6. CURB RAMPS WITH RETURNED CURBS MAY BE USED ONLY WHERE PEDESTRIANS WOULD NOT NORMALLY WALK ACROSS THE RAMP, EITHER BECAUSE THE ADJACENT SURFACE IS PLANTING OR OTHER NON-WALKING SURFACE OR BECAUSE THE SIDE APPROACH IS SUBSTANTIALLY OBSTRUCTED. OTHERWISE, PROVIDE FLARED SIDES.
7. ADDITIONAL INFORMATION ON CURB RAMP LOCATION, DESIGN, LIGHT RIFLECTIVE VALUE AND TEXTURE MAY BE FOUND IN THE CURRENT EDITION OF THE TEXAS ACCESSIBILITY STANDARDS (TAS) AND 16 TAC 68.102.
8. AT INTERSECTIONS WHERE CROSSWALK MARKINGS ARE NOT REQUIRED, CURB RAMPS SHALL BE ALIGNED WITH THEORETICAL CROSSWALKS,OR AS DIRECTED BY THE ENGINEER.
9. PROVIDE A SMOOTH TRANSITION WHERE THE CURB RAMPS CONNECT TO THE STREET.
10. FLARE SLOPE SHALL NOT EXCEED 10% MEASURED ALONG CURB LINE.
11. ALL RAMPS AND LANDINGS WITH A CONCRETE SURFACE SHALL HAVE A COURSE BROOM FINISH OR OTHER ROUGH NON-SKID TYPE FINISH AS APPROVED BY THE ENGINEER.
12. PLACE 6"OF CONCRETE IN RAMPS, LANDINGS, AND FLARES THAT ARE LOCATED AT THE RETURNS ADJACENT TO THE BACK OF CURB OF ARTERIAL STREETS AND COMMERCIAL SITES.

GENERAL NOTES:

1. CONCRETE TO BE CITY OF MIDLAND CLASS "A" WITH A MINIMUM28 DAY COMPRESSION STRENGTH OF 3000 PS. USE FIBER REINFORCED CONCRETE THROUGHOUT.
2. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO THE CITY OF MIDLAND STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE DIRECTED BY ADA STANDARDS AND RESOURCES.

DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	DIRECTIONAL RAMP WITHIN RADIUS		231
APPROVED: MCC			

Parkhill

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 19 OF 60

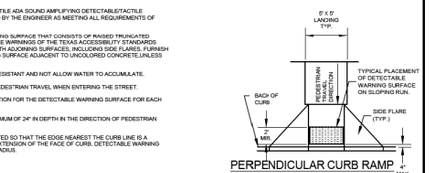
104

DETECTABLE WARNING SURFACE NOTES:

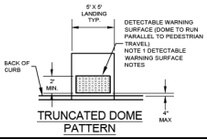
1. DETECTABLE WARNING SURFACE SUCH AS ARMOR-TILE ADA SOUND AMPLIFYING DETECTABLE/TACTILE WARNING SURFACE TILE OR EQUAL AND APPROVED BY THE ENGINEER AS MEETING ALL REQUIREMENTS OF ASTM C-936, C-33.
2. CURB RAMPS MUST CONTAIN A DETECTABLE WARNING SURFACE THAT CONSISTS OF RAISED TRUNCATED DOMES COMPLYING WITH SECTION 7.08 DETACHABLE WARNINGS OF THE TEXAS ACCESSIBILITY STANDARDS (TAS). THE SURFACE MUST CONTRAST VISUALLY WITH ADJOINING SURFACES, INCLUDING SIDE FLARES. FURNISH DARK BROWN OR DARK RED DETECTABLE WARNING SURFACE ADJACENT TO UNCOLORED CONCRETE,UNLESS SPECIFIED ELSEWHERE IN THE PLANS.
3. DETECTABLE WARNING SURFACES MUST BE SLIP RESISTANT AND NOT ALLOW WATER TO ACCUMULATE.
4. ALIGN TRUNCATED DOMES IN THE DIRECTION OF PEDES"RIAN TRAVEL WHEN ENTERING THE STREET.
5. SHADED AREAS INDICATE THE APPROXIMATE LOCATION FOR THE DETECTABLE WARNING SURFACE FOR EACH CURB RAMP TYPE.
6. DETECTABLE WARNING SURFACES SHALL BE A MINIMUM OF 24" IN DEPTH IN THE DIRECTION OF PEDESTRIAN TRAVEL.
7. DETECTABLE WARNING SURFACES SHALL BE LOCATED SO THAT THE EDGE NEAREST THE CURB LINE IS A MINIMUM OF 6" AND A MAXIMUM OF 15" FROM THE EXTENSION OF THE FACE OF CURB. DETECTABLE WARNING SURFACES MAY BE CURVED ALONG THE CORNER RADIUS.
8. SINGLE TILE PLATES COLONIAL RED COLOR.

GENERAL NOTES:

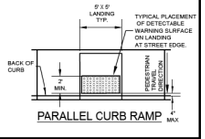
1. CONCRETE TO BE CITY OF MIDLAND CLASS "A" WITH A MINIMUM 28 DAY COMPRESSION STRENGTH OF 3000 PSI. USE FIBER REINFORCED CONCRETE THROUGHOUT.
2. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO THE CITY OF MIDLAND STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE DIRECTED BY ADA STANDARDS AND RESOURCES.



PERPENDICULAR CURB RAMP



TRUNCATED DOME PATTERN



PARALLEL CURB RAMP

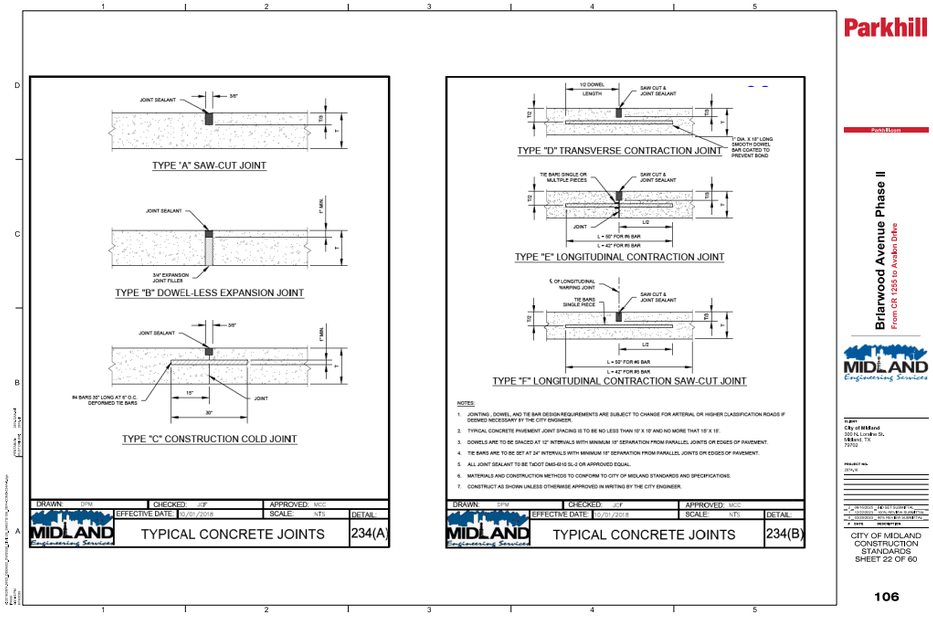
DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL
CHECKED: JCF	DETECTABLE WARNING SURFACE		233
APPROVED: MCC			

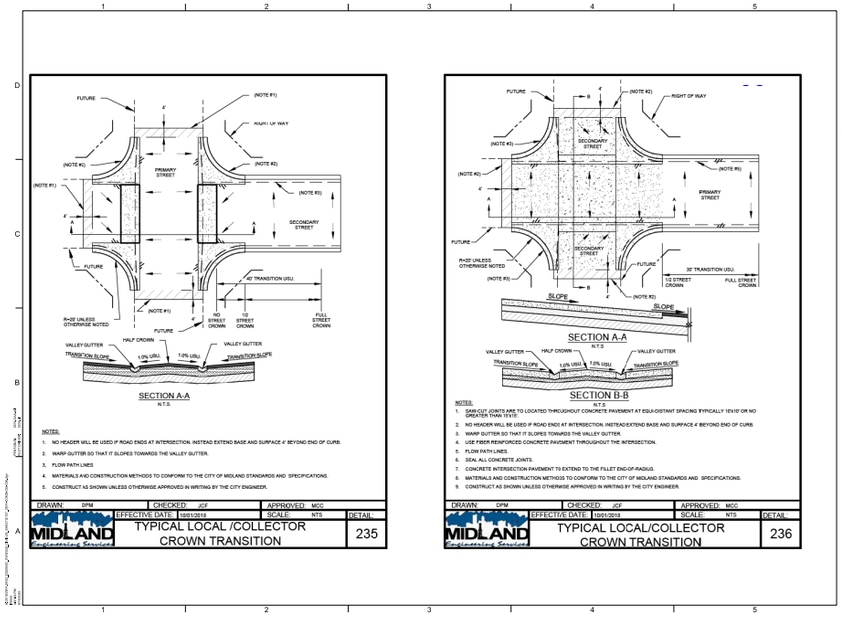
Parkhill

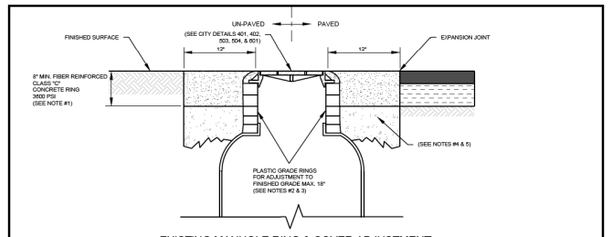
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 21 OF 60

105


TYPE "A" SAW-CUT JOINT
TYPE "B" DOWEL-LESS EXPANSION JOINT
TYPE "C" CONSTRUCTION COLD JOINT
NOTES:
1. JOINTING, DOWEL, AND TIE BAR DESIGN REQUIREMENTS ARE SUBJECT TO CHANGE FOR ARTERIAL OR HIGHER CLASSIFICATION ROADS IF DEEMED NECESSARY BY THE CITY ENGINEER.
2. TYPICAL CONCRETE PAVEMENT JOINT SPACING IS TO BE NO LESS THAN 10' X 10' AND NO MORE THAT 15' X 15'.
3. DOWELS ARE TO BE SPACED AT 12" INTERVALS WITH MINIMUM 15" SEPARATION FROM PARALLEL JOINTS OR EDGES OF PAVEMENT.
4. TIE BARS ARE TO BE SET AT 24" INTERVALS WITH MINIMUM 15" SEPARATION FROM PARALLEL JOINTS OR EDGES OF PAVEMENT.
5. ALL JOINT SEALANT TO BE TxDOT DMS-6310 SL-2 OR APPROVED EQUAL.
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL: 234(A)
TYPICAL CONCRETE JOINTS
TYPE "D" TRANSVERSE CONTRACTION JOINT
TYPE "E" LONGITUDINAL CONTRACTION JOINT
TYPE "F" LONGITUDINAL CONTRACTION SAW-CUT JOINT
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL: 234(B)
TYPICAL CONCRETE JOINTS
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 22 OF 60
106


FUTURE
(NOTE #1)
RIGHT OF WAY
(NOTE #2)
PRIMARY STREET
SECONDARY STREET
R=25' UNLESS OTHERWISE NOTED
40' TRANSITION U/DJ.
NO STREET CROWN
1/2 STREET CROWN
FULL STREET CROWN
HALF CROWN
VALLEY GUTTER
TRANSITION SLOPE
1.0% U/DJ.
7.0% U/DJ.
SECTION A-A
N.T.S.
NOTES:
1. NO HEADER WILL BE USED IF ROAD ENDS AT INTERSECTION. INSTEAD EXTEND BASE AND SURFACE 4' BEYOND END OF CURB.
2. WARP GUTTER SO THAT IT SLOPES TOWARDS THE VALLEY GUTTER.
3. FLOW PATH LINES
4. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO THE CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
5. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
TYPICAL LOCAL /COLLECTOR CROWN TRANSITION
235
SECONDARY STREET
PRIMARY STREET
(NOTE #3)
(NOTE #4)
(NOTE #5)
30' TRANSITION U/DJ.
1/2 STREET CROWN
FULL STREET CROWN
SLOPE
SECTION A-A
N.T.S
SECTION B-B
N.T.S
NOTES:
1. SAW-CUT JOINTS ARE TO LOCATED THROUGHOUT CONCRETE PAVEMENT AT EQUI-DISTANT SPACING TYPICALLY 10'x10' OR NO GREATER THAN 15'x15'.
2. NO HEADER WILL BE USED IF ROAD END AT INTERSECTION. INSTEAD EXTEND BASE AND SURFACE 4' BEYOND END OF CURB.
3. WARP GUTTER SO THAT IT SLOPES TOWARDS THE VALLEY GUTTER.
4. USE FIBER REINFORCED CONCRETE PAVEMENT THROUGHOUT THE INTERSECTION.
5. FLOW PATH LINES.
6. SEAL ALL CONCRETE JOINTS.
7. CONCRETE INTERSECTION PAVEMENT TO EXTEND TO THE FILLET END-OF-RADIUS.
8. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO THE CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
9. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
TYPICAL LOCAL/COLLECTOR CROWN TRANSITION
236
Parkhill
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND CONSTRUCTION STANDARDS SHEET 23 OF 60
107



EXISTING MANHOLE RING & COVER ADJUSTMENT

NOTES:

1. INSTALL 12" MIN. FIBER REINFORCED CLASS "C" CONCRETE RING, 3650 PSI, WHEN MANHOLE IS LOCATED IN AN ARTERIAL R.O.W.
2. GRADE RINGS TO MEET ASTM STANDARD A48 AND TO BE 2", 4", OR 6" THICKNESS AS REQUIRED. INSTALL ASPHALT TAR IN THICK, UNIFORM COATING OVER ALL OUTER ADJUSTMENT RING SURFACES AND JOINTS.
3. ENGINEERING SERVICES REPRESENTATIVE AND UTILITY SERVICES REPRESENTATIVE MAY ALLOW GREATER ADJUSTMENT RING DEPTH TO ACCOMMODATE PAVING STRUCTURES.
4. REMOVE ALL MATERIAL EXCAVATED FROM SITE AND EXCAVATION.
5. FILL ANY OVER-EXCAVATION WITH FLOWABLE FILL 2-SACK (2-SACK = 188 LBS/CY, PORTLAND CEMENT).
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MCC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS
		EXISTING MANHOLE RING & COVER ADJUSTMENT	DETAIL: 319

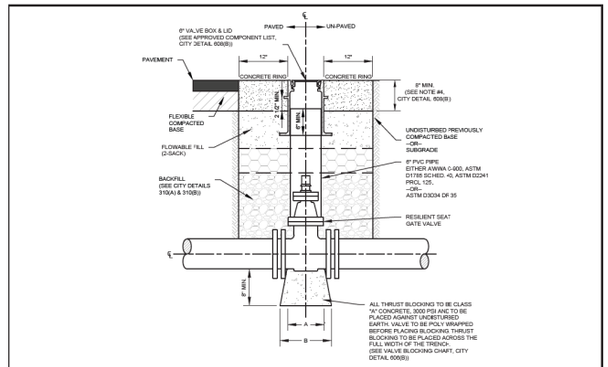
Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION STANDARDS
SHEET 36 OF 60

108



DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	TYPICAL VALVE AND VALVE BOX		608(A)
APPROVED: MCC			

Parkhill

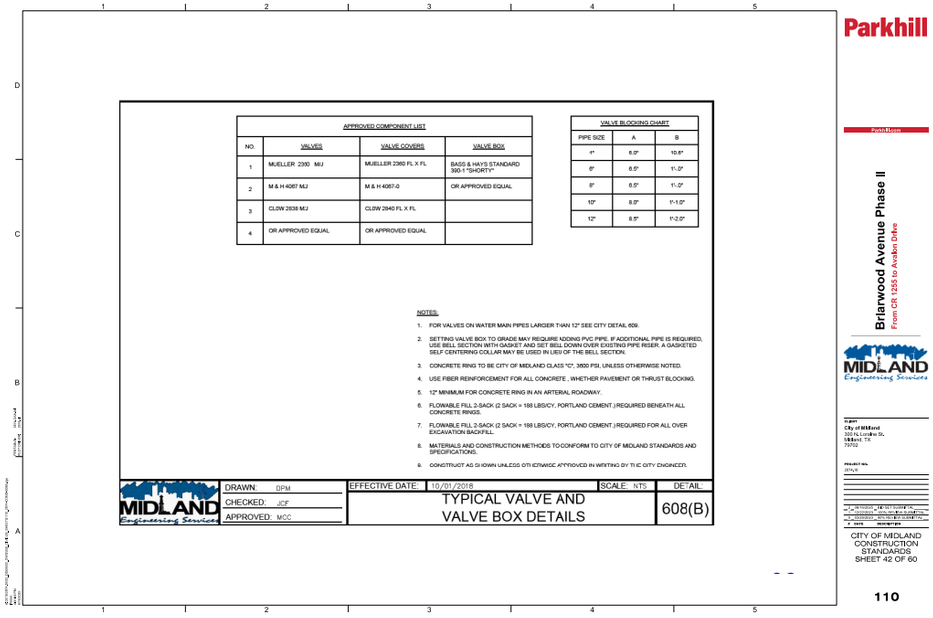
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 41 OF 60

109



APPROVED COMPONENT LIST			
NO.	VALVES	VALVE COVERS	VALVE BOX
1	MUELLER 2360 MJ	MUELLER 2360 FL X FL	BASS & HAYS STANDARD 300-1 "SHORTY"
2	M & H 4067 MJ	M & H 4067-0	OR APPROVED EQUAL
3	CLOW 2838 MJ	CLOW 2840 FL X FL	
4	OR APPROVED EQUAL	OR APPROVED EQUAL	

VALVE BLOCKING CHART		
PIPE SIZE	A	B
4"	6.0"	10.8"
6"	6.5"	1'-0"
8"	6.5"	1'-3"
10"	8.0"	1'-1.5"
12"	8.5"	1'-2.5"

NOTES:

1. FOR VALVES ON WATER MAIN PIPES LARGER THAN 12" SEE CITY DETAIL 609.
2. SETTING VALVE BOX TO GRADE MAY REQUIRE ADDING PVC PIPE. IF ADDITIONAL PIPE IS REQUIRED, USE BELL SECTION WITH GASKET AND SET BELL DOWN OVER EXISTING PIPE RISER. A GASKETED SELF CENTERING COLLAR MAY BE USED IN LIEU OF THE BELL SECTION.
3. CONCRETE RING TO BE CITY OF MIDLAND CLASS "C", 3600 PSI, UNLESS OTHERWISE NOTED.
4. USE FIBER REINFORCEMENT FOR ALL CONCRETE , WHETHER PAVEMENT OR THRUST BLOCKING.
5. 12" MINIMUM FOR CONCRETE RING IN AN ARTERIAL ROADWAY.
6. FLOWABLE FILL 2-SACK (2 SACK = 188 LBS/CY, PORTLAND CEMENT,) REQUIRED BENEATH ALL CONCRETE RINGS.
7. FLOWABLE FILL 2-SACK (2 SACK = 188 LBS/CY, PORTLAND CEMENT,) REQUIRED FOR ALL OVER EXCAVATION BACKFILL.
8. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
9. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JCF	TYPICAL VALVE AND VALVE BOX DETAILS		608(B)
APPROVED: MCC			

Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

Engineering Services

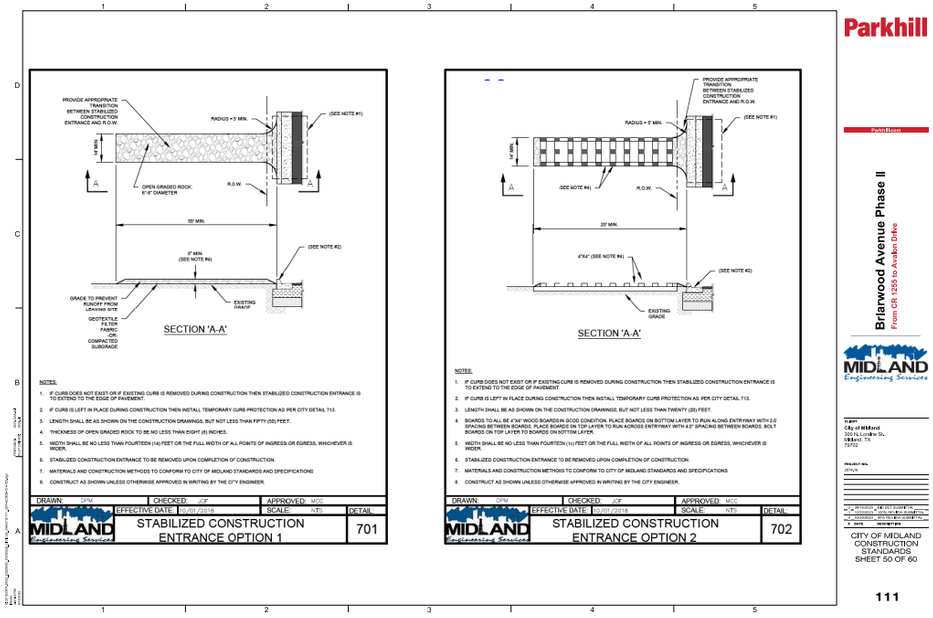
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

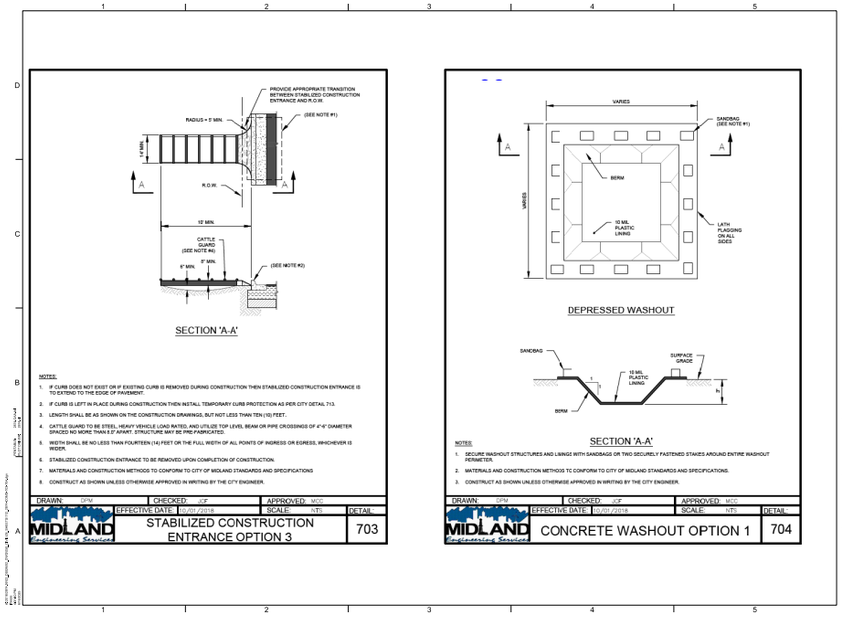
Project No.
007419

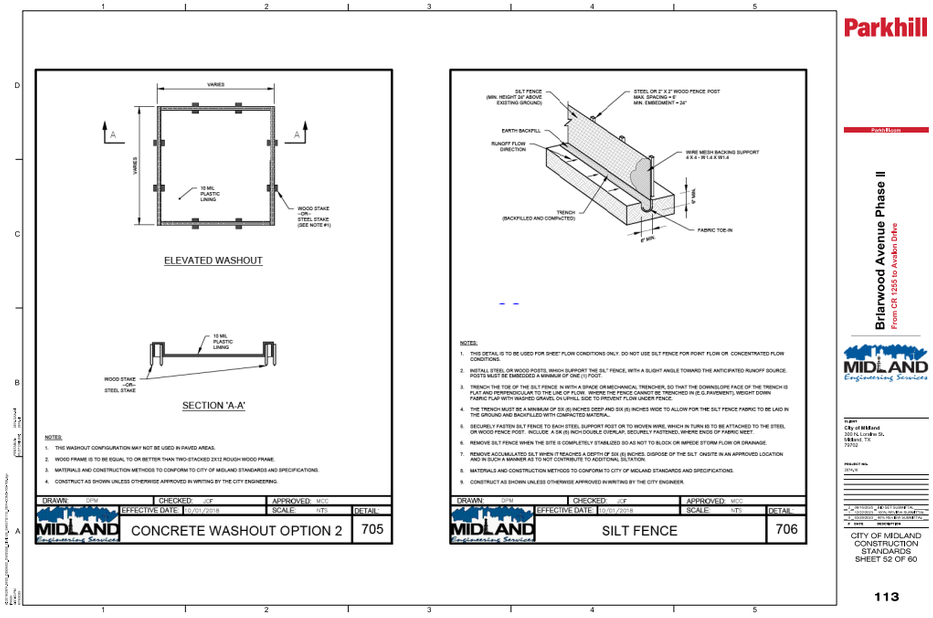
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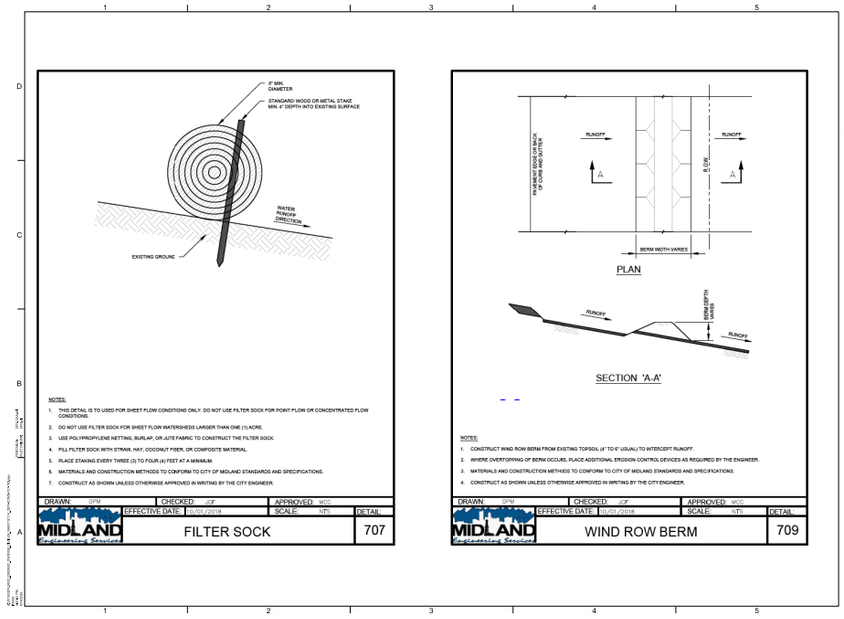
CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 42 OF 60

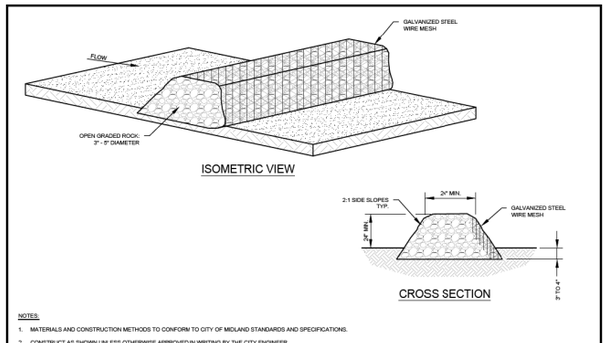
110


PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND R.O.W.
RADIUS = 5' MIN.
(SEE NOTE #1)
6" MIN.
OPEN GRADED ROCK: 6"-8" DIAMETER
R.O.W.
50' MIN.
8" MIN. (SEE NOTE #4)
(SEE NOTE #2)
GRADE TO PREVENT RUNOFF FROM LEAVING SITE
EXISTING GRADE
GEOTEXTILE FILTER FABRIC OR COMPACTED SUBGRADE
SECTION 'A-A'
NOTES:
1. IF CURB DOES NOT EXIST OR IF EXISTING CURB IS REMOVED DURING CONSTRUCTION THEN STABILIZED CONSTRUCTION ENTRANCE IS TO EXTEND TO THE EDGE OF PAVEMENT.
2. IF CURB IS LEFT IN PLACE DURING CONSTRUCTION THEN INSTALL TEMPORARY CURB PROTECTION AS PER CITY DETAIL 713.
3. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN FIFTY (50) FEET.
4. THICKNESS OF OPEN GRADED ROCK TO BE NO LESS THAN EIGHT (8) INCHES.
5. WIDTH SHALL BE NO LESS THAN FOURTEEN (14) FEET OR THE FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS, WHICHEVER IS WIDER.
6. STABILIZED CONSTRUCTION ENTRANCE TO BE REMOVED UPON COMPLETION OF CONSTRUCTION.
7. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS
8. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2019
SCALE: NTS
DETAIL: 701
MIDLAND Engineering Services
STABILIZED CONSTRUCTION ENTRANCE OPTION 1
PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND R.O.W.
RADIUS = 5' MIN.
(SEE NOTE #1)
6" MIN.
(SEE NOTE #4)
R.O.W.
20' MIN.
4"X4" (SEE NOTE #4)
(SEE NOTE #2)
EXISTING GRADE
SECTION 'A-A'
NOTES:
1. IF CURB DOES NOT EXIST OR IF EXISTING CURB IS REMOVED DURING CONSTRUCTION THEN STABILIZED CONSTRUCTION ENTRANCE IS TO EXTEND TO THE EDGE OF PAVEMENT.
2. IF CURB IS LEFT IN PLACE DURING CONSTRUCTION THEN INSTALL TEMPORARY CURB PROTECTION AS PER CITY DETAIL 713.
3. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN TWENTY (20) FEET.
4. BOARDS TO ALL BE 4"X4" WOOD BOARDS IN GOOD CONDITION. PLACE BOARDS ON BOTTOM LAYER TO RUN ALONG ENTRYWAY WITH 2.0 SPACING BETWEEN BOARDS. PLACE BOARDS ON TOP LAYER TO RUN ACROSS ENTRYWAY WITH 4.0" SPACING BETWEEN BOARDS. BOLT BOARDS ON TOP LAYER TO BOARDS ON BOTTOM LAYER.
5. WIDTH SHALL BE NO LESS THAN FOURTEEN (14) FEET OR THE FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS, WHICHEVER IS WIDER.
6. STABILIZED CONSTRUCTION ENTRANCE TO BE REMOVED UPON COMPLETION OF CONSTRUCTION.
7. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS
8. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2019
SCALE: NTS
DETAIL: 702
MIDLAND Engineering Services
STABILIZED CONSTRUCTION ENTRANCE OPTION 2
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND Engineering Services
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702
Project No.
25747
DATE DESCRIPTION
CITY OF MIDLAND CONSTRUCTION STANDARDS
SHEET 50 OF 60
111


PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND R.O.W.
RADIUS = 5' MIN.
(SEE NOTE #1)
4" MIN.
R.O.W.
12' MIN.
CATTLE GUARD (SEE NOTE #4)
6" MIN.
8" MIN.
(SEE NOTE #2)
SECTION 'A-A'
NOTES:
1. IF CURB DOES NOT EXIST OR IF EXISTING CURB IS REMOVED DURING CONSTRUCTION THEN STABILIZED CONSTRUCTION ENTRANCE IS TO EXTEND TO THE EDGE OF PAVEMENT.
2. IF CURB IS LEFT IN PLACE DURING CONSTRUCTION THEN INSTALL TEMPORARY CURB PROTECTION AS PER CITY DETAIL 713.
3. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN TEN (10) FEET.
4. CATTLE GUARD TO BE STEEL, HEAVY VEHICLE LOAD RATED, AND UTILIZE TOP LEVEL BEAM OR PIPE CROSSINGS OF 4"-6" DIAMETER SPACED NO MORE THAN 6" APART. STRUCTURE MAY BE PRE-FABRICATED.
5. WIDTH SHALL BE NO LESS THAN FOURTEEN (14) FEET OR THE FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS, WHICHEVER IS WIDER.
6. STABILIZED CONSTRUCTION ENTRANCE TO BE REMOVED UPON COMPLETION OF CONSTRUCTION.
7. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS
8. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 12/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
STABILIZED CONSTRUCTION ENTRANCE OPTION 3
703
VARIES
SANDBAG (SEE NOTE #1)
BERM
VARIES
10 MIL PLASTIC LINING
LATH FLAGGING ON ALL SIDES
DEPRESSED WASHOUT
SANDBAG
SURFACE GRADE
10 MIL PLASTIC LINING
BERM
SECTION 'A-A'
NOTES:
1. SECURE WASHOUT STRUCTURES AND LININGS WITH SANDBAGS OR TWO SECURELY FASTENED STAKES AROUND ENTIRE WASHOUT PERIMETER.
2. MATERIALS AND CONSTRUCTION METHODS TC CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
3. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 12/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
CONCRETE WASHOUT OPTION 1
704
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND CONSTRUCTION STANDARDS
SHEET 51 OF 60
112


VARIES
VARIES
A
A
10 MIL PLASTIC LINING
WOOD STAKE -OR- STEEL STAKE (SEE NOTE #1)
ELEVATED WASHOUT
10 MIL PLASTIC LINING
WOOD STAKE -OR- STEEL STAKE
SECTION 'A-A'
NOTES:
1. THIS WASHOUT CONFIGURATION MAY NOT BE USED IN PAVED AREAS.
2. WOOD FRAME IS TO BE EQUAL TO OR BETTER THAN TWO-STACKED 2X12 ROUGH WOOD FRAME.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEERING.
DRAWN: DPM
CHECKED: JDF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
CONCRETE WASHOUT OPTION 2
705
SILT FENCE (MIN. HEIGHT 24" ABOVE EXISTING GROUND)
STEEL OR 2" X 2" WOOD FENCE POST MAX. SPACING = 8' MIN. EMBEDMENT = 24"
EARTH BACKFILL
RUNOFF FLOW DIRECTION
WIRE MESH BACKING SUPPORT 6 G A - W 1.4 X W1.4
6" MIN.
TRENCH (BACKFILLED AND COMPACTED)
8" MIN.
FABRIC TOE-IN
NOTES:
1. THIS DETAIL IS TO BE USED FOR SHEET FLOW CONDITIONS ONLY. DO NOT USE SILT FENCE FOR POINT FLOW OR CONCENTRATED FLOW CONDITIONS.
2. INSTALL STEEL OR WOOD POSTS, WHICH SUPPORT THE SILT FENCE, WITH A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POSTS MUST BE EMBEDDED A MINIMUM OF ONE (1) FOOT.
3. TRENCH THE TOE OF THE SILT FENCE IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW. WHERE THE FENCE CANNOT BE TRENCHED IN (E.G.PAVEMENT), WEIGHT DOWN FABRIC FLAP WITH WASHED GRAVEL ON UPHILL SIDE TO PREVENT FLOW UNDER FENCE.
4. THE TRENCH MUST BE A MINIMUM OF SIX (6) INCHES DEEP AND SIX (6) INCHES WIDE TO ALLOW FOR THE SILT FENCE FABRIC TO BE LAID IN THE GROUND AND BACKFILLED WITH COMPACTED MATERIA...
5. SECURELY FASTEN SILT FENCE TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE, WHICH IN TURN IS TO BE ATTACHED TO THE STEEL OR WOOD FENCE POST. INCLUDE A 04 (6) INCH DOUBLE OVERLAP, SECURELY FASTENED, WHERE ENDS OF FABRIC MEET.
6. REMOVE SILT FENCE WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. REMOVE ACCUMULATED SILT WHEN IT REACHES A DEPTH OF SIX (6) INCHES. DISPOSE OF THE SILT ONSITE IN AN APPROVED LOCATION AND IN SUCH A MANNER AS TO NOT CONTRIBUTE TO ADDITIONAL SILTATION.
8. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
9. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JDF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
SILT FENCE
706
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND Engineering Services
client
City of Midland
300 N. Loraine St.
Midland, TX
79702
project no.
DATE
DESCRIPTION
CITY OF MIDLAND CONSTRUCTION STANDARDS SHEET 52 OF 60
113


5" MIN. DIAMETER
STANDARD WOOD OR METAL STAKE MIN. 4" DEPTH INTO EXISTING SURFACE
WATER RUNOFF DIRECTION
EXISTING GROUND
NOTES:
1. THIS DETAIL IS TO USED FOR SHEET FLOW CONDITIONS ONLY. DO NOT USE FILTER SOCK FOR POINT FLOW OR CONCENTRATED FLOW CONDITIONS.
2. DO NOT USE FILTER SOCK FOR SHEET FLOW WATERSHEDS LARGER THAN ONE (1) ACRE.
3. USE POLYPROPYLENE NETTING, BURLAP, OR JUTE FABRIC TO CONSTRUCT THE FILTER SOCK.
4. FILL FILTER SOCK WITH STRAW, HAY, COCONUT FIBER, OR COMPOSITE MATERIAL.
5. PLACE STAKING EVERY THREE (3) TO FOUR (4) FEET AT A MINIMUM.
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JDF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL
FILTER SOCK
707
RUNOFF
PAVEMENT EDGE OR BACK OF CURB AND GUTTER
A
5' TYP.
BERM WIDTH VARIES
PLAN
MAX DEPTH VARIES
SECTION 'A-A'
NOTES:
1. CONSTRUCT WIND ROW BERM FROM EXISTING TOPSOIL (4" TO 6" USUAL) TO INTERCEPT RUNOFF.
2. WHERE OVERTOPPING OF BERM OCCURS, PLACE ADDITIONAL EROSION CONTROL DEVICES AS REQUIRED BY THE ENGINEER.
3. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
4. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
WIND ROW BERM
709
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 53 OF 60
114



ISOMETRIC VIEW

CROSS SECTION

NOTES:

1. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
2. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

MIDLAND Engineering Services	DRAWN: DPM CHECKED: JCF APPROVED: MSC	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL: 708
		ROCK FILTER DAM		

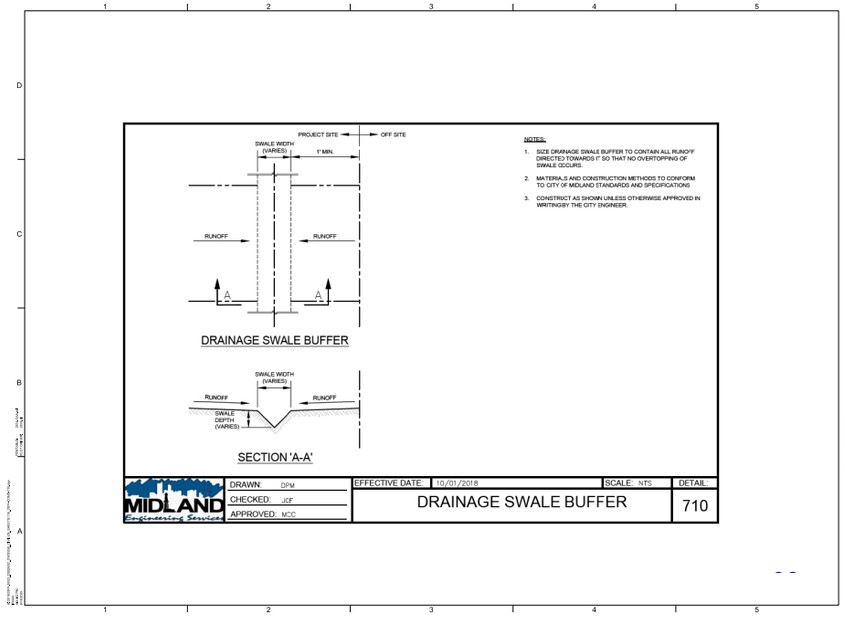
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Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION STANDARDS
SHEET 54 OF 60

115



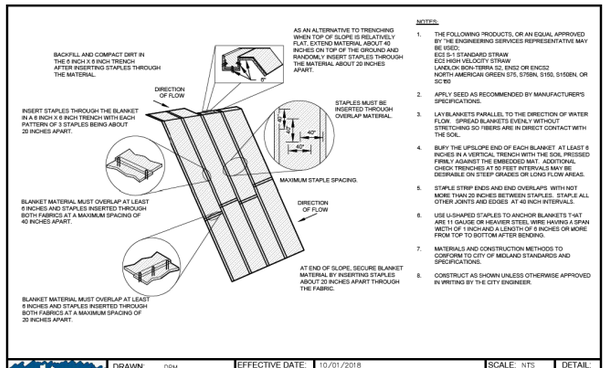
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Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 56 OF 60

116



NOTES:

1. THE FOLLOWING PRODUCTS, OR AN EQUAL APPROVED BY THE ENGINEERING SERVICES REPRESENTATIVE MAY BE USED:
   ECS S-1 STANDARD STRAW
   ECS HIGH VELOCITY STRAW
   LANDLOK BON-TERRA S2, ENS2 OR ENCS2
   NORTH AMERICAN GREEN S75, S75BN, S150, S150BN, OR SC150
2. APPLY SEED AS RECOMMENDED BY MANUFACTURER'S SPECIFICATIONS.
3. LAY BLANKETS PARALLEL TO THE DIRECTION OF WATER FLOW. SPREAD BLANKETS EVENLY WITHOUT STRETCHING SO FIBERS ARE IN DIRECT CONTACT WITH THE SOIL.
4. BURY THE UPSLOPE END OF EACH BLANKET AT LEAST 6 INCHES IN A VERTICAL TRENCH WITH THE SOIL PRESSED FIRMLY AGAINST THE EMBEDDED MAT. ADDITIONAL CHECK TRENCHES AT 50 FEET INTERVALS MAY BE DESIRABLE ON STEEP GRADES OR LONG FLOW AREAS.
5. STAPLE STRIP ENDS AND END OVERLAPS WITH NOT MORE THAN 20 INCHES BETWEEN STAPLES. STAPLE ALL OTHER JOINTS AND EDGES AT 40 INCH INTERVALS.
6. USE U-SHAPED STAPLES TO ANCHOR BLANKETS THAT ARE 11 GAUGE OR HEAVIER STEEL WIRE HAVING A SPAN WIDTH OF 1 INCH AND A LENGTH OF 8 INCHES OR MORE FROM TOP TO BOTTOM AFTER BENDING.
7. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
8. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

DRAWN: DPM	EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL:
CHECKED: JDF	EROSION CONTROL BLANKET AND VEGETATION		711
APPROVED: MSC			

Parkhill

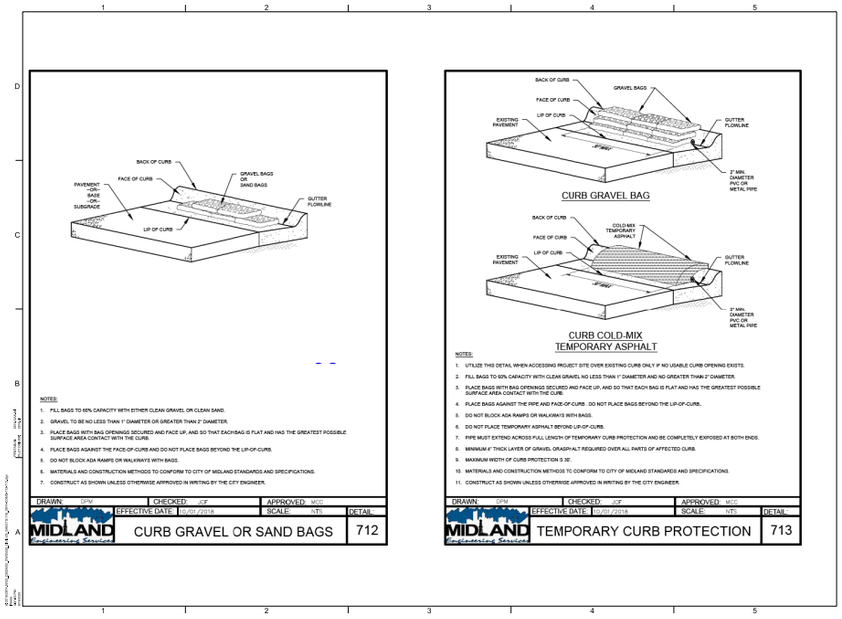
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

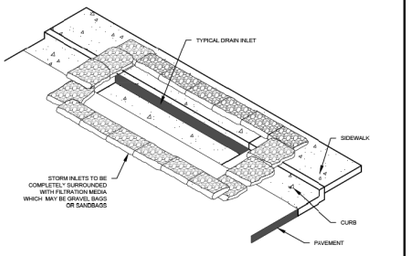
MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 56 OF 60

117


BACK OF CURB
FACE OF CURB
LIP OF CURB
PAVEMENT
OR
BASE
OR
SUBGRADE
GRAVEL BAGS
OR
SAND BAGS
GUTTER
FLOWLINE
NOTES:
1. FILL BAGS TO 60% CAPACITY WITH EITHER CLEAN GRAVEL OR CLEAN SAND.
2. GRAVEL TO BE NO LESS THAN 1" DIAMETER OR GREATER THAN 2" DIAMETER.
3. PLACE BAGS WITH BAG OPENINGS SECURED AND FACE UP, AND SO THAT EACHBAG IS FLAT AND HAS THE GREATEST POSSIBLE SURFACE AREA CONTACT WITH THE CURB.
4. PLACE BAGS AGAINST THE FACE-OF-CURB AND DO NOT PLACE BAGS BEYOND THE LIP-OF-CURB.
5. DO NOT BLOCK ADA RAMPS OR WALKWAYS WITH BAGS.
6. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
7. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
CURB GRAVEL OR SAND BAGS
712
BACK OF CURB
GRAVEL BAGS
FACE OF CURB
LIP OF CURB
EXISTING
PAVEMENT
GUTTER
FLOWLINE
2" MIN.
DIAMETER
PVC OR
METAL PIPE
CURB GRAVEL BAG
BACK OF CURB
COLD-MIX
TEMPORARY
ASPHALT
FACE OF CURB
LIP OF CURB
EXISTING
PAVEMENT
GUTTER
FLOWLINE
2" MIN.
DIAMETER
PVC OR
METAL PIPE
CURB COLD-MIX
TEMPORARY ASPHALT
NOTES:
1. UTILIZE THIS DETAIL WHEN ACCESSING PROJECT SITE OVER EXISTING CURB ONLY IF NO USABLE CURB OPENING EXISTS.
2. FILL BAGS TO 60% CAPACITY WITH CLEAN GRAVEL NO LESS THAN 1" DIAMETER AND NO GREATER THAN 2" DIAMETER.
3. PLACE BAGS WITH BAG OPENINGS SECURED AND FACE UP, AND SO THAT EACH BAG IS FLAT AND HAS THE GREATEST POSSIBLE SURFACE AREA CONTACT WITH THE CURB.
4. PLACE BAGS AGAINST THE PIPE AND FACE-OF-CURB . DO NOT PLACE BAGS BEYOND THE LIP-OF-CURB.
5. DO NOT BLOCK ADA RAMPS OR WALKWAYS WITH BAGS.
6. DO NOT PLACE TEMPORARY ASPHALT BEYOND LIP-OF-CURB.
7. PIPE MUST EXTEND ACROSS FULL LENGTH OF TEMPORARY CURB PROTECTION AND BE COMPLETELY EXPOSED AT BOTH ENDS.
8. MINIMUM 4" THICK LAYER OF GRAVEL OR ASPH ALT REQUIRED OVER ALL PARTS OF AFFECTED CURB.
9. MAXIMUM WIDTH OF CURB PROTECTION S 30'.
10. MATERIALS AND CONSTRUCTION METHODS TC CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS.
11. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.
DRAWN: DPM
CHECKED: JCF
APPROVED: MCC
EFFECTIVE DATE: 10/01/2018
SCALE: NTS
DETAIL:
MIDLAND Engineering Services
TEMPORARY CURB PROTECTION
713
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND Engineering Services
City of Midland
300 N. Loraine St.
Midland, TX
79702
CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 57 OF 60
118



GRAVEL BAGS OR SANDBAGS

NOTES:

1. FILL BAGS TO 60% CAPACITY WITH CLEAN GRAVEL OR CLEAN SAND.
2. PLACE BAGS WITH BAG OPENINGS SECURED AND FACE UP, AND SO THAT EACH BAG IS FLAT AND HAS THE GREATEST POSSIBLE SURFACE AREA CONTACT WITH THE SURFACE.
3. GRAVEL TO BE NO LESS THAN 1" DIAMETER OR GREATER THAN 2" DIAMETER.
4. MATERIALS AND CONSTRUCTION METHODS TO CONFORM TO CITY OF MIDLAND STANDARDS AND SPECIFICATIONS
5. CONSTRUCT AS SHOWN UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER.

DRAWN: DPM	CHECKED: JCF	APPROVED: MCC
EFFECTIVE DATE: 10/01/2018	SCALE: NTS	DETAIL: 714

CURB INLET PROTECTION

Parkhill

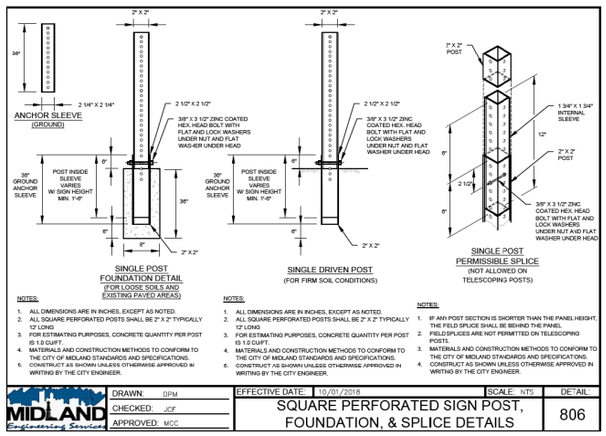
Briarwood Avenue Phase II
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

CITY OF MIDLAND
CONSTRUCTION
STANDARDS
SHEET 58 OF 60

119



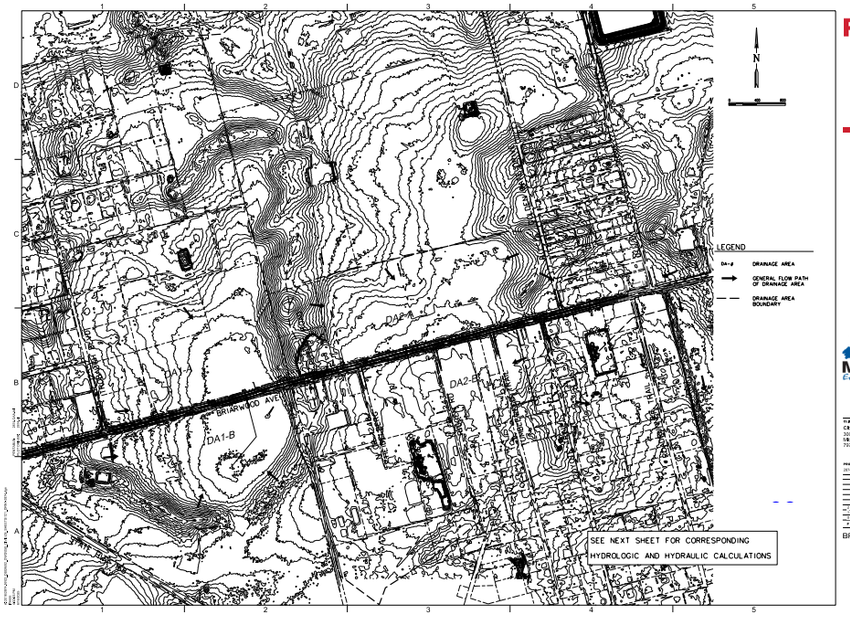
Parkhill

Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

CITY OF MIDLAND
CONSTRUCTION STANDARDS
SHEET 59 OF 60

120



Parkhill

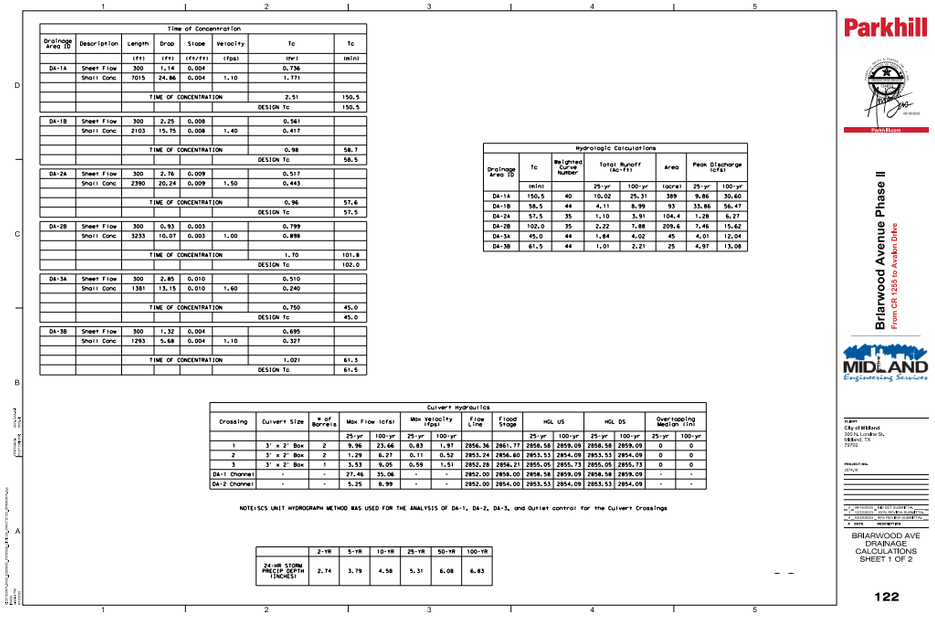
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE DRAINAGE AREA MAP

121



Time of Concentration

Drainage Area ID	Description	Length	Drop	Slope	Velocity	Tc	Tc
		(ft)	(ft)	(ft/ft)	(fps)	(hr)	(min)
DA-1A	Sheet Flow	300	1.14	0.004		0.736	
	Shall Conc	7015	24.86	0.004	1.10	1.771	
				TIME OF CONCENTRATION		2.51	150.5
						DESIGN Tc	150.5
DA-1B	Sheet Flow	300	2.25	0.008		0.561	
	Shall Conc	2103	15.75	0.008	1.40	0.417	
				TIME OF CONCENTRATION		0.98	58.7
						DESIGN Tc	58.5
DA-2A	Sheet Flow	300	2.76	0.009		0.517	
	Shall Conc	2390	20.24	0.009	1.50	0.443	
				TIME OF CONCENTRATION		0.96	57.6
						DESIGN Tc	57.5
DA-2B	Sheet Flow	300	0.93	0.003		0.799	
	Shall Conc	3233	10.07	0.003	1.00	0.898	
				TIME OF CONCENTRATION		1.70	101.8
						DESIGN Tc	102.0
DA-3A	Sheet Flow	300	2.85	0.010		0.510	
	Shall Conc	1381	13.15	0.010	1.60	0.240	
				TIME OF CONCENTRATION		0.750	45.0
						DESIGN Tc	45.0
DA-3B	Sheet Flow	300	1.32	0.004		0.695	
	Shall Conc	1293	5.68	0.004	1.10	0.327	
				TIME OF CONCENTRATION		1.021	61.3
						DESIGN Tc	61.5

Hydrologic Calculations

Drainage Area ID	Tc	Weighted Curve Number	Total Runoff (Ac-ft)		Area	Peak Discharge (cfs)	
	(min)		25-yr	100-yr	(acres)	25-yr	100-yr
DA-1A	150.5	40	10.02	25.31	389	9.86	30.60
DA-1B	58.5	44	4.11	8.99	93	33.86	56.47
DA-2A	57.5	35	1.10	3.91	104.4	1.28	6.27
DA-2B	102.0	35	2.22	7.88	209.6	7.45	15.62
DA-3A	45.0	44	1.84	4.02	45	4.01	12.04
DA-3B	61.5	44	1.01	2.21	25	4.97	13.08

Culvert Hydraulics

Crossing	Culvert Size	# of Barrels	Max Flow (cfs)		Max Velocity (fps)		Flow Line	Flood Stage	HGL US		HGL DS		Overtopping Section (ft)	
			25-yr	100-yr	25-yr	100-yr			25-yr	100-yr	25-yr	100-yr	25-yr	100-yr
1	3' x 2' Box	2	9.96	23.66	0.83	1.97	2856.36	2861.77	2858.58	2859.09	2858.58	2859.09	0	0
2	3' x 2' Box	2	1.29	6.27	0.11	0.52	2853.24	2856.60	2853.53	2854.09	2853.53	2854.09	0	0
3	3' x 2' Box	1	3.53	9.05	0.59	1.51	2852.28	2856.21	2855.05	2855.73	2855.05	2855.73	0	0
DA-1 Channel		-	-	27.46	35.06	-	-	2852.00	2858.00	2858.58	2859.09	2858.58	2859.09	-	-
DA-2 Channel		-	-	5.25	8.99	-	-	2852.00	2854.00	2853.53	2854.09	2853.53	2854.09	-	-

NOTE:SCS UNIT HYDROGRAPH METHOD WAS USED FOR THE ANALYSIS OF DA-1, DA-2, DA-3, and Outlet control for the Culvert Crossings

	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
24-HR STORM PRECIP DEPTH (INCHES)	2.74	3.79	4.58	5.31	6.08	6.83

Parkhill

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

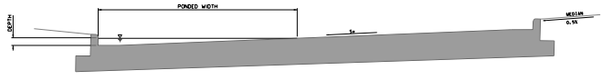
BRIARWOOD AVE
DRAINAGE
CALCULATIONS
SHEET 1 OF 2

122

PONDED WIDTH CALCULATIONS (LEFT AND RIGHT GUTTER)

STA.	to/from	STA.	Area (AC)	CONTRIBUTING AREA	Q10 (CFS)	Q100 (CFS)	MANNING'S n	Sx (FT/FT)	S (FT/FT)	10-YR PONDED DEPTH (FT)	10-YR PONDED WIDTH (FT)	100-YR PONDED DEPTH (FT)	100-YR PONDED WIDTH (FT)
152+27	from	151+00	1.23	ROW/PAVE	3.80	10.32	0.22	0.02	0.0033	0.41	30.7	0.49	39.07
151+62	to	149+37	1.23	ROW/PAVE	3.80	10.32	0.22	0.02	0.0050	0.36	23.4	0.44	33.07
149+77	from	152+80	0.16	PAVE	1.21	2.27	0.22	0.02	0.0037	0.25	10.1	0.29	14.48
150+82	to	152+31	0.21	PAVE	1.24	2.83	0.22	0.02	0.0064	0.25	10.1	0.29	11.97
153+17	from	149+55	1.26	ROW/PAVE	3.44	11.24	0.22	0.02	0.0119	0.22	10.9	0.27	18.51
151+62	to	149+37	1.23	ROW/PAVE	3.80	10.32	0.22	0.02	0.0050	0.36	23.4	0.44	33.07
151+25	to	151+00	0.03	ROW/PAVE	0.26	1.26	0.22	0.02	0.0033	0.22	10.2	0.26	15.90
151+25	to	152+83	0.76	ROW/PAVE	0.94	4.87	0.22	0.02	0.0033	0.31	20.7	0.38	34.73
151+84	to	152+80	0.76	ROW/PAVE	0.94	4.87	0.22	0.02	0.0033	0.31	20.7	0.38	34.73
172+80	from	169+72	1.42	ROW/PAVE	1.49	13.31	0.22	0.02	0.0052	0.44	23.1	0.49	25.81
167+71	to	169+72	1.11	ROW/PAVE	3.81	11.50	0.22	0.02	0.0104	0.41	30.3	0.48	43.90
169+10	from	164+90	0.72	ROW/PAVE	1.21	7.29	0.22	0.02	0.0051	0.21	10.8	0.25	17.42

NOTES: HEIGHT OF CURB = 6" ABOVE LIP 7" ABOVE GUTTER
MAX ALLOW PONDED DEPTH = APPRX. 0.58'
S = LONGITUDINAL SLOPE
Sx = PAVEMENT CROSS SLOPE



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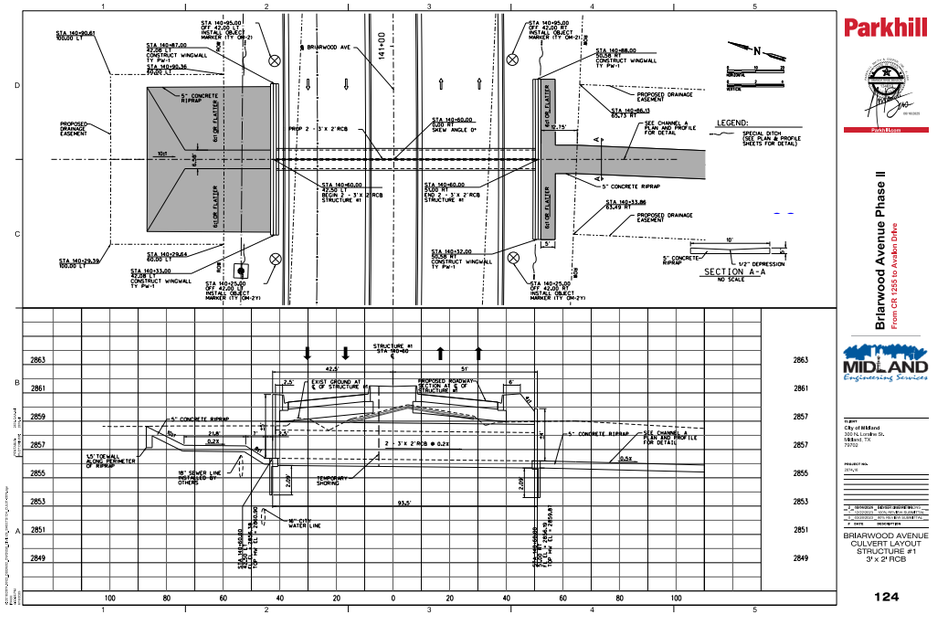
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
DRAINAGE
CALCULATIONS
SHEET 2 OF 2

123



Parkhill

Briarwood Avenue Phase II

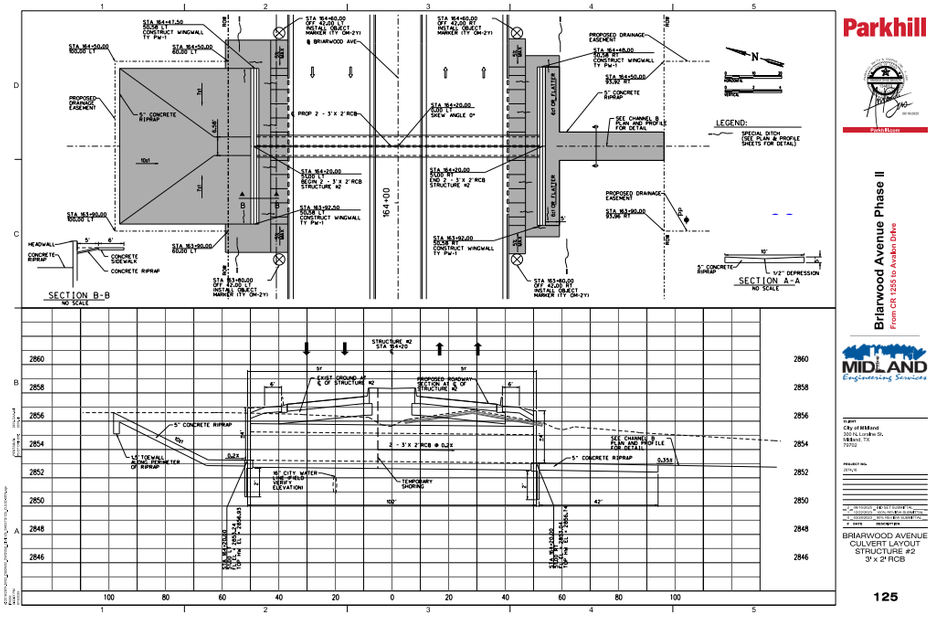
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79701

BRIARWOOD AVENUE
CULVERT LAYOUT
STRUCTURE #1
3' x 2' RCB

124



Parkhill

Briarwood Avenue Phase II

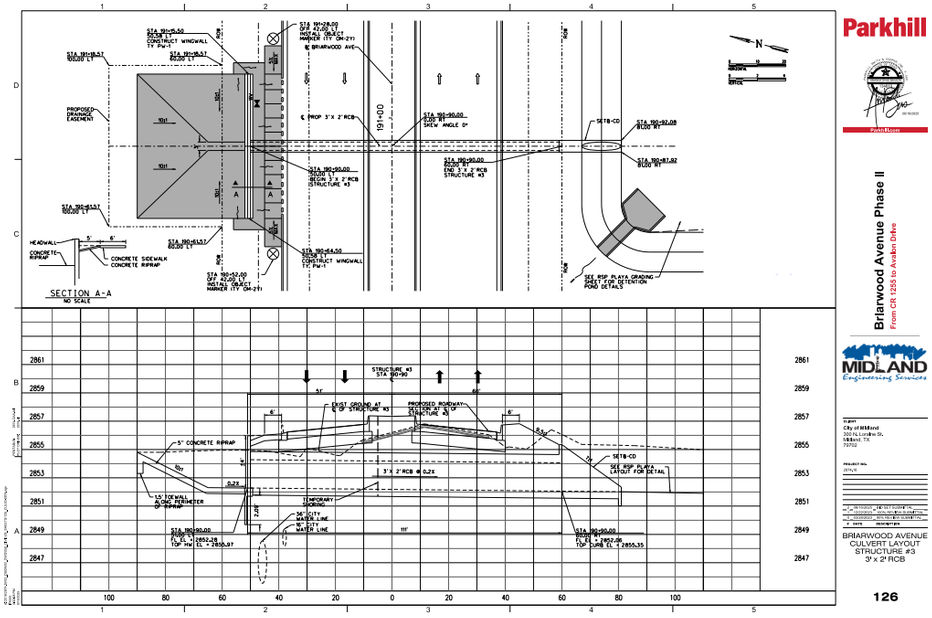
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79701

BRIARWOOD AVENUE
CULVERT LAYOUT
STRUCTURE #2
3' x 2' RCB

125



Parkhill

Briarwood Avenue Phase II

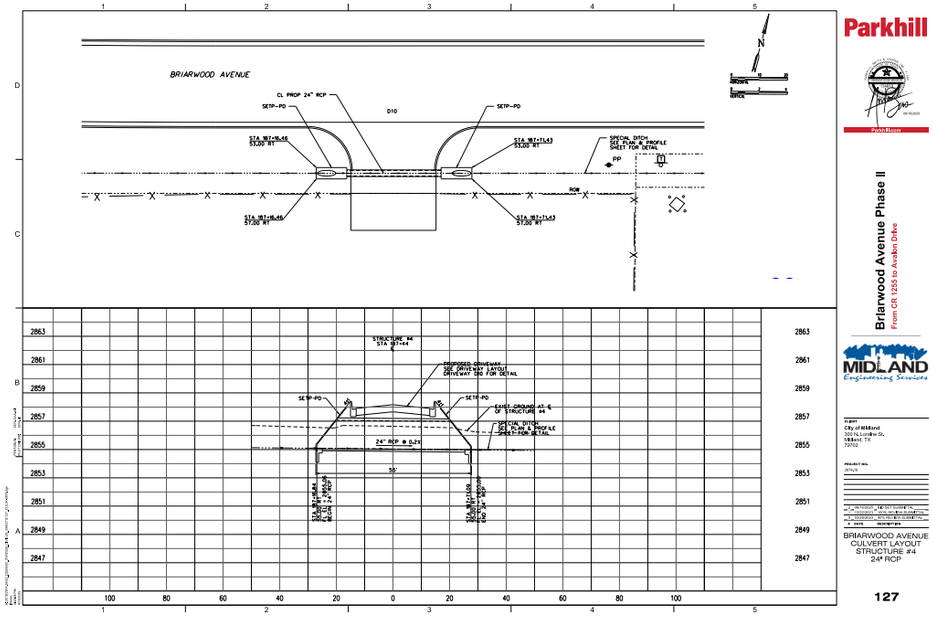
From CR 1255 to Avalon Drive

MIDLAND
Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79701

BRIARWOOD AVENUE
CULVERT LAYOUT
STRUCTURE #3
3' x 2' RCB

126



Parkhill

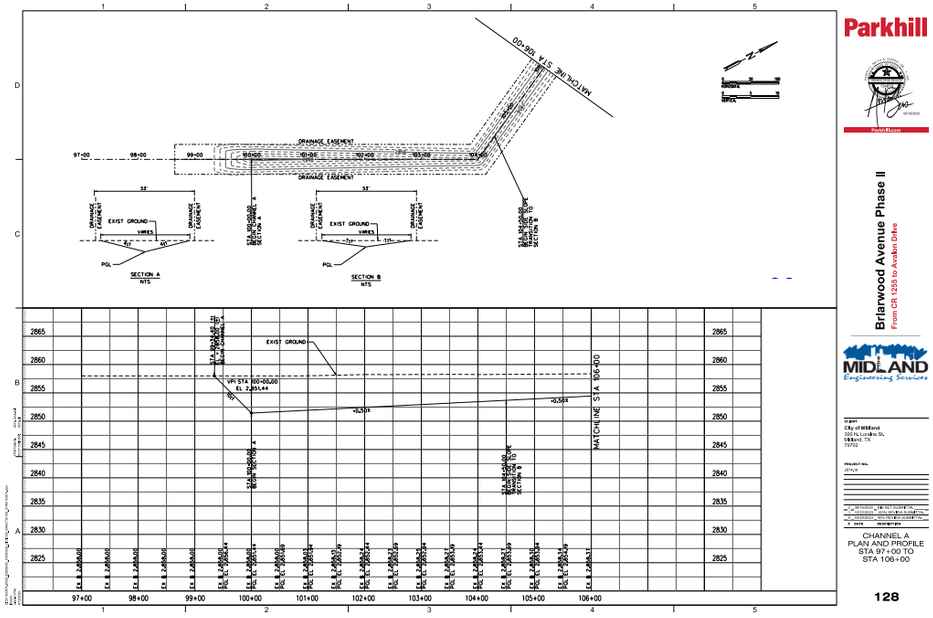
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
CULVERT LAYOUT
STRUCTURE #4
24" RCP

127



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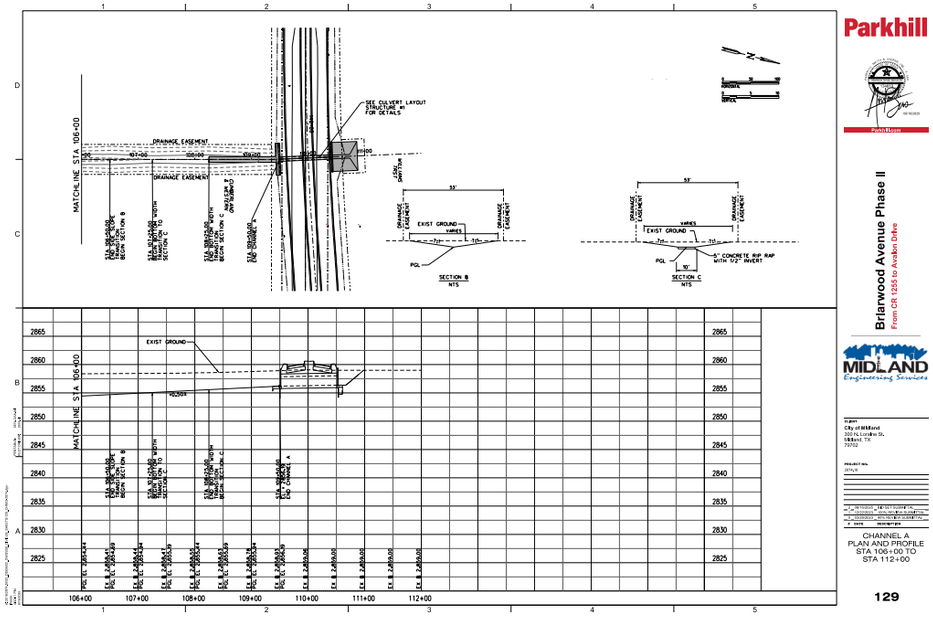
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CHANNEL A
PLAN AND PROFILE
STA 97+00 TO
STA 106+00

128



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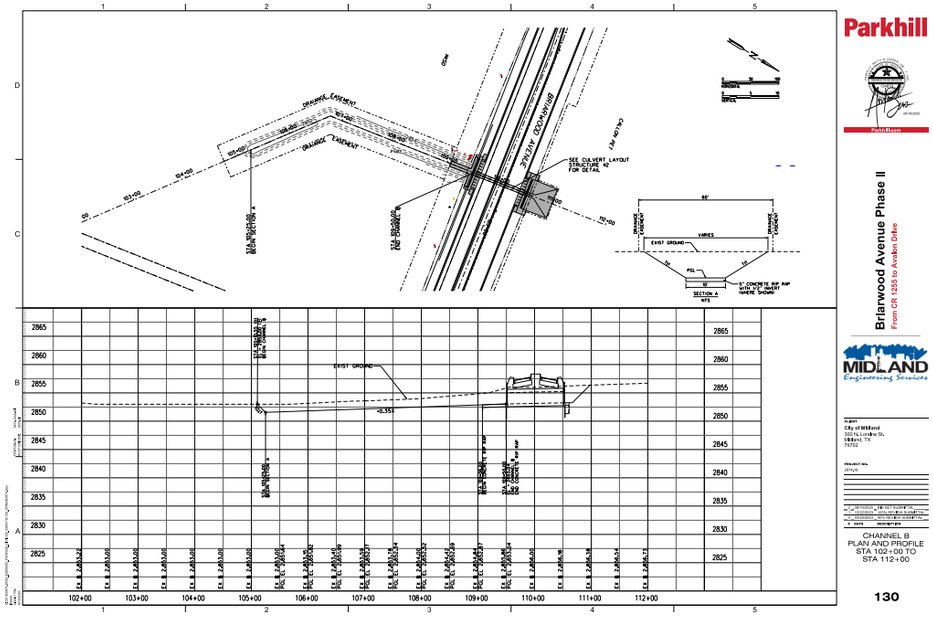
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CHANNEL A
PLAN AND PROFILE
STA 106+00 TO
STA 112+00

129



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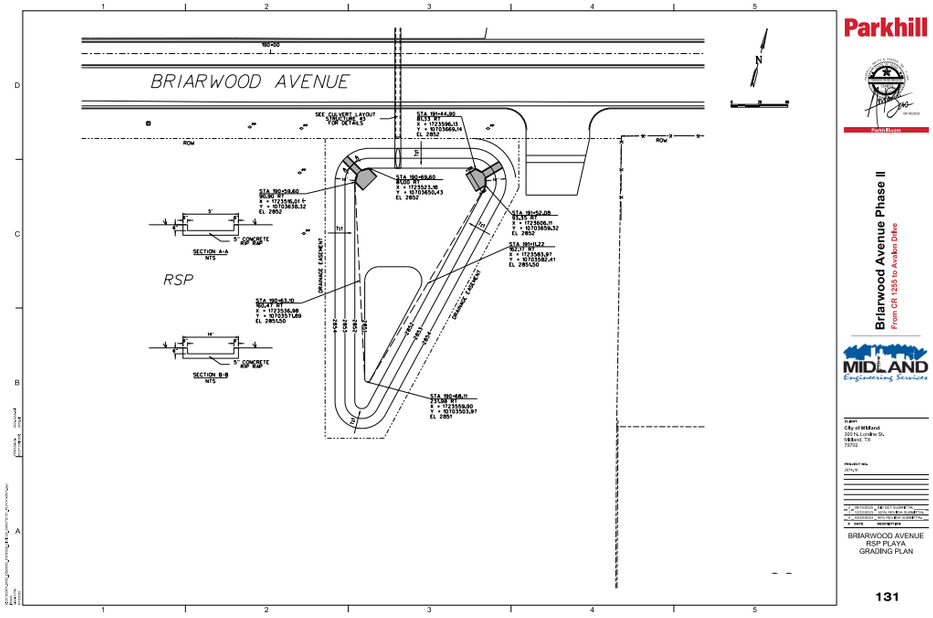
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

CHANNEL B
PLAN AND PROFILE
STA 102+00 TO
STA 112+00

130



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John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND
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City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
RSP PLAYA
GRADING PLAN

131

Culvert Station and/or Creek Name Followed by applicable end (LI, RI, or Both)	Description of Box Culvert No. Spans - Span X Height	Bar Fill Height (Ft)	Applicable Box Culvert Standard (1)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Extrened Curb Height (Ft)	Hw (2) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Haw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (CY)	Class "C" Conc (Wingwall) (CY) (3)	Total Wingwall Area (SF)
Structure #1 STA 140+60 (LT)	2 – 3' x 2'	3'	MC-3-23	PW-1	0°	6:1	8"	7"	2.000'	4.667'	N/A	N/A	22.000'	7.750'	N/A	0.0	0.6	19.2	267
Structure #1 STA 140+60 (RT)	2 – 3' x 2'	3'	MC-3-23	PW-1	0°	6:1	8"	7"	1.000'	3.667'	N/A	N/A	22.000'	7.750'	N/A	0.0	0.3	12.3	181
Structure #2 STA 184+20 (Both)	2 – 3' x 2'	3'	MC-3-23	PW-1	0°	6:1	8"	7"	1.000'	3.667'	N/A	N/A	22.000'	7.750'	N/A	0.0	0.6	24.6	322
Structure #3 STA 190+90 (LT)	1 – 3' x 2'	3'	SCC•3&4	PW-1	0°	6:1	6"	7"	1.000'	3.667'	N/A	N/A	22.000'	4.167'	N/A	0.0	0.2	12.0	181
Structure #3 STA 190+90 (RT)	1 – 3' x 2'	3'	SCC•3&4	SETB•CO	0°	6:1	8"	7"	0.750'	3.167'	N/A	N/A	17.000'	N/A	4.167'	0.0	0.1	2.9	N/A

NOTES:
Skew = 0° on SW-0, FW-0, SETB-CO, SETB-SW-0, and SETB-FW-0 standard sheets;
30° minimum for safety end treatment.

SL:1 = Horizontal : 1 Vertical
- Side slope at culvert for flared or straight wingwalls.
- Channel slope for parallel wingwalls.
- Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Ahw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Ahw = Length of anchor toewall (applicable to safety end treatment only)
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (BCRM) standard sheet, the volume shown in the table is increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to furnish precast culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

Texas Department of Transportation

Bridge Division Standard

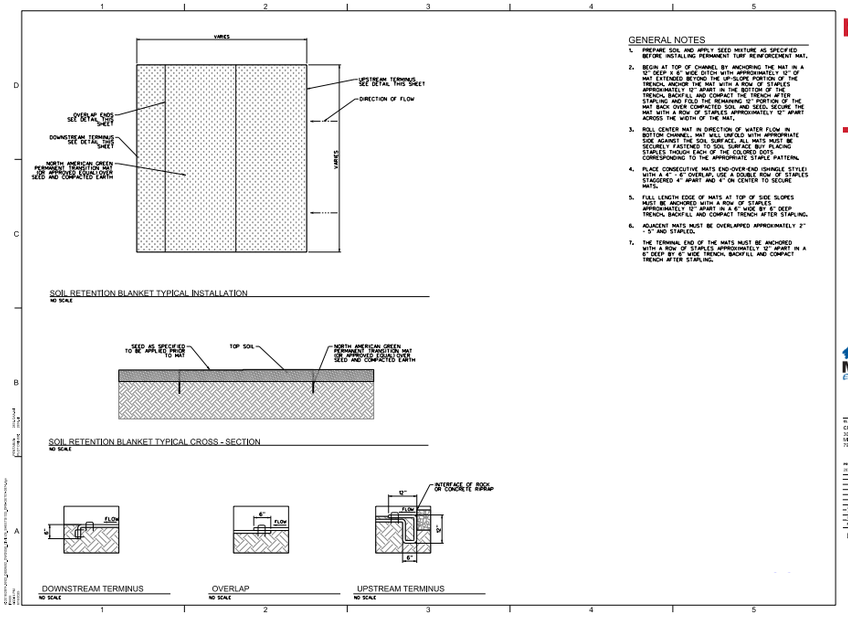
BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcs-bw-23-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.
				132

PRELIMINARY
This draft has not been submitted to the Texas Engineering Practice Act. Do not use for construction purposes.
Texas Department of Transportation is not responsible for any use of this preliminary draft.

DATE:
FILE:



GENERAL NOTES

1. PREPARE SOIL AND APPLY SEED MIXTURE AS SPECIFIED BEFORE INSTALLING PERMANENT TURF REINFORCEMENT MAT.
2. BEGIN AT TOP OF CHANNEL BY ANCHORING THE MAT IN A 12" DEEP X 6" WIDE DITCH WITH APPROXIMATELY 12" OF MAT EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE MAT WITH A ROW OF STAPLES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING AND FOLD THE REMAINING 12" PORTION OF THE MAT BACK OVER COMPACTED SOIL AND SEED. SECURE THE MAT WITH A ROW OF STAPLES APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE MAT.
3. ROLL CENTER MAT IN DIRECTION OF WATER FLOW IN BOTTOM CHANNEL. MAT WILL UNFOLD WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL MATS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES IN APPROPRIATE LOCATIONS AS SHOWN AND CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. PLACE CONSECUTIVE MATS END-OVER-END (SHINGLE STYLE) WITH A 4" - 6" OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER TO SECURE MATS.
5. FULL LENGTH EDGE OF MATS AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES APPROXIMATELY 12" APART IN A 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT TRENCH AFTER STAPLING.
6. ADJACENT MATS MUST BE OVERLAPPED APPROXIMATELY 2" - 5" AND STAPLED.
7. THE TERMINAL END OF THE MATS MUST BE ANCHORED WITH A ROW OF STAPLES APPROXIMATELY 12" APART IN A 6" DEEP BY 6" WIDE TRENCH. BACKFILL AND COMPACT TRENCH AFTER STAPLING.

Parkhill

John Rowe

Briarwood Avenue Phase II

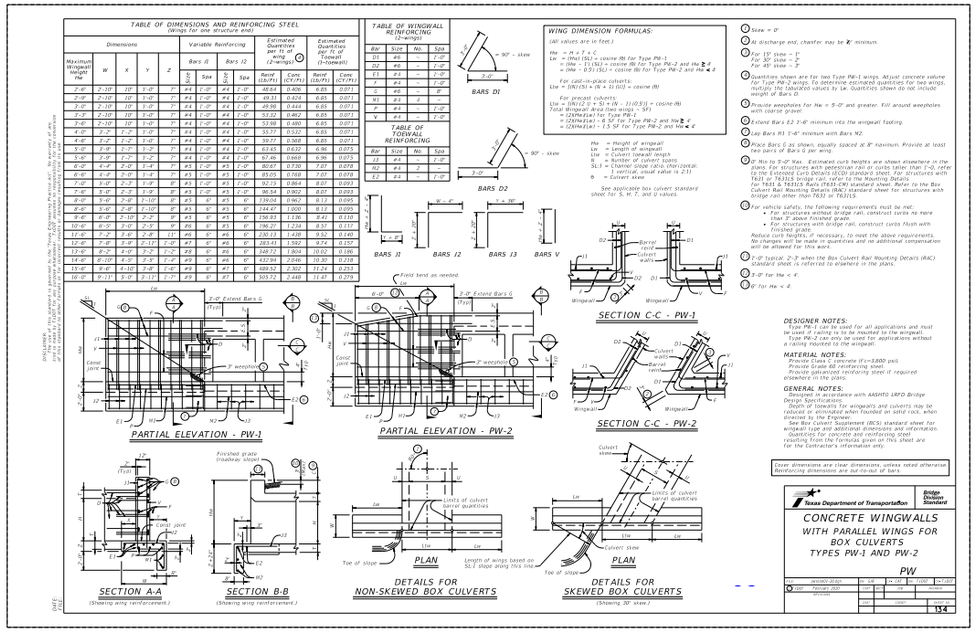
From CR 1250 to Avalon Drive

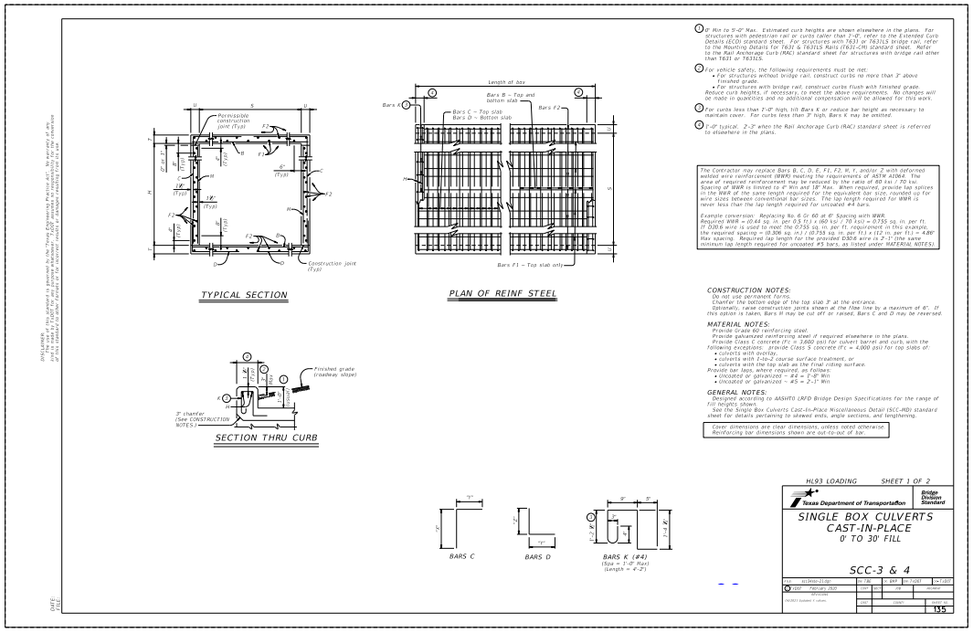
MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

DRAINAGE DETAILS
STONE RIPRAP
&
SOIL RETENTION BLANKET

133


TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)
TABLE OF WINGWALL REINFORCING
(2 wings)
TABLE OF TOEWALL REINFORCING
WING DIMENSION FORMULAS:
DESIGNER NOTES:
MATERIAL NOTES:
GENERAL NOTES:
PARTIAL ELEVATION - PW-1
PARTIAL ELEVATION - PW-2
SECTION C-C - PW-1
SECTION C-C - PW-2
SECTION A-A
SECTION B-B
PLAN
DETAILS FOR NON-SKEWED BOX CULVERTS
DETAILS FOR SKEWED BOX CULVERTS
CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR
BOX CULVERTS
TYPES PW-1 AND PW-2
PW
Texas Department of Transportation
Bridge Division Standard
134



0' Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail on curbs taller than 3'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Extended Curb Details (ECD) standard sheet. For structures with bridge rail other than T631 or T631LS, refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

For curbs less than 2'-0" high, bilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3' high, Bars K may be omitted.

1'-0" typical. 2'-2" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, H, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Provide WWR with the longest wires in the direction of the principal bar. Splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR.
Required WWR = (0.44 sq. in. per ft) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft) x (12 in. per ft) = 4.86" Max spacing. Required lap length for the provided D306 wire is 7'-1" (the same minimum lap length required for uncoated #3 bars, as listed under MATERIAL NOTES).

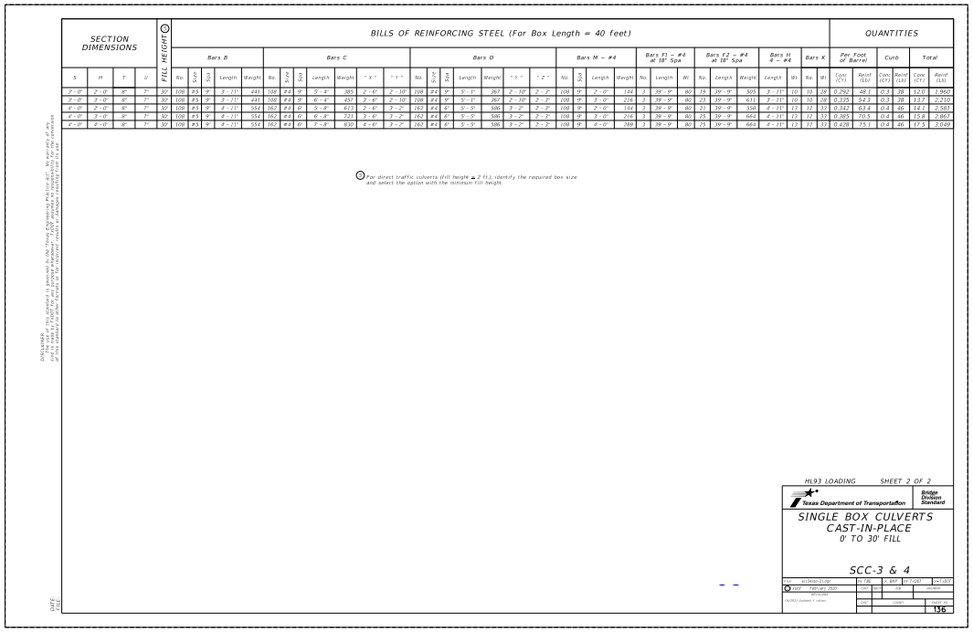
CONSTRUCTION NOTES:
Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the fillet line by a maximum of 6". If this option is taken, Bars H may be cut off or raised, Bars C and D may be reversed.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class S concrete (f'c = 4,500 psi) for the top slab, wingwalls and apron and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 2-lift-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide the following minimum bar coating:
- Uncoated or galvanized – #4 and #5 Min
- Uncoated or galvanized – #6 – 2-1" Min

GENERAL NOTES:
Design is according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
See the Single Box Culverts Cast-In-Place Miscellaneous Detail (SCC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



SECTION DIMENSIONS

S	H	T	U
2'-0"	2'-0"	8"	7"
2'-0"	3'-0"	8"	7"
2'-0"	4'-0"	8"	7"
2'-0"	5'-0"	8"	7"
2'-0"	6'-0"	8"	7"
2'-0"	7'-0"	8"	7"

FILL HEIGHT ①

BILLS OF REINFORCING STEEL (For Box Length = 40 feet)

Bars B					Bars C						Bars D						Bars M — #4				Bars F1 — #4 at 18" Spa		Bars F2 — #4 at 18" Spa		Bars H 4 — #4		Bars X		QUANTITIES Per Foot of Barrel		Curb	Total	
No.	Size (in)	Size (US)	Length	Weight	No.	Size (in)	Size (US)	Length	Weight	"X"	"Y"	No.	Size (in)	Size (US)	Length	Weight	"Y"	"Z"	No.	Size (US)	Length	Wt.	No.	Length	Weight	Length	Wt.	No.	Wt.	Conc (CY)	Reinf (LB)	Conc (CY)	Reinf (LB)	Conc (CY)	Reinf (LB)
108	#5	5	7'-11"	441	108	#8	8	5'-4"	305	2'-6"	2'-10"	108	#4	4	5'-5"	367	2'-10"	2'-3"	108	5	2'-0"	144	3	39'-9"	80	39'-9"	505	9'-11"	10	10	0.292	48.1	0.3	28	12.0	1,960
108	#5	5	7'-11"	441	108	#8	8	6'-4"	457	3'-6"	2'-10"	108	#4	4	5'-5"	367	2'-10"	2'-3"	108	5	2'-0"	216	3	39'-9"	80	39'-9"	611	9'-11"	10	10	0.325	54.3	0.3	28	13.7	2,210
108	#5	5	7'-11"	554	162	#8	8	5'-8"	423	2'-6"	3'-2"	162	#4	4	5'-5"	506	3'-2"	2'-3"	108	5	2'-0"	144	3	39'-9"	80	39'-9"	558	9'-11"	15	15	0.362	63.4	0.4	46	14.1	2,581
108	#5	5	7'-11"	554	162	#8	8	6'-8"	711	3'-6"	3'-2"	162	#4	4	5'-5"	506	3'-2"	2'-3"	108	5	2'-0"	216	3	39'-9"	80	39'-9"	664	9'-11"	15	15	0.385	70.5	0.4	46	15.8	2,867
108	#5	5	7'-11"	554	162	#8	8	7'-8"	830	4'-6"	3'-2"	162	#4	4	5'-5"	506	3'-2"	2'-3"	108	5	2'-0"	288	3	39'-9"	80	39'-9"	664	9'-11"	15	15	0.428	75.1	0.4	46	17.5	3,049

QUANTITIES

① For direct traffic culverts (Fill height ≤ 2 Ft.), identify the required box size and select the option with the minimum Fill height.

DESIGNED
DETAILED
CHECKED
QUANTITIES
CHECKED
DATE 3-20

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS
CAST-IN-PLACE
0' TO 30' FILL

SCC-3 & 4

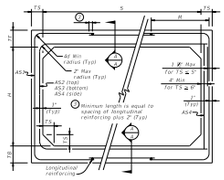
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REVISIONS		DIST	COUNTY		
08-22 Updated to current standards					SHEET NO. 136

BOX DATA

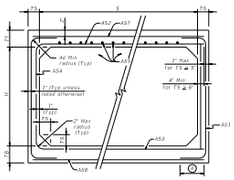
SECTION DIMENSIONS					Fill Height	W (min)	REINFORCING (sq. in. / ft.) ①						② Add. Weight
S (ft.)	H (ft.)	T1 (in.)	T2 (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
3	2	7	6	4	< 2	-	0.17	0.25	0.16	0.10	0.17	0.17	0.14	3.3
3	2	4	4	4	2 < 3	31	0.13	0.19	0.16	0.10	-	-	-	2.4
3	2	4	4	4	3 < 5	31	0.10	0.11	0.12	0.10	-	-	-	2.4
3	2	4	4	4	10	31	0.10	0.10	0.10	0.10	-	-	-	2.4
3	2	4	4	4	15	31	0.10	0.13	0.13	0.10	-	-	-	2.4
3	2	4	4	4	20	31	0.11	0.17	0.17	0.10	-	-	-	2.4
3	2	4	4	4	25	31	0.14	0.21	0.21	0.10	-	-	-	2.4
3	2	4	4	4	30	31	0.17	0.25	0.25	0.10	-	-	-	2.4
3	2	4	4	4	35	31	0.20	0.29	0.30	0.10	-	-	-	2.4
3	3	7	6	4	< 2	-	0.17	0.27	0.17	0.10	0.17	0.17	0.14	3.7
3	3	4	4	4	2 < 3	31	0.10	0.22	0.21	0.10	-	-	-	2.8
3	3	4	4	4	3 < 5	31	0.10	0.14	0.14	0.10	-	-	-	2.8
3	3	4	4	4	10	31	0.10	0.11	0.11	0.10	-	-	-	2.8
3	3	4	4	4	15	31	0.10	0.14	0.15	0.10	-	-	-	2.8
3	3	4	4	4	20	31	0.10	0.18	0.19	0.10	-	-	-	2.8
3	3	4	4	4	25	31	0.10	0.23	0.23	0.10	-	-	-	2.8
3	3	4	4	4	30	31	0.12	0.27	0.28	0.10	-	-	-	2.8
3	3	4	4	4	35	31	0.14	0.32	0.32	0.10	-	-	-	2.8

① For box length = 8'-0"

② AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.

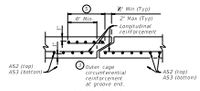


FILL HEIGHT 2 FT. AND GREATER



FILL HEIGHT LESS THAN 2 FT.

② Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Widening top slab detail, KEY joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f'c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard for wing, headwall, and flared end details.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

3'-0" SPAN

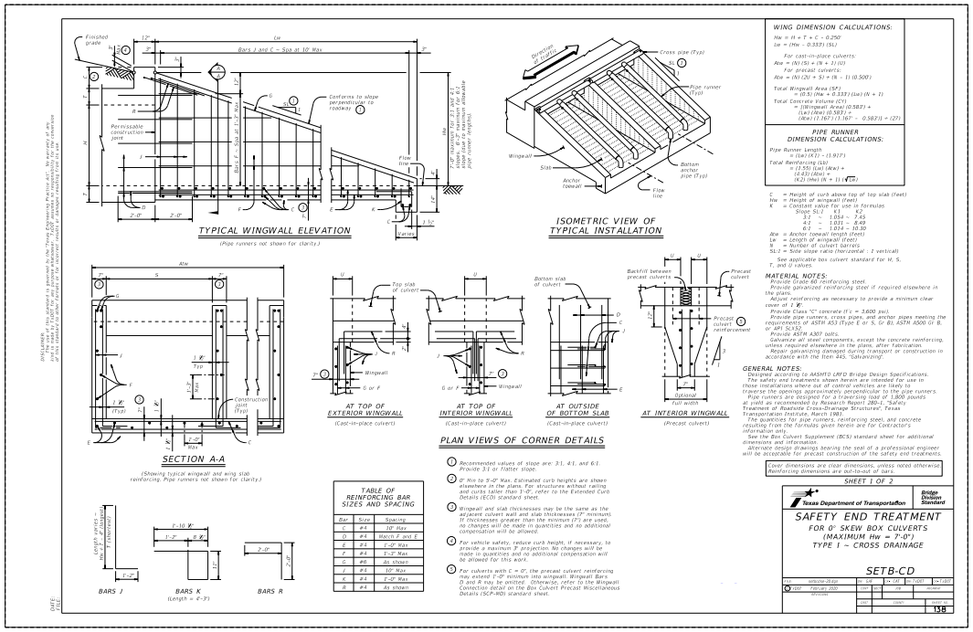
SCP-3

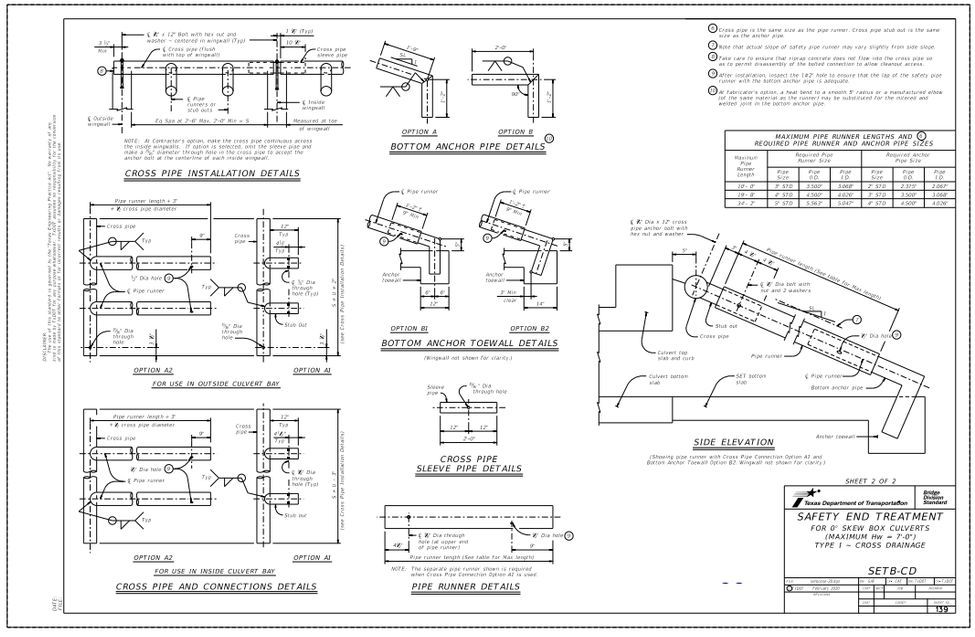
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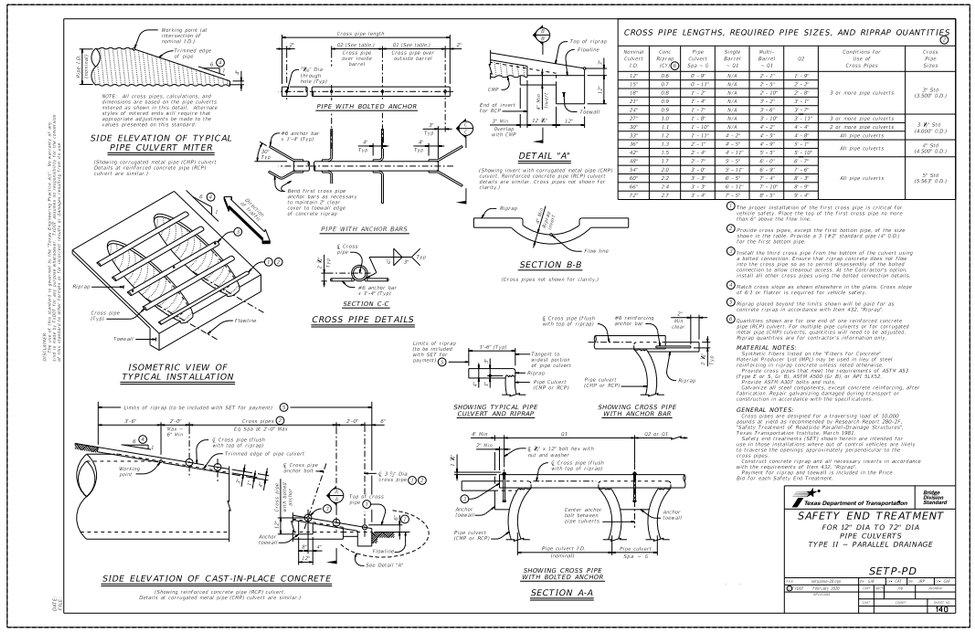
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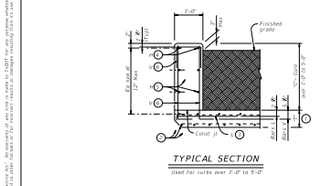
DATE:

DESIGNED
DETAILED
CHECKED
QUANTITIES BY
CHECKED
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TYPICAL WINGWALL ELEVATION
(Pipe runners not shown for clarity.)
ISOMETRIC VIEW OF TYPICAL INSTALLATION
SECTION A-A
(Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)
AT TOP OF EXTERIOR WINGWALL
(Cast-in-place culvert)
AT TOP OF INTERIOR WINGWALL
(Cast-in-place culvert)
AT OUTSIDE OF BOTTOM SLAB
(Cast-in-place culvert)
AT INTERIOR WINGWALL
(Precast culvert)
PLAN VIEWS OF CORNER DETAILS
BARS J
BARS K
(Length = 4'-3")
BARS R
WING DIMENSION CALCULATIONS:
PIPE RUNNER DIMENSION CALCULATIONS:
MATERIAL NOTES:
GENERAL NOTES:
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.
SHEET 1 OF 2
Texas Department of Transportation
Bridge Division Standard
SAFETY END TREATMENT
FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE 1 — CROSS DRAINAGE
SETB-CD
DATE: 2020
FILE: setbcd-20.dgn
DN: TxDOT
CK: MB
DW: JDD
CK: TM
© TxDOT February 2020
CONT
SECT
JOB
HIGHWAY
DIST
COUNTY
SHEET NO.
138

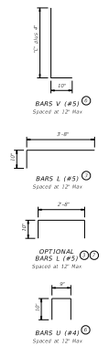

CROSS PIPE INSTALLATION DETAILS
NOTE: At Contractor's option, make the cross pipe continuous across the inside wingwalls. If option is selected, omit the sleeve pipe and make a 5/8" diameter through hole in the cross pipe to accept the anchor bolt at the centerline of each inside wingwall.
BOTTOM ANCHOR PIPE DETAILS
OPTION A
OPTION B
BOTTOM ANCHOR TOEWALL DETAILS
(Wingwall not shown for clarity.)
OPTION B1
OPTION B2
CROSS PIPE SLEEVE PIPE DETAILS
PIPE RUNNER DETAILS
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.
FOR USE IN OUTSIDE CULVERT BAY
FOR USE IN INSIDE CULVERT BAY
OPTION A2
OPTION A1
CROSS PIPE AND CONNECTIONS DETAILS
Cross pipe is the same size as the pipe runner. Cross pipe stub out is the same size as the anchor pipe.
Note that actual slope of safety pipe runner may vary slightly from side slope.
Take care to ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.
After installation, inspect the 1¼" hole to ensure that the lap of the safety pipe runner with the bottom anchor pipe is adequate.
At fabricator's option, a heat bent to a smooth 5' radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.
MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES
Maximum Pipe Runner Length
Required Pipe Runner Size
Required Anchor Pipe Size
Pipe Size
Pipe O.D.
Pipe I.D.
10'- 0"
3" STD
3.500"
3.068"
2" STD
2.375"
2.067"
19'- 0"
4" STD
4.500"
4.026"
3" STD
3.500"
3.068"
34'- 7"
5" STD
5.563"
5.047"
4" STD
4.500"
4.026"
SIDE ELEVATION
(Showing pipe runner with Cross Pipe Connection Option A1 and Bottom Anchor Toewall Option B2. Wingwall not shown for clarity.)
SHEET 2 OF 2
Texas Department of Transportation
Bridge Division Standard
SAFETY END TREATMENT
FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE 1 – CROSS DRAINAGE
SETB-CD
FILE: setbcdne-28.dgn
DATE: February 2020
FHWA
139


SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER
(Showing corrugated metal pipe (CMP) culvert. Details at reinforced concrete pipe (RCP) culvert are similar.)
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts retained as shown in this detail. Alternate styles of retained ends will require that appropriate adjustments be made to the values presented in this standard.
PIPE WITH BOLTED ANCHOR
PIPE WITH ANCHOR BARS
DETAIL "A"
(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)
SECTION B-B
(Cross pipes not shown for clarity.)
SECTION C-C
CROSS PIPE DETAILS
ISOMETRIC VIEW OF TYPICAL INSTALLATION
SHOWING TYPICAL PIPE CULVERT AND RIPRAP
SHOWING CROSS PIPE WITH ANCHOR BAR
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE
(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)
SHOWING CROSS PIPE WITH BOLTED ANCHOR
SECTION A-A
CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES
Nominal Culvert I.D.
Conc Riprap (CY)
Pipe Culvert Size = S
Single Barrel = D1
Multi-Barrel = D1
D2
Conditions for Use of Cross Pipes
Cross Pipe Sizes
12" 0.6 0' - 9" N/A 2' - 1" 1' - 9"
15" 0.7 0' - 11" N/A 2' - 5" 2' - 2"
18" 0.8 1' - 2" N/A 2' - 10" 2' - 8"
21" 0.9 1' - 4" N/A 3' - 2" 3' - 1"
24" 0.9 1' - 7" N/A 3' - 6" 3' - 7"
27" 1.0 1' - 9" N/A 3' - 10" 3' - 11"
30" 1.1 1' - 10" N/A 4' - 2" 4' - 4"
33" 1.2 1' - 11" 4' - 2" 4' - 5" 4' - 9"
36" 1.3 2' - 1" 4' - 5" 4' - 9" 5' - 1"
42" 1.5 2' - 4" 4' - 11" 5' - 5" 5' - 10"
48" 1.7 2' - 7" 5' - 5" 6' - 0" 6' - 7"
54" 2.0 2' - 0" 5' - 11" 6' - 9" 7' - 6"
60" 2.2 3' - 3" 6' - 5" 7' - 4" 8' - 3"
66" 2.4 3' - 9" 6' - 11" 7' - 10" 8' - 9"
72" 2.7 3' - 4" 7' - 5" 8' - 5" 9' - 4"
3 or more pipe culverts
2 pipe culverts
All pipe culverts
3 #5 anchor bars
3 #6 anchor bars
3" Std (3.500" O.D.)
4" Std (4.000" O.D.)
5" Std (5.563" O.D.)
1 The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.
2 Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 (#2" standard pipe (4" O.D.) for the first bottom pipe.
3 Install the third cross pipe from the bottom of the culvert using a 3'-0" length of pipe. Cut the pipe in half and use only one side of the cross pipe so as to permit disassembly of the bolted connection to allow clearance access. At the Contractor's option, install all other cross pipes using the bolted connection details.
4 Match cross slope as shown elsewhere in the plans. Cross slope of 4:1 or flatter is required for vehicle safety.
5 Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".
6 Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.
MATERIAL NOTES:
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Use bolts, nuts, and washers conforming to ASTM A 307 or ASTM A 453 (Type 3 or 5, Gr B), ASTM A 563 (Gr B), or AFI 5L52.
Provide ASTM A307 bolts and nuts.
Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.
GENERAL NOTES:
Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures". Treatments that meet the Test Level 3 (TL-3) "Safety and Performance Standard for Highway Features" (1989) safety requirements (SPF) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.
Construct concrete riprap and all necessary inserts in accordance with the requirements of Item 432, "Riprap".
Payment for riprap and tiewalls is included in the Price Bid for each Safety End Treatment.
Texas Department of Transportation
Bridge Division Standard
SAFETY END TREATMENT
FOR 12" DIA TO 72" DIA PIPE CULVERTS
TYPE II – PARALLEL DRAINAGE
SETP-PD
FILE: setpdtxt-20.dgn
DATE: February 2020
REVISIONS
CK: TR
DW: TxDOT
CK: TR
14.0



TYPICAL SECTION

Used for curbs over 1'-0" to 5'-0"



BARS V (#5) ⑥
Spaced at 12" Max

BARS L (#5) ⑦
Spaced at 12" Max

OPTIONAL BARS L (#5) ⑧ ⑨
Spaced at 12" Max

BARS U (#4) ⑩
Spaced at 12" Max

① 'T' is equal to the culvert top slab thickness. For precast boxes with slabs less than 9" thick, see SCP-MD standard for additional details.

② Adjust normal culvert slab bars as necessary to clear obstructions.

③ Place bars L as shown. T-16 hook as necessary to maintain cover.

④ Place normal culvert curb bars M(#4) as shown. Adjust as necessary to clear obstructions.

⑤ Additional bars M(#4) as required to maintain 12" Max spacing.

⑥ Replace normal culvert curb bars K with one bar U and two bars V as shown spaced at 12" Max. Adjust length of bars V as necessary to maintain clear cover.

⑦ Optional bars L are to be used only for precast box culverts with 3'-0" closure pour.

⑧ Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The value in table can be interpolated for intermediate values of curb height, 'C'. Quantity includes bars K (when applicable).

TABLE OF ESTIMATED CURB QUANTITIES ⑧

Curb Height 'C'	Conc (CY/LF)	Reinf Steel (LB/LF)
1'-0"	0.037	10.4
1'-6"	0.056	14.5
2'-0"	0.074	19.0
2'-6"	0.093	18.0
3'-0"	0.111	19.0
3'-6"	0.130	21.1
4'-0"	0.148	22.4
4'-6"	0.167	24.6
5'-0"	0.185	25.9

CONSTRUCTION NOTES:
Adjust reinforcing steel as necessary to provide 1 ½" cover.
For vehicle safety, top of the curb must not project more than 3" above the finished grade.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the project.
Provide Class 'C' concrete (f'_c = 3,600 psi) minimum for curbs.
Provide bar laps, where required, as follows:
- Uncoated or galvanized – #4 = 2'-0" Min

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
These extended curb details have sufficient strength to allow for future retrofit of Type T631 or TX3115 railing. Type T631 railing is shown in the Bridge Railing and RR3 Type rails. These details are not suitable for the retrofitting of other rail types. For new construction using T631 or TX3115 railing, use the TXDOT-CR standard.
This Curb is considered as part of the Box Culvert for payment.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

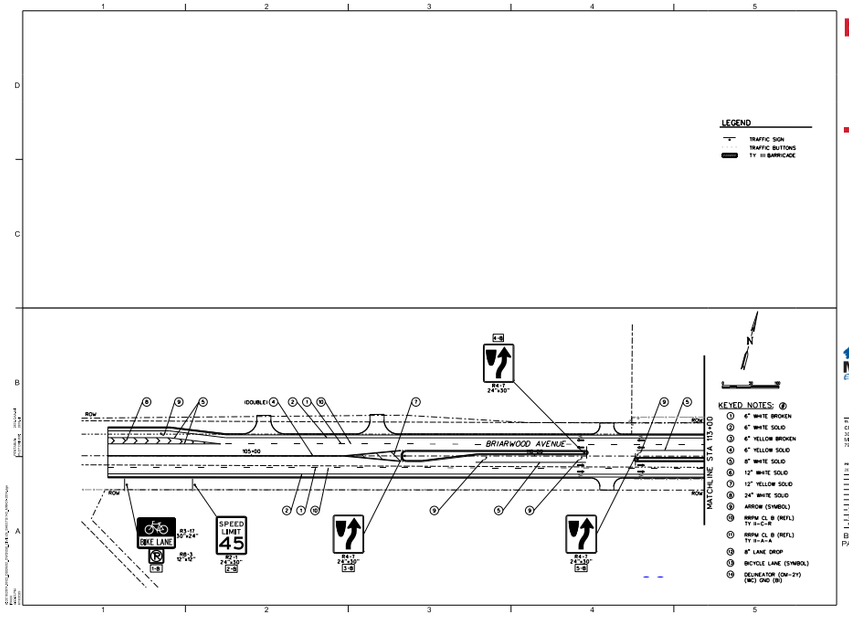
Texas Department of Transportation — Bridge Division Standard

EXTENDED CURB DETAILS FOR BOX CULVERTS WITH CURBS OVER 1'-0" TO 5'-0" TALL

ECD

FILE: SP-3NU-(12-13)-Strip	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.
				141

DATE PLOTTED:
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John Rowe

Briarwood Avenue Phase II

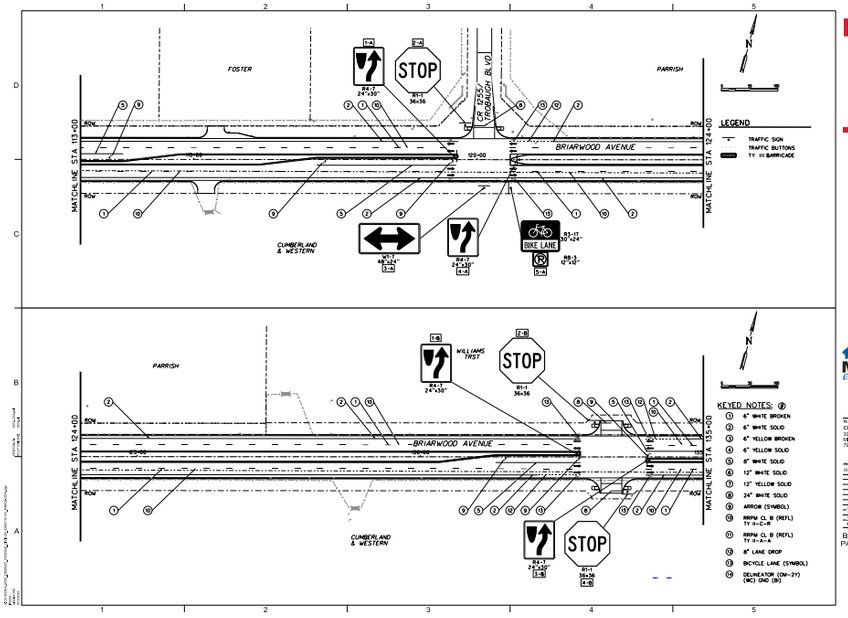
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
PAVEMENT MARKINGS
AND SIGNS
STA 102+00 TO
STA 113+00
SHEET 1 OF 6

142



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Briarwood Avenue Phase II

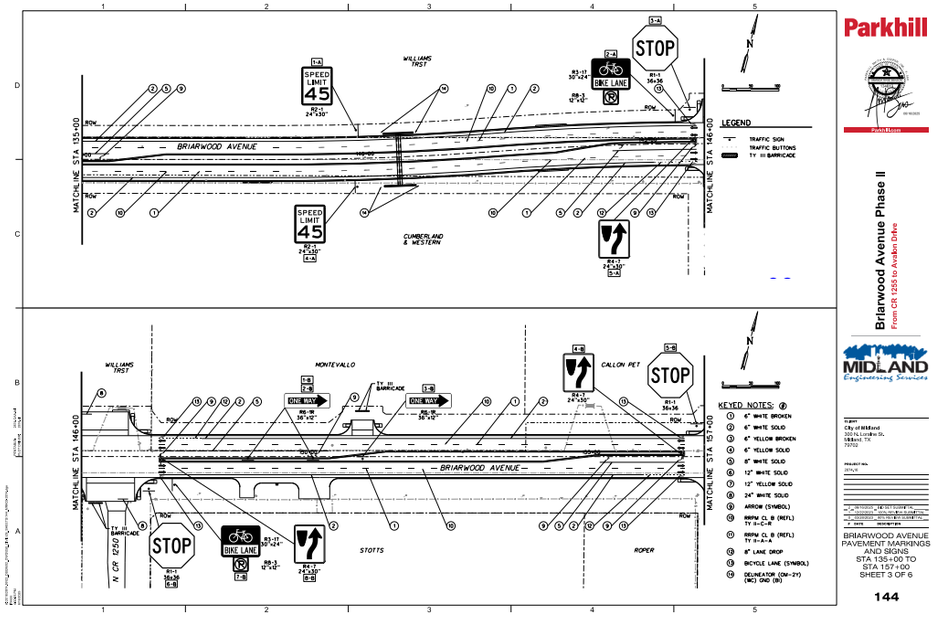
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
PAVEMENT MARKINGS
AND SIGNS
STA 113+00 TO
STA 135+00
SHEET 1 OF 6

143



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John Rowe

Briarwood Avenue Phase II

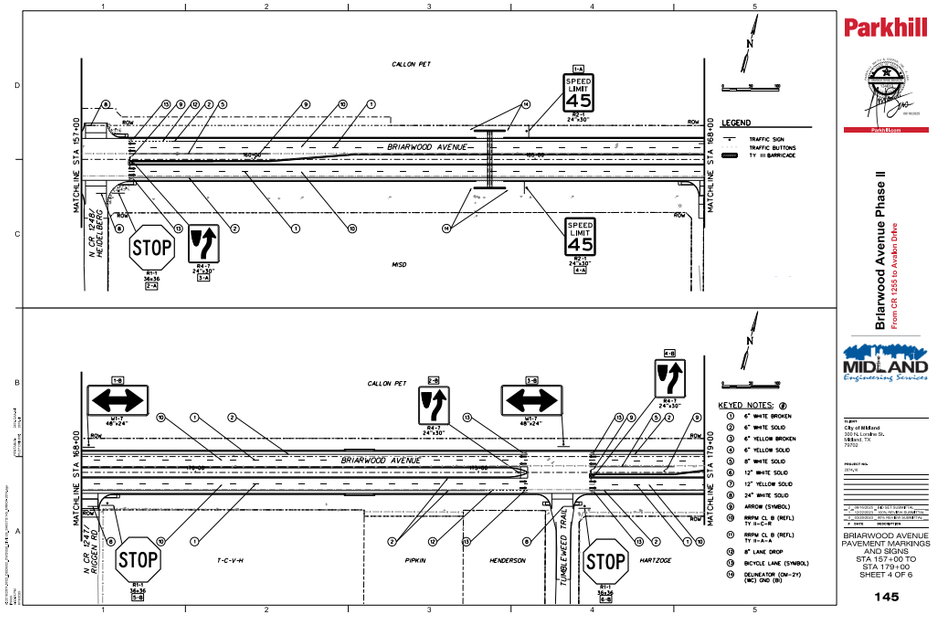
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
PAVEMENT MARKINGS
AND SIGNS
STA 135+00 TO
STA 157+00
SHEET 3 OF 6

144



Parkhill

John Rowe

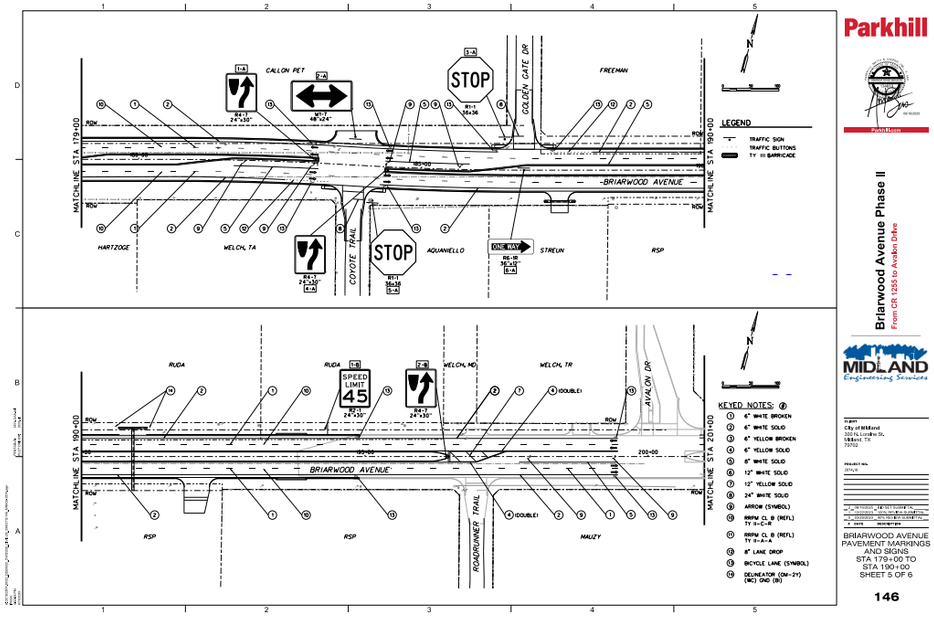
Briarwood Avenue Phase II

From CR 1225 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE PAVEMENT MARKINGS AND SIGNS STA 157+00 TO STA 179+00 SHEET 4 OF 6

145



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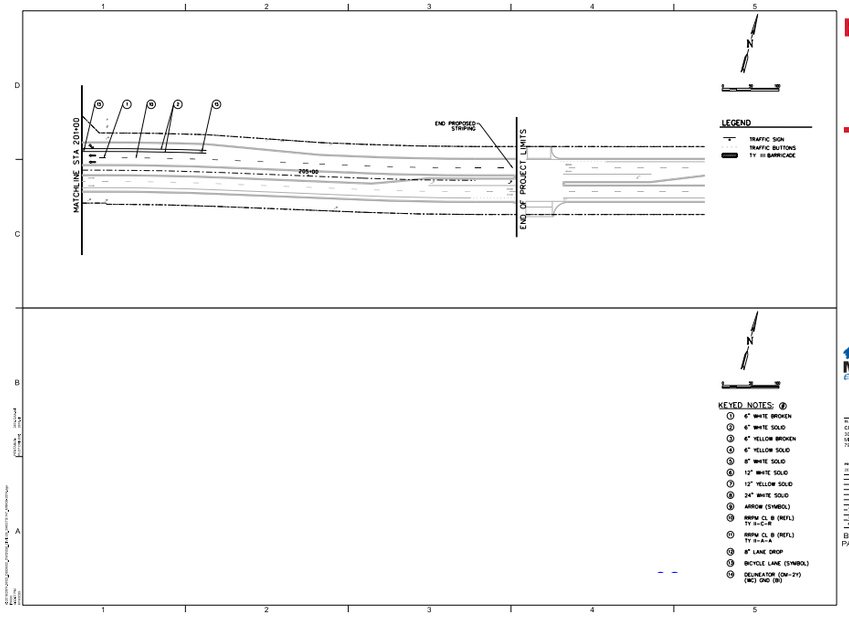
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PAVEMENT MARKINGS
AND SIGNS
STA 179+00 TO
STA 190+00
SHEET 5 OF 6

146



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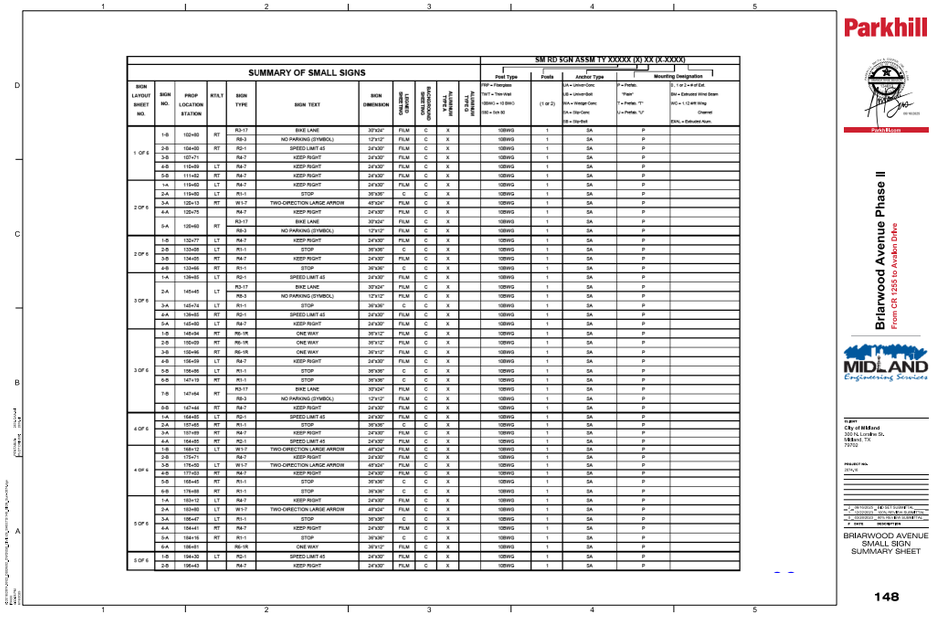
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
PAVEMENT MARKINGS
AND SIGNS
STA 201+00 TO
END OF PROJECT
SHEET 6 OF 6

147



SUMMARY OF SMALL SIGNS

SIGN LAYOUT SHEET NO.	SIGN NO.	PROP LOCATION STATION	RT/LT	SIGN TYPE	SIGN TEXT	SIGN DIMENSION	COLLEGE STATION STANDARDS	TXDOT STANDARDS	ALTERNATE TYPE A	ALTERNATE TYPE B	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)				
											Post Type TSP = Flanges TWT = Tree Wrist TSHC = 10 SHO SS = Sch 80	Posts (1 or 2)	Anchor Type US = Union-Conc US = Union-Soil NA = Integr-Conc SA = Slip-Conc SI = Slip-Soil	Mounting Designation P = Perfab. "Plain" T = Perfab. "T" L = Perfab. "L"	S = 1 or 2 # of Ext SW = Extruded Wind Beam NC = 1 1/2 #/ft Wing Channel EWL = Extruded Num.
1 OF 5	1-B	102+80	RT	R3-17	BIKE LANE	30"X24"	FILM	C	X		10SWG	1	SA	P	
	2-B	104+00	RT	R3-3	NO PARKING (SYMBOL)	12"X12"	FILM	C	X		10SWG	1	SA	P	
	3-B	107+71		R1-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10SWG	1	SA	P	
	4-B	110+89	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	
	5-B	111+82	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	
2 OF 5	1-A	119+82	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	
	2-A	119+90	LT	R1-1	STOP	30"X30"	C	C	X		10SWG	1	SA	P	
	3-A	120+13	RT	W1-7	TWO-DIRECTION LARGE ARROW	48"X24"	FILM	C	X		10SWG	1	SA	P	
	4-A	120+75		R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	
	5-A	120+60	RT	R3-17	BIKE LANE	30"X24"	FILM	C	X		10SWG	1	SA	P	
				R3-3	NO PARKING (SYMBOL)	12"X12"	FILM	C	X		10SWG	1	SA	P	
2 OF 5	1-B	132+77	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	
	2-B	133+08	LT	R1-1	STOP	30"X30"	C	C	X		10SWG	1	SA	P	
	3-B	134+05	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	
	4-B	133+66	RT	R1-1	STOP	30"X30"	C	C	X		10SWG	1	SA	P	
3 OF 5	1-A	139+65	LT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10SWG	1	SA	P	
	2-A	145+45	LT	R3-17	BIKE LANE	30"X24"	FILM	C	X		10SWG	1	SA	P	
				R3-3	NO PARKING (SYMBOL)	12"X12"	FILM	C	X		10SWG	1	SA	P	
	3-A	145+74	LT	R1-1	STOP	30"X30"	C	C	X		10SWG	1	SA	P	
	4-A	139+65	RT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10SWG	1	SA	P	
	5-A	145+65	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	
3 OF 5	1-B	149+94	RT	R6-1R	ONE WAY	36"X12"	FILM	C	X		10SWG	1	SA	P	
	2-B	150+09	RT	R6-1R	ONE WAY	36"X12"	FILM	C	X		10SWG	1	SA	P	
	3-B	150+46	RT	R6-1R	ONE WAY	36"X12"	FILM	C	X		10SWG	1	SA	P	
	4-B	156+59	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	
	5-B	156+66	LT	R1-1	STOP	30"X30"	C	C	X		10SWG	1	SA	P	
	6-B	147+19	RT	R1-1	STOP	30"X30"	C	C	X		10SWG	1	SA	P	
	7-B	147+64	RT	R3-17	BIKE LANE	30"X24"	FILM	C	X		10SWG	1	SA	P	
				R3-3	NO PARKING (SYMBOL)	12"X12"	FILM	C	X		10SWG	1	SA	P	
	8-B	147+44	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	
4 OF 5	1-A	164+65	LT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10SWG	1	SA	P	
	2-A	167+45	RT	R1-1	STOP	30"X30"	C	C	X		10SWG	1	SA	P	
	3-A	167+69	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	
	4-A	164+65	RT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10SWG	1	SA	P	
4 OF 5	1-B	169+12	LT	W1-7	TWO-DIRECTION LARGE ARROW	48"X24"	FILM	C	X		10SWG	1	SA	P	
	2-B	173+71		R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	
	3-B	176+50	LT	W1-7	TWO-DIRECTION LARGE ARROW	48"X24"	FILM	C	X		10SWG	1	SA	P	
	4-B	177+63	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	
	5-B	165+45	RT	R1-1	STOP	30"X30"	C	C	X		10SWG	1	SA	P	
	6-B	178+68	RT	R1-1	STOP	30"X30"	C	C	X		10SWG	1	SA	P	
5 OF 5	1-A	183+12	LT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	
	2-A	183+40	LT	W1-7	TWO-DIRECTION LARGE ARROW	48"X24"	FILM	C	X		10SWG	1	SA	P	
	3-A	186+47	LT	R1-1	STOP	30"X30"	C	C	X		10SWG	1	SA	P	
	4-A	184+41	RT	R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	
	5-A	184+16	RT	R1-1	STOP	30"X30"	C	C	X		10SWG	1	SA	P	
	6-A	186+61		R6-1R	ONE WAY	36"X12"	FILM	C	X		10SWG	1	SA	P	
5 OF 5	1-B	194+30	LT	R2-1	SPEED LIMIT 45	24"X30"	FILM	C	X		10SWG	1	SA	P	
	2-B	196+43		R4-7	KEEP RIGHT	24"X30"	FILM	C	X		10SWG	1	SA	P	

Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND
Engineering Services

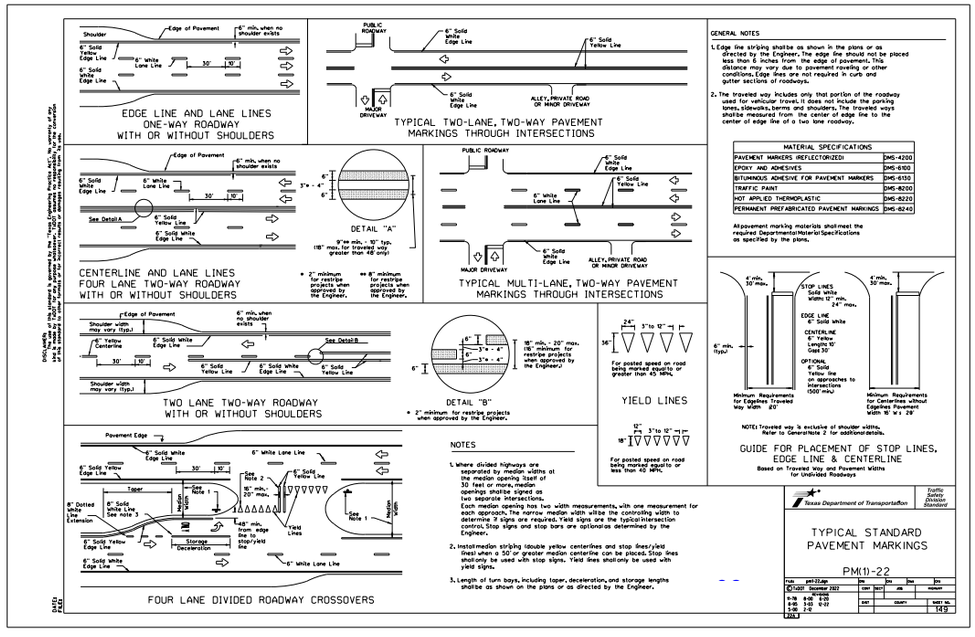
client
City of Midland
300 N. Loraine St.
Midland, TX
79702

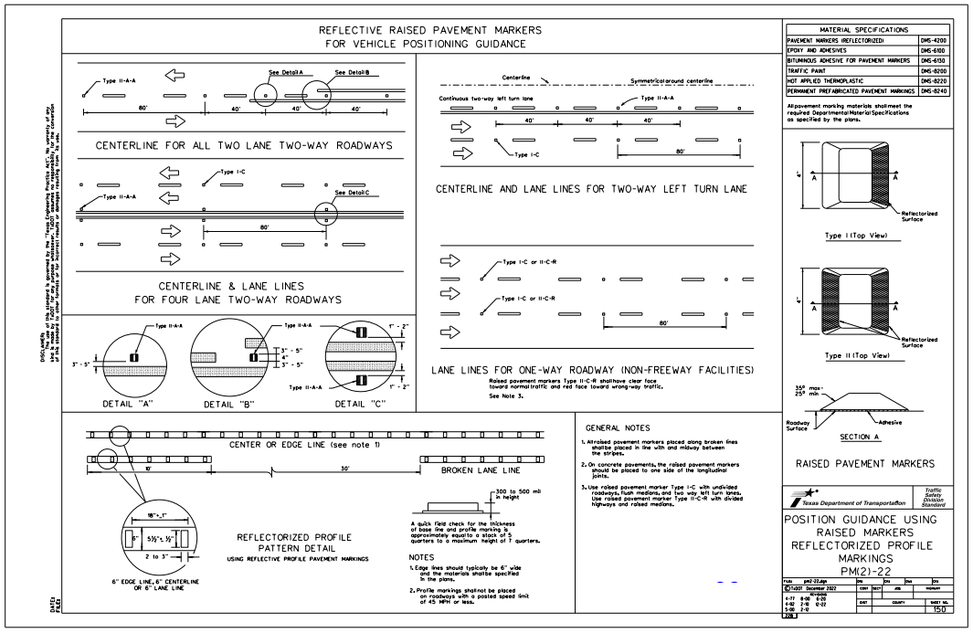
PROJECT No.
(SCALE)

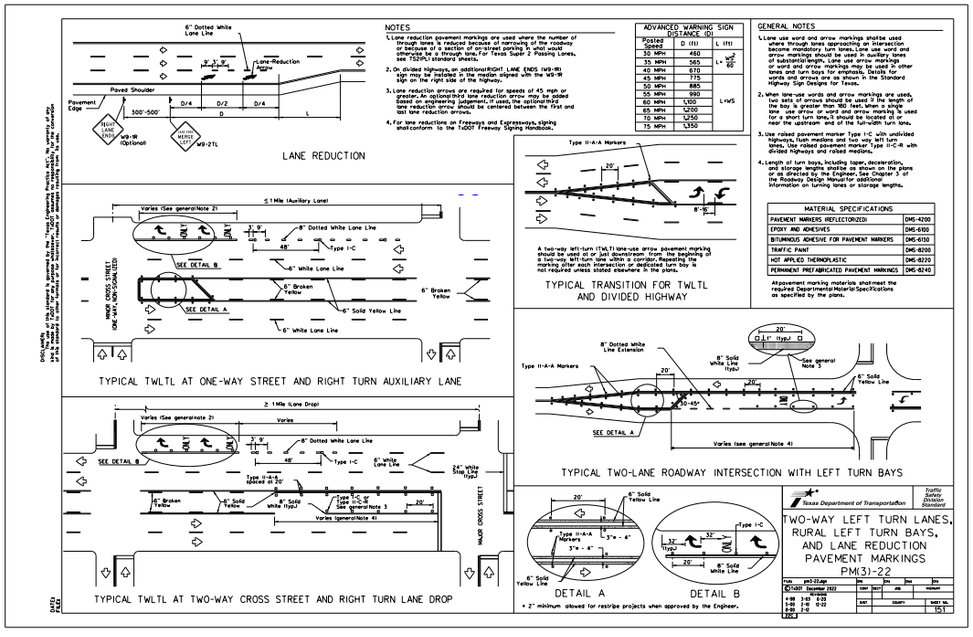
#	DATE	DESCRIPTION
1	08/15/2025	AS SHOWN ON PLANS
2	08/29/2025	ADDITIONAL SIGNS ADDED

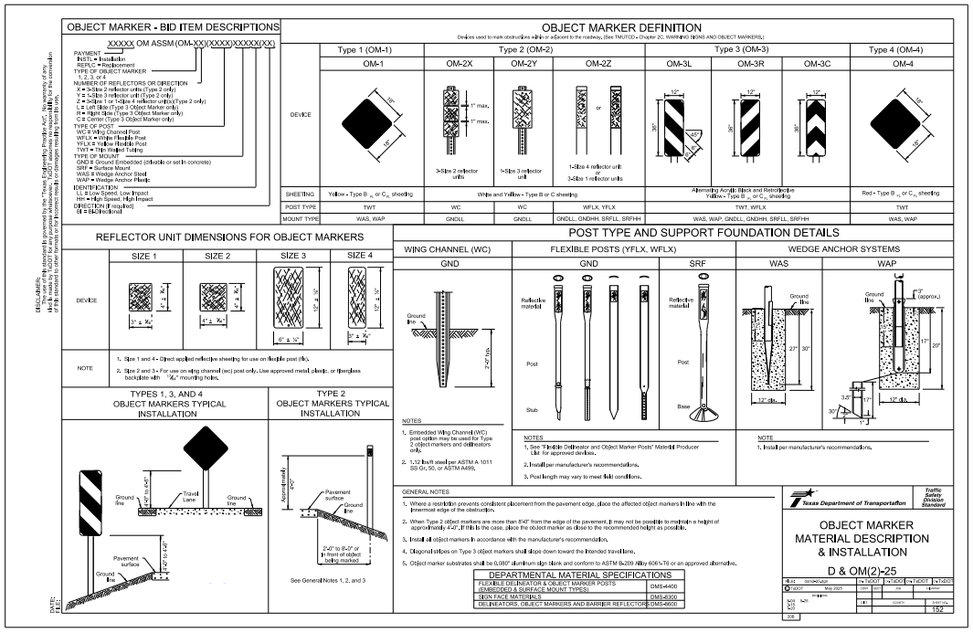
BRIARWOOD AVENUE
SMALL SIGN
SUMMARY SHEET

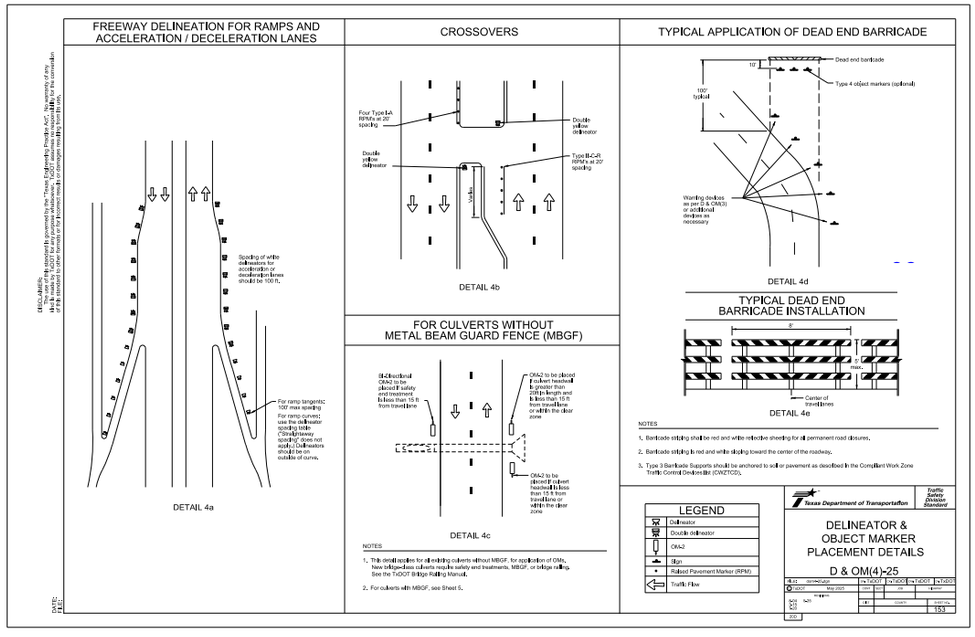
148

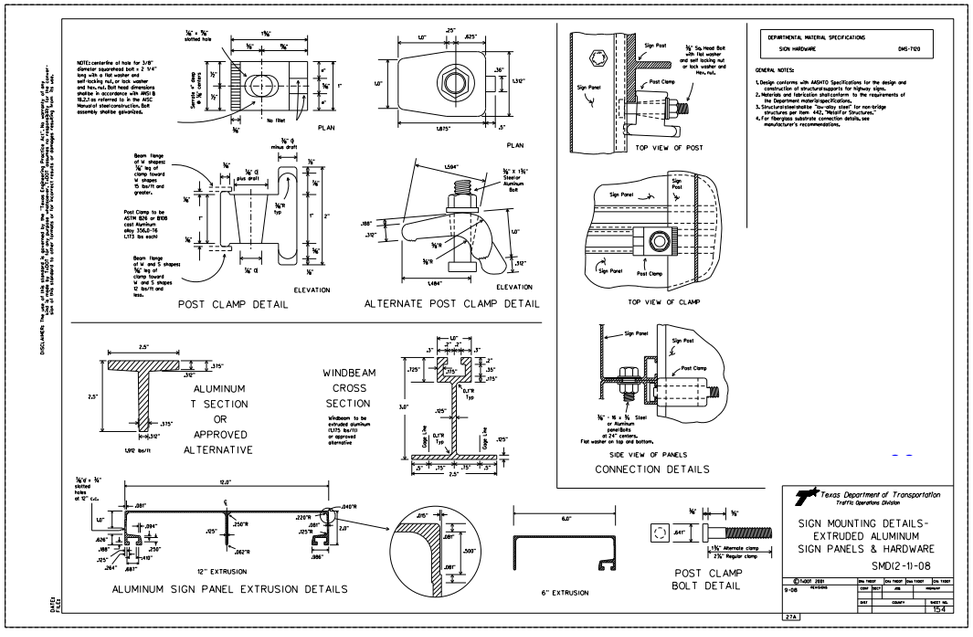

EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS
TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS
GENERAL NOTES
1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.
MATERIAL SPECIFICATIONS
PAVEMENT MARKERS (REFLECTORIZED) DMS-4200
EPOXY ADHESIVES DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS DMS-6150
TRAFFIC PAINT DMS-8200
HOT APPLIED THERMOPLASTIC DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS DMS-8240
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS
DETAIL "A"
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS
TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS
DETAIL "B"
YIELD LINES
GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE
Based on Traveled Way and Pavement Widths
for Undivided Roadways
FOUR LANE DIVIDED ROADWAY CROSSOVERS
NOTES
1. Where divided highways are separated by median widths of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.
Texas Department of Transportation
Traffic Safety Division Standard
TYPICAL STANDARD
PAVEMENT MARKINGS
PM(1)-22
DATED JUNE 2022

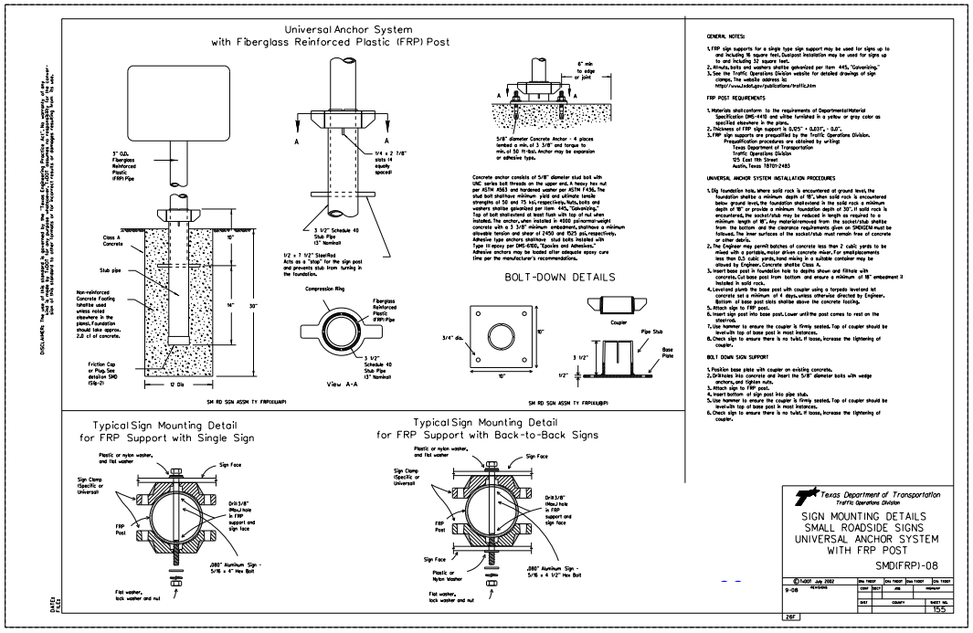

REFLECTIVE RAISED PAVEMENT MARKERS
FOR VEHICLE POSITIONING GUIDANCE
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS
CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY ROADWAYS
CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)
DETAIL "A"
DETAIL "B"
DETAIL "C"
CENTER OR EDGE LINE (see note 1)
BROKEN LANE LINE
REFLECTORIZED PROFILE
PATTERN DETAIL
USING REFLECTIVE PROFILE PAVEMENT MARKINGS
GENERAL NOTES
NOTES
MATERIAL SPECIFICATIONS
PAVEMENT MARKERS (REFLECTORIZED) DMS-4200
EPOXY AND ADHESIVES DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS DMS-6150
TRAFFIC PAINT DMS-8200
HOT APPLIED THERMOPLASTIC DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS DMS-8240
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.
Type I (Top View)
Type II (Top View)
SECTION A
RAISED PAVEMENT MARKERS
Texas Department of Transportation
Traffic Safety Division Standard
POSITION GUIDANCE USING
RAISED MARKERS
REFLECTORIZED PROFILE
MARKINGS
PM(2)-22

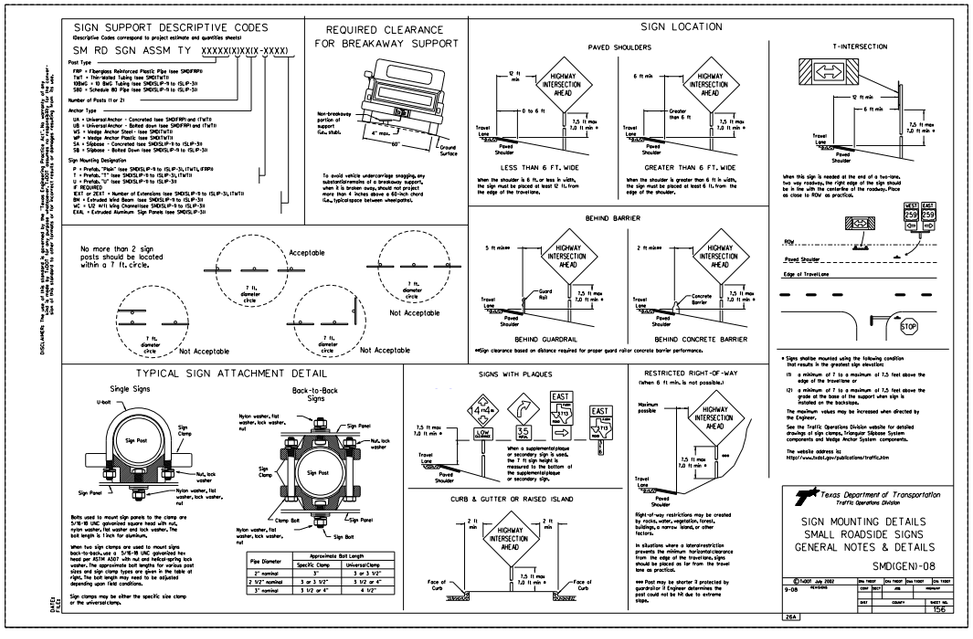

LANE REDUCTION
NOTES
1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because a lane is dropped to provide parking. If this would result in a through lane, or Texas Super 7 Passing Lanes, see TSOPM1 standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be placed on the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.
ADVANCED WARNING SIGN DISTANCE (D)
Posted Speed | D (ft) | L (ft)
30 MPH | 450 | L= WS/60
35 MPH | 565
40 MPH | 670
45 MPH | 775
50 MPH | 885 | L=WS
55 MPH | 990
60 MPH | 1,100
65 MPH | 1,200
70 MPH | 1,250
75 MPH | 1,350
GENERAL NOTES
1. Lane use word and arrow markings shallbe used where through lanes approaching an intersection become mandatory. Unless lane use words are used, lane use arrows shall be placed on the beginning of substantial length. Lane use arrow markings or word and arrow markings may be used to other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow word and arrow marking is used in a turn bay, it should be placed 20 feet from or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, non-medians and two-way left turn highways, non-medians and two-way left turn highways with raised medians. Use Type II-C-R with divided highways and raised median.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as shown in Table 3-23 and Table 3-24 of the Roadway Design Manual for additional information on turning lanes or storage lengths.
MATERIAL SPECIFICATIONS
PAVEMENT MARKERS REFLECTORIZED | DMS-4200
EPOXY AND ADHESIVES | DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS | DMS-6150
TRAFFIC PAINT | DMS-8200
HOT APPLIED THERMOPLASTIC | DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS | DMS-8240
All pavement marking materials shallmeet the required Departmental Material Specifications as specified by the plans.
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE
TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP
DETAIL A
DETAIL B
* 2" minimum allowed for restripe projects when approved by the Engineer.
Texas Department of Transportation
Traffic Safety Division Standard
TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS
PM(3)-22
FILE: pm322.dgn
©TxDOT December 2022
DATE:
FED.RD. DIV. NO.
STATE
DIST
COUNTY
SHEET NO.
151

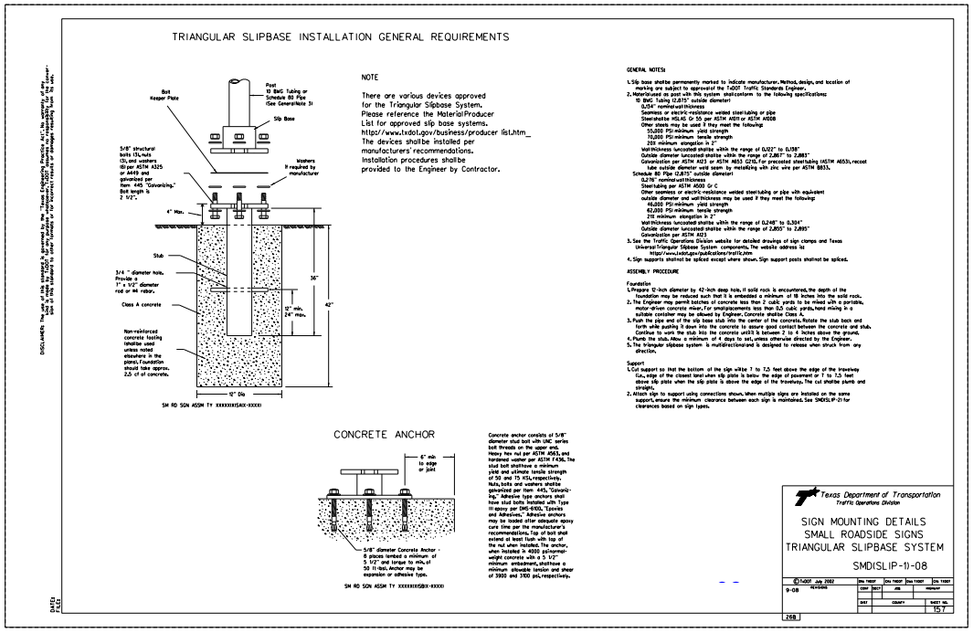

OBJECT MARKER - BID ITEM DESCRIPTIONS
XXXXX OM ASSM(OM-XX)(XXXX)(XXXX)(XX)
PAYMENT
INSTL = Installation
REPLC = Replacement
TYPE OF OBJECT MARKER
1, 2, 3, or 4
NUMBER OF REFLECTORS OR DIRECTION
X = 1=Size 2 reflector units (Type 2 only)
Y = 1=Size 3 reflector unit (Type 2 only)
Z = 3=Size 1 or 1=Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)
TYPE OF POST
GND = Ground Mounted Post
WFLX = White Flexible Post
YFLX = Yellow Flexible Post
TWT = Thin Walled Tubing
TYPE OF MOUNT
GNDI = Ground Embedded (driveable or set in concrete)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic
IDENTIFICATION
LL = Low Speed, Low Impact
HH = High Speed, High Impact
DIRECTION (if required)
BI = Bi-Directional
OBJECT MARKER DEFINITION
Devices used to mark obstructions within or adjacent to the roadway (See TMUTCD, Chapter 2C, WARNING SIGNS AND OBJECT MARKERS)
Type 1 (OM-1)
OM-1
Type 2 (OM-2)
OM-2X
OM-2Y
OM-2Z
Type 3 (OM-3)
OM-3L
OM-3R
OM-3C
Type 4 (OM-4)
OM-4
DEVICE
1 reflector unit
3-Size 2 reflector units
1-Size 3 reflector unit
1-Size 4 reflector unit
or
3-Size 1 reflector units
SHEETING
Yellow - Type B or C sheeting
White and Yellow - Type B or C sheeting
Alternating Acrylic Black and Retroflective Yellow - Type B or C sheeting
Red - Type B or C sheeting
POST TYPE
TWT
WC
WFLX, YFLX
TWT, WFLX
TWT
MOUNT TYPE
WAS, WAP
GNDLL
GNDLL, GNDHH, SRFLL, SRFHH
WAS, WAP, GNDLL, GNDHH, SRFLL, SRFHH
WAS, WAP
REFLECTOR UNIT DIMENSIONS FOR OBJECT MARKERS
SIZE 1
SIZE 2
SIZE 3
SIZE 4
DEVICE
NOTE
1. Size 1 and 4 - Object applied reflective sheeting for use on flexible post (fb).
2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic, or fiberglass backplate with 9/16" mounting holes.
POST TYPE AND SUPPORT FOUNDATION DETAILS
WING CHANNEL (WC)
GND
FLEXIBLE POSTS (YFLX, WFLX)
GND
SRF
WEDGE ANCHOR SYSTEMS
WAS
WAP
Ground line
Reflective material
Post
Stub
Base
NOTES
1. Embedded Wing Channel (WC) post option may be used for Type 2 object markers and delineators only.
2. 1-1/2 lbs/ft steel per ASTM A 1011 SS Gr. 55, or ASTM A499.
NOTES
1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
NOTE
1. Install per manufacturer's recommendations.
TYPES 1, 3, AND 4 OBJECT MARKERS TYPICAL INSTALLATION
TYPE 2 OBJECT MARKERS TYPICAL INSTALLATION
Ground line
Travel Lane
Pavement surface
Accordingly
2'-0" to 8'-0" in front of object being marked
See General Notes 1, 2, and 3
GENERAL NOTES
1. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
2. When Type 2 object markers are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker as close to the recommended height as possible.
3. Install all object markers in accordance with the manufacturer's recommendation.
4. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.
5. Object marker substrates shall be 0.080" aluminum sign blank and conform to ASTM B-209 Alloy 6061-T6 or an approved alternative.
DEPARTMENTAL MATERIAL SPECIFICATIONS
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES): DMS-4400
SIGN FACE MATERIALS: DMS-4300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS: DMS-4600
Texas Department of Transportation
Traffic Safety Division Standard
OBJECT MARKER MATERIAL DESCRIPTION & INSTALLATION
D & OM(2)-25
FILE: dom2-25.dgn
DN: TxDOT
CK: TxDOT
DW: TxDOT
CK: TxDOT
©TxDOT May 2025
CONT
SECT
JOB
HIGHWAY
DIST
COUNTY
SHEET NO.
152
DATE:
FHWA:
DESCRIPTION:
The use of this standard is governed by the "Texas Engineering Practice Act". No liability of any kind is assumed by the Texas Department of Transportation for the use of these standards, or the results of their application on designs not prepared by employees of the Texas Department of Transportation, or for any modifications made to these standards without the written approval of an authorized employee of the Texas Department of Transportation.

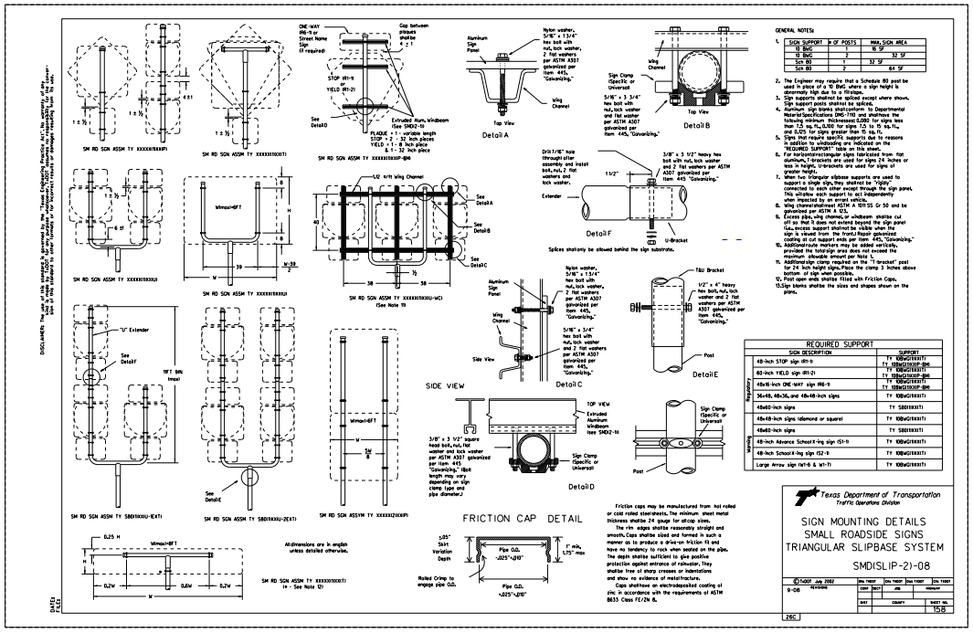

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION / DECELERATION LANES
Spacing of white delineators for acceleration or deceleration lanes should be 100 ft.
For ramp tangents: 100' max spacing
For ramp curves: use the delineator spacing table (Straight/Curve) in Fig 3-1. Curve may not apply. Delineators should be on outside of curve.
DETAIL 4a
CROSSOVERS
Four Type 1A RPMs at 20' spacing
Double yellow delineator
Double yellow delineator
Type II-C-R RPMs at 20' spacing
Varies
DETAIL 4b
FOR CULVERTS WITHOUT METAL BEAM GUARD FENCE (MBGF)
Bi-Directional OMA2 to be placed if safety end treatment is less than 15 ft from travel lane.
OMA2 to be placed if culvert headwall is greater than 20 ft in length and is less than 15 ft from travel lane or within the clear zone
OMA2 to be placed if culvert headwall is less than 15 ft from travel lane or within the clear zone
DETAIL 4c
NOTES
1. This detail applies for all existing culverts without MBGF, for application of OMs. New bridge-class culverts require safety end treatments, MBGF, or bridge railing. See the TxDOT Bridge Railing Manual.
2. For culverts with MBGF, see Sheet 5.
TYPICAL APPLICATION OF DEAD END BARRICADE
10'
Dead end barricade
Type 4 object markers (optional)
100' typical
Warning devices as per D & OM(3) or additional devices as necessary
DETAIL 4d
TYPICAL DEAD END BARRICADE INSTALLATION
8'
4' max.
Center of travel lanes
DETAIL 4e
NOTES
1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in the Compliant Work Zone Traffic Control Devices list (CWZTCD).
LEGEND
Delineator
Double delineator
OMA2
Sign
Raised Pavement Marker (RPM)
Traffic Flow
Texas Department of Transportation
Traffic Safety Division Standard
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS
D & OM(4)-25
FILE: dom4d25.dgn
DN: TxDOT
CK: TxDOT
DW: TxDOT
CK: TxDOT
©TxDOT May 2025
CONT
SECT
JOB
HIGHWAY
DIST
COUNTY
SHEET NO.
153
DATE:
FED.RD. DIV. NO.
FILE:
DESC./MARK:
1) The use of this standard is governed by the "Texas Engineering Practice Act". Any modification of this standard, including deletion of details not applicable to a project, may void the engineer's seal unless the modifications are signed, sealed and dated by the engineer responsible for its preparation. The responsible engineer is the user of this standard and not the State of Texas or any agency thereof.
2) Any revisions to this standard must be approved by the Traffic Operations Division of the Texas Department of Transportation. Requests for revisions should be submitted to the Traffic Operations Division, Standards Section.

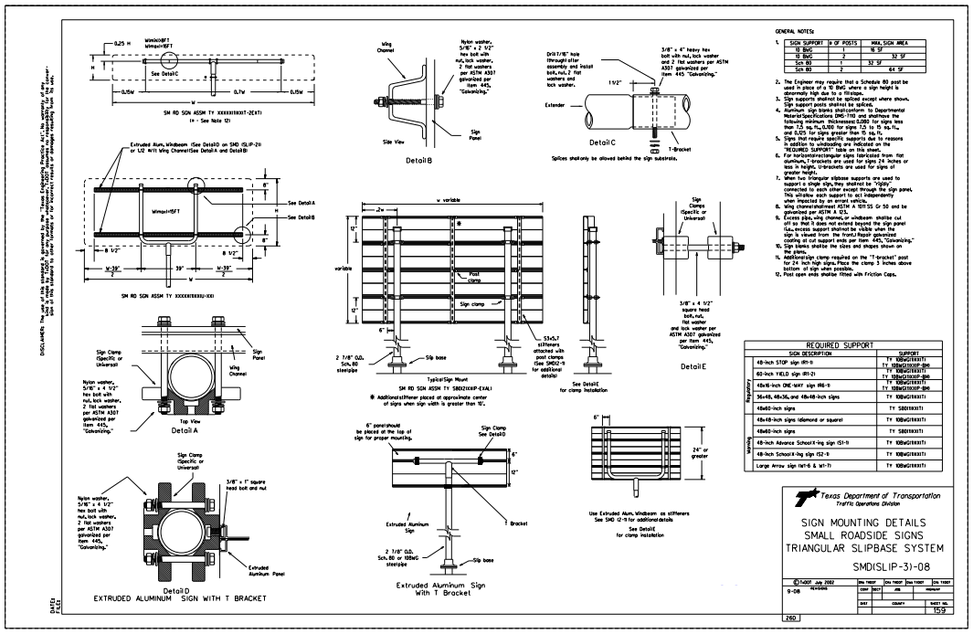

POST CLAMP DETAIL
ELEVATION
PLAN
ALTERNATE POST CLAMP DETAIL
ELEVATION
PLAN
TOP VIEW OF POST
TOP VIEW OF CLAMP
SIDE VIEW OF PANELS
CONNECTION DETAILS
DEPARTMENTAL MATERIAL SPECIFICATIONS
SIGN HARDWARE
DMS-7120
GENERAL NOTES:
ALUMINUM
T SECTION
OR
APPROVED
ALTERNATIVE
WINDBEAM
CROSS
SECTION
12" EXTRUSION
ALUMINUM SIGN PANEL EXTRUSION DETAILS
6" EXTRUSION
POST CLAMP
BOLT DETAIL
Texas Department of Transportation
Traffic Operations Division
SIGN MOUNTING DETAILS-
EXTRUDED ALUMINUM
SIGN PANELS & HARDWARE
SMD(2-1)-08
27A

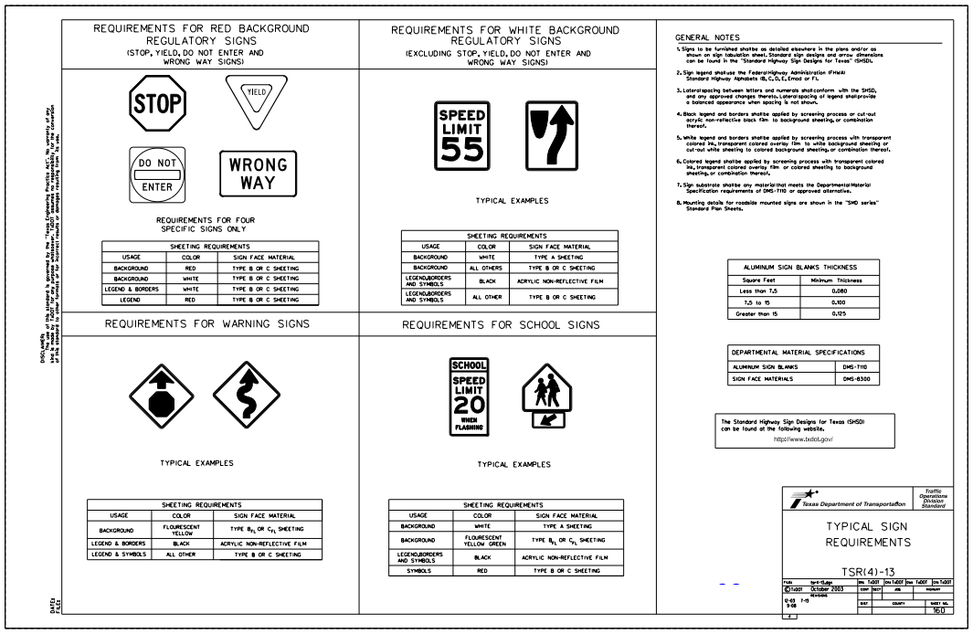

Universal Anchor System
with Fiberglass Reinforced Plastic (FRP) Post
BOLT-DOWN DETAILS
GENERAL NOTES:
FRP POST REQUIREMENTS
UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES
BOLT DOWN SIGN SUPPORT
Typical Sign Mounting Detail
for FRP Support with Single Sign
Typical Sign Mounting Detail
for FRP Support with Back-to-Back Signs
Texas Department of Transportation
Traffic Operations Division
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
UNIVERSAL ANCHOR SYSTEM
WITH FRP POST
SMD(FRP)-08

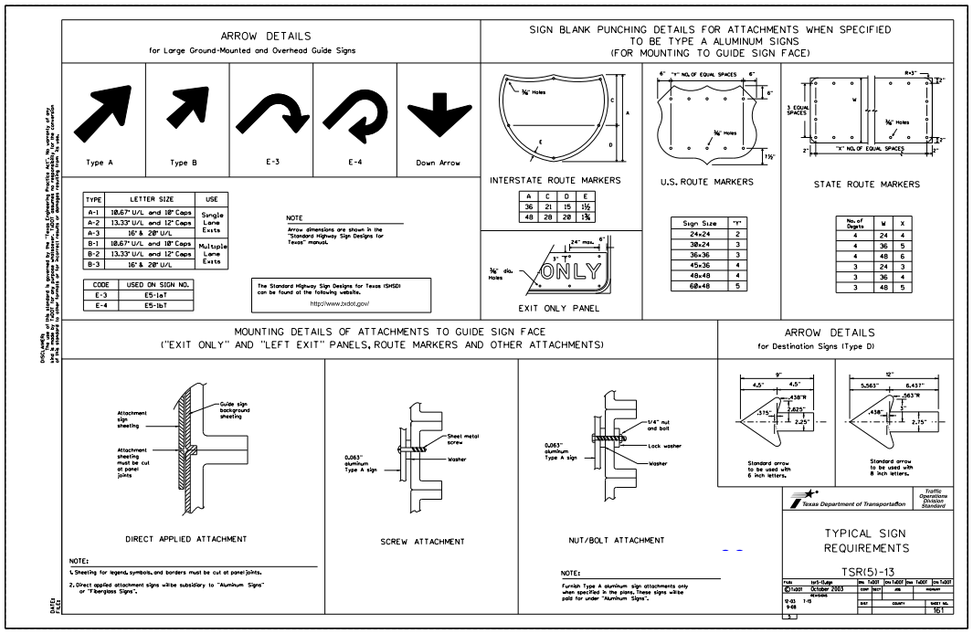

SIGN SUPPORT DESCRIPTIVE CODES
SM RD SGN ASSM TY XXXXX(X)X(X)X(X-XXXX)
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT
SIGN LOCATION
PAVED SHOULDERS
LESS THAN 6 FT. WIDE
GREATER THAN 6 FT. WIDE
T-INTERSECTION
BEHIND BARRIER
BEHIND GUARDRAIL
BEHIND CONCRETE BARRIER
No more than 2 sign posts should be located within a 7 ft. circle.
Acceptable
Not Acceptable
TYPICAL SIGN ATTACHMENT DETAIL
Single Signs
Back-to-Back Signs
SIGNS WITH PLAQUES
CURB & GUTTER OR RAISED ISLAND
RESTRICTED RIGHT-OF-WAY
Texas Department of Transportation
Traffic Operations Division
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
GENERAL NOTES & DETAILS
SMD(GEN)-08


TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS
NOTE
There are various devices approved for the Triangular Slipbase System. Please reference the MaterialProducer List for approved slip base systems. http://www.txdot.gov/business/producer lists.htm The devices shallbe installed per manufacturers' recommendations. Installation procedures shallbe provided to the Engineer by Contractor.
GENERAL NOTES:
ASSEMBLY PROCEDURE
CONCRETE ANCHOR
Texas Department of Transportation
Traffic Operations Division
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM
SMD(SLIP-1)-08


SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM
SMDISLIP-2)-08
FRICTION CAP DETAIL
SIDE VIEW
TOP VIEW
Detail A
Detail B
Detail C
Detail D
Detail E
Detail F
GENERAL NOTES:
REQUIRED SUPPORT
Texas Department of Transportation
Traffic Operations Division


SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM
SMDISLIP-3)-08
Texas Department of Transportation
Traffic Operations Division
GENERAL NOTES:
REQUIRED SUPPORT
Detail A
Detail B
Detail C
Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET
Detail E
Typical Sign Mount
Extruded Aluminum Sign With T Bracket


REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)
STOP
YIELD
DO NOT ENTER
WRONG WAY
REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY
SHEETING REQUIREMENTS
USAGE | COLOR | SIGN FACE MATERIAL
BACKGROUND | RED | TYPE B OR C SHEETING
BACKGROUND | WHITE | TYPE B OR C SHEETING
LEGEND & BORDERS | WHITE | TYPE B OR C SHEETING
LEGEND | RED | TYPE B OR C SHEETING
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)
SPEED LIMIT 55
TYPICAL EXAMPLES
SHEETING REQUIREMENTS
USAGE | COLOR | SIGN FACE MATERIAL
BACKGROUND | WHITE | TYPE A SHEETING
BACKGROUND | ALL OTHERS | TYPE B OR C SHEETING
LEGEND,BORDERS AND SYMBOLS | BLACK | ACRYLIC NON-REFLECTIVE FILM
LEGEND,BORDERS AND SYMBOLS | ALL OTHER | TYPE B OR C SHEETING
REQUIREMENTS FOR WARNING SIGNS
TYPICAL EXAMPLES
SHEETING REQUIREMENTS
USAGE | COLOR | SIGN FACE MATERIAL
BACKGROUND | FLOURESCENT YELLOW | TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS | BLACK | ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS | ALL OTHER | TYPE B OR C SHEETING
REQUIREMENTS FOR SCHOOL SIGNS
SCHOOL SPEED LIMIT 20 WHEN FLASHING
TYPICAL EXAMPLES
SHEETING REQUIREMENTS
USAGE | COLOR | SIGN FACE MATERIAL
BACKGROUND | WHITE | TYPE A SHEETING
BACKGROUND | FLOURESCENT YELLOW GREEN | TYPE B_{FL} OR C_{FL} SHEETING
LEGEND,BORDERS AND SYMBOLS | BLACK | ACRYLIC NON-REFLECTIVE FILM
SYMBOLS | RED | TYPE B OR C SHEETING
GENERAL NOTES
1. Signs to be furnished shallbe as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shalluse the FederalHighway Administration (FHwA) Standard Highway Alphabets (B,C,D,E,Emod or F).
3. Lateralspacing between letters and numerals shallconform with the SHSD, and any approved changes thereto. Lateralspacing of legend shallprovide a balanced appearance when spacing is not shown.
4. Black legend and borders shallbe applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shallbe applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting,or combination thereof.
6. Colored legend shallbe applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shallbe any materialthat meets the DepartmentalMaterial Specification requirements of DMS-7110 or approved alternatives.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.
ALUMINUM SIGN BLANKS THICKNESS
Square Feet | Minimum Thickness
Less than 7.5 | 0.080
7.5 to 15 | 0.100
Greater than 15 | 0.125
DEPARTMENTAL MATERIAL SPECIFICATIONS
ALUMINUM SIGN BLANKS | DMS-7110
SIGN FACE MATERIALS | DMS-8300
The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/
Texas Department of Transportation
Traffic Operations Division Standard
TYPICAL SIGN REQUIREMENTS
TSR(4)-13
FILE: tsr4-13.dgn
DN: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT
©TxDOT October 2003
CONT SECT JOB HIGHWAY
REVISIONS
DIST COUNTY SHEET NO.
16



TYPE	LETTER SIZE	USE
A-1	18.67" U/L and 18" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 28" U/L	
B-1	18.67" U/L and 18" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 28" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

NOTE
Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

A	C	D	E
36	21	15	1½
48	28	20	1¾

Sign Size	"Y"
24×24	2
30×24	3
36×36	3
45×36	4
48×48	4
60×48	5

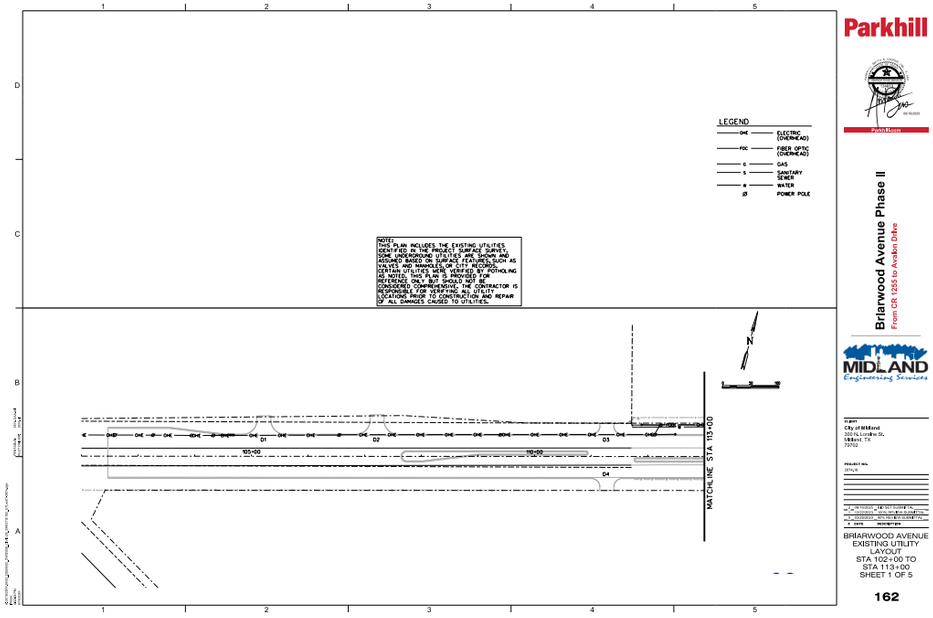
No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

NOTE:
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

FILE: tsr1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS				
9-03 1-13	DIST	COUNTY		SHEET NO.
9-98				161

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Parkhill

Briarwood Avenue Phase II

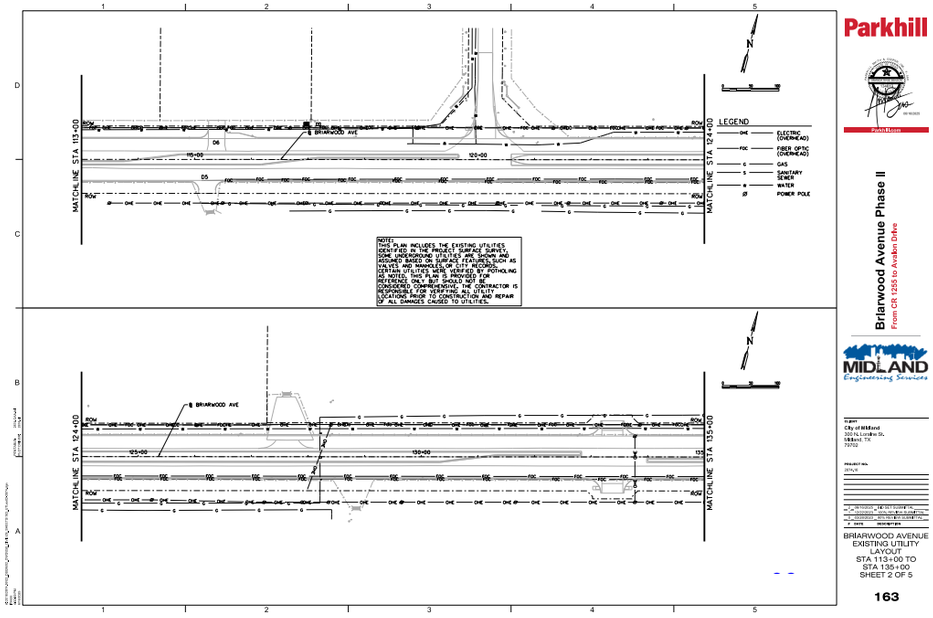
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
EXISTING UTILITY
LAYOUT
STA 102+00 TO
STA 113+00
SHEET 1 OF 5

162



Parkhill

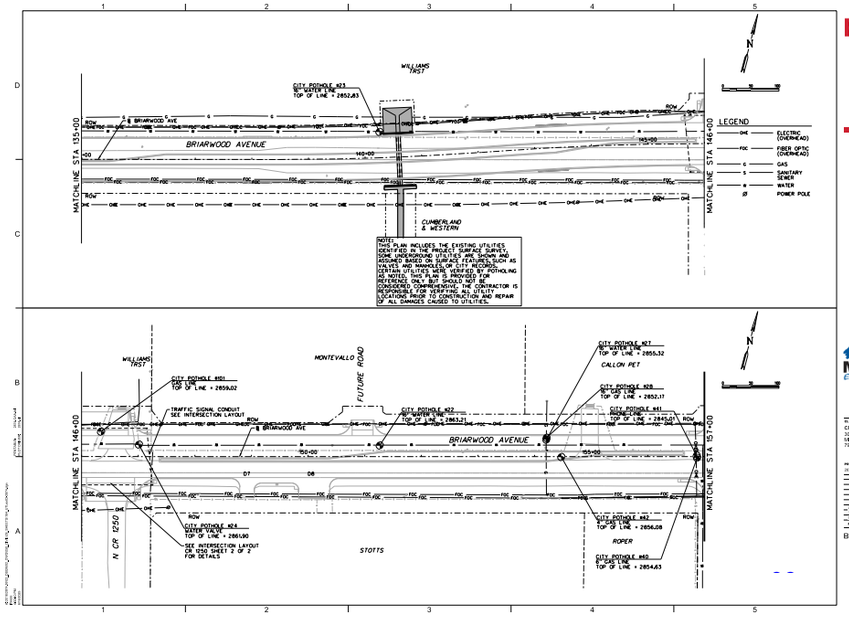
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EXISTING UTILITY
LAYOUT
STA 113+00 TO
STA 135+00
SHEET 2 OF 5

163



Parkhill

John Rowe

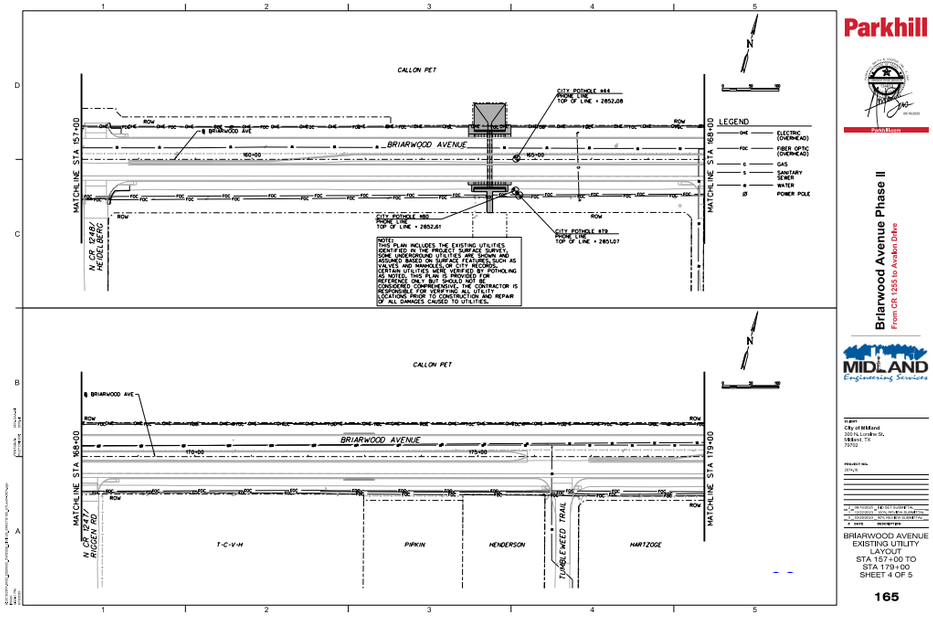
Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EXISTING UTILITY LAYOUT
STA 135+00 TO STA 157+00
SHEET 3 OF 5

164



Parkhill

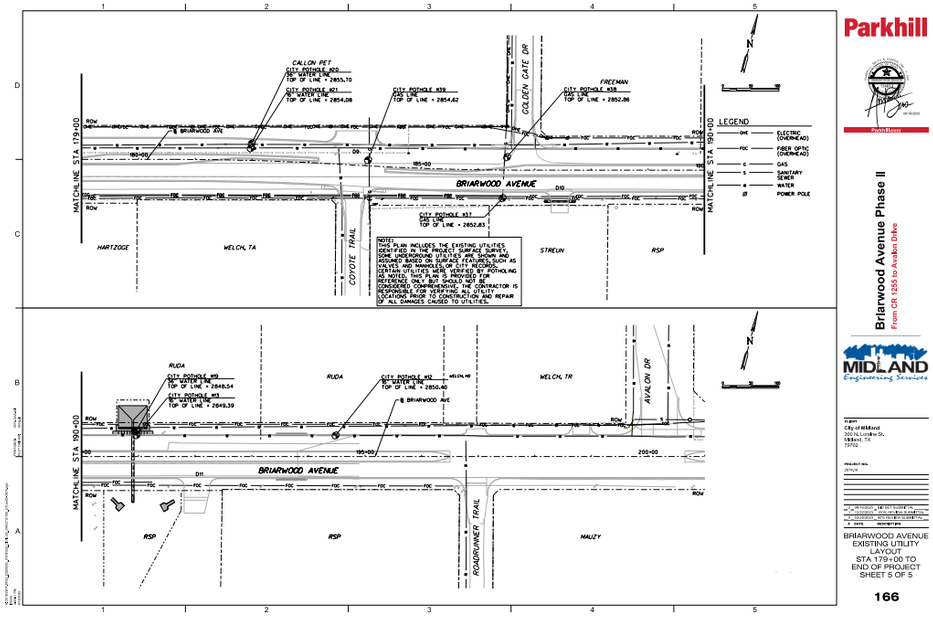
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EXISTING UTILITY
LAYOUT
STA 157+00 TO
STA 179+00
SHEET 4 OF 5

165



Parkhill

John Rowe

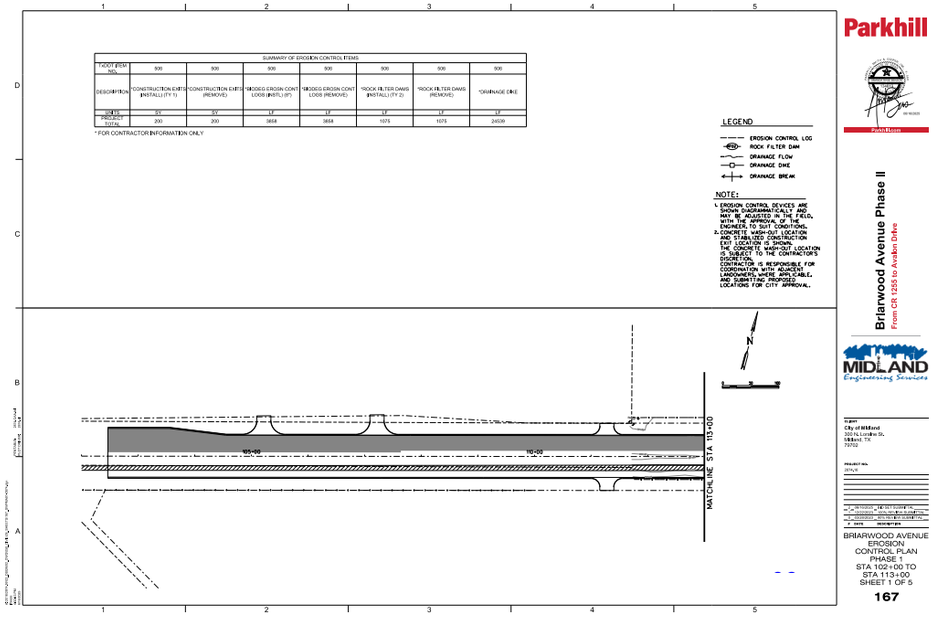
Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EXISTING UTILITY
LAYOUT
STA 179+00 TO
END OF PROJECT
SHEET 5 OF 5

166



SUMMARY OF EROSION CONTROL ITEMS

TxDOT ITEM NO.	506	506	506	506	506	506	506
DESCRIPTION	*CONSTRUCTION EXITS (INSTALL) (TY 1)	*CONSTRUCTION EXITS (REMOVE)	*BIODEG EROSN CONT LOGS (INSTL) (9")	*BIODEG EROSN CONT LOGS (REMOVE)	*ROCK FILTER DAMS (INSTALL) (TY 2)	*ROCK FILTER DAMS (REMOVE)	*DRAINAGE DIKE
UNITS	SY	SY	LF	LF	LF	LF	LF
PROJECT TOTAL	200	200	5658	5658	1075	1075	24039

* FOR CONTRACTOR INFORMATION ONLY

LEGEND

- EROSION CONTROL LOG
- ROCK FILTER DAM
- DRAINAGE FLOW
- DRAINAGE DIKE
- DRAINAGE BREAK

NOTE:

1. EROSION CONTROL DEVICES ARE SHOWN DIAGRAMMATICALLY AND MAY BE ADJUSTED IN THE FIELD, BY THE CONTRACTOR OR THE ENGINEER, TO SUIT CONDITIONS.
2. CONCRETE WASH-OUT LOCATION AND STABILIZED CONSTRUCTION EXIT LOCATION SHOWN ON THE CONCRETE WASH-OUT LOCATION IS SUBJECT TO THE CONTRACTOR'S DISCRETION. CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH ADJACENT LANDOWNERS, WHERE APPLICABLE, AND SUBMITTING PROPOSED LOCATIONS FOR CITY APPROVAL.

N

1" = 50'

105+00

110+00

MATCHLINE STA 113+00

Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

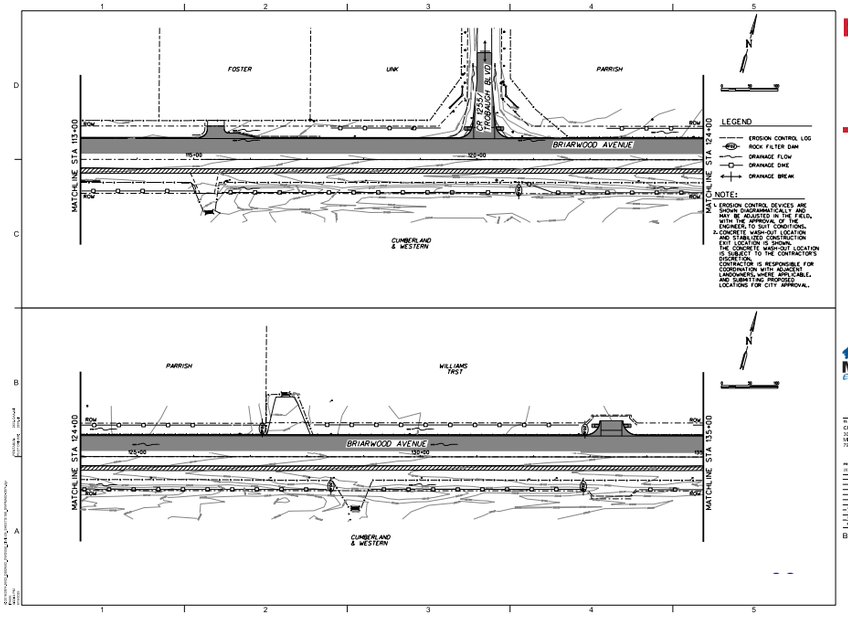
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

PROJECT No.
(167x1)

#	DATE	DESCRIPTION
1	08/19/2025	AS SUBMITTED FOR CITY REVIEW
2	09/09/2025	INITIAL SUBMITTAL FOR BIDDING
3	09/30/2025	ADDITIONAL SUBMITTAL FOR BIDDING

BRIARWOOD AVENUE EROSION CONTROL PLAN PHASE 1
STA 102+00 TO STA 113+00
SHEET 1 OF 5

167



Parkhill

John Rowe

Briarwood Avenue Phase II

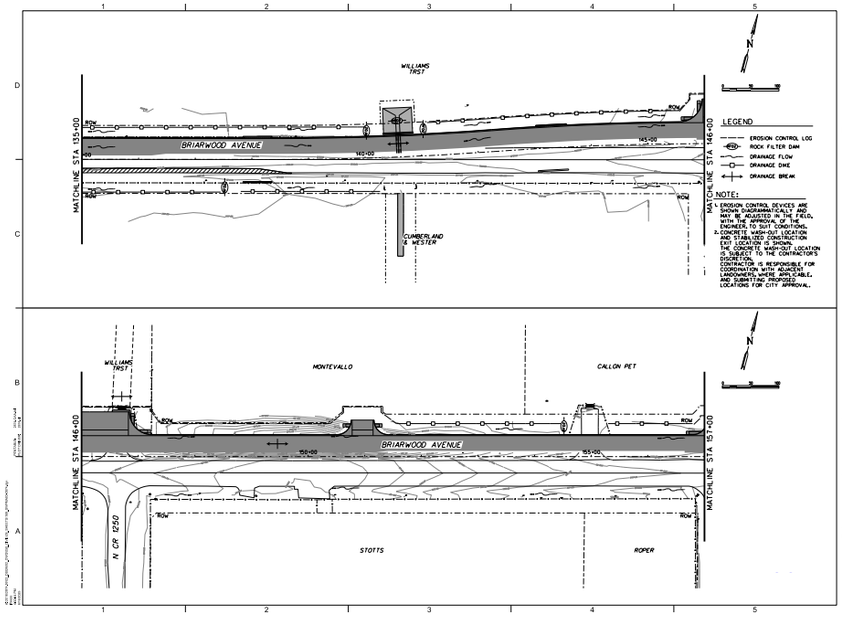
From CR 1255 to Avalon Drive

MIDLAND Engineering Services

Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 1
STA 113+00 TO
STA 135+00
SHEET 2 OF 5

168



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

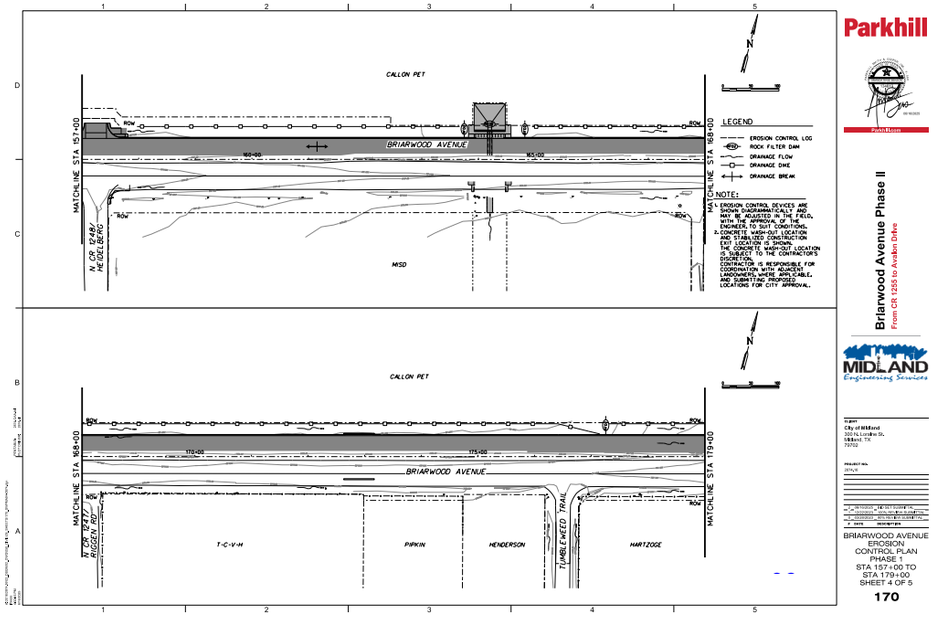
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

PROJECT No.
007619

#	DATE	DESCRIPTION
1	08/19/2025	AS BUILT COMPLETE
2	00/00/0000	INITIAL SUBMISSION
3	00/00/0000	REVISED PER CITY COMMENTS
4	00/00/0000	REVISED PER CITY COMMENTS

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 1
STA 135+00 TO
STA 157+00
SHEET 3 OF 5

169



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

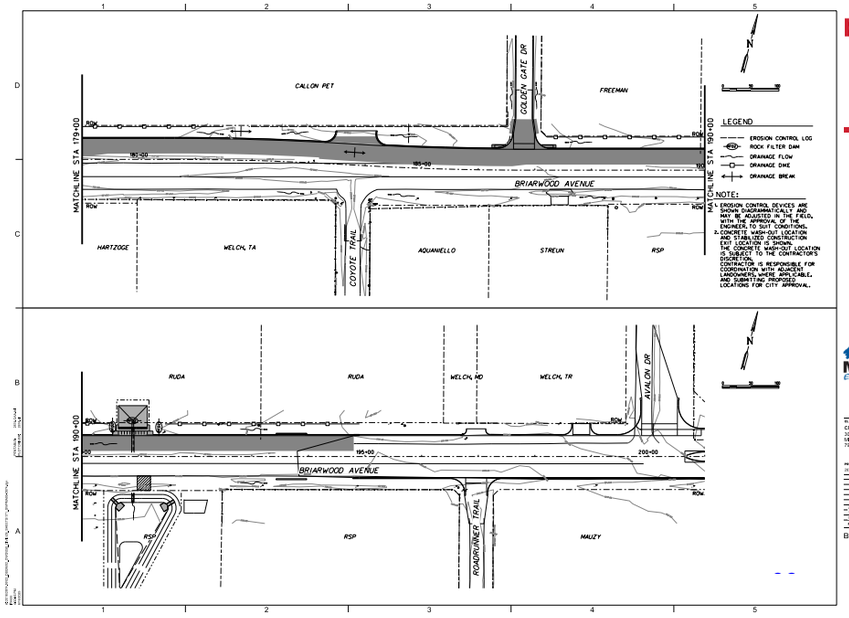
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
067419

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 1
STA 157+00 TO
STA 179+00
SHEET 4 OF 5

170



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

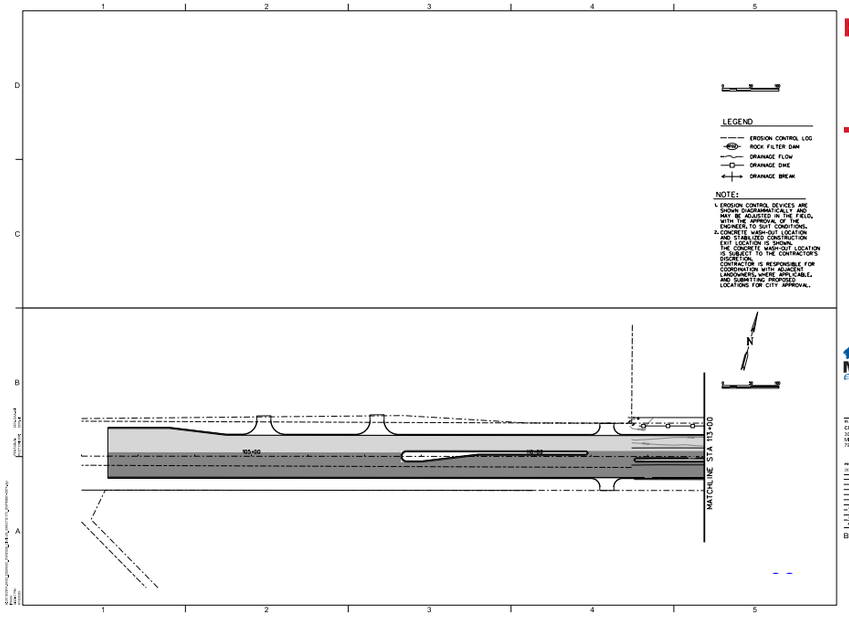
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

PROJECT No.

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 1
STA 179+00 TO
END OF PROJECT
SHEET 5 OF 5

171



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

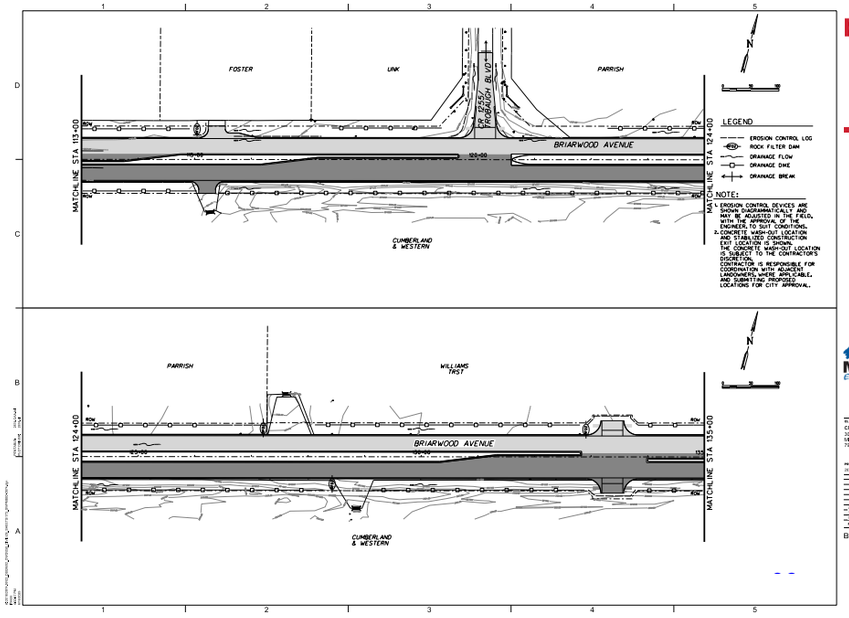
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
067419

#	DATE	DESCRIPTION

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 102+00 TO
STA 113+00
SHEET 1 OF 5

172



Parkhill

John Rees

Briarwood Avenue Phase II

From CR 1255 to Avalon Drive

MIDLAND Engineering Services

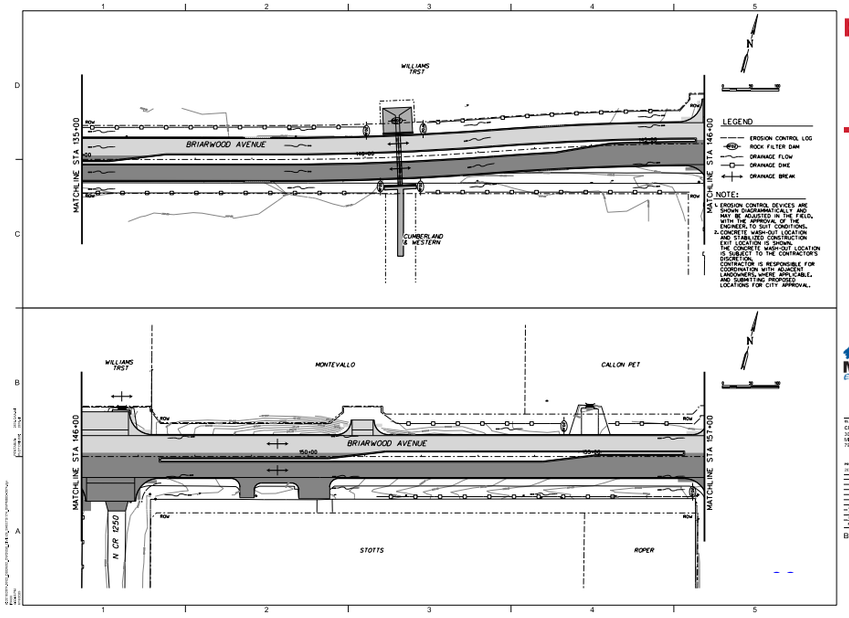
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

Project No.
007619

#	DATE	DESCRIPTION
1	08/19/2025	AS BUILT CONDITIONS
2	08/20/2025	ADDITIONAL EROSION CONTROL
3	08/20/2025	REVISED PER CITY REVIEW

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 113+00 TO
STA 135+00
SHEET 2 OF 5

173



Parkhill

John Rowe

Briarwood Avenue Phase II

From CR 1250 to Avalon Drive

MIDLAND Engineering Services

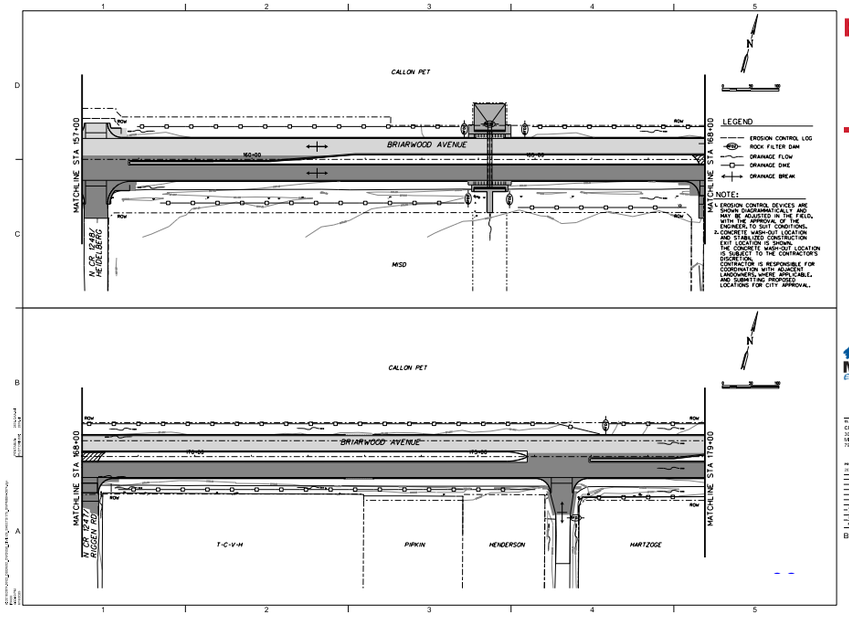
Client
City of Midland
300 N. Loraine St.
Midland, TX
79702

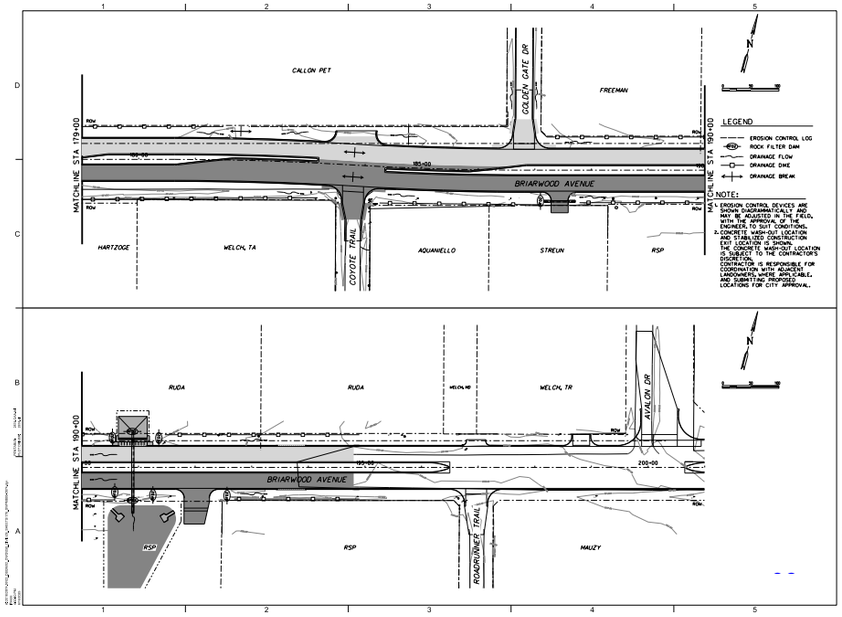
Project No.
067419

#	DATE	DESCRIPTION
1	08/19/2025	AS SUBMITTED
2	08/29/2025	INITIAL SUBMISSION
3	09/02/2025	REVISED PER COMMENTS

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 135+00 TO
STA 157+00
SHEET 3 OF 5

174


CALLON PET
BRIARWOOD AVENUE
MATCHLINE STA 157+00
MATCHLINE STA 168+00
N CR 1248/ HEIDELBERG
MSD
LEGEND
EROSION CONTROL LOG
ROCK FILTER DAM
DRAINAGE FLOW
DRAINAGE DIKE
DRAINAGE BREAK
MATCHLINE NOTE:
1. EROSION CONTROL DEVICES ARE SHOWN DIAGRAMMATICALLY AND MAY BE ADJUSTED IN THE FIELD, BY THE CONTRACTOR OR THE ENGINEER, TO SUIT CONDITIONS.
2. CONCRETE WASH-OUT LOCATION AND STABILIZED CONSTRUCTION ENTRANCE LOCATION SHOWN ON THE CONCRETE WASH-OUT LOCATION IS SUBJECT TO THE CONTRACTOR'S DISCRETION.
3. CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH ADJACENT LANDOWNERS, WHERE APPLICABLE, AND SUBMITTING PROPOSED LOCATIONS FOR CITY APPROVAL.
CALLON PET
BRIARWOOD AVENUE
MATCHLINE STA 168+00
MATCHLINE STA 179+00
N CR 1248/ RIDGEN RD
T-C-V-H
PIPKIN
HENDERSON
HARTZOGE
Parkhill
Briarwood Avenue Phase II
From CR 1250 to Avalon Drive
MIDLAND
Engineering Services
BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 157+00 TO
STA 179+00
SHEET 4 OF 5
175



Parkhill

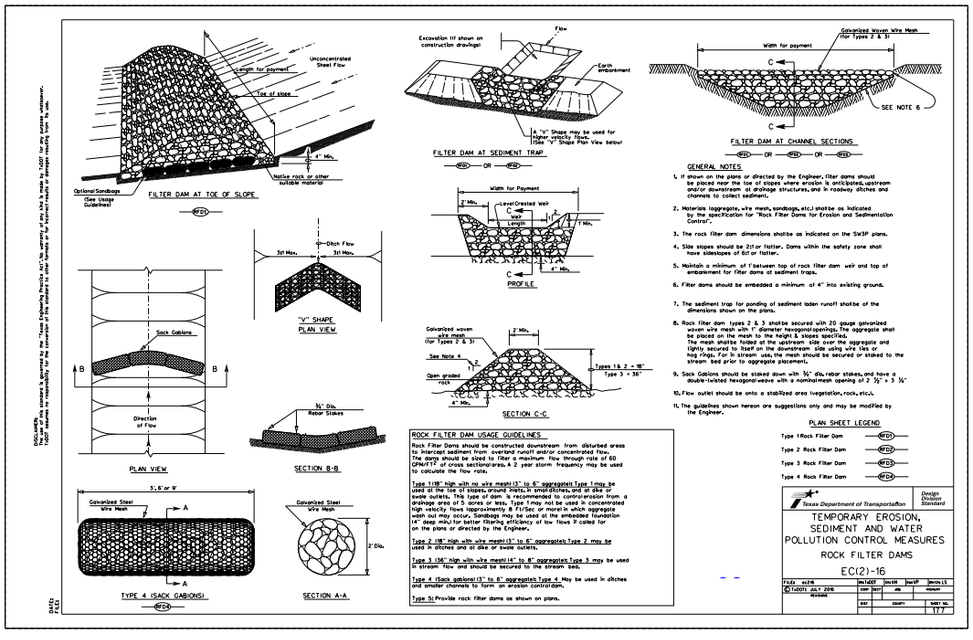
Briarwood Avenue Phase II

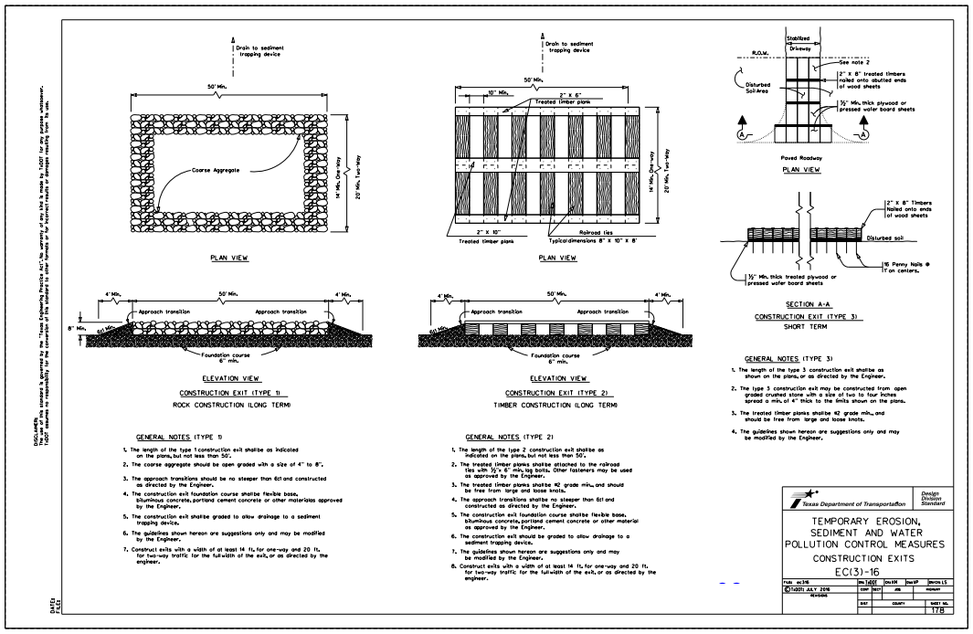
From CR 1250 to Avalon Drive

MIDLAND Engineering Services

BRIARWOOD AVENUE
EROSION
CONTROL PLAN
PHASE 2
STA 179+00 TO
END OF PROJECT
SHEET 5 OF 5

176


Width for payment
Unconcentrated Sheet Flow
Toe of slope
4" Min.
Native rock or other suitable material
Optional Sandbags (See Usage Guidelines)
FILTER DAM AT TOE OF SLOPE
WFD
Excavation (if shown on construction drawings)
Flow
Earth embankment
A "V" Shape may be used for higher velocity flows. (See "V" Shape Plan View below)
FILTER DAM AT SEDIMENT TRAP
WFD OR WFD
Width for Payment
2' Min.
Level Crested Weir
C
LENGTH
H
1' Min.
4" Min.
PROFILE
Galvanized Woven Wire Mesh (for Types 2 & 3)
Width for payment
SEE NOTE 6
FILTER DAM AT CHANNEL SECTIONS
WFD OR WFD OR WFD
Ditch Flow
3:1 Min.
3:1 Min.
"V" SHAPE
PLAN VIEW
Sack Gabions
B
Direction of Flow
PLAN VIEW
½" Dia. Rebar Stakes
SECTION B-B
Galvanized woven wire mesh (for Types 2 & 3)
2' Min.
See Note 4
Open graded rock
Type 1 & 2 = 18"
Type 3 = 36"
4" Min.
SECTION C-C
3', 6' or 9'
Galvanized Steel Wire Mesh
A
TYPE 4 (SACK GABIONS)
Galvanized Steel Wire Mesh
2' Dia.
SECTION A-A
WFD
ROCK FILTER DAM USAGE GUIDELINES
Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT² of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.
Type 1 (18" high with no wire mesh) (3" to 6" aggregate) Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at skirt of swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximately 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency at low flows if called for on the plans or directed by the Engineer.
Type 2 (18" high with wire mesh) (3" to 6" aggregate) Type 2 may be used in ditches and at dike or swale outlets.
Type 3 (36" high with wire mesh) (4" to 8" aggregate) Type 3 may be used in stream flow and should be secured to the stream bed.
Type 4 (Sack gabions) (3" to 6" aggregate) Type 4 May be used in ditches and smaller channels to form an erosion control dam.
Type 5: Provide rock filter dams as shown on plans.
GENERAL NOTES
1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream of drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized wire mesh on the upstream face of the aggregate. The aggregate shall be placed on the mesh to the height & shape specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ½" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ½".
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
PLAN SHEET LEGEND
Type 1 Rock Filter Dam WFD
Type 2 Rock Filter Dam WFD
Type 3 Rock Filter Dam WFD
Type 4 Rock Filter Dam WFD
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
ROCK FILTER DAMS
EC(2)-16
FILE: ec216
DN: TxDOT
CK: TxDOT
DW: KB
CK: MMW
©TxDOT: JULY 2016
REVISIONS
CONT: 0617
SHEET NO. 117
DGN: ec216
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DATE: FILE:



GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shallbe as indicated on the plans,but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shallbe flexible base, bituminous concrete,portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shallbe graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit,or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shallbe as indicated on the plans,but not less than 50'.
2. The treated timber planks shallbe attached to the railroad ties with 7/2 x 6" min.lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shallbe #2 grade min., and should be free from large and loose knots.
4. The approach transitions shallbe no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shallbe flexible base, bituminous concrete,portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shallbe as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shallbe #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

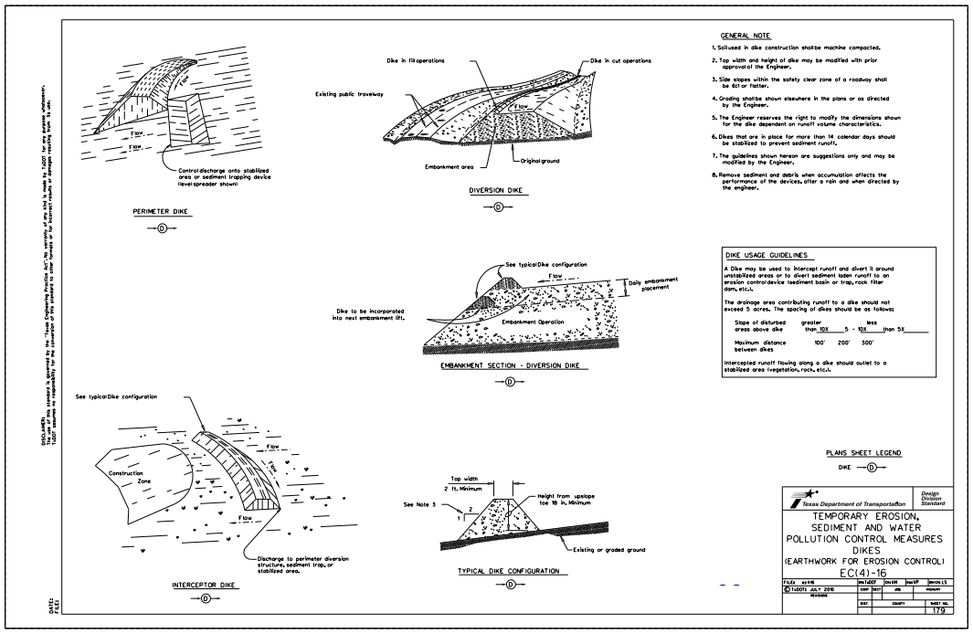
Design Division Standard

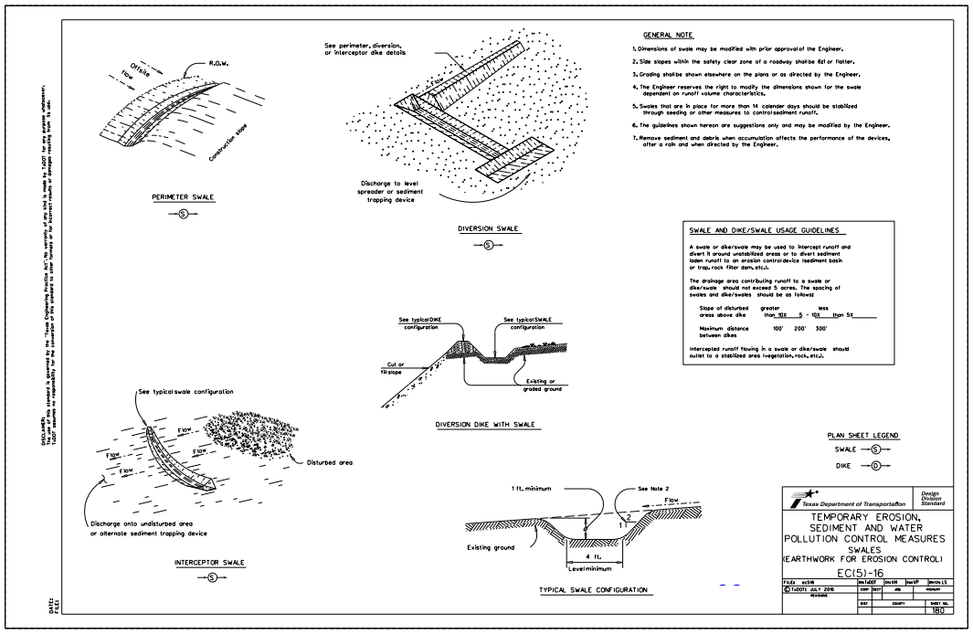
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
CONSTRUCTION EXITS
EC(3)-16

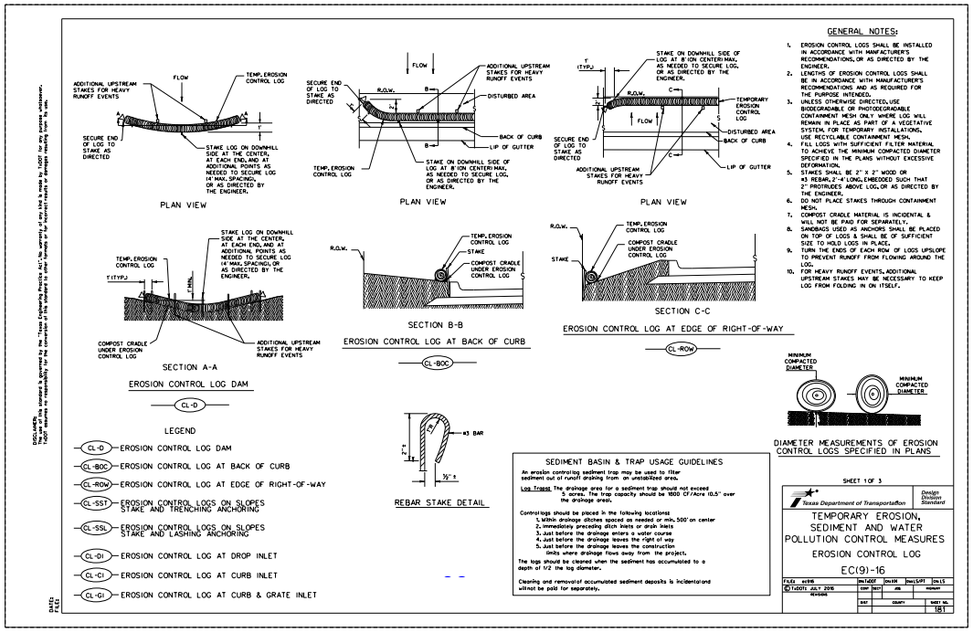
FILE: ec316	DN: TxDOT	CK: DW	DW: JR	CK: MONAHY
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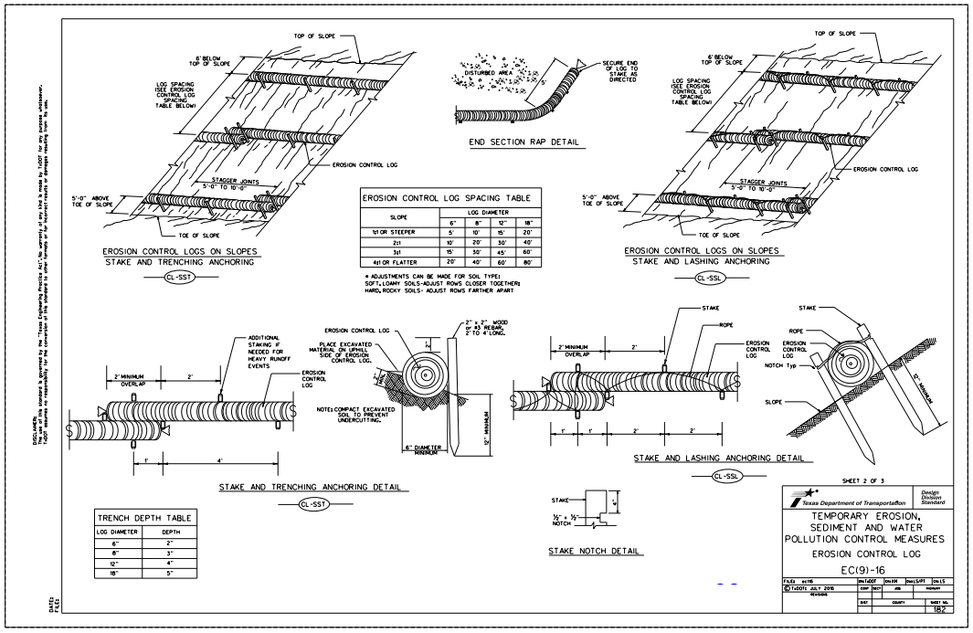
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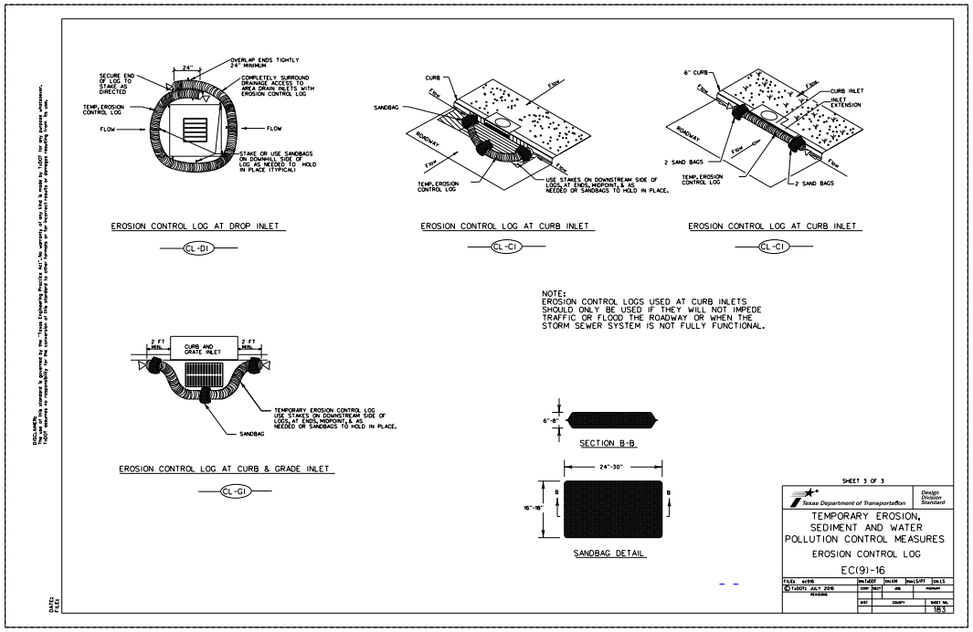
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Flow
Control discharge onto stabilized area or sediment trapping device (level spreader shown)
PERIMETER DIKE
Dike in fill operations
Dike in cut operations
Existing public traveluay
Flow
Embankment area
Original ground
DIVERSION DIKE
GENERAL NOTE
1. Soil used in dike construction shall be machine compacted.
2. Top width and height of dike may be modified with prior approval of the Engineer.
3. Side slopes within the safety clear zone of a roadway shall be 6:1 or flatter.
4. Grading shall be shown elsewhere in the plans or as directed by the Engineer.
5. The Engineer reserves the right to modify the dimensions shown for the dike dependent on runoff volume characteristics.
6. Dikes that are in place for more than 14 calendar days should be stabilized to prevent sediment runoff.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Remove sediment and debris when accumulation affects the performance of the devices, after a rain and when directed by the engineer.
See typical Dike configuration
Flow
Daily embankment placement
Dike to be incorporated into next embankment lift.
Embankment Operation
EMBANKMENT SECTION - DIVERSION DIKE
DIKE USAGE GUIDELINES
A Dike may be used to intercept runoff and divert it around unstabilized areas or to divert sediment laden runoff to an erosion control device (sediment basin or trap, rock filter dam, etc.).
The drainage area contributing runoff to a dike should not exceed 5 acres. The spacing of dikes should be as follows:
Slope of disturbed areas above dike: greater than 10% | 5 - 10% | less than 5%
Maximum distance between dikes: 100' | 200' | 300'
Intercepted runoff flowing along a dike should outlet to a stabilized area (vegetation, rock, etc.).
See typical Dike configuration
Flow
Construction Zone
Discharge to perimeter diversion structure, sediment trap, or stabilized area.
INTERCEPTOR DIKE
Top width 2' ft. Minimum
See Note 3
2
1
Height from upslope toe 18" in. Minimum
Existing or graded ground
TYPICAL DIKE CONFIGURATION
PLANS SHEET LEGEND
DIKE
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
DIKES
(EARTHWORK FOR EROSION CONTROL)
EC(4)-16
FILE: ec416
DN: TxDOT
CK: TxDOT
DW: KR
CK: KP
JULY 2016
REVISIONS
SHEET NO.
119
DATE:
FILE:


R.O.W.
Offsite flow
Construction slope
PERIMETER SWALE
See perimeter, diversion, or interceptor dike details
Flow
Discharge to level spreader or sediment trapping device
DIVERSION SWALE
GENERAL NOTE
1. Dimensions of swale may be modified with prior approval of the Engineer.
2. Side slopes within the safety clear zone of a roadway shall be 6:1 or flatter.
3. Grading shall be shown elsewhere on the plans or as directed by the Engineer.
4. The Engineer reserves the right to modify the dimensions shown for the swale dependent on runoff volume characteristics.
5. Swales that are in place for more than 14 calendar days should be stabilized through seeding or other measures to control sediment runoff.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Remove sediment and debris when accumulation affects the performance of the devices, after a rain and when directed by the Engineer.
SWALE AND DIKE/SWALE USAGE GUIDELINES
A swale or dike/swale may be used to intercept runoff and divert it around unstabilized areas or to divert sediment laden runoff to an erosion control device (sediment basin or trap, rock filter dam, etc.).
The drainage area contributing runoff to a swale or dike/swale should not exceed 5 acres. The spacing of swales and dike/swales should be as follows:
Slope of disturbed area above dike: greater than 5%; 1% - 5%; less than 1%
Maximum distance between dikes: 100' 200' 300'
Intercepted runoff flowing in a swale or dike/swale should outlet to a stabilized area (vegetation, rock, etc.).
See typical DIKE configuration
See typical SWALE configuration
Cut or fill slope
Existing or graded ground
DIVERSION DIKE WITH SWALE
PLAN SHEET LEGEND
SWALE
DIKE
See typical swale configuration
Flow
Disturbed area
Discharge onto undisturbed area or alternate sediment trapping device
INTERCEPTOR SWALE
1 ft. minimum
See Note 2
1 ft
Existing ground
4 ft.
Level minimum
TYPICAL SWALE CONFIGURATION
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
SWALES
(EARTHWORK FOR EROSION CONTROL)
EC(5)-16
FILE: ec516
DN:TxDOT
CK: TxDOT
DW: CLS
REVISIONS
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JOB
HIGHWAY
DIST
COUNTY
SHEET NO.
180
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DATE:
FILE:


ADDITIONAL UPSTREAM STAKES FOR HEAVY RUNOFF EVENTS
FLOW
TEMP. EROSION CONTROL LOG
SECURE END OF LOG TO STAKE AS DIRECTED
STAKE LOG ON DOWNHILL SIDE AT THE CENTER, AT EACH ENDS AND AT ADDITIONAL POINTS AS NEEDED TO SECURE LOG 14' MAX. SPACING, OR AS DIRECTED BY THE ENGINEER.
PLAN VIEW
SECURE END OF LOG TO STAKE AS DIRECTED
R.O.W.
ADDITIONAL UPSTREAM STAKES FOR HEAVY RUNOFF EVENTS
DISTURBED AREA
BACK OF CURB
LIP OF GUTTER
TEMP. EROSION CONTROL LOG
STAKE LOG ON DOWNHILL SIDE OF LOG AT 8' ON CENTER MAX. AS NEEDED TO SECURE LOG, OR AS DIRECTED BY THE ENGINEER.
PLAN VIEW
STAKE LOG ON DOWNHILL SIDE OF LOG AT 8'-10' ON CENTER MAX. AS NEEDED TO SECURE LOG, OR AS DIRECTED BY THE ENGINEER.
TEMPORARY EROSION CONTROL LOG
DISTURBED AREA
BACK OF CURB
LIP OF GUTTER
SECURE END OF LOG TO STAKE AS DIRECTED
ADDITIONAL UPSTREAM STAKES FOR HEAVY RUNOFF EVENTS
PLAN VIEW
STAKE LOG ON DOWNHILL SIDE AT THE CENTER, AT EACH ENDS AND AT ADDITIONAL POINTS AS NEEDED TO SECURE LOG 14' MAX. SPACING, OR AS DIRECTED BY THE ENGINEER.
TEMP. EROSION CONTROL LOG
COMPOST CRADLE UNDER EROSION CONTROL LOG
ADDITIONAL UPSTREAM STAKES FOR HEAVY RUNOFF EVENTS
SECTION A-A
EROSION CONTROL LOG DAM
CL-D
R.O.W.
TEMP. EROSION CONTROL LOG
STAKE
COMPOST CRADLE UNDER EROSION CONTROL LOG
SECTION B-B
EROSION CONTROL LOG AT BACK OF CURB
CL-BOC
R.O.W.
TEMP. EROSION CONTROL LOG
STAKE
COMPOST CRADLE UNDER EROSION CONTROL LOG
SECTION C-C
EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
CL-ROW
LEGEND
CL-D EROSION CONTROL LOG DAM
CL-BOC EROSION CONTROL LOG AT BACK OF CURB
CL-ROW EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
CL-SST EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
CL-SSL EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
CL-DI EROSION CONTROL LOG AT DROP INLET
CL-CI EROSION CONTROL LOG AT CURB INLET
CL-GI EROSION CONTROL LOG AT CURB & GRATE INLET
#3 BAR
2"±
36"±
REBAR STAKE DETAIL
SEDIMENT BASIN & TRAP USAGE GUIDELINES
An erosion controlog sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).
Contrologs should be placed in the following locations:
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the projects.
The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.
Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.
GENERAL NOTES:
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.
MINIMUM COMPACTED DIAMETER
MINIMUM COMPACTED DIAMETER
DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS
SHEET 1 OF 3
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16
FILE: ec916
DN: TxDOT
CK: TxDOT
DW: KR
CK: MUNOZ
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DATED: FEB 15


TOP OF SLOPE
6' BELOW TOP OF SLOPE
LOG SPACING (SEE EROSION CONTROL LOG SPACING TABLE BELOW)
EROSION CONTROL LOG
STAGGER JOINTS 5'-0" TO 10'-0"
5'-0" ABOVE TOE OF SLOPE
TOE OF SLOPE
EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING
CL-SST
DISTURBED AREA
SECURE END OF LOG TO STAKE AS DIRECTED
END SECTION RAP DETAIL
EROSION CONTROL LOG SPACING TABLE
SLOPE
LOG DIAMETER
6" 8" 12" 18"
1:1 OR STEEPER 5' 10' 15' 20'
2:1 10' 20' 30' 40'
3:1 15' 30' 45' 60'
4:1 OR FLATTER 20' 40' 60' 80'
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPES: SOFT, LOAMY SOILS- ADJUST ROWS CLOSER TOGETHER; HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART
TOP OF SLOPE
6' BELOW TOP OF SLOPE
LOG SPACING (SEE EROSION CONTROL LOG SPACING TABLE BELOW)
EROSION CONTROL LOG
STAGGER JOINTS 5'-0" TO 10'-0"
5'-0" ABOVE TOE OF SLOPE
TOE OF SLOPE
EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING
CL-SSL
ADDITIONAL STAKING IF NEEDED FOR HEAVY RUNOFF EVENTS
2' MINIMUM OVERLAP
2'
EROSION CONTROL LOG
1'
4'
STAKE AND TRENCHING ANCHORING DETAIL
CL-SST
EROSION CONTROL LOG
PLACE EXCAVATED MATERIAL ON UPHILL SIDE OF EROSION CONTROL LOG.
3" x 3" WOOD or #3 REBAR 2' TO 4' LONG
NOTE: COMPACT EXCAVATED SOIL TO PREVENT UNDERCUTTING.
4" DIAMETER MINIMUM
12" MINIMUM
STAKE
ROPE
2' MINIMUM OVERLAP
2'
EROSION CONTROL LOG
1'
1'
2'
2'
STAKE AND LASHING ANCHORING DETAIL
CL-SSL
STAKE
ROPE
EROSION CONTROL LOG
NOTCH Typ
SLOPE
12" MINIMUM
TRENCH DEPTH TABLE
LOG DIAMETER DEPTH
6" 2"
8" 3"
12" 4"
18" 5"
STAKE
1½" x 3½" NOTCH
STAKE NOTCH DETAIL
SHEET 2 OF 3
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16
FILE: ec16
DN: TxDOT
CK:
DW:
CK:
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OVERLAP ENDS TIGHTLY 24" MINIMUM
24"
SECURE END OF LOG TO STAKE AS DIRECTED
COMPLETELY SURROUND DRAINAGE ACCESS TO AREA DRAIN INLETS WITH EROSION CONTROL LOG
TEMP. EROSION CONTROL LOG
FLOW
FLOW
STAKE OR USE SANDBAGS ON DOWNHILL SIDE OF LOG AS NEEDED TO HOLD IN PLACE (TYPICAL)
EROSION CONTROL LOG AT DROP INLET
CL-D1
CURB
SANDBAG
ROADWAY
TEMP. EROSION CONTROL LOG
USE STAKES ON DOWNSTREAM SIDE OF LOGS AT ENDS, MIDPOINT & AS NEEDED OR SANDBAGS TO HOLD IN PLACE.
EROSION CONTROL LOG AT CURB INLET
CL-C1
6" CURB
CURB INLET INLET EXTENSION
ROADWAY
2 SAND BAGS
TEMP. EROSION CONTROL LOG
2 SAND BAGS
EROSION CONTROL LOG AT CURB INLET
CL-C1
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.
2 FT MIN.
CURB AND GRATE INLET
2 FT MIN.
TEMPORARY EROSION CONTROL LOG USE STAKES ON DOWNSTREAM SIDE OF LOGS AT ENDS, MIDPOINT & AS NEEDED OR SANDBAGS TO HOLD IN PLACE.
SANDBAG
EROSION CONTROL LOG AT CURB & GRADE INLET
CL-G1
6"-8"
SECTION B-B
24"-30"
B
L
16"-18"
B
J
SANDBAG DETAIL
SHEET 3 OF 3
Texas Department of Transportation
Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16
FILE: ec916
DN:TxDOT
CK: TxDOT
DW:
CK:
DW:LAN
CK:LS
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SHEET NO.
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CITY OF MIDLAND, TEXAS

Plans for the Construction of

AVALON DRIVE & BRIARWOOD AVE.
TRAFFIC SIGNAL PROJECT

MAYOR

LORI BLONG

COUNCIL MEMEBERS

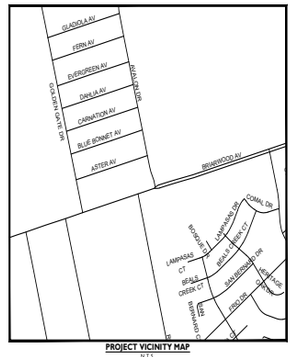
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AMY STRETCHER BURKES	DISTRICT 4
ROBIN POOLE	AT LARGE
JOHN BURKHOLDER	AT LARGE

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TOMMY GONZALEZ

ENGINEERING SERVICE DIRECTOR
GABE McCLELLAND
OFFICE: (432) 685-7983

CITY OF MIDLAND, 300 N. LORAINE ST., MIDLAND, TX 79702

100% SUBMITTAL



PROJECT VICINITY MAP
N.T.S.

MIDLAND
Engineering Services

FEBRUARY 2025

FINAL PLANS	
CONTRACTOR	
DATE CONTRACTOR BEGAN WORK	

AS BUILT	
DATE WORK WAS COMPLETED	
DATE WORK WAS ACCEPTED	
FINAL CONTRACT COST	

INDEX OF SHEET

SHEET NUMBER	SHEET TITLE
C100	COVER SHEET
C110	GENERAL NOTES
C120	QUANTITY SUMMARY
C130	CONDUIT PLAN
C131	CONDUIT TABLE
C140	SIGNAL LAYOUT PLAN
C141	SIGNAL TABLES
C150	PAVEMENT MARKING PLAN
C200	TX DOT DETAIL ED (1) 14
C201	TX DOT DETAIL ED (2) 14
C202	TX DOT DETAIL ED (3) 14
C203	TX DOT DETAIL ED (4) 14
C204	TX DOT DETAIL ED (5) 14
C205	TX DOT DETAIL ED (6) 14
C206	TX DOT DETAIL ED (7) 14
C207	TX DOT DETAIL PED (1) 23
C208	TX DOT DETAIL PED (2) 23
C209	TX DOT DETAIL RM (1) 19
C210	TX DOT DETAIL RM (2) 19
C211	TX DOT DETAIL RM (3) 19
C212	TX DOT DETAIL RM (4) 19
C213	TX DOT DETAIL SMD 98
C214	TX DOT DETAIL SPH - 85 (1) - 12
C215	TX DOT DETAIL SPH - 85 (2) - 12
C216	TX DOT DETAIL PH - C - 12
C217	TX DOT DETAIL PH - CS(PH) - 12
C218	TX DOT DETAIL PH - D - 12
C219	TX DOT DETAIL TS - ED - 12
C220	TX DOT DETAIL SUP - A - 12
C221	TX DOT DETAIL TS - CP - 21
C222	TX DOT DETAIL PH - SPH - 21
C223	TX DOT DETAIL TS - BP - 21

ANDREW L. MELLEN, P.E.
PROJECT ENGINEER

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ASSISTANT CITY ENGINEER

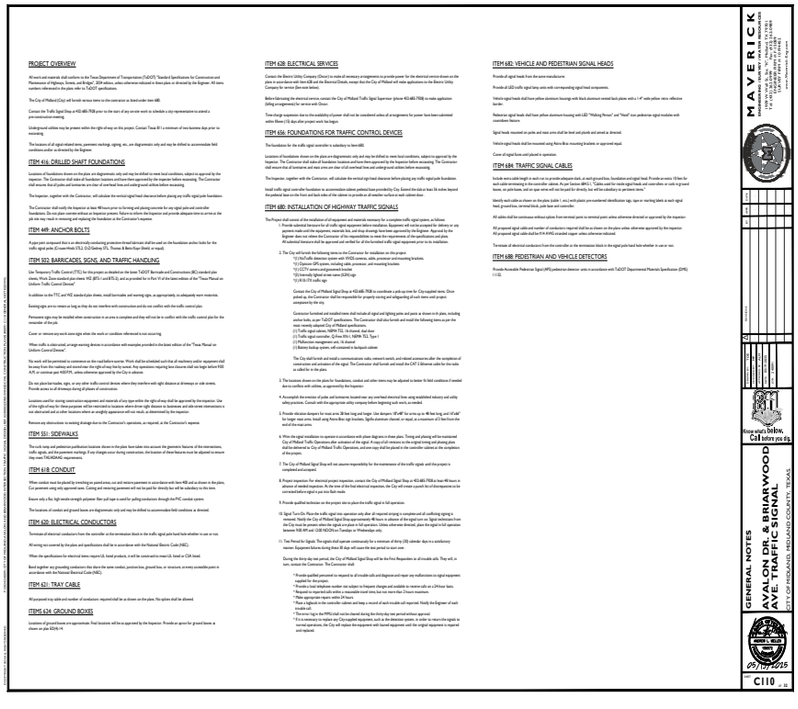
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COVER SHEET
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF MIDLAND, MIDLAND COUNTY, TEXAS

05/30/2025

C100



PROJECT OVERVIEW

All work and materials shall conform to the Texas Department of Transportation (TxDOT) "Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges", 2024 edition, unless otherwise indicated in these plans or directed by the Engineer. All items numbers referenced in the plans refer to TxDOT specifications.

The City of Midland (City) will furnish various items to the contractor as listed under item 6.80.

Contact the Traffic Signal Shop at 432-685-7508 prior to the start of any service work to schedule a city representative to attend a pre-construction meeting.

Underground utilities may be present within the right-of-way on the project. Contact Texas 811 a minimum of two business days prior to excavating.

The locations of all signal-related items, pavement markings, signing, etc., are diagrammatic only and may be shifted to accommodate field conditions under as directed by the Engineer.

ITEM 416: DRILLED SHAFT FOUNDATIONS

Locations of foundations shown on the plans are diagrammatic only and may be shifted to meet local conditions, subject to approval by the inspector. The Contractor shall stake all foundation locations and have them approved by the inspector before excavating. The Contractor shall ensure that all poles and luminaires are clear of overhead lines and underground utilities before excavating.

The Inspector, together with the Contractor, will calculate the vertical signal head clearance before placing any traffic signal pole foundation.

The Contractor shall notify the Inspector at least 48 hours prior to forming and placing concrete for any signal pole and controller foundation. The Inspector will determine the depth of the foundation based on the soil conditions encountered and provide adequate notice so arrive at the job site may result in removing and replacing the foundation at the Contractor's expense.

ITEM 449: ANCHOR BOLTS

A pipe joint waterproof shim is set electrically conducting protective threaded luminaire shall be used on the foundation anchor bolts for the traffic signal poles. (Cross-Hatch-Fit-It, 512 Osborne 515, Thomas & Betts Kopr-Shield, or equal).

ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING

Use Temporary Traffic Control (TTC) for this project as detailed on the latest TxDOT Barricade and Construction (BC) standard plan sheets. Work Zone standard plan sheets 'WZ (BTS-1 and BTS-2)', and as provided for in Part VI of the latest edition of the "Texas Manual on Uniform Traffic Control Devices".

In addition to the TTC and WZ standard plan sheets, install barricades and warning signs, as appropriately, to adequately warn motorists.

Existing signs are to remain as long as they do not interfere with construction and do not conflict with the traffic control plan.

Permanent signs may be installed when construction in an area is complete and they will not be in conflict with the traffic control plan for the remainder of the job.

Cover or remove any work zone signs when the work or condition referenced is not occurring.

When traffic is inter-timed, arrange warning devices in accordance with examples provided in the latest edition of the "Texas Manual on Uniform Control Devices".

No work will be permitted to commence on the road before noon. Work shall be scheduled such that all machinery and/or equipment shall be away from the roadway and stored near the right-of-way line by noon. Any operations requiring lane closures shall not begin before 9:00 A.M. or continue past 4:00 P.M., unless otherwise approved by the City in advance.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets. Provide access to all driveways during all phases of construction.

Locations used for storing construction equipment and materials of any type within the right-of-way shall be approved by the inspector. Use of the right-of-way for these purposes will be restricted in locations where driver sight distance to businesses and side-street intersections is not obstructed and in other locations where an unsightly appearance will not result, as determined by the inspector.

Remove any obstructions to existing drainage due to the Contractor's operations, as required, at the Contractor's expense.

ITEM 551: SIDEWALKS

The curb ramp and pedestrian pushbutton locations shown in the plans have taken into account the geometric features of the intersections, TxDOT standards, and pedestrian crossing markings. If any changes occur during construction, the location of these features must be adjusted to ensure that meets TDLR/ADAAG requirements.

ITEM 618: CONDUIT

When conduit must be placed by trenching on paved areas, cut and restore pavement in accordance with Item 400 and as shown in the plans. Cut pavement using only approved saws. Cutting and restoring pavement will not be paid for directly but will be subsidiary to this item.

Ensure only a Buy high tensile strength polyester fiber pull rope is used for pulling conductors through the PVC conduit systems.

The locations of conduit and ground boxes are diagrammatic only and may be shifted to accommodate field conditions as directed.

ITEM 620: ELECTRICAL CONDUCTORS

Terminate all electrical conductors from the controller at the termination block in the traffic signal pole hand hole whether in use or not.

All wiring not covered by the plans and specifications shall be in accordance with the National Electric Code (NEC).

When the specifications for electrical items require UL listed products, it will be construed to mean UL listed or CSA listed.

Bond together any grounding conductors that share the same conduit, junction box, ground box, or structure, at every accessible point in accordance with the National Electrical Code (NEC).

ITEM 621: TRAY CABLE

All proposed tray cable and number of conductors required shall be as shown on the plans. No splices shall be allowed.

ITEM 624: GROUND BOXES

Locations of ground boxes are approximate. Final locations will be as approved by the Inspector. Provide an apron for ground boxes as shown on plan 8224-14.

ITEM 628: ELECTRICAL SERVICES

Contact the Electric Utility Company (Oncor) to make all necessary arrangements to provide power for the electrical services shown on the plans in accordance with Item 628 and the Electrical Details, except that the City of Midland will make applications to the Electric Utility Company for service (See note below).

Before fabricating the electrical service, contact the City of Midland Traffic Signal Supervisor (phone 432-685-7508) to make application (billing arrangements) for service with Oncor.

Time-charge suspension due to the availability of a power shall not be considered unless all arrangements for power have been submitted within fifteen (15) days after principal work has begun.

ITEM 656: FOUNDATIONS FOR TRAFFIC CONTROL DEVICES

The foundations for the traffic signal controller is subsidiary to Item 680.

Locations of foundations shown on the plans are diagrammatic only and may be shifted to meet local conditions, subject to approval by the Inspector. The Contractor shall stake all foundation locations and have them approved by the Inspector before excavating. The Contractor shall ensure that all luminaires and mast arms are clear of all overhead lines and underground utilities before excavating.

The Inspector, together with the Contractor, will calculate the vertical signal head clearance before placing any traffic signal pole foundation.

Install traffic signal controller foundation to accommodate cabinet pedestal base provided by City. Extend the slab at least 36 inches beyond the pedestal base on the front and back sides of the cabinet to provide an all-weather surface at each cabinet door.

ITEM 680: INSTALLATION OF HIGHWAY TRAFFIC SIGNALS

The Project shall consist of the installation of all equipment and materials necessary for a complete traffic signal system, as follows:

1. Provide submittal literature for all traffic signal equipment before installation. Equipment will not be accepted for delivery or any payment made until the equipment, material lists, and shop drawings have been approved by the Engineer. Approval by the Engineer does not relieve the Contractor of his responsibilities to meet the requirements of the specifications and plans. All submitted literature shall be approved and not verified for all the furnished traffic signal equipment prior to its installation.

2. The City will furnish the following items to the Contractor for installation on this project:
   - *(1) EagleEye detection system with VIVID cameras, cable, processor and mounting brackets.
   - *(1) Clarion GPS system, including cable, processor, and mounting brackets
   - *(1) 332S-CT cabinet with controller
   - *(2) Internally lighted street name (S)(W) sign
   - *(1) R10-27k traffic sign

   Contact the City of Midland Signal Shop at 432-685-7508 to coordinate a pick-up time for City-supplied items. Once the items are delivered, the Contractor shall be responsible for properly receiving and safeguarding all such items until project completion by the city.

   Contractor furnished and installed items shall include all signal and lighting poles and posts as shown in th plans, including anchor bolts, as per TxDOT specifications. The Contractor shall also furnish and install the following items as per the specifications and plans. Provide all items listed below:
   - (1) Traffic signal cabinet, NEMA TS2, 16-channel, dual door
   - (1) Traffic signal controller, Q-Free 814-1, NEMA TS2, Type 1
   - (1) Malfunction management unit, 16 channel
   - (1) Battery backup system, self-contained in backpack cabinet

   The City shall furnish and install a communication radio, network switch, and related accessories after the completion of construction and activation of the signal. The Contractor shall furnish and install the CAT 5 Ethernet cable for the radio as called for in the plans.

3. The locations shown on the plans for foundations, conduit and other items may be adjusted for better fit field conditions if needed due to conflicts with utilities, as approved by the Inspector.

4. Accomplish the erection of poles and luminaires located over any overhead electrical lines using established industry and utility safety practices. Consult with the appropriate utility company before beginning work, as needed.

5. Provide vibration dampers for mast arms 28 feet long and longer. Use dampers "8"x48" for arms up to 40 feet long, and "x5 sub" for longer mast arms. Install using Astro-Brac sign brackets, 3ghtly aluminum channel, or equal, at a maximum of 5 feet from the end of the mast arms.

6. Wire the signal installation to operate in accordance with phase diagrams in these plans. Timing and phasing will be maintained City of Midland Traffic Operations after activation of the signal. A copy of all revisions to the original timing and phasing plans shall be delivered to City of Midland Traffic Operations, and a new copy shall be placed in the controller cabinet at the completion of the project.

7. The City of Midland Signal Shop will not assume responsibility for the maintenance of the traffic signals until the project is completed and accepted.

8. Project inspection: For electrical project inspection, contact the City of Midland Signal Shop at 432-685-7508 at least 48 hours in advance of needed inspection. At the time of the final electrical inspection, the City will create a punch list of discrepancies to be corrected before signal is put into flash mode.

9. Provide qualified technician on the project site to place the traffic signal in full operation.

10. Signal Turn-On: Place the traffic signal into operation only after all requested striping is completed and all conflicting striping is removed. Notify the City of Midland Signal Shop approximately 48 hours in advance of the signal turn-on. Signal technicians from the City must be present when the signals are placed in full operation. Unless otherwise directed, place the signal in full operation between 9:00 AM and 12:00 NOON on Tuesday or Wednesday only.

11. Two Period Set Signals. The signals shall operate continuously for a minimum of thirty (30) calendar days in a satisfactory manner. Equipment failures during these 30 days will cause the test period to start over.

    During the thirty-day test period, the City of Midland Signal Shop will be the First Responders to all trouble calls. They will, in turn, contact the Contractor. The Contractor shall:

    - * Provide qualified personnel to respond to all trouble calls and diagnose and repair any malfunctions to signal equipment supplied for the project.
    - * Provide a local telephone number not subject to frequent changes and available to receive calls on a 24-hour basis.
    - * Respond to trouble calls within two hours. Provide trouble-shoot times but not more than 2 hours maximum.
    - * Make appropriate repairs within 24 hours.
    - * Place a logbook in the controller cabinet and keep a record of each trouble call reported. Notify the Engineer of each trouble call.
    - * Extend or log in the 30PD₁ shall not be cleared during this thirty-day test period without approval.

    If the signal equipment fails to perform satisfactorily during the test period, or fails to operate in order to return the signals to normal operation, the City will replace the equipment with new or like equipment and the original equipment is repaired and replaced.

ITEM 685: VEHICLE AND PEDESTRIAN SIGNAL HEADS

Provide all signal heads from the same manufacturer.

Provide all LED traffic signal lamp units with corresponding signal head components.

Vehicle signal heads shall have yellow aluminum housings with black aluminum vented back plates with a 1-4" visible yellow retro reflective border.

Pedestrian signal heads shall have yellow aluminum housing with LED "Walking Person" and "Hand" icon pedestrian signal modules with countdown feature.

Signal heads mounted on poles and mast arms shall be level and plumb and oriented as directed.

Vehicle signal heads shall be mounted using Astro-Brac mounting brackets or approved equal.

Cover all signal faces until placed in operation.

ITEM 684: TRAFFIC SIGNAL CABLES

Include service cable length in each run to provide adequate slack, at each ground box, foundation and signal head. Provide no excess 12 feet for each cable terminated in the controller cabinet. As per Section 684.5.1, "Cables used for inside signal heads and cord sets or cords in ground boxes, on pole bases, and on span wires will not be paid for directly, but will be subsidiary to pertinent items."

Identify each cable as shown on the plans (cable 1, etc.) with plastic pre-numbered identification tags, tape or marking labels at each signal head, ground box, terminal block, pole base and controller.

All cables shall be continuous without splices from terminal point to terminal point unless otherwise directed or approved by the inspector.

All proposed signal cables and number of conductors required shall be as shown on the plans unless otherwise approved by the inspector. All proposed signal cables shall be #14 AWG stranded copper unless otherwise indicated.

Terminate all electrical conductors from the controller at the termination block in the signal pole hand hole whether in use or not.

ITEM 688: PEDESTRIAN AND VEHICLE DETECTORS

Provide Accessible Pedestrian Signal (APS) pedestrian detector units in accordance with TxDOT Departmental Materials Specification (DMS) 11-02.

MAVERICK
TRAFFIC & LIGHTING
1109 W. Loop 250 N. Ste. "A" Midland, TX 79705
(432) 682-1112 FAX (432) 682-1113
TBPE FIRM REGISTRATION #: F-3199
TBPELS FIRM REGISTRATION #: 10194396

NO.	DATE	BY	DESCRIPTION
1	09/19/25		

GENERAL NOTES
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF MIDLAND, MIDLAND COUNTY, TEXAS

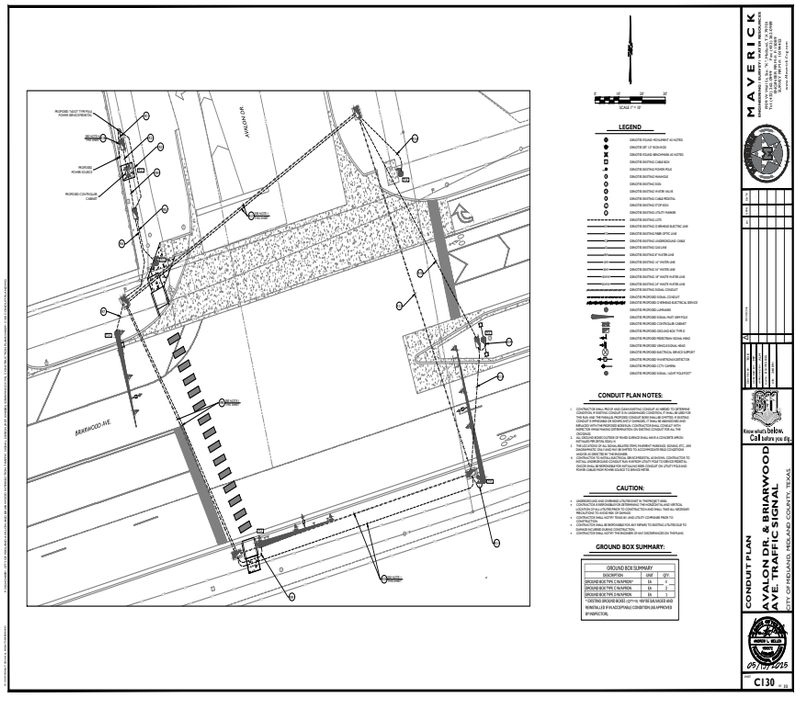
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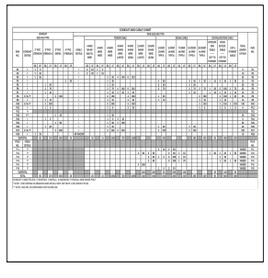
C110 of 32

Texas law requires that you call before you dig.
Call before you dig.

ESTIMATE OF QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
104 0601	CRAL SAWT (FIBER) PAVE (FULL)	LF	0
105 7616	CRAL SAWT (FIBER) PAVE (FULL)	LF	1016
105 7617	CRAL SAWT (FIBER) PAVE (FULL)	LF	1016
105 7618	CRAL SAWT (FIBER) PAVE (FULL)	LF	1016
300 7001	THERMOPLASTIC	SY	1
310 7015	15 IN SLIP BASE W/ 6 CONN TO LEG	EA	4
416 7005	CONCRETE (CLASS C) (FLUME)	LF	30
416 7007	CONCRETE (CLASS C) (FLUME)	LF	30
416 7021	CONCRETE (CLASS C) (FLUME)	LF	60
416 7048	CONCRETE (CLASS C) (FLUME)	LF	30
420 7001	CONCRETE (CLASS C) (FLUME)	LF	30
420 7006	CLASS C (CHAN) (FLUME)	LF	60
420 7008	CLASS C (CHAN) (FLUME)	LF	30
420 7011	CLASS C (CHAN) (FLUME)	LF	30
420 7013	CLASS C (CHAN) (FLUME)	LF	30
421 7001	CRIB WALL (CLASS A)	LF	30
421 7002	CRIB WALL (CLASS A)	LF	30
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421 7495	CRIB WALL (CLASS A)	LF	30
421 7496	CRIB WALL (CLASS A)	LF	30
421 7497


AVALON DR.
BRIARWOOD AVE.
SCALE: 1" = 30'
LEGEND
CONDUIT PLAN NOTES
CAUTION:
GROUND BOX SUMMARY:
GROUND BOX SUMMARY
DESCRIPTION
UNIT
QTY.
GROUND BOX TYPE 3 (NAMPEN)
Ea.
4
GROUND BOX TYPE 2 (NAMPEN)
Ea.
3
GROUND BOX TYPE 1 (NAMPEN)
Ea.
1
* CONSTRUCTION SPLICING BOXES: (QTY=4) METER SALVAGED AND
REINSTALLED IF IN ACCEPTABLE CONDITION OR AS APPROVED
BY INSPECTOR.
MAVERICK
CONSULTING, INC.
CONDUIT PLAN
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND VILLAGE, DENTON COUNTY, TEXAS
05/19/2025
C130



HOME RUN CABLE TERMINATION CHART

CNDR NO.	CONDUCTOR COLOR	CAB2.1 to MMU (DOOR) TB NUMB	CAB2.2 to MMU (DOOR) TB NUMB	CAB2.3 to MMU (DOOR) TB NUMB	CAB2.4 to MMU (DOOR) TB NUMB	CAB2.5 to MMU (DOOR) TB NUMB
1	BLACK	SPARE	SPARE	SPARE	SPARE	SPARE
2	WHITE	SH EQM	SH EQM	SH EQM	SH EQM	SH EQM
3	RED	SH 1-2 EQM	SH 3,4,5 EQM	SH 1&2,3,4 EQM	SH 1&2,3,4,5 EQM	SH 1&2 EQM
4	GREEN	SH 1-2 EQM	SH 3,4,5 EQM	SH 1&2,3,4 EQM	SH 1&2,3,4,5 EQM	SH 1&2 EQM
5	ORANGE	SPARE	SH 3,4,5 INT.	SH 1&2,3 INT.	SH 1&2,3,4,5 INT.	SPARE
6	BLUE	SPARE	SPARE	SPARE	SPARE	SPARE
7	WHITE/BLACK	SPARE	SPARE	SPARE	SPARE	SPARE
8	RED/BLACK	SH 1-2 EQM	SPARE	SPARE	SPARE	SPARE
9	GREEN/BLACK	SH 1-2 EQM	SH 3 EQM	SH 1&2 EQM	SPARE	SPARE
10	ORANGE/BLACK	SPARE	SPARE	SH 3 CLKTL	SPARE	SPARE
11	BLUE/BLACK			SPARE	SPARE	
12	BLUE/WHITE			SPARE	SH 1-2 INT.	
13	RED/WHITE			SPARE	SH 1-2 INT.	
14	GREEN/WHITE			SPARE	SH 1-2 INT.	
15	BLUE/WHITE			SPARE	SH 1-2 INT.	
16	BLACK/RED			SPARE	SPARE	
17	WHITE/RED			SPARE	SPARE	
18	ORANGE/RED			SPARE	SPARE	
19	BLUE/RED			SPARE	SPARE	
20	RED/GREEN			SPARE	SPARE	

NOTE: ACTUAL CABLES MAY VARY.

NOTE: INDICATIONS, CABLES FROM CONTROLLER CABINET(TYCO2070-1) CABLE#2, PLUG#1 AT FOR APPLYING TO BOTTOM.

MAVERICK
TRAFFIC ENGINEERING & SIGNAL DESIGN
2101 W. Pipeline Rd., Ste. 114, Hurst, TX 76054
Phone: 817-282-0263 Fax: 817-282-0264
Email: mail@maverick-tx.com
TBPE Firm Registration No. F-14439

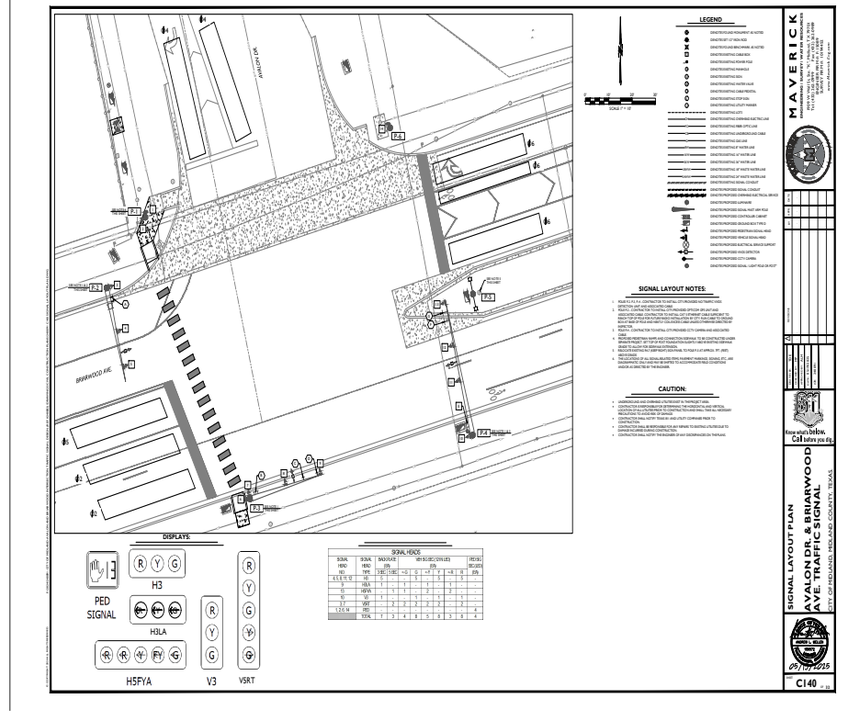
NO.	DESCRIPTION	DATE
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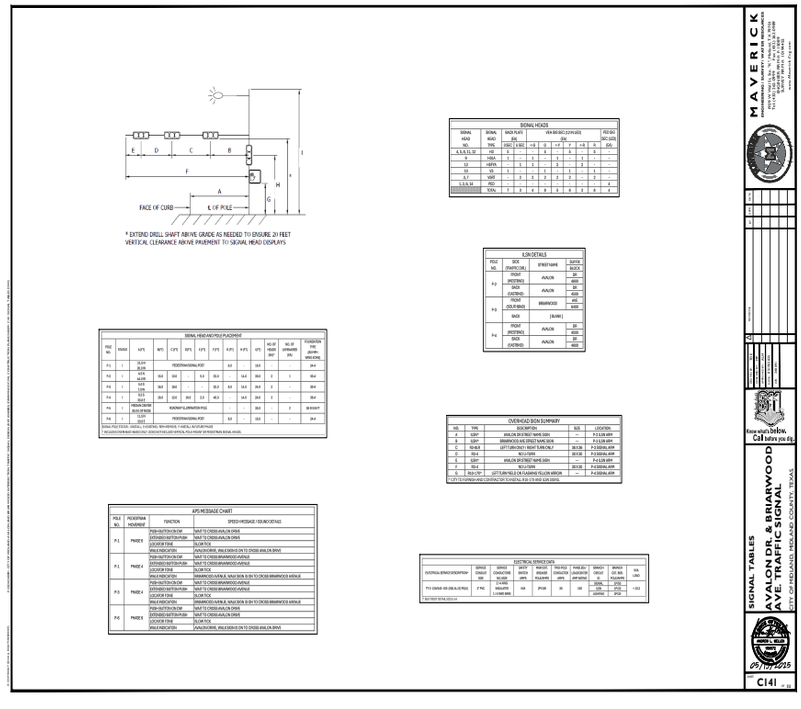
Know what's below. Call before you dig.

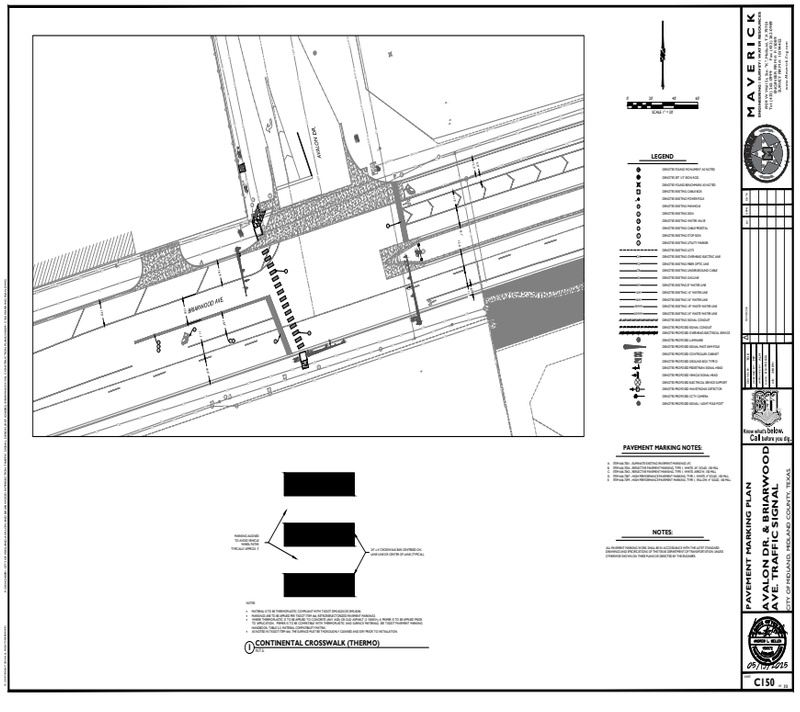
CONDUIT TABLES
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND VILLAGE DENTON COUNTY, TEXAS

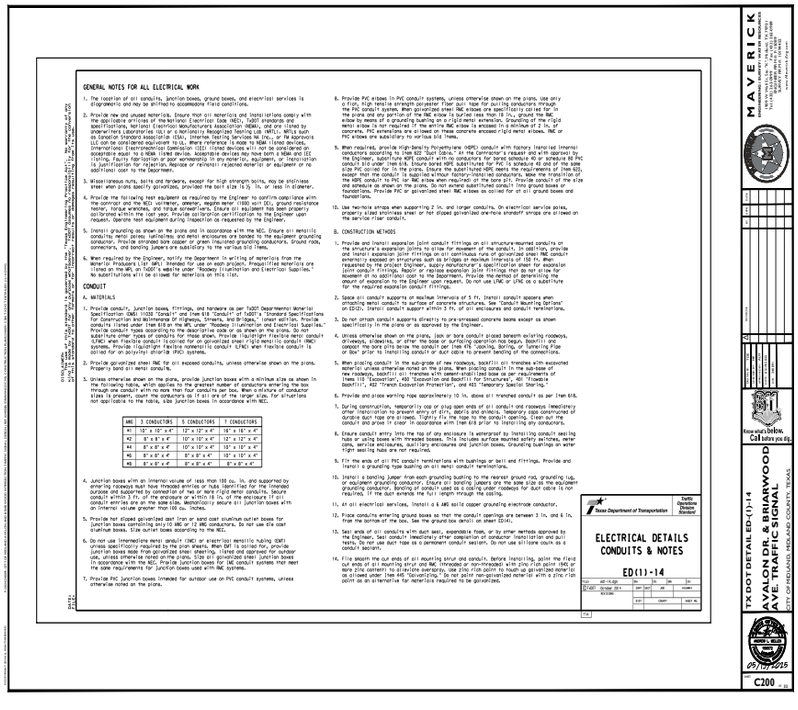
05/19/2025

CI31 of 33


AVALON DR.
BRIARWOOD AVE.
LEGEND
SIGNAL LAYOUT NOTES
CAUTION
DISPLAYS
H3
PED SIGNAL
H3LA
H5FYA
V3
VSRT
SIGNAL HEADS
MAVERICK
SIGNAL LAYOUT PLAN
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND VILLAGE DENTON COUNTY, TEXAS
05/19/2025
C140


E
D
C
B
F
A
FACE OF CURB
℄ OF POLE
H
G
I
* EXTEND DRILL SHAFT ABOVE GRADE AS NEEDED TO ENSURE 20 FEET VERTICAL CLEARANCE ABOVE PAVEMENT TO SIGNAL HEAD DISPLAYS
SIGNAL HEADS
SIGNAL HEAD NO.
SIGNAL HEAD TYPE
SHOP PLATE (LH)
VEH 300 MC (12IN LED) (RH)
PED 150 (MC LED)
SIDE
REAR
SIDE
REAR
SIDE
REAR


AVALON DR.
BRIARWOOD AVE
SCALE 1" = 20'
LEGEND
PAVEMENT MARKING NOTES:
NOTES:
CONTINENTAL CROSSWALK (THERMO)
SCALE: 1" = 5'
MAVERICK
PAVEMENT MARKING PLAN
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND VILLAGE, DENTON COUNTY, TEXAS
09/10/2025
C150



GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and encroachment services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable portions of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Ltd., or MET Laboratories, Inc. are acceptable. Devices that are marked with the International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any materials, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is 5/8 in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: ohmmeter, ammeter, megohmmeter 1000 volt DC), ground-resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated by a NIST traceable calibration service within the past year. Furnish when requested. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits, metal poles, luminaires, and metal enclosures are bonded to the equipment grounding conductor. Ground all electrical systems as shown on the plans and manufacturer's instructions. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Materials Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL under Item 610, "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification DMS 11028 "Conduit" and Item 618 "Conduit" of TxDOT's Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges," latest edition. Provide conduit of the type, size, and trade number as shown on the plans and in the bid tabulations. Provide conduit types according to the description code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized sheet-rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized sheet RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conductors per box. When a mixture of conductor sizes is contained in a box, provide a box size based on the largest size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#14	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#12	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#10	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#4	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an interior volume of less than 100 cu. in. and supported by entering roadways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only #6 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a high, high tensile strength polyester fiber duct tape for pulling conductors through the PVC conduit system. When galvanized sheet RMC elbows are specifically called for in the PVC conduit system, provide a transition from the PVC conduit to the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

7. When required, provide high-density polyethylene (HDPE) conduit with factory installed internal conductors according to Item 620 "Duct Cable." At the Contractor's request and with approval by the Engineer, the Department will allow substitution of HDPE conduit for PVC or RMC conduit 3/4 conduit 3/4 under Item 618. Ensure bored HDPE substitutes for PVC in schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 620, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC or RMC elbow when required at the bore pit. Provide conduit of the size and type called for in the plans for the portion of the conduit installed above the bore pit. Provide PVC or galvanized steel RMC elbows as called for on all ground boxes and foundations.

8. Use heatshrink straps when supporting 2 in. and larger conduits. On electrician service poles, use only 3-band stainless steel or hot dipped galvanized premade standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits or the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized sheet RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint fittings. Provide fittings that are designed to accommodate 4 in. of conduit axial movement or as additional load to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFNC or LFMC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specified in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or other the base or surfacing operation has begun. Backfill and compact the bore pits before the conduit per Item 416 "Drilling, Boring, or Tunneling Pilot or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material, flowable backfill, or cement-stabilized base as per requirements of new roadways. Backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted battery switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on other than sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a coring under roadways for duct cable is not required. If the duct extends the full length through the coring.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all exporting since and conduit. Before installing, paint the field cut threads on all galvanized RMC with a zinc-rich primer conforming to Item 445 "Galvanizing." Use more zinc content to minimize overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS
CONDUITS & NOTES
ED(1)-14

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C200 of 22

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification DMS-11040, "Conductors," and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors as follows: Phase conductors shall have black insulation, neutrals shall have white insulation. Identify grounding conductors #6 AWG and smaller by continuous green insulation or bare conductors. Identify ungrounded limit conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the entire system. Identify conductors #4 AWG and larger by continuous green insulation or by green tape. Identify conductors #6 AWG and smaller by green sleeve or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper #4 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS-11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two arrows, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in pull boxes and 3 ft. minimum, 5 ft. maximum length for each conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical service enclosures. Splice conductors using compression connectors, screw type, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight seal. Use heat shrink tubing that has a minimum recovery ratio of 3 to 1. Apply both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the heat shrink tubing and the conductor. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the wire. Clean conductors before splicing or terminating. Damaged individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not reuse damaged conductors with duct tape, electrician tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors 8 AWG and smaller when those conductors pass through a breakaway support device. Follow manufacturer's instructions for installation. Use a calibrated torque wrench to achieve proper torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings for the number of openings factory sealed. Use pressurfilled breakaway connectors as shown on the plans.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are electrically continuous and accessible at junction, pull, and termination points. For flexible conduit installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors on grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 18 in. above grade vertically and more than 3 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile communication equipment, ensure the conductors are buried a minimum of 12 in. deep and are the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS-11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plan sheets. Provide grounding electrodes according to NEC article 250 for specific locations including electrical services, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Function auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

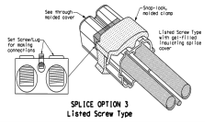
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

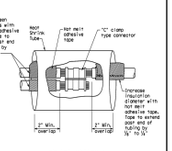
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

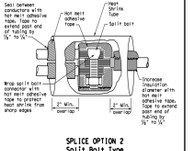
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 3
Listed Screw Type



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type

Texas Department of Transportation
Traffic Operations Division Standard

ELECTRICAL DETAILS
CONDUCTORS

ED(3)-14

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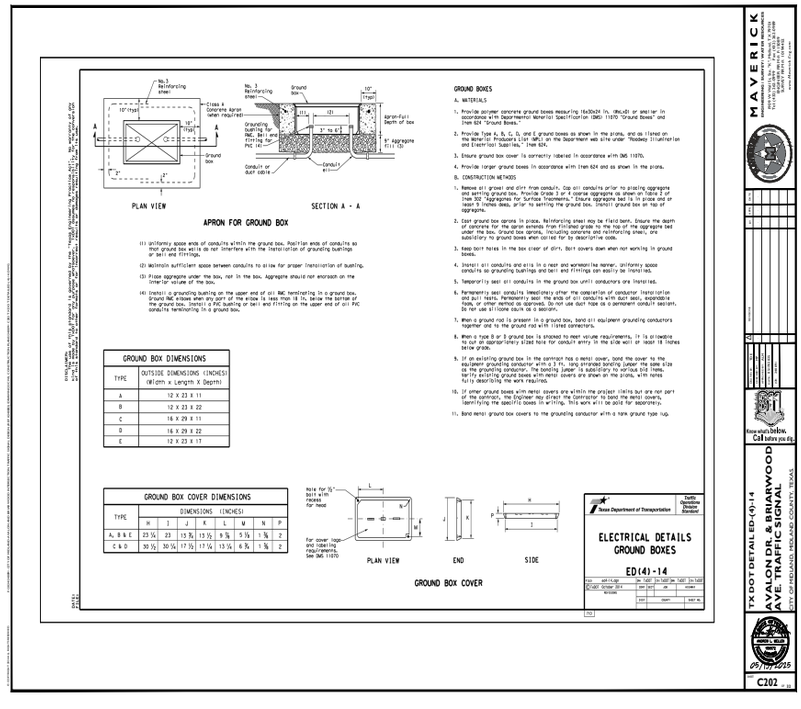
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APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ensure the bushing is bonded and the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS

TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS

TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 ½	23	15 ⅜	13 ½	9 ⅜	5 ⅛	1 ⅜	2
C & D	30 ½	30 ¾	17 ½	17 ¼	13 ¼	6 ⅜	1 ⅜	2

GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (HxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 5 or 6 coarse aggregate as shown in Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 6 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Open ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and slip in a neat and workmanlike manner, uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type D or E ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 Ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a new ground type lug.

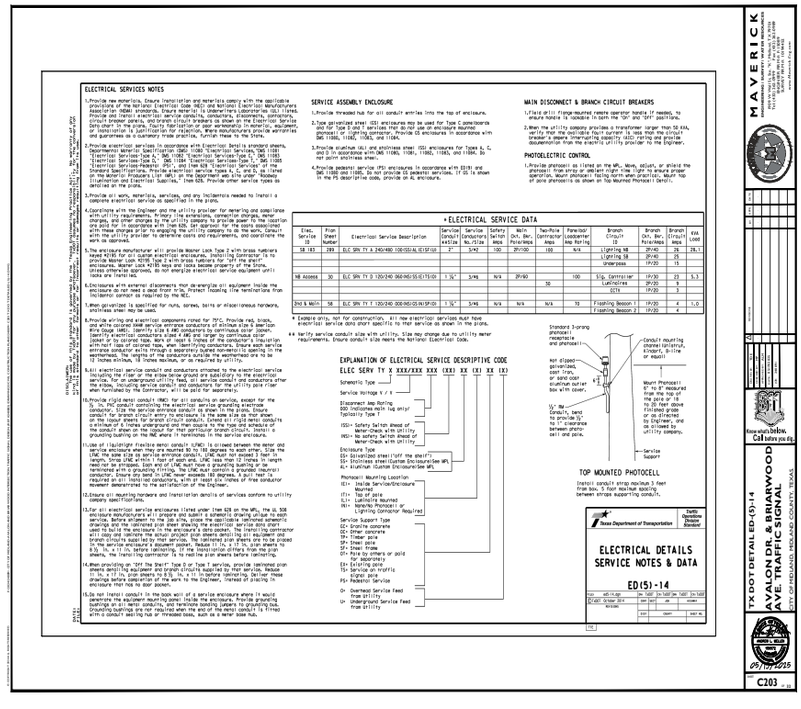
Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

ED(4)-14

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ELECTRICAL SERVICES NOTES

1. Provide new materials, ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed.
2. Provide electrical services, including but not limited to, service entrance conductors, circuit breaker panels, and branch circuits breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation will be rejected. Provide products that are standard with the manufacturer and guaranteed as a customary trade practice, furnish these to the State.
3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.
4. Coordinate with the Engineer and the utility provider for metering and compliance with the utility company's service drop requirements. Any utility company charges, like meter charges, to the utility company, is provided under the respective bid line item and are paid for in accordance with Item 626. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.
5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers for "Off the Shelf" enclosures. Where enclosures are specified to be keyed alike, provide Master Lock #2700 Type 2 with brass tumblers for "Off the Shelf" enclosures. Master Lock #2191 keys and locks become property of the State. Where keyed alike is approved, do not energize electrical service equipment until locks are installed.
6. Enclosures with screened disconnects must de-energize all equipment inside the enclosure do not need a dead front. In lieu, protect exposing the terminations from incidental contact as required by the NEC.
7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.
8. Provide wiring and electrical components rated for 75°C. Provide red, black, white, and green conductors for all electrical conductors #6 AWG and smaller (Amer. Wire Gauge (AWG). Identify size 4 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket, with color tape, or with color ink. Identify the grounded (neutral) conductor with hot tape of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed nonmetallic opening in the service enclosure. Ensure the length of conductor extending beyond the box is no less than 12 inches minimum, 18 inches maximum, or as required by utility.
9. All electrical service conduit and conductors attached to the electrical service including that part of the wiring below ground are subsidiary to the electrical service. The conductors in the service drop from the utility pole to the point of connection at the widow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.
10. Provide rigid metal conduit (RMC) for all conduits on service, except for the 3/4 inch PVC conduit containing the electrical service grounding electrode conductor. Ensure the grounding electrode conductor is installed in a separate conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits from the top of the service enclosure to the bottom of the service enclosure. Use the conduit shown on the layout for that particular branch circuits. Install a grounding bushing on the RMC where it terminates in the service enclosure.
11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Torque LFMC within 1 foot of each end. LFMC less than 12 inches in length must be bonded with a bonding jumper. The LFMC must be terminated with a grounding fitting. The LFMC must contain a grounded neutral conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull mark is required on the LFMC to determine if the conductor has any degrees of free conductor movement predetermined to the satisfaction of the Engineer.
12. Ensure all mounting hardware and installation details of services conform to utility company specifications.
13. For all electrical service enclosures listed under Item 626 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable reinforced schematic drawings and the reinforced plan sheets showing the electrical service data sheet used to build the enclosure in the enclosure's data packet. The training contractor will verify that the schematic drawing is correct and matches the service and branch circuits supplied by that service. The reinforced plan sheets are to be placed in the service enclosure's document packet. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in. before reinforcing. For 8 1/2 in. x 11 in. plan sheets that are not reinforced with a grounding fitting. The training contractor is to redline plan sheets before laminating.
14. When providing an "Off The Shelf" Type D or Type F service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pockets.
15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings for all conduits entering the service enclosure. Provide grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.
2. Type galvanized sheet (GS) enclosures may be used for Type C pedestrian and for Type D and F services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.
3. Provide stainless (SS) and aluminum sheet (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless sheet.
4. Provide pedestal service (PS) enclosures in accordance with SS(R) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is capable to turn the "On" and "Off" positions.
2. When the utility company provides a transformer larger than 50 kVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Mount, adjust, or shield the photocell so that it is oriented to receive light rays from the sky for proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

ELECTRICAL SERVICE DATA

Elec. Service ID	Prin Sheet Number	Electrical Service Description	Service Conduit Existing	Service Conductors No./Size	Safety Switch Amps	Meter Mtr. Ser. Provisions	Two-Pole Contractor Amps	Panelboard/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Ser. Provisions	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 1Ø0/3SU AL 60 SP 01R	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	24	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 3Ø0/4W/3S 01/1 SP 01	1 ¼"	3/#6	N/A	2P/60		100	¼ SL Controller Luminaires	1P/20	22	5.3
							30			2P/20	3	
									CCTV	1P/20	5	
2nd & Main	58	ELC SRV TY F 120/240 3Ø0/4W/3S 01/1 SP 01	1 ¼"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National Electrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

- Schematic Type
- Service Voltage X / X
- Disconnect Amp Rating
  000 Indicates meter lug only
  Typically Type I
- 1SOS= Safety Switch Ahead of Meter-Check with Utility
  1NSS= No safety Switch Ahead of Meter-Check with Utility
- Enclosure Type
  GS= Galvanized sheet/"off the shelf"
  SS= Stainless steel/Custom Enclosure/See MPL
  AL= Aluminum Custom Enclosure/See MPL
- Photocell Mounting Location
  IS1= Inside Service/Enclosure Mounted
  IT1= Top of pole
  TL1= Luminaire Mounted
  IN1= Separate Photocell or Lighting Contractor Required
- Service Support Type
  CC= Granite concrete
  OC= Other concrete
  SP= Steel pole
  TP= Timber pole
  SF= Sheet frame
  OY= Pole by others or pold for laboratory
- Ele Ser Ty = Service Type
  TS= Service on traffic signal pole
  PS= Pedestrian Service
- O= Overhead Service Feed from Utility
- U= Underground Service Feed from Utility

TOP MOUNTED PHOTOCELL

Install conduit strap no more than 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5)-14

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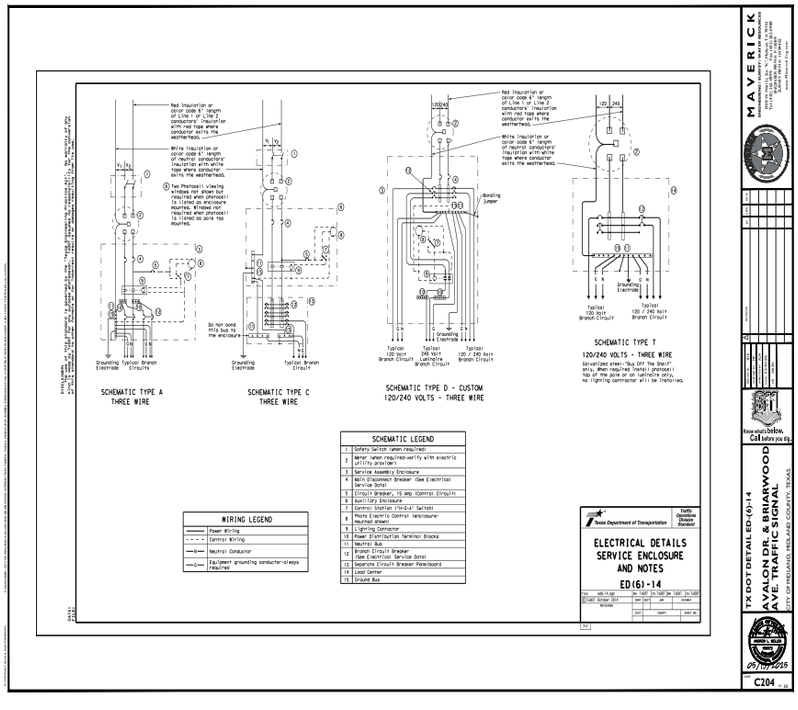
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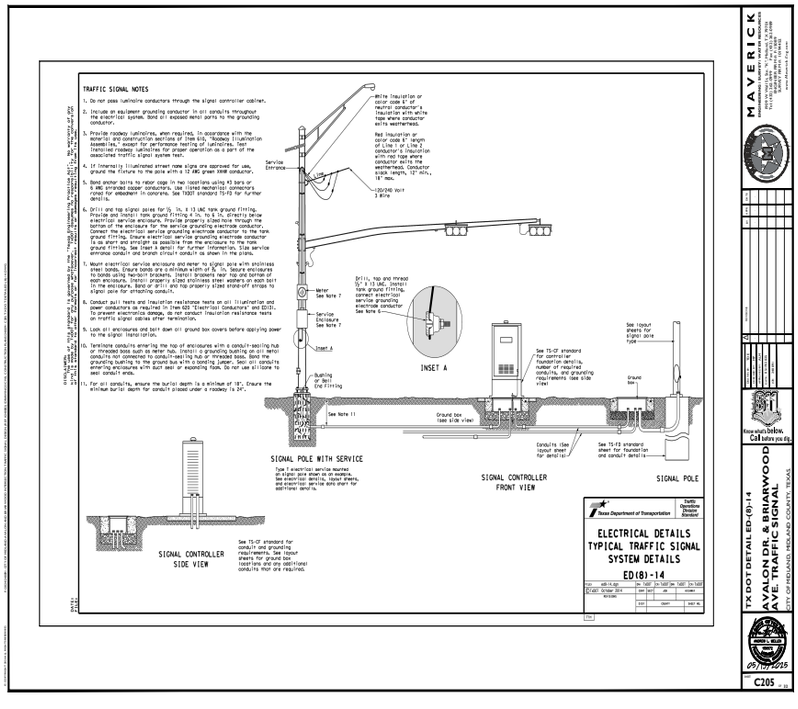
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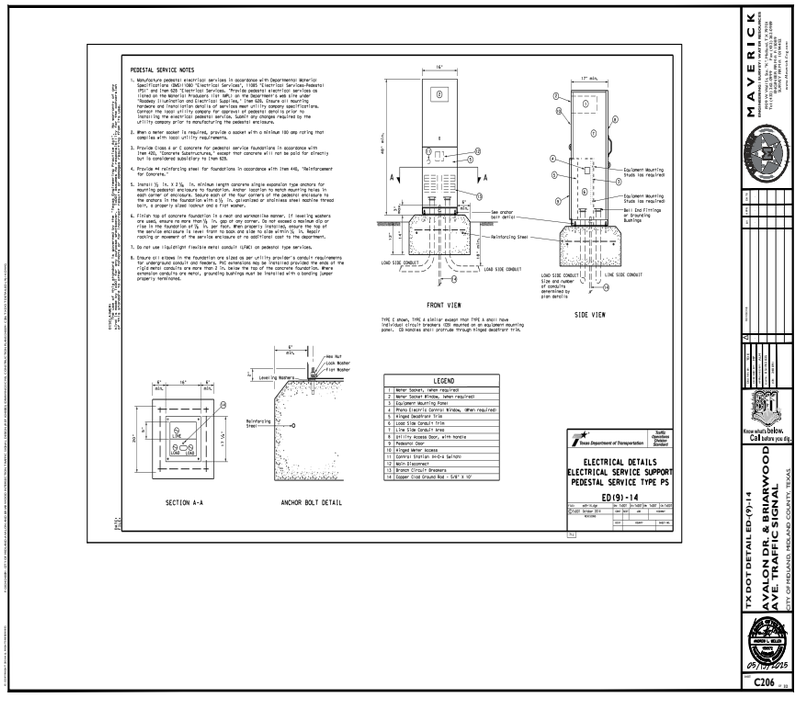
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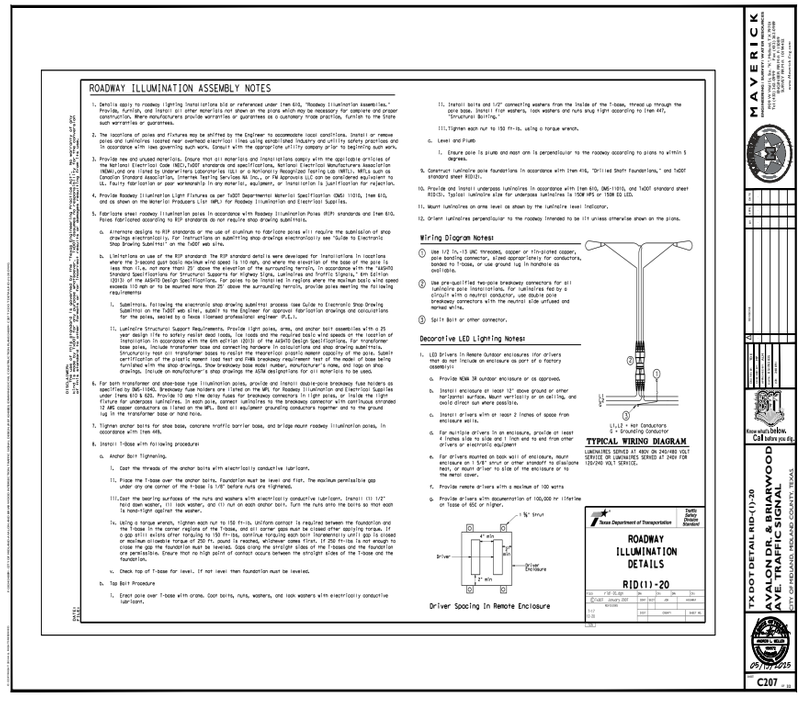
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C204


TRAFFIC SIGNAL NOTES
1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," and the details for mounting of luminaires. Test intensified roadway luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rigged for embedment in concrete. See TXDOT standard TS-FD for further details.
6. Drill and tap signal poles for ½ in. X 13 UNC rank ground fitting. Drill, tap and thread a hole in the pole for the ½ in. rank ground fitting. Route electrical service encasement/conduit through a properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the rank ground fitting. Ensure electrical service grounding electrode conductor is #6 AWG minimum copper conductor. Use listed mechanical connector to ground fitting. See Sheet A details for further information. Size all service entrance conduit and branch circuit conduit as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands using two-hole bracket. Install bracket so that it is parallel to bands using two-hole brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Bond or drill and tap properly sized stand-off straps to signal pole for grounding conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and Ed(1). To prevent electrical damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".
White insulation or color code 'K' neutral conductor's insulation with white tape where conductor exits weatherhead.
Red insulation or color code 'K' (ungrn or blue if 3 conductor cable) insulation with red tape where conductor exits the weatherhead. Conductor tails lengths, 12" min., 18" max.
Service Entrance
120/240 Volt 3 Wire
Meter See Note 7
Service Enclosure See Note 7
Inset A
Bushing or Bell (no fitting)
See Note 11
Drill, tap and thread a hole in the pole for rank ground fitting, connect electrical service grounding electrode conductor See Note 6.
INSET A
See TS-07 standard for controller foundation details, conduit sizing, conduits, and grounding requirements (see side view)
Ground box
See layout sheets for signal pole type
Ground box (see side view)
SIGNAL POLE WITH SERVICE
Type 1 electrical service mounted on signal pole shown as an example. See Sheet A for service equipment, and electrical service data sheet for additional details.
SIGNAL CONTROLLER FRONT VIEW
Conduits (See layout sheet for conduits)
See TS-FD standard sheet for foundation and conduit details.
SIGNAL POLE
SIGNAL CONTROLLER SIDE VIEW
See TS-07 standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.
Texas Department of Transportation
Traffic Operations Division Standard
ELECTRICAL DETAILS
TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS
ED(8)-14
FILE: ed8-14.dgn
DN: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT
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REVISIONS
CONT SECT JOB HIGHWAY
DIST COUNTY SHEET NO.
MAVERICK
TX DOT DETAIL ED-(8)-14
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOUSTON, HARRIS COUNTY, TEXAS
05/19/2025
C205


PEDESTAL SERVICE NOTES
1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS) 1080 "Electrical Services", 1085 "Electrical Services-Pedestal ITC" and Item 620 "Electrical Services." Provide pedestal electrical services listed on the Material Products List (MPL) on the Department's web site under "Electrical Services-Pedestal." Ensure that all MPL listed items meet the hardware and fabrication details of services meet utility company specifications. Contact the local utility company for approval of pedestal details prior to manufacturing. Make any additional hardware changes required by the utility company prior to manufacturing the pedestal enclosure.
2. When a meter socket is required, provide a socket with a minimum 100 amp rating that complies with local utility requirements.
3. Provide Class A or C concrete for pedestal service foundations in accordance with Item 420, "Concrete Substructures," except that concrete will not be paid for directly but is considered subsidiary to Item 620.
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."
5. Install (3) 1/2 in. X 13 in. minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to foundation with 1/2 in. diameter by 12 in. long galvanized or stainless steel machine thread bolts, a properly sized washer and a flat washer.
6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than 1/2 in. gap at any corner. Do not exceed a maximum slope of 1/8 in. in the foundation within 12 in. of any anchor. When properly installed, ensure the top of the service enclosure is level from to back and side to side within 1/2 in. Repair cracking or movement of the service enclosure at no additional cost to the department.
7. Do not use liquidtight flexible metal conduit (LFMC) on pedestal type services.
8. Ensure all elbows in the foundation are sized as per utility provider's conduit requirements for underground conduit and feeders. PVC connections may be restricted provided the ends of the rigid metal conduits are more than 2 in. below the top of the concrete foundation. Where expansion conduits are metal, grounding bushings must be installed with a bonding jumper properly terminated.
FRONT VIEW
SIDE VIEW
Equipment Mounting Studs (as required)
Ground Rod Fittings or Grounding Bushings
Reinforcing Steel
LOAD SIDE CONDUIT
LINE SIDE CONDUIT
Size and number of conduits determined by plan details
TYPE S shown. TYPE A shorter support than TYPE S which have individual circuit breakers or fuses mounted on an equipment-mounting panel. ID handles shall protrude through hinged deadfront trim.
SECTION A-A
ANCHOR BOLT DETAIL
Hex Nut
Lock Washer
Flat Washer
Leveling Washers
Reinforcing Steel
LEGEND
1 Meter Socket, when required
2 Meter Socket Window, when required
3 Equipment Mounting Panel
4 Pedestal Enclosure Window, when required
5 Hinged Deadfront Trim
6 Load Side Conduit Trim
7 Line Side Conduit Area
8 Utility Access Door, with handle
9 Pedestal Door
10 Hinged Meter Access
11 Opening Station Anchor Bolt(s)
12 Main Disconnect
13 Branch Circuit Breakers
14 Copper Clad Ground Rod - 5/8" x 10'
Texas Department of Transportation
Traffic Operations Division Standard
ELECTRICAL DETAILS
ELECTRICAL SERVICE SUPPORT
PEDESTAL SERVICE TYPE PS
ED(9)-14
FILE: ed9-14.dgn
DN: TxDOT
CK: TxDOT
DW: TxDOT
CK: TxDOT
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REVISIONS
4-03: 5-10: 7-13:
8-14:
9-07:
05/19/2025
C206



ROADWAY ILLUMINATION ASSEMBLY NOTES

1. Details apply to roadway lighting installations bid or referenced under Item 618, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.

2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any materials, equipment, or installation is justification for rejection.

4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.

5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.

   a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web sites.

   b. Limitations on use of the RIP standards: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than 11 ft, not more than 25' above the elevation of the surrounding terrain. In accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) or the AASHTO Design Specifications, for poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25' above the surrounding terrain, provide poles meeting the following requirements:

      I. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web sites), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).

      II. Luminaire Structural Support Requirements. Provide slip joints, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, provide transformer bases and connecting hardware in accordance with shop drawing submittals. Submit certification of the slip joint fatigue test and the anchor bolt fatigue test for the model of pole being furnished with the shop drawings. Submit certification of the plastic moment load test and FMEA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.

6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11042. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 each time delay fuses for breakaway connectors. In light poles, or inside the light fixture for underpass luminaires, in each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.

7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.

8. Install T-Base with following procedures:

   a. Anchor Bolt Tightening.

      I. Coat the threads of the anchor bolts with electrically conductive lubricant.

      II. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the T-base is 1/8" before nuts are tightened.

      III. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hard down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.

      IV. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.

      V. Check top of T-base for level. If not level then foundation must be leveled.

   b. Top Bolt Procedure

      I. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

      II. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."

      III. Tighten each nut to 150 ft-lb, using a torque wrench.

   c. Level and Plumb

      I. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.

9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(3).

10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.

11. Mount luminaires on arms level as shown by the luminaire level indicator.

12. Orient luminaires perpendicular to the roadway (mounted to be ↕↕ unless otherwise shown on the plans.

Wiring Diagram Notes:

1. Use 1/2 IN.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.
2. Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.
3. Split bolt or other connector.

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V OR 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):
   a. Provide NEMA 3R outdoor enclosure or as approved.
   b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.
   c. Install drivers with at least 2 inches of space from enclosure walls.
   d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronics equipment.
   e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.
   f. Provide remote drivers with a maximum of 100 watts.
   g. Provide drivers with documentation of 100,000 hr lifetime or Tcase of 65C or higher.

Driver Spacing in Remote Enclosure

Texas Department of Transportation

ROADWAY ILLUMINATION DETAILS

RID(1)-20

FILE: rid1-20.dgn	DN:	CK:	DW:	CK:
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REVISIONS				
10/21				
7/24				

DISTRICT COUNTY SHEET NO.

MAVERICK
TRAFFIC SYSTEMS, LLC
2101 Old Highway 80 • Forney, TX 75126
Phone: 214-514-9260 • Fax: 214-514-9261
Texas Registered Firm F-14355

NO.	DATE	BY	DESCRIPTION
1	10/21	BWH	REVISED PER TXDOT COMMENTS
2	7/24	BWH	REVISED PER TXDOT COMMENTS

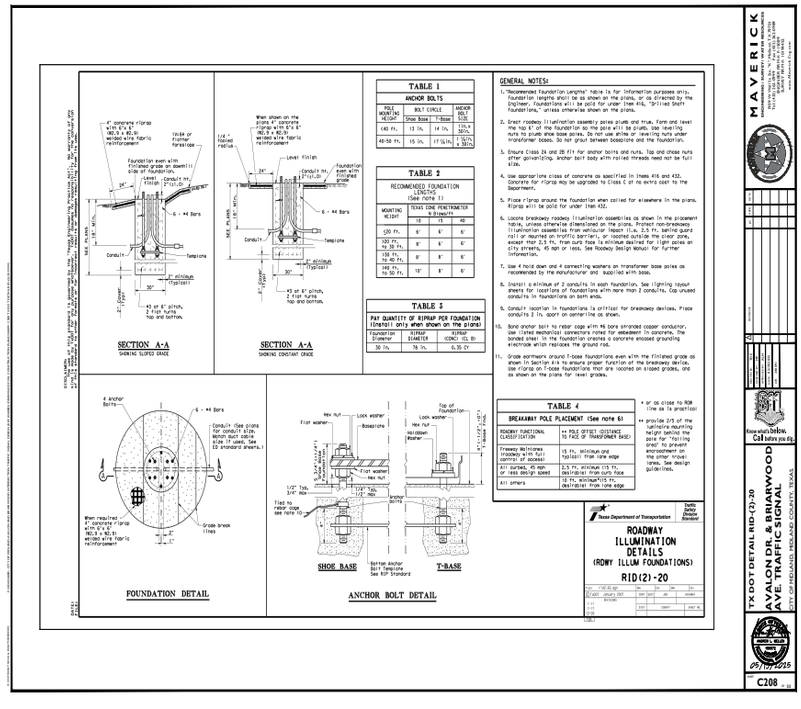
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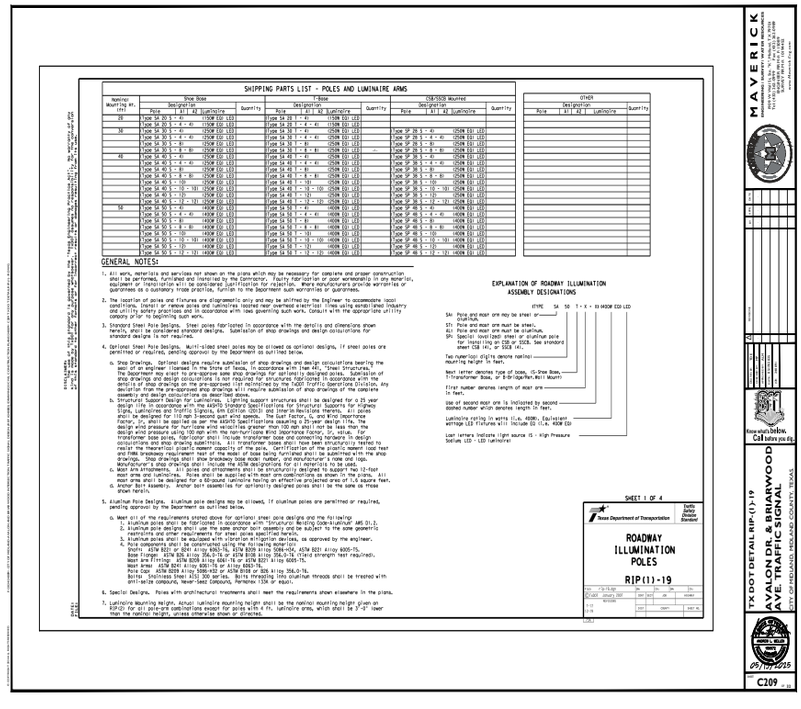
TX DOT DETAIL RID(1)-20
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CITY OF MIDLOTHIAN, NAVARRO COUNTY, TEXAS

05/19/2025

C207 of 22

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SECTION A-A
SHOWING SLOPED GRADE
SECTION A-A
SHOWING CONSTANT GRADE
FOUNDATION DETAIL
ANCHOR BOLT DETAIL
SHOE BASE
T-BASE
TABLE 1
ANCHOR BOLTS
TABLE 2
RECOMMENDED FOUNDATION LENGTHS (See note 1)
TABLE 3
PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)
GENERAL NOTES:
TABLE 4
BREAKAWAY POLE PLACEMENT (See note 6)
ROADWAY ILLUMINATION DETAILS
(RDWY ILLUM FOUNDATIONS)
RID(2)-20
MAVERICK
TX DOT DETAIL RID(2)-20
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HOLLAND, WILLIAMSON COUNTY, TEXAS
05/19/2025
C208



SHIPPING PARTS LIST - POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base Designation				Quantity	T-Base Designation				Quantity	CSB/SSB Mounted Designation				Quantity
	Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire	
30	Type SA 30 S - 4 - 41			150W EDI LED		Type SA 30 T - 4 - 41			150W EDI LED						
	Type SA 30 S - 4 - 41	4'	4'	150W EDI LED		Type SA 30 T - 4 - 41	4'	4'	150W EDI LED						
35	Type SA 35 S - 4 - 41			150W EDI LED		Type SA 35 T - 4 - 41			150W EDI LED		Type SF 35 S - 4 - 41			150W EDI LED	
	Type SA 35 S - 4 - 41	4'	4'	150W EDI LED		Type SA 35 T - 4 - 41	4'	4'	150W EDI LED		Type SF 35 S - 4 - 41	4'	4'	150W EDI LED	
	Type SA 35 S - 8 - 81			150W EDI LED		Type SA 35 T - 8 - 81			150W EDI LED		Type SF 35 S - 8 - 81			150W EDI LED	
	Type SA 35 S - 8 - 81	8'	8'	150W EDI LED		Type SA 35 T - 8 - 81	8'	8'	150W EDI LED		Type SF 35 S - 8 - 81	8'	8'	150W EDI LED	
40	Type SA 40 S - 4 - 41			150W EDI LED		Type SA 40 T - 4 - 41			150W EDI LED		Type SF 35 S - 4 - 41			150W EDI LED	
	Type SA 40 S - 4 - 41	4'	4'	150W EDI LED		Type SA 40 T - 4 - 41	4'	4'	150W EDI LED		Type SF 35 S - 4 - 41	4'	4'	150W EDI LED	
	Type SA 40 S - 8 - 81			150W EDI LED		Type SA 40 T - 8 - 81			150W EDI LED		Type SF 35 S - 8 - 81			150W EDI LED	
	Type SA 40 S - 8 - 81	8'	8'	150W EDI LED		Type SA 40 T - 8 - 81	8'	8'	150W EDI LED		Type SF 35 S - 8 - 81	8'	8'	150W EDI LED	
	Type SA 40 S - 10 - 101			150W EDI LED		Type SA 40 T - 10 - 101			150W EDI LED		Type SF 35 S - 10 - 101			150W EDI LED	
	Type SA 40 S - 10 - 101	10'	10'	150W EDI LED		Type SA 40 T - 10 - 101	10'	10'	150W EDI LED		Type SF 35 S - 10 - 101	10'	10'	150W EDI LED	
	Type SA 40 S - 12 - 121			150W EDI LED		Type SA 40 T - 12 - 121			150W EDI LED		Type SF 35 S - 12 - 121			150W EDI LED	
	Type SA 40 S - 12 - 121	12'	12'	150W EDI LED		Type SA 40 T - 12 - 121	12'	12'	150W EDI LED		Type SF 35 S - 12 - 121	12'	12'	150W EDI LED	
50	Type SA 50 S - 4 - 41			240W EDI LED		Type SA 50 T - 4 - 41			240W EDI LED		Type SF 45 S - 4 - 41			240W EDI LED	
	Type SA 50 S - 4 - 41	4'	4'	240W EDI LED		Type SA 50 T - 4 - 41	4'	4'	240W EDI LED		Type SF 45 S - 4 - 41	4'	4'	240W EDI LED	
	Type SA 50 S - 8 - 81			240W EDI LED		Type SA 50 T - 8 - 81			240W EDI LED		Type SF 45 S - 8 - 81			240W EDI LED	
	Type SA 50 S - 8 - 81	8'	8'	240W EDI LED		Type SA 50 T - 8 - 81	8'	8'	240W EDI LED		Type SF 45 S - 8 - 81	8'	8'	240W EDI LED	
	Type SA 50 S - 10 - 101			240W EDI LED		Type SA 50 T - 10 - 101			240W EDI LED		Type SF 45 S - 10 - 101			240W EDI LED	
	Type SA 50 S - 10 - 101	10'	10'	240W EDI LED		Type SA 50 T - 10 - 101	10'	10'	240W EDI LED		Type SF 45 S - 10 - 101	10'	10'	240W EDI LED	
	Type SA 50 S - 12 - 121			240W EDI LED		Type SA 50 T - 12 - 121			240W EDI LED		Type SF 45 S - 12 - 121			240W EDI LED	
	Type SA 50 S - 12 - 121	12'	12'	240W EDI LED		Type SA 50 T - 12 - 121	12'	12'	240W EDI LED		Type SF 45 S - 12 - 121	12'	12'	240W EDI LED	

OTHER Designation				
Pole	A1	A2	Luminaire	Quantity

GENERAL NOTES:

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, part or assembly shall be corrected or replaced by the Contractor. The Contractor shall provide all available warranties or guarantees as a customary trade practice, furnish to the Department such warranties or guarantees.

2. The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry safe practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.

4. Optional Steel Pole Designs. Multi-sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.

   a. Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal and signature of a Professional Engineer registered in the State of Texas for approval by the Engineer. The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete structure for approval by the Engineer prior to fabrication.
   b. Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition, 2013 with Interim Revisions through 2015. Poles shall be designed for 110 mph 3-second gust wind speeds. The Gust Factor, G_f, and Wind Importance Factor, I_r, shall be applied as per the AASHTO Specifications assuming a 25-year design life. The design wind pressure for hurricane wind velocities greater than 100 mph shall not be less than the design wind pressure using 100 mph with the non-hurricane Wind Importance Factor, I_r, value. For hurricane wind velocities greater than 100 mph, the Wind Importance Factor, I_r, shall be used in the design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and the breakaway design shall be submitted for approval. Base plates furnished shall be matched with the shop drawings. Approved shop drawings shall be stamped "Approved for Fabrication" before fabrication begins.
   c. Manufacturer's shop drawing shall include the ASTM designations for all materials to be used.
   d. Mast arm Attachments. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 50-pound luminaire having an effective projected area of 1.5 square feet.
   e. Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.

5. Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.

   a. Meet all of the requirements stated above for optional steel pole designs and the following:
      1. Aluminum pole designs shall be designed in accordance with the AASHTO Specifications, LTS-5 (2013).
      2. Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
      3. Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
      4. Pole components shall be constructed using the following materials:
      Shaft: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
      Base Flanges: ASTM B26 Alloy 356.0-T6 or ASTM B108 Alloy 356.0-T6 if yield strength test required.
      Mast arm Fittings: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
      Mast Arms: ASTM B241 Alloy 6061-T6 or Alloy 6063-T6.
      Hand hole cover: ASTM B26-356.0-T6 or Alloy 5086-H32 or B26 Alloy 356.0-T6.
      Bolts: Stainless Steel 2(5) 300 series. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133A or equal.

6. Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.

7. Luminaire Mounting Height. Actual luminaire mounting height shall be the nominal mounting height given on RIP(2) for all pole-arm combinations except for poles with 4 ft. luminaire arms, which shall be 3'-0" lower than the nominal height, unless otherwise shown or directed.

EXPLANATION OF ROADWAY ILLUMINATION ASSEMBLY DESIGNATIONS

SHEET 1 OF 4

Texas Department of Transportation — Traffic Operations Division Standard

ROADWAY ILLUMINATION POLES

RIP(1)-19

FILE: rip19-20.dgn	DN:	CK:	DW:	CK:
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REVISIONS				
5-21	DIST	COUNTY		SHEET NO.
8-24				

DISTRICT

MAVERICK
Maverick Signal Systems, LLC
Texas Registered Engineering Firm F-20033
2015 W. Hwy 83, Ste. 1 • Pharr, TX 78577
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Scott Parker, P.E. #142833
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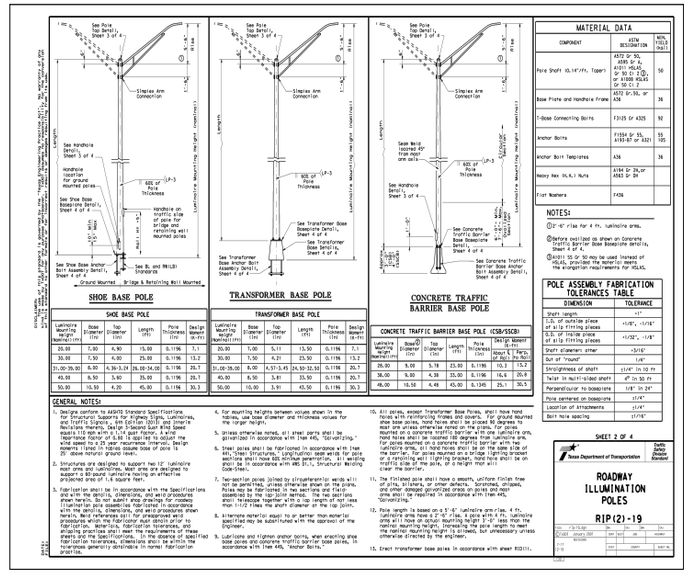
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TX DOT DETAIL RIP(1)-19
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF MISSION, HIDALGO COUNTY, TEXAS

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C209 of 22

PACKET 6.1002 September 9, 2025



SHOE BASE POLE

TRANSFORMER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE

SHOE BASE POLE

Luminaire Mounting Height (nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Wall Thickness (in)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.90	25.00	0.1196	13.2
31.00-35.00	8.00	4.39-3.39	28.00-34.00	0.1196	20.7
40.00	8.50	3.40	35.00	0.1196	20.7
50.00	10.50	4.00	45.00	0.1196	30.3

TRANSFORMER BASE POLE

Luminaire Mounting Height (nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Wall Thickness (in)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-35.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	20.7
50.00	10.00	3.91	43.50	0.1196	30.3

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)

Luminaire Mounting Height (nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment at Base (kip-ft) Mast Arms & Pedestals	Design Moment at Base (kip-ft) Pole to Pole
25.00	5.00	4.18	23.00	0.1196	10.3	13.2
30.00	5.00	4.38	33.00	0.1196	16.6	20.8
40.00	10.50	4.48	43.00	0.1345	25.1	30.5

GENERAL NOTES:

1. Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. Design 3-Second Gust Wind Speed supporting documents are based on ASCE 7-10 and a basic wind speed of 3.33 gust factor, adjusted for wind speed to a 25 year recurrence interval. Design moments listed in tables assume base of pole is 25' above natural ground level.
2. Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a single luminaire having an effective projected area of 1.5 square feet.
3. Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown on the plans. The Fabricator shall submit working drawings of luminaire pole assemblies fabricated in accordance with the details, dimensions, and weld procedures shown on the plans. Working drawings shall include the procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of these sheets and the Specifications. In the absence of specified tolerances, the Fabricator shall follow the most rigorous tolerances generally obtainable in normal fabrication practice.
4. For mounting heights between values shown in the tables, use the greater diameter and thickness values for the larger height.
5. Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."
6. Steel poles shall be fabricated in accordance with Item 441, "Steel Structures." Longitudinal seam welds for pole shafts shall be complete joint penetration (CJP) groove welds and shall be in accordance with AWS D1.1, Structural Welding Code-Steel.
7. Telescoping poles joined by slip-fit expansion sleeves will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the Contractor if desired. The two sections shall be telescoped a minimum of 1.5 times, but not more than 1-1/2 times the shaft diameter at the top joint.
8. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
9. Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."
10. All poles, except Transformer Base Poles, shall have hand hole openings. For poles mounted on a shoe base or a concrete shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a bridge or retaining wall, or for direct buried poles, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or retaining wall, all hand holes shall be located on the traffic side of the pole, at a height that will allow clear the barrier.
11. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."
12. Pole length is based on a 5'-6" luminaire arm-rise. A 7'-6" luminaire arm-rise shall be used for 40' poles. Concrete poles will have an actual mounting height 2'-0" less than the nominal mounting height. Increasing the pole length to meet the nominal mounting height is allowed, but unnecessary unless otherwise directed by the engineer.
13. Erect transformer base poles in accordance with sheet RIG111.

MATERIAL DATA

COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft- (0.14"/Ft. Taper)	A572 Gr 50, A595 Gr A, A1011 Gr 50 or 55 CL 2 (3), or A1008 HSLAS Gr 50 CL 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T-Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H,or A563 Gr DH	
Flat Washers	F436	

NOTES:

(1) 5'-6" rise for 4 Ft. luminaire arms.

(2) Before oscillized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.

(3) A1011 SS Gr 50 may be used instead of A572 Gr 50 provided it also meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE

DIMENSION	TOLERANCE
Shaft length	±1"
O.D. of outside piece at slip fitting pieces	+1/8", -1/16"
O.D. of inside piece at slip fitting pieces	+1/32", -1/8"
Shaft diameter; other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 Ft
Twist in multi-sided shaft	4° in 10' Ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of attachments	±1/4"
Bolt hole spacing	±1/16"

SHEET 2 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(2)-19

FILE:	rip19.dgn	DN:	CK:	DW:	CK:
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REVISIONS					
2-13		DIST	COUNTY		SHEET NO.
2-19					

MAVERICK

TX DOT DETAIL RIP-(2)-19

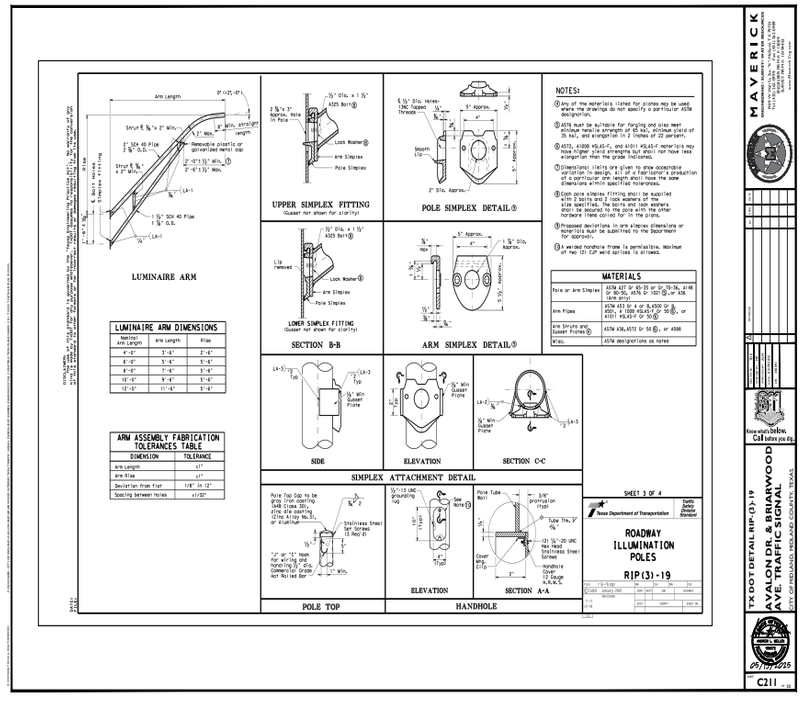
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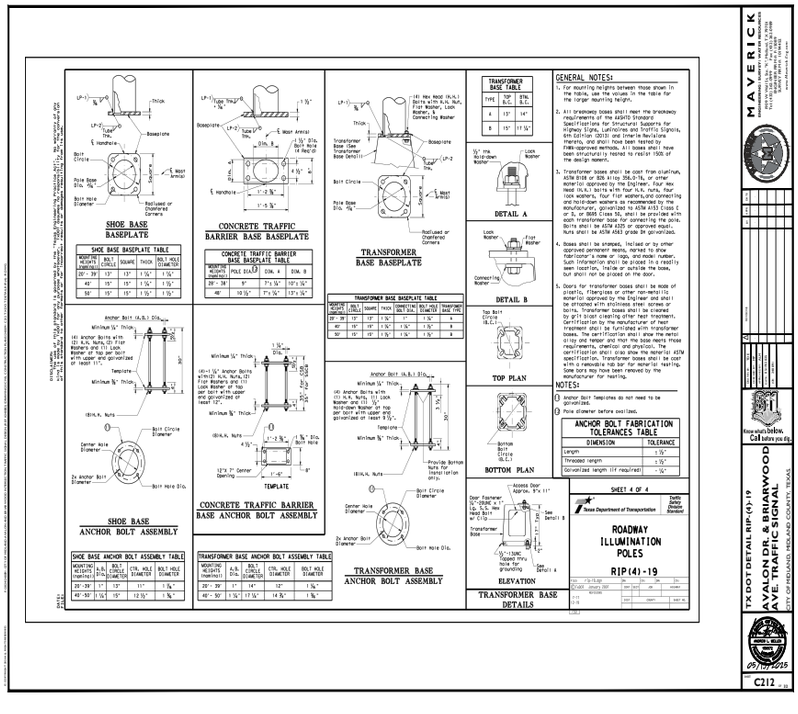
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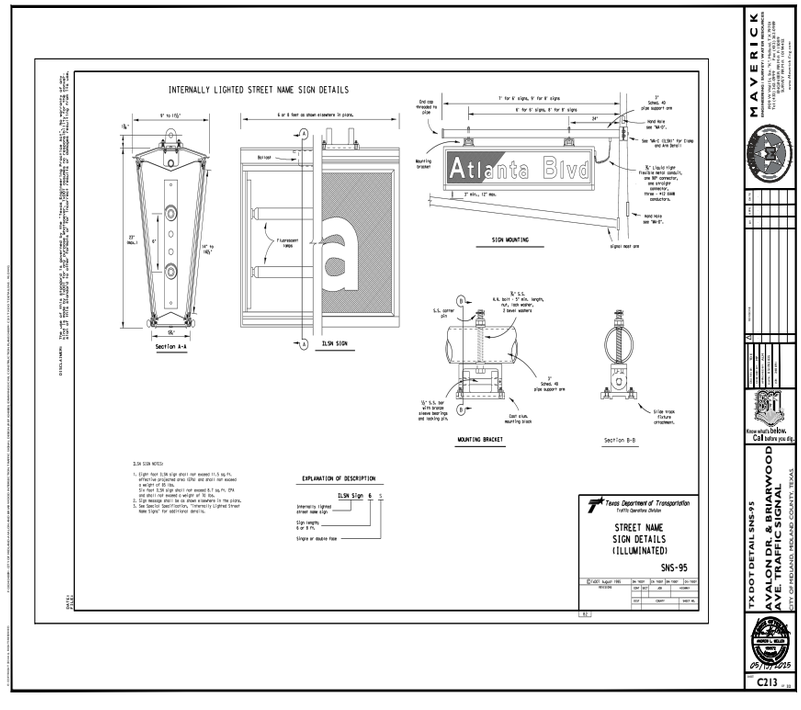
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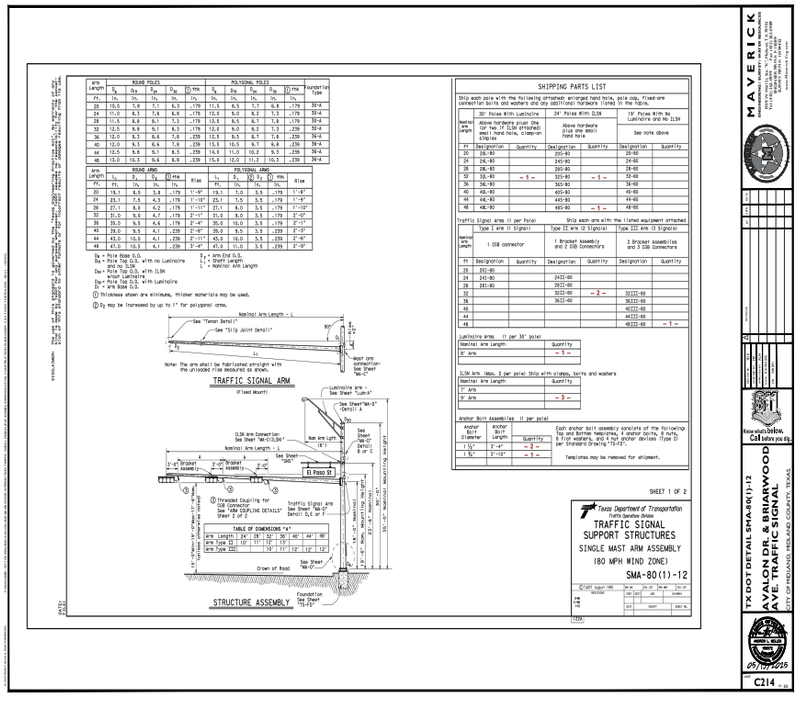
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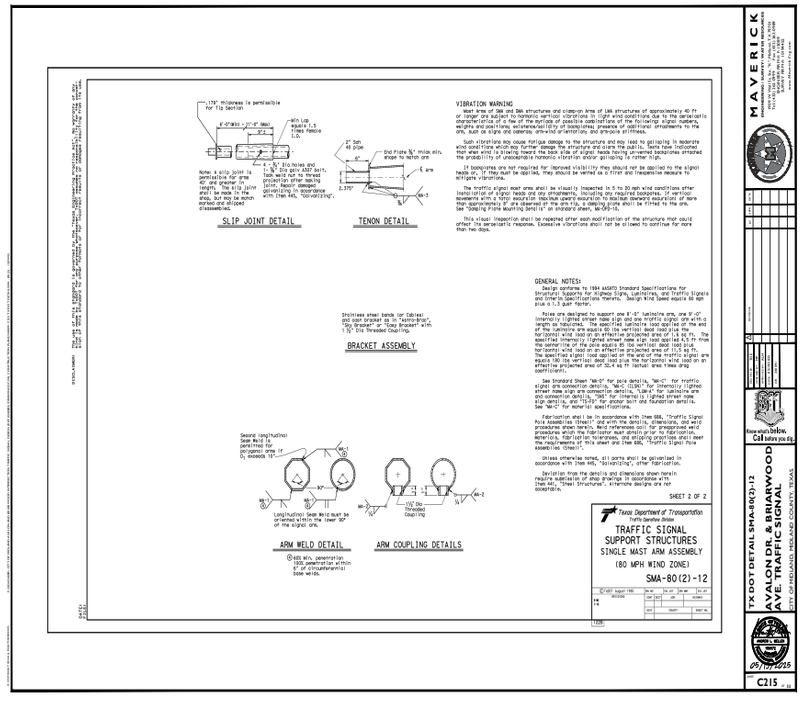
C210

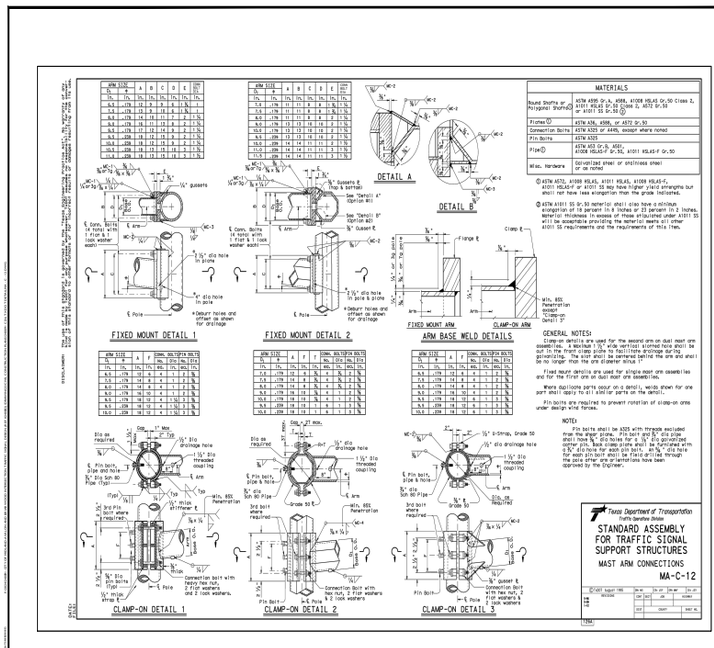

LUMINAIRE ARM
LUMINAIRE ARM DIMENSIONS
Nominal Arm Length | Arm Length | Rise
4'-0" | 3'-6" | 2'-6"
6'-0" | 5'-6" | 5'-6"
8'-0" | 7'-6" | 5'-6"
10'-0" | 9'-6" | 5'-6"
12'-0" | 11'-6" | 5'-6"
ARM ASSEMBLY FABRICATION TOLERANCES TABLE
DIMENSION | TOLERANCE
Arm Length | ±1"
Arm Rise | ±1"
Deviation from Flat | 1/8" in 12"
Spacing between holes | ±1/32"
UPPER SIMPLEX FITTING
(Gusset not shown for clarity)
POLE SIMPLEX DETAIL⑥
LOWER SIMPLEX FITTING
(Gusset not shown for clarity)
SECTION B-B
ARM SIMPLEX DETAIL⑥
NOTES:
④ Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.
⑤ ASTM must be suitable for forging and also meet the following requirements: Minimum yield point of 35 ksi, and elongation in 2 inches of 22 percent.
⑥ A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.
⑦ Dimensional limits are given to show acceptable variation in design. Any deviation in a production or a particular length shall have the same dimensions within specified tolerances.
⑧ Each pole simplex fitting shall be supplied complete with all bolts, nuts and washers as specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans.
⑨ Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.
⑩ A welded handhole frame is permissible. Maximum of two 121 CJP weld splices is allowed.
MATERIALS
Pole or Arm Simplex | ASTM A27 Gr 65-35 or Gr 70-36, A148 Gr 80-50, A576 Gr 1021 ⑤ or A36 (one piece)
Arm Pipes | ASTM A53 Gr A or B, A500 Gr B, A501, A1085, A1011 HSLAS Gr 50 ⑥, or A1011 HSLAS-F Gr 50 ⑥
Arm Struts and Gusset Plates ④ | ASTM A36, A572 Gr 50 ⑥, or A588
Misc. | ASTM designations as noted
SIDE
ELEVATION
SECTION C-C
SIMPLEX ATTACHMENT DETAIL
POLE TOP
ELEVATION
SECTION A-A
HANDHOLE
SHEET 3 OF 4
Texas Department of Transportation
Traffic Safety Division Standard
ROADWAY ILLUMINATION POLES
RIP(3)-19
MAVERICK
TX DOT DETAIL RIP(3)-19
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND VILLAGE, DENTON COUNTY, TEXAS
05/11/2025
C211


SHOE BASE BASEPLATE
SHOE BASE BASEPLATE TABLE
CONCRETE TRAFFIC BARRIER BASE BASEPLATE
CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE
TRANSFORMER BASE BASEPLATE
TRANSFORMER BASE BASEPLATE TABLE
TRANSFORMER BASE TABLE
GENERAL NOTES:
NOTES:
ANCHOR BOLT FABRICATION TOLERANCES TABLE
SHOE BASE ANCHOR BOLT ASSEMBLY
SHOE BASE ANCHOR BOLT ASSEMBLY TABLE
CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY
TEMPLATE
TRANSFORMER BASE ANCHOR BOLT ASSEMBLY
TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE
DETAIL A
DETAIL B
TOP PLAN
BOTTOM PLAN
ELEVATION
TRANSFORMER BASE DETAILS
Texas Department of Transportation
ROADWAY ILLUMINATION POLES
RIP(4)-19
SHEET 4 OF 4
MAVERICK
TX DOT DETAIL RIP(4)-19
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CITY OF HOLLAND, MCLENNAN COUNTY, TEXAS
05/19/2025
C212


INTERNALLY LIGHTED STREET NAME SIGN DETAILS
Atlanta Blvd
SIGN MOUNTING
ILSN SIGN
MOUNTING BRACKET
Section A-A
Section B-B
ILSN SIGN NOTES:
EXPLANATION OF DESCRIPTION
ILSN Sign
Texas Department of Transportation
Traffic Operations Division
STREET NAME
SIGN DETAILS
(ILLUMINATED)
SNS-95
MAVERICK
TX DOT DETAIL SNS-95
AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIDALGO, HIDALGO COUNTY, TEXAS
05/19/2025
C213


ROAD POLES
POLYGONAL POLES
ROUND ARMS
POLYGONAL ARMS
SHIPPING PARTS LIST
TRAFFIC SIGNAL ARM
(Flared Mount)
STRUCTURE ASSEMBLY
Nominal Arm Length - L
Luminaire Arm - See Sheet "LUM-A"
DLSN Arm Connection - See Sheet "MA-C1,DA"
Mast Arm Length (ft.)
Nominal Arm Length - L
See Sheet "MA-D" Detail A
See Sheet "MA-D" Detail B or C
Traffic Signal Arm See Sheet "MA-D" Detail D,E or F
Foundation See Sheet "FD-TS"
Drawn at Road
Mast arm connection- See Sheet "MA-C"
Note: The arm shall be fabricated straight with the unloaded tip measured as shown.
SHEET 1 OF 2
Texas Department of Transportation
TRAFFIC SIGNAL SUPPORT STRUCTURES
SINGLE MAST ARM ASSEMBLY
(80 MPH WIND ZONE)
SMA-80(1)-12
MAVERICK
TX DOT DETAIL SMA-80(1)-12
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CITY OF MIDLOTHIAN, TRAVIS & ELLIS COUNTY, TEXAS
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C214


SLIP JOINT DETAIL
TENON DETAIL
BRACKET ASSEMBLY
ARM WELD DETAIL
ARM COUPLING DETAILS
VIBRATION WARNING
GENERAL NOTES:
SHEET 2 OF 2
Texas Department of Transportation
Traffic Operations Division
TRAFFIC SIGNAL
SUPPORT STRUCTURES
SINGLE MAST ARM ASSEMBLY
(80 MPH WIND ZONE)
SMA-80(2)-12
MAVERICK
TX DOT DETAIL SMA-80(2)-12
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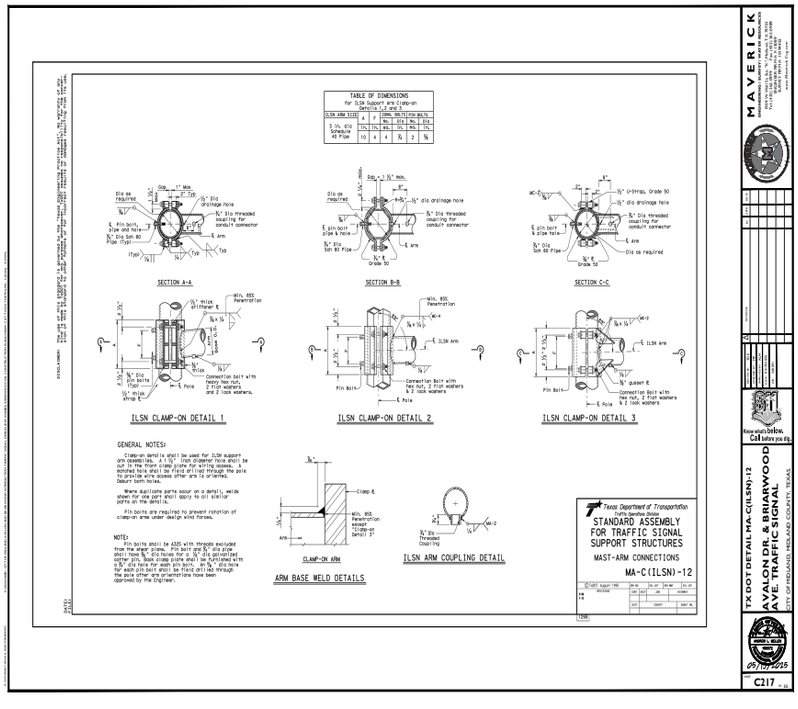


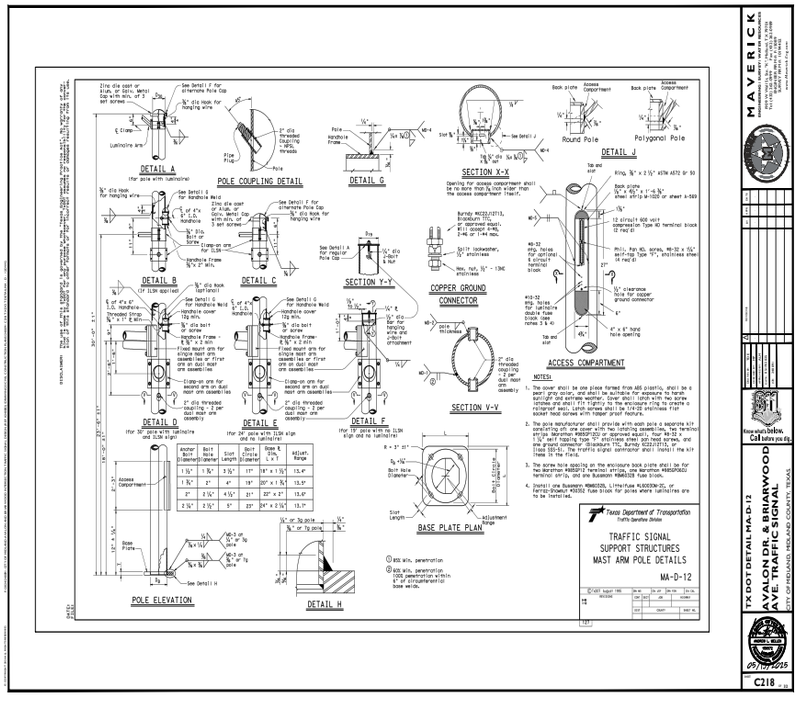
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C216


TABLE OF DIMENSIONS
for ILSN Support arm Clamp-on
Support arms
ILSN ARM SIZE
A
F
(TRBL BOLTS) Min BOLTS
No. Dia
No. Dia
5 3/8 dia Schedule 40 Pipe
10
4
4
3/4
2
3/4
SECTION A-A
SECTION B-B
SECTION C-C
ILSN CLAMP-ON DETAIL 1
ILSN CLAMP-ON DETAIL 2
ILSN CLAMP-ON DETAIL 3
GENERAL NOTES:
NOTES:
CLAMP-ON ARM
ARM BASE WELD DETAILS
ILSN ARM COUPLING DETAIL
Texas Department of Transportation
Traffic Operations Division
STANDARD ASSEMBLY
FOR TRAFFIC SIGNAL
SUPPORT STRUCTURES
MAST-ARM CONNECTIONS
MA-C(ILSN)-12
MAVERICK
TX DOT DETAIL MA-C(ILSN)-12
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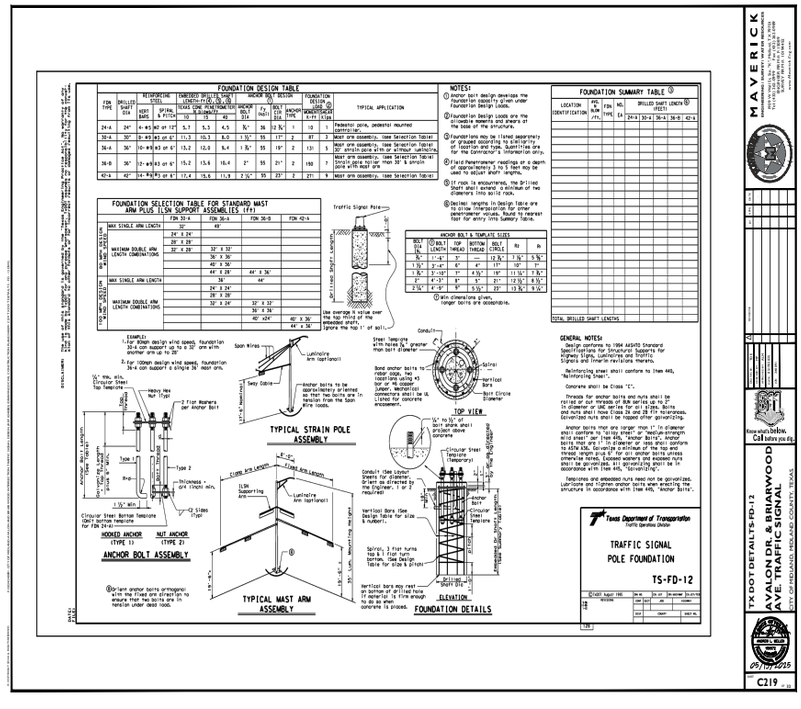
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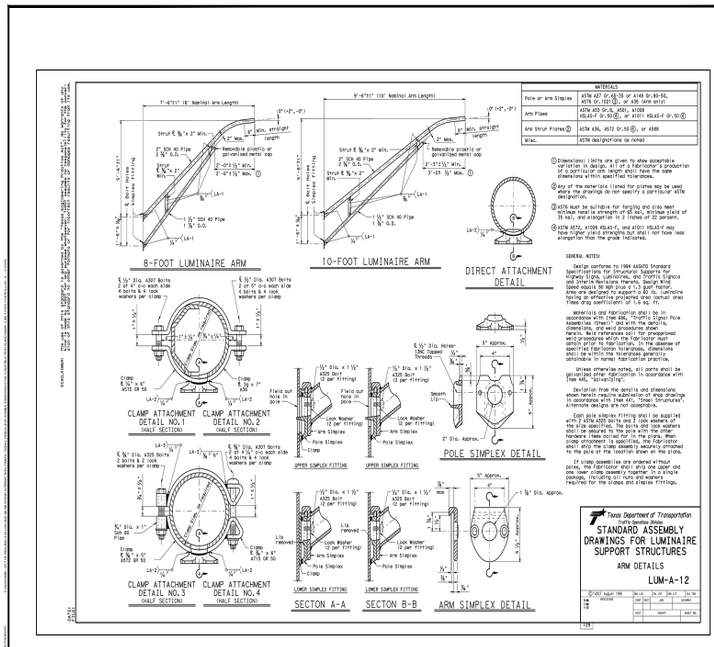
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05/19/2025

C218


FOUNDATION DESIGN TABLE
FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)
NOTES:
FOUNDATION SUMMARY TABLE
ANCHOR BOLT & TEMPLATE SIZES
GENERAL NOTES:
TYPICAL STRAIN POLE ASSEMBLY
TYPICAL MAST ARM ASSEMBLY
ANCHOR BOLT ASSEMBLY
FOUNDATION DETAILS
TOP VIEW
ELEVATION
TRAFFIC SIGNAL
POLE FOUNDATION
TS-FD-12
MAVERICK
TX DOT DETAILS TS-FD-12
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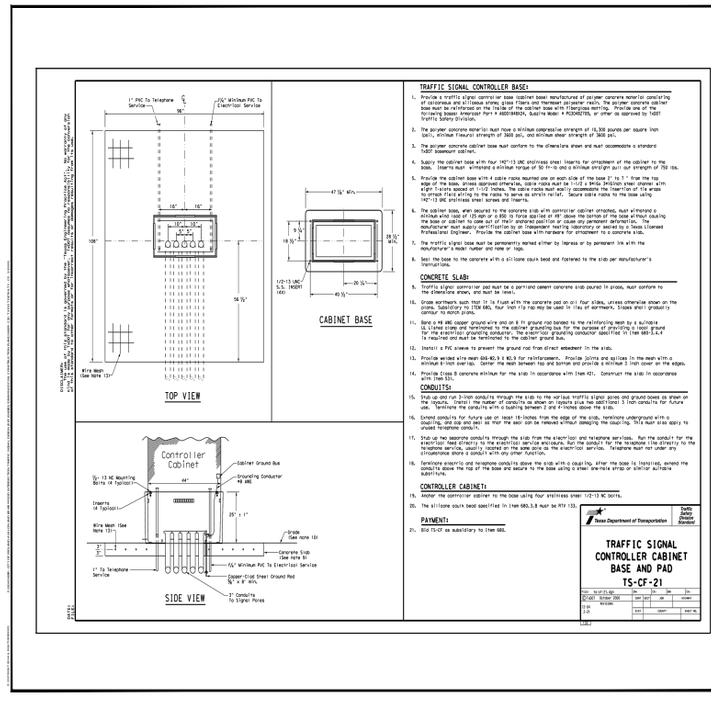
TX DOT DETAIL LUM-A-12

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CITY OF MIDLAND, MIDLAND COUNTY, TEXAS

05/19/2025

C220



TRAFFIC SIGNAL CONTROLLER BASE:

1. Provide a traffic signal control base (cabinet base) manufactured of polymer concrete material consisting of aggregate and resin binder. Provide a base with a minimum thickness of 2 inches. The cabinet base must be reinforced on the inside of the cabinet base with fiberglass matting. Provide one of the following bases: Ameridan Part # 4600184824, Suddle Model # PC30402TBS, or other as approved by TxDOT Traffic Safety Division.
2. The polymer concrete material must have a minimum compressive strength of 10,300 pounds per square inch (psi), minimum flexural strength of 3600 psi, and minimum shear strength of 3600 psi.
3. The polymer concrete cabinet base must conform to the dimensions shown and must accommodate a standard TxDOT basement cabinet.
4. Supply the cabinet base with four 1/2"-13 UNC stainless steel inserts for attachment of the cabinet to the base. Inserts must withstand a minimum torque of 50 ft-lb and a minimum straight pull out strength of 750 lbs.
5. Provide the cabinet base with 4 cable risers mounted one on each side of the base 3" to 5" from the top edge of the base, unless approved otherwise. Cable risers must be 1-1/2 x 9¼in 3¼in/inch steel channel with eight 1-slots spaced at 1-1/2 inches. The cable risers must easily accommodate the insertion of tie wraps to attach field wiring to the risers to serve as strain relief. Secure cable risers to the base using 1/2"-13 UNC stainless steel screws and inserts.
6. The cabinet base, when secured to the concrete slab with controller cabinet attached, must withstand a minimum wind load of 125 mph or a 300 lb force applied at 48" above the bottom of the base without causing the base or cabinet to come out of their anchored position or cause any permanent deformation. The manufacturer must provide a letter of certification stating this requirement, signed by a Licensed Professional Engineer. Provide the cabinet base with hardware for attachment to a concrete slab.
7. The traffic signal base must be permanently marked either by ingress or by permanent ink with the manufacturer's model number and date of mfgr.
8. Seal the base to the concrete with a silicone caulk bead and fastened to the slab per manufacturer's instructions.

CONCRETE SLAB:

9. Traffic signal controller pad must be a portland cement concrete slab poured in place, must conform to the dimensions shown, and must be level.
10. Grade earthwork such that it is flush with the concrete pad on all four sides, unless otherwise shown on the plans. Satisfactory to ITEM 680, four inch rip rap may be used in lieu of earthwork. Slopes shall gradually contour to match grade.
11. Bond a #6 AWG copper ground wire and an 8 ft ground rod bonded to the reinforcing mesh by a suitable UL listed clamp and terminated to the cabinet grounding bus for the purpose of providing a resistance ground for the electrical grounding conductor. The electrical grounding conductor specified in Item 680-2.6.4 is required and must be terminated to the cabinet ground bus.
12. Install a PVC sleeve to prevent the ground rod from direct embedment in the slab.
13. Provide welded wire mesh 6X6-W2.9 X W2.9 for reinforcement. Provide joints and splices in the mesh with a minimum 6-inch overlap. Center the mesh between top and bottom and provide a minimum 3 inch cover on the edges.
14. Provide Class B concrete minimum for the slab in accordance with Item 421. Construct the slab in accordance with Item 531.

CONDUITS:

15. Stub up and run 3-inch conduits through the slab for the various traffic signal poses and ground boxes as shown on the layouts. Install the number of conduits as shown on layouts plus two additional 2 inch conduits for future use. Terminate the conduits with a bushing between 2 and 4 inches above the slab.
16. Extend conduits for future use on least 18 inches from the edge of the slab, terminate underground with a coupling and plug or cap so that the slab can be removed without damaging the conduit. Tie a nylon slide apply to unused telephone conduit.
17. Stub up two separate conduits through the slab from the electrician and telephone services. Run the conduit for the electrician feed directly to the electrician service enclosure. Run the conduit for the telephone line directly to the telephone service, usually located on the same pole as the electrician service. Telephone must not under any circumstance share a conduit with any other function.
18. Terminate electric and telephone conduits above the slab with a coupling. After the base is installed, extend the conduits above the top of the base and secure to the base using a sheet aluminum strap or similar suitable substitute.

CONTROLLER CABINET:

19. Anchor the controller cabinet to the base using four stainless steel 1/2-13 NC bolts.
20. The silicone caulk bead specified in Item 680.3.8 must be RTV 133.

PAYMENT:

21. Bid TS-CF as subsidiary to Item 680.

Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC SIGNAL CONTROLLER CABINET BASE AND PAD

TS-CF-21

FILE: ts-cf-21.dgn	DN:	CK:	DW:	CK:
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13-21:				
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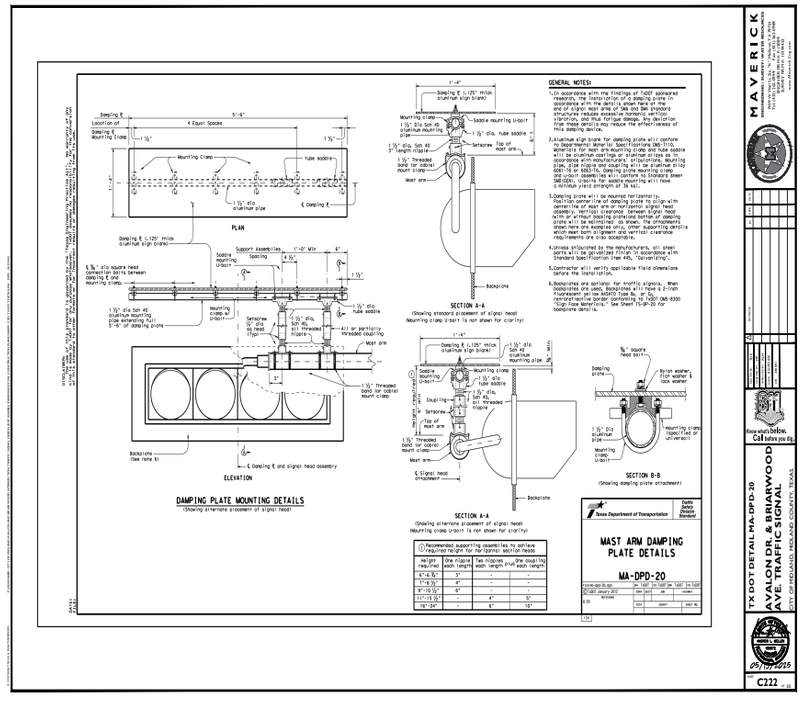
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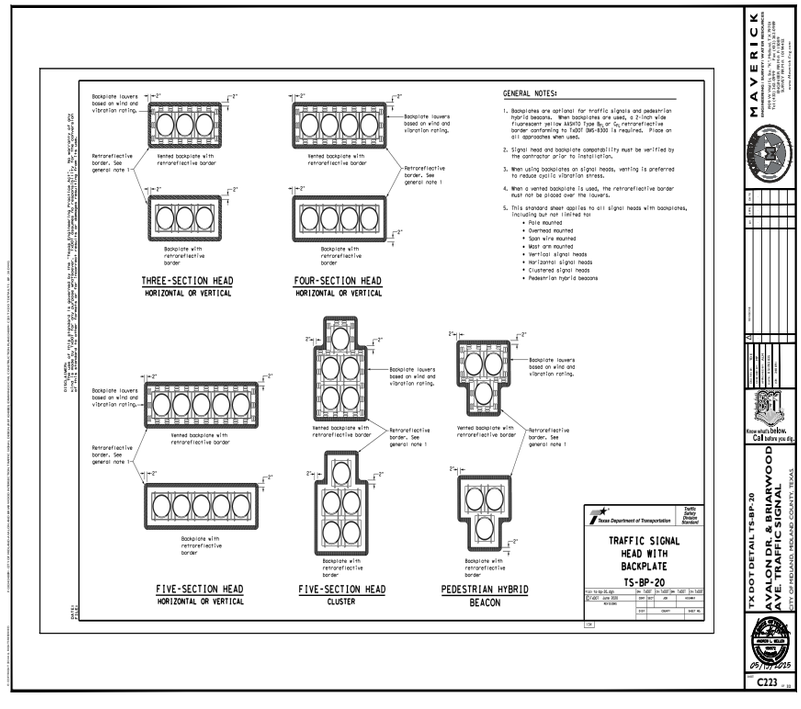
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CITY OF HOLLAND WOODS COUNTY, TEXAS

05/19/2025

C221


DAMPING PLATE MOUNTING DETAILS
(Showing alternate placement of signal head)
PLAN
ELEVATION
SECTION A-A
(Showing standard placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)
SECTION A-A
(Showing alternate placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)
SECTION B-B
(Showing damping plate attachment)
GENERAL NOTES:
MAST ARM DAMPING PLATE DETAILS
MA-DPD-20
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TX DOT DETAIL MA-DPD-20
C222



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AVALON DR. & BRIARWOOD AVE. TRAFFIC SIGNAL
CITY OF HIGHLAND VILLAGE, DENTON COUNTY, TEXAS

05/19/2025

C223

City Council Meeting

Item Number: 7

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Justine Ruff, Director

Subject: **RESOLUTION AUTHORIZING THE EXECUTION OF A CONTRACT WITH CERRIS BUILDERS, INC., IN THE AMOUNT OF $38,577,000.00 FOR THE TERMINAL MODERNIZATION AND EXPANSION PROJECT AT MIDLAND INTERNATIONAL AIR & SPACE PORT; APPROVING $3,857,700.00 FOR CONTINGENCIES; APPROPRIATING FUNDS; AND AUTHORIZING PAYMENT FOR SAID PROJECT (DISTRICT 4) (AIRPORTS) (TRANSPARENT & CONSISTENT COMMUNICATION)**

Purpose:

Resolution authorizing the execution of a contract with Cerris Builders, Inc. in the amount of $38,577,000.00 for the MAF Terminal Modernization and Expansion Project at Midland International Airport and appropriate the necessary funds for said project.

Recommended City Council Action:

Approve

Fiscal Impact:

City/Airport Fund – Non eligible share		$ 778.124.21
City/Airport Fund - Contingency		$ 3,857,700.00
FAA FY 25 ATP Construction Grant 76		$ 8,000,000.00
FAA FY 25 IIJA Construction Grant 77		$ 10,264,531.00
FAA FY26 IIJA Construction Future Grant		$ 4,036,367.00
Passenger Facility Charge (PFC) Funds		$ 20,102,121.79
	Total	$ 47,038,844.00

Breakout of Costs

Construction Phase Airport Admin Costs (Audit, etc)		$ 25,000.00
Construction Phase Architectural Fee		$ 2,273,804.00
Construction Phase Administrative Costs		$ 883,215.00
Construction Phase Surveying and Testing		$ 410,000.00
Platting, FSL-2 Evautation and Passenger Queuing Modeling		$ 276,125.00
Construction Improvement Costs		$ 38,577,000.00
Design Existing Checkpoint 3rd Lane Construction Contingency		$ 36,000.00
Airport Furniture, Fixtures and Misc. Equipment (FF&E)		$ 600,000.00
Construction Contingency		$ 3,857,700.00
Recommended Construction Phase Appropriation	**Total**	**$ 47,038,844.00**

Appropriation Language:

That the sum of $4,635,824.21 is hereby appropriated from the Airport Operating Fund (500) Unappropriated Fund Balance and transferred to the Terminal Building Security Checkpoint Project (900449-505).

That the sum of $22,300,898 will be paid by FAA grant funds and is hereby appropriated in the Terminal Building Security Checkpoint Project (900449-505).

That the sum of $20,102,121.79 will be appropriated from the PFC Fund to support long term financing for the Terminal Building Security Checkpoint Project (900449-505).

Strategic Priority:

(Transparent & Consistent Communication)

Discussion:

At the September 10, 2024, Council meeting, a resolution was adopted authorizing a capital funding plan for Airport Improvements. This plan included 18 projects, among which was the Midland International Air & Space Port Terminal Modernization and Expansion Project.

The project was publicly advertised in May 2025, and sealed bids were opened on Wednesday, July 30, 2025, at 2:00 p.m. Cerris Builders Inc. submitted the sole bid for this project.

The scope of work includes expanding the terminal building to accommodate up to six security checkpoint lanes, additional lobby restrooms, a post-security pet relief area, an additional escalator and elevator, and the rehabilitation of an existing elevator. The

project also incorporates energy-efficient upgrades to the terminal's HVAC and lighting systems.

City Manager's Office

RESOLUTION NO._____

RESOLUTION AUTHORIZING THE EXECUTION OF A CONTRACT WITH CERRIS BUILDERS, INC., IN THE AMOUNT OF $38,577,000.00 FOR THE TERMINAL MODERNIZATION AND EXPANSION PROJECT AT MIDLAND INTERNATIONAL AIR & SPACE PORT; APPROVING $3,857,700.00 FOR CONTINGENCIES; APPROPRIATING FUNDS; AND AUTHORIZING PAYMENT FOR SAID PROJECT

WHEREAS, the City approved plans and specifications and authorized the advertisement for bids for the Terminal Modernization and Expansion Project at Midland International Air & Space Port (the "Project"); and

WHEREAS, the City received one (1) responsive bid, with said bid being submitted by Cerris Builders, Inc., for a total cost of $38,577,000.00 for the construction of the Project; and

WHEREAS, the City Council finds the price proposed by Cerris Builders, Inc., for the construction of the Project to be fair and reasonable; and

WHEREAS, the City Council finds it to be in the public interest to award a contract to Cerris Builders, Inc., for the construction of the Project and to appropriate necessary funds; and

WHEREAS, the City Council finds it to be in the public interest to approve $3,857,700.00 for contingencies;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That the City Manager, or his designee, and the City Secretary are hereby authorized and directed to execute and attest, respectively, on behalf of the City of Midland, a contract with Cerris Builders, Inc., in the amount of $38,577,000.00 for the construction of the Project. Said contract shall be on file in the office of the City Secretary and referenced by the date and number of this resolution.

SECTION TWO. That the sum of $3,857,700.00 for contingencies is hereby approved.

SECTION THREE. That the following amounts are hereby appropriated and transferred from the following funds to the Terminal Building Security Checkpoint Project (900449-505):

- $4,635,824.21 from the Airport Operating Fund (500) Unappropriated Fund Balance; and
- $20,102,121.79 from the PFC Fund.

Additionally, the sum of $22,300,898.00 in grant funds issued by the Federal Aviation Administration to the City of Midland shall be appropriated to the Terminal Building Security Checkpoint Project (900449-505).

SECTION FOUR. That the City Comptroller is hereby authorized and directed to pay Cerris Builders, Inc., pursuant to the terms of said contract from funds appropriated herein upon receipt of proper invoices or statements approved by the City Manager or his designee.

On motion of Council member _____, seconded by Council member _____, the above and foregoing resolution was adopted by the City Council of the City of Midland at a regular meeting on the _____ day of _____, A.D., 2025, by the following vote:

Council members voting “AYE”:

Council members voting “NAY”:

_____
Lori Merritt Blong, Mayor

ATTEST:

_____
Marcia Bentley-German, City Secretary

RECOMMENDED AND APPROVED:

_____
Tommy Gonzalez, City Manager

APPROVED AS TO CONTENT
AND COMPLETENESS:

_____
Justine Ruff, Director of Airports

APPROVED AS TO FORM ONLY:

_____
Nicholas Toulet, Interim City Attorney

Parkhill

PROJECT MANUAL

MIDLAND INTERNATIONAL AIR & SPACE PORT

Terminal Expansion and Modernization

Midland, Texas

Midland International Air & Space Port

May | 2025

Parkhill Project # 4239823

TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

00 31 00 Available Project Information
Geotechnical Report
00 41 00 Bid Form
00 52 00 Agreement Form
00 54 10 Weather Table (Midland)
00 73 43 Wage Rate Requirements
00 80 10 Owner-Provided Contracting Documents
Advertisement for Bids
Instructions to Bidders
City of Midland – Message to Vendors
Exhibit C - Bonding Requirements
Bid Bond
Payment Bond
Performance Bond
Exhibit D – Building Wage Rates
Conflict of Interest Reporting Requirements
Conflict of Interest Questionnaire
Consideration of Location of Bidder's Principal Place of Business Affidavit of Eligibility
Notice to Bidders
General Conditions of Bidding
Standard Purchase Terms
City of Midland Contract
Non-Collusion Statement
FAA Contract Provisions
MAF Contract Assurance



05/23/2025

DIVISION 01 - GENERAL REQUIREMENTS

01 10 00 Summary
01 20 00 Price and Payment Procedures
01 30 00 Administrative Requirements
RFI Form
AIA Document C106-2022 Digital Data Licensing Agreement
01 33 00 Submittal Procedures
01 40 00 Quality Requirements
01 42 00 References
01 50 00 Temporary Facilities and Controls
01 57 13 Temporary Erosion and Sediment Control
01 60 00 Product Requirements
01 70 00 Execution and Closeout Requirements
01 91 13 General Commissioning Requirements

DIVISION 02 - EXISTING CONDITIONS

02 41 19 Selective Demolition

DIVISION 03 - CONCRETE

03 10 00 Concrete Forming and Accessories
03 20 00 Concrete Reinforcing
03 30 00 Cast-In-Place Concrete

DIVISION 04 - MASONRY

04 05 23 Through-Wall and Substrate Flashing System
04 20 00 Unit Masonry



05/23/2025

DIVISION 05 - METALS

05 12 00 Structural Steel Framing
05 12 13 Architecturally Exposed Structural Steel Framing
05 31 00 Steel Decking

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

06 06 60 Schedules for Plastic Fabrications
06 10 00 Rough Carpentry
06 16 00 Sheathing
06 16 00.16 Sheathing (Zip System)

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 21 00 Thermal Insulation
07 22 16 Roof Board Insulation
07 27 26 Fluid-Applied Membrane Air Barriers
07 42 13.82 Metal Composite Material Wall Panels (Alucobond)
07 53 00 Coal-Tar Elastomeric Roofing System
07 62 00 Sheet Metal and Miscellaneous Accessories
07 72 00 Roof Accessories
07 92 00 Joint Sealants
07 92 19 Acoustical Joint Sealants

DIVISION 08 - OPENINGS

08 11 13 Hollow Metal Doors and Frames
08 11 19 Stainless Steel Doors and Frames
08 33 23 Overhead Coiling Doors
08 33 33 Security Grilles Side-Folding
08 41 13 Aluminum-Framed Entrances and Storefronts
08 44 13 Glazed Aluminum Curtain Walls
08 71 00 Door Hardware
08 80 00 Glazing
08 87 00 Decorative Film



05/23/2025

DIVISION 09 - FINISHES

09 22 16 Non-Structural Metal Framing
09 29 00 Gypsum Board
09 30 13 Ceramic Tiling
09 51 13 Acoustical Panel Ceilings
09 54 23 Metal Pan Ceilings
09 65 13 Resilient Base and Accessories
09 66 16 Terrazzo Floor Tile
09 66 23 Resinous Matrix Terrazzo Flooring
09 67 26 Resinous Flooring
09 68 13 Tile Carpeting
09 77 00 Special Wall Surfaces
09 91 23 Interior Painting

DIVISION 10 - SPECIALTIES

10 14 00 Signage
10 21 31.14 Stainless Steel Toilet Compartments
10 26 00 Wall and Door Protection
10 28 13 Toilet Accessories
10 44 13 Fire Protection Cabinets
10 44 16 Fire Extinguishers
10 75 16 Ground-Set Flagpoles

DIVISION 11 - EQUIPMENT

Not Used

DIVISION 12 - FURNISHINGS

12 36 16 Metal Countertops
12 36 23.13 Plastic-Laminate-Clad Countertops
12 36 61.16 Solid Surfacing Countertops

DIVISION 13 – SPECIAL CONSTRUCTION

Not Used

DIVISION 14 – CONVEYING EQUIPMENT

14 24 00 Hydraulic Elevators
14 31 00 Escalators



05/23/2025

DIVISION 21 - FIRE SUPPRESSION

21 05 00 Common Work Results for Fire Suppression
21 13 13 Wet-Pipe Sprinkler Systems

DIVISION 22 - PLUMBING

22 05 29 Hangers and Supports for Plumbing Piping and Equipment
22 05 53 Identification for Plumbing Piping and Equipment
22 07 00 Plumbing Insulation
22 08 00 Commissioning of Plumbing
22 10 00 Plumbing Piping
22 14 29 Sump Pumps
22 33 00 Electric Domestic Water Heaters
22 40 00 Plumbing Fixtures

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

25 05 00 General Mechanical Requirements
23 05 00.20 Basic Mechanical Materials and Methods
23 05 29 Hangers and Supports for HVAC Piping and Equipment
25 05 53 Identification for Plumbing and HVAC Piping and Equipment
23 05 93 Testing, Adjusting, and Balancing for HVAC
23 07 00 HVAC Insulation
23 08 00 Commissioning of HVAC
23 09 23 Direct-Digital Controls (DDC) System for HVAC
23 09 93 Sequence of Operations for HVAC Controls
23 11 23 Facility Natural-Gas Piping
23 23 00 Refrigerant Piping
23 31 00 HVAC Ducts and Casings
23 33 00 Air Duct Accessories
23 34 00 HVAC Fans
23 37 00 Air Outlets and Inlets
23 63 13 Air-Cooled Refrigerant Condensers
23 73 00 Indoor Central-Station Air-Handling Units
23 81 26.10 Ductless-Split System Air Conditioners
Appendix Existing Cooling Tower O&M Manual (For Reference Only)

DIVISION 25 - INTEGRATED AUTOMATION

Not Used

DIVISION 26 - ELECTRICAL

26 05 00 Basic Electrical Methods
26 05 13 Building Wire and Cable
26 05 19 Equipment Wiring Systems
26 05 26 Grounding and Bonding
26 05 29 Supporting Devices
26 05 33 Conduit
26 05 33.16 Boxes
26 05 36 Cable Trays
26 05 53 Electrical Identification
26 05 73 Power System Studies
26 09 24 Lighting Controls
26 12 16 Dry Type Transformers
26 18 39 Enclosed Motor Controllers
26 24 16 Switchboards and Panelboards
26 27 26 Wiring Devices
26 28 16.16 Enclosed Switches
26 31 00 Photovoltaic Collectors
26 51 00 Interior Lighting



05/23/2025

DIVISION 27 - COMMUNICATIONS

Not Used

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

28 35 00 Emergency Radio Communication Enhancement Systems
28 51 29.10 Two-Way Communication System

DIVISION 31 - EARTHWORK

31 10 00 Site Clearing
31 20 00 Earth Moving
31 23 16.16 Trenching

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 11 23 Aggregate Base Courses
32 12 16 Asphalt Paving
32 13 13 Concrete Paving
32 18 13 Synthetic Grass Surfacing
32 33 00 Site Furnishings
32 84 00 Planting Irrigation
32 91 1 5 Soil Preparation (Performance Specification)
32 93 00 Plants

DIVISION 33 - UTILITIES

33 01 10.58 Disinfection of Water Utility Piping Systems
33 05 09.33 Thrust Restraint for Utility Piping
33 05 61 Concrete Manholes
33 14 16 Site Water Utility Distribution Piping
33 31 00 Sanitary Sewerage Piping
33 42 00 Stormwater Conveyance

DIVISIONS 34 - 48

Not Used



05/23/2025

PACKET 7.13 September 9, 2025

DESIGN PROFESSIONAL RESPONSIBILITY

The Specification Sections authenticated by my seal and signature are limited to the following:

DIVISION 03 - CONCRETE

03 10 00	Concrete Formwork
03 20 00	Concrete Reinforcement
03 30 00	Cast-In-Place Concrete

DIVISION 05 - METALS

05 12 00	Structural Steel Framing
05 12 13	Architecturally Exposed Structural Steel Framing
05 31 00	Steel Decking



05/23/2025

DESIGN PROFESSIONAL RESPONSIBILITY

The Specification Sections authenticated by my seal and signature are limited to the following:



05/23/2025

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

06 06 60 Schedules for Plastic Fabrications

DIVISION 08 - OPENINGS

08 87 00 Decorative Film

DIVISION 09 - FINISHES

09 30 13 Ceramic Tiling
09 51 13 Acoustical Panel Ceilings
09 54 23 Metal Pan Ceilings
09 65 13 Resilient Base and Accessories
09 66 23 Resinous Matrix Terrazzo Flooring
09 67 26 Resinous Flooring
09 68 13 Tile Carpeting
09 72 00 Wall Coverings
09 77 00 Special Wall Surfaces
09 91 23 Interior Painting

DIVISION 10 - SPECIALTIES

10 21 13.14 Stainless-Steel Toilet Compartments
10 26 00 Wall and Door Protection

DIVISION 12 - FURNISHINGS

12 36 16 Metal Countertops
12 36 23.13 Plastic-Laminate-Clad Countertops
12 36 61.16 Solid Surfacing Countertops

DESIGN PROFESSIONAL RESPONSIBILITY

The Specification Sections authenticated by my seal and signature are limited to the following:

DIVISION 04 - MASONRY

04 05 23 Through-Wall and Substrate Flashing System

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 22 16 Roof Board Insulation
07 53 00 Coal-Tar Elastomeric Roofing System
07 62 00 Sheet Metal and Miscellaneous Accessories
07 72 00 Roof Accessories

DESIGN PROFESSIONAL RESPONSIBILITY

The Specification Sections authenticated by my seal and signature are limited to the following:

DIVISION 10 - SPECIALTIES

10 75 16 Ground-Set Flagpoles

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 84 00 Planting Irrigation
32 91 15 Soile Preparation (Performance Specification)
32 93 00 Plants



05/23/2025

DESIGN PROFESSIONAL RESPONSIBILITY

The Specification Sections authenticated by my seal and signature are limited to the following:



05/23/2025

DIVISION 21 - FIRE SUPPRESSION

21 05 00	Common Work Results for Fire Suppression
21 13 13	Wet-Pipe Sprinkler Systems

DIVISION 22 - PLUMBING

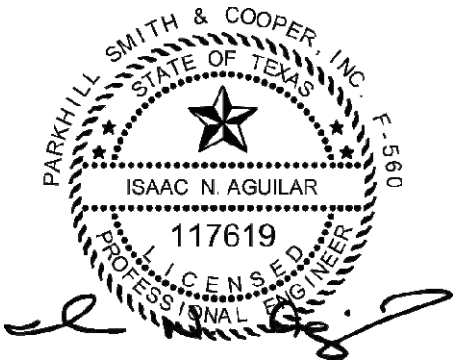
22 05 29	Hangers and Supports for Plumbing Piping and Equipment
22 05 53	Identification for Plumbing Piping and Equipment
22 07 00	Plumbing Insulation
22 08 00	Commissioning of Plumbing
22 10 00	Plumbing Piping
22 14 29	Sump Pumps
22 33 00	Electric Domestic Water Heaters
22 40 00	Plumbing Fixtures

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

25 05 00	General Mechanical Requirements
23 05 00.20	Basic Mechanical Materials and Methods
23 05 29	Hangers and Supports for HVAC Piping and Equipment
25 05 53	Identification for Plumbing and HVAC Piping and Equipment
23 05 93	Testing, Adjusting, and Balancing for HVAC
23 07 00	HVAC Insulation
23 08 00	Commissioning of HVAC
23 09 23	Direct-Digital Control System for HVAC
23 09 93	Sequence of Operations for HVAC/Plumbing Controls
23 11 23	Facility Natural-Gas Piping
23 23 00	Refrigerant Piping
23 31 00	HVAC Ducts and Casings
23 33 00	Air Duct Accessories
23 34 00	HVAC Fans
23 37 00	Air Outlets and Inlets
23 63 13	Air-Cooled Refrigerant Condensers
23 73 00	Indoor Central Station Air Handling Units
23 81 26.10	Ductless-Split System Air Conditioners
Appendix	Existing Cooling Tower O&M Manual (For Reference Only)

DESIGN PROFESSIONAL RESPONSIBILITY

The Specification Sections authenticated by my seal and signature are limited to the following:



05/23/2025

DIVISION 26 - ELECTRICAL

26 05 00	Basic Electrical Methods
26 05 13	Building Wire and Cable
26 05 19	Equipment Wiring Systems
26 05 26	Grounding and Bonding
26 05 29	Supporting Devices
26 05 33	Conduit
26 05 33.16	Boxes
26 05 36	Cable Trays
26 05 53	Electrical Identification
26 05 73	Power System Studies
26 09 24	Lighting Controls
26 12 16	Dry Type Transformers
26 18 39	Enclosed Motor Controllers
26 24 16	Switchboards and Panelboards
26 27 26	Wiring Devices
26 28 16.16	Enclosed Switches
26 51 00	Interior Lighting

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

28 35 00	Emergency Radio Communication Enhancement Systems
28 51 29.10	Two-Way Communication System

DESIGN PROFESSIONAL RESPONSIBILITY

The Specification Sections authenticated by my seal and signature are limited to the following:



05/23/2025

DIVISION 31 - EARTHWORK

31 10 00	Site Clearing
31 20 00	Earth Moving
31 23 16.16	Trenching

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 11 23	Aggregate Base Courses
32 13 13	Concrete Paving

DIVISION 33 - UTILITIES

33 01 10.58	Disinfection of Water Utility Piping Systems
33 05 09.33	Thrust Restraint for Utility Piping
33 05 61	Concrete Manholes
33 14 16	Site Water Utility Distribution Piping
33 31 00	Sanitary Sewerage Piping
33 42 00	Stormwater Conveyance

SECTION 00 31 00 – AVAILABLE PROJECT INFORMATION

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
1. Division 01 Specification Sections apply to Work of this Section.

1.2 INFORMATION

A. Geotechnical Data:
1. An investigation of subsurface soil conditions at the building site was authorized by the Owner, and these investigations were made by:

Terracon
10400 State Hwy 191
Midland, Texas 79707
432.684.9600

2. Entire report is bound at the end of this Section.

B. Property Survey:
1. A survey of the property was authorized by the Owner, and the survey was made by:

Piper Surveying Co., Inc.
Post Office Box 60432
Midland, Texas 79711
432.550.7810

2. Site layout, drawings and boundary traverse and closure information are included in the drawings.
3. Property survey and site improvement layout is available for Contractor's information only and is not a warranty of existing conditions.

1.3 RESPONSIBILITY

A. Bidders are expected to examine the geotechnical data report and site survey information then determine for themselves the validity of the information contained there-in as it relates to this Project.
B. Architect and Owner do not guarantee continuity of conditions indicated at boring locations and assume no responsibility for variations of subsoil quality or conditions.
C. Architect and Owner assume no responsibility for variations of site survey information.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

DOCUMENT 00 41 00 - BID FORM

Date: July 30 , 2025

Marcia Bently-German, City Secretary
City of Midland
300 N. Loraine Street
Midland, Texas 79701

Dear Madam:

The undersigned, having carefully examined the specifications, drawings, and related documents entitled:

Terminal Expansion and Modernization
Midland International Air & Space Port
9506 La Force Blvd, Midland, Texas

all as prepared by Parkhill 1700 West Wall Street, Suite 100, Midland, Texas 79701; 432.697.1447, made an on-site inspection of the premises and all other conditions affecting the cost and/or execution of the work, proposes to furnish all materials, labor, and equipment necessary to complete the work in accordance with said documents, of which this bid is a part, for the following sum:

I. BASE BID: THIRTY EIGHT MILLION FIVE HUNDRED SEVENTY SEVEN THOUSAND Dollars ($ 38,577,000.00)

II. ALTERNATE #1 BID: EIGHT THOUSAND SIX HUNDRED

Dollars ($ 8,600.00)

III. ALTERNATE #2 BID: NO BID

Dollars ($ [redacted]0.00)

TOTAL BID INCLUDING BASE AND ALTERNATES: THIRTY EIGHT MILLION FIVE HUNDRED EIGHTY FIVE THOUSAND SIX HUNDRED Dollars ($ 38,585,600.00)

(**Note:** All amounts shall be shown in both written and figure form. In case of discrepancy between the written amount and the figure, the written amount will govern. For alternates, check whether it is an add, deduct, or no change.)

We have included, in the Bid sum, all applicable taxes and all allowances described in Section 01 20 00 "Price and Payment Procedures."

The undersigned acknowledges receipt of 5 addenda to the Drawings and Project Manual as follows:

No. 1 Date 6/11/2025 No. 2 Date 7/1/2025 No. 3 Date 7/7/2025

No. 4 Date 7/8/2025 No. 5 Date 7/28/2025 No. Date

(The Bidder is to fill in I.D. Number and date of each thereby acknowledging receipt of Addenda).

The undersigned acknowledges they have read and met the requirements of paragraph IB-8 in Section 00 80 12.02 "Instructions to Bidders" and have examined the site, and are familiar with all existing conditions.

If awarded the contract, the undersigned agrees to commence work under this contract on or before a date to be specified in Written Notice to Proceed, and to substantially complete the project within ~~420~~ 580 calendar days from said date unless modified by change order. T.W.

Bidder agrees to pay the Owner $1,000.00 per day, as liquidated damages, for each day the substantial completion of this project extends beyond the stipulated substantial completion date.

If notified of the acceptance of this bid within ninety (90) days of the time set for the opening of bids, bidder agrees within 10 days of notification, to execute a contract in the form of the City of Midland Contract included in Section 00 80 10 "Owner-Provided Contracting Documents" for the above work, for the above stated compensation.

BID SECURITY, as defined in the Request For Bids and Instructions to Bidders, which the Undersigned agrees to disposition of, is attached to this Bid.

Upon acceptance of this Bid by Owner, Contractor shall furnish, at the time of the signing of the contract, a PERFORMANCE BOND AND LABOR/MATERIAL PAYMENT BOND, in the amount of 100 percent of the Contract Price. Surety shall meet requirements specified in the Owner/Contractor Agreement.

It is understood that the Owner reserves the right to accept or reject any and all Bids and to waive all formalities in accordance with State law.

ATTACHMENTS

Appendix A - List of Subcontractors: Include names of all Subcontractors and portions of the Work each Subcontractor will perform.

Respectfully Submitted,

By: Todd Winnerman

Title: President

Business Address with Zip Code

(SEAL: If Bid is by Corporation)

3712 Helios Way Pflugerville, TX 78660

Telephone Number with Area Code 512.687.6400

FAX Number with Area Code 512.687.6401

Fill in the applicable information:

A Corporation, chartered in the State of Texas.

Authorized to do business in the State of Texas.

A Partnership, composed of _____, and

_____ and _____.

An Individual operating under the name of _____

_____.

Corporate Seal:

END BID FORM

SECTION 00 52 00 – AGREEMENT FORM

PART 1 - GENERAL

1.1 APPLICABLE DOCUMENT

A. The Agreement for the Work will be written on the Sample Agreement form indicated below and that follows this Section.
   1. Owner provided Agreement. See Section 08 10 00 “Owner-Provided Contracting Documents.”

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

DOCUMENT 00 54 10 - WEATHER TABLE
(MIDLAND, TX)

The number of calendar days indicated on the Bid Form – Document 00 41 00 is the contract time allowed to complete the project from Notice to Proceed to Substantial Completion, taking into account the normal weather occurrence as shown in the Table below. Weather occurrences exceeding those listed in the table will be taken into consideration when evaluating a request for extension in contract time.

MONTH	MEAN NUMBER DAYS PRECIPITATION (0.01" OR MORE)	NORMAL PRECIPITATION (WATER EQUIVALENT) (INCHES)	MEAN NUMBER DAYS SNOWFALL (INCLUDING ICE PELLETS/SLEET) (1.0" OR MORE)	AVERAGE NUMBER OF DAYS THAT MIN. TEMP IS < 40
JANUARY	3	0.30	0	27
FEBRUARY	4	0.43	0	20
MARCH	3	0.87	0	11
APRIL	2	0.60	0	3
MAY	5	1.21	0	0
JUNE	3	1.43	0	0
JULY	3	0.79	0	0
AUGUST	4	1.13	0	0
SEPTEMBER	4	1.36	0	0
OCTOBER	4	1.02	0	3
NOVEMBER	2	0.70	0	14
DECEMBER	2	0.24	0	21
ANNUALLY	40	10.07	0	99

This table is based on information from NOAA and measured at the Midland International Airport, Midland, Texas.

Means, normals and averages are based on records covering a period of 4 years from 2020-2024.

SECTION 00 73 43 – WAGE RATE REQUIREMENTS

PART 1 - GENERAL

1.1 WAGE RATE ESTABLISHMENT

A. Pursuant to Chapter 2258, Texas Government Code, all contractors and any subcontractor involved in the construction of a public work project shall pay not less than the prevailing rates as per diem wages in the locality at the time of construction to all laborers, workmen and mechanics employed by them in the execution of this contract.
B. The contractor shall forfeit as a penalty to the Owner, $60.00 for each laborer, workman, or mechanic employed for each calendar day, or portion thereof, such laborer, workman, or mechanic is paid less than the said stipulated rates for any work done under this contract by him, or by any subcontractor under him.
C. Nothing herein contained, however, shall be construed to prohibit the payment of more than the prevailing rate of wages to any laborer, workman, or mechanic employed on the work.
D. Attention is called to the fact that there must be paid on this project not less than the general prevailing rates which have been established by the Owner and verified by the Contractor as indicated in the Schedule at the end of this document.
E. The General Prevailing Rate for overtime shall be 1-1/2 times the scheduled rate on an hourly basis.

1.2 POSTING WAGE RATES

A. Minimum Wage Rates shall be posted on job site in a conspicuous place open for inspection by all workmen.

1.3 EMPLOYEE CLAIMS

A. Any employee who alleges that he has not been paid the minimum wage rate may file a written claim with the Owner.

1.4 PAYMENT OF EMPLOYEES AND PAYROLL RECORDS

A. The Contractor and each subcontractor shall pay each of his employees engaged to perform work under this contract in full (less mandatory legal deductions) not less than once a week.
B. Payment is to be in cash or check readily payable without discount. If payment is by cash, obtain the signature of the employee verifying the payroll period, total hours worked, rate per hour, total wages earned and the date received.
C. Attach one copy of cash payment verification to payroll records.
D. The Contractor and each subcontractor engaged at the site of the work shall prepare and maintain weekly payroll reports certified to be correct.
E. Payroll records shall contain the name, social security number, classification, rate per hour, hours worked each day, including regular hours and overtime hours.

1.5 PAYROLL RECORDS

A. Payroll records shall be made available upon request for inspection by the Architect or by a designated representative of the Owner to ascertain compliance with the minimum wage scale provision of this contract.

1.6 WAGE RATE SCHEDULE

A. See attached General Decision TX20250261 dated March 14, 2025, issued by the Federal Government and any revisions/updates issued for Midland County.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

"General Decision Number: TX20250261 03/14/2025

Superseded General Decision Number: TX20240261

State: Texas

Construction Type: Building

County: Midland County in Texas.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $17.75 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2025.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2025
1	03/14/2025

* BOIL0074-003 01/01/2025

	Rates	Fringes
BOILERMAKER	$ 33.17	24.92

ENGI0178-005 06/01/2020

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
(1) Tower Crane	$ 32.85	13.10
(2) Cranes with Pile Driving or Caisson Attachment and Hydraulic Crane 60 Tons and above	$ 28.75	10.60
(3) Hydraulic cranes 59 Tons and under	$ 32.35	13.10

IRON0084-011 06/01/2024

	Rates		Fringes
IRONWORKER, ORNAMENTAL	$ 28.26		8.13

PLUM0404-001 09/01/2022

	Rates		Fringes
PLUMBER	$ 28.64		10.65

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* SUTX2014-037 07/21/2014

	Rates		Fringes
BRICKLAYER	$ 20.00		0.00
CARPENTER	$ 13.82	**	0.00
CEMENT MASON/CONCRETE FINISHER	$ 13.76	**	0.00
ELECTRICIAN	$ 23.18		6.31
INSULATOR - MECHANICAL (Duct, Pipe & Mechanical System Insulation)	$ 19.77		7.13
IRONWORKER, REINFORCING	$ 12.27	**	0.00
IRONWORKER, STRUCTURAL	$ 22.16		5.26
LABORER: Common or General	$ 11.80	**	0.00
LABORER: Mason Tender - Brick	$ 11.38	**	0.00
LABORER: Mason Tender - Cement/Concrete	$ 10.58	**	0.00
LABORER: Pipelayer	$ 12.49	**	2.13
LABORER: Roof Tearoff	$ 11.28	**	0.00
OPERATOR: Backhoe/Excavator/Trackhoe	$ 14.25	**	0.00
OPERATOR: Bobcat/Skid Steer/Skid Loader	$ 13.93	**	0.00
OPERATOR: Bulldozer	$ 18.29		1.31
OPERATOR: Drill	$ 16.22	**	0.34
OPERATOR: Forklift	$ 14.83	**	0.00
OPERATOR: Grader/Blade	$ 13.37	**	0.00
OPERATOR: Loader	$ 13.55	**	0.94
OPERATOR: Mechanic	$ 17.52	**	3.33
OPERATOR: Paver (Asphalt, Aggregate, and Concrete)	$ 16.03	**	0.00
OPERATOR: Roller	$ 12.70	**	0.00
PAINTER (Brush, Roller, and Spray)	$ 15.00	**	0.73
PIPEFITTER	$ 25.80		8.55
ROOFER	$ 14.75	**	0.00
SHEET METAL WORKER (HVAC Duct Installation Only)	$ 22.73		7.52
SHEET METAL WORKER, Excludes HVAC Duct Installation	$ 19.50		0.00
TILE FINISHER	$ 11.22	**	0.00
TILE SETTER	$ 14.74	**	0.00
TRUCK DRIVER: Dump Truck	$ 12.39	**	1.18

TRUCK DRIVER: Flatbed Truck.....$ 19.65 8.57

TRUCK DRIVER: Semi-Trailer
Truck.....$ 12.50 ** 0.00

TRUCK DRIVER: Water Truck.....$ 12.00 ** 4.11

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($17.75) or 13658 ($13.30). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE:

UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION"

SECTION 00 80 10 - OWNER-PROVIDED CONTRACTING DOCUMENTS

Section Includes:
Advertisement for Bids
Instructions to Bidders
City of Midland – Message to Vendors
Exhibit C - Bonding Requirements
Bid Bond
Payment Bond
Performance Bond
Exhibit D – Building Wage Rates
Conflict of Interest Reporting Requirements
Conflict of Interest Questionnaire
Consideration of Location of Bidder's Principal Place of Business Affidavit of Eligibility
Notice to Bidders
General Conditions of Bidding
Standard Purchase Terms
City of Midland Contract
Non-Collusion Statement

ADVERTISEMENT FOR BIDS
NOTICE TO BIDDERS

Sealed proposals addressed to the City Secretary will be received at the office of the City Secretary, City Hall, Midland, Texas until **2:00 pm, Wednesday, June 25, 2025**, for furnishing all necessary materials, machinery, equipment, superintendence, and labor for constructing certain improvements at Midland International Air & Space Port, Midland, Texas. These improvements are contained in Plans and Specifications entitled, "Midland International Air & Space Port, Terminal Expansion and Modernization," dated May 23, 2025.

Immediately following the closing time for receipt of Bids/Proposals will be publicly opened and read aloud. Any Bid received after closing time will be returned unopened.

Principal items of Work are set forth in specific detail in the Proposal Section of these Specifications; however, Work items may be generally described as expansion of Terminal Building for new passenger checkpoint and modernization of existing Terminal Building.

Work will also include other miscellaneous materials, equipment, machinery, superintendence, and labor for constructing these improvements for the Midland International Air & Space Port, Midland, Texas.

A Bid Proposal guaranty is to accompany the Bid, thereby guaranteeing the good faith of the Bidder and that Bidder will enter into the written contract. The guaranty is to amount to 5 percent of the total bid and must be in the form of cash or certified check, issued by a bank satisfactory to the City of Midland, or a bid bond.

Bidders are expected to inspect site of work and inform themselves regarding all local conditions.

In all areas of employment, women will be afforded equal opportunity for employment. Employment of women shall not diminish the standards or requirements for employment of minorities.

This project is subject to Minority Business Enterprise Contract Provisions, Foreign Trade Restrictions, Federal Debarment and Suspension, Drug-free Workplace, and other requirements stated in the Instructions to Bidders and other sections of project specifications and contract documents.

Policy. It is the policy of the Department of Transportation (DOT) that disadvantaged business enterprises as defined in 49 CFR Part 26 shall have maximum opportunity to participate in performance of contracts financed in whole or in part with Federal funds.

Buy American Provision. Proposed contract is subject to the Buy American Provision under Section 9129 of the Aviation Safety and Capacity Expansion Act of 1990. Details of such requirement are contained in Specifications.

MAF treats Bidder/Offer compliance with good faith effort requirements as a matter of responsiveness.

Requirements of 49 CFR Part 26, Regulations of the U.S. Department of Transportation, apply to this contract. It is the policy of MAF to practice nondiscrimination based on race, color, sex, or national origin in award or performance of this contract. All firms qualifying under this solicitation are encouraged to submit Bids/Proposals. Award of this contract will be conditioned upon satisfying requirements of this bid specification. These requirements apply to all Bidders/Offerors, including those who qualify as a DBE. DBE contract goal of 2.93 percent has been established for this contract. Bidder/Offeror shall make good faith efforts, as defined in Appendix A, 49 CFR Part 26, to meet contract goal for DBE participation in performance of this contract.

Successful Bidder/Offeror will be required to submit the following information: (1) names and addresses of DBE firms that will participate in contract; (2) description of work each DBE firm will perform; (3) dollar amount of participation of each DBE firm participating; (4) written documentation of bidder/offeror's commitment to use a DBE subcontractor whose participation submits to meet contract goal; (5) written confirmation from the DBE of participation in contract as provided in commitment made under (4); and (6) if contract goal is not met, evidence of good faith efforts. Successful Bidder or Offeror must provide written confirmation of participation from each DBE firm the Bidder or Offeror lists in their commitment. This Bidder/Offeror must submit DBE written confirmation of participation within five days of receiving Owner notice to successful Bidder.

Information for Bidders, Proposal forms, Specifications, and Plans are on file in the office of the Director of Airports, Midland International Air & Space Port.

Downloaded documents (PDF file extension format) can be obtained from the Parkhill Info Exchange website after registering as a plan holder with Parkhill via https://parkhill.com/projects-for-bid/ or by contacting Elizabeth Hollenbeck, Project Coordinator, at ehollenbeck@parkhill.com. No cost or deposit required for downloaded documents.

CITY OF MIDLAND, TEXAS
Marcia Bentley-German
City Secretary

INSTRUCTIONS TO BIDDERS

IB-1. BID FORMS

Bid shall be submitted on Proposal form in the bound Specifications.

In addition to the completed Proposals, bid forms shall include Bid Security, Financial Statement, and other specified documents. Failure to submit a complete Bid as specified will be considered as sufficient cause for rejection of the Bid.

IB-2. PREPARATION OF PROPOSALS

All blanks in the forms shall be filled in and all required information shall be included with Proposals. Bid prices shall be written in ink. Receipt of all addenda issued shall be acknowledged in the space provided on the addendum. Each addendum received and the Bid Security shall be enclosed with Proposal. Proposal and accompanying documents shall be enclosed in a sealed envelope, addressed to the City Secretary, 300 N. Loraine, Midland, Texas 79701, marked "Terminal Expansion and Modernization" with name and address of Bidder also shown thereon. **If Sealed Bid is sent in a mailing envelope, outside of mailing envelope must also have same marking visible.**

IB-3. EXPERIENCE RECORD AND FINANCIAL STATEMENT

Experience Record included herein, shall be filled in, showing completed jobs, of a similar nature to the one covered by Proposal, and work in progress with contract and bond amounts and percent complete.

A sworn statement of the current financial condition of Bidder shall also be enclosed with Proposal, to provide Owner with information relative to the responsibility of bidders and their ability to finance and construct the work. This statement shall be enclosed with Proposal in a separate envelope and will be returned to Bidder upon return of his bid security.

TxDOT prequalification can be submitted in lieu of a financial statement with bids; however, financial information may be required of the apparent low Bidder.

IB-4. BID SECURITY

Each proposal must be accompanied by a Bid Bond, Certified Check, or cash in the amount of not less than 5 percent of the maximum bid submitted, payable without recourse to the City of Midland, Texas. If a Bid Bond is submitted as Bid Security, it shall be executed by an approved surety company authorized to do business in the State of Texas and accepted according to the latest list of companies holding certificates of authority from the Secretary of the Treasury of the United States of America. Such Bid Security shall be so conditioned if Bidder is awarded Contract and unable or fails to furnish performance and payment bonds and execute Contract within 10 days after date of award, Security shall revert to Owner as compensation for damages which Owner suffers because of such failure by Bidder.

IB-5. PERFORMANCE AND PAYMENT BONDS

With execution and delivery of the Contract Documents, Contractor shall furnish, on the forms provided herein, bonds, as required by the General Conditions, of 100 percent of the total contract price, executed by an approved surety company authorized to do business in the State of Texas, and accepted according to the latest list of companies holding certificates of authority from the Secretary of the Treasury of the United States of America. Performance and Payment Bonds submitted shall be in compliance with Chapter 2253 of the Texas Government Code.

IB-6. INTERPRETATION OF BIDS

No bid will be considered which fails to supply all information indicated, or which has any limitation or provisions placed upon it by Bidder. In case of a difference between the written words and the figures in Proposal, amount stated in written words will be considered as bid price, without recourse on the part of Contractor. In case of ambiguity or lack of clearness in Proposal, Owner will adopt the most advantageous construction thereof or reject the bid. Owner reserves the right to accept or reject any or all bids, if it is deemed to be in the best interest of the public. Further, Owner reserves the right to reject any bids because of irregularity or to waive such irregularity if such action is in the public interest.

IB-7. DISPOSITION OF BIDS

Owner expects to make award of the contracts as soon as possible after the opening of bids, but specifically reserves the right to hold all Proposals for a period not to exceed 90 days, before making an award. No Proposal, having been opened, may be withdrawn prior to expiration of this 90-day period. Bid security of all but the successful Bidder will be returned upon making an award.

Contract will be awarded to the responsible bidder submitting the lowest bid complying with the conditions of the Advertisement for Bidders and the Instructions to Bidders.

IB-8. EXAMINATION OF SITE, PLANS, AND SPECIFICATIONS

Prior to submission of a Proposal, each Bidder shall have made a thorough examination of the site of work and of the plans and specifications, and shall become informed as to the location and nature of the proposed construction, labor conditions and all other matters that may affect the cost and time of completion of the work upon which he bids. Bidders shall make such investigations of the nature of the project as they deem necessary and shall assume all responsibility for fully informing themselves of the character of materials which will be encountered. Submission of a Proposal shall be prima facie evidence that Bidder has made such an examination. Contact Steve Hirst, Airport Facilities Manager (432.560.2200), to schedule a site examination visit.

IB-9. PREBID CONFERENCE

A prebid conference will be held at **10:00 am, Wednesday, June 4, 2025**, in the Conference Room at Midland International Air & Space Port. At this time, all interested bidders will be requested to appear and present any questions they may have pertaining to this project. All bidders are urged to attend prebid conference because they will be charged with notice of the matters discussed therein. Attendance to the prebid conference is not mandatory.

IB-10. INTERPRETATION OF SPECIFICATIONS PRIOR TO BIDDING

Any questions arising during the advertising period as to the meaning or intent of the specifications will be answered by an addendum which will be sent to all who have placed a deposit and/or furnished plans and Contract documents issued by Parkhill. Engineer shall receive requests for clarifications to specifications and plans at least seven (7) days prior to the date for receipt of bids.

Receipt of each addendum shall be acknowledged by Bidder in the space provided and each addendum shall be enclosed with Proposal when it is submitted. All addenda shall become a part of these contract documents.

IB-11. AVAILABILITY OF PLANS

All parties with an interest in the type of work included in the project covered by these documents, shall be given a reasonable opportunity to examine the documents and prepare a bid or sub-bid. Documents may be examined without charge as noted in the Notice to Bidders.

Downloadable documents (PDF file extension format) can be obtained from the Parkhill Info Exchange website after registering as a plan holder with Parkhill via https://parkhill.com/projects-for-bid/ or through Elizabeth Hollenbeck, Project Coordinator, at ehollenbeck@parkhill.com. No cost or deposit required for downloaded documents.

IB-12. PLANT LOCATION AND STORAGE AREA

Contractors bidding on the work included in this contract who desire to locate a material storage area or other similar facility on the airport property may secure such site, buildings or areas by direct negotiation with the Director of Airports, Midland International Air & Space Port, Midland, Texas. An area located adjacent to the project area will be identified as available for use by Contractor for staging and material storage.

IB-13. WITHDRAWAL OF PROPOSALS

Any Bidder, upon his or his authorized representative's written request, will be given permission to withdraw his Proposal not later than the time set for opening thereof. At the time of opening of Proposals, when such Proposal is reached, it will be returned to him unread.

IB-14. DISQUALIFICATION OF BIDDERS

Any one or more of the following causes may be considered as sufficient for the disqualification of bidder and the rejection of his bid or bids:

More than one Proposal for the same work from an individual firm, partnership, or corporation under the same or different name.

Evidence of collusion among bidders. Participants in such collusion may not receive recognition as Bidders for any future work.

Unbalanced Proposals in which the prices for some items are out of proportion to the prices for other items.

Failure to submit a unit price for each item of work for which a bid price is required by Proposal.

Lack of competency as revealed by the financial statement submitted.

Lack of responsibility as shown by past work judged from the standpoint of workmanship and progress.

Uncompleted work which, in the judgment of Owner, might hinder or prevent the prompt completion of additional work if awarded.

For being in arrears on existing contracts, in litigation with Owner, or having defaulted on a previous contract.

IB-15. MATERIAL GUARANTY

Before any contract is awarded, Bidder may be required to furnish a complete statement of origin, composition, or manufacture of any or all materials proposed to be used in the construction of the work, together with samples, which may be subjected to the tests provided for in these Specifications to determine their quality and fitness for the work.

IB-16. DISADVANTAGED BUSINESS ENTERPRISE CONTRACT PROVISIONS

It is the policy of the Department of Transportation (DOT) that disadvantaged business enterprises as defined in 49 CFR Part 26 shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal funds under this agreement. Consequently, Bidder will be required to conform to the DBE requirements of 49 CFR Part 26.

IB-17. WAIVER

BY SUBMITTING A BID, EACH BIDDER AGREES TO AND DOES HEREBY WAIVE ANY CLAIM BIDDER HAS OR MAY HAVE AGAINST THE CITY OF MIDLAND, TEXAS, AND THE CITY'S EMPLOYEES, AGENTS, AND OFFICERS ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE FOLLOWING:

1. ADMINISTRATION, EVALUATION, OR RECOMMENDATION OF ANY BID;
2. WAIVER OR DELETION OF ANY REQUIREMENT UNDER BID DOCUMENTS OR CONTRACT DOCUMENTS;
3. ACCEPTANCE OR REJECTION OF ANY BIDS; AND
4. AWARD OF CONTRACT

BY SUBMITTING A BID, BIDDER ACKNOWLEDGES THAT BIDDER UNDERSTANDS ALL TERMS OF BIDDING DOCUMENTS AND CONSENTS TO BIDDING PROCESS AND THE POSSIBILITY OF A NEGATIVE ASSESSMENT. BY SUBMITTING A BID, BIDDER ACKNOWLEDGES AND AGREES THAT THERE WAS AND IS NO DISPARITY OF BARGAINING POWER BETWEEN BIDDER AND THE CITY OF MIDLAND, TEXAS.

BIDDER AGREES THIS IS THE INTENTIONAL RELINQUISHMENT OF THE LISTED PRESENTLY EXISTING KNOWN RIGHTS.

A Message for Our Vendors

The City of Midland, Texas has developed a strategic plan with long-term objectives, new mission and vision statements, and a course of action to carry out goals established by and for our community. This includes strategic priorities that will address our economy, infrastructure, quality of life, standards for a safe and secure city, plus much more that's detailed below. We hope you join us on this exciting journey and to be part of the energy toward a successful and prosperous Midland!

Vision Statement

The City of Midland will be the premier and safest city in West Texas by providing world-class municipal services through operational excellence and a culture of innovation.

Mission Statement

Deliver exceptional services and promote a high quality of life and place for ALL our citizens.

Guiding Principles: I-FORCE

Integrity
Financial Stewardship
Outstanding Service
Respect
Collaboration
Excellence

City Council Key Focus Areas

Communication • Customer Service
Economic Development
Fiscal Responsibility & Accountability
High-Performing City Team • Legislation
Quality of Place • Technology Improvements

Core Values

Commitment: Duty to the public good.
Engagement: Foster partnerships and collaboration.
Excellence: Practice continuous improvement.
Innovation: Embrace creativity and cutting-edge solutions.
Integrity: Operate with transparency and accountability.
Inclusivity: Ensure all voices are heard and valued.

Vendor & Contractor Communication

In order to ensure smooth coordination and effective communication between contractors and the City of Midland**, it is imperative that contractors provide adequate advance notice before commencing work on specific projects**. The city requires ten (10) days' notice on commencement of project. This advance notice requirement serves to notify all relevant city departments, ensuring proper preparation and coordination of resources. Additionally, it facilitates timely dissemination of information to the public, if necessary, thereby minimizing potential disruptions and maximizing transparency throughout the project lifecycle. **By adhering to this protocol, contractors demonstrate their commitment to fostering productive partnerships with the City of Midland and upholding standards of efficient project management and community engagement. This commitment is a part of our strategic plan, with direct ties to Goal 4: Transparent and Consistent Communication and Strategies 4.4 and 4.5.**

Strategic Plan

1. Strong Economy with More Quality Jobs

1.1 Increase the Midland Sales Tax Base: Develop strategies to expand the tax base by attracting businesses and supporting local commerce.
1.2 Enhance Visitor Revenue Opportunities: Boost tourism through marketing and infrastructure improvements.
1.3 Continue Downtown and West Midland Redevelopment: Promote revitalization efforts for a vibrant downtown.
1.4 Nurture Development Districts: Establish key action plans honed to enhance Development Districts.
1.5 Grow the Core Business of Air Transportation: Develop and transform the Midland airport system.
1.6 Diversify Midland's Economy: Support initiatives that diversify the local economy and enhance resilience.
1.7 Expand Opportunities and Programming for General and Small Business: Foster the growth, retention, and expansion of local small businesses as well as business in general.
1.8 Improve Speed to Market for Citizens, Builders, Developers, and Contractors: Reduce wait times for permit review/approval and inspection process of permitted work.
1.9 Establish Our Community as a Premier Destination for Retail and Entertainment: Offer unique and compelling experiences that draw visitors, ultimately driving economic growth and community vibrancy, while increasing tourism and business development.

2. Set the Standard for a safe and secure City

2.1 Enhance public safety programs.
2.2 Improve Pedestrian and Motorist Safety: Invest in traffic management and infrastructure.
2.3 Implement Effective Code Enforcement Strategies: Address nuisances to improve overall health and safety.
2.4 Revitalize Neighborhoods: Utilize best practices to support the redevelopment of neighborhoods.
2.5 Enhance Animal Services: Ensure the welfare of pets and wildlife in the city.
2.6 Grow and Retain Public Safety Resources: Expand law enforcement presence as well as fire reduction and prevention programs while reducing attrition.

3. Quality of Life and Place

3.1 Enhance Community Engagement: Champion innovative recreational, educational, and cultural programs that enrich residents' lives in partnership with the business community.
3.2 Foster Relationships with Foundations and Outside Businesses: Collaborate to create world-class facilities and amenities.
3.3 Create an Attractive and Inclusive Living Environment: Develop and enhance live, work, and play opportunities for our citizens.
3.4 Establish Beautification Programs: Implement initiatives to make the community clean and bright.
3.5 Nurture and Promote a Healthy Community: Increase healthy community living and education opportunities for citizens of all ages.
3.6 Build the Best Parks System in Our Region: Offer diverse, accessible, and enjoyable green spaces, tournament-ready ball fields, safe playgrounds, and unique recreational opportunities that enhance the quality of life/quality of place for our community.

4. Transparent and Consistent Communication

4.1 Set a Climate of Respect, Collaboration, and Team Spirit: Cultivate a culture of openness and respect.
4.2 Enhance Communication Efficiency and Effectiveness: Leverage and expand the use of technology to facilitate the exchange of information.
4.3 Elevate Internal Communication and Employee Engagement: Strengthen information flow and collaboration among city staff.
4.4 Advance Two-Way Communication of Key Messages: Engage effectively with external stakeholders; foster community engagement.
4.5 Strengthen Messaging Opportunities Through Various Media Outlets: Communicate the city's achievements and initiatives.

5. Provide Sound Governance and Fiscal Management

5.1 Recruit and Retain a Skilled and Diverse Workforce: Invest in talent and diversity; grow our local pipeline of skilled employees.
5.2 Enhance Citizen Experience: Improve employee working conditions to better serve citizens.
5.3 Hone Public Servant Proficiency: Cultivate a culture of professional growth, skilled mastery, and information exchange.
5.4 Implement Cutting-Edge Practices: Harness automation and Artificial Intelligence technology for efficient resource utilization.
5.5 Promote a Well-Balanced Customer Service Philosophy: Consistently deliver excellent service to residents.
5.6 Deliver Services Timely and Efficiently: Prioritize continuous improvement.
5.7 Ensure Continued Financial Stability and Accountability: Maintain financial transparency.
5.8 Deliver Effective and Efficient Processes: Maximize value in procurement.
5.9 Ensure Reliability and Safety: Maintain existing assets and develop new city asset opportunities, including parks

and other facilities, with a standard of excellence.

5.10 Create a Work Environment that Supports Bleeding-Edge Practices: Encourage bleeding-edge practice that then cultivates an environment where employees can learn from their experiences and improve processes; thus, becoming a learning organization.

6. Strengthen and Sustain Our Infrastructure

6.1 Provide Reliable and Sustainable Utilities: Guarantee water supply and distribution systems security and longevity.

6.2 Enhance Infrastructure for Economic Growth: Improve competitiveness through infrastructure investments that includes collaboration with neighboring jurisdictions and exemplary peer agencies.

6.3 Streamline and Consolidate City Facilities: Create synergy for improved services.

6.4Standardize Infrastructure Processes Across the City: Ensure consistency, timeliness, and accountability in infrastructure development.

6.5 Implement a Funding Stream for Infrastructure: Establish reliable funding for continual improvements.

6.6 Strategize for and Monitor City Growth: Develop proactive responses to growth rather than reactive.

6.7 Develop and Implement Comprehensive Road Planning and Maintenance Initiatives: Ensure safe and maintained roads for existing and new developing areas and main thoroughfares.

EXHIBIT C

Bonding Requirements

The successful bidder shall be required to furnish a Performance & Payment Bond* for bids in excess of $50,000.00, in an amount equal to one hundred percent (100%) of the total contract price, such bond to be executed by a Corporate Surety authorized to do business in the State of Texas and acceptable to the City of Midland. **All bonds must be executed on forms contained in these contract documents**. The form of agreement which the successful bidder, as contractor, will be required to execute is also included herewith. The form of agreement and the form of the bonds should be carefully examined by the bidder.

A certified check, cashier's check, bank money order, or irrevocable letter of credit issued by a bank satisfactory to the City, **or a bidder's bond on the form provided**, in the amount of five percent (5%) of the largest possible lump sum bid submitted, payable without recourse to the City, must accompany the bidder's proposal, as a guaranty that the bidder will enter a contract and execute the required payment bond and guaranty in the forms provided within fifteen (15) days after notice of award of contract to him. Bids or proposals without the required bid guaranty will not be considered. All bid sureties and payment bonds shall name the City of Midland as Obligee.

*A cash security such as a cashier's check or irrevocable letter of credit issued by a bank satisfactory to the City for 100 % of the contract amount may be supplied in lieu of the Performance and Payment Bonds. The check will be returned un-cashed upon satisfactory completion of the work and evidence of payment of all obligations due for the contract.

BID BOND

THE STATE OF TEXAS §

COUNTY OF MIDLAND §

SURETY NO. N/A

KNOW ALL MEN BY THESE PRESENTS, THAT

Cerris Builders

4050 Smith Road, Midland, TX 79707

(hereinafter called the Principal), as Principal, and

Federal Insurance Company

202B Hall's Mill Road, Whitehouse Station, NJ 08889 (215) 640-1000

(hereinafter called the Surety), as Surety, are held and firmly bound unto the City of Midland, Texas a home rule municipal corporation of Midland County, Texas, (hereinafter called the Obligee), in the amount of

Five Percent of Amount Bid DOLLARS

($ 5% of Amount Bid), for the payment whereof the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a Bid or Proposal to enter into a certain written Contract with the obligee to Terminal Expansion and Modernization: Project No. 4239823.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall faithfully enter into such written Contract, then this obligation shall be void; otherwise to remain in full force and effect.

IT IS EXPRESSLY UNDERSTOOD AND AGREED that if said Principal should withdraw its Bid anytime after such Bid is opened and before official rejection to such Bid or, if successful in securing the award thereof, said Principal should fail to enter into the Contract and furnish satisfactory Performance Bond and Payment Bond, the Obligee, in either such events, shall be entitled and is hereby given the right to collect the full amount of this Bid Bond as liquidated damages.

PROVIDED, further that if any legal action be filed upon this Bond venue shall lie in Midland County, Texas

IN WITNESS THEREOF, THE SAID PRINCIPAL AND SURETY do sign and seal this instrument, this 9th day of July, 20 25.

Cerris Builders

Principal

By _____

Address 4050 Smith Road

Midland, TX 79707

Federal Insurance Company

Surety

By _____

Rebecca S. Leal, Attorney-in-Fact

Address 202B Hall's Mill Road

Whitehouse Station, NJ 08889

APPROVED AS TO FORM:

City Attorney

NOTE: ATTACH POWER OF ATTORNEY

CHUBB

Power of Attorney

Federal Insurance Company | Vigilant Insurance Company | Pacific Indemnity Company
Westchester Fire Insurance Company | ACE American Insurance Company

Know All by These Presents, that **FEDERAL INSURANCE COMPANY**, an Indiana corporation, **VIGILANT INSURANCE COMPANY**, a New York corporation, **PACIFIC INDEMNITY COMPANY**, a Delaware corporation, **WESTCHESTER FIRE INSURANCE COMPANY** and **ACE AMERICAN INSURANCE COMPANY** corporations of the Commonwealth of Pennsylvania, do each hereby constitute and appoint Christy M. Braile, Danielle R. Capps, Jeffrey C. Carey, Mary T. Flanigan, Tahitia M. Fry, C. Stephens Griggs, Erin C. Lavin, Veronica Lawver, Rebecca S. Leal, Kellie A. Meyer, Patrick T. Pribyl, Debra J. Scarborough, Lauren Scott, Hillary D. Shepard, Evan D. Sizemore, Kristin D. Thurber and Mariana Walker of Kansas City, Missouri ----------

each as their true and lawful Attorney-in-Fact to execute under such designation in their names and to affix their corporate seals to and deliver for and on their behalf as surety thereon or otherwise, bonds and undertakings and other writings obligatory in the nature thereof (other than bail bonds) given or executed in the course of business, and any instruments amending or altering the same, and consents to the modification or alteration of any instrument referred to in said bonds or obligations.

In **Witness Whereof**, said **FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, PACIFIC INDEMNITY COMPANY, WESTCHESTER FIRE INSURANCE COMPANY** and **ACE AMERICAN INSURANCE COMPANY** have each executed and attested these presents and affixed their corporate seals on this **15th** day of **July, 2024**.

Rupert HD Swindells, Assistant Secretary

Warren Eichhorn, Vice President

STATE OF NEW JERSEY
County of Hunterdon ss.

On this 15th day of **July, 2024** before me, a Notary Public of New Jersey, personally came Rupert HD Swindells and Warren Eichhorn, to me known to be Assistant Secretary and Vice President, respectively, of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, PACIFIC INDEMNITY COMPANY, WESTCHESTER FIRE INSURANCE COMPANY and ACE AMERICAN INSURANCE COMPANY, the companies which executed the foregoing Power of Attorney, and the said Rupert HD Swindells and Warren Eichhorn, being by me duly sworn, severally and each for himself did depose and say that they are Assistant Secretary and Vice President, respectively, of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, PACIFIC INDEMNITY COMPANY, WESTCHESTER FIRE INSURANCE COMPANY and ACE AMERICAN INSURANCE COMPANY and know the corporate seals thereof, that the seals affixed to the foregoing Power of Attorney are such corporate seals and were thereto affixed by authority of said Companies; and that their signatures as such officers were duly affixed and subscribed by like authority.

Notarial Seal

Albert Contursi
NOTARY PUBLIC OF NEW JERSEY
No 50202369
Commission Expires August 22, 2027

Notary Public

CERTIFICATION

Resolutions adopted by the Boards of Directors of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY on August 30, 2016; WESTCHESTER FIRE INSURANCE COMPANY on December 11, 2006; and ACE AMERICAN INSURANCE COMPANY on March 20, 2009:

"RESOLVED, that the following authorizations relate to the execution, for and on behalf of the Company, of bonds, undertakings, recognizances, contracts and other written commitments of the Company entered into in the ordinary course of business (each a "Written Commitment"):

(1) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise.

(2) Each duly appointed attorney-in-fact of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise, to the extent that such action is authorized by the grant of powers provided for in such person's written appointment as such attorney-in-fact.

(3) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to appoint in writing any person the attorney-in-fact of the Company with full power and authority to execute, for and on behalf of the Company, under the seal of the Company or otherwise, such Written Commitments of the Company as may be specified in such written appointment, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.

(4) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to delegate in writing to any other officer of the Company the authority to execute, for and on behalf of the Company, under the Company's seal or otherwise, such Written Commitments of the Company as are specified in such written delegation, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.

(5) The signature of any officer or other person executing any Written Commitment or appointment or delegation pursuant to this Resolution, and the seal of the Company, may be affixed by facsimile on such Written Commitment or written appointment or delegation.

FURTHER RESOLVED, that the foregoing Resolution shall not be deemed to be an exclusive statement of the powers and authority of officers, employees and other persons to act for and on behalf of the Company, and such Resolution shall not limit or otherwise affect the exercise of any such power or authority otherwise validly granted or vested."

I, Rupert HD Swindells, Assistant Secretary of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, PACIFIC INDEMNITY COMPANY, WESTCHESTER FIRE INSURANCE COMPANY and ACE AMERICAN INSURANCE COMPANY (the "Companies") do hereby certify that

(i) the foregoing Resolutions adopted by the Board of Directors of the Companies are true, correct and in full force and effect,
(ii) the foregoing Power of Attorney is true, correct and in full force and effect.

Given under my hand and seals of said Companies at Whitehouse Station, NJ, this July 9, 2025

Rupert HD Swindells, Assistant Secretary

IN THE EVENT YOU WISH TO VERIFY THE AUTHENTICITY OF THIS BOND OR NOTIFY US OF ANY OTHER MATTER, PLEASE CONTACT US AT:
Telephone (908) 903-3493 Fax (908) 903-3656 e-mail: surety@chubb.com

Combined: FED-VIG-PI-WFIC-AAIC (rev. 11-19)

Have a complaint or need help?
Tiene una queja o necesita ayuda?

IMPORTANT NOTICE

If you have a problem with a claim or your premiums, call your insurance company first. If you can't work out the issue, the Texas Department of Insurance may be able to help.

Even if you file a complaint with the Texas Department of Insurance, you should also file a complaint or appeal through your insurance company. If you don't, you may lose your right to appeal.

To get information or file a complaint with CHUBB:

Call Toll-free: ***1-800-36-CHUBB***
Mail: Eastern Claim Service Center
600 Independence Parkway
Chesapeake, VA 23320
Attn: Surety Support
Phone: 800-252-4670 Fax: 800-664-5358
Email: ecsc.claims@chubb.com

To get help with an insurance question or file a complaint with the state:

The Texas Department of Insurance
Call with a question: 1-800-252-3439
File a complaint: www.tdi.texas.gov
E-mail: ConsumerProtection@tdi.texas.gov
Mail: MC-111-1A, P.O. Box 149091
Austin, TX 78714-9091

AVISO IMPORTANTE

Si tiene un problema con un reclamo o las primas, llame primero a la empresa de seguros. Si no puede resolver el problema, el Departamento de Seguros del estado de Tejas puede ayudar.

Si registra una queja con el Departamento de Seguros del estado de tejas, tambien debe presentar una queja o apelacion a traves de su compania de seguros. Si no lo hace puede perder su derecho de apelar.

Para obtener informacion o registro de una queja con CHUBB:

Llame al: ***1-800-36-CHUBB***
Correo: Eastern Claim Service Center
600 Independence Parkway
Chesapeake, VA 23320
Attn: Surety Support
Telefono: 800-252-4670 Fax: 800-664-5358
Correo electronico: ecsc.claims@chubb.com

Para ayuda con una pregunta de seguros o registrar una queja con el estado:

El Departamento de Seguros del Estado de Tejas
Preguntas: 1-800-252-3439
Quejas: www.tdi.texas.gov
Correo electronico: ConsumerProtection@tdi.texas.gov
Correo: MC-111-1A, P.O. Box 149091
Austin, TX 78714-9091

PAYMENT BOND

THE STATE OF TEXAS §

COUNTY OF MIDLAND § SURETY NO _____

KNOW ALL MEN BY THESE PRESENTS, THAT _____ of the City of _____ of the County of _____ and State of Texas as Principal, and _____, as Surety, are held and firmly bound unto the City of Midland, Texas, as Obligee, in the amount of _____ DOLLARS ($ _____) for the payment whereof the said Principal and Surety bind themselves, their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the _____ day of _____, 20__, for the furnishing of materials, equipment to perform all labor and work necessary for _____, hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, the condition of the obligation is that if the said Principal shall pay all claimants supplying labor and material to him or a subcontractor in the prosecution of the work provided for in said contract, then this obligation shall be null and void; otherwise, it is to remain in full force and effect.

Surety, for value received, stipulates and agrees that no change, extension of time alteration or addition to the terms of the contract, or to the work performed there under, or the plans, specifications of drawings accompanying the same, or any assignment of the contract as may be provided for in the instructions to bidders, shall in anywise affect its obligation on this Bond, and it does waive notice of any such change, extension of

time, alteration or addition to the terms of the contract, assignment thereof, or to the work to be performed there under.

IN WITNESS WHEREOF the said Principal and Surety have signed and sealed this instrument, this _____ day of _____ , 20__ .

_____	_____
Principal	Surety
By _____	By _____
Address _____	Address _____
_____	_____
_____	_____

APPROVED AS TO FORM:

_____

City Attorney

NOTE: Attach Power of Attorney

Form Revised August 2012

PERFORMANCE BOND

THE STATE OF TEXAS §

COUNTY OF MIDLAND § SURETY NO _____

KNOW ALL MEN BY THESE PRESENTS, THAT _____ (Hereinafter called the Principal[s]), as Principal(s), and _____ (Hereinafter called the Surety), as Surety, are held and firmly bound unto the City of Midland, Texas a home rule municipal corporation of Midland County, Texas, (hereinafter called the Obligee), in the amount of _____ DOLLARS ($ _____) for the payment whereof the said Principal and surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the _____day of _____ , 20___ , for the furnishing of materials and equipment to perform all labor and work necessary for the construction of _____ , specifically including in the scope of this work and bond, the additional maintenance guaranty provisions set forth in the contract conditions, which contract is hereby referred to and made a part hereof as fully and to the same extent as if copies at length herein, as well as the Principal's primary obligation to perform according to plans and specifications.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall faithfully perform the work in accordance with the plans, specifications, instructions to bidder, general and special conditions and other contract documents, including any addendum thereto, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED further that if any legal action be filed upon this Bond venue shall lie in Midland County, State of Texas.

Surety, for value received, stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract, or to the work performed thereunder, or the plans, specifications or drawings accompanying the same, or any assignment of the contract as may be provided for in the instructions to bidders, shall in anywise affect its obligation on this Bond, and it does waive notice of any such change, extension of time, alteration or addition to the terms of the contract, assignment thereof, or the work to be performed thereunder.

IN WITNESS WHEREOF, the said Principal and surety do sign and seal this instrument, this _____ day of _____ , 20___.

_____	_____
Principal	Surety
By _____	By _____
Address _____	Address _____
_____	_____
_____	_____

APPROVED AS TO FORM:

_____

City Attorney

NOTE: Attach Power of Attorney

Form Revised August 2012

EXHIBIT D - Building Wage Rate rev 01/05/2024

For current Building Wage Rates, please refer to Section 00 73 43 "Wage Rate Requirements."

IMPORTANT NOTICE

Conflict Of Interest Reporting Requirements

Compliance with LOCAL GOVERNMENT CODE TITLE 5. MATTERS AFFECTING PUBLIC OFFICERS AND EMPLOYEES SUBTITLE C. MATTERS AFFECTING PUBLIC OFFICERS AND EMPLOYEES OF MORE THAN ONE TYPE OF LOCAL GOVERNMENT CHAPTER 176. DISCLOSURE OF CERTAIN RELATIONSHIPS WITH LOCAL GOVERNMENT OFFICERS; PROVIDING PUBLIC ACCESS TO CERTAIN INFORMATION.

Form CIQ: This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session. This questionnaire shall be filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a). By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. See Section 176.006(a-1), Local Government Code. A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

Bidders are responsible for filing Conflict of Interest form "CIQ" in accordance with the above referenced statute. Failure to do so is a class C Misdemeanor. Contracts or Purchase Orders awarded to a vendor that has violated this law is subject to termination at such time that the violation is discovered with no recourse to the City of Midland. The bidder will be subsequently removed from the bidders list for a minimum of one year.

When there is no known conflict of interest as defined by the statute, it is not necessary to file/submit the Form CIQ. The form must be submitted if a conflict is subsequently discovered.

By submitting a response to this request, vendor represents that it complies with the requirements of Chapter 176 of the Texas Local Government Code.

For a current list of the local government officers go to: http://www.midlandtexas.gov/

Upon completion of the form, sign and submit with bid or mail to:

City of Midland
Attn: City Secretary
PO Box 1152
Midland, Texas 79702

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor doing business with local governmental entity

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. *See* Section 176.006(a-1), Local Government Code.

A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

OFFICE USE ONLY

Date Received

1 **Name of vendor who has a business relationship with local governmental entity.**

Cerris Builders, Inc.

2 ☐ **Check this box if you are filing an update to a previously filed questionnaire.** (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

3 **Name of local government officer about whom the information is being disclosed.**

_____

Name of Officer

4 **Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.**

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

☐ Yes ☐ No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

☐ Yes ☐ No

5 **Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.**

N/A

6 ☐ Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).

7 _____ July 30, 2025

Signature of vendor doing business with the governmental entity Date

CONFLICT OF INTEREST QUESTIONNAIRE
For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm. For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

(A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;

(B) a transaction conducted at a price and subject to terms available to the public; or

(C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

(a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

***

(2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds $2,500 during the 12-month period preceding the date that the officer becomes aware that

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than $100 in the 12-month period preceding the date the officer becomes aware that:

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

(a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

(1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);

(2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or

(3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

(1) the date that the vendor:

(A) begins discussions or negotiations to enter into a contract with the local governmental entity; or

(B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

(2) the date the vendor becomes aware:

(A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);

(B) that the vendor has given one or more gifts described by Subsection (a); or

(C) of a family relationship with a local government officer.

Form provided by Texas Ethics Commission www.ethics.state.tx.us Revised 1/1/2021

Consideration of Location of Bidder's Principal Place of Business
For Bids of $50,000 up to $100,000 for Services and $500,000 for Commodities
Affidavit of Eligibility

Pursuant to Texas Local Government Code 271.9051, in purchasing real property, personal property that is not affixed to real property, or services, if the City receives one or more bids from a bidder whose principal place of business is in the City of Midland and whose bid is within five percent (5%) of the lowest bid price received by the City from a bidder who is not a resident of the City of Midland, the City may enter into a contract with:

(1) the lowest bidder; or

(2) the bidder whose principal place of business is in the City of Midland if the City Council determines, in writing, that the local bidder offers the City the best combination of contract price and additional economic development opportunities for the City of Midland created by the contract award, including the employment of residents of the City of Midland and increased tax revenues to the City of Midland.

In order to receive consideration, bidders must submit this affidavit to:

Erika Martinez
Purchasing Manager
City of Midland
300 N. Loraine St.,
PO BOX 1152
Midland, TX 79702-1152

Complete all areas below. Incomplete affidavits may be rejected.

Local Business Name: Cerris Builders, Inc.

Local Address (must be within the City limits): 4050 Smith Rd. Midland, TX 79705

1. Is the above address the principal place of business for the business named above? ☐ Yes ☑ No
2. How many residents of the City of Midland are employed at the above business location? 37
3. Year your business was established in the City of Midland: 2025
4. If you collect sales tax for ANY class of customer, provide the following Reseller information:

   Reseller Permit Number: n/a

   Company Name and Address (as it appears on permit):

5. Does your business have more than one office in the State of Texas? ☑ Yes ☐ No
   If Yes, identify the office location considered as the point-of sale for the purpose of sales tax calculation:

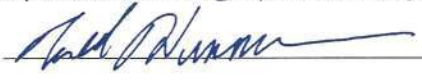
   4050 Smith Rd. Midland, TX 79705

6. Was the local business required to pay business and/or real property tax for the most recent tax year?

   ☐ Yes ☑ No

   If Yes, did the local business pay any of this tax to the City of Midland? ☐ Yes ☑ No

Under penalty of perjury, the undersigned states that the foregoing statements are true and correct. It is further acknowledged that any person, firm, corporation or entity intentionally submitting false information to the City in an attempt to qualify for eligibility shall be prohibited from bidding on City of Midland products and services for a period of one (1) year.

Authorized Signature:  Date: July 30, 2025

Printed Name and Title: Todd Winnerman, President

NOTICE TO BIDDERS

IF THIS PURCHASE REQUIRES A CONTRACT, THE ATTACHED **CONTRACT AND INSURANCE REQUIREMENTS ARE NON-NEGOTIABLE**. MODIFICATIONS BY BIDDER/COMPANY OF ANY MATERIAL TERM(S) TO THE CONTRACT DOCUMENTS WILL BE DEEMED A NON-RESPONSIVE BID. NON-RESPONSIVE BIDS WILL BE REJECTED. BIDDER/COMPANY MUST BE WILLING TO SIGN THE CONTRACT AS IS AND WITHOUT MODIFICATIONS, PROVIDE PROPERLY EXECUTED BONDS (IF APPLICABLE) AND PROVIDE INSURANCE SPECIFICALLY AS REQUIRED WITHIN THE CONTRACT DOCUMENTS **WITHIN 21 DAYS** OF THE DATE OF THE TRANSMITTAL LETTER.

IF THE SELECTED BIDDER/COMPANY CANNOT MEET THE ABOVE REQUIREMENTS, THEN **THE CITY RESERVES THE RIGHT TO AWARD THIS PURCHASE TO ANOTHER BIDDER**.

IMPORTANT NOTICE – IF THE CONTRACT DOCUMENTS REQUIRE WORKER'S COMPENSATION INSURANCE, BIDDER/COMPANY MUST CARRY WORKER'S COMPENSATION INSURANCE TO BE ELIGIBLE FOR THIS CONTRACT. IF YOU CANNOT PROVIDE WORKER'S COMPENSATION INSURANCE AS REQUIRED BY STATE OF TEXAS STATUTE, WE RESPECTFULLY REQUEST THAT YOU "NO BID" THIS WORK.

COMPLIANCE: Company agrees that it shall comply with Texas Government Code Section 2252.908, *et seq.*, as amended. Company agrees that it shall comply with Texas Local Government Code Section 176.006, *et seq.*, as amended. For further instructions on how to comply with Texas Government Code Section 2252.908 and Texas Local Government Code Section 176.006,

please go to https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm and https://www.ethics.state.tx.us/filinginfo/conflict_forms.htm.

ANY VENDOR WHO FAILS TO COMPLY WITH THE TERMS OF THE AWARD **MAY BE DECLARED AN IRRESPONSIBLE VENDOR**. BIDS SUBMITTED BY SAID VENDOR SHALL NOT BE CONSIDERED AGAIN FOR A MINIMUM PERIOD OF SIX MONTHS AS DETERMINED BY THE CITY MANAGER.

IMPORTANT: READ CAREFULLY BEFORE MAKING BID
GENERAL CONDITIONS OF BIDDING

1. All bids are to be submitted as specified in the procurement document(s).

2. Each Bidder is requested to provide: Descriptive literature clearly marked to show each item on this bid. Any catalog or manufacturer's reference in this proposal is descriptive, but not restrictive, and is used only to indicate type and quality. If, however, the bidder proposes similar but not identical terms, he must furnish all particulars. If no mention is made of any exceptions, it is assumed that he is bidding on the article specified and not on an approved equal and he will be required to deliver exact article specified.

3. Prices should be itemized. (Indicate unit price and extend to show total price.) In case of discrepancy between the unit price and the extension, the unit price shall govern.

4. Unit price for each item offered shall include all discounts; e.g., trade, seasonal, etc. with net 30 days payment terms. Discounts shall not be shown as such but shall be incorporated in the base bid price. Any bid showing discounts will be considered an alternate bid. The City of Midland will not be responsible for any goods delivered without a purchase order number.

5. If the Contract is awarded, it will be awarded to either the lowest responsible bidder, or to the bidder who provides goods or services at the best value for the City of Midland. In determining the best value for the City of Midland, the City of Midland may consider the criteria enumerated in Section 252.043 of the Texas Local Government Code. The City of Midland reserves the right to award by item or by total bid, or to reject any or all bids or parts of bids. Further, the City of Midland reserves all rights granted by Section 271.027 of the Texas Local Government Code. The City of Midland reserves the right to award the bid to the lowest responsible bidder.

6. Time of proposed delivery shall be stated in number of calendar days.

7. NOTE: The City of Midland, Texas is exempt from all Federal, State and City tax. Please do not include these taxes in your bid price or invoice. Taxable items must be so designated, and the City will supply vendor with a Tax Exemption Certificate, properly executed.

8. All items are to be delivered, unloaded and stacked at the location indicated on the Bid Request and Purchase Order.

9. All items are to be delivered F.O.B. to the City of Midland, Texas with freight prepaid and included in the bid.

10. Detailed specifications rule over General specifications (headings, etc.)

11. The City of Midland reserves the right to remove a company from the bid list for (1) continued failure to respond to request for bids, (2) failure to deliver merchandise within promised time, or (3) delivery of substandard merchandise.

12. No officer or employee of the City shall have a financial interest, direct or indirect, in any contract with the City, or be financially interested, directly or indirectly, in the sale to the City of any lands, materials, supplies or services except as allowed under chapter 176 of the Local Government Code. Form CIQ shall be submitted and placed on file with the City of Midland.

13. The City shall determine the most advantageous bid for the City and accept the proposal of the responsible party submitting the lowest and/or most advantageous bid or reject any and all bids.

14. The City of Midland, Texas may consider as informal any bid not prepared and submitted in accordance with the provisions hereof, and may waive, in its sole discretion, any informalities.

15. Public Information. To the extent that Bidder is submitting a bid for a contract described by Section 552.371 of the Texas Government Code, Bidder agrees as follows in accordance with Section 552.372(b) of the Texas Government Code: The requirements of Subchapter J, Chapter 552, Government Code, may apply to this bid, and the contractor or vendor agrees that the contract can be terminated if the contractor or vendor knowingly or intentionally fails to comply with a requirement of that subchapter.

STANDARD PURCHASE TERMS AND CONDITIONS
PURCHASING DIVISION, CITY OF MIDLAND, TEXAS

"Seller", as used herein, has the same meaning as "Company". "Buyer", as used herein, has the same meaning as "City".

Seller and Buyer agree as follows:

1. SELLER TO PACKAGE GOODS - Seller will package goods in accordance with good commercial practice. Each shipping container shall be clearly and permanently marked as follows; (a) Seller's name and address, (b) Consignee's name, and address, and purchase order number, (c) Container number and total number of containers, e.g. box 1 of 4 boxes, and (d) the number of the container bearing the packing slip. Seller shall bear cost of packaging unless otherwise provided. Goods shall be suitably packed to secure lowest transportation costs and to conform with requirements of common carriers and any applicable specifications. Buyer's count or weight shall be final and conclusive on shipments not accompanied by packing lists.

2. SHIPMENT UNDER RESERVATION PROHIBITED - Seller is not authorized to ship the goods under reservation and no tender of a bill of lading will serve as a tender of goods.

3. TITLE & RISK OF LOSS - The title and risk of loss of the goods shall not pass to Buyer until Buyer actually receives and takes possession of the goods at the point or points of delivery in Midland, Texas.

4. NO REPLACEMENT OF DEFECTIVE TENDER - Every tender or delivery of goods must fully comply with all provisions of this contract as to time of delivery, quality and the like. If a tender is made which does not fully conform, this shall constitute a breach and Seller shall not have the right to substitute a conforming tender, provided, where the time for performance has yet expired, the Seller may reasonably notify Buyer of his intention to cure and may then make a conforming tender within the contract time but not afterward.

5. PLACE OF DELIVERY - The place of delivery shall be that set forth in the block of the purchase order entitled "deliver to".

6. INVOICES - Seller shall submit separate ORIGINAL invoices, on each purchase order. Invoices shall indicate the purchase order number. All invoices must be mailed to City of Midland, Accounts Payable, P.O. Box 1152, Midland, TX 79702-1152. Payment will be made within 30 days from the date the invoice and properly executed receiving documents are received by City of Midland, Accounts Payable at the above address. Invoices sent to any other address will delay payment.

7. GRATUITIES - The buyer may, by written notice to the seller, cancel this contract without liability to Seller, if it is determined by Buyer that gratuities, in the form of entertainment, gifts, or otherwise, were offered or given by the seller, or any agent or representative of the Seller, to any officer or employee of the City of Midland with a view toward securing a contract or securing favorable treatment with respect to performing of such a contract. In the event this contract is cancelled by Buyer pursuant to this provision, Buyer shall be entitled, in addition to any other rights and remedies, to recover or withhold the amount of the cost incurred by Seller in providing such gratuities.

8. WARRANTY - PRICE -

a. The price to be paid by the Buyer shall be that contained in Seller's bid which Seller warrants to be no higher than Seller's current prices on order by others for products of the kind and specifications covered by this agreement for similar quantities under similar or like conditions and methods of purchase. In the event Seller breaches this warranty, the prices of the items shall be reduced to the Seller's current prices on order by others, or in the alternative, Buyer may cancel this contract without liability to Seller for breach or Seller's actual expense.

b. The Seller warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for commission, percentage, brokerage, or contingent fee excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Seller for the purpose of securing business. For breach or violation of this warranty the Buyer shall have the right or rights to cancel this contract without liability and to deduct from the contract price, or otherwise recover the full amount of such commission, percentage, brokerage or contingent fee.

9. WARRANTY - PRODUCT - Seller shall not limit or exclude any implied warranties and any attempt to do so shall render this contract voidable at the option of the Buyer. Seller warrants that the goods furnished will conform to the specification, drawings, and description listed in the bid invitation, and to the sample(s) furnished by Seller, if any. In the event of a conflict between the specifications, drawings and descriptions, the specifications shall govern.

10. SAFETY WARRANTY - Seller warrants that the product sold to Buyer shall conform to the standards promulgated by the U.S. Department of Labor under the Occupational Safety and Health Act of 1970. In the event the product does not conform to OSHA standards, Buyer may return the product for correction or replacement at the Seller's expense. In the event Seller fails to make the appropriate correction within a reasonable time, correction made by buyer will be at Seller's expense.

11. RIGHT OF INSPECTION - Buyer shall have the right to inspect the goods at delivery before accepting them.

12. CANCELLATION - Buyer shall have the right to cancel for default all or any part of the undelivered portion of this order if Seller breached any of the terms hereof including warranties of Seller if the Seller becomes insolvent or commits acts of bankruptcy. Such right of cancellation is in addition to and not in lieu of any other remedies which Buyer may have in law or equity.

13. TERMINATION - The performance of work under this order may be terminated in whole, or in part by the Buyer in accordance with this provision. Termination of work hereunder shall be effected by the delivery to Seller of a "Notice of Termination" specifying the extent to which performance of work under the order is terminated and the date upon which such termination becomes effective. Such right of termination is in addition to and not in lieu of the rights of Buyer set forth in Clause 13, herein.

14. FORCE MAJEURE - Neither party shall be held responsible for losses, resulting if the fulfillment of any terms or provisions of this contract is delayed or prevented by any cause not within the control of the party whose performance is interfered with, and which by the exercise of reasonable diligence said party is unable to prevent.

15. ASSIGNMENT - DELEGATION - No right or interest in this contract shall be assigned or delegation of any obligation made by Seller without the written permission of the Buyer. Any attempted assignment or delegation by the Seller shall be wholly void and totally ineffective for all purposes unless made in conformity with this paragraph.

16. MODIFICATIONS - This contract can be modified or rescinded only by a writing signed by both of the parties or their duly authorized agents.

17. INTERPRETATION - PAROL EVIDENCE - This writing, plus any specifications for bids and performance provided by Buyer in its advertisement for bids, is intended by the parties as a final expression of this agreement. No course of prior dealings between the parties and no usage of the trade shall be relevant to supplement or explain any term used in this agreement. Acceptance or acquiescence in a course of performance rendered under this agreement shall not be relevant to determine the meaning of this agreement even though the accepting or acquiescing party has knowledge of the performance and opportunity for objection. Whenever a term defined by the Uniform Commercial Code is used in this agreement, the definition contained in the Code is to control.

18. ADVERTISING - Seller shall not advertise or publish without Buyer's prior consent the fact that Buyer has entered into the contract, except to the extent necessary to comply with proper requests for information from an authorized representative of the federal, state or local government.

19. RIGHT TO ASSURANCE - Whenever one party to the contract in good faith has reason to question the other party's intent to perform he may demand that the other party give written assurance of this intent to perform. In the event that a demand is made and no assurance is given within five (5) days, the demanding party may treat this failure as an anticipatory repudiation of the contract.

20. PROTECTION AGAINST ROYALTIES OR PATENT INFRINGEMENT - The Seller shall pay all royalties and license fees, and shall provide for the use of any design, device, material or process covered by letters patent or copyright by suitable legal agreement with Patentee or Owner thereof. The Seller shall defend all suits or claims for infringement of any patent or copyrights and shall indemnify and save the Buyer harmless from any loss on account thereof, except that Buyer shall defend all such suits and claims and shall be responsible for all such loss when a particular design, device, material or process is allowed to the Seller, the Seller shall indemnify and save Buyer harmless from any loss on account thereof. If the material or process specified or required by Buyer is an infringement, the Seller shall be responsible for such loss unless he promptly gives written notice to the buyer of such infringement.

21. TIME - It is hereby expressly agreed and understood that time is of the essence for the performance of this contract, and any failure by contract to meet the time specifications of this agreement will cause Seller to be in default of this agreement.

22. TAX - The City of Midland is exempt from all Federal, State and City tax. Please do not include these taxes in your bid price or invoice. Taxable items must be so designated, and the City will supply vendor with a Tax Exemption Certificate, properly executed.

23. **INSURANCE –**

The following provisions apply unless the agreement is for the supply of goods only:

Seller shall at all times during the term of this agreement maintain and keep in full force and effect insurance in the following types and minimum amounts with companies authorized to do business in the State of Texas:

Commercial General Liability (including Contractual liability):	
-Personal Injury:	$1,000,000.00 per person
	$1,000,000.00 per occurrence
-Property Damage:	$500,000.00 per occurrence
Business Automobile Liability:	$250,000.00 combined single limit - Personal Injury and Property Damage
Worker's Compensation:	Statutory limits
Employers' Liability:	$500,000.00 per accident or occurrence

The Commercial General Liability shall be on a per project or policy aggregate, including completed operations, and shall be on an occurrence basis.

The Workers' Compensation coverage provided by Seller shall inure to the benefit of employees injured during the course and scope of their employment by Seller pursuant to this agreement.

The Business Automobile Liability insurance provided by Seller shall cover any auto for bodily injury and property damage, including owned vehicles, hired and non-owner vehicles, and employee non-ownership, and the amount of such policy shall be a minimum of $250,000.00 covering any vehicle used for the execution of the work that is the subject of this agreement.

All insurance required pursuant to this agreement, except for Worker's Compensation Insurance, shall name the Buyer as an additional insured on a claims occurred basis. All insurance required pursuant to this agreement, including Worker's Compensation Insurance, shall provide for a waiver of subrogation as to the Buyer.

The parties agree that, prior to the execution of the agreement, Seller shall provide one or more certificates of insurance showing that the requirements of this article have been met, and specifically containing, without limitations, the following endorsement:

"The City of Midland is included as an additional insured, on a claims occurred basis, on all policies except for Worker's Compensation. The Seller and Insurer hereby waive all rights of subrogation with respect to claims against the City of Midland, its agents, employees and officers, on all policies of insurance."
Buyer shall be provided the notice by Seller's insurance provider not later than thirty (30) days prior to any reduction or termination of such coverage. Buyer shall not be required to provide any insurance whatsoever pursuant to this agreement.

Seller shall contractually require all contractors, subcontractors, and sub-subcontractors that work on any portion of the work that is the subject of this agreement to obtain insurance coverage that meets or exceeds the policy requirements and minimum amounts specified herein. All contractors, subcontractors, and sub-subcontractors shall obtain insurance policies that provide blanket waivers of subrogation in favor of the City of Midland and policies that name the City of Midland as an additional insured on a claims occurred basis (except workers compensation).

24. ASSIGNMENT - Seller shall not, either directly or indirectly, assign all or any part of this agreement or any interest, right or privilege herein, without the prior written consent of the Buyer. The issue on whether or not to grant consent to an assignment is in the sole discretion of the Buyer.

25. RELEASE - NOTWITHSTANDING ANY OTHER PROVISIONS, SELLER HEREBY RELEASES, ACQUITS, RELINQUISHES AND FOREVER DISCHARGES BUYER, BUYER'S EMPLOYEES AND OFFICERS, FROM ANY AND ALL DEMANDS, CLAIMS, DAMAGES, OR CAUSES OF ACTION OF ANY KIND WHATSOEVER WHICH SELLER HAS OR MIGHT HAVE IN THE FUTURE, INCLUDING BUT NOT LIMITED TO BREACH OF CONTRACT, QUANTUM MERUIT, CLAIMS UNDER THE DUE PROCESS AND TAKINGS CLAUSES OF THE TEXAS AND UNITED STATES CONSTITUTIONS, TORT CLAIMS, OR BUYER'S NEGLIGENCE.

26. GOVERNING LAW AND VENUE - This agreement shall be governed by the laws of the State of Texas. All performance and payment made pursuant to this agreement shall be deemed to have occurred in Midland County, Texas. Exclusive venue for any claims, suits or any other action arising from or connected in any way to this agreement or the performance of this agreement shall be in Midland County, Texas. The obligations and undertakings of each of the parties to this agreement shall be deemed to have occurred in Midland County, Texas.

27. INDEPENDENT CONTRACTOR - It is expressly understood and agreed that Seller shall perform all work and services described herein as an independent contractor and not as an officer, agent, servant or employee of the Buyer; that Seller shall have exclusive control of and the exclusive right to control the details of the services and work performed hereunder, and all persons performing the same; and shall be solely responsible for the acts and omissions of its officers, agents, employees, contractors and subcontractors; that the doctrine of respondeat superior shall not apply as between Buyer and Seller, its officers, agents, employees, contractors and subcontractors; and that nothing herein shall be construed as creating a partnership or joint enterprise between Buyer and Seller. No person performing any of the work and services described hereunder by Seller shall be considered an officer, agent, servant or employee of the Buyer. Further, it is specifically understood and agreed that nothing in this agreement is intended or shall be construed as creating a "Community of Pecuniary Interest" or "An Equal Right of Control" which would give rise to vicarious liability. Seller shall be an independent contractor under this agreement and shall assume all of the rights, obligations and liabilities, applicable to it as such independent contractor hereunder. The Buyer does not have the power to direct the order in which the work is done. The Buyer shall not have the right to control the means, methods or details of the Seller's work. Seller shall assume exclusive responsibility for the work. Seller is entirely free to do the work in its own way.

28. NOTICE OF ALLEGED BREACH; STATUTORY PREREQUISITES - As a condition precedent to filing suit for alleged damages incurred by an alleged breach of an express or implied provision of this agreement, Seller or his legal representative, shall give the City Manager, or any other reasonable official of the Buyer, notice in writing (consisting of one original and seven copies of notice attached to a copy of this agreement) of such damages, duly verified, within one-hundred-twenty (120) days after the same has been sustained. The discovery rule does not apply to the giving of this notice. The notice shall include when, where and how the damages occurred, the apparent extent thereof, the amount of damages sustained, the amount for which the Seller will settle, the physical and mailing addresses of Seller at the time and date the claim was presented and the physical and mailing addresses of Seller for the six months immediately preceding the occurrence of such damages, and the names and addresses of the witnesses upon whom the Seller relies to establish its claim; and a failure to so notify the City Manager within the time and manner provided herein shall exonerate, excuse and except the Buyer from any liability whatsoever. The Buyer is under no obligation to provide notice to Seller that Seller's notice is insufficient. Buyer reserves the right to request reasonable additional information regarding the claim. Said additional information shall be supplied within thirty (30) days after receipt of notice.

The statutory prerequisites outlined herein constitute jurisdictional requirements pursuant to Section 271.154 of the Texas Local Government Code and Section 311.034 of the Texas Government Code. Notwithstanding any other provision, Seller's failure to comply with the requirements herein shall perpetually bar Seller's claim for damages under Chapter 271 of the Texas Local Government Code, and Section 311.034 of the Texas Government Code, regardless if Buyer has actual or constructive notice or knowledge of said claim or alleged damages. Seller agrees that the requirements of this entire agreement are reasonable.

29. INDEMNITY (NOT APPLICABLE TO PURCHASE AGREEMENTS) - SELLER WILL INDEMNIFY AND HOLD HARMLESS AND DEFEND BUYER AND ALL OF BUYER'S OFFICERS, AGENTS AND EMPLOYEES FROM ALL SUITS, ACTIONS, CLAIMS, DAMAGES, PERSONAL INJURIES, LOSSES, PROPERTY DAMAGE AND EXPENSES OF ANY CHARACTER WHATSOEVER, INCLUDING REASONABLE ATTORNEY'S FEES,

BROUGHT FOR OR ON ACCOUNT OF ANY INJURIES OR DAMAGES RECEIVED OR SUSTAINED BY ANY PERSON OR PERSONS OR PROPERTY, ON ACCOUNT OF ANY NEGLIGENT ACT OF SELLER, its agents or employees, or any subcontractor, arising out of, or resulting from, Seller's use of, or activities on, the agreement premises, and Seller will be required to pay any judgment with costs which may be obtained against Buyer or any of its officers, agents or employees, including reasonable attorney's fees.

SELLER SHALL INDEMNIFY AND HOLD HARMLESS AND DEFEND BUYER AND ALL OF BUYER'S OFFICERS, AGENTS AND EMPLOYEES FROM ALL SUITS, ACTIONS, CLAIMS, DAMAGES, ACCIDENTAL DEATH, PERSONAL INJURIES, PROPERTY DAMAGE, LOSSES, AND EXPENSE OF ANY CHARACTER WHATSOEVER INCLUDING REASONABLE ATTORNEY'S FEES, BROUGHT FOR OR ON ACCOUNT OF ANY INJURIES OR DAMAGES RECEIVED OR SUSTAINED BY ANY PERSON OR PERSONS OR PROPERTY, ON ACCOUNT OF ANY NEGLIGENT ACT OF BUYER, BUYER'S OFFICERS, AGENTS AND EMPLOYEES, WHETHER SUCH NEGLIGENT ACT WAS THE SOLE PROXIMATE CAUSE OF THE INJURY OR DAMAGE OR A PROXIMATE CAUSE JOINTLY AND CONCURRENTLY WITH SELLER OR SELLER'S EMPLOYEES, AGENTS OR SUBCONTRACTORS NEGLIGENCE, IN THE EXECUTION, SUPERVISION AND OPERATIONS GROWING OUT OF OR IN ANY WAY CONNECTED WITH THE PERFORMANCE OF THIS AGREEMENT AND SELLER WILL BE REQUIRED TO PAY ANY JUDGMENT WITH COSTS WHICH MAY BE OBTAINED AGAINST BUYER OR ANY OF BUYER'S OFFICERS, AGENTS OR EMPLOYEES, INCLUDING ATTORNEY'S FEES.

30. SOVEREIGN IMMUNITY - By executing this agreement the Buyer is not waiving its right of sovereign immunity. The Buyer is retaining its immunity from suit. The Buyer is not granting consent to be sued by legislative resolution or action. **THERE IS NO WAIVER OF SOVEREIGN IMMUNITY**.

31. THIRD PARTY BENEFICIARY - The Buyer's approval of this agreement does not create a third party beneficiary. There is no third party beneficiary to this agreement. No person or entity who is not a party to this agreement shall have any third party beneficiary or other rights hereunder.

32. <u>ATTORNEY FEES</u> - BY EXECUTING THIS AGREEMENT, SELLER AGREES TO WAIVE AND DOES HEREBY KNOWINGLY, CONCLUSIVELY, VOLUNTARILY AND INTENTIONALLY WAIVE ANY CLAIM IT HAS OR MAY HAVE IN THE FUTURE AGAINST THE BUYER, REGARDING THE AWARD OF ATTORNEY'S FEES, WHICH ARE IN ANY WAY RELATED TO THE AGREEMENT, OR THE CONSTRUCTION, INTERPRETATION OR BREACH OF THE AGREEMENT. THE SELLER SPECIFICALLY AGREES THAT IF THE SELLER BRINGS OR COMMENCES ANY LEGAL ACTION OR PROCEEDING RELATED TO THIS AGREEMENT, THE CONSTRUCTION, INTERPRETATION, VALIDITY OR BREACH OF THIS AGREEMENT, INCLUDING BUT NOT LIMITED TO ANY ACTION PURSUANT TO THE PROVISIONS OF THE TEXAS UNIFORM DECLARATORY JUDGMENTS ACT (TEXAS CIVIL PRACTICE AND REMEDIES CODE SECTION 37.001, ET. SEQ., AS AMENDED), OR CHAPTER 271 OF THE TEXAS LOCAL GOVERNMENT CODE, THE SELLER AGREES TO ABANDON, WAIVE AND RELINQUISH ANY AND ALL RIGHTS TO THE RECOVERY OF ATTORNEY'S FEES TO WHICH SELLER MIGHT OTHERWISE BE ENTITLED.

SELLER AGREES THAT THIS IS THE VOLUNTARY AND INTENTIONAL RELINQUISHMENT AND ABANDONMENT OF A PRESENTLY EXISTING KNOWN RIGHT. SELLER ACKNOWLEDGES THAT IT UNDERSTANDS ALL TERMS AND CONDITIONS OF THE AGREEMENT. THE SELLER FURTHER ACKNOWLEDGES AND AGREES THAT THERE WAS AND IS NO DISPARITY OF BARGAINING POWER BETWEEN THE BUYER AND THE SELLER. THIS SECTION SHALL NOT BE CONSTRUED OR INTERPRETED AS A WAIVER OF SOVEREIGN IMMUNITY.

THE SELLER AND BUYER ARE RELYING ON THEIR OWN JUDGMENT. EACH PARTY HAD THE OPPORTUNITY TO DISCUSS THIS AGREEMENT WITH LEGAL COUNSEL PRIOR TO ITS EXECUTION.

33. CONSIDERATION - The terms of this agreement are supported by good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged by the parties named herein.

34. CERTIFICATION - In accordance with the Texas Local Government Code, the City of Midland Department of Facilities and Fleet Management does hereby certify that the City of Midland is in compliance with Sections 252, 271 and all applicable sections of the Texas Local Government Code and other state law as it applies to procurement and contracting issues.

35. FEDERAL WAGE REQUIREMENTS - If applicable, the Davis-Bacon Act, 29 CFR 5.5, and any related acts or regulations are hereby incorporated by reference and made a part of this agreement, and all terms and requirements under said laws, by such incorporation, are made terms and requirements of this agreement, to which the parties to this agreement have agreed to be bound.

36. COMPLIANCE WITH FEDERAL, STATE AND LOCAL LAWS - Seller shall at all times during the term of this agreement comply with applicable federal, state, and local laws regarding Seller's activities pursuant to this agreement, including but not limited to all applicable sections of the Municipal Code of Midland, Texas, as may be amended, said sections being hereby incorporated by reference and made a part of this agreement for all legal purposes. Failure to abide by any such law mentioned herein constitutes grounds for the immediate termination of this agreement.

THE CITY OF MIDLAND

CONTRACT

Contract No.

THIS CONTRACT, effective the ____day of _____ 20____, by and between the City of Midland, hereinafter referred to as "CITY", and Cerris Builders, Inc., hereinafter referred to as "COMPANY", is made for the following considerations:

1. **Cost:** Total Proposal: $ 38,577,000.00 (BASE BID) DOLLARS

2. **Scope of Work:** COMPANY shall perform all work described and shall provide labor, materials, equipment and supervision necessary for MAF Terminal Building. Said work being more particularly described in the following documents, which are attached hereto and incorporated herein for all purposes.

EXHIBIT A .....Specifications, Proposal or Cost Summary
EXHIBIT B .....Intentionally Omitted
EXHIBIT C .....Bonding instructions for Public Works Contract of $50,000 and more
EXHIBIT D .....Wage Scale

3. **City:** The words "CITY's Representative" or "representative" shall mean City of Midland or the designee under whose supervision these contract documents, including the plans and specifications, were prepared, or who may inspect work performed under this Contract; or such other representative, supervisor, or inspector as may be authorized by CITY to act in any particular capacity under this Contract.

4. **City's Representative:** CITY's Representative may make periodic visits to the site to observe the progress and quality of the executed work and to determine, in general, if the work is proceeding in accordance with the contract documents. CITY's representative will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the work, nor will such representative be responsible for the construction means, methods, techniques, sequences or procedures, or the safety precautions incident thereto. CITY's representative will not be responsible for COMPANY's failure to perform the work in accordance with the contract.

5. **Company:** Unless otherwise stipulated, COMPANY shall provide and pay for all materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, and all water, light, power, fuel, transportation and all other facilities necessary for the execution and completion of the work covered by the contract documents. Unless otherwise specified, all materials shall be new, and both workmanship and materials shall be of a good quality. COMPANY shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

5.1. COMPANY shall, at its expense, obtain all permits and licenses necessary for the performance of this contract and pay all fees and taxes required by law, and comply with all laws, ordinances, rules and regulations governing COMPANY's performance of the contract, including all environmental laws and regulations, whether state or federal.

5.2. All work shall be done and all materials furnished in strict conformity with the contract and specifications.

6. **Minor Work Not Mentioned:** All minor detail of the work not specifically mentioned in the Specifications but obviously necessary for the proper completion of the work, such as the proper connection of new work to old, shall be considered as incidental to and a part of the work for which the prices are named in the contract. COMPANY will not be entitled to any additional compensation therefor unless specifically stated otherwise. Otherwise the term "extra work" as used in this contract shall mean and include all work that may be required by CITY to be done by COMPANY to accomplish any alteration or addition to the work as shown on the Specifications.

6.1. COMPANY shall perform all extra work under the direction of CITY's Representative when presented with a written work order signed by CITY's Representative, subject, however, to the right of the COMPANY to require written confirmation of such extra work order by CITY. Payment for extra work shall be as agreed in the work order.

7. **Safety:** COMPANY shall at all times exercise reasonable precaution for the safety of employees and others on or near the work and shall comply with all applicable provisions of federal, state and municipal laws. All machinery and equipment and other physical hazards shall be guarded in accordance with federal, state or municipal laws or regulations.

8. **INDEMNITY: COMPANY SHALL INDEMNIFY AND HOLD HARMLESS AND DEFEND CITY AND ALL OF CITY'S OFFICERS, AGENTS AND EMPLOYEES FROM ALL SUITS, ACTIONS, CLAIMS, DAMAGES, PERSONAL INJURIES, ACCIDENTAL DEATH, LOSSES, PROPERTY DAMAGE AND EXPENSES OF ANY CHARACTER**

WHATSOEVER, INCLUDING ATTORNEY'S FEES, BROUGHT FOR OR ON ACCOUNT OF ANY INJURIES OR DAMAGES RECEIVED OR SUSTAINED BY ANY PERSON OR PERSONS OR PROPERTY, ON ACCOUNT OF ANY NEGLIGENT ACT OF COMPANY, THEIR AGENTS OR EMPLOYEES, OR ANY SUBCONTRACTOR, IN THE EXECUTION, SUPERVISION AND OPERATIONS GROWING OUT OF OR IN ANY WAY CONNECTED WITH THE PERFORMANCE OF THIS CONTRACT, AND COMPANY WILL BE REQUIRED TO PAY ANY JUDGMENT WITH COSTS WHICH MAY BE OBTAINED AGAINST CITY OR ANY OF ITS OFFICERS, AGENTS OR EMPLOYEES, INCLUDING ATTORNEY'S FEES. THE OBLIGATIONS CONTAINED IN THIS SECTION 8 SHALL SURVIVE THE TERMINATION OF THIS CONTRACT.

8.1. **COMPANY SHALL INDEMNIFY AND HOLD HARMLESS AND DEFEND CITY AND ALL OF CITY'S OFFICERS, AGENTS AND EMPLOYEES FROM ALL SUITS, ACTIONS, CLAIMS, DAMAGES, PERSONAL INJURIES, ACCIDENTAL DEATH, PROPERTY DAMAGE, LOSSES, AND EXPENSES OF ANY CHARACTER WHATSOEVER INCLUDING ATTORNEY'S FEES, BROUGHT FOR OR ON ACCOUNT OF ANY INJURIES OR DAMAGES RECEIVED OR SUSTAINED BY ANY PERSON OR PERSONS OR PROPERTY, ON ACCOUNT OF ANY NEGLIGENT ACT OF CITY, CITY'S OFFICERS, AGENTS AND EMPLOYEES, WHETHER SUCH NEGLIGENT ACT WAS THE SOLE PROXIMATE CAUSE OF THE INJURY OR DAMAGE OR A PROXIMATE CAUSE JOINTLY AND CONCURRENTLY WITH COMPANY OR COMPANY'S EMPLOYEES, AGENTS OR SUBCONTRACTORS NEGLIGENCE IN THE EXECUTION, SUPERVISION AND OPERATIONS GROWING OUT OF OR IN ANY WAY CONNECTED WITH THE PERFORMANCE OF THIS CONTRACT, AND COMPANY WILL BE REQUIRED TO PAY ANY JUDGMENT WITH COSTS WHICH MAY BE OBTAINED AGAINST CITY OR ANY OF ITS OFFICERS, AGENTS OR EMPLOYEES, INCLUDING ATTORNEY'S FEES. THE OBLIGATIONS CONTAINED IN THIS SECTION 8.1 SHALL SURVIVE THE TERMINATION OF THIS CONTRACT.**

8.2. **COMPANY AGREES THAT IT WILL INDEMNIFY AND SAVE CITY HARMLESS FROM ALL CLAIMS GROWING OUT OF ANY DEMANDS OF SUBCONTRACTORS, LABORERS, WORKMEN, MECHANICS, MATERIALMEN, AND FURNISHERS OF MACHINERY AND PARTS THEREOF, EQUIPMENT, POWER TOOLS AND ALL SUPPLIES, INCURRED IN THE FURTHERANCE OF THE PERFORMANCE OF THIS CONTRACT. WHEN CITY SO DESIRES, COMPANY**

SHALL FURNISH SATISFACTORY EVIDENCE THAT ALL OBLIGATIONS OF THE NATURE HEREINABOVE DESIGNATED HAVE BEEN PAID, DISCHARGED OR WAIVED. COMPANY, ITS SURETIES AND INSURANCE CARRIERS SHALL DEFEND, INDEMNIFY AND SAVE HARMLESS CITY AND ALL OF ITS OFFICERS, AGENTS AND EMPLOYEES FROM ALL SUITS, ACTIONS, OR CLAIMS OF ANY CHARACTER WHATSOEVER, BROUGHT FOR OR ON ACCOUNT OF ANY INJURIES OR DAMAGES RECEIVED OR SUSTAINED BY ANY PERSON OR PERSONS OR PROPERTY, ARISING FROM ANY ACT OF COMPANY OR ANY SUBCONTRACTOR, THEIR AGENTS OR EMPLOYEES, IN THE EXECUTION AND SUPERVISION OF THIS CONTRACT, AND WILL BE REQUIRED TO PAY ANY JUDGMENT WITH COSTS WHICH MAY BE OBTAINED AGAINST CITY OR ANY OF ITS OFFICERS, AGENTS, OR EMPLOYEES INCLUDING ATTORNEY'S FEES. THE OBLIGATIONS CONTAINED IN THIS SECTION 8.2 SHALL SURVIVE THE TERMINATION OF THIS CONTRACT.

9. **Start of Work:** COMPANY shall commence work no later than ten (10) days after receipt of the execution of this document or other written release to proceed and shall complete such work no later than 420 calendar days after release to proceed.

10. **Clean Up:** COMPANY shall promptly remove from CITY's premises all materials condemned by CITY's Representative on account of failure to conform to the contract, whether actually incorporated in the work or not, and COMPANY shall at its own expense promptly replace such condemned materials with other materials conforming to the requirements of the contract. COMPANY shall also bear the expense of restoring all work of other contractors damaged by any such removal or replacement. If COMPANY does not remove and replace any such condemned materials within a reasonable time after a written notice by CITY, CITY may remove and replace such at COMPANY's expense.

11. **Warranty:** Neither the final payment nor any provision in this contract shall relieve COMPANY of responsibility for faulty materials or workmanship, and he shall remedy any defects due thereto and pay for any damage to other work resulting therefrom, which shall appear within a period of one (1) year from the date of substantial completion. CITY shall give notice of observed defects with reasonable promptness.

12. **Remedy:** CITY may, on account of subsequently discovered evidence, withhold whole or part of any payment to such extent as may be necessary to protect itself from loss on account of:

12.1. Defective work not remedied or

12.2. Claims filed or reasonable evidence indicating possible filing of claims; or

12.3. Failure of COMPANY to make payments promptly to subcontractors or for material or labor which CITY may pay as an agent for the COMPANY; or

12.4. Damages to another contractor or subcontractor.

When the above grounds to withhold payment are removed, or COMPANY provides a surety bond satisfactory to CITY, which will protect CITY in the amount withheld, payment may be released.

13. **Funding Out:** In the event no funds or insufficient funds are appropriated and budgeted or are otherwise unavailable in any fiscal period for contract payments due under the contract, then this contract shall terminate on the last day of the fiscal period for which full appropriations were made, without penalty or expense to CITY of any kind whatsoever.

14. **Wage Scale:** COMPANY agrees to pay all workmen in his employ no less than the generally prevailing wage rate for employees of similar category in the Permian Basin Area, as is depicted in the wage rate scale attached hereto as Specification Section 00 73 42 "Wage Rate Requirements," and incorporated herein by reference for all legal purposes.

14.1. If applicable, the Davis-Bacon Act, 29 CFR 5.5, and any related acts or regulations are hereby incorporated by reference and made a part of this Contract, and all terms and requirements under said laws, by such incorporation, are made terms and requirements of this Contract, to which the parties to this Contract have agreed to be bound.

15. **Prompt Pay Act:** CITY and COMPANY agree that Texas Government Code, Chapter 2251, Payment for Goods and Services (the "Prompt Pay Act") does not waive governmental immunity.

16. **Payment; Retainage:** After all work is completed by COMPANY, including all Change Orders altering the original scope and amount of the contract are completed, and the CITY has inspected and approved that the work is completed and in compliance with the contract and all subsequent Change Orders, the CITY may thereafter issue payment to COMPANY in the amount of the contract and all Change Orders. The CITY shall be the final judge of when the work is completed by COMPANY. The CITY, in its sole discretion, shall determine if the work under the contract and under any Change Orders has been done to the CITY's requirements.

16.1. The CITY may make periodic payments to COMPANY; provided, however, such periodic payments may only be made pursuant to this section, and only after all work and all Change Orders are completed by COMPANY and approved by the CITY. The approval shall be in

the CITY's sole discretion. Requests for progress payments may be made to the extent of the materials and labor completed at the end of each month. Upon approval by the CITY or the CITY's representative, the request and invoice shall be forwarded for payment less 5% retainage. The total of these payments shall not exceed 95% of the total contract amount.

17. **Late Completion; Liquidated Damages:** It is hereby understood and mutually agreed, by and between COMPANY and the CITY, that the date of beginning and the time for completion as specified in the contract of the work to be done hereunder are ESSENTIAL CONDITIONS of this contract; and it is further mutually understood and agreed that the work embraced in this contract shall be commenced on a date to be specified in the "Notice to Proceed." COMPANY agrees that said work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between COMPANY and the CITY, that the time for the completion of the work described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

17.1. In the event COMPANY shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the CITY, then COMPANY and

COMPANY's surety, if any, shall be liable for and does hereby agree, as a part consideration for the awarding of this contract, to pay to the CITY $1,000.00, not as a penalty but as liquidated damages for such breach of contract as hereinafter set forth, for each and every day that COMPANY shall be in default after the time stipulated in the contract for completing the work. Further, the CITY shall have the right to cancel this contract for such delay. In the event the CITY cancels this contract pursuant to the terms of this section, the CITY shall pay to COMPANY only those monies deemed appropriate by the CITY, in its sole discretion, to compensate COMPANY for any work actually performed, less any liquidated damages COMPANY owes the CITY.

17.2. The said amount is fixed and agreed upon by and between COMPANY and the CITY because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the CITY would in such event sustain, and said amount is agreed to be the amount of damages which the CITY would sustain and said amount shall be retained from time to time by the CITY from current periodical estimates.

17.3. It is further agreed that time is of the essence of each and every portion of this contract and of the specifications wherein a definite and certain length of time is fixed for the

performance of any act whatsoever; and where under the contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this contract. Provided, that COMPANY shall not be charged with liquidated damages or any excess cost when the CITY determines, in its sole discretion, that COMPANY is without fault and COMPANY's reasons for the time extension are acceptable to the CITY. Provided, further, that COMPANY shall not be charged with liquidated damages of any excess cost when the delay in completion of the work is due:

a. To any preference, priority or allocation order duly issued by the Government;

b. To unforeseeable cause beyond the control and without the fault or negligence of COMPANY, including, but not restricted to, acts of God, or of the public enemy, acts of the CITY, acts of another contractor in the performance of a contract with the CITY, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and severe weather; and

c. To any delays of subcontractors or suppliers occasioned by any of the causes specified in subsections (a) and (b) of this article.

17.4. Provided, further, that COMPANY shall, within ten (10) days from the beginning of such delay, unless the CITY shall, in its sole discretion grant a further period of time prior to the date of final settlement of the contract, notify the CITY, in writing, of the causes of the delay, who shall ascertain the facts and extent of the delay and notify COMPANY within a reasonable time of its decision in the matter.

17.5. **COMPANY AGREES THAT THE PAYMENT OF SUCH LIQUIDATED DAMAGES MAY BE RECOVERED BY THE CITY FROM RETAINAGE HELD BY THE CITY. NOTWITHSTANDING ANY OTHER PROVISION HEREOF, COMPANY HEREBY RELEASES, ACQUITS, RELINQUISHES AND FOREVER DISCHARGES CITY, CITY'S EMPLOYEES AND OFFICERS FROM ANY AND ALL DEMANDS, CLAIMS, DAMAGES, OR CAUSES OF ACTION OF ANY KIND WHATSOEVER ARISING FROM THE CITY WITHHOLDING PAYMENT FROM COMPANY AS LIQUIDATED DAMAGES FOR COMPANY'S FAILURE TO COMPLETE THE WORK WITHIN THE TIME SPECIFIED HEREIN, INCLUDING BUT NOT LIMITED TO BREACH OF CONTRACT, QUANTUM MERUIT, CLAIMS UNDER THE DUE PROCESS AND TAKINGS CLAUSES OF THE TEXAS AND UNITED STATES CONSTITUTIONS, TORT CLAIMS, OR CITY'S NEGLIGENCE.**

17.6. **COMPANY SHALL RECEIVE NO FINANCIAL COMPENSATION FOR DELAY OR HINDRANCE TO THE WORK. IN NO EVENT SHALL THE CITY BE**

LIABLE TO COMPANY OR ANY SUBCONTRACTOR OR SUPPLIER, ANY OTHER PERSON OR ANY SURETY FOR OR ANY EMPLOYEE OR AGENT OF ANY OF THEM, FOR ANY DAMAGES ARISING OUT OF OR ASSOCIATED WITH ANY DELAY OR HINDRANCE TO THE WORK, REGARDLESS OF THE SOURCE OF THE DELAY OR HINDRANCE, INCLUDING EVENTS OF FORCE MAJEURE, AND EVEN IF SUCH DELAY OR HINDRANCE RESULTS FROM, ARISES OUT OF OR IS DUE, IN WHOLE OR IN PART, TO THE NEGLIGENCE OF THE CITY. COMPANY'S SOLE REMEDY IN ANY SUCH CASE SHALL BE AN EXTENSION OF TIME.

18. **No Third-Party Beneficiary:** CITY's approval of this contract does not create a third-party beneficiary. There is no third-party beneficiary to this contract. No person or entity who is not a party to this contract shall have any third-party beneficiary or other rights hereunder.

19. **WAIVER OF ATTORNEY FEES: BY EXECUTING THIS CONTRACT, COMPANY AGREES TO WAIVE AND DOES HEREBY KNOWINGLY, CONCLUSIVELY, VOLUNTARILY AND INTENTIONALLY WAIVE ANY CLAIM IT HAS OR MAY HAVE IN THE FUTURE AGAINST CITY REGARDING THE AWARD OR ATTORNEY'S FEES, WHICH ARE IN ANY WAY RELATED TO THIS CONTRACT, OR THE CONSTRUCTION, INTERPRETATION OR BREACH OF THIS CONTRACT. COMPANY SPECIFICALLY AGREES THAT IF COMPANY BRINGS OR COMMENCES ANY LEGAL ACTION OR PROCEEDING RELATED TO THIS CONTRACT, THE CONSTRUCTION, INTERPRETATION, VALIDITY OR BREACH OF THIS CONTRACT, INCLUDING, BUT NOT LIMITED TO, ANY ACTION PURSUANT TO THE PROVISIONS OF THE TEXAS UNIFORM DECLARATORY JUDGMENTS ACT (TEXAS CIVIL PRACTICE AND REMEDIES CODE SECTION 37.001, ET SEQ., AS AMENDED), OR CHAPTER 271 OF THE TEXAS LOCAL GOVERNMENT CODE, COMPANY AGREES TO ABANDON, WAIVE AND RELINQUISH ANY AND ALL RIGHTS TO THE RECOVERY OF ATTORNEY'S FEES TO WHICH COMPANY MIGHT OTHERWISE BE ENTITLED.**

COMPANY AGREES THAT THIS IS THE VOLUNTARY AND INTENTIONAL RELINQUISHMENT AND ABANDONMENT OF A PRESENTLY-EXISTING KNOWN RIGHT. COMPANY ACKNOWLEDGES THAT IT UNDERSTANDS ALL TERMS AND CONDITIONS OF THIS CONTRACT. COMPANY FURTHER ACKNOWLEDGES AND AGREES THAT THERE WAS AND IS NO DISPARITY OF BARGAINING POWER BETWEEN CITY AND COMPANY. THIS SECTION SHALL NOT BE CONSTRUED OR INTERPRETED AS A WAIVER OR GOVERNMENTAL IMMUNITY AND SHALL SURVIVE THE TERMINATION OF THIS CONTRACT.

COMPANY IS RELYING ON ITS OWN JUDGMENT. COMPANY HAD THE OPPORTUNITY TO DISCUSS THIS CONTRACT WITH COMPETENT LEGAL COUNSEL PRIOR TO ITS EXECUTION. THE OBLIGATIONS CONTAINED IN THIS SECTION 18 SHALL SURVIVE THE TERMINATION OF THIS CONTRACT.

20. **Governmental Immunity:** By executing this contract CITY is not waiving its right of governmental immunity. CITY is retaining its immunity from suit. CITY is not granting consent to be sued by legislative resolution or action.

THERE IS NO WAIVER OF GOVERNMENTAL IMMUNITY.

21. **Insurance:**

COMPANY shall at all times during the term of this Contract maintain and keep in full force and effect insurance in the following types and minimum amounts with companies authorized to do business in the State of Texas:

Commercial General Liability (including Contractual liability):	
-Personal Injury:	$1,000,000.00 per person $1,000,000.00 per occurrence
-Property Damage:	$500,000.00 per occurrence
Business Automobile Liability:	$250,000.00 combined single limit - Personal Injury and Property Damage
Workers' Compensation:	Statutory limits
Employers' Liability:	$500,000.00 per accident or occurrence

The Commercial General Liability shall be on a per project aggregate, including completed operations, and shall be on a claims-occurred basis. This insurance shall name CITY as an additional insured and waive subrogation in favor of CITY.

The Business Automobile Liability insurance provided by COMPANY shall cover any auto for bodily injury and property damage, including owned vehicles, hired and non-city vehicles, and employee non-ownership, and the amount of such policy shall be a minimum of $250,000.00 covering any vehicle used for the execution of the work that is the subject of this Contract. This insurance shall name CITY as an additional insured and waive subrogation in favor of CITY.

The Workers' Compensation coverage provided by COMPANY shall inure to the benefit of employees injured during the course and scope of their employment by COMPANY pursuant to this Contract. The Workers' Compensation shall waive all rights of subrogation in favor of CITY. All insurance required pursuant to this Contract shall provide for a waiver of subrogation in favor of CITY. All insurance required pursuant to this Contract, except for Workers' Compensation Insurance, shall name CITY as an additional

insured on a claims occurred basis. CITY shall be provided the notice by COMPANY's insurance provider not later than thirty (30) days prior to any reduction or termination of such coverage.

COMPANY shall contractually require all contractors, subcontractors, and sub-subcontractors that work on any portion of the work that is the subject of this Contract to obtain insurance coverage that meets or exceeds the policy requirements and minimum amounts specified herein. All contractors, subcontractors, and sub-subcontractors shall obtain insurance policies that provide blanket waivers of subrogation in favor of the City of Midland and policies that name the City of Midland as an additional insured on a claims occurred basis (except workers' compensation).

The parties agree that, prior to the execution of the Contract, COMPANY shall provide one or more certificates of insurance specifically stating that these requirements have been met and subject to the approval of CITY. CITY shall not be required to provide any insurance whatsoever pursuant to this Contract.

COMPANY certifies that the certificate of insurance provided as required herein complies with the requirements of Chapter 1811 of the Texas Insurance Code. COMPANY shall not use an unapproved certificate of insurance or insert inappropriate language on a certificate. Compliance with state law is the sole responsibility of COMPANY.

22. **Assignment**: COMPANY shall not, either directly or indirectly, assign all or any part of this Contract or any interest, right or privilege herein, without the prior written consent of CITY. The issue on whether or not to grant consent to an assignment is in the sole discretion of CITY.

23. **RELEASE: NOTWITHSTANDING ANY OTHER PROVISION CONTAINED HEREIN, COMPANY HEREBY RELEASES, ACQUITS, RELINQUISHES AND FOREVER DISCHARGES CITY AND CITY'S COUNCIL MEMBERS, EMPLOYEES, AND OFFICERS FROM ANY AND ALL DEMANDS, CLAIMS, DAMAGES OR CAUSES OF ACTION OF ANY KIND WHATSOEVER THAT COMPANY HAS OR MIGHT HAVE IN THE FUTURE, INCLUDING, BUT NOT LIMITED TO, BREACH OF CONTRACT, QUANTUM MERUIT, CLAIMS UNDER THE DUE PROCESS AND TAKINGS CLAUSES OF THE TEXAS AND UNITED STATES CONSTITUTIONS, TORT CLAIMS, OR CITY'S NEGLIGENCE. THE OBLIGATIONS CONTAINED IN THIS SECTION SHALL SURVIVE THE TERMINATION OF THIS CONTRACT**.

24. **Governing Law and Venue:** This contract shall be governed by the laws of the State of Texas. All performance and payment made pursuant to this contract shall be deemed to have occurred in Midland County, Texas. The obligations and undertakings of each of the parties to this Agreement shall be deemed

to have occurred in Midland County, Texas. Exclusive venue for any claims, suits or any other action arising from or connected in any way to this contract or the performance of this contract shall be in Midland County, Texas.

25. **Independent Contractor:** COMPANY shall perform all work and services described herein as an independent contractor and not as an officer, agent, servant, or employee of CITY. COMPANY shall have exclusive control of, and the exclusive right to control the details of the services and work to be performed hereunder, and all persons performing the same. COMPANY shall be solely responsible for the acts and omissions of its officers, agents, employees, contractors and subcontractors and the doctrine of respondeat superior shall not apply as between CITY and COMPANY, its officers, agents, employees, contractors and subcontractors. Nothing in this Contract shall be construed as creating a partnership or joint enterprise between CITY and COMPANY. No person performing any of the work and services described hereunder by COMPANY shall be considered an officer, agent, servant or employee of CITY. Further, it is specifically understood and agreed that nothing in this contract is intended or construed as creating a "Community of Pecuniary Interest" or an "Equal Right of Control" which would give rise to vicarious liability.

COMPANY shall be an independent contractor under this Contract and shall assume all of the rights, obligations and liabilities, applicable to it as such independent contractor hereunder. CITY does not have the power to direct the order in which the work is done. CITY shall not have the right to control the means, methods or details of COMPANY's work. COMPANY shall assume exclusive responsibility for the work. COMPANY is entirely free to do the work in its own way.

26. **Notice of Alleged Breach; Statutory Prerequisites:** As a condition precedent to filing suit for alleged damages incurred by an alleged breach of an express or implied provision of this Contract, COMPANY or its legal representative, shall give the City Manager, or any other reasonable official of CITY, notice in writing (consisting of one (1) original and seven (7) copies of notice attached to a copy of this Contract) of such damages, duly verified, within one hundred twenty (120) days after the same has been sustained. The discovery rule does not apply to the giving of this notice. The notice shall include when, where and how the damages occurred, the apparent extent thereof, the amount of damages sustained, the amount for which COMPANY shall settle, the physical and mailing addresses of COMPANY at the time and date the claim was presented and the physical and mailing addresses of COMPANY for the six (6) months immediately preceding the occurrence of such damages, and the names and addresses of the witnesses upon whom COMPANY relies to establish its claim; and a failure to provide such written notification within the time and manner provided herein shall exonerate, excuse and except

CITY from any liability whatsoever. CITY is under no obligation to provide notice to COMPANY that COMPANY's notice is insufficient. CITY reserves the right to request additional information regarding the claim. Said additional information shall be supplied within thirty (30) days after receipt of notice.

The statutory prerequisites outlined herein constitute jurisdictional requirements pursuant to Section 271.154 of the Texas Local Government Code and Section 311.034 of the Texas Government Code. Notwithstanding any other provision to the contrary, COMPANY's failure to comply with the requirements of this Section shall perpetually bar COMPANY's claim for damages under Chapter 271 of the Texas Local Government Code, and Section 311.034 of the Texas Government Code, regardless if CITY has actual or constructive notice or knowledge of said claim or alleged damages. COMPANY agrees that the requirements of this entire Contract are reasonable. The provisions and obligations of this Section shall survive the termination of this Contract.

27. **Consideration:** The terms of this Contract are supported by good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged by the parties named herein.

28. **Termination At Will:** CITY may terminate this Contract at will for no or any reason upon giving at least one hundred eighty (180) days written notice to COMPANY. The parties to this Contract understand and agree that it is in CITY's sole discretion to cancel the Contract during the term of the Contract without penalty to CITY. COMPANY has no expectation and has received no guarantees that this Contract will not be terminated before the end of the Contract term. The parties have bargained for the flexibility of terminating this Contract upon tender of the requisite notice at any time during the term of the Contract. All work and services under the Contract shall be suspended upon termination of the Contract becoming effective.

29. **Compliance:** COMPANY agrees that it shall comply with Texas Government Code Section 2252.908, *et seq.*, as amended. COMPANY agrees that it shall comply with Texas Local Government Code Section 176.006, *et seq.*, as amended.

30. To the extent that Sections 2271.002, 2274.002, and 2276.002 of the Texas Government Code (collectively, the "Anti-Boycott Statutes") apply to this Contract, COMPANY hereby verifies:

- that Company does not boycott Israel and will not boycott Israel during the term of this Contract;
- that Company does not boycott energy companies and will not boycott energy companies during the term of this Contract; and

- that Company does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association and will not discriminate during the term of this Contract against a firearm entity or firearm trade association.

To the extent that the Anti-Boycott Statutes do not apply to this Contract, such verification is not required, and Company shall be deemed to have not made such verification.

31. **Records Retention and Production of Information.** To the extent that this Contract constitutes a contract described by Section 552.371 of the Texas Government Code, COMPANY shall: (i) preserve all contracting information related to this Contract as provided by the records retention requirements applicable to CITY for the duration of this Contract; (ii) promptly provide to CITY any contracting information related to the Contract that is in the custody or possession of COMPANY on request of CITY; and (iii) on completion of the Contract, either: (a) provide at no cost to CITY all contracting information related to the Contract that is in the custody or possession of COMPANY; or (b) preserve the contracting information related to the Contract as provided by the records retention requirements applicable to CITY.

32. **Public Information.** To the extent that this Contract is a contract described by Section 552.371 of the Texas Government Code, COMPANY agrees as follows in accordance with Section 552.372(b) of the Texas Government Code: The requirements of Subchapter J, Chapter 552, Government Code, may apply to this Contract, and COMPANY agrees that the contract can be terminated if COMPANY knowingly or intentionally fails to comply with a requirement of that subchapter.

33. **Conflict of Terms.** If a conflict of terms or language exists between: (i) any of the provisions of this Contract and (ii) any of the provisions contained in any exhibit(s) attached to this Contract, precedence shall be given to the provisions of this Contract. For the avoidance of any doubt, the provisions contained in this Contract shall supersede any and all conflicting provisions contained in any exhibit(s) attached hereto. Furthermore, the parties acknowledge and agree that any provision contained in an exhibit(s) attached to this Contract that imposes an additional express or implied obligation on CITY is hereby made void and of no force or effect. CITY's sole and exclusive obligations under this Contract are contained in the provisions of this Contract that precede the signature page(s), which evidences the parties' execution.

34. Company agrees that all iron or steel products produced through a manufacturing process and used in the project that is the subject of this Contract shall be produced in the United States in accordance with Government Code § 2252.202, et seq., as amended.

EXECUTED IN DUPLICATE the day and year first above mentioned.
THE CITY OF MIDLAND, TEXAS

By: _____
Tommy Gonzalez, City Manager

ATTEST

_____
Marcia Bentley-German, City Governance Officer/City Secretary

APPROVED ONLYAS TO FORM

_____
John Ohnemiller, City Attorney

COMPANY:

By: _____

Name: _____

Title: _____

STATE OF _____ §
§
COUNTY OF_____ §

BEFORE ME, the undersigned authority, on this ____ day of _____, 20___ personally appeared, _____, an officer of _____., known to me to be the person and official whose name is subscribed to the forgoing instrument, and acknowledged to me that he executed the same as the act and deed of said corporation, for the purposes and consideration therein expressed, and in the capacity therein stated.
GIVEN UNDER MY HAND AND SEAL OF OFFICE this the ____day of _____, 20____.

_____
Notary Public, State of _____

SOLICITATION NO. 42398.23

NON-COLLUSION STATEMENT

The undersigned hereby certifies that:

(1) The price(s) and amount of this bid have been arrived at independently and without collusion, consultation, communication or agreement with any other company, firm, contractor, bidder or potential bidder.

(2) Neither the price(s) nor the amount of this bid, and neither the approximate price(s) nor approximate amount of this bid, have been disclosed to any other company, firm or person who is a bidder or potential bidder, and they will not be disclosed before bid opening.

(3) No attempt has been made or will be made to induce any company, firm or person to refrain from bidding on this contract, or to submit a bid higher than this bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.

(4) The bid of my company or firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any company, firm or person to submit a complementary or other noncompetitive bid.

Authorized Signature

President
Title

Todd Winnerman
Name (Print)

Cerris Builders, Inc.
Company

July 30, 2025
Date

NOTE: Bid and Proposal terms are interchangeable.

FEDERAL CONTRACT PROVISIONS

ACCESS TO RECORDS AND REPORTS

Contractor must maintain an acceptable cost accounting system. Contractor agrees to provide the Owner, the Federal Aviation Administration and the Comptroller General of the United States or any of their duly authorized representatives access to any books, documents, papers and records of Contractor which are directly pertinent to the specific contract for the purpose of making audit, examination, excerpts and transcriptions. Contractor agrees to maintain all books, records and reports required under this contract for a period of not less than three years after final payment is made and all pending matters are closed.

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables

Goals for minority participation for each trade: 19.1%

Goals for female participation in each trade: 6.9%

These goals are applicable to all of Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, Contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a) and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting Contractor's goals shall be a violation of the contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs (OFCCP) within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

4. As used in this notice and in the contract resulting from this solicitation, the "covered area" is Texas, Midland County, City of Midland.

BREACH OF CONTRACT TERMS

Any violation or breach of terms of this contract on the part of Contractor or its subcontractors may result in the suspension or termination of this contract or such other action that may be necessary to enforce the rights of the parties of this agreement.

Owner will provide Contractor written notice that describes the nature of the breach and corrective actions Contractor must undertake in order to avoid termination of the contract. Owner reserves the right to withhold payments to Contractor until such time Contractor corrects the breach or the Owner elects to terminate the contract. Owner's notice will identify a specific date by which Contractor must correct the breach. Owner may proceed with termination of the contract if Contractor fails to correct the breach by the deadline indicated in Owner's notice.

The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder are in addition to, and not a limitation of, any duties, obligations, rights, and remedies otherwise imposed or available by law.

BUY AMERICAN PREFERENCE

SOURCE

Title 49 USC § 50101

Executive Order 14005, *Ensuring the Future is Made in All of America by All of America's Workers*

Bipartisan Infrastructure Law (Pub. L. No. 117-58), Build America, Buy America (BABA)

APPLICABILITY

The Buy American Preference incorporates statutory requirements and policies outlined in the in 49 USC § 50101, Executive Order 14005, and BABA.

Section 50101 of 49 USC requires that all steel and manufactured goods used on AIP projects be produced in the United States. This section also gives the FAA the ability to issue a waiver to a Sponsor to use non-domestic material on an AIP funded project subject to meeting certain conditions. A Sponsor may request that the FAA issue a waiver from the Buy American Preference requirements if the FAA finds that:

1) Applying the provision is not in the public interest.
2) The steel or manufactured goods are not available in sufficient quantity or quality in the United States.

3) The cost of components and subcomponents produced in the United States is more than 60 percent of the total components of a facility or equipment, and final assembly has taken place in the United States. Items that have an FAA standard specification item number (such as specific airport lighting equipment) are considered the equipment.
4) Applying this provision would increase the cost of the overall project by more than 25 percent.

Executive Order 14005 advances the Administration's priority to use terms and conditions of Federal financial assistance awards to maximize the use of goods, products, and materials produced in, and services offered in, the United States. The Order directs, to the extent appropriate and consistent with applicable law, agencies shall partner with the Hollings Manufacturing Extension Partnership (MEP) to conduct supplier scouting in order to identify American companies that are able to produce goods, products, and materials in the United States that meet Federal procurement needs, prior to consideration of using non-domestic products.

The Bipartisan Infrastructure Law, Build America, Buy America (BABA) Act strengthens Made in America Laws and bolsters America's industrial base, protects national security, and supports high-paying jobs. Under BABA, iron, steel, and certain construction materials are required to be 100% produced in the United States.

Under the Bipartisan Infrastructure Law (Pub. L. No. 117-58) BABA three waivers are available for iron and steel, manufactured products, and construction materials when a Federal agency finds that:
1) Applying the domestic content procurement preference would be inconsistent with the public interest (a "public interest waiver");
2) Types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality (a "nonavailability waiver"); or
3) The inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent (an "unreasonable cost waiver").

BABA defines construction materials, items that are or consists primarily of non-ferrous metals, plastic, and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables), glass (including optic glass), lumber or drywall.

Items that consist of two or more of the aforementioned materials that have been combined together through a manufacturing process, and items that include at least one of the listed materials combined with a material that is not listed through a manufacturing process, should be treated as manufactured products, rather than as construction materials. For example, a plastic framed sliding window should be treated as a manufactured product while plate glass should be treated as a construction material**.**

The Buy America Preference requirements flow down from the Sponsor to first tier contractors, who are responsible for ensuring that lower tier contractors and subcontractors are also in compliance.

Note: The Buy American Preference does not apply to temporary equipment a contractor uses as a tool of its trade and which does not remain as part of the project.

Required Documentation

The FAA Buy American Requests. All applications (requests) for an FAA Buy American Preference Waiver includes, at minimum, a completed Content Percentage Worksheet and Final Assembly Questionnaire. Additional information may be requested from the applicant by the FAA. Airport Sponsors, consultants, construction contractors, or equipment manufacturers are responsible for completing and submitting waiver applications. The FAA is unable to make a determination on waiver requests with incomplete information. Sponsors must confirm with the bidder or offeror to assess the adequacy of the waiver request and associated information prior to forwarding a waiver request to the FAA for action. All FAA waivers forms are available from the FAA Buy American Requirements webpage.

Proprietary Confidentiality. Exemption 4 of the Freedom of Information Act protects "trade secrets and commercial or financial information obtained from a person that is privileged or confidential. Proprietary manufacturing and design information submitted to the Federal Aviation Administration for the purposes of receiving a Buy American Waiver shall not be disclosed outside the FAA. The FAA will provide a written notification to the Airport Sponsor, manufacturer(s), contractor(s) or supplier(s) when a waiver determination is complete.

Timing of Waiver Requests. Sponsors desiring a Type 2 waiver should submit their waiver request, with justification, *before* issuing a solicitation for bids or a request for proposal for a project.

The Sponsor must submit a Type 2, Type 3, or Type 4 waiver request *prior* to executing the contract. The FAA will generally not consider waiver requests after execution of the contract except where extraordinary and extenuating circumstances exist.

The Buy American Notice of Determination (NOD) Process. The FAA Reauthorization Act of 2018 requires that all approved waivers must be posted to the FAA's website and remain posted for public comment for 10 days, before becoming effective. All FAA waivers must complete the NOD process. Sponsors are encouraged to wait until approved waivers become effective before executing AIP projects.

Buy American Conformance Lists. The FAA Office of Airports maintains listings of projects and products that have received a waiver from the Buy American Preference requirements for project specific and nationwide use. Each of these conformance lists is available online at www.faa.gov/airports/aip/buy_american/. Products listed on the FAA Nationwide Buy American Conformance list do not require additional submittal of domestic content information. Nationwide waivers expire five years from the date issued, unless revoked earlier by the FAA.

Facility Waiver Requests. For construction of a facility, the Sponsor may submit the waiver request after bid opening, but prior to contract execution. Examples of facility construction include terminal buildings, terminal renovation, and snow removal equipment buildings.

Contract Types –

Construction and Equipment – The Sponsor must meet the Buy American Preference requirements of 49 USC § 50101 and BABA for all AIP funded projects that require materials that are or consists primarily of iron, steel or manufactured goods and construction materials.

Professional Services – Professional service agreements (PSAs) do not normally result in a deliverable that meets the definition of a manufactured product. However, the emergence of various project delivery methods has created situations where task deliverables under a PSA may include

a manufactured product. If a PSA includes providing a manufactured good as a deliverable under the contract, the Sponsor must include the Buy American Preference provision in the agreement.

Property – Most land transactions do not involve acquiring a manufactured product. However, under certain circumstances, a property acquisition project could result in the installation of a manufactured product. For example, the installation of property fencing, gates, doors and locks, etc. represent manufactured products acquired under an AIP funded land project that must comply with Buy American Preferences.

Use of Provisions – No mandatory language provided. The following language is acceptable to the FAA and meets the intent of this requirement. If the Sponsor uses different language, the Sponsor's revised language must fully comply with 49 USC § 50101 and BABA.

There are two types of FAA Buy American certifications. The Sponsor must incorporate the appropriate certifications of compliance with FAA Buy American Preference in the solicitation:

- **Construction Projects** involving the replacement, rehabilitation, reconstruction of airfield surfaces such as on runways, taxiways, taxilanes, aprons, roadways, parking lots, etc. – Insert the Certificate of compliance to FAA Buy American Preference based on Construction Projects.
- **Equipment and Buildings Projects** involving and including the acquisition of equipment such as snow removal equipment, navigational aids, wind cones, and the construction of buildings such as hangars, terminal development, lighting vaults, aircraft rescue & firefighting buildings, etc. - Insert the Certificate of Compliance with FAA Buy American Preference Based on Equipment/Building Projects.

MODEL SOLICITATION CLAUSES

Certification of Compliance with FAA Buy American Preference Statement

FAA BUY AMERICAN PREFERENCE

Contractor certifies that its bid/offer is in compliance with 49 USC § 50101, BABA and other related Made in America Laws,[1] U.S. statutes, guidance, and FAA policies, which provide that Federal funds may not be obligated unless all iron, steel and manufactured goods used in AIP funded projects are produced in the United States, unless the Federal Aviation Administration has issued a waiver for the product; the product is listed as an Excepted Article, Material Or Supply in Federal Acquisition Regulation subpart 25.108; or is included in the FAA Nationwide Buy American Waivers Issued list.

[1] Per Executive Order 14005 "Made in America Laws" means all statutes, regulations, rules, and Executive Orders relating to federal financial assistance awards or federal procurement, including those that refer to "Buy America" or "Buy American," that require, or provide a preference for, the purchase or acquisition of goods, products, or materials produced in the United States, including iron, steel, and manufactured products offered in the United States.

PACKET 7.88 September 9, 2025

The Bidder or Offeror must complete and submit the certification of compliance with FAA's Buy American Preference, BABA and Made in America laws included herein with their bid or offer. The Airport Sponsor/Owner will reject as nonresponsive any bid or offer that does not include a completed certification of compliance with FAA's Buy American Preference and BABA.

The Bidder or Offeror certifies that all constructions materials, defined to mean an article, material, or supply other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives that are or consist primarily of: non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); lumber; or drywall used in the Project are manufactured in the U.S.

Certification of Compliance with FAA Buy American Preference – Construction Projects

As a matter of bid responsiveness, Bidder or Offeror must complete, sign, date, and submit this certification statement with its proposal. Bidder or Offeror must indicate how it intends to comply with 49 USC § 50101, BABA and other related Made in America Laws, U.S. statutes, guidance, and FAA policies, by selecting one of the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (i.e., not both) by inserting a checkmark (✓) or the letter "X".

☐ Bidder or Offeror hereby certifies that it will comply with 49 USC § 50101, BABA and other related U.S. statutes, guidance, and policies of the FAA by:

a) Only installing iron, steel and manufactured products produced in the United States;

b) Only installing construction materials defined as: an article, material, or supply – other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives that are or consist primarily of non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); lumber or drywall that have been manufactured in the United States.

c) Installing manufactured products for which the Federal Aviation Administration (FAA) has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing; or

d) Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

By selecting this certification statement, the bidder or offeror agrees:

a) To provide to the Airport Sponsor or the FAA evidence that documents the source and origin of the iron, steel, and/or manufactured product.
b) To faithfully comply with providing U.S. domestic products.
c) To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.
d) Certify that all construction materials used in the project are manufactured in the U.S.

☒ The bidder or offeror hereby certifies it cannot comply with the 100% Buy American Preferences of 49 USC § 50101(a) but may qualify for a Type 3 or Type 4 waiver under 49 USC § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:

a) To the submit to the Airport Sponsor or FAA within 15 calendar days of being selected as the responsive bidder, a formal waiver request and required documentation that supports the type of waiver being requested.
b) That failure to submit the required documentation within the specified timeframe is cause for a non-responsive determination that may result in rejection of the proposal.
c) To faithfully comply with providing U.S. domestic products at or above the approved U.S. domestic content percentage as approved by the FAA.

d) To furnish U.S. domestic product for any waiver request that the FAA rejects.
e) To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

Required Documentation

Type 2 Waiver (Nonavailability) - The iron, steel, manufactured goods or construction materials or manufactured goods are not available in sufficient quantity or quality in the United States. The required documentation for the Nonavailability waiver is

a) Completed Content Percentage Worksheet and Final Assembly Questionnaire
b) Record of thorough market research, consideration where appropriate of qualifying alternate items, products, or materials including;
c) A description of the market research activities and methods used to identify domestically manufactured items capable of satisfying the requirement, including the timing of the research and conclusions reached on the availability of sources.

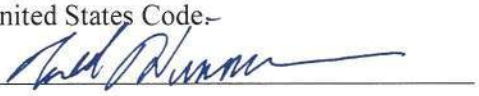
Type 3 Waiver – The cost of components and subcomponents produced in the United States is more than 60 percent of the cost of all components and subcomponents of the "facility/project." The required documentation for a Type 3 waiver is:

a) Completed Content Percentage Worksheet and Final Assembly Questionnaire including;
b) Listing of all manufactured products that are not comprised of 100% U.S. domestic content (excludes products listed on the FAA Nationwide Buy American Waivers Issued listing and products excluded by Federal Acquisition Regulation Subpart 25.108; products of unknown origin must be considered as non-domestic products in their entirety).
c) Cost of non-domestic components and subcomponents, excluding labor costs associated with final assembly and installation at project location.
d) Percentage of non-domestic component and subcomponent cost as compared to total "facility" component and subcomponent costs, excluding labor costs associated with final assembly and installation at project location.

Type 4 Waiver (Unreasonable Costs) - Applying this provision for iron, steel, manufactured goods, or construction materials would increase the cost of the overall project by more than 25%. The required documentation for this waiver is:

a) A completed Content Percentage Worksheet and Final Assembly Questionnaire from;
b) At minimum two comparable equal bids and/or offers;
c) Receipt or record that demonstrates that supplier scouting called for in Executive Order 14005, indicates that no domestic source exists for the project and/or component;
d) Completed waiver applications for each comparable bid and/or offer.

False Statements: Per 49 USC § 47126, this certification concerns a matter within the jurisdiction of the Federal Aviation Administration and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code.

July 30, 2025	
Date	Signature
Cerris Builders, Inc	President
Company Name	Title

PACKET 7.92 September 9, 2025

GENERAL CIVIL RIGHTS PROVISIONS

In all its activities within the scope of its airport program, the Contractor agrees to comply with pertinent statutes, Executive Orders, and such rules as identified in Title VI List of Pertinent Nondiscrimination Acts and Authorities to ensure that no person shall, on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance.

This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

Specific Clause used for General Contract Agreements

The above provision binds Contractor and subcontractors from the bid solicitation period through the completion of the contract.

Title VI Solicitation Notice:

The Midland International Air & Space Port, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 USC §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders or offerors that it will affirmatively ensure that for any contract entered into pursuant to this advertisement, select businesses, or disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and no businesses will be discriminated against on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability in consideration for an award.

Title VI List of Pertinent Nondiscrimination Acts and Authorities

During the performance of this contract, Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 USC § 2000d *et seq*., 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR part 21 (Non-discrimination in Federally-Assisted programs of the Department of Transportation—Effectuation of Title VI of the Civil Rights Act of 1964);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 USC § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Section 504 of the Rehabilitation Act of 1973 (29 USC § 794 *et seq*.), as amended (prohibits discrimination on the basis of disability); and 49 CFR part 27 (Nondiscrimination on the Basis of Disability in Programs or Activities Receiving Federal Financial Assistance);
- The Age Discrimination Act of 1975, as amended (42 USC § 6101 *et seq*.) (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982 (49 USC § 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);

- The Civil Rights Restoration Act of 1987 (PL 100-259) (broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990 (42 USC § 12101, et seq) (prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities) as implemented by U.S. Department of Transportation regulations at 49 CFR parts 37 and 38;
- The Federal Aviation Administration's Nondiscrimination statute (49 USC § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (ensures nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations);
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs 70 Fed. Reg. 74087 (2005);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 USC § 1681, et seq).

Compliance with Nondiscrimination Requirements:

During the performance of this Contract, Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor"), agrees as follows:

1. **Compliance with Regulations:** Contractor (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Acts and Authorities, as they may be amended from time to time, which are herein incorporated by reference and made a part of this Contract.
2. **Nondiscrimination:** Contractor, with regard to the Work performed by it during the Contract, will not discriminate on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability in the selection and retention of subcontractors, including procurements of materials and leases of equipment. Contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.
3. **Solicitations for Subcontracts, including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding or negotiation made by Contractor for Work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by Contractor of Contractor's obligations under this contract and the Nondiscrimination Acts and Authorities on the grounds of race, color, or national origin.

4. **Information and Reports:** Contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Nondiscrimination Acts and Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, Contractor will so certify to the Sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.
5. **Sanctions for Noncompliance:** In the event of a Contractor's noncompliance with the non-discrimination provisions of this Contract, the Sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:
    a. Withholding payments to Contractor under the Contract until Contractor complies; and/or
    b. Cancelling, terminating, or suspending a contract, in whole or in part.
6. **Incorporation of Provisions:** Contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. Contractor will take action with respect to any subcontract or procurement as the Sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if Contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, Contractor may request the Sponsor to enter into any litigation to protect the interests of the Sponsor. In addition, Contractor may request the United States to enter into the litigation to protect the interests of the United States.

CLEAN AIR AND WATER POLLUTION CONTROL

Contractor agrees to comply with all applicable standards, orders, and regulations issued pursuant to the Clean Air Act (42 USC §§ 7401-7671q) and the Federal Water Pollution Control Act as amended (33 USC §§ 1251-1387). Contractor agrees to report any violation to the Owner immediately upon discovery. Owner assumes responsibility for notifying the Environmental Protection Agency (EPA) and the Federal Aviation Administration.

Contractor must include this requirement in all subcontracts that exceed $150,000.

CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS

1. Overtime Requirements.

No Contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic, including watchmen and guards, in any workweek in which he or she is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

2. Violation; Liability for Unpaid Wages; Liquidated Damages.

In the event of any violation of the clause set forth in paragraph (1) of this clause, Contractor, and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this clause, in the sum of $29 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this clause.

3. Withholding for Unpaid Wages and Liquidated Damages.

The Federal Aviation Administration (FAA) or Owner shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of Work performed by Contractor or subcontractor under any such contract or any other Federal contract with the same Prime Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this clause.

4. Subcontractors.

Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) and also a clause requiring the subcontractor to include these clauses in any lower tier subcontracts. The Prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this clause.

COPELAND “ANTI-KICKBACK” ACT

Contractor must comply with the requirements of the Copeland “Anti-Kickback” Act (18 USC 874 and 40 USC 3145), as supplemented by Department of Labor regulation 29 CFR part 3. Contractor and subcontractors are prohibited from inducing, by any means, any person employed on the project to give up any part of the compensation to which the employee is entitled. Contractor and each Subcontractor must submit to Owner, a weekly statement on the wages paid to each employee performing on covered work during the prior week. Owner must report any violations of the Act to the Federal Aviation Administration.

DAVIS-BACON REQUIREMENTS

1. Minimum Wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalent thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this Section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can easily be seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination;

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event Contractor, the laborers, or mechanics to be employed in the classification, or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii) (B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If Contractor does not make payments to a trustee or other third person, Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* that the Secretary of Labor has found, upon the written request of Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding. The Federal Aviation Administration or the Sponsor shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from Contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the Federal Aviation Administration may, after written notice to Contractor, Sponsor, Applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and Basic Records.

(i) Payrolls and basic records relating thereto shall be maintained by Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 1(b)(2)(B) of the Davis-Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits

under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, Contractor shall maintain records that show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, Contractor will submit the payrolls to the applicant, Sponsor, or Owner, as the case may be, for transmission to the Federal Aviation Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR § 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (*e.g.,* the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at https://www.dol.gov/agencies/whd/government-contracts/construction/payroll-certification or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker and shall provide them upon request to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, Contractor will submit them to the applicant, Sponsor, or Owner, as the case may be, for transmission to the Federal Aviation Administration, Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, Sponsor, or Owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR § 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR § 5.5 (a)(3)(i), and that such information is correct and complete;

(2) That each laborer and mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) Contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Sponsor, the Federal Aviation Administration, or the Department of Labor and shall permit such representatives to interview employees during working hours on the job. If Contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to Contractor, Sponsor, applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR § 5.12.

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR § 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination that provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate that is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal Employment Opportunity. The utilization of apprentices, trainees, and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act Requirements.

Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

6. Subcontracts.

Contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR §§ 5.5(a)(1) through (10) and such other clauses as the Federal Aviation Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR § 5.5.

7. Contract Termination: Debarment.

A breach of the contract clauses in paragraph 1 through 10 of this Section may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR § 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements.

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes Concerning Labor Standards.

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of Eligibility.

(i) By entering into this Contract, Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR § 5.12(a)(1).

(ii) No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR § 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 USC § 1001.

CERTIFICATION OF OFFEROR/BIDDER REGARDING DEBARMENT

By submitting a bid/proposal under this solicitation, the bidder or offeror certifies that neither it nor its principals are presently debarred or suspended by any Federal department or agency from participation in this transaction.

CERTIFICATION OF LOWER TIER CONTRACTORS REGARDING DEBARMENT

The successful bidder, by administering each lower tier subcontract that exceeds $25,000 as a "covered transaction," must confirm each lower tier participant of a "covered transaction" under the project is not presently debarred or otherwise disqualified from participation in this federally-assisted project. The successful bidder will accomplish this by:

1. Checking the System for Award Management at website: http://www.sam.gov.
2. Collecting a certification statement similar to the Certification of Offeror /Bidder Regarding Debarment, above.
3. Inserting a clause or condition in the covered transaction with the lower tier contract.

If the Federal Aviation Administration later determines that a lower tier participant failed to disclose to a higher tier participant that it was excluded or disqualified at the time it entered the covered transaction, the FAA may pursue any available remedies, including suspension and debarment of the non-compliant participant.

DISADVANTAGED BUSINESS ENTERPRISE

Bid Information Submitted as a matter of responsiveness:
Owner's award of this Contract is conditioned upon Bidder or Offeror satisfying the good faith effort requirements of 49 CFR § 26.53.

As a condition of responsiveness, the Bidder or Offeror must submit the following information with its proposal on the forms provided herein:

1) The names and addresses of Disadvantaged Business Enterprise (DBE) firms that will participate in the Contract;
2) A description of the work that each DBE firm will perform;
3) The dollar amount of the participation of each DBE firm listed under (1);
4) Written statement from Bidder or Offeror that attests their commitment to use the DBE firm(s) listed under (1) to meet the Owner's project goal;
5) Written confirmation from each listed DBE firm that it is participating in the contract in the kind and amount of work provided in the prime contractor's commitment; and
6) If Bidder or Offeror cannot meet the advertised project DBE goal, evidence of good faith efforts undertaken by the Bidder or Offeror as described in appendix A to 49 CFR part 26. The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.

Bid Information submitted as a matter of responsibility:
The Owner's award of this contract is conditioned upon Bidder or Offeror satisfying the good faith effort requirements of 49 CFR § 26.53.

As a condition of responsibility, every Bidder or Offeror must submit the following information on the forms provided herein within five days after Bid Opening.

1) The names and addresses of Disadvantaged Business Enterprise (DBE) firms that will participate in the contract;
2) A description of the work that each DBE firm will perform;
3) The dollar amount of the participation of each DBE firm listed under (1);
4) Written statement from Bidder or Offeror that attests their commitment to use the DBE firm(s) listed under (1) to meet the Owner's project goal;
5) Written confirmation from each listed DBE firm that it is participating in the contract in the kind and amount of work provided in the prime contractor's commitment; and
6) If Bidder or Offeror cannot meet the advertised project DBE goal, evidence of good faith efforts undertaken by the Bidder or Offeror as described in appendix A to 49 CFR part 26. The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.

Contract Assurance (49 CFR § 26.13)

Contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. Contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:

1) Withholding monthly progress payments;
2) Assessing sanctions;
3) Liquidated damages; and/or
4) Disqualifying Contractor from future bidding as non-responsible.

Prompt Payment (49 CFR § 26.29) –
The Prime Contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than 30 days from the receipt of each payment the prime contractor receives from City of Midland, Texas. The Prime Contractor agrees further to return retainage payments to each subcontractor within 30 days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above-referenced time frame may occur only for good cause following written approval of the City of Midland, Texas. This clause applies to both DBE and non-DBE subcontractors.

Termination of DBE Subcontracts (49 CFR § 26.53(f)) –
The Prime Contractor must not terminate a DBE subcontractor listed in response to this Bid Proposal (or an approved substitute DBE firm) without prior written consent of City of Midland, Texas. This includes, but is not limited to, instances in which the Prime Contractor seeks to perform work originally designated for a DBE subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm.

The Prime Contractor shall utilize the specific DBEs listed to perform the work and supply the materials for which each is listed unless Contractor obtains written consent City of Midland, Texas. Unless City of Midland, Texas consent is provided, the Prime Contractor shall not be entitled to any payment for work or material unless it is performed or supplied by the listed DBE.

City of Midland, Texas may provide such written consent only if City of Midland, Texas agrees, for reasons stated in the concurrence document, that the prime contractor has good cause to terminate the DBE firm. For purposes of this paragraph, good cause includes the circumstances listed in 49 CFR §26.53.

Before transmitting to City of Midland, Texas its request to terminate and/or substitute a DBE subcontractor, the Prime Contractor must give notice in writing to the DBE subcontractor, with a copy to City of Midland, Texas, of its intent to request to terminate and/or substitute, and the reason for the request.

The Prime Contractor must give the DBE five days to respond to the Prime Contractor's notice and advise City of Midland, Texas, and Contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why City of Midland, Texas should not approve the prime contractor's action. If required in a particular case as a matter of public necessity (e.g., safety), City of Midland, Texas may provide a response period shorter than five days.

In addition to post-award terminations, the provisions of this Section apply to preaward deletions of or substitutions for DBE firms put forward by offerors in negotiated procurements.

TEXTING WHEN DRIVING

In accordance with Executive Order 13513, "Federal Leadership on Reducing Text Messaging While Driving," (10/1/2009) and DOT Order 3902.10, "Text Messaging While Driving," (12/30/2009), the Federal Aviation Administration encourages recipients of Federal grant funds to adopt and enforce safety policies that decrease crashes by distracted drivers, including policies to ban text messaging while driving when performing work related to a grant or subgrant.

In support of this initiative, the Owner encourages Contractor to promote policies and initiatives for its employees and other work personnel that decrease crashes by distracted drivers, including policies that ban text messaging while driving motor vehicles while performing work activities associated with the project. Contractor must include the substance of this clause in all sub-tier contracts exceeding $10,000 that involve driving a motor vehicle in performance of work activities associated with the project.

PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT

Contractor and Subcontractor agree to comply with mandatory standards and policies relating to use and procurement of certain telecommunications and video surveillance services or equipment in compliance with the National Defense Authorization Act.

EQUAL OPPORTUNITY CLAUSE

During the performance of this contract, Contractor agrees as follows:

(1) Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identify, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff, or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) Contractor will, in all solicitations or advertisements for employees placed by or on behalf of Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with Contractor's legal duty to furnish information.

(4) Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided by the agency contracting officer, advising the labor union or workers' representative of Contractor's commitments under this section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of Contractor's noncompliance with the nondiscrimination clauses of this contract or with any such rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(8) Contractor will include the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. Contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions, including sanctions for noncompliance*: Provided,* however, that in the event Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, Contractor may request the United States to enter into such litigation to protect the interests of the United States.

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY
CONSTRUCTION CONTRACT SPECIFICATIONS

1. As used in these specifications:

a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;

b. "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;

c. "Employer identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;

d. "Minority" includes:

(1) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

(2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);

(3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(4) American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation, and which is set forth in the solicitations from which this contract resulted.

3. If Contractor is participating (pursuant to 41 CFR part 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these Specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in a geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and

female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by Contractor during the training period, and Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which Contractor's employees are assigned to Work. Contractor, where possible, will assign two or more women to each construction project. Contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are aware of and carry out Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to Contractor by the union or, if referred, not employed by Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions Contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which Contractor has a collective bargaining agreement has not referred to Contractor a minority person or woman sent by Contractor, or when Contractor has other information that the union referral process has impeded Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to Contractor's employment needs, especially those programs funded or approved by the Department of Labor. Contractor shall provide notice of these programs to the sources compiled under 7b above.

f. Disseminate Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing Contractor's EEO policy with other contractors and subcontractors with whom Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related

activities to ensure that the EEO policy and Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative action obligations (7a through 7p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which Contractor is a member and participant may be asserted as fulfilling any one or more of its obligations under 7a through 7p of these specifications provided that Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of Contractor. The obligation to comply, however, is Contractor's and failure of such a group to fulfill an obligation shall not be a defense for Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though Contractor has achieved its goals for women generally, Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, sexual orientation, gender identity, or national origin.

11. Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR part 60-4.8.

14. Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee, the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g. those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR part 201, et seq, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part-time workers.

Contractor has full responsibility to monitor compliance to the referenced statute or regulation. Contractor must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division.

CERTIFICATION REGARDING LOBBYING

The Bidder or Offeror certifies by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Bidder or Offeror, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

PROHIBITION OF SEGREGATED FACILITIES

(a) Contractor agrees that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. Contractor agrees that a breach of this clause is a violation of the Equal Employment Opportunity clause in this contract.

(b) "Segregated facilities," as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.

(c) Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Employment Opportunity clause of this contract.

OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. The employer must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The employer retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (29 CFR Part 1910). The employer must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

PROCUREMENT OF RECOVERED MATERIALS

Contractor and subcontractor agree to comply with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, and the regulatory provisions of 40 CFR Part 247. In the performance of this contract and to the extent practicable, Contractor and subcontractors are to use products containing the highest percentage of recovered materials for items designated by the Environmental Protection Agency (EPA) under 40 CFR Part 247 whenever:

1) The contract requires procurement of $10,000 or more of a designated item during the fiscal year; or
2) Contractor has procured $10,000 or more of a designated item using Federal funding during the previous fiscal year.

The list of EPA-designated items is available at www.epa.gov/smm/comprehensive-procurement-guidelines-construction-products.

Section 6002(c) establishes exceptions to the preference for recovery of EPA-designated products if Contractor can demonstrate the item is:

a) Not reasonably available within a timeframe providing for compliance with the contract performance schedule;
b) Fails to meet reasonable contract performance requirements; or
c) Is only available at an unreasonable price.

SEISMIC SAFETY

The Contractor agrees to ensure that all work performed under this contract, including work performed by subcontractors, conforms to a building code standard that provides a level of seismic safety substantially equivalent to standards established by the National Earthquake Hazards Reduction Program (NEHRP). Local building codes that model their code after the current version of the International Building Code (IBC) meet the NEHRP equivalency level for seismic safety.

CERTIFICATION OF OFFEROR/BIDDER REGARDING TAX DELINQUENCY AND FELONY CONVICTIONS

The applicant must complete the following two certification statements. The applicant must indicate its current status as it relates to tax delinquency and felony conviction by inserting a checkmark (✓) in the space following the applicable response. The applicant agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification in all lower tier subcontracts.

Certifications

1) The applicant represents that it is ( ) is not ( ) a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

2) The applicant represents that it is ( ) is not ( ) a corporation that was convicted of a criminal violation under any Federal law within the preceding 24 months.

Note

If an applicant responds in the affirmative to either of the above representations, the applicant is ineligible to receive an award unless the Sponsor has received notification from the agency suspension and debarment official (SDO) that the SDO has considered suspension or debarment and determined that further action is not required to protect the Government's interests. The applicant therefore must provide information to the owner about its tax liability or conviction to the Owner, who will then notify the FAA Airports District Office, which will then notify the agency's SDO to facilitate completion of the required considerations before award decisions are made.

Term Definitions

Felony conviction: Felony conviction means a conviction within the preceding twenty four (24) months of a felony criminal violation under any Federal law and includes conviction of an offense defined in a section of the U.S. Code that specifically classifies the offense as a felony and conviction of an offense that is classified as a felony under 18 USC § 3559.

Tax Delinquency: A tax delinquency is any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

TERMINATION FOR CONVENIENCE (CONSTRUCTION & EQUIPMENT CONTRACTS)

The Owner may terminate this contract in whole or in part at any time by providing written notice to Contractor. Such action may be without cause and without prejudice to any other right or remedy of Owner. Upon receipt of a written notice of termination, except as explicitly directed by the Owner, Contractor shall immediately proceed with the following obligations regardless of any delay in determining or adjusting amounts due under this clause:

1. Contractor must immediately discontinue work as specified in the written notice.
2. Terminate all subcontracts to the extent they relate to the work terminated under the notice.
3. Discontinue orders for materials and services except as directed by the written notice.

4. Deliver to the Owner all fabricated and partially fabricated parts, completed, and partially completed work, supplies, equipment and materials acquired prior to termination of the work, and as directed in the written notice.
5. Complete performance of the work not terminated by the notice.
6. Take action as directed by the Owner to protect and preserve property and work related to this contract that Owner will take possession.

Owner agrees to pay Contractor for:

1. Completed and acceptable work executed in accordance with the contract documents prior to the effective date of termination;
2. Documented expenses sustained prior to the effective date of termination in performing work and furnishing labor, materials, or equipment as required by the contract documents in connection with uncompleted work;
3. Reasonable and substantiated claims, costs, and damages incurred in settlement of terminated contracts with Subcontractors and Suppliers; and
4. Reasonable and substantiated expenses to Contractor directly attributable to Owner's termination action.

Owner will not pay Contractor for loss of anticipated profits or revenue or other economic loss arising out of or resulting from the Owner's termination action.

The rights and remedies this clause provides are in addition to any other rights and remedies provided by law or under this contract.

TERMINATION FOR CAUSE (CONSTRUCTION)

Section 80-09 of FAA Advisory Circular 150/5370-10 establishes standard language for conditions, rights, and remedies associated with Owner termination of this contract for cause due to default of Contractor.

TRADE RESTRICTION CERTIFICATION

By submission of an offer, the Offeror certifies that with respect to this solicitation and any resultant contract, the Offeror –

1) is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms as published by the Office of the United States Trade Representative (USTR);

2) has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country included on the list of countries that discriminate against U.S. firms as published by the USTR; and

3) has not entered into any subcontract for any product to be used on the Federal project that is produced in a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR.

This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18 USC § 1001.

The Offeror/Contractor must provide immediate written notice to the Owner if the Offeror/Contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. Contractor must require subcontractors provide immediate written notice to Contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.

Unless the restrictions of this clause are waived by the Secretary of Transportation in accordance with 49 CFR § 30.17, no contract shall be awarded to an Offeror or subcontractor:

1) who is owned or controlled by one or more citizens or nationals of a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR; or
2) whose subcontractors are owned or controlled by one or more citizens or nationals of a foreign country on such USTR list; or
3) who incorporates in the public works project any product of a foreign country on such USTR list.

Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by this provision. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

The Offeror agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in all lower tier subcontracts. Contractor may rely on the certification of a prospective subcontractor that it is not a firm from a foreign country included on the list of countries that discriminate against U.S. firms as published by USTR, unless the Offeror has knowledge that the certification is erroneous.

This certification is a material representation of fact upon which reliance was placed when making an award. If it is later determined that Contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration (FAA) may direct through the Owner cancellation of the contract or subcontract for default at no cost to the Owner or the FAA.

VETERAN'S PREFERENCE

In the employment of labor (excluding executive, administrative, and supervisory positions), Contractor and all sub-tier contractors must give preference to covered veterans as defined within Title 49 United States Code Section 47112. Covered veterans include Vietnam-era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns (as defined by 15 USC § 632) owned and controlled by disabled veterans. This preference only applies when there are covered veterans readily available and qualified to perform the work to which the employment relates.

CERTIFICATION REGARDING DOMESTIC PREFERENCES FOR PROCUREMENTS

The Bidder or Offeror certifies by signing and submitting this bid or proposal that, to the greatest extent practicable, the Bidder or Offeror has provided a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including, but not limited to, iron, aluminum, steel, cement, and other manufactured products) in compliance with 2 CFR § 200.322.

REFER TO SECTION 00 73 43 “WAGE RATE REQUIREMENTS” FOR THE LATEST VERSION OF THE WAGE RATE TABLES.

CONTRACT ASSURANCE

Contractor will ensure that the following clause is placed in every DOT-assisted contract and subcontract:

Contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by Contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or such other remedy as the recipient deems appropriate. This may include, but is not limited to:

1. Withholding monthly progress payments;
2. Assessing sanctions;
3. Liquidated damages; and or
4. Disqualifying the contractor from future bidding as non-responsible.

PROMPT PAYMENT

Prime Contractor agrees to pay each Subcontractor under this Prime Contract for satisfactory performance of its contract no later than 30 working days from the receipt of each payment the prime contractor receives from the City of Midland. Prime contractor agrees further to return retainage payments to each subcontractor within 30 working days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the City of Midland. The clause applies to both DBE and non-DBE subcontractors.

For purposes of this section, a subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished and documented as required by the City of Midland. When the City of Midland has made an incremental acceptance of a portion of a prime contract, the work of a Subcontractor covered by that acceptance is deemed to be satisfactorily completed.

Contractor will not be reimbursed for work performed by Subcontractors unless and until the contractor ensures that the subcontractors are promptly paid for the work they have performed.

Contractor failure to comply with the requirements of the DBE Plan shall constitute a material breach of this contract. In such a case, the City of Midland reserves the right to terminate the contract; to deduct the amount of DBE goal not accomplished by DBEs from the money due or to become due Contractor, not as a penalty but as liquidated damages to the City of Midland or such other remedy or remedies as the City of Midland deems appropriate.

CITY OF MIDLAND DEPARTMENT OF AIRPORTS
DBE POLICY STATEMENT

Section 26.1, 26.23 Objectives/Policy Statement

The City of Midland, Owner, and Operator of Midland International Air & Space Port, herein referred to as MAF, established a Disadvantaged Business Enterprise (DBE) program in accordance with regulations of the U.S. Department of Transportation (DOT), 49 CFR Part 26. MAF received Federal financial assistance from the Department of Transportation and as a condition of receiving this assistance, MAF signed an assurance to comply with 49 CFR Part 26.

It is the MAF policy to ensure DBEs, as defined in Part 26, have an equal opportunity to receive and participate in DOT-assisted contracts. It is also our policy to:

1. ensure nondiscrimination in award and administration of DOT-assisted contracts;
2. create a level playing field on which DBEs can compete fairly for DOT-assisted contracts;
3. ensure DBE Program is narrowly tailored in accordance with applicable law;
4. ensure only firms who fully meet 49 CFR Part 26 eligibility standards are permitted to participate as DBEs;
5. help remove barriers to participation of DBEs in DOT-assisted contracts; and
6. assist development of firms that can successfully compete in the marketplace outside the DBE program.

An MAF staff person has been delegated as the DBE Liaison Officer. In that capacity, appointed staff is responsible for implementing all DBE program aspects. Implementation of the DBE program is accorded the same priority as compliance with all other legal obligations incurred by MAF in financial assistance agreements with the Department of Transportation.

MAF disseminated this policy statement to the City Council of the City of Midland, Texas, and all components of the organization. We distributed this statement to DBE and non-DBE business communities who perform Work for us on DOT-assisted contracts. This is accomplished via inclusion in all our Bid Documents.

Justine Ruff, Director of Airports

Section 26.37 Monitoring Responsibilities

MONITORING PAYMENTS TO DBEs AND NON-DBEs

MAF undertakes ongoing monitoring of prime payments to subcontractors over the course of any covered contract. Such monitoring activities will be accomplished as follows:

1. Prime Contractors must submit monthly proof of prompt payment to Airport.
2. DBELO will monitor prompt payment to subcontractors via review of cancelled checks and/or accounts payable ledgers submitted with monthly reports.
3. DBELO will verify checks payable to subcontractors are dated within prompt payment period.
4. DBELO may also contact DBE subcontractors by phone/email to confirm receipt of payment within prompt payment period.

Airport requires prime contractors to maintain records/documents of payment to subcontractors, including DBEs, for a minimum of three years unless otherwise provided by applicable record retention requirements for Airport financial assistance agreement, whichever is longer. These records will be made available for inspection upon request by any authorized representative of the MAF or DOT. This reporting requirement extends to all DBE and non-DBE subcontractors.

INFORMATION TO BE SUBMITTED (26.53(B)):

MAF treats Bidder/Offeror compliance with good faith effort requirements as a matter of responsiveness.

Requirements of 49 CFR Part 26, Regulations of the U.S. Department of Transportation, apply to this Contract. It is MAF policy to practice nondiscrimination based on race, color, sex, or national origin in award or performance of this Contract. All firms qualifying under this solicitation are encouraged to submit Bids/Proposals. Award of this Contract will be conditioned upon satisfying Bid Specification requirements applying to all Bidders/Offerors, including those who qualify as a DBE. A DBE Contract goal of 2.93 percent has been established for this Contract. Bidder/Offeror shall make good faith efforts, as defined in Appendix A, 49 CFR Part 26, to meet the Contract goal for DBE participation in performance of this Contract.

Types of actions to support good faith efforts at meeting Contract goal for DBE participation (not intended as an all-inclusive list and other methods by Bidder may be relevant in documenting good faith effort:

1. Have DBE subcontractors attend Prebid Meeting
2. Documentation of notices sent to potential DBE subcontractors requesting interest in bidding.
3. Documentation of emails sent to potential DBE subcontractors requesting interest in bidding.
4. Documentation (dates and times) of phone calls made to potential DBE subcontractors informing them of the Project and soliciting an interest in bidding. This should include follow-up calls to support aggressively attempting to obtain DBE participation.

Good faith effort documentation must be included with Proposal submitted.

TO INCLUDE WITH PROPOSAL:

Bidder/Offeror shall include with their proposal:

1. Form 1: Disadvantaged Business Enterprise (DBE) Utilization, (signed by Bidder/Offeror);
2. Form 2: Letter of Intent (for each DBE firm). Note: *DBE firm signature not required at time of proposal submission*; and
3. Completed Bidder Information Sheet.

UPON AWARD OF CONTRACT:

Successful Bidder/Offeror will be required to submit the following information within 5 days of Bid Opening:

(1) names and addresses of DBE firms who will participate in the Contract;
(2) description of work each DBE firm will perform;
(3) dollar amount of participation for each DBE firm participating;
(4) written documentation of Bidder/Offeror commitment to use a DBE subcontractor whose participation meets Contract goal;
(5) written confirmation from DBE of Contract participation as provided in commitment made under (4); and
(6) upon unmet Contract goal, evidence of good faith efforts. Successful Bidder/Offeror must submit DBE written confirmation of participation within five days after Bid Opening.

Midland International Air & Space Port

To all Bidders for AIP-funded projects for Midland International Air & Space Port (MAF):

Any company desiring to submit a bid on an AIP grant project for MAF, must complete a Bidder Information Sheet that includes:

- Name of Firm;
- Address of Firm;
- Age of Firm;
- If Firm is a certified Disadvantaged Business Enterprise (DBE); and
- Amount of annual gross receipts.

Before Contract is awarded, companies must also submit Demonstration of Good Faith Efforts, Form 1: DBE Utilization, and Form 2: Letter of Intent for each DBE subcontractor. If DBE goal percentage is met, complete one Form 1 and a separate Form 2 for each DBE subcontractor. If not met, complete Form 1 and submit documentation of Good Faith Efforts (see 49 CFR Part 26, Appendix A) to support percentage accomplished.

Upon Airport acceptance of bid, submit the following information to MAF Disadvantage Business Enterprises Liaison Officer (DBELO) before Project starts:

- Commitments made to all subcontractors (DBE/non-DBE): MAF Form 2: Letter of Intent or TxDOT Form 4901; and
- Proof of DBE certification of all DBE subcontractors.

Once Project starts, submit monthly to the DBELO a Monthly Progress Report (MAF form or TxDOT Forms 4903 or 4904) of actual dollar amount paid to DBE subcontractors.

Call 432.560.2200 for questions. Thank you for your time and consideration regarding this matter.

Sincerely,

MAF, Liaison Officer
Disadvantage Business Enterprise

Encl

FORMS 1 AND 2: DEMONSTRATION OF GOOD FAITH EFFORTS

Form 1: Disadvantaged Business Enterprise (DBE) Utilization

Undersigned Bidder/Offeror has satisfied bid specification requirements as follows:

☐ Bidder/Offeror met DBE contract goal:

Bidder/Offeror is committed to a minimum of 2.93% DBE utilization on this contract.

☐ Bidder/Offeror has not met DBE contract goal:

Bidder/Offeror is committed to a minimum of ___ DBE utilization on this contract and submitted documentation demonstrating good faith efforts.

Legal name of Bidder/Offeror's firm: Cerris Builders, Inc.

Bidder/Offeror Representative: Todd Winnerman, President

Name/Title: Todd Winnerman, President

Signature

July 30, 2025
Date

Form 2: Letter of Intent

Note: Authorized representative (AR) named herein must be a vested individual with authority to make contracting decisions on behalf of the firm.

Name of Bidder/Offeror's firm: Cerris Builders, Inc.

Name/title of firm's AR: Todd Winnerman, President

Phone: 913.317.3740 Email: twinnerman@cerris.com

Name of DBE firm: To be determined

Name/title of DBE firm's AR: To be determined

Address: _____

City: _____ State: ____ Zip: _____

Phone: _____ Email: _____

Work to be performed by DBE firm: To be determined

Description of Work	NAICS	Dollar Amount/%*	Dealer/Manufacturer**

**Percentage to be used only in negotiated procurements, including design-build contracts.*
***For material suppliers only, indicate if DBE is a manufacturer or regular dealer as defined by §26.55.*

Undersigned Bidder/Offeror is committed to utilizing the named DBE firm for work described herein. Total expected dollar value of this Work is $_____. Bidder/Offeror understands if awarded contract/agreement resulting from this procurement, it must enter a subcontract with identified DBE firm representative of listed type and amount of Work. Bidder/Offeror understands upon submitting this form with bid/offer, it may not substitute/terminate listed DBE without following procedures of 49 CFR Part 26, §26.53.

_____ July 30, 2025

Signature of Bidder/Offeror's Authorized Representative Date

Undersigned DBE affirms it is ready, willing, and able to perform amount and type of work as described herein and is properly certified to be counted for DBE participation, therefore.

To be determined _____

Signature of DBE's Authorized Representative Date

If Bidder/Offeror does not receive award of Prime Contract, all representations in this Letter of Intent shall be null and void.

Submit this page for each DBE subcontractor.

MAF Terminal Expansion and Modernization - Good Faith Effort - List of Invited Contractors and Contact Log

		Subcontracting Opportunity	Commodity Code	1st Notice	2nd Notice	Call	Final Addendum	Bid Status	Vendor ID	Company Name	Phone	Contact Person
		DIVISION 2										
0	*******	Temporary Fencing	330-55	6/11/2025	6/19/2025	7/3/2025		LM	1204550225400	**UNIVERSAL FENCE COMPANY, INC.**	214-492-1005	CEO/Kelly Lipham
	*******	Temporary Fencing	330-55	6/11/2025	6/19/2025	7/3/2025		LM	1263385953800	**B.I.T CONSTRUCTION SERVICES**	512-258-5336	Britanie Olvera
	*******	Temporary Fencing	330-55	6/11/2025	6/19/2025	7/3/2025		LM	1743003328600	**COBOS DESIGN & CONSTRUCTION, INC.**	512-478-1986	Office Mgr/Florence
1	*******	Demolition		6/11/2025	6/19/2025	7/3/2025		LM	1742939960700	**BORDER DEMOLITION AND**	915-860-8855	BONNIE SOLIS
	*******	Demolition		6/11/2025	6/19/2025	7/3/2025		LM	1201428994100	**ROBLES 1 DEMOLITION, LLC**	915-533-2941	Managing Member Daniel Robles
	*******	Demolition		6/11/2025	6/19/2025	7/3/2025		LM	1742516982200	**HUNTER DEMOLITION & WRECKING CORP**	210-227-5100	Debbie Hunter
2	*******	Termite Control	910-59	6/11/2025	6/19/2025	7/3/2025		LM	1742240690400	**OLIVER TERMITE AND PEST CONTROL**	512-926-1509	Byron Bonhomme
	*******	Termite Control	910-59	6/11/2025	6/19/2025	7/3/2025		LM	1384116297000	**NORTHERN LIGHTS GROUP LLC**	512-651-1067	Megan Matthews
	*******	Termite Control	910-59	6/11/2025	6/19/2025	7/3/2025		LM	1813420698800	**ARROW S PEST CONTROL LLC**	979-213-2080	Trevor Santana
3	*******	Earthwork	909-76	6/11/2025	6/19/2025			BI	1462706182400	**CT WALKER, LLC**	512-300-3080	CASSANDRA WALKER
	*******	Earthwork	909-76	6/11/2025	6/19/2025	7/3/2025		Full mailbox	1522408948000	**WELCH EXCAVATION & UTILITY COMPANY**	903-877-3528	President/Janis Lee Welch
	*******	Earthwork	909-76	6/11/2025	6/19/2025			BI	1881782741500	**DAMYSUS ENTERPRISES, LLC**	281-248-7549	Michael Okechukwu
	*******	Earthwork	909-76	6/11/2025	6/19/2025	7/3/2025		LM	1742754561500	**ADRIAN ENTERPRISES, INC.**	361-883-7007	Anna C. Adrian, President
	*******	Earthwork	909-76	6/11/2025	6/19/2025			BI	1752860414700	**CAMCAT INC.**	325-725-6144	Cody M Shields
	*******	Earthwork	909-76	6/11/2025	6/19/2025			BI	1383672860300	**H-B CONSTRUCTION INC**	972-390-8582	SANDRA BLOOMER
	*******	Earthwork	909-76	6/11/2025	6/19/2025	7/3/2025		LM	1834050961300	**G2 CONSTRUCTION SERVICES, INC.**	512-688-5725	Shane Gibson
	*******	Earthwork	909-76	6/11/2025	6/19/2025	7/3/2025		LM	1274703752600	**HOSS LAND SERVICES LLC**	830-980-8610	Donna Hoss
	*******	Earthwork	909-76	6/11/2025	6/19/2025			BI	1474133625000	**HAYDEN CONSTRUCTION**	682-559-5085	Leigh Ann Hill
4	*******	Erosion Control	988-14	6/11/2025	6/19/2025	7/3/2025		LM	1742939459000	**ENVIRONMENTAL SURVEY INC.**	512-458-8531	Stanley Wilson
	*******	Erosion Control	988-14	6/11/2025	6/19/2025			BI	1832366010200	**CENTRAL TEXAS HYDROSEEDING AND ERC**	512-791-4552	Michael Torrence
	*******	Erosion Control	988-14	6/11/2025	6/19/2025	7/3/2025		LM	1342000822200	**GLOBAL EROSION CONTROL, INC.**	903-451-4413	President/Pam Parks
	*******	Erosion Control	988-14	6/11/2025	6/19/2025	7/3/2025		LM	1752623791600	**MASTERSCAPES, INC.**	325-692-1838	Pres./Catherine C. Haught
5	*******	Asphalt Paving	929-12	6/11/2025	6/19/2025	7/3/2025		LM	1742919890000	**CEDA-TEX SVCS INC**	512-339-0155	Fred Odanga
	*******	Asphalt Paving	929-12	6/11/2025	6/19/2025	7/3/2025		LM	1020576013400	**LTH ENTERPRISES, LTD.**	512-281-9579	JUANITA VALARIE NEIDIG
	*******	Asphalt Paving	929-12	6/11/2025	6/19/2025	7/3/2025		LM	1472315024000	**AHI INDUSTRIAL LLC**	210-653-7770	Sandra E. Nolan
6	*******	Utilities	913-56	6/11/2025	6/19/2025	7/3/2025		LM	1262197773000	**Associated Construction Partners, Ltd.**	210-698-8714	OwnerJillian R Simpson
	*******	Utilities	913-56	6/11/2025	6/19/2025	7/3/2025		LM	1742529736700	**MCNAMARA CUSTOM SERVICES, INCORP**	254-836-4304	Daniel Thompson
	*******	Utilities	913-56	6/11/2025	6/19/2025	7/3/2025		LM	1522408948000	**WELCH EXCAVATION & UTILITY COMPANY**	903-877-3528	President/Janis Lee Welch
7		SITE CONCRETE	914-30	6/11/2025	6/19/2025	7/3/2025		LM	1263807518900	**NATIONAL NATIVE AMERICAN CONSTRUC**	208-635-5400	Luke Lettau
		SITE CONCRETE	914-30	6/11/2025	6/19/2025	7/3/2025		LM	1263385953800	**B.I.T CONSTRUCTION SERVICES**	512-258-5336	Britanie Olvera
		SITE CONCRETE	914-30	6/11/2025	6/19/2025	7/3/2025		LM	1462706182400	**CT WALKER, LLC**	512-300-3080	CASSANDRA WALKER
8	329300	Landscaping	906-56	6/11/2025	6/19/2025	7/3/2025		LM	1820594175200	**CIRCLE V LANDSCAPE ARCHITECTURE, LLC**	816-565-1021	JAIME SIMS
	329300	Landscaping	906-56	6/11/2025	6/19/2025	7/3/2025		LM	1261476339400	**MALDONADO-BURKETT, LLP**	512-916-1386	Ramon H Maldonado
	329300	Landscaping	906-56	6/11/2025	6/19/2025	7/3/2025		LM	1824950032500	**CCA LANDSCAPE ARCHITECTS, INC.**	214-739-9105	Jaclyn Szafranic
		DIVISION 3										
9		BUILDING CONCRETE	914-30	6/11/2025	6/19/2025	7/3/2025		LM	1834050961300	**G2 Construction Services, Inc.**	512-688-5725	Jyl Gibson
		BUILDING CONCRETE	914-30	6/11/2025	6/19/2025	7/3/2025		LM	1201853252800	**ALLEN CONCRETE LLC**	915-921-0678	Miguel Allen
		BUILDING CONCRETE	914-30	6/11/2025	6/19/2025	7/3/2025		LM	1752659366400	**White Construction Company**	830-257-7477	Glinn H White
		DIVISION 4										
10	042000	Unit Masonry	914-55	6/11/2025	6/19/2025	7/3/2025		LM	1462706182400	**CT WALKER, LLC**	512-300-3080	CASSANDRA WALKER
	042000	Unit Masonry	914-55	6/11/2025	6/19/2025	7/3/2025		LM	1881782741500	**DAMYSUS ENTERPRISES, LLC**	281-248-7549	Michael Okechukwu
	042000	Unit Masonry	914-55	6/11/2025	6/19/2025	7/3/2025		LM	1474352236000	**LIMON MASONRY LLC**	956-685-5252	Rolando Limon
		DIVISION 5										
11	051200	Structural Steel Framing	570-84	6/11/2025	6/19/2025	7/3/2025		LM	1931788048200	**ADCOM Enterprises LLC**	956-525-3756	Carlos Montfort
	051200	Structural Steel Framing	570-84	6/11/2025	6/19/2025	7/3/2025		LM	1752519409200	**QMF STEEL, INC.**	903-455-3618	PRESIDENT SHERRILL LESTER
	051200	Structural Steel Framing	570-84	6/11/2025	6/19/2025	7/3/2025		LM	1900999880800	**SOUTH CENTRAL SUPPLY LLC**	512-367-0311	Hope Craft
		DIVISION 6										
12	064000	Architectural Woodwork - Countertops	914-88	6/11/2025	6/19/2025	7/3/2025		LM	1203194307400	**SMB GROUP LLC**	281-272-0786	Burhan Ali
	064000	Architectural Woodwork - Countertops	914-88	6/11/2025	6/19/2025	7/3/2025		LM	1742909817500	**AUSTIN LUMBER CO, INC.**	512-848-5146	Laura Culin
	064000	Architectural Woodwork - Countertops	914-88	6/11/2025	6/19/2025	7/3/2025		LM	1264390936400	**BUILT FOR DREAMS INC DBA BFD INTERIO**	806-771-6806	Alisha L Gregg
		DIVISION 7										
13	076113	Roofing	770-77	6/11/2025	6/19/2025	7/3/2025		LM	1824166801300	**BASS ROOFING & RESTORATION, LLC**	888-407-6634	Shelley Bassinger
	076113	Roofing	770-77	6/11/2025	6/19/2025	7/3/2025		LM	1851343794900	**OTTER ROOFING**	469-598-2721	Jonas Fruge
	076113	Roofing	770-77	6/11/2025	6/19/2025	7/3/2025		LM	1742427440900	**RIO ROOFING, INC.**	956-423-3359	Molly Hichens
14	079200	Joint Sealants & Waterproofing	745-56	6/11/2025	6/19/2025	7/3/2025		LM	1742536970300	**GORMAN MOISTURE PROTECTION INC**	915-542-1975	Gina Mendoza
	079200	Joint Sealants & Waterproofing	745-56	6/11/2025	6/19/2025	7/3/2025		LM	1742230136000	**A ORTIZ CONSTRUCTION & PAVING, INC.**	361-882-2122	Contact Person
	079200	Joint Sealants & Waterproofing	745-56	6/11/2025	6/19/2025	7/3/2025		LM	1874563944500	**C&B EXCAVATION & PAVING**	903-875-6163	Bonnie Lee
		DIVISION 8										
15	081113	Doors and Frames	150-25	6/11/2025	6/19/2025	7/3/2025		LM	1923744904600	**SPARTA DOOR & HARDWARE, INC.**	682-371-5652	Tonya Perkins
	081113	Doors and Frames	150-25	6/11/2025	6/19/2025	7/3/2025		LM	1741037320700	**Dumas Hardware**	210-655-0061	Greg Kanning
	081113	Doors and Frames	150-25	6/11/2025	6/19/2025			BI	1861713500100	**VETTRUS SUPPLY LLC**	409-270-2020	Barbara Vasquez
	081113	Doors and Frames	150-25	6/11/2025	6/19/2025	7/3/2025		LM	1900999880800	**SOUTH CENTRAL SUPPLY LLC**	512-367-0311	Hope Craft
16	084113	Aluminum-Framed Entrances and Storefronts, Glazir	914-47	6/11/2025	6/19/2025	7/3/2025		LM	1742652845500	**DONALD DAY INC**	361-572-0026	Maygan Fuentes
	084113	Aluminum-Framed Entrances and Storefronts, Glazir	914-47	6/11/2025	6/19/2025	7/3/2025		LM	1743252507300	**MCCO GROUP INC.**	512-489-4443	Calvin Mitchell
	084113	Aluminum-Framed Entrances and Storefronts, Glazir	914-47	6/11/2025	6/19/2025	7/3/2025		LM	1861375089400	**Allied Glazing Management LLC**	737-600-2090	Nicholas Lindsay
		DIVISION 9										
17	092116	Gypsum Board Assemblies	909-45	6/11/2025	6/19/2025	7/3/2025		LM	1454523402400	**ALVAREZ DRYWALL & ACOUSTICS, INC.**	325-665-3275	President / Charles Alvarez
	092116	Gypsum Board Assemblies	910-75	6/11/2025	6/19/2025	7/3/2025		LM	1208678151000	**MILLARD DRYWALL & ACOUSTICAL**	512-442-8110	JAMES E. MILLARD
	092116	Gypsum Board Assemblies	910-75	6/11/2025	6/19/2025	7/3/2025		LM	1274900258500	**CENTRAL TEXAS INSULATION CONTRACTO**	254-613-4882	DORA ALCOZER
18	096800	Flooring	360-10	6/11/2025	6/19/2025	7/3/2025		LM	1752906698100	**C2 FLOORING**	214-267-0667	Melisa Martin

MAF Terminal Expansion and Modernization - Good Faith Effort - List of Invited Contractors and Contact Log

		Subcontracting Opportunity	Commodity Code	1st Notice	2nd Notice	Call	Final Addendum	Bid Status	Vendor ID	Company Name	Phone	Contact Person
	096800	Flooring	360-10	6/11/2025	6/19/2025	7/3/2025		LM	1261516780100	ACE FLOORING SOLUTIONS, LLC	210-967-0200	Managing Partner / Pete Gonzales
	096800	Flooring	360-10	6/11/2025	6/19/2025	7/3/2025		LM	1752706360000	JOEL'S Floors	254-290-2832	OwnerJoel Guzman Sr
19	099123	Painting	914-61	6/11/2025	6/19/2025	7/3/2025		LM	1742584410100	RGS PAINTING, INC. DBA QUALITY DRYWA	361-879-0519	ARTHUR R. HERRERA
	099123	Painting	914-61	6/11/2025	6/19/2025	7/3/2025		LM	1263930450500	MEDEL PAINTING, INC.	512-312-4508	Rafael Medel
	099123	Painting	914-61	6/11/2025	6/19/2025	7/3/2025		LM	1742984427100	V VAZQUEZ PAINTING	210-639-1936	Owner/Vicente Vazquez
		DIVISION 10										
20	101400	Signage	801-56	6/11/2025	6/19/2025	7/3/2025		LM	1742633552100	HIGHTECH SIGNS	512-832-0000	President/Vicky I. Abney
	101400	Signage	801-56	6/11/2025	6/19/2025	7/3/2025		LM	1721240218800	IDEAL SIGNS;LLC	512-930-7446	President/Michele Dillon
	101400	Signage	801-56	6/11/2025	6/19/2025	7/3/2025		LM	1455293302100	TANGENT SIGNS LLC	936-435-0312	April Killingsworth
21	102800	Toilet and Bath Accessories	670-02	6/11/2025	6/19/2025	7/3/2025		LM	1814726202800	STATE PARK SUPPLIES, LLC	432-294-6988	State Park Supplies
	102800	Toilet and Bath Accessories	670-02	6/11/2025	6/19/2025	7/3/2025		LM	1900999880800	SOUTH CENTRAL SUPPLY LLC	512-367-0311	Hope Craft
	102800	Toilet and Bath Accessories	670-02	6/11/2025	6/19/2025	7/3/2025		LM	1300438759600	SUPPLY INNOVATIONS COMPANY, LLC	210-225-3194	Nancy Flack
	102800	Toilet and Bath Accessories	670-02	6/11/2025	6/19/2025			BI	1463312300600	DURON BUILDING SPECIALTIES, LLC	469-293-8784	shaun duron
	102800	Toilet and Bath Accessories	670-02	6/11/2025	6/19/2025	7/3/2025		LM	1752254406700	ROCKY DURON & ASSOCIATES, INC.	214-358-5713	Marcos Duron, Vice President
22		Flagpoles	962-37	6/11/2025	6/19/2025	7/3/2025		LM	1264727332000	R.E.C. ENTERPRISES, LLC	903-748-8732	Patricia J. Hamilton
		Flagpoles	962-37	6/11/2025	6/19/2025			BI	1742782963900	STRATEGIC PARTNERSHIPS, INC.	512-531-3900	Mary Kay Spellman
		Flagpoles	962-37	6/11/2025	6/19/2025	7/3/2025		LM	1814985108300	CORNERSTONE SYNERGY LLC	806-279-0999	Luke Durst
		Flagpoles	962-37	6/11/2025	6/19/2025	7/3/2025		LM	1814461148200	XYPLES, LLC	404-488-8811	Tochukwu Okonkwor
		DIVISION 11										
		DIVISION 12										
		DIVISION 13 - not used (no HUBS for booths)										
		DIVISION 14 - not used (no HUBs for elevators										
		DIVISION 15										
23	220500	Plumbing	914-68	6/11/2025	6/19/2025	7/3/2025		LM	1742541453300	ELITE MECHANICAL OF TEXAS INC	830-606-2356	Joaquin Barraza
	220500	Plumbing	914-68	6/11/2025	6/19/2025	7/3/2025		LM	1844252253000	JJP Plumbing, LLC	979-324-7611	Michelle Perry
	220500	Plumbing	914-68	6/11/2025	6/19/2025	7/3/2025		LM	1043760724400	MECHANICAL & PROCESS SYSTEMS,	512-691-9259	President - Michael Gonsalvez
	230500	HVAC	914-50	6/11/2025	6/19/2025	7/3/2025		LM	1274417897600	COSSELMON MECHANICAL LLC	806-381-0180	Ranora Cosselmon
	230500	HVAC	914-50	6/11/2025	6/19/2025	7/3/2025		LM	1742541453300	ELITE MECHANICAL OF TEXAS INC	830-606-2356	Joaquin Barraza/ President
	230500	HVAC	914-50	6/11/2025	6/19/2025	7/3/2025		LM	1741898809700	FUNK AND COMPANY	915-542-1502	ALEX AGUIRRE, President
	230500	HVAC	914-50	6/11/2025	6/19/2025	7/3/2025		LM	1043760724400	MECHANICAL & PROCESS SYSTEMS,	512-691-9259	President - Michael Gonsalvez
		DIVISION 16										
24	260500	Electrical	914-38	6/11/2025				WNQ	1200753129100	GERALD NUNN ELECTRIC, L.L.C.	254-793-3539	Gerald Nunn
	260500	Electrical	914-38	6/11/2025	6/19/2025	7/3/2025		LM	1200564425200	TRADEMARK ELECTRIC INC	817-656-8455	Tommy Blessing
	260500	Electrical	914-38	6/11/2025	6/19/2025	7/3/2025		LM	1811008952300	TUMLINSON ELECTRIC, LLC	512-693-4444	CEO/Suanna Tumlinsom
25	270000	Communications	914-29	6/11/2025	6/19/2025	7/3/2025		LM	1464037748800	AK TELECOM, LLC	361-389-1129	Matt R Sturdivant
	270000	Communications	914-29	6/11/2025	6/19/2025	7/3/2025		LM	1861127024200	TRIUMPH CABLING SYSTEMS, L.L.C.	281-914-7936	Jacinto Gonzalez
	270000	Communications	914-29	6/11/2025	6/19/2025	7/3/2025		LM	1451963199900	JM ENGINEERING, LLC	512-614-0226	Melissa Weinberger
		GENERAL REQUIREMENTS										
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		Asian Contractor Association	512-926-5400	Aletta Sung
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		Bexar County Small Business & Entrepren	210-335-2478	Renee Watson
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		Dallas/Fort Worth Minority Supplier Deve	214-630-0747	Edwin Cruz
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM				
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		El Paso Hispanic Chamber of Commerce	915-566-4066	Terri Reed
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		Golden Triangle Minority Business Counci	409-962-8530	Beverly Hatcher
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		Hispanic Contractors Association de San A	210-444-1100	Roy Attwood
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		Houston Minority Supplier Development I	713-271-7805	Jenera Theirry
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		Regional Hispanic Contractors Association	972-786-0909	Julio E. Florez
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		Southwest Minority Supplier Developmen	512-386-8766	Gabrielle Ramirez
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		Texas Association of African American Ch	512-535-5610	Charles O'Neal
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		Texas Association of Mexican American Cl	512-444-5727	Pauline Anton
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		Tri-County Black Chamber of Commerce	832-875-3977	Leondria Thompson
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		US India Chamber of Commerce DFW	214-346-9559	
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		U.S. Pan Asian American Chamber of Com	682-367-1393	
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		BI		Women's Business Council - Southwest	817-299-0566	Natalie Groff
		Minority & Women Trade Organization Development Centers		6/11/2025	6/19/2025	7/3/2025		LM		Women's Business Enterprise Alliance (WI	713-681-9232	April Day

Legend:

BI	Bad Information
LM	Left Message
UD	Undecided
WQ	Will Quote
WNQ	Will Not Quote

Emily Burgess

From: Emily Burgess
Sent: Wednesday, June 11, 2025 2:30 PM
Cc: Lane Culp; Todd Cunningham
Subject: MAF Terminal Modernization - Invitation to Bid

Good Afternoon,

You have been invited to bid on the MAF Terminal Expansion and Modernization in Midland, TX. The link below will take you to the plans and specifications. If you are interested and would like to bid, follow up through email. If you have any questions please reach out.

Bid Documents: https://mmccorp.egnyte.com/fl/MfPjKGwVQpHm

The project consists of a 37,229 square foot addition to the existing terminal – selective demolition, structural steel frame, coal-tar roof, masonry and composite panel exterior, paving, utilities, and site improvements.

Thank you,

EMILY BURGESS
Estimating/Precon Lead
CERRIS BUILDERS

965 Advance Ave
Midland, Texas 79701
O: 432.276.6925 C: 512.202.2993
CERRISBUILDERS.COM
Formerly MW Builders. To learn more, visit here.

'kelly@universalfencecompany.com'; 'BRITANIE@BITSERVICESINC.COM'; 'cdc@cobosinc.com'; 'bonniesol@borderdemo-enviro.com'; 'droblesjr@demcon.net'; 'dhunter@hunterdemo.com'; 'byron@oliverpest.com'; 'rmccall@spauldingdecon.com'; 'Arrowspestcontrol@gmail.com'; 'ct.walker@austin.rr.com'; 'estimating@welchexcavation.net'; 'Michael@damysusenterprises.com'; 'admin@envirosurvey.com'; 'michael@centexhydroseed.com'; 'pam@globalerosion.com'; 'contact@cedatex.com'; 'vneidig.lth@gmail.com'; 'mark@ahiindustrial.com'; 'jill@acpartners.org'; 'bids@acandplumbing.com'; 'welchexcavation@gmail.com'; 'Luke@nnacinc.com'; 'BRITANIE@BITSERVICESINC.COM'; 'ct.walker@austin.rr.com'; 'jaime.sims@circlevla.com'; 'ramon@maldonado-burkett.com'; 'jaclyn@ccalandscapearch.com'; 'jyl@g2csinc.com'; 'ACI@ALLENCONCRETEINC.COM'; 'glinn@whiteconstructioncompany.com'; 'ct.walker@austin.rr.com'; 'Michael@damysusenterprises.com'; 'r@limonmasonry.com'; 'carlosmontfort95@gmail.com'; 'sherrill@qmfsteel.com'; 'sales@supplytexas.com'; 'burhan@smbgroup.net'; 'laura@austinlumber.com'; 'alisha@bfdinteriors.com'; 'shelley@bassroof.com'; 'jonasotterroofing@gmail.com'; 'molly@rioroofinginc.com'; 'gmendoza@gormanmoisture.com'; 'AORTIZPAV@SBCGLOBAL.NET'; 'candbexcavationandpaving@gmail.com'; 'sales@spartadoorandhardware.com'; 'rhondie@dumashardware.com'; 'bvasquez@vettrussupply.com'; 'mvargas@texas-glass.com'; 'calvinm@cglass.us'; 'nicholas@alliedglazingmgmt.com'; 'becky@alvarezdrywall.net'; 'mmillard@millarddrywall.com'; 'cticmail@gmail.com'; 'mmartin@c2flooring.com'; 'joelsfloors@embarqmail.com'; 'ART@QUALITYDRYWALLCC.COM'; 'rmedel@medelpaintinginc.com'; 'Vvazquezpainting@att.net'; 'hightech@signsaustin.com'; 'michele@ideal-signs.com'; 'tangentsigns@gmail.com'; 'office@stateparksupplies.com'; 'sales@supplytexas.com'; 'nancy@supplyinnovationsllc.com'; 'sduron@duronbuildingspecialties.com'; 'msduron@rockyduron.com'; 'phamil4460@aol.com'; 'mspellman@spartnerships.com'; 'ldurst@cornerstonetx.net'; 'jbarraza@elitemechanicaloftexasinc.com'; 'michelle@americanplumbingcompany.net'; 'mike@mpsltd.us'; 'ranora@cmamarillo.com'; 'jbarraza@elitemechanicaloftexasinc.com'; 'alex@funkandcompany.com'; 'mike@mpsltd.us'; 'Gerald@gnellctx.com'; 'tblessing@tmelectric.com'; 'Suanna@TumlinsonElectric.com'; 'matt@aktelsolutions.com'; 'jas@triumph-cs.com'; 'melissa@jm-engineer.com'; 'asiancontractor@gmail.com'; 'rwatson@bexar.org'; 'sourcing@dfwmsdc.com'; 'Hatcher.beverly@gtmbc.com'; 'admin@hcadesa.org'; 'Julio@regionalhca.org'; 'gabrielle@smsdc.org'; 'cro@taaacc.org'; 'panton@tamacc.org'; 'info@usicoc.org'; 'gmcdermott@[illegible]paacc-sw.org'; 'ngroff@wbcsouthwest.org'

From: Lane Culp
Sent: Thursday, June 19, 2025 10:17 AM
Subject: MAF Terminal Modernization - Invitation to Bid

Good Afternoon,

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Bid Documents: https://mmccorp.egnyte.com/fl/MfPjKGwVQpHm

The project consists of a 37,229 square foot addition to the existing terminal – selective demolition, structural steel frame, coal-tar roof, masonry and composite panel exterior, paving, utilities, and site improvements.

Thank you,

LANE CULP
Estimator
CERRIS BUILDERS

4050 Smith Road
Midland, TX 79705
O: 432.276.6943
CERRISBUILDERS.COM
Formerly MW Builders. To learn more, visit here.

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Midland International Air & Space Port

Department of Airports

BIDDER INFORMATION SHEET

Firm Name: Cerris Builders, Inc.

Address: 3712 Helios Way

Pflugerville, TX 78660

Age of Firm: 54 years

Is your Firm a Certified Disadvantaged Business Enterprise (DBE)? **YES** ☐ **NO** ☑

Mark the category of your Firm's Annual Gross Receipts.

- ☐ **Less than $1 million.**
- ☐ **More than $1 million, less than $5 million.**
- ☐ **More than $5 million, less than $10 million.**
- ☐ **More than $10 million, less than $15 million.**
- ☑ **More than $15 million.**

SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Work covered by Contract Documents.
2. Contractor use of site and premises.
3. Work sequence.
4. Owner occupancy.

B. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.
2. Section 01 30 00 "Administrative Requirements" for Project information management.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Location: Midland, Texas.

B. Without force or effect, Work of Project consists of the expansion of Terminal Building for new passenger checkpoint and modernization of existing Terminal Building.

1.3 OWNER FURNISHED PRODUCTS

A. Products furnished to site and paid for by Owner:
1. TSA Equipment.

B. Owner's Responsibilities:
1. Arrange for and deliver Owner reviewed Shop Drawings, product data, and samples, to Contractor.
2. Arrange and pay for product delivery to site.
3. On delivery, inspect products jointly with Installer and Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.

C. Contractor's Responsibilities:
1. Review Owner reviewed Shop Drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage, jointly with Owner and Installer.

1.4 CONTRACTOR USE OF SITE AND PREMISES

A. Limit use of site and premises to allow:
1. Owner occupancy: Owner will operate facility continuously throughout construction.
2. Work by others.
3. Use of site and premises by public.

B. Construction Operations: Limited to areas noted on Drawings. Contractor's personnel will be required to wear Airport issued badge at all times. Cost of badging will be by Contractor. All Contractor personnel must be supervised while accessing or working within Airport "Sterile" areas.

C. Time Restrictions for Performing Interior Work: Coordinate Stage 3 work, see 1.7.A.3 of this Section, such that no less than one Airport "KABA" Exit device is operational at all times.

D. Utility Outages and Shutdown: Utility outages or shutdowns are to be held to a minimum, executed after Airport hours, and closely coordinated with Facility Staff a minimum 72 hours prior to outage or shutdown.

1.5 WORK SEQUENCE

A. Construct Work in stages to accommodate Owner's occupancy requirements during construction period, coordinate construction schedule and operations with Owner:
   1. Stage 1: Necessary selective demolition and construction of terminal expansion.
   2. Stage 2: Relocation of existing security lanes after installation of new security lanes.
   3. Stage 3: Selective demolition of existing security checkpoint and construction of new lease space(s).

1.6 OWNER OCCUPANCY

A. Owner will occupy premises during construction to conduct normal operations.
B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
C. Coordinate noisy, odoriferous, and disruptive work with Owner.
D. Schedule Work to accommodate Owner occupancy.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 20 00 - PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Material allowances.
   2. Adjustments allowance.
   3. Schedule of Values.
   4. Application for Payment.
   5. Change Procedures.
   6. Alternates.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 01 30 00 "Administrative Requirements" for Project information management.
   3. Section 01 33 00 "Submittal Procedures" for Schedule of Values.
   4. Section 01 60 00 "Product Requirements" for product substitutions.

1.2 MATERIAL ALLOWANCES

A. Costs Included in Material Allowances: Cost of product (materials and equipment) to Contractor or subcontractor, less applicable trade discounts, delivery to site, and applicable taxes.

B. Costs Not Included in Material Allowance, but included in Contract Sum/Price: Handling at site, including unloading, uncrating, and storage; protection of products from elements and from damage, labor, payroll (including taxes, benefits, pensions, insurance and other employee wage costs) installation and finishing costs, bonds, project insurance (workers comp, auto, general liability, builders risk and other insurance required by the Owner/Contractor agreement overhead, profit, and other expenses contemplated for stated allowance amounts.

C. Architect Responsibilities:
   1. Consult with Contractor in consideration and selection of product, suppliers.
   2. Select products in consultation with Owner and transmit decision to Contractor.
   3. Prepare Change Order.

D. Contractor Responsibilities:
   1. Assist Architect in selection of product and suppliers.
   2. Obtain proposals from suppliers and offer recommendations.
   3. On notification of selection by Architect, execute purchase agreement with designated supplier.
   4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
   5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

E. Funds will be drawn from Cash Allowances only by Change Order.

F. At closeout of Contract, funds remaining in Cash Allowances will be credited to Owner by Change Order.

G. Allowances Schedule:
   1. Include $95,000 for purchase of Light Art lighting fixtures above security checkpoint and at first floor elevator entry. Cost of fixture delivery to site and installation by Contractor.
   2. Section 10 14 00 "Signage": Include stipulated sum for purchase and delivery of interior signage to match existing. See schedule attached to Section 10 14 00 "Signage."
   3. Include $50,000 for refurbishment of existing South Commuter Gate Elevator.
   4. Include $30,000 for Terrazzo floor pattern at entrance to Hall L096.

1.3 ADJUSTMENT ALLOWANCE

A. Include stipulated sum of $500,000 for use upon Owner's instruction.
B. Costs Included in Allowance: Contractor's costs for products, equipment, delivery, installation, labor, payroll (including taxes, benefits, pensions, insurance and other employee wage costs), applicable taxes, and equipment rental; handling at site, including unloading, uncrating, and storage; protection of products from elements and from damage; finishing costs.
C. Costs Not Included in Allowance, but included in Contract Sum/Price: Bonds, project insurance (workers comp, auto, general liability, builders risk and other insurances required by the Owner/Contractor agreement), overhead, profit, and other expenses contemplated for stated allowance amounts.
D. Funds will be drawn from Allowance only by Change Order.
E. At closeout of Contract, funds remaining in Allowance will be credited to Owner by Change Order.

1.4 SCHEDULE OF VALUES

A. Submit typed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet.
B. Submit Schedule of Values in duplicate within 15 days after date established in Notice to Proceed or of Owner-Contractor Agreement, whichever is sooner.
C. Format: Utilize Table of Contents of this Project Manual. Identify each line item with number and title of major specification Section , separating labor and material for each line item. Identify site mobilization, general conditions, testing, bonds, and insurance as separate line items.
D. Include in each line item amount of Allowances specified in this Section.
E. Include within each line item, a directly proportional amount of Contractor's overhead and profit.
F. Revise schedule to list approved Change Orders, with each Application for Payment. Construction Change Requests (CCR) will be listed numerically at end of schedule as they are added to the Work.

1.5 APPLICATIONS FOR PAYMENT

A. Submit notarized application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet.
B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

C. Deposits on Material, Equipment or Products:
   1. Material/Equipment Deposits: Owner will not pay for deposits for material, equipment or products that may be required of the Contractor in order to start the fabrication process of work that will eventually be incorporated into the Project but are not actually on the Project site. All material, equipment or products must be on the Project site and properly stored before the Owner will make payment to the Contractor.
   2. The Owner will make payment for materials, equipment or products that are properly delivered and stored on the Project site for subsequent incorporation into the Project as authorized in the Owner-Contractor Agreement.
   3. Owner may consider payment of materials, equipment or products that are properly stored, secured and insured in a third party warehouse within a fifty (50) mile radius of the Project site that are in accordance with the requirements and authorized in the Owner-Contractor Agreement.

D. Payment Period: As defined in Owner-Contractor agreement.

E. A complete application for payment includes one copy of waiver of liens from each subcontractor, Construction progress schedule, and submittal schedule, all items are required to process the Application for Payment.

1.6 CHANGE PROCEDURES

A. Architect will advise of minor changes in Work not involving an adjustment to Contract Sum/Price or Contract Time as authorized by Owner/Contractor Agreement by issuing Architect's Supplemental Instructions on Architect's Standard Supplemental Instruction form.

B. Architect may issue a Construction Change Request which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications and a change in Contract Time for executing change. Contractor will prepare and submit an estimate within seven days.

C. Contractor may propose a change by submitting request for change to Architect. Include reason for change and effect on Contract Sum/Price, Contract Time, and subcontractors. Document requested substitutions in accordance with Section 01 60 00 "Product Requirements."

D. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Architect.

E. Construction Change Directive: Architect may issue a directive, on AIA Form G714 Construction Change Directive or Primary Designer approved form Construction Change Request (CCR) signed by Owner, instructing Contractor to proceed with a change in Work, for subsequent inclusion in a Change Order. Document will describe changes in Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.

F. Time and Material Change Order:
   1. Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract.
   2. Architect will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.
   3. Maintain detailed records of work done on Time and Material basis.
   4. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in Work.

G. Change Order Forms: AIA G701 Change Order.
H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in Conditions of the Contract.
I. Change Order: Furnish an itemized breakdown, in form acceptable to Architect of costs and supporting information including but not limited to quantities and material prices. Tier subcontracted work performed at labor rates, employer payments, and rental rates. Itemize breakdown detail shall be same for subcontractor work. Provide complete supporting information for profit and overhead or markups used when requested. Consider the following items a part of overhead or Contractor's and subcontractor's mark-up and do not include as separate cost item: Labor for Superintendents, Assistant Superintendents, home office personnel, timekeepers, and maintenance mechanics at any level of contracting; individual pieces of equipment, hand tools or instruments having a new value of $500.00 or less, whether or not consumed by use; on site and main offices; modification to record Contract Documents; nor guarantee period costs.

1.7 ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected by Owner. Accepted Alternates will be identified in Owner-Contractor Agreement.
B. Coordinate related work and modify surrounding work as required.
C. Schedule of Alternates:
    1. Alternate No. 1: Terrrazzo Tile Flooring.
        a. Base Bid Item:
            1) Section 09 66 23 "Resinous Matrix Terrazzo Flooring," (TER1) as specified in its entirety.
            2) Sheets I-001 and I-111 as noted.
        b. Alternate Item:
            1) Section 09 66 16 "Terrazzo Floor Tile," (TER2) as specified in its entirety.
            2) Sheets I-001 and I-111 substituting TER2 for TER1 everywhere it is noted.
    2. Alternate No. 2: Photovoltaic Collectors.
        a. Alternate Item:
            1) Suggested Photovoltaic Collectors layout, sheet a-141, system as noted for delegated design by qualified system designer.
            2) Provide roof mounted hose bibs and hose reels only if Alternate No. 2 is approved by Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Project Information Management.
2. Coordination.
3. Survey.
4. Electronic drawing file (digital data) request.
5. Submittal schedule.
6. Preconstruction meeting.
7. Request for information.
8. Progress meetings.
9. Preinstallation meetings.
10. Cutting and patching.

B. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.

1.2 PROJECT INFORMATION MANAGEMENT

A. Project Website:
1. Use Newforma Info Exchange; https://projects.team-psc.com/UserWeb/Login to send and receive Project information.
2. Contact Architect to setup a user name and password information.
3. If this Project is not listed when logged in, contact Architect to add this Project to your account.

B. Project information includes, but is not limited to, the following:
1. Product Submittals.
2. Requests for Information (RFI).
3. Applications for Payment.
4. Schedules.
5. Construction Change Requests (CCRs).
6. Closeout Documents.
7. Construction Document Files.
   a. Weather Days.
   b. Electronic File Requests.
   c. Correspondence.
   d. Test Reports.
   e. Meeting Minutes.
   f. Field Reports.

1.3 COORDINATION

A. Coordinate scheduling, submittals, and Work to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.
B. Verify that utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
D. In finished areas, except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.
E. Large Apparatus: Any large apparatus which is to be installed in any space and is too large to permit access through windows, doorways, or shafts shall be provided before enclosing structure is completed.
F. Items which require electrical connections shall be coordinated with Division 26 Electrical for:
    1. Voltage.
    2. Phase.
    3. Ampacity.
    4. Number and size of wires.
    5. Wiring diagrams.
    6. Starter size, details, and location.
    7. Control devices and details.
G. Coordinate completion and clean-up of Work of separate Sections in preparation for Substantial Completion and for portions of Work designated for Owner's occupancy.
H. After Owner occupancy of premises, coordinate access to site with Owner for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.4 SURVEY

A. Employ surveyor registered in the State of Texas to locate survey control and reference points.
B. Protect survey control and reference points.
C. Control datum for survey is that shown on Drawings.
D. Verify set-backs and easements, and confirm Drawing dimensions and elevations.
E. Provide field surveying services. Establish elevations, lines, and levels, utilizing recognized surveying practices.
F. Submit registered site drawing and certificate signed by registered surveyor that elevations and locations of Work are in conformance with Contract Documents.

1.5 ELECTRONIC DRAWING FILE (DIGITAL DATA) REQUEST

A. Upon Award of Contract:

1. At the pre-construction meeting, Contractor shall bring the executed Digital Data Licensing Agreement (AIA C106-2022) at the end of this Section for the release of electronic files. Upon Contractor submitting the executed Agreement to the Architect, the Architect will provide the Contractor one (1) electronic copy of the Revit®BIM Model file(s), AutoCAD (.dwg) file(s), when Revit®BIM Model file is not available, and Portable Document Format (.pdf) file(s) at no charge within 5 working days. **Note that CAD files associated with the work can be accessed and exported from the Revit®BIM Model provided to the Contractor through the use of Revit®software; therefore, individual CAD files will not be provided by the Architect**.
2. The Revit®BIM Model file provided to the Contractor is NOT FOR CONSTRUCTION PURPOSES, but for convenience only. This BIM Model will consist of the original model utilized for base bid. It is the responsibility of the Contracor to coordinate all accepted alternates, addenda, Request for Information, Porposal Requests, and any other changes realized during the procurement and construction phases. The Architect will not provide up-to-date Contract Documents or updated BIM Models to the Contractor unless otherwise stated within the Owner/Architect Agreement.
3. Conformed Construction Documents: If Conformed Construction Documents are required by the Owner/Architect Agreement, they will be provided in PDF. Conformed Construction Documents are the Drawings and Specifications modified to include any Addenda issued before execution of the Contract.
    a. To the extent Conformed Construction Documents are provided to the Contractor, the following provisions shall apply:
        1) The Conformed Construction Documents and related information contained therein, are provided for Contractor's convenience only, and does not relieve the Contractor from the requirements of the Contract Documents. Specifically, to the extent that any discrepancy or conflict exists between the Issue for Bid documents, including any Addenda issued prior to execution of the Contact or Modifications issued after the execution of the Contact on the one hand, and the Conformed Construction Documents on the other; the Issue for Bid documents, Addenda, and Modifications shall control unless otherwise specified in writing by the Architect.
        2) Contractor shall not use such drawings, documents, or other data, in whole or in part, for any purpose or project other than this Project in the preparation of Shop Drawings and other submittals.
        3) Contractor acknowledges that such drawings, documents, and other data are subject to change or modification. Contractor shall be responsible for updating any drawings, documents, or other data obtained prior to use by them for any purpose.
        4) Any Conformed Construction Documents, including any Drawings, Specifications, documents, or other data related thereto are provided "as is" without representation or warranty by Architect, either expressed or implied.

5) Contractor acknowledges that Conformed Construction Documents provided by Architect are as a courtesy to Contractor, at their specific request, and accordingly, CONTRACTOR HEREBY AGREES TO RELEASE, HOLD HARMLESS, DEFEND AND INDEMNIFY ARCHITECT AND OWNER FROM ANY AND ALL CLAIMS, DEMANDS, OR CAUSES OF ACTION, WHICH CONTRACTOR OR ANY THIRD PARTY MAY HAVE BY REASON OF ANY INJURY OR DAMAGE SUSTAINED BY CONTRACTOR OR THIRD PARTY ARISING OUT OF OR IN ANY WAY RELATED TO THE USE OF SUCH CONFORMED CONSTRUCTION DOCUMENTS.

1.6 SUBMITTAL SCHEDULE

A. Prepare submittal schedule in accordance with General Conditions of the Contract for Construction.
B. Include in submittal schedule all submittals and samples required by all section of this Project Manual and any additional submittals required by the Contractor to construct the Project.
C. Submit submittal schedule for Architect's review within 15 days after date established in Notice to Proceed or with the first Application for Payment, whichever is sooner. **Failure to submit submittal schedule with the first Application for Payment will be cause for not processing Application for Payment.**

1.7 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after Notice to Proceed.
B. Attendance Required:
   1. Owner.
   2. Architect.
   3. Contractor.
   4. Major subcontractors.
C. Agenda:
   1. Submission of executed bonds and insurance certificates.
   2. Distribution of Contract Documents.
   3. Submission of list of subcontractors, list of products, Schedule of Values, submittal schedule, and progress schedule.
   4. Designation of personnel representing each party in Contract and Architect.
   5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, Request for Information (RFI), and Contract closeout procedures.
   6. Review Notice to Proceed (NTP) and Substantial Completion Dates.
   7. Workers' Identification and Background Checks.
   8. Surface drainage requirements (SWPPP).
   9. Scheduling:
      a. Use of premises by Owner and Contractor.
      b. Owner's requirements and occupancy.
      c. Survey and building layout.
      d. Security and housekeeping procedures.

e. Construction progress meetings.
f. Procedures for testing.
g. Procedures for maintaining record documents.
h. Requirements for start-up of equipment.
i. Inspection and acceptance of equipment put into service during construction period.

10. Scheduling activities of Construction Material Testing (CMT) lab.

D. Record minutes and distribute copies within 3 days after meeting to participants with 2 copies to Architect and those affected by decisions made.

1.8 REQUEST FOR INFORMATION

A. Request for information (RFI) requests from subcontractors or material suppliers will not be considered. All RFI's must be submitted by Contractor.
B. RFI's must be submitted to Architect via software as indicated in paragraph 1.2.A
C. Information indicated on RFI shall be complete before submission. If Architect determines that request can be answered with information provided, Architect will assign an RFI tracking number. Requests determined by Architect not to be an RFI will be returned to Contractor electronically and deleted from Architect's electronic tracking software without being assigned an RFI tracking number. A transmittal document returning the denied RFI request will be provided with a response indicating action to be taken by Contractor.
D. RFIs may contain more than one item when items are related issues. Otherwise, only one item shall be addressed on each RFI request.
E. Allow 7 days for Architect's response to each RFI.
F. Response to RFI will be issued to Contractor and Owner per Section 01 33 00 "Submittal Procedures."
G. Responses from Architect are not changes unless issued with a change per Section 01 20 00 Price and Payment Procedures."
H. Section 01 30 01 is a sample RFI Form. Contractor will be provided a blank for its use. Any RFI submitted without this form will be returned without review and unanswered.

1.9 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of Work at minimum monthly intervals.
B. Make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
C. Attendance Required:
1. Owner.
2. Job superintendent.
3. Major subcontractors.
4. Suppliers.
5. Architect as appropriate to agenda topics for each meeting.
D. Agenda:
1. Field observations, problems, and decisions.
2. Identification of problems which impede planned progress.
3. Review of submittals schedule and status of submittals.
4. Review of off-site fabrication and delivery schedules.
5. Maintenance of progress schedule.

6. Corrective measures to regain projected schedules.
7. Planned progress during succeeding work period.
8. Coordination of projected progress.
9. Maintenance of quality and work standards.
10. Effect of proposed changes on progress schedule and coordination.
11. Other business relating to Work.

E. Record minutes, and distribute copies within 3 days to Architect, participants, and those affected by decisions made.

1.10 PREINSTALLATION MEETING

A. When required in individual specification Sections, convene a preinstallation meeting at site prior to installing Work.
B. Require attendance of parties directly affecting, or affected by, Work.
C. Notify Architect 7 days in advance of meeting date.
D. Prepare agenda and preside at meeting.
1. Review conditions of installation, preparation and installation procedures.
2. Review coordination with related work.
E. Record minutes, and distribute copies within 3 days after meeting to participants.

PART 2 - PRODUCTS

2.1 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Motors: Specific motor type is specified in individual Specification Sections.
B. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.
C. Cord and Plug: Provide minimum 6-foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual Specification Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
B. Verify that existing substrate is capable of structural attachment of new Work being applied or attached.
C. Examine and verify specific conditions described in individual Specification Sections.
D. Verify that utility services are available, of correct characteristics, and in correct location.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.
B. Seal cracks or openings of substrate prior to applying next material or substance.
C. Apply any manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 CUTTING AND PATCHING

A. Employ skilled and experienced installer to perform cutting and patching.
B. Submit request in advance of cutting or altering elements which affects:
   1. Structural integrity of element.
   2. Integrity of weather-exposed or moisture-resistant elements.
   3. Efficiency, maintenance, or safety of element.
   4. Visual qualities of sight-exposed elements.
   5. Work of Owner or separate contractor.
C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
   1. Fit several parts together, to integrate with other Work.
   2. Uncover Work to install or correct ill-timed Work.
   3. Remove and replace defective and non-conforming Work.
   4. Remove samples of installed Work for testing.
   5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
D. Execute work by methods which will avoid damage to other Work, and provide proper surfaces to receive patching and finishing.
E. Cut rigid materials using masonry saw or core drill.
F. Restore Work with new products in accordance with requirements of Contract Documents.
G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection. For an assembly, refinish entire unit.
J. Identify any hazardous substance or condition exposed during Work to Architect for decision or remedy.

END OF SECTION

Parkhill

RFI No. _____

TO:

FROM:

SUBMITTED BY:

PROJECT NAME:

PROJECT NO.:

* Items to be completed by Contractor before submittal to Parkhill for review. RFI form must be fully completed for Parkhill to respond.

Issue Date:		***Requested Reply Date:**	

***RFI DESCRIPTION:** *(Fully describe the question or type of information requested. Provide photos and/or sketches as applicable to help with the description. Additional pages may be attached, if needed.)*

***REFERENCES/ATTACHMENTS:** *(List specific documents researched when seeking the information requested.)*

Specifications	Drawings	Other

**Disciplines involved (select one or more):*

☐Architect ☐Civil ☐Landscape Architect ☐Interior Designer ☐Structural ☐Mechanical ☐Plumbing
☐Electrical ☐Other _____

***CONTRACTOR PROPOSED SOLUTION:** *(If RFI concerns a site or construction condition, the sender shall provide a recommended solution, including cost and/or schedule considerations before Parkhill can respond. The proposal solution shall consist of a revised text, sketches, drawings, etc. as applicable to a full and complete explanation.)*

RESPONSE: *(Provide answer to RFI, including cost and/or schedule considerations, revised text, sketches, drawings, etc. as applicable to fully explain response. Additional pages may be attached, if needed.)*

Response by:_____ ☐ Attachments:

Copies: ☐ Owner ☐ Consultants

Note: This reply is not an authorization to proceed with work involving additional cost, time or both. If any reply requires a change to the Contract Documents, a Change Order, Construction Change Directive or a Construction Change Request must be executed in accordance with the Contract Documents.

SAMPLE

AIA® Document C106™ – 2022

Digital Data Licensing Agreement

AGREEMENT made as of the day of in the year
(In words, indicate day, month, and year.)

BETWEEN the Party transmitting Digital Data ("Transmitting Party"):
(Name, address, and contact information, including electronic addresses)

and the Party receiving the Digital Data ("Receiving Party"):
(Name, address, and contact information, including electronic addresses)

for the following Project:
(Name and location or address of the Project)

for the following Digital Data ("Digital Data"):
(Identify below, in detail, the information created or stored in digital form that the Parties intend to be subject to this Agreement.)

[Revit Models (.rvt files)]
[AutoCAD (.dwg files)]
[Portable Document Format (.pdf)]

The Transmitting Party and Receiving Party agree as follows.

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

SAMPLE

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User Notes: (913993287)

TABLE OF ARTICLES

1 GENERAL PROVISIONS

2 TRANSMISSION OF DIGITAL DATA

3 LICENSE CONDITIONS

4 LICENSING FEE OR OTHER COMPENSATION

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 The purpose of this Agreement is to grant a license from the Transmitting Party to the Receiving Party for the Receiving Party's use of Digital Data and to set forth the license terms.

§ 1.2 This Agreement is the entire and integrated agreement between the Parties. Except as specifically set forth herein, this Agreement does not create any other contractual relationship between the Parties.

§ 1.3 Confidential Digital Data is Digital Data containing confidential or business proprietary information that the Transmitting Party designates as "confidential."

ARTICLE 2 TRANSMISSION OF DIGITAL DATA

§ 2.1 The Transmitting Party grants to the Receiving Party a nonexclusive limited license to use the Digital Data solely and exclusively for the uses, and in accordance with the terms, set forth in Article 3.

§ 2.2 Only the Receiving Party is permitted to access and use the Digital Data. Unlicensed and unauthorized access or use by third parties is strictly prohibited except as set forth in Section 2.4.1.

§ 2.3 The transmission of Digital Data constitutes a warranty by the Transmitting Party to the Receiving Party that the Transmitting Party is the copyright owner of the Digital Data or otherwise has permission to transmit the Digital Data to the Receiving Party for its use on the Project in accordance with the terms and conditions of this Agreement.

§ 2.4 Where the Transmitting Party has designated information furnished pursuant to this Agreement as "confidential," the Receiving Party shall keep the information confidential and shall not disclose it to any other person or entity except as set forth in Section 2.4.1.

§ 2.4.1 The Receiving Party may disclose Confidential Digital Data after seven (7) days' notice to the Transmitting Party where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Receiving Party may also disclose Confidential Digital Data to its employees, consultants, sureties, subcontractors and their employees, sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.5 By transmitting Digital Data, the Transmitting Party does not convey any ownership right in the Digital Data or in the software used to generate the Digital Data. Unless otherwise granted in a separate license, the Receiving Party's right to use, modify, or further transmit Digital Data is specifically limited to those uses, and in accordance with the terms, set forth in Article 3, and nothing contained in this Agreement conveys any other right to use the Digital Data.

§ 2.6 To the fullest extent permitted by law, the Receiving Party shall indemnify and defend the Transmitting Party from and against all claims arising from or related to the Receiving Party's modification to, or unlicensed use of, the Digital Data.

§ 2.7 Transmission of the Digital Data does not abridge or extinguish the Transmitting Party's rights, including, to the extent applicable, exclusive ownership interest, in such information under all applicable state, federal, and international laws including, without limitation, laws governing the protection of copyrights and intellectual property.

§ 2.8 The provisions of this Article 2 shall survive the termination of this Agreement.

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User Notes: (913993287)

ARTICLE 3 LICENSE CONDITIONS

§ 3.1 The Receiving Party may use and rely upon the Digital Data to the extent set forth in this Article 3.

(Paragraph deleted)

[X] **§ 3.1.1** The Digital Data is transmitted solely for the Receiving Party's information. Receiving Party acknowledges that any use of the Digital Data shall be at Receiving Party's sole risk. The Receiving Party accepts the Digital Data "as is" without any warranty or representations from the Transmitting Party as to whether the Digital Data is accurate, complete, or fit for use as intended by the Receiving Party. The Receiving Party is solely responsible for verifying whether the Digital Data is accurate, complete, or fit for the Receiving Party's intended use.

(Paragraphs deleted)

§ 3.1.1.1 This Digital Data is part of the Transmitting Party's Instruments of Service and shall not be used by Receiving Party or anyone else receiving this data through or from the Receiving Party for any purpose other than as a convenience in the preparation of bid submittals, shop drawings, coordination drawings, construction phase submittals, and field layout and staking required by the Owner for the exclusive use of the referenced Project. Any use or reuse by the Receiving Party or by others will be at the Receiving Party's sole risk and without liability or legal exposure to Transmitting Party. The Receiving Party agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against Transmitting Party, its officers, directors, employees, or subconsultants that may arise out of or in connection with Receiving Party's use of this Digital Data.

§ 3.1.1.2 No representation as to the compatibility of this Digital Data with Receiving Party's hardware or software is provided.

§ 3.1.1.3 This Digital Data is not a Construction Document. Differences may exist between this Digital Data and corresponding two-dimensional hard-copy Construction Document. The Transmitting Party makes no representation regarding the accuracy or completeness of the Digital Data the Receiving Party receives. In the event that a conflict arises between the signed/sealed two-dimensional hard-copy Construction Document prepared by Transmitting Party and the Digital Data, the signed/sealed two-dimensional hard-copy Construction Document shall govern. The Receiving Party is responsible for determining if any conflict exists. By the Receiving Party's use of this Digital Data, Receiving Party is not relieved of their duty to fully comply with the Contract Documents, including, and without limitation, the need to check, confirm and coordinate all dimensions and details, field measurements, verify field conditions and coordination of work with that of other contractors for the Project.

§ 3.1.1.4 Because information presented in the Digital Data can be modified, unintentionally or otherwise, the Transmitting Party reserves the right to remove all indicia of ownership and/or involvement from each Digital Data.

§ 3.1.1.5 Under no circumstances shall delivery of this Digital Data for use by the Receiving Party be deemed a sale of document ownership by Transmitting Party, and no warranties, either express or implied, of merchantability or fitness for any particular purpose is made. In no event shall the Transmitting Party be liable for any loss of profit or any consequential damages as a result of the Receiving Party's use or reuse of this Digital Data.

§ 3.1.1.6 The Digital Data file does not necessarily contain all the information that is required to produce finished Construction Documents. Because of this, there may be data within the Digital Data that is missing, incomplete or even contradictory to the information provided in the final two dimensional Construction Documents.

§ 3.1.1.7 Professional judgment will need to be used by the Receiving Party, along with reasonable expectations and interpretations in order to use the Digital Data for its intended purpose. Should the Transmitting Party provide revised and updated copies of the Digital Data to the Receiving Party throughout the Project, all terms and conditions of this agreement will be applicable and unchanged for all subsequent transmissions of the Digital Data

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ARTICLE 4 LICENSING FEE OR OTHER COMPENSATION

The Receiving Party agrees to pay the Transmitting Party the following fee or other compensation for the Receiving Party's use of the Digital Data:

(State the fee, in dollars, or other method by which the Receiving Party will compensate the Transmitting Party for the Receiving Party's use of the Digital Data.)

This Agreement is entered into as of the day and year first written above and terminates one year from said date, except as set forth below.

(Indicate when this Agreement will terminate, if other than one year from the date it was entered into, and other conditions related to termination.)

N/A

PARKHILL	**[RECEIVING PARTY]**
TRANSMITTING PARTY *(Signature)*	**RECEIVING PARTY** *(Signature)*
(Printed name and title)	*(Printed name and title)*

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SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Submittal procedures.
   2. Resubmittal requirements.
   3. Construction progress schedules.
   4. Proposed products list.
   5. Shop drawings.
   6. Product data.
   7. Samples.
   8. Design data.
   9. Test reports.
   10. Certificates.
   11. Manufacturers' instructions.
   12. Manufacturers' field reports.
   13. Erection drawings.
   14. Construction photographs.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 01 20 00 "Price and Payment Procedures" for Schedule of Values; Inspecting and Testing Allowances.
   3. Section 01 30 00 "Administrative Requirements" for Project information management.
   4. Section 01 40 00 "Quality Requirements" for manufacturers' field services and reports; Testing Laboratory Services.
   5. Section 01 70 00 "Execution and Closeout Requirements" for Contract warranty, manufacturer's certificates, and closeout submittals.

1.2 SUBMITTAL PROCEDURES

A. Submit to Architect for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Produce copies and distribute in accordance with this Article.

C. Use Project website to submit record documents as described in Section 01 70 00 "Execution and Closeout Requirements."

D. A complete submittal consists of all the items required within an individual specification section, i.e. product data, shop drawings, LEED information, product samples, etc. for every material and component within the specification sections. All submittals documents shall be clearly marked as to the specific item within the document that is being submitted for review. Contents of the submittals document that is not pertinent shall be struck-thru.

E. Transmit each submittal separately with Contractor's standard transmittal letter including Contractor's name, address, and phone number. Each submittal shall contain only one Specification Section.

F. Sequentially number transmittal forms using Section number or Contractors other sequential numbering system.

G. Identify Project, Contractor, subcontractor, or supplier; pertinent drawing sheet and detail number(s), and Specification Section number appropriate to submittal.
H. Apply Contractor's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with requirements of Work and Contract Documents.
I. Schedule submittals to expedite Project, and deliver to Architect. Coordinate submission of related items.
J. For each submittal for review, allow 15 calendar days excluding delivery time to and from Contractor.
K. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work. Information, comments, field verifications, responses, or other notations marked on submittals by Contractor shall be done in blue or green colors only.
L. Allow space on submittals for Contractor and Architect's review stamps.
M. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
N. Submittals not requested will not be recognized or processed.
O. Format:
    1. Submit all submittals digitally using .PDF file extension. Each submittal shall be a single .PDF file including transmittal letter. Multiple files for same submittal will not be accepted.
    2. Submittals in any other format, including .ZIP files, will be rejected.
    3. Hard copies will not be accepted.
    4. To ensure each page is legible, .PDF pages of drawings shall be same size/scale as a hard copy. Where applicable, scale symbols should be provided to indicate scale. Illegible submittals will be rejected.
    5. Uploaded submittals to Project website.
P. Submittal procedures described in this Article applies to construction progress schedule, products list, shop drawings, product data, samples (actual samples and digital files of same), design data, test reports, certificates, manufacturer's instructions and field reports, erection drawings, and any other type of submittal submitted to Architect.

1.3 RESUBMITTAL REQUIREMENTS

A. Revise and resubmit submittals, as required, and resubmit to meet requirements as specified and as noted on submittal reviews.
B. Mark as RESUBMITTAL.
C. Re-use original transmittal number and supplement with sequential alphabetical or numeric suffix for each re-submittal.

1.4 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial progress schedule for Architect's review within 15 calendar days after date established in Notice to Proceed or with the first Application for Payment, whichever is sooner.
B. Revise and resubmit as required.
C. Submit revised schedule with each Application for Payment, identifying changes since previous version.

D. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.
E. Indicate estimated percentage of completion for each item of Work at each submission.
F. Dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes. Submit separate schedule of submittal dates for following:
   1. Shop drawings.
   2. Product data.
   3. Samples.
   4. Owner furnished products.
   5. Products identified under Allowances.
G. Determine appropriate lead times to allow for manufacturing and delivery of products/material for incorporation into Work. Indicate product/material manufacturer's lead-time for manufacturing and delivery to site. Include as a separate line for each product/material. Failure to timely submit and process submittals, and ordering of products/materials for delivery to site will not be grounds for approval of substitutions for other products/materials.
H. Indicate delivery dates for Owner furnished products and products identified under Allowances.
I. Revisions to Schedules:
   1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
   2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
   3. Prepare narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect including effect of changes on schedules of separate contractors.

1.5 PROPOSED PRODUCTS LIST

A. Within 15 calendar days after date of Notice to Proceed, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.6 SHOP DRAWINGS

A. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
B. Printable Image Size: Minimum 8-1/2 by 11 inches and maximum 30 by 42 inches.
C. Draw details to a minimum scale of 1/2-inch equal to 1 foot.
D. Draw site plans to same scale indicated on Contract Drawings.
E. Draw other plans to a minimum scale of 1/8-inch equal to 1 foot.
F. Construction Documents (electronic or paper format) issued by Architect cannot be used in any shape, form, or fashion in creation and development of shop drawings, except that electronic files containing floor plans or site plans which have been acquired from Architect may be used as backgrounds for Contractor, subcontractors, sub-subcontractors, and material suppliers in shop drawing process.

G. In creation and publication of Shop Drawings, under no circumstances shall Design Professional's seal or title block of drawing be reproduced. Shop drawings must be original works from Contractor, subcontractors, sub-subcontractors, and material suppliers.

1.7 PRODUCT DATA

A. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.
B. Include recommendations for application and use, and reference to compliance with specified standards of trade associations and testing agencies.
C. Include notation of special coordination requirements for interfacing with adjacent work and building utilities where applicable.
D. After review, distribute in accordance with "Submittal Procedures" Article above and provide copies for Record Documents described in Section 01 70 00 "Execution and Closeout Requirements."

1.8 SAMPLES

A. Submit samples to illustrate functional and aesthetic characteristics of product, with integral parts and attachment devices. Submit physical sample after color digital image (photo or scanned .PDF) of sample has been electronically submitted to Project Management website with appropriate Transmittal Letter(s). Coordinate sample submittals for interfacing work.
B. Unless otherwise specified, submit samples of finishes from manufacturers' full range of standard colors, textures, and patterns, for Architect's selection.
C. Where variations in color, pattern, or texture are inherent in material or product, submit multiple samples to indicate approximate range or variations.
D. Include full Project information and identification of manufacturer, model number, type, style and color on each sample.
E. Submit number of samples specified in individual Specification Sections; one of which will be retained by Architect.

1.9 DESIGN DATA

A. Submit for Architect's knowledge as Contract Administrator or for Owner.
B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.10 TEST REPORTS

A. Submit for Architect's knowledge as Contract Administrator or for Owner.
B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.11 CERTIFICATES

A. When specified in individual Specification Sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Architect.
B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
C. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

1.12 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual Specification Sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing.
B. Identify conflicts between manufacturers' instructions and Contract Documents.
C. Indicate special procedures, conditions requiring special attention and special environmental criteria required for application or installation.

1.13 MANUFACTURER'S FIELD REPORTS

A. Submit reports for Architect's benefit as Contract Administrator or for Owner.
B. Submit report within 30 days of observation to Architect for information.
C. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.14 ERECTION DRAWINGS

A. Submit drawings for Architect's benefit as Contract Administrator or for Owner.
B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.
C. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.15 CONSTRUCTION PHOTOGRAPHS

A. Each month submit photographs to Architect with Application for Payment.
B. Photographs:
    1. Format: JPEG file extension; color.
    2. Subject:
        a. Take 2 site photographs from differing directions and 5 interior photographs indicating relative progress of Work, 5 days maximum prior to submitting pay request.
C. Identify photographs with date, time, orientation, and Project identification.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Quality control and control of installation.
   2. Tolerances.
   3. References.
   4. Testing and Inspection services.
   5. Examination.
   6. Preparation.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 01 30 00 "Administrative Requirements" for Project information management.
   3. Section 01 33 00 "Submittal Procedures" for submission of manufacturers' instructions and certificates.
   4. Section 01 60 00 "Product Requirements" for requirements for material and product quality.

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
B. Comply with manufacturers' instructions, including each step in sequence.
C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
D. Comply with specified standards as a minimum quality for Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
E. Perform Work by persons qualified to produce workmanship of specified quality.
F. Verify field measurements are as indicated on shop drawings or as instructed by manufacturer.
G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
C. Adjust products to appropriate dimensions; position before securing in place.

1.4 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.
B. Conform to reference standard by date of issue current on date of Contract Documents, except where a specific date is established by Code.
C. Obtain copy of standards when required by Specification Section.
D. Neither contractual relationship, duties, nor responsibilities of parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.5 TESTING AND INSPECTION SERVICES

A. Owner will appoint, employ, and pay for specified services of an independent firm to perform inspection and testing.
B. The independent firm will perform inspections, tests, and other services specified in individual Specification Sections and as required by Architect or Owner.
C. Testing, inspections and source quality control may occur on or off Project site. Perform off-site testing as required by Architect or Owner.
D. Submit independent testing laboratory firm's reports to Architect. Reports to include observations and results of tests and will indicate compliance or non-compliance with Contract Documents.
E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, provide safe access to Project site, and provide assistance by incidental labor as requested.
    1. Notify , Architect and independent firm 48 hours prior to expected time for operations requiring services.
    2. Pay for additional samples and tests required for Contractor's use.
F. Employment of independent testing agency or laboratory does not relieve Contractor from performing Work to Contract requirements.
G. Re-testing and/or re-inspection required because of non-conformance to specified requirements will be charged to Contractor by deducting re-testing and/or re-inspection charges from Contract Sum/Price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.
C. Examine and verify specific conditions described in individual Specification Sections.
D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.
B. Seal cracks or openings of substrate prior to applying next material or substance.
C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

END OF SECTION

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.
B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
H. "Provide": Furnish and install, complete and ready for the intended use.
I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
    1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.
C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
    1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Abbreviations and acronyms not included in this list shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States." The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; (See FGIA).
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ABMA - American Boiler Manufacturers Association; www.abma.com.
8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
11. AF&PA - American Forest & Paper Association; www.afandpa.org.
12. AGA - American Gas Association; www.aga.org.
13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
15. AI - Asphalt Institute; www.asphaltinstitute.org.
16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; www.steel.org.
19. AITC - American Institute of Timber Construction; www.plib.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASSP - American Society of Safety Professionals (The); www.assp.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.

37. AVIXA - Audiovisual and Integrated Experience Association; (Formerly: Infocomm International); www.avixa.org.
38. AWEA - American Wind Energy Association; www.awea.org.
39. AWI - Architectural Woodwork Institute; www.awinet.org.
40. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
41. AWPA - American Wood Protection Association; www.awpa.com.
42. AWS - American Welding Society; www.aws.org.
43. AWWA - American Water Works Association; www.awwa.org.
44. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
45. BIA - Brick Industry Association (The); www.gobrick.com.
46. BICSI - BICSI, Inc.; www.bicsi.org.
47. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
48. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
49. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
50. CDA - Copper Development Association; www.copper.org.
51. CE - Conformite Europeenne; www.ec.europa.eu/growth/single-market/ce-marking.
52. CEA - Canadian Electricity Association; www.electricity.ca.
53. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
55. CGA - Compressed Gas Association; www.cganet.com.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
57. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
58. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
60. CPA - Composite Panel Association; www.compositepanel.org.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
62. CRRC - Cool Roof Rating Council; www.coolroofs.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA - CSA Group; www.csa-group.org.
65. CSI - Cast Stone Institute; www.caststone.org.
66. CSI - Construction Specifications Institute (The); www.csiresources.org.
67. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
68. CTA - Consumer Technology Association; www.cta.tech.
69. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.coolingtechnology.org.
70. CWC - Composite Wood Council; (See CPA).
71. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
72. DHA - Decorative Hardwoods Association; (Formerly: Hardwood Plywood & Veneer Association); www.decorativehardwoods.org.
73. DHI - Door and Hardware Institute; www.dhi.org.
74. ECA - Electronic Components Association; (See ECIA).
75. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
76. ECIA - Electronic Components Industry Association; www.ecianow.org.
77. EIA - Electronic Industries Alliance; (See TIA).
78. EIMA - EIFS Industry Members Association; www.eima.com.

79. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
80. EOS/ESD Association; (Electrostatic Discharge Association); www.esda.org.
81. ESTA - Entertainment Services and Technology Association; (See PLASA).
82. ETL - Intertek (See Intertek); www.intertek.com.
83. EVO - Efficiency Valuation Organization; www.evo-world.org.
84. FCI - Fluid Controls Institute; www.fluidcontrolsinstitute.org.
85. FGIA - Fenestration and Glazing Industry Alliance; https://fgiaonline.org.
86. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
87. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
88. FM Approvals - FM Approvals LLC; www.fmapprovals.com.
89. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
90. FRSA - Florida Roofing, Sheet Metal Contractors Association, Inc.; www.floridaroof.com.
91. FSA - Fluid Sealing Association; www.fluidsealing.com.
92. FSC - Forest Stewardship Council U.S.; www.fscus.org.
93. GA - Gypsum Association; www.gypsum.org.
94. GANA - Glass Association of North America; (See NGA).
95. GS - Green Seal; www.greenseal.org.
96. HI - Hydraulic Institute; www.pumps.org.
97. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
98. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
99. HPVA - Hardwood Plywood & Veneer Association; (See DHA).
100. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
101. IAS - International Accreditation Service; www.iasonline.org.
102. ICBO - International Conference of Building Officials; (See ICC).
103. ICC - International Code Council; www.iccsafe.org.
104. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
105. ICPA - International Cast Polymer Association; www.theicpa.com.
106. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
107. IEC - International Electrotechnical Commission; www.iec.ch.
108. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
109. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
110. IESNA - Illuminating Engineering Society of North America; (See IES).
111. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
112. IGMA - Insulating Glass Manufacturers Alliance; (See FGIA).
113. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.org.
114. II - Infocomm International; (See AVIXA).
115. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
116. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
117. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
118. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
119. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
120. ISO - International Organization for Standardization; www.iso.org.

121. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
122. ITU - International Telecommunication Union; www.itu.int.
123. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
124. LMA - Laminating Materials Association; (See CPA).
125. LPI - Lightning Protection Institute; www.lightning.org.
126. MBMA - Metal Building Manufacturers Association; www.mbma.com.
127. MCA - Metal Construction Association; www.metalconstruction.org.
128. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
129. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
130. MHI - Material Handling Industry; www.mhi.org.
131. MIA - Marble Institute of America; (See NSI).
132. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
133. MPI - Master Painters Institute; www.paintinfo.com.
134. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
135. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
136. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
137. NADCA - National Air Duct Cleaners Association; www.nadca.com.
138. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
139. NALP - National Association of Landscape Professionals; www.landscapeprofessionals.org.
140. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
141. NBI - New Buildings Institute; www.newbuildings.org.
142. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
143. NCMA - National Concrete Masonry Association; www.ncma.org.
144. NEBB - National Environmental Balancing Bureau; www.nebb.org.
145. NECA - National Electrical Contractors Association; www.necanet.org.
146. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
147. NEMA - National Electrical Manufacturers Association; www.nema.org.
148. NETA - InterNational Electrical Testing Association; www.netaworld.org.
149. NFHS - National Federation of State High School Associations; www.nfhs.org.
150. NFPA - National Fire Protection Association; www.nfpa.org.
151. NFPA - NFPA International; (See NFPA).
152. NFRC - National Fenestration Rating Council; www.nfrc.org.
153. NGA - National Glass Association (The); (Formerly: Glass Association of North America); www.glass.org.
154. NHLA - National Hardwood Lumber Association; www.nhla.com.
155. NLGA - National Lumber Grades Authority; www.nlga.org.
156. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
157. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
158. NRCA - National Roofing Contractors Association; www.nrca.net.
159. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
160. NSF - NSF International; www.nsf.org.
161. NSI - National Stone Institute; (Formerly: Marble Institute of America); www.naturalstoneinstitute.org.
162. NSPE - National Society of Professional Engineers; www.nspe.org.
163. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.

164. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
165. NWFA - National Wood Flooring Association; www.nwfa.org.
166. NWRA - National Waste & Recycling Association; www.wasterecycling.org
167. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
168. PDI - Plumbing & Drainage Institute; www.pdionline.org.
169. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
170. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
171. RFCI - Resilient Floor Covering Institute; www.rfci.com.
172. RIS - Redwood Inspection Service; www.redwoodinspection.com.
173. SAE - SAE International; www.sae.org.
174. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
175. SDI - Steel Deck Institute; www.sdi.org.
176. SDI - Steel Door Institute; www.steeldoor.org.
177. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
178. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
179. SIA - Security Industry Association; www.siaonline.org.
180. SJI - Steel Joist Institute; www.steeljoist.org.
181. SMA - Screen Manufacturers Association; www.smainfo.org.
182. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
183. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
184. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
185. SPIB - Southern Pine Inspection Bureau; www.spib.org.
186. SPRI - Single Ply Roofing Industry; www.spri.org.
187. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
188. SSINA - Specialty Steel Industry of North America; www.ssina.com.
189. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
190. STI - Steel Tank Institute; www.steeltank.com.
191. SWI - Steel Window Institute; www.steelwindows.com.
192. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
193. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
194. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
195. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
196. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
197. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
198. TMS - The Masonry Society; www.masonrysociety.org.
199. TPI - Truss Plate Institute; www.tpinst.org.
200. TPI - Turfgrass Producers International; www.turfgrasssod.org.
201. TRI - Tile Roofing Institute; www.tileroofing.org.
202. UL - Underwriters Laboratories Inc.; www.ul.com.
203. UL LLC - UL LLC; www.ul.com.
204. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
205. USAV - USA Volleyball; www.usavolleyball.org.
206. USGBC - U.S. Green Building Council; www.usgbc.org.
207. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
208. WA - Wallcoverings Association; www.wallcoverings.org.

209. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
210. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
211. WDMA - Window & Door Manufacturers Association; www.wdma.com.
212. WI - Woodwork Institute; www.wicnet.org.
213. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
214. WWPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.
1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.govinfo.gov.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).

4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Temporary Utilities:
      a. Electricity.
      b. Lighting.
      c. Heating.
      d. Cooling.
      e. Ventilation.
      f. Communication services.
      g. Water.
      h. Sanitary.
   2. Construction Facilities:
      a. Field offices and sheds.
      b. Vehicular access.
      c. Parking.
      d. Progress cleaning.
      e. Project identification.
      f. Traffic regulation.
   3. Temporary Controls:
      a. Barriers.
      b. Fencing.
      c. Security.
      d. Water control.
      e. Dust control.
      f. Erosion and sediment control.
      g. Protection of Work.
   4. Removal of utilities, facilities, and controls.

B. Related Requirements:
   1. Divisions 01 Specification Sections apply to Work of this Section.
   2. Section 01 70 00 "Execution and Closeout Requirements" for final cleaning.

1.2 TEMPORARY ELECTRICITY

A. Connect to existing power service. Power consumption shall not disrupt Owner's need for continuous service.

B. Provide temporary electric feeder from existing building electrical service at location as directed. Power consumption shall not disrupt Owner's need for continuous service.

C. Provide separate metering and pay utility provider for cost of energy used.

D. Provide power outlets for construction operations, with branch wiring and distribution boxes as required.

E. Provide flexible power cords as required.

F. Provide main temporary service disconnect and overcurrent protection at convenient location in conformance with National Electric Code.

G. Permanent convenience receptacles may not be utilized during construction.

H. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.
   1. Provide 20 ampere duplex outlets, single phase circuits for power tools for every 2,000 sq. ft. of active work area and at specific locations as required.
   2. Provide 20 ampere, single phase branch circuits for lighting.

1.3 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Existing building lighting may not be utilized during construction. Provide and maintain 1 watt/sq. ft. lighting to exterior staging and storage areas after dark for security purposes.
B. Provide and maintain 0.25 watt/sq. ft. H.I.D. lighting to interior work areas after dark for security purposes.
C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
D. Maintain lighting and provide routine repairs.

1.4 TEMPORARY HEAT

A. Provide and pay for heat devices as required to maintain specified conditions for construction operations until new heating system is installed.
B. Owner will pay cost of energy used. Exercise measures to conserve energy.
C. Enclose building prior to activating temporary heat in accordance with "Exterior Enclosure" Article in this Section.
D. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in Specifications.

1.5 TEMPORARY COOLING

A. Provide and pay for temporary cooling devices as required to maintain specified conditions for construction operations until new cooling system is installed.
B. Existing facilities shall not be used.
C. Owner will pay cost of energy used. Exercise measures to conserve energy.
D. Provide separate metering and pay utility provider for cost of energy used.
E. Enclose building prior to activating temporary cooling in accordance with "Enclosures" Article in this Section.
F. Prior to operation of permanent equipment for temporary cooling purposes, verify installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
G. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in Specifications.

1.6 TEMPORARY VENTILATION

A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
B. Provide temporary fan units as required to maintain clean air for construction operations.

1.7 TEMPORARY COMMUNICATION SERVICES

A. As a minimum, provide cellular mobile telephone service for on-site superintendent and home office telephone service.
B. Owner's communication systems shall not be used .
C. Provide field office with the following service:
   1. Provide data service including all required equipment (modems, filters, etc.) with minimum 5.0Mbps downstreams/2.0Mbps upstream. Service shall utilize a DHCP IP address for connection. Contractor shall pay all costs associated with this service including any Internet Service Provider feeds.

1.8 TEMPORARY WATER SERVICE

A. Connect to existing water source for construction operations. Extend and supplement with temporary devices as needed to maintain specified conditions for construction operations.
B. Provide separate metering and reimburse Owner for cost of water used.
C. Exercise measures to conserve water.
D. Provide temporary pipe insulation to prevent freezing.

1.9 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures.
B. Existing facilities shall not be used.
C. At end of construction, return facilities to same or better condition than originally found.

1.10 FIELD OFFICES AND SHEDS

A. Do not use existing facilities for field offices or for storage.
B. Office:
   1. Weathertight, with lighting, electrical outlets, heating, cooling, and ventilating equipment.
   2. Equip with sturdy furniture including conference table and chairs to accommodate six persons.
   3. Provide temporary communications services specified in this Section.
   4. Locate offices and sheds a minimum distance of 30 feet from existing and new structures.
C. Storage Areas and Sheds:
   1. Size storage to requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products to requirements of Section 01 60 00 "Product Requirements."
   2. Fire Extinguishers: Appropriate type fire extinguisher at each storage area.
   3. Interior Materials in Storage Sheds: As required to provide specified environmental conditions for storage of products.
   4. Heating and Ventilation: As required to maintain products in accordance with Contract Documents.
   5. Lighting: As required for maintenance and inspection of products.

D. Preparation: Fill and grade sites for temporary structures sloped for drainage away from buildings.
E. Installation: Install office spaces ready for occupancy 15 calendar days after date fixed in Notice to Proceed..
F. Maintenance and Cleaning:
   1. Weekly janitorial services for offices; periodic cleaning and maintenance for office and storage areas.
   2. Maintain approach walks free of mud, water, and snow.
G. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

1.11 EMPLOYEE RESIDENTIAL OCCUPANCY

A. Not allowed on Owner's property.

1.12 VEHICULAR ACCESS

A. Location as indicated on Drawings.
B. Provide and maintain access to fire hydrants and control valves free of obstructions.
C. Provide means of removing mud from vehicle wheels before entering on site paved areas and public streets.
D. Use existing on-site roads for construction traffic as designated.

1.13 PARKING

A. Construct temporary gravel surface parking areas to accommodate construction personnel.
B. Locate as approved by Architect.
C. When site space is not adequate, provide additional off-site parking.
D. Use of existing on-site streets and driveways for construction traffic is ermitted.
E. Use of existing parking facilities by construction personnel is not permitted.
F. Do not allow heavy or tracked vehicles or construction equipment in parking areas.
G. Do not allow vehicle parking on existing pavement.
H. Permanent Pavements and Parking Facilities:
   1. Prior to Substantial Completion, bases for permanent roads and parking areas may be used for construction traffic.
   2. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.
   3. Use of permanent parking structures is not permitted.
I. Maintenance:
   1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
   2. Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.
J. Removal, Repair:
   1. Remove temporary materials and construction before Substantial Completion.
   2. Remove underground work and compacted materials to depth of 2 feet; fill and grade site as specified.
   3. Repair existing facilities damaged by use, to specified condition.
K. Mud from Site Vehicles: Provide means of removing mud from vehicle wheels before entering streets.

1.14 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing space.
C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
D. Remove waste materials, debris, and rubbish from site and dispose off-site at intervals as required to maintain clean site.

1.15 PROJECT IDENTIFICATION

A. Project Identification Sign:
   1. Size: Provide one 8 feet wide by 4 feet high, as shown in drawings.
   2. Materials: 3/4-inch-thick exterior grade plywood and solid wood frame.
   3. Background Paint: Exterior quality, two coats; sign background of color as selected.
   4. Lettering: Exterior paint of quality adequate to withstand weathering, fading, and chipping for duration of construction, colors as selected with exhibit lettering by professional sign painter.
B. Project Informational Signs:
   1. If required by other Documents or Sections of Project Manual, provide weather-protected signs for site safety procedures, wage rates, and Storm Water Pollution Prevention Plan.
   2. Erect sign on or adjacent to field office, if required.
C. Design sign and structure to withstand 90 miles/hr wind velocity.
D. Installation:
   1. Install Project identification sign within 15 days after date fixed by Notice to Proceed.
   2. Erect at location directed by Architect.
   3. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
   4. Install sign surface plumb and level, with butt joints. Anchor securely.
   5. Paint exposed surfaces of sign supports and framing.
E. No other signs are allowed without Owner's permission except those required by law.
F. Maintenance: Maintain signs and supports clean, repair deterioration and damage.
G. Removal: Remove signs, framing, supports, and foundations at completion of Project and restore area.

1.16 TRAFFIC REGULATION

A. Signs, Signals, and Devices:
   1. Post Mounted and Wall Mounted Traffic Control and Informational Signs: As approved by authority having jurisdiction.
   2. Traffic Cones and Drums: As approved by authority having jurisdiction.

B. Haul Routes:
   1. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.
   2. Confine construction traffic to designated haul routes.
   3. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

C. Traffic Signs and Signals:
   1. Provide signs at approaches to site and on site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
   2. Relocate as Work progresses, to maintain effective traffic control.

D. Removal:
   1. Remove equipment and devices when no longer required.
   2. Repair damage caused by installation.
   3. Remove post settings to depth of 2 feet.

1.17 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
   1. Allow for Owner's use of site.

B. Protect site improvements including but not limited to pavements, walkways, and drainage structures from damage. Replace damaged site improvements to original condition.

C. Protect non-owned vehicular traffic and stored materials from damage.

1.18 TEMPORARY FENCING

A. Construction: Commercial grade chain link fence.

B. Provide 6-foot-high fence around construction site and temporary materials storage area; equip with vehicular gates with locks.

1.19 SECURITY

A. Security Program:
   1. Protect Work, existing premises, and Owner's operations from theft, vandalism, and unauthorized entry.
   2. Initiate program in coordination with Owner's existing security system at Project mobilization.
   3. Maintain program throughout construction period until Owner occupancy.

B. Entry Control:
   1. Restrict entrance of persons and vehicles into Project site and existing facilities.
   2. Allow entrance only to authorized persons with proper identification.
   3. Coordinate access of Owner's personnel to site in coordination with Owner's security forces.

C. Personnel Identification:
   1. Provide identification badge to each person authorized to enter premises.
   2. Badge to Include information required by Owner.
   3. Maintain list of accredited persons, submit to Owner on request.
   4. Require return of badges at expiration of their employment on Work.

1.20 WATER CONTROL

A. Grade site to drain.
B. Maintain excavations free of water.
C. Provide, operate, and maintain pumping equipment.
D. Protect site from puddling and running water. Provide water barriers as required to protect site from soil erosion.
E. Provide water barriers as required to protect existing buildings from puddling, ponding or other water accumulation that may damage foundations or other sub-surface construction.

1.21 DUST CONTROL

A. Execute Work by methods to minimize raising dust from construction operations.
B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.22 EROSION AND SEDIMENT CONTROL

A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
B. Minimize surface area of bare soil exposed at one time.
C. Provide temporary measures including berms, dikes, and drains, and other devices to prevent water flow that would result in erosion.
D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.23 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual Specification Sections.
B. Provide temporary and removable protection for installed products. Control activity in immediate work area to minimize damage.
C. Provide protective coverings at openings in walls, roof, and soffits.
D. Protect finished walkways, drives, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
F. Prohibit traffic from landscaped areas.

1.24 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary above grade utilities, equipment, facilities, and materials as soon as permanent facilities can be utilized.
B. Remove risers for underground utilities to a minimum depth of 2 feet and cap.
C. Remove buried equipment, facilities, and materials completely to a minimum depth of 2 feet and cap.

D. Backfill excavations as specified in other sections and grade site as indicated.
E. Clean and repair damage caused by installation or use of temporary work.
F. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.
G. Remove the following at completion of Work:
    1. Office.
    2. Storage sheds.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 57 13 - TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes implementation of a Project Stormwater Pollution Prevention Plan (SWPPP) and installation, maintenance, and removal of erosion and sediment control devices.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCES

A. Reference standards cited herein refer to the current reference standard published at the time of the latest revision date logged unless a date is specifically cited.
   1. ASTM D3786 - Standard Test Method for Bursting Strength of Textile Fabrics - Diaphragm Bursting Strength Tester Method.
   2. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
   3. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.
   4. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.
   5. TCEQ TPDES General Permit No. TXR15000.
   6. TxDOT DMS-6230 Temporary Sediment Control Fence Fabric.•
   7. TxDOT Item 506 Temporary Erosion, Sedimentation, and Environmental Controls.•

1.3 CONTRACTOR RESPONSIBILITIES

A. Meet all TCEQ and EPA requirements for stormwater pollution prevention to include:
   1. Developing a Stormwater Pollution Prevention Plan (SWPPP) unless otherwise stated in Contract Documents;
   2. Filing Notice of Intent (NOI) and include Owner as Operator;•
   3. Installing and maintaining all erosion control measures and best management practices (BMPs);
   4. Performing inspections and preparing reports;
   5. Filing Notice of Termination (NOT); and
   6. Removing erosion control measures and BMPs from site.

1.4 SUBMITTALS

A. SWPPP.
B. TCEQ NOI and NOT for stormwater discharges associated with construction activity under TPDES General Permit.
C. Construction site notice.
D. Notice of Change (if applicable).
E. Other related documentation conforming to Section 01 33 00 Submittal Procedures.•

PART 2 - PRODUCTS

2.1 PRODUCT TYPES AND MATERIALS

A. Sandbag Material: Furnish sandbags meeting Article 2.1.F herein except any gradation of aggregate may be used to fill sandbags.

B. Stabilized Construction Entrances. Provide materials to meet details shown herein and on Drawings.
   1. Provide crushed aggregate for long- and short-term construction exits.
   2. Furnish clean, hard, and durable aggregates free from adherent coatings such as salt, alkali, dirt, clay, loam, shale, soft or flaky materials, organic, and injurious matter.
   3. Use 3- to 5-inch coarse aggregate with a minimum thickness of 12 inches..
   4. Place aggregate over a geotextile fabric meeting the following criteria:
      a. Tensile Strength: 300 pounds, per ASTM D4632.
      b. Puncture Strength: 120 pounds, per ASTM D4833.
      c. Mullen Burst Rate: 600 psi, per ASTM D3786.
      d. Apparent Opening Size: No. 40 (max), per ASTM D4751.
   5. For existing pavement to remain in an area that will function as a stabilized construction entrance, Contractor to provide trackout control mat or approved equal.

C. Sandbags:
   1. Provide sandbag material of polypropylene-, polyethylene-, or polyamide-woven fabric with minimum 4-ounce-per-square-yard unit weight, Mullen burst-strength exceeding 300 psi, and ultraviolet stability exceeding 70 percent.
   2. Use natural coarse sand or manufactured sand meeting gradation given in Table 1 to fill sandbags.
   3. Filled sandbags must be 24 to 30 inches long, 16 to 18 inches wide, and 6 to 8 inches thick.

Table 1 - SAND GRADATION

Sieve No.	Maximum Retained
4	3% by weight
100	80% by weight
200	95% by weight

D. Temporary Sediment Control Fence:
   1. Provide net-reinforced fence using woven, geotextile fabric.
   2. Logos visible to traveling public is not allowed.
   3. Fabric: Provide fabric materials per DMS-6230, Temporary Sediment Control Fence Fabric.•
   4. Posts:
      a. Provide essentially straight wood or steel posts with minimum 48-inch length, unless otherwise shown on Drawings.
      b. Soft wood posts must be at least 3 inches in diameter or nominal 2 by 4 inches.
      c. Hardwood posts must have minimum 1.5- by 1.5-inch cross section
      d. T- or L-shaped steel posts must have minimum 1.3-lb. per foot weight.

5. Net Reinforcement: Provide at least 12.5-gauge, galvanized, welded-wire mesh, with maximum 2- by 4-inch opening size, at least 24 inches wide, unless otherwise shown on Drawings.
6. Staples: Provide with a crown at least 3/4-inch wide and legs 1/2-inch long.

PART 3 - EXECUTION

3.1 INSTALLATION

A. SWPPP: Develop and implement in accordance with TPDES Construction General Permit requirements or as shown on Plans. Prevent water pollution from stormwater runoff by using and maintaining appropriate structural and nonstructural BMPs to reduce pollutants discharges from construction site.

B. Control Measures:
   1. Implement in area to be disturbed before beginning construction, or as directed. Limit disturbance to area shown on Drawings, or as directed.
   2. Control site waste such as discarded building materials, concrete truck washout water, chemicals, litter, and sanitary waste at construction site.
   3. If, in Engineer¢s opinion, Contractor cannot control soil erosion and sedimentation resulting from construction operations, Engineer will limit disturbed area to what Contractor can control.
   4. Immediately correct ineffective control measures. Implement additional controls as directed. Remove excavated material within time requirements specified in applicable stormwater permit.
   5. Upon acceptance of vegetative cover by the City, remove and dispose all temporary control measures, temporary embankments, bridges, matting, falsework, piling, debris, or other obstructions placed during construction that are not part of finished work, or as directed.

C. Do not locate disposal areas, stockpiles, or haul roads in any wetland, water body, or streambed.

D. Do not install temporary construction crossings in or across any water body without prior approval of appropriate resource agency and Engineer.

E. Provide protected storage area for paints, chemicals, solvents, and fertilizers at an approved location. Keep paints, chemicals, solvents, and fertilizers off bare ground and provide shelter for stored chemicals.

F. Installation and Maintenance:
   1. Perform work per TPDES General Permit.
   2. When approved, dispose sediments within embankments or where material will not contribute to further siltation.
   3. Dispose removed material in accordance with federal, state, and local regulations.
   4. Remove devices upon approval or when directed.
      a. Upon removal, finish-grade and dress area.
      b. Stabilize disturbed areas per permit, as shown on Drawings, and/or as directed.
   5. Contractor retains ownership of stockpiled material and must remove from Project when new installations or replacements are no longer required.

G. Construction Entrances:
1. When tracking conditions exist, prevent traffic from crossing or exiting construction site or moving directly onto a public roadway, alley, sidewalk, parking area, or other right of way areas other than at construction entrance locations.
2. Place exit over a foundation course, if necessary. Grade foundation course or compacted subgrade to direct runoff from construction exits to a sediment trap as shown on Drawings, or as directed.
3. At drive approaches, verify construction entrance is full width of drive and meets length shown on Drawings.
   a. Width: at least 20 feet for 1-way and 24 feet for 2-way traffic for all other points of ingress or egress, or as directed by Engineer.

H. Earthwork for Erosion Control. Perform excavation and embankment operations to minimize erosion and remove collected sediments from other erosion control devices.
1. Excavation and Embankment for Erosion Control Measures
   a. Place earth dikes, swales, or combinations of both along low crown of daily lift placement, or as directed, to prevent runoff spillover.
   b. Place swales and dikes at other locations as shown on Drawings, or as directed, to prevent runoff spillover or divert runoff.
   c. Construct cuts with low end blocked with undisturbed earth to prevent erosion of hillsides.
   d. Construct sediment traps at drainage structures in conjunction with other erosion control measures as shown on Drawings, or as directed.
   e. Where required, create a sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent control measures for drainage locations that serve an area with 10 or more disturbed acres at one time, not including offsite areas.
2. Excavation of Sediment and Debris: Remove when accumulation affects performance of devices, after a typical rain event, and when directed.

I. Sandbags for Erosion Control:
1. Construct a berm or dam of sandbags to intercept sediment-laden stormwater runoff from disturbed areas, create a retention pond, detain sediment, and release water in sheet flow.
2. Fill each bag with sand so at least top 6 inches of bag is unfilled to allow for proper tying of open end.
3. Place sandbags with tied ends in same direction.
4. Offset subsequent rows of sandbags half the length of preceding row.
5. Place single layer of sandbags downstream as secondary debris trap.
6. Place additional sandbags as necessary or directed for supplementary support to berms, dams of sandbags, or earth.

J. Temporary Sediment-Control Fence:
1. Provide temporary sediment-control fence near downstream perimeter of disturbed area to intercept sediment from sheet flow.
2. Incorporate fence into erosion-control measures used to control sediment in areas of higher flow. Install fence as shown on Drawings, specified herein, or as directed.
   a. Post Installation: Embed posts at least 18 inches deep or adequately anchor, if in rock, with a 6- to 8-foot spacing and install on slight angle toward run-off source.

b. Fabric Anchoring:
   1) Dig trenches along uphill side of fence to anchor 6-8 inches of fabric.
   2) Provide minimum trench cross-section of 6 by 6 inches.
   3) Place fabric against side of trench and align approximately 2 inches of fabric along bottom in upstream direction.
   4) Backfill trench then hand-tamp.

c. Fabric and Net Reinforcement Attachment:
   1) Unless otherwise shown on Drawings, attach reinforcement to wooden posts with staples, (or to steel posts with T-clips), in at least four places, equally spaced.
   2) Sewn vertical pockets may be used to attach reinforcement to end posts.
   3) Fasten fabric to top strand of reinforcement by hog rings or cord every 15 inches or less.

d. Fabric and Net Splices:
   1) Locate splices at fence post with minimum 6-inch lap attached in at least six places equally spaced, unless otherwise shown on Drawings. Do not locate splices in concentrated flow areas.
   2) Requirements for installation of used temporary sediment-control fence include:
      a) Fabric with minimal or no visible signs of biodegradation (weak fibers);
      b) Fabric without excessive patching (more than one patch every 15-20 feet);
      c) Posts without bends; and
      d) Backing without holes.

3.2 CLEANING

A. Waste Management: Remove sediment, debris, and litter as needed.

3.3 MAINTENANCE

A. Install and maintain temporary erosion- and sedimentation-control device integrity to accumulate silt and debris until earthwork construction and permanent erosion-control features are in place or disturbed area is adequately stabilized as determined by Engineer.
B. If device ceases to function as intended, repair or replace device or portions thereof as necessary.
C. Inspect construction site as prescribed in TPDES General Permit.
D. Maintain records of inspections and modifications based on inspection results, if any, and make available in accordance with permit.

3.4 CLOSEOUT ACTIVITIES

A. Erosion-control measures remain in place and maintained until all soil-disturbing activities at Project site are complete and site is stabilized as required by the permit.
B. Establish a uniform vegetative cover of 70 percent on all unpaved areas, areas not covered by permanent structures, or where permanent erosion-control measures (i.e. riprap, gabions, or geotextiles) are employed.
C. Transmit copy of submitted NOT to Engineer.

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Products.
   2. Product delivery, storage, and handling.
   3. Substitutions.

B. Related Requirements:
   1. Section 00 21 13 "Instructions to Bidders" for product options and substitution procedures.
   2. Division 01 Specification Sections apply to Work of this Section.
   3. Section 01 30 00 "Administrative Requirements" for Project information management.
   4. Section 01 40 00 "Quality Requirements" for product quality monitoring. Testing Laboratory Services.
   5. Section 01 42 00 "References."

1.2 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming Work and does not include machinery and equipment used for preparation, fabrication, conveying and erection of Work.

B. Hazardous Materials: Products or material containing hazardous materials or substances, including but not limited to asbestos or polychlorinated biphenylshall (PCB), shall not be included in Work.

C. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.

D. Provide interchangeable components of same manufacturer, for similar components.

E. Materials required to match existing work and not otherwise specified, shall be equal to existing work in quality, color, and finish. Workmanship and installation shall be comparable to adjacent existing work. Architect shall be authority in determination of acceptable work.

1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery:
   1. Deliver materials, products, and equipment to site in manufacturer's original, unopened containers or packaging, with identifying labels intact and legible.
   2. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
   3. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
   4. Arrange deliveries in accord with construction schedule and in ample time to facilitate inspection prior to installation to avoid unnecessary delays in construction process.

B. Storage:
   1. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible.
   2. Store sensitive products in weathertight, climate-controlled enclosures.
   3. For exterior storage of fabricated products, place on supports, above ground, sloped to drain water.
   4. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of products.
   5. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
   6. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
   7. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
   8. Materials, products, and equipment may be stored off site in a bonded and insured warehouse approved by Architect and Owner. Pay all costs incurred for off-site storage facilities. Products properly stored in off-site storage facilities may be included in progress pay requests with written approval of Architect.

C. Handling: Handle materials, products, and equipment in a manner prescribed by manufacturer or specified to protect from damage during storage and installation.

1.4 SUBSTITUTIONS

A. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during bidding period to requirements specified in this Section.

B. Substitutions (after bidding period) may be considered when a product becomes unavailable through no fault of Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents. Provide each request on CSI Form 13.1A supplied by Architect.

D. A request constitutes a representation that Bidder:
   1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
   2. Will provide same warranty for Substitution as for specified product.
   3. Will coordinate installation and make changes to other Work which may be required for Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.
   5. Will reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to Contract Documents.

F. Substitution Submittal Procedure:
   1. Submit request for substitution for consideration. Limit each request to one proposed Substitution.
   2. Requests shall include name of material or equipment to be substituted and a description of proposed substitution including drawings, performance and test data, and other information necessary for an evaluation.
   3. Submit item-by-item (line-by-line) comparison of each item listed in Specification compiled and submitted comparing specified material/product with proposed substitution and specifically noting all differences between the compared products and/or systems.
   4. Submit statement setting forth changes in other material, equipment or other portions of Work including changes in work of other contracts that incorporation of proposed substitution would require shall be included.
   5. Submit shop drawings, product data, and certified test results for proposed product equivalence.
   6. Architect will notify Contractor, in writing, of decision to accept or reject request.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Closeout procedures.
   2. Final cleaning.
   3. Starting of systems.
   4. Demonstration and instructions.
   5. Testing, adjusting, and balancing.
   6. Protecting installed construction.
   7. Hazardous materials affidavits.
   8. Project record documents.
   9. Operation and maintenance data.
   10. Manual for materials and finishes.
   11. Manual for equipment and systems.
   12. Spare parts and maintenance products.
   13. Product warranties and product bonds.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 01 30 00 "Administrative Requirements" for Project information management.

1.2 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect's review.

B. Provide submittals to Architect required by authority having jurisdiction.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

D. Closeout documents will be submitted electronically in OCR (Optical Character Recognition)/PDF format.

E. At Owner's request, Contractor shall provide a hard copy of Closeout Documents in 3-ring binders.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final Project assessment.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains, and foreign substances; polish transparent and glossy surfaces; and vacuum carpeted and soft surfaces.

C. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.

D. Replace filters of operating equipment.
E. Clean debris from roofs, gutters, downspouts, and drainage systems.
F. Clean site; sweep paved areas, rake clean landscaped surfaces.
G. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.4 STARTING OF SYSTEMS

A. Coordinate schedule for startup of various equipment and systems.
B. Notify Primary Designer days prior to startup of each item.
C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.
E. Verify wiring and support components for equipment are complete and tested.
F. Execute startup under supervision of applicable manufacturer's representative in accordance with manufacturers' instructions.
G. Submit a written report in accordance with Section 01 33 00 "Submittal Procedures" that equipment or system has been properly installed and is functioning correctly.

1.5 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of final inspection.
B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain aspects of operation and maintenance.
D. Demonstrate startup, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

1.6 TESTING, ADJUSTING, AND BALANCING

A. Testing, adjusting, and balancing will be performed in accordance with requirements specified in Division 23 Section "Testing, Adjusting, and Balancing."
B. Owner will appoint, employ, and pay for services of independent firm to perform testing, adjusting, and balancing.
C. Independent firm will perform services specified in Division 23 Section "Testing, Adjusting, and Balancing."
D. Reports will be submitted by independent firm to Architect indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

1.7 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual Specification Sections.
B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
C. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
D. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
E. Prohibit traffic from landscaped areas.

1.8 HAZARDOUS MATERIALS AFFIDAVITS

A. Contractor to provide notarized affidavit declaring that hazardous materials were not incorporated into or delivered to site.
B. Hazardous materials include asbestos, lead polychlorinated biphenyl (PCB), prohibited termite eradication chemicals or any substance of any proportion determined or suspected by an agency of federal or state government to create a health hazard.
C. Provide table of contents listing affidavits in alphabetical order.
D. Prepare cover page with printed title "AFFIDAVITS OF NON-INCORPORATED HAZARDOUS MATERIALS", Title of Project, Project Address, Owner's Name, Address and Phone, and Date of Construction Completion.
E. Provide one complete set of aforementioned information in OCR (Optical Character Recognition)/PDF format.
F. Submit prior to Application for Final Payment.

1.9 PROJECT RECORD DOCUMENTS

A. Maintain on site 1 set of record documents; record actual revisions to Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to Contract.
   5. Reviewed Shop Drawings, Product Data, and Samples.
   6. Complete set of MSDS sheets for materials.
   7. Manufacturer's instruction for assembly, installation, and adjusting.
B. Ensure entries are complete and accurate, enabling future reference by Owner.
C. Store record documents separate from documents used for construction.
D. Record information concurrent with construction progress, not less than weekly.
E. Specifications: Legibly mark and record at each product Section description of products installed, including following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda, Change Orders, RFI responses, and other modifications. For Addenda, Change Orders, and RFI responses, cut out and tape to pages in appropriate location, referencing source of change.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish first floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of Work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract Drawings.
   6. Changes made by Addenda, Change Order, RFI responses, and other modifications. For Addenda, Change Orders, and RFI responses, cut out and tape to pages in appropriate location, referencing source of change.
   7. Submit in OCR (Optical Character Recognition)/PDF format.
   8. Comply with most current requirements of Department of State Health Services, Texas Asbestos Health Protection Rules (TAHPR), Title 25., HEALTH SERVICES, Part I, Chapter 295-Occupational Health, §295.34-Asbestos Management in Facilities and Public Buildings, paragraph (i) as a minimum and as outlined below.
   9. Submit MSDS on products used in construction of Project.
   10. Submit MSDS electronically in 8-1/2- by 11-inch format text pages.
   11. Prepare cover page with printed title "MATERIAL SAFETY DATA SHEETS (MSDS)", Title of Project, Project Address, Owner's Name, Address and Phone, and Date of Construction Completion.
   12. Internally subdivide contents with page dividers, organized into CSI format shown in Project Manual.
   13. Prepare a table of contents, listing each of Division headings and listing each material/product under each heading by manufacturer and material/product name.
   14. Submit complete set of aforementioned information in OCR (Optical Character Recognition)/PDF format.
   15. Submit information with Application for Final Payment and include MSDS for materials/products delivered or installed in Project.
   16. Failure to submit updated electronic MSDS documents will cause Application for Final Payment to be held by Architect (not submitted to Owner for processing) until such time updated electronic MSDS documents are received and reviewed for compliance by Architect.

G. Submit documents to Architect with claim for final Application for Payment.

1.10 OPERATION AND MAINTENANCE DATA

A. Submit data electronically in 8-1/2- by 11-inch text pages, OCR (Optical Character Recognition)/PDF format.

B. Prepare cover page with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of Project.

C. Internally subdivide contents with page dividers, logically organized as described below:
   1. Drawings: Provide in OCR (Optical Character Recognition)/PDF format.
   2. Contents: Prepare Table of Contents for each file (if multiple files), with each product or system description identified, in three parts as follows:
      a. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, subcontractors, and major equipment suppliers.

b. Part 2: Operation and maintenance instructions, arranged by system and subdivided by Specification Section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify:
   1) Significant design criteria.
   2) List of equipment.
   3) Parts list for each component.
   4) Operating instructions.
   5) Maintenance instructions for equipment and systems.
   6) Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

c. Part 3: Project documents and certificates, including:
   1) Shop drawings and product data.
   2) Air and water balance reports.
   3) Certificates.
   4) Scanned copies of warranties and bonds in OCR (Optical Character Recognition)/PDF format.

D. Submit one complete set of aforementioned information in OCR (Optical Character Recognition)/PDF format.

E. Submit documents with Application for Final Payment.

1.11 MANUAL FOR MATERIALS AND FINISHES

A. Submit in OCR (Optical Character Recognition)/PDF format of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return electronic file with comments.

B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within 10 days after acceptance.

C. Submit one electronic copy of completed volumes 15 days prior to final inspection. Draft copy to be reviewed and returned , with Architect comments. Revise content of electronic document set as required prior to final submission.

D. Submit electronic documents of revised final volumes in final form within 10 days after final inspection.

E. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom manufactured products.

F. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

G. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.

H. Additional Requirements: As specified in individual product Specification Sections.

I. Include listing in Table of Contents for design data, with fly sheet.

1.12 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit in OCR (Optical Character Recognition)/PDF format of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return with comments.
B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit electronic documents within 10 days after acceptance.
C. Submit electronic copy of completed volume(s) 15 days prior to final inspection. Draft copy to be reviewed and returned [after final inspection], with Architect comments. Revise content of electronic document set as required prior to final submission.
D. Submit electronic documents in OCR (Optical Character Recognition)/PDF format of revised final volumes in final form within 10 days after final inspection.
E. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
F. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; by label machine.
G. Include color coded wiring diagrams as installed.
H. Operating Procedures: Include startup, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and special operating instructions.
I. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
J. Include servicing and lubrication schedule, and list of lubricants required.
K. Include manufacturer's printed operation and maintenance instructions.
L. Include sequence of operation by controls manufacturer.
M. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
N. Include control diagrams by controls manufacturer as installed.
O. Include Contractor's coordination drawings, with color coded piping diagrams as installed.
P. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
Q. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
R. Include test and balancing reports as specified in Section 01 40 00 "Quality Requirements".
S. Additional Requirements: As specified in individual product Specification Sections.
T. Include listing in Table of Contents for design data, with dividers.

1.13 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual Specification Sections.
B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.
C. Submit receipts signed by Owner or letter stating Contractor has delivered extra products to Owner.

1.14 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed by responsible subcontractors, suppliers, and manufacturers, within 10 days after completion of applicable item of work.
B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
C. Verify documents are in proper form, contain full information, and are notarized.
D. Co-execute submittals when required.
E. Include Table of Contents.
F. Submit one complete set of aforementioned information in OCR (Optical Character Recognition)/PDF format for review.
G. Submit prior to Application for Final Payment.
H. Time of Submittals:
    1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
    2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
    3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing date of acceptance as beginning of warranty or bond period.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 91 13 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Commissioning Authority will be hire by General Contractor directly.
   2. Commissioning Authority shall provide services necessary to comply with Section C408 of the 2015 International Energy Conservation Code.
   3. Contractor shall perform and assist in the commissioning process. Perform commissioning in a systematic process to ensure that all building systems perform interactively according to design intent and Owner's operational needs. Commissioning process shall encompass and coordinate separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing, and training.
   4. Commissioning during construction phase is intended to achieve the following specific objectives according to the Contract Documents:
      a. Verify applicable equipment and systems are installed in accordance with manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
      b. Verify and document proper performance of equipment and systems.
      c. Verify operation and maintenance documentation left on-site is complete.
   5. Commissioning process shall not take away from or reduce responsibility of Contractor to provide finished and fully functioning product.
   6. HVAC commissioning description.

B. Related Requirements:
   1. Other Division 01 Specification Sections apply to Work of this Section.

1.2 DEFINITIONS

A. Acceptance Phase: Phase of construction after startup and initial checkout when functional performance tests, operation and maintenance documentation review, and training occurs.

B. Approval: Acceptance that a piece of equipment or system has been properly installed and is functioning in tested modes according to Contract Documents.

C. Architect: Prime consultant and subconsultants who comprise design team, generally HVAC Mechanical Designer/Engineer and Electrical Designer/Engineer.

D. Commissioning Authority: Commissioning Authority directs and coordinates day-to-day commissioning activities. Commissioning Authority does not take an oversight role like Construction Manager. Commissioning Authority is part of Construction Manager team or shall report directly to Construction Manager.

E. Commissioning Plan: An overall plan, developed before or after bidding, that provides structure, schedule, and coordination planning for commissioning process.

F. Contractor: Provider of labor, materials, equipment, and services to complete the Work as outlined in the Contract Documents.

G. Construction Checklist: A list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by Commissioning Authority to subcontractor. Construction checklists are primarily static inspections and procedures to prepare equipment or system for initial operation (e.g., belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some construction checklist items entail simple testing of function of a component, a piece of equipment or system (such as measuring voltage imbalance on a three-phase motor). Construction checklists augment and are combined with manufacturer's startup checklist.

H. Construction Manager:
   1. Owner's Representative in day-to-day activities of construction. In general, construction management services Contractor is hired by Owner to assist in overall management of Project including supervising and on-site managing authority over a Project's construction. General Contractor reports to Construction Manager. Construction Manager is Owner's on-site representative.
   2. When Commissioning Authority is hired by Contractor or Architect, Construction Manager referred to in commissioning process is a member of Construction Manager team (staff or independent contractor) who shall have direct significant mechanical engineering and commissioning experience. That person designated from Construction Manager team is Owner's Representative verifying adequacy of commissioning process. In this case, Construction Manager will be more involved in commissioning work and in witnessing portions of process (selected startup and functional tests) and reviewing documents (test approvals, etc.) than in following case.
   3. When Commissioning Authority is hired by Construction Manager (on staff or as a subcontractor), or directly by Owner, there may not need to be another Construction Manager representative reviewing and approving work of Commissioning Authority, other than schedule approvals and consultation during problem solving. In that case, references to Construction Manager in these Specifications would actually mean Commissioning Authority, except that Commissioning Authority progress reports would go to Project Manager rather than Construction Manager.

I. Deferred Functional Tests: Functional tests that are performed later, after Substantial Completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow test from being performed.

J. Deficiency: A condition in installation or function of a component, piece of equipment, or system that is not in compliance with Contract Documents (that is, does not perform properly or is not complying with design intent).

K. Design Intent: A dynamic document that provides explanation of ideas, concepts and criteria that are considered to be very important to Owner. It is initially outcome of programming and conceptual design phases.

L. Design Narrative or Design Documentation: Sections of either Design Intent or Basis of Design.

M. Factory Testing: Testing of equipment on-site or at factory, by-factory personnel with Owner's Representative present.

N. Functional Performance Test: Test of dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is dynamic testing of systems (rather than just components) under full operation (e.g., chiller pump is tested interactively with chiller functions to see if pump ramps up and down to maintain differential pressure setpoint). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. Systems are run through all control system's sequences of operation and components are verified to be responding as sequences state. Traditional air or water test and balancing is not functional testing, in the commissioning sense of the word. Testing and balancing contractor's primary work is setting up system flows and pressures as specified, while functional testing is verifying that which has already been set up. Commissioning Authority develops functional test procedures in a sequential written form, coordinates, oversees and documents actual testing, which is usually performed by installing contractor or vendor. Functional tests are performed after construction checklists, and startup are complete.

O. Indirect Indicators: Indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100 percent closed.

P. Manual Test: Using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make "observation").

Q. Monitoring: Recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or trending capabilities of control systems.

R. Noncompliance: See "Deficiency."

S. Nonconformance: See "Deficiency."

T. Overwritten Value: Writing over a sensor value in control system to see response of a system (e.g., changing outside air temperature value from 50 to 75 degrees F to verify economizer operation). See also "Simulated Signal."

U. Owner-Contracted Tests: Tests paid for by Owner outside of the Agreement with Contractor and for which Commissioning Authority does not oversee. Tests will not be repeated during functional tests if properly documented.

V. Phased Commissioning: Commissioning that is completed in phases (by floors, for example) due to size of structure or other scheduling issues, in order minimize total construction time.

W. Project Manager: Contracting and managing authority for Owner over design and/or construction of Project, a staff position.

X. Sampling: Functionally testing only a fraction of total number of identical or near identical pieces of equipment. Refer to article "Functional Performance Testing" for additional details.

Y. Seasonal Performance Tests: Functional Tests that are deferred until system(s) will experience conditions closer to their design conditions.

Z. Simulated Condition: Condition that is created for purpose of testing response of a system (e.g., applying a hair blower to a space sensor to see response in a VAV box).

AA. Simulated Signal: Disconnecting a sensor and using a signal generator to send an amperage, resistance, or pressure to transducer and DDC system to simulate a sensor value.

BB. Startup: Initial starting or activating of dynamic equipment, including executing construction checklists.

CC. Subcontractors: Specialty contractors who hold contracts with Contractor to furnish and install building components and systems.
DD. Test Procedures: Step-by-step process which must be executed to fulfill test requirements.
EE. The test procedures are developed by Commissioning Authority.
FF. Test Requirements: Requirements specifying what modes and functions, etc., shall be tested. The test requirements are not detailed test procedures. The test requirements are specified in Contract Documents.
GG. Trending: Monitoring using building control system.
HH. Vendor: Supplier of equipment.

1.3 REFERENCES

A. 2018 International Energy Conservation Code:
1. Section C408, for minimum and mandatory commissioning requirements.

1.4 SUBMITTALS

A. Commissioning Authority will provide appropriate subcontractors with specific request for type of submittal documentation Commissioning Authority requires to facilitate commissioning work. Requests will be integrated into normal submittal process and protocol of construction team. At minimum, request will include manufacturer and model number, manufacturer's printed installation and detailed startup procedures, full sequences of operation, operation and maintenance data, performance data, any performance test procedures, Control Drawings, and details of Owner-contracted tests. In addition, installation and checkout materials that are actually shipped inside equipment and actual field checkout sheet forms to be used by factory or field technicians shall be submitted to Commissioning
B. authority. All documentation requested by Commissioning Authority will be included by subcontractors in their operation and maintenance data manual contributions.
1. Commissioning Authority will review submittals related to commissioned equipment for conformance to Contract Documents as it relates to commissioning process, to functional performance of equipment, and adequacy for developing test procedures. Review will be primarily to aid in development of functional testing procedures and only secondarily to verify compliance with equipment specifications. Commissioning Authority will notify Construction Manager, Project Manager, or Architect as requested, of items missing or areas that are not in conformance with Contract Documents and which require resubmission.
2. Commissioning Authority may request additional design narrative from Architect and controls contractor, depending on completeness of design intent documentation and sequences provided with Specifications.
3. Submittals to Commissioning Authority do not constitute compliance for operation and maintenance manual documentation. Operation and maintenance manuals are responsibility of Contractor, though Commissioning Authority will review them.

4. Written Work Products: Commissioning process generates a number of written work products described in various parts of Specifications. Commissioning plan lists all formal written work products, describes briefly their contents, who is responsible to create them, their due dates, who receives and approves them and location of specification to create them. Written products are:

Product	Developed By
Final commissioning plan	Commissioning Authority
Commissioning meeting minutes	Commissioning Authority
Commissioning schedules	Commissioning Authority with Contractor and Project Manager / Construction Manager
Equipment documentation submittals	Subcontractors
Sequence clarifications	Subcontractors and Architect as needed
Construction checklists	Commissioning Authority
Startup and initial checkout plan	Subcontractors and Commissioning Authority (compilation of existing documents)
Startup and initial checkout forms filled out	Subcontractors
Final TAB report	TAB Subcontractor
Issues log (deficiencies)	Commissioning Authority
Commissioning Progress Record	Commissioning Authority
Deficiency reports	Commissioning Authority
Functional test forms	Commissioning Authority
Filled out functional tests	Commissioning Authority with Contractor
O&M manuals	Subcontractors
Commissioning record book	Commissioning Authority
Final commissioning report	Commissioning Authority
Misc. approvals	Commissioning Authority

1.5 QUALITY ASSURANCE

A. Meetings:
1. Scoping Meeting: Within 14 days of commencement of construction, Commissioning Authority will schedule, plan, and conduct a commissioning scoping meeting with
2. entire commissioning team in attendance. Meeting minutes will be distributed to all parties by Commissioning Authority. Information gathered from this meeting will allow Commissioning Authority to revise commissioning plan to its "final" version, which will also be distributed to all parties.
3. Miscellaneous Meetings: Other meetings will be planned and conducted by Commissioning Authority as construction progresses. Meetings will cover coordination, deficiency resolution, and planning issues with particular subcontractors. Commissioning Authority will plan meetings and will minimize unnecessary time being spent by subcontractors. For large projects, meetings may be held monthly, until final three months of construction when they may be held as frequently as one per week.

B. Coordination:
   1. Members of commissioning team shall consist of Commissioning Authority, Project Manager, designated representative of Owner's Construction Management firm, Contractor, Architect, and design engineers (particularly mechanical engineer), mechanical subcontractor, electrical subcontractor, testing and balancing representative, controls subcontractor, and other installing subcontractors or vendors. Owner's building or plant operator/engineer shall also be a member of commissioning team.
   2. Management: Commissioning Authority shall direct and coordinate commissioning activities and report to the Construction Manager, Project Manager and Owner. Members of commissioning team shall work together to fulfill their contracted responsibilities and meet objectives of the Contract Documents.

C. Reporting:
   1. Commissioning Authority will provide regular reports to Construction Manager, Project Manager, or Owner, depending on management structure, with increasing frequency as construction and commissioning progresses. Standard forms are provided and referenced in commissioning plan.
   2. Commissioning Authority will regularly communicate with all members of commissioning team, keeping them apprised of commissioning progress and scheduling changes through memos, progress reports, etc.
   3. Testing or review approvals and nonconformance and deficiency reports are made regularly with review and testing as described in later Sections.
   4. Final summary report by Commissioning Authority will be provided to Construction Manager, Project Manager, or Owner, focusing on evaluating commissioning process issues and identifying areas where process could be improved. Acquired documentation, logs, minutes, reports, deficiency lists, communications, findings, unresolved issues, etc., will be compiled in appendices and provided with summary report. Construction checklists, functional tests, and monitoring reports will not be part of final report but will be stored in Commissioning Record in operation and maintenance manuals.

1.6 ENGINEER'S RESPONSIBILITIES

A. Construction and Acceptance Phase:
   1. Perform normal submittal review, construction observation, etc., as contracted. On-site observation shall be completed just prior to system startup.
   2. Engineer shall assist (along with subcontractors) in clarifying operation and control of commissioned equipment in areas where Specifications, Control Drawings, or equipment documentation is not sufficient for writing detailed testing procedures.
   3. Participate in resolution of system deficiencies identified during commissioning, according to Contract Documents.
   4. Review construction checklists for major pieces of equipment for sufficiency prior to their use.
   5. Review functional test procedure forms for major pieces of equipment for sufficiency prior to their use.

B. Warranty Period: Participate in resolution of noncompliance, nonconformance, and design deficiencies identified during commissioning during warranty period commissioning.

C. Follow commissioning plan.

1.7 COMMISSIONING AUTHORITY'S RESPONSIBILITIES

A. Commissioning Authority shall not be responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. Commissioning Authority may assist with problem-solving, nonconformance, or deficiencies. Primary role of Commissioning Authority shall be to develop and coordinate execution of testing plan, observe, and document performance that systems are functioning in accordance with documented design intent and in accordance with Contract Documents. Contractor shall provide tools and labor to start, check-out and functionally test equipment and systems.

B. Construction and Acceptance Phase:

1. Coordinate and direct commissioning activities in a logical, sequential, and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with necessary parties, frequently updated timelines and schedules, and technical expertise.
2. Coordinate commissioning work and, with Contractor and Project/Construction Manager, ensure that commissioning activities are being scheduled into master schedule.
3. Revise commissioning plan as necessary.
4. Plan and conduct commissioning scoping meeting and other commissioning meetings.
5. Request and review additional information required to perform commissioning tasks, including operation and maintenance materials, Contractor startup, and checkout procedures.
6. Before startup, gather and review current control sequences and interlocks and work with subcontractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.
7. Review Contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with Architect reviews.
8. Write and distribute construction checklists.
9. Perform site visits, as necessary, to observe component and system installations. Attend selected planning and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to commissioning process. Assist in resolving any discrepancies.
10. Notify Owner of pre-functional tests and construction checklist completion by reviewing prefunctional checklist reports and by selected site observation and spot checking.
11. Notify Owner of systems startup by reviewing startup reports and by selected site observation.
12. Review testing and balancing execution plan.
13. Before testing and balancing is executed, oversee sufficient functional testing of control system and approve system to be used for testing and balancing.
14. Review air and water systems balancing by spot testing, by documenting completed reports, and by selected site observation.

15. With necessary assistance and review from installing subcontractors, write functional performance test procedures for equipment and systems. Test procedures may include energy management control system trending, stand-alone data logger monitoring, or manual functional testing. Submit to Owner for review, and for approval if required.
16. Analyze functional performance trend logs and monitoring data to verify performance.
17. Coordinate and witness functional performance tests performed by installing subcontractors. Coordinate retesting as necessary until satisfactory performance is achieved.
18. Maintain master deficiency and resolution log and separate testing record. Provide Owner with written progress reports and test results with recommended actions.
19. Review equipment warranties to ensure that Owner's responsibilities are clearly defined.
20. Compile and maintain commissioning record and building systems book(s).
21. Review operation and maintenance manuals.
22. Provide final commissioning report as specified below.
23. Develop commissioning record book in accordance with ASHRAE HVAC Commissioning Guideline 0-2005.

C. Warranty Period:
1. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
2. Return to site at 10 months into the 12-month warranty period and review with facility staff current building operation and condition of outstanding issues related to original and seasonal commissioning. Identify areas that may come under warranty or under original construction contract as a warranty period punch list.
3. Prepare and submit final Commission Record report to Owner.

D. Attend commissioning scoping meeting and additional meetings, as necessary.
E. Follow commissioning plan.
F. Conduct HVAC system orientation and inspection.
G. Air Economizer shall undergo a functional test to determine that they operate in accordance with manufacturer's specifications.

1.8 CONSTRUCTION MANAGER'S - OWNER'S REPRESENTATIVE'S RESPONSIBILITIES

A. Construction and Acceptance Phase:
1. Facilitate coordination of commissioning work by Commissioning Authority, and, with Contractor and Commissioning Authority, ensure that commissioning activities are being scheduled into master schedule.
2. Review and approve final commissioning plan.
3. Attend commissioning scoping meeting and other commissioning team meetings.
4. Perform normal review of Contractor submittals.
5. Furnish copy of construction documents, addenda, change orders and approved submittals and Shop Drawings related to commissioned equipment to Commissioning Authority.
6. Prior to testing, review and approve functional performance test procedures submitted by Commissioning Authority.
7. When necessary, observe and witness construction checklists, startup and functional testing of selected equipment.

8. Review commissioning progress and deficiency reports.
9. Coordinate resolution of noncompliance and design deficiencies identified in all phases of commissioning.
10. Sign-off (final approval) on individual commissioning tests as completed and passing. Recommend completion of commissioning process to Project Manager.
11. Assist Contractor in coordinating training of Owner personnel.

B. Warranty period: Assist Commissioning Authority as necessary in seasonal or deferred testing and deficiency corrections required by Specifications.
C. Attend commissioning scoping meeting and additional meetings, as necessary.
D. Follow commissioning plan.

1.9 OWNER'S PROJECT MANAGER'S RESPONSIBILITIES

A. Construction and Acceptance Phase:
1. Manage contract of Architect and of Contractor.
2. Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions according to commissioning plan - construction phase.
3. Provide final approval for completion of commissioning work.

B. Warranty period: Ensure seasonal or deferred testing and deficiency issues are addressed.
C. Attend commissioning scoping meeting and additional meetings, as necessary.
D. Follow commissioning plan.

1.10 CONTRACTOR'S RESPONSIBILITIES

A. Construction and Acceptance Phase:
1. Facilitate coordination of commissioning work by Commissioning Authority, and, with Commissioning Authority, ensure that commissioning activities are being scheduled into master schedule.
2. Include cost of commissioning in total Contract Price.
3. Furnish copy of construction documents, addenda, change orders and approved submittals and Shop Drawings related to commissioned equipment to Commissioning Authority.
4. In each Purchase Order or subcontract written, include requirements for submittal data, operation and maintenance data, commissioning tasks and training.
5. Ensure subcontractors execute commissioning responsibilities according to Contract Documents and schedule.
6. Representative shall attend commissioning scoping meeting and other necessary meetings scheduled by Commissioning Authority to facilitate commissioning process.
7. Coordinate training of Owner's personnel.
8. Prepare operation and maintenance manuals, according to Contract Documents, including clarifying and updating original sequences of operation to record "as-built" conditions.

B. Warranty Period:
1. Ensure subcontractors execute seasonal or deferred functional performance testing, witnessed by Commissioning Authority, according to Contract Documents.
2. Ensure subcontractors correct deficiencies and make necessary adjustments to operation and maintenance manuals and "as-built" Record Drawings for applicable issues identified in seasonal testing.

C. Attend commissioning scoping meeting and additional meetings, as necessary.
D. Follow commissioning plan.

1.11 VENDOR'S RESPONSIBILITIES

A. Provide requested submittal data, including detailed startup procedures and specific responsibilities of Owner to keep warranties in force.
B. Assist in equipment testing per agreements with subcontractors.
C. Include special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment in accordance with Contract Documents in bid price, except for standalone data logging equipment that may be used by Commissioning Authority.
D. Analyze specified products and verify that designer has specified newest most updated equipment reasonable for Project's scope and budget.
E. Provide information requested by Commissioning Authority regarding equipment sequence of operation and testing procedures.
F. Review test procedures for equipment installed by manufacturer's factory representatives.
G. Attend commissioning scoping meeting and additional meetings, as necessary.
H. Follow commissioning plan.

1.12 SCHEDULING

A. Commissioning Authority shall work with Owner and Contractor according to established protocols to schedule commissioning activities. Commissioning Authority shall provide sufficient notice to Owner and Contractor for scheduling commissioning activities. Contractor shall integrate commissioning activities into master schedule. Commissioning Authority, Owner, and Contractor shall address scheduling problems and make necessary notifications in timely manner in order to expedite commissioning process.
B. Commissioning Authority shall provide initial schedule of primary commissioning events at commissioning scoping meeting. Commissioning plan shall provide format for schedule. As construction progresses, more detailed schedules shall be developed by Commissioning Authority. Commissioning plan shall also provide format for detailed schedules.
C. Prepare schedule indicating anticipated start dates for the following:
    1. Piping system pressure testing
    2. Piping system flushing and cleaning.
    3. Ductwork cleaning.
    4. Ductwork pressure testing.
    5. Equipment and system startups
    6. Automatic temperature control system checkout.
    7. Testing, adjusting, and balancing.
    8. HVAC system orientation and inspection.
    9. Lighting system controls testing.
    10. Operation and maintenance manual submittals.
    11. Training sessions.

1.13 OWNER'S INSTRUCTION

A. Contractor shall be responsible for training coordination and scheduling and ultimately for ensuring training is completed.

1.14 COMMISSIONING DESCRIPTION

A. HVAC commissioning process includes the following tasks:
   1. Testing and startup of HVAC equipment and systems.
   2. Equipment and system verification checks.
   3. Assistance in functional performance testing and balancing, and equipment and system performance.
   4. Provide qualified personnel to assist in commissioning tests, including seasonal testing.
   5. Complete and endorse functional performance test checklists provided by Commissions Authority to assure equipment and systems are fully operational and ready for functional performance testing.
   6. Provide equipment, materials, and labor necessary to correct deficiencies found during commissioning process to fulfill contract and warranty requirements.
   7. Provide operation and maintenance information and record drawings to Commissioning Authority for review verification and organization, prior to authorization.
   8. Provide a preliminary commissioning report that identifies the following:
      a. Itemization of deficiencies found during testing required by Section C408.2.3 in the IECC 2018, that have not been corrected at the time of report preparation.
      b. Deferred test that cannot be performed at the time of report preparation because of climatic conditions.
      c. Climatic conditions required by performance of the deferred tests.
   9. Provide assistance to Commissioning Authority to develop, edit, the document system operation descriptions.
   10. Provide training for systems specified in this Section with coordination by Commissioning Authority.
   11. Provide operating and maintenance manual that includes the following:
      a. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
      b. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.
      c. Name and address of at least one service agency.
      d. HVAC and service hot water controls system maintenance and calibration information, including wiring diagrams, schematics and control sequence descriptions. Desired or field-determined set points shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.
      e. Submittal data indicating all selected options for each piece of lighting equipment and lighting controls.
      f. Operating and maintenance manuals for each piece of lighting equipment. Required routine maintenance actions, cleaning and recommended re-lamping shall be clearly identified.
      g. A schedule for inspection and recalibrating all lighting controls.
      h. A narrative of how each system is intended to operate, including recommended set points.

12. Provide a final commissioning report that contains the following:
    a. The result of the functional performance tests, disposition of deficiencies found during the testing.
    b. Include details of corrective measures used or proposed
    c. Functional performance test procedures used during the commissioning process including measurable criteria for test acceptance, provide herein for repeatability.
13. Provide a system balancing report describing the activities and measurements completed in accordance with Section C408.2.2 in IECC 2015.

B. Equipment and Systems to Be Commissioned:
1. New HVAC systems that were installed under this Contract.

C. The following is a partial list of equipment included in the HVAC Commissioning:
1. Provide functional performance testing specified in Section C408.2.3 of IECC 2018. Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with approved plans and specifications such that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all modes and sequence of operation, including under full-load, part-load and the following emergency conditions.
    a. All modes as described in the sequence of operation.
    b. Redundant or automatic back-up mode.
    c. Performance of alarms.
    d. Mode of operation upon a loss of power and restoration of power.
        1) Pumps.
        2) Piping systems.
        3) Ductwork.
        4) Variable frequency drives.
        5) VRF indoor units.
        6) VRF outdoor units.
        7) ERV unit.
        8) Mini-splits.
        9) Package Rooftop Units.
        10) Outside air unit.
        11) Electric Water Heater.
        12) Fire Pump System
        13) Unit Heaters.
        14) HVLS Fans.
        15) Indoor Air Quality.
        16) Testing, Adjusting and Balancing work.

D. Perform seasonal function performance tests for the following equipment and systems:
1. Heating equipment during heating season.
2. Cooling equipment during cooling season.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. Standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by each contractor for equipment being

B. For example, mechanical subcontractor shall ultimately be responsible for standard testing equipment for HVAC system and controls system, except for equipment specific to and used by testing and balancing contractor in their commissioning responsibilities. Two-way radios shall be provided by Contractor for equipment being tested.

1. Special equipment, tools and instruments which are only available from vendor, specific to a piece of equipment and required for testing equipment shall be provided, left on site, and shall become property of Owner.
2. Testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with tolerances specified.

PART 3 - EXECUTION

3.1 COMMISSIONING PROCESS

A. Commissioning plan shall provide guidance in execution of commissioning process. Immediately after initial commissioning scoping meeting, Commissioning Authority will update plan submitted with Bid which is then considered "final" plan. Plan will continue to evolve and expand as Project progresses.

B. Commissioning Tasks and Sequence:

1. Commissioning during construction shall begin with scoping meeting conducted by Commissioning Authority to review commissioning process with commissioning team members.
2. Additional meetings required during construction shall be scheduled by Commissioning Authority with necessary parties attending, to plan, scope, coordinate, schedule future activities and resolve problems.
3. Equipment documentation shall be submitted to Commissioning Authority during normal submittals, including detailed startup procedures.
4. Commissioning Authority shall work with subcontractors in developing startup plans and startup documentation formats, including providing subcontractors with construction checklists to be completed, during startup process.
5. Checkout and performance verification shall proceed from simple to complex; from component level to equipment to systems and intersystem levels with construction checklists being completed before functional testing.
6. Subcontractors shall execute and document construction checklists and perform startup and initial checkout. Commissioning Authority shall document that checklists and startup were completed according to approved plans. Commissioning Authority may witness startup of selected equipment.
7. Commissioning Authority shall develop specific equipment and system functional performance test procedures. Subcontractors shall review procedures.

8. Procedures shall be executed by subcontractors, under direction of, and documented by Commissioning Authority.
9. Items of noncompliance in material, installation, or setup shall be corrected at subcontractor's expense and system shall be retested.
10. Commissioning Authority shall review operation and maintenance documentation for completeness.
11. Commissioning shall be completed prior to Substantial Completion.
12. Deferred testing shall be conducted, as specified or required.

3.2 STARTUP, CONSTRUCTION CHECKLISTS, AND INITIAL CHECKOUT

A. Perform following procedures on equipment to be commissioned. Some systems that are not comprised, e.g., electrical system power quality, may have very simplified construction checklists and startup.

B. Construction checklists shall verify that equipment and systems are hooked up and operational. It ensures that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full checkout. No sampling strategies are used. Prefunctional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of given system.

3.3 FUNCTIONAL PERFORMANCE TESTING

A. Functional performance testing shall demonstrate that each system is operating in accordance with documented design intent and Contract Documents. Functional testing shall facilitate bringing systems from state of Substantial Completion to full dynamic operation. During testing process, areas of deficient performance shall be identified and corrected, improving operation and functioning of systems.

B. Each system shall be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load) where there is a specified system response. Verify each sequence in sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested. Development of test procedures: Before test procedures are written, Commissioning Authority shall obtain all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Commissioning Authority shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each subcontractor or vendor responsible to execute a test shall provide limited assistance to Commissioning Authority in developing procedures review (answering questions about equipment, operation, sequences, etc.). Prior to execution, Commissioning Authority shall provide a copy of test procedures to subcontractor(s) who shall review tests for feasibility, safety, equipment, and warranty protection. Commissioning Authority may submit tests to Architect for review, if requested.

C. Commissioning Authority shall review Owner-contracted, factory testing or required Owner acceptance tests which Commissioning Authority is not responsible to oversee, including documentation format, and shall determine what further testing or format changes may be required to comply with Specifications. Redundancy of testing shall be minimized.

D. Purpose of specific test is to verify and document compliance with stated criteria of acceptance given on test form.

3.4 PHASED COMMISSIONING

A. Startup and initial checkout may be executed in phases.
B. Phasing shall be planned and scheduled during coordination meeting of Commissioning Authority, Construction Manager, Contractor and mechanical, testing and balancing, and controls contractors.
C. Results shall be incorporated into master and commissioning schedule.

3.5 FINAL DOCUMENTATION

A. Standard operation and maintenance manuals: Specific content and format requirements for standard operation and maintenance manuals shall be as specified in Section 01 70 00 "Execution and Closeout Requirements."
B. Final report details: Final commissioning report shall include executive summary, list of participants and roles, brief system description, overview of commissioning and testing scope and a general description of testing and verification methods. For each piece of commissioned equipment, report shall contain disposition of commissioning authority regarding adequacy of equipment, documentation, and training meeting Contract Documents in following areas:
    1. Equipment meeting equipment Specifications.
    2. Equipment installation.
    3. Functional performance and efficiency.
    4. Equipment documentation and design intent.
C. Outstanding noncompliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. shall also be listed.
D. Each noncompliance issue shall be referenced to specific functional test, inspection, trend log, etc. where deficiency is documented.
E. Functional performance and efficiency section for each piece of equipment shall include brief description of verification method used (manual testing, BAS trend logs, data loggers, etc.) and include observations and conclusions from testing.
F. Other documentation will be retained by Commissioning Authority.

END OF SECTION

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.
B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
   1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.3 FIELD CONDITIONS

A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
C. Storage or sale of removed items or materials on-site is not permitted.
D. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
   5. Maintain adequate ventilation when using cutting torches.
   6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
   7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
   8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
   9. Dispose of demolished items and materials promptly.

3.3 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Form-facing material for cast-in-place concrete.
   2. Shoring, bracing, and anchoring.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 DEFINITIONS

A. Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.

B. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review the following:
      a. Special inspection and testing and inspecting agency procedures for field quality control.
      b. Construction, movement, contraction, and isolation joints
      c. Forms and form-removal limitations.
      d. Shoring and reshoring procedures.
      e. Anchor rod and anchorage device installation tolerances.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following:
   1. Exposed surface form-facing material.
   2. Concealed surface form-facing material.
   3. Pan-type forms.
   4. Form ties.
   5. Waterstops.
   6. Form-release agent.

B. Shop Drawings: Prepared by, and signed and sealed by, a qualified professional engineer responsible for their preparation, detailing fabrication, assembly, and support of forms.
   1. For exposed vertical concrete walls, indicate dimensions and form tie locations.
   2. Indicate dimension and locations of construction and movement joints required to construct the structure in accordance with ACI 301.
      a. Location of construction joints is subject to approval of the Architect.
   3. Indicate location of waterstops.
   4. Indicate proposed schedule and sequence of stripping of forms, shoring removal, and reshoring installation and removal.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.
   1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
   2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.

2.2 FORM-FACING MATERIALS

A. As-Cast Surface Form-Facing Material:
   1. Provide continuous, true, and smooth concrete surfaces.
   2. Furnish in largest practicable sizes to minimize number of joints.
   3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 03 30 00 "Cast-In-Place Concrete, and as follows:
      a. Plywood, metal, or other approved panel materials.

B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.
   1. Provide lumber dressed on at least two edges and one side for tight fit.

C. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation, with straight or tapered end forms.

2.3 WATERSTOPS

A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4- by 1-inch.

B. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer-modified chloroprene rubber, for adhesive bonding to concrete, 3/8- by 3/4-inch.

2.4 RELATED MATERIALS

A. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4- by 3/4-inch, minimum.

B. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
   1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

C. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish units that leave no corrodible metal closer than 1-inch to the plane of exposed concrete surface.
   2. Furnish ties that, when removed, leave holes no larger than 1-inch in diameter in concrete surface.
   3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

A. Comply with ACI 301.
B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 03 30 00 "Cast-In-Place Concrete" for as-cast finishes.Limit concrete surface irregularities as follows:
   1. Surface Finish-1.0: ACI 117 Class D, 1-inch.
   2. Surface Finish-2.0: ACI 117 Class B, 1/4-inch.
   3. Surface Finish-3.0: ACI 117 Class A, 1/8-inch.
C. Construct forms tight enough to prevent loss of concrete mortar.
   1. Minimize joints.
   2. Exposed Concrete: Symmetrically align joints in forms.
D. Construct removable forms for easy removal without hammering or prying against concrete surfaces.
   1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
   2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   3. Install keyways, reglets, recesses, and other accessories, for easy removal.
E. Do not use rust-stained, steel, form-facing material.
F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.
   1. Provide and secure units to support screed strips
   2. Use strike-off templates or compacting-type screeds.
G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
   1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
   2. Locate temporary openings in forms at inconspicuous locations.
H. Chamfer exterior corners and edges of permanently exposed concrete.
I. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.

J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.
   1. Determine sizes and locations from trades providing such items.
   2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.

K. Construction and Movement Joints:
   1. Construct joints true to line with faces perpendicular to surface plane of concrete.
   2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
   3. Place joints perpendicular to main reinforcement.
   4. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
      a. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
   5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
   6. Space vertical joints in walls at 60 feet maximum.
      a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

L. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
   1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
   2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.

M. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

N. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

O. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
   1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
   3. Clean embedded items immediately prior to concrete placement.

3.3 INSTALLATION OF WATERSTOPS

A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated on Drawings, according to manufacturer's written instructions, by adhesive bonding, mechanically fastening, and firmly pressing into place.
   1. Install in longest lengths practicable.
   2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
   3. Protect exposed waterstops during progress of the Work.

3.4 REMOVING AND REUSING FORMS

A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
   1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
   2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work.
   1. Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
   2. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.
   1. Align and secure joints to avoid offsets.
   2. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.5 SHORING AND RESHORING INSTALLATION

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
   1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:
   1. Inspect formwork for shape, location, and dimensions of the concrete member being formed.

END OF SECTION

SECTION 03 20 00 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Steel reinforcement bars.
   2. Welded-wire reinforcement.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review the following:
      a. Special inspection and testing and inspecting agency procedures for field quality control.
      b. Steel-reinforcement installation.

1.3 ACTION SUBMITTALS

A. Shop Drawings: Comply with ACI SP-066:
   1. Include placing drawings that detail fabrication, bending, and placement.
   2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
B. Construction Joint Layout: Indicate proposed construction joints required to build the structure.
   1. Location of construction joints is subject to approval of the Architect.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
   1. Store reinforcement to avoid contact with earth.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615, Grade 60, deformed.
B. Low-Alloy Steel Reinforcing Bars: ASTM A706, deformed.

2.2 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
   1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
      a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
C. Steel Tie Wire: ASTM A1064, annealed steel, not less than 0.0508-inch in diameter.
   1. Finish: Plain.

2.3 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:
   1. Do not cut or puncture vapor retarder.
   2. Repair damage and reseal vapor retarder before placing concrete.
B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
B. Accurately position, support, and secure reinforcement against displacement.
   1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
   2. Do not tack weld crossing reinforcing bars.
C. Preserve clearance between bars of not less than 1-inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
D. Provide concrete coverage in accordance with ACI 318.
E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
F. Splices: Lap splices as indicated on Drawings.
   1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
   2. Stagger splices in accordance with ACI 318.

G. Install welded-wire reinforcement in longest practicable lengths.
   1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
      a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches.
   2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
   3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
   4. Lace overlaps with wire.

3.3 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
   1. Place joints perpendicular to main reinforcement.
   2. Continue reinforcement across construction joints unless otherwise indicated.
   3. Do not continue reinforcement through sides of strip placements of floors and slabs.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
B. Inspections:
   1. Steel-reinforcement placement.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 03 10 00 "Concrete Forming and Accessories" for form-facing materials and waterstops.
   3. Section 03 20 00 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
   4. Section 07 92 00 "Joint Sealants."

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixtures.
      c. Ready-mix concrete manufacturer.
      d. Concrete Subcontractor.
      e. Special concrete finish Subcontractor.
   2. Review the following:
      a. Special inspection and testing and inspecting agency procedures for field quality control.
      b. Construction joints, control joints, isolation joints, and joint-filler strips.
      c. Semirigid joint fillers.
      d. Vapor-retarder installation.
      e. Anchor rod and anchorage device installation tolerances.
      f. Cold and hot weather concreting procedures.
      g. Concrete finishes and finishing.
      h. Curing procedures.
      i. Forms and form-removal limitations.
      j. Shoring and reshoring procedures.
      k. Methods for achieving specified floor and slab flatness and levelness.
      l. Floor and slab flatness and levelness measurements.

m. Concrete repair procedures.
n. Concrete protection.
o. Initial curing and field curing of field test cylinders (ASTM C31).
p. Protection of field cured field test cylinders.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following.
1. Fly ash.
2. Blended hydraulic cement.
3. Aggregates.
4. Admixtures:
a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
5. Vapor retarders.
6. Curing materials.
7. Joint fillers.
8. Repair materials.

B. Design Mixtures: For each concrete mixture, include the following:
1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Slump limit.
6. Air content.
7. Nominal maximum aggregate size.
8. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
9. Intended placement method.
10. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:
1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
a. Location of construction joints is subject to approval of the Architect.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:
1. Concrete Class designation.
2. Location within Project.
3. Formed Surface Finish designation and final finish.
4. Final finish for floors.
5. Curing process.

1.5 INFORMATIONAL SUBMITTALS

A. Material Test Reports: For the following, from a qualified testing agency:
   1. Fly ash.
   2. Blended hydraulic cement.
   3. Admixtures:
B. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.
   1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94 and ACI 301.

1.8 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.
   1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   2. When average high and low temperature is expected to fall below 40 degrees F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
   3. Do not use frozen materials or materials containing ice or snow.
   4. Do not place concrete in contact with surfaces less than 35 degrees F, other than reinforcing steel.
   5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:
   1. Maintain concrete temperature at time of discharge to not exceed 95 degrees F.
   2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:
   1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
   2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
   3. Obtain aggregate from single source.
   4. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:
   1. Fly Ash: ASTM C618, Class C or F.
   2. Blended Hydraulic Cement: ASTM C595, Type IL, portland-limestone cement.

C. Normal-Weight Aggregates: ASTM C33, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.
   1. Alkali-Silica Reaction: Comply with one of the following:
      a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
      b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
      c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.
   2. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
   3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C260.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.
   1. Water-Reducing Admixture: ASTM C494, Type A.
   2. High-Range, Water-Reducing Admixture: ASTM C494M, Type F.

F. Water and Water Used to Make Ice: ASTM C94, potable

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A; not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Reef Industries, Inc.
      b. Stego Industries, LLC.

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
C. Water: Potable or complying with ASTM C1602.
D. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.
    1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
        a. Dayton Superior.
        b. Euclid Chemical Company (The); an RPM company.

2.5 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.
B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.

2.6 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8-inch and that can be feathered at edges to match adjacent floor elevations.
    1. Cement Binder: ASTM C150- portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
    2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
    3. Aggregate: Well-graded, washed gravel, 1/8- to 1/4-inch or coarse sand, as recommended by underlayment manufacturer.
    4. Compressive Strength: Not less than 4,100 psi at 28 days when tested in accordance with ASTM C109.
B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4-inch and that can be filled in over a scarified surface to match adjacent floor elevations.
    1. Cement Binder: ASTM C150 portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
    2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
    3. Aggregate: Well-graded, washed gravel, 1/8- to 1/4-inch or coarse sand as recommended by topping manufacturer.
    4. Compressive Strength: Not less than 5,000 psi at 28 days when tested in accordance with ASTM C109.

2.7 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
   1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
   1. Fly Ash or Other Pozzolans: 25 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
   1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
   2. Use water-reducing admixture in pumped concrete, and concrete with a w/cm below 0.50.

2.8 CONCRETE MIXTURES

A. Class A: Normal-weight concrete used for footings, grade beams, and tie beams.
   1. Minimum Compressive Strength: 3,000 psi at 28 days.
   2. Maximum w/cm: 0.50.
   3. Air Content:
      a. 4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size.
   4. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

B. Class B: Normal-weight concrete used for foundation walls.
   1. Minimum Compressive Strength: 4,000 psi at 28 days.
   2. Maximum w/cm: 0.45.
   3. Slump Limit: 8 inches, plus or minus 1-inch for concrete with verified slump of 3 inches plus or minus 1-inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.
   4. Air Content:
      a. 4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size.
   5. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

C. Class C: Normal-weight concrete used for interior slabs-on-ground.
   1. Minimum Compressive Strength: 3,000 psi at 28 days.
   2. Maximum w/cm: 0.45.
   3. Slump Limit: 5 inches, plus or minus 1-inch.
   4. Air Content:
      a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

D. Class D: Normal-weight concrete used for interior suspended slabs.
   1. Minimum Compressive Strength: 4,000 psi at 28 days.
   2. Maximum w/cm: 0.45.
   3. Slump Limit: 8 inches, plus or minus 1-inch for concrete with verified slump of 3 inches plus or minus 1-inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.
   4. Air Content:
      a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

E. Class E: Normal-weight concrete used for concrete toppings.
   1. Minimum Compressive Strength: 3,000 psi at 28 days.
   2. Slump Limit: 5 inches, plus or minus 1-inch.
   3. Air Content:
      a. Do not use an air entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

F. Class F: Normal-weight concrete used for building frame members.
   1. Minimum Compressive Strength: 4,000 psi at 28 days.
   2. Maximum w/cm: 0.45.
   3. Slump Limit: 8 inches, plus or minus 1-inch for concrete with verified slump of 3 inches plus or minus 1-inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.

G. Class G: Normal-weight concrete used for building walls.
   1. Minimum Compressive Strength: 4,000 psi at 28 days.
   2. Maximum w/cm: 0.45.
   3. Slump Limit: 8 inches, plus or minus 1-inch for concrete with verified slump of 3 inches plus or minus 1-inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.
   4. Air Content:
      a. 4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size.
   5. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

H. Class H: Normal-weight concrete used for interior metal pan stairs and landings:
   1. Minimum Compressive Strength: 3,000 psi at 28 days.
   2. Maximum w/cm: 0.53.
   3. Maximum Size Aggregate: 1/2-inch.
   4. Air Content: 0 percent, plus or minus 0.5 percent at point of delivery.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:
   1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
   2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:
   1. Daily access to the Work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
   4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
   1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.

3.4 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
   1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
   2. Face laps away from exposed direction of concrete pour.
   3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
   4. Lap joints 6 inches and seal with manufacturer's recommended tape.
   5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
   6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
   7. Protect vapor retarder during placement of reinforcement and concrete.
      a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

3.5 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
   1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
   2. Place joints perpendicular to main reinforcement.
      a. Continue reinforcement across construction joints unless otherwise indicated.
      b. Do not continue reinforcement through sides of strip placements of floors and slabs.
   3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
   4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
   5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
   6. Space vertical joints in walls at 60 feet maximum. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8-inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
   2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
   1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
   2. Terminate full-width joint-filler strips not less than 1/2-inch or more than 1-inch below finished concrete surface, where joint sealants, specified in Section 07 92 00 "Joint Sealants," are indicated.
   3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
E. Doweled Joints:
   1. Install dowel bars and support assemblies at joints where indicated on Drawings.
   2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.
F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
   1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
   2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
   1. If a section cannot be placed continuously, provide construction joints as indicated.
   2. Deposit concrete to avoid segregation.
   3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
   4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
      a. Do not use vibrators to transport concrete inside forms.
      b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
      c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
      d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
   1. Do not place concrete floors and slabs in a checkerboard sequence.
   2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
   3. Maintain reinforcement in position on chairs during concrete placement.
   4. Screed slab surfaces with a straightedge and strike off to correct elevations.
   5. Level concrete, cut high areas, and fill low areas.
   6. Slope surfaces uniformly to drains where required.
   7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
   8. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:
   1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
      a. Patch voids larger than 1-1/2 inches wide or 1/2-inch deep.
      b. Remove projections larger than 1-inch.
      c. Tie holes do not require patching.
      d. Surface Tolerance: ACI 117 Class D.
      e. Apply to concrete surfaces not exposed to public view.
   2. ACI 301 Surface Finish SF-3.0:
      a. Patch voids larger than 3/4-inch-wide or 1/2-inch-deep.
      b. Remove projections larger than 1/8-inch.
      c. Patch tie holes.
      d. Surface Tolerance: ACI 117 Class A.
      e. Locations: Apply to concrete surfaces to receive a rubbed finish,.

B. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings:
   1. Smooth-Rubbed Finish:
      a. Perform no later than one day after form removal.
      b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
      c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.
      d. Maintain required patterns or variances as shown on Drawings or to match .

C. Related Unformed Surfaces:
   1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
   2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish:
   1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
   2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4-inch in one direction.
   3. Apply scratch finish to surfaces to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish:
1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish.

D. Trowel Finish:
1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:
a. Slabs on Ground:
1) Specified overall values of flatness, FF 35; and of levelness, FL 25; with minimum local values of flatness, FF 24; and of levelness, FL 17.
b. Suspended Slabs:
1) Specified overall values of flatness, FF 35; and of levelness, FL 20; with minimum local values of flatness, FF 24; and of levelness, FL 15.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.
1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

3.9 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:
1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.
   1. Cast-in inserts and accessories, as shown on Drawings.
   2. Screed, tamp, and trowel finish concrete surfaces.

3.10 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
   1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
   2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
   3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h, calculated in accordance with ACI 305.1, before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:
   1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
   2. If forms remain during curing period, moist cure after loosening forms.
   3. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
      a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
      b. Continuous Sprinkling: Maintain concrete surface continuously wet.
      c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
      d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
      e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
         1) Recoat areas subject to heavy rainfall within three hours after initial application.
         2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:
   1. Begin curing immediately after finishing concrete.
   2. Interior Concrete Floors:
      a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
         1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
            a) Lap edges and ends of absorptive cover not less than 12-inches.
            b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
   a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
   b) Cure for not less than seven days.
3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
   a) Water.
   b) Continuous water-fog spray.

b. Floors to Receive Polished Finish: Contractor has option of the following:
1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
   a) Lap edges and ends of absorptive cover not less than 12 inches.
   b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
   a) Water.
   b) Continuous water-fog spray.

3.11 TOLERANCES

A. Conform to ACI 117.

3.12 JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.
   1. Defer joint filling until concrete has aged at least 6 months.
   2. Do not fill joints until construction traffic has permanently ceased.
B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.
D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.13 CONCRETE SURFACE REPAIRS

A. Defective Concrete:
   1. Repair and patch defective areas when approved by Architect.
   2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
   1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2-inch in any dimension to solid concrete.
      a. Limit cut depth to 3/4-inch.
      b. Make edges of cuts perpendicular to concrete surface.
      c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
      d. Fill and compact with patching mortar before bonding agent has dried.
      e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
   2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
      a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
      b. Compact mortar in place and strike off slightly higher than surrounding surface.
   3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:
   1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
      a. Correct low and high areas.
      b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
   2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01-inch-wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
   3. After concrete has cured at least 14 days, correct high areas by grinding.
   4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.
      a. Finish repaired areas to blend into adjacent concrete.
   5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
      a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
      b. Feather edges to match adjacent floor elevations.
   6. Correct other low areas scheduled to remain exposed with repair topping.
      a. Cut out low areas to ensure a minimum repair topping depth of 1/4-inch to match adjacent floor elevations.
      b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes 1-inch or less in diameter, by cutting out and replacing with fresh concrete.
    a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
    b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
    c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
    d. Place, compact, and finish to blend with adjacent finished concrete.
    e. Cure in same manner as adjacent concrete.
8. Repair random cracks and single holes 1-inch or less in diameter with patching mortar.
    a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
    b. Dampen cleaned concrete surfaces and apply bonding agent.
    c. Place patching mortar before bonding agent has dried.
    d. Compact patching mortar and finish to match adjacent concrete.
    e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.14 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31.
2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
    a. Test reports shall include reporting requirements of ASTM C31, ASTM C39, and ACI 301, including the following as applicable to each test and inspection:
        1) Project name.
        2) Name of testing agency.
        3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
        4) Name of concrete manufacturer.
        5) Date and time of inspection, sampling, and field testing.
        6) Date and time of concrete placement.
        7) Location in Work of concrete represented by samples.
        8) Date and time sample was obtained.
        9) Truck and batch ticket numbers.

10) Design compressive strength at 28 days.
11) Concrete mixture designation, proportions, and materials.
12) Field test results.
13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
14) Type of fracture and compressive break strengths at seven days and 28 days.

C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

D. Inspections:
1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C172 shall be performed in accordance with the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least 5 randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143:
a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
b. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231 pressure method, for normal-weight concrete.
a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064:
a. One test hourly when air temperature is 40 degrees F and below or 80 degrees F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31:
a. Cast and laboratory cure one set of four 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.
b. Cast, initial cure, and field cure oneset of four standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39.
a. Test 1 laboratory-cured specimen at 7 days and 1 set of 2 specimens at 28 days.
b. Test 1 field-cured specimen at 7 days and 1 set of 2 specimens at 28 days.
c. A compressive-strength test shall be the average compressive strength from a set of 2 specimens obtained from same composite sample and tested at age indicated.

7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5,000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5,000 psi.
9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
10. Additional Tests:
    a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by Architect.
        1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 section 1.6.6.3.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 24 hours of completion of floor finishing and promptly report test results to Architect.

3.15 PROTECTION

A. Protect concrete surfaces as follows:
1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION

SECTION 04 05 23 – THROUGH-WALL AND WALL SUBSTRATE FLASHING SYSTEM

PART 1 - GENERAL

1.1 GENERAL

A. Contractor shall review American Concrete Institute 530.1 mandatory specification checklist for additional requirements necessary for specific project.

B. Flashing system shall be provided and installed by a qualified waterproofing contractor.

C. Contractor shall provide a photo manifest of through-wall installation, including all starts, stops, and transitions in plane.

D. It is the intent of this specification that the new work will provide a watertight facility restricted to the location where work is to be performed. The specifications describe the minimum acceptable standards of construction and finish.

E. Contractor shall water test all through-wall flashings once veneer is twelve inches (12”) above installed flashing. Coordinate test with Architect and Consultant.

F. Manufacturer of cloak flashing shall have a representative inspect the installed work a minimum of two times per week. The representative shall not be the installer.

G. All vertical flashing to be installed full height of the vertical surface.

I. The design intent is to have windows installed, flashed, and water tested prior to veneer installation.

1.2 RELATED SECTIONS

1. Section 07 22 16 – Roof Board Insulation
2. Section 07 53 00 – Coal-Tar Elastomeric Roof System
3. Section 07 62 00 – Sheet Metal Flashing and Miscellaneous Accessories
4. Section 07 72 00 – Roof Accessories

1.3 QUALITY ASSURANCE

A. At a scheduled pre-construction meeting with all trades, contractor shall review flashing for the project and how the flashing shall be sequenced with the following: below grade waterproofing, air and vapor system, window installation, sealant installation, relief angles and roofing.

1.4 SUBMITTALS

A. Shop Drawings: Contractor shall provide from the manufacturer a review of the flashing design for the project and location of preformed shapes on reduced floor plan.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened containers and rolls with all labels intact and legible including labels indicating appropriate warnings, storage conditions, lot numbers, and usage instructions. Materials damaged in shipping or storage shall not be used.

B. Manufacturer's packaging and/or roll plastic is not acceptable for exterior storage. Tarpaulin with grommets shall be minimum acceptable for exterior coverings. All materials stored as above shall be a minimum of four inches (4") off the substrate, and the tarpaulin tied off with rope.

C. Deliver materials in sufficient quantity to allow continuity of work.

D. Handle and store material in such a manner as to avoid damage.

E. Protect materials against damage by construction traffic.

F. Storage: All materials should be stored under cover to avoid site damage. During cool weather construction, store materials inside at 50º F or higher.

G. The proper storage of materials is the sole responsibility of the contractor and damaged materials shall be discarded, removed from the project site, and replaced prior to application.

1.6 SITE CONDITIONS

A. Job Condition Requirements: Coordinate the work of the contractor with the work to be performed by the Owner's personnel, to ensure proper sequencing of the entire work. The contractor shall follow local, state, and federal regulations, safety standards, and codes. When a conflict exists, use the stricter document.

B. Protection of Work and Property:
1. Work: The contractor shall maintain adequate protection of all his work from damage and shall protect the Owner's and adjacent property from injury or loss arising from this contract. He shall provide and maintain at all times any OSHA required danger signs, guards, and/or obstructions necessary to protect the public and his workmen from any dangers inherent with or created by the work in progress. All federal, state, and city rules and requirements pertaining to safety and all EPA standards, OSHA standards, NESHAP regulations shall be fulfilled by the contractor as part of his proposal.
2. Property: Protect existing planting and landscaping as necessary or required to provide and maintain clearance and access to the work of this contract. Examples of two categories or degrees of protection are generally as follows: a) removal, protection, preservation, or replacement and replanting of plant materials; b) protection of plant materials in place, and replacement of any damage resulting from the contractor's operations.

C. Damage to Work of Others: The contractor shall repair, refinish, and make good any damage to the building or landscaping resulting from any of his operation. This shall include, but is not limited to, any damage to plaster, tile work, wall covering, paint, ceilings, floors, or any other finished work. Damage done to the building, equipment, or grounds shall be repaired at the successful contractor's expense holding the Owner harmless from any other claims for property damage and/or personal injury.

PACKET 7.233 September 9, 2025

D. Measurements: It will be the contractor's responsibility to obtain and/or verify any necessary dimensions by visiting the job site, and the contractor shall be responsible for the correctness of same. Any drawings supplied are for reference only.

E. Cleaning and Disposal of Materials:
1. Contractor shall keep the job clean and free from all loose materials and foreign matter. Contractor shall take necessary precautions to keep outside walls clean.
2. All waste materials, rubbish, etc., shall be removed from the Owner's premises as accumulated. Rubbish shall be carefully handled to reduce the spread of dust. At completion, all work areas shall be left clean and all contractor's equipment and materials removed from the site.
3. Debris shall be deposited at an approved disposal site.

1.7 WARRANTY

A. Flashing Manufacturer: Project shall be installed in such a manner that the flashing material manufacturer will furnish a written ten (10) year materials warranty from the date of substantial completion of the completed project.

B. If the CTEM roof system is being provided and installed on the same facility as the flashing is being provided and installed, the warranty period for this flashing system shall be included in the roof warranty for the same twenty (20) year period.

PART 2 – PRODUCTS

2.1 BUILT-IN FLASHING MEMBRANE

A. The built-in flashing membrane shall be 40 mil flexible sheet material, consisting of a blend of elastomeric and polymers. The membrane shall be reinforced with synthetic fibers, calendered into sheet form, rolled and cut to width.

B. Cloaks shall be pre-formed, three dimensional flexible units used for detail corners, level changes, stop ends, and special applications.

Physical Properties		
Elongation	175%	ASTM D412
Tensile Strength	650 psi	ASTM D412
Tear Strength	280 psi	ASTM D624
Low Temperature Flexibility	-25º F Pass	ASTM D146
Water Absorption	Less than 0.1%	ASTM D471

C. Cloak color shall be as selected by Architect. Reference manufacturer's list of colors for selection.

PACKET 7.234 September 9, 2025

2.2 RELATED MATERIALS FOR BUILT-IN FLASHING MEMBRANE

A. Flashing Membrane Adhesive: Flashing adhesive exceeds the requirements of TTS00230C Type II, Class B, ASTM C 92094. The product shall be terra cotta (dull red) in color.

Physical Properties		
Hardness Shore A	24 ± 3	ASTM C 661
Shear Strength	75 psi	ASTM D 1002
Tack Free Time	25 minutes	ASTM C 679
Slump (sag)	Zero slump	ASTM C 697
Shrinkage	No measurable shrinkage after 14 days	
Low Temperature Flexibility	-20° F pass 1/4 inch mandrel	
Service Temperature	-40° F to 200° F continuous service	
Shelf Life	One year	

2.3 SURFACE-ADHERED WITH DRIP FLASHING MEMBRANE

A. Surface-adhered with drip membrane shall be a composite 40 mil membrane consisting of 25 mils of elastomeric/thermal plastic membrane and 15 mils of SBS asphaltic adhesive. The membrane shall be reinforced with synthetic fibers, calendered into sheet form, rolled and cut to standard widths.

B. Standard Sheet Dimensions:

Thickness	40 mil
Roll length	75 ft
Roll widths	12, 18, 24, 36 in

C. Cloaks shall be pre-formed, three dimensional flexible units used for detail corners, level changes, stop ends, and special applications.

Physical Properties		
Elongation	225%	ASTM D412
Tensile Strength	875 psi	ASTM D412
Tear Strength	270 psi	ASTM D624
Low Temperature Flexibility	-25º F Pass	ASTM D146
Water Absorption	Less than 0.1%	ASTM D471

2.4 RELATED MATERIALS FOR SURFACE ADHERED FLASHING MEMBRANE

A. Asphalt Primer: Shall be a two-sided, self-adhering tape used to seal the top of cloaks against the back-up wythe. Adhesive may be used as an alternative.

B. Substrate Primer:

Physical Properties		
Solids by Weight	68%	
Viscosity	758 cps	
Weight per Gallon	9.3 lbs.	
Elongation	>656% no Breakage, Exceeded Travel of Instron	ASTM D 2370
Tensile Strength	85.1 psi	ASTM D 2370
pH	10	
Hardness Shore A	59	
Peel Strength	Aluminum No Fail at 4.60 pli Concrete No Fail at 3.86 pli	

C. Mastic: Shall be used at all laps and joints, and top terminations.

2.5 WALL DRAINAGE SYSTEM

A. Collection device shall be a dovetail shaped material to place in the cavity of brick masonry walls for collecting mortar droppings above the level of the weep holes and flashing. The 90% open weave construction material shall be High Density Polyethylene (HDPE) mesh for thickness of 0.4 – 1.0 inch, or recycled polyester mesh for 2.0 inch thickness.

B. Material shall not oxidize, rot, promote mold or fungus, or react with other common building materials such as mortar, cement, asphalt, modified bitumen, PVC, copper, or galvanized metal; shall be Mortar Net, or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions for compliance with requirements for installation tolerances and other specific conditions.

3.2 GENERAL

A. Laying Masonry Walls: Use an inverted lintel CMU or fully grouted hollow CMU as a base for flashing at sills, floor joints, and other similar conditions.

B. Preparation: All sharp protrusions and mortar droppings must be removed from the substrate, and the surface must be clean and dry.

C. Where brick work occurs above the roof elevation, provide solid protection of the existing roof system until work is complete.

D. Flashing shall be fully supported when crossing the cavity except at sill and coping locations.

E. Flashing shall be fully adhered around all wall penetrations prior to veneer installation.

3.3 INSTALLATION OF BUILT-IN FLASHING MEMBRANE

A. Flashing membrane and cloaks shall be installed in a bed of fresh mortar and should extend through the outer wythe a minimum of one-fourth inch (1/4") and left exposed. Flashing membrane is UV resistant.

B. Weep holes shall be provided immediately above all flashing at 24-inch centers. A minimum of two weeps shall be installed above any wall opening.

C. All joints in the flashing membrane shall be lapped a minimum of four inches (4") using flashing membrane adhesive.

D. Flashing membrane shall be installed six inches (6") above finished grade level.

E. Cloaks and end dams shall be installed at all window, door heads and sills.

F. Vertical flashing at wall openings shall extend into the wall opening four inches (4"). The door/window frame shall be installed with the flashing extending onto the back of the frame.

G. Cleaning: Flashing membrane shall not be damaged by cavity cleaning after installation. Precautions to be taken during subsequent work are:
1. Use of cavity battens to prevent mortar droppings;
2. Removal of droppings before they harden;
3. Never use implements such as steel rods for cleaning the cavity; and
4. Inspection of cavity flashing for damage as the work proceeds.

3.4 INSTALLATION OF SURFACE-ADHERED FLASHING WITH DRIP MEMBRANE

A. Priming: All flashing substrates shall be primed. Flashing primer shall be applied with a brush, roller or sprayed. Coverage is approximately 400 square feet per U.S. gallon (3.78L). Drying time may vary depending on temperature, humidity, and air movement; drying time should be approximately 45 minutes.

B. Flashing System Installation: Starting at a corner, mount cloak to substrate flashing adhesive. Cut surface adhered membrane into workable sections (8'-10'). Remove the release sheet and adhere the membrane to the inner leaf of construction lapping the membrane onto the cloak four inches (4"). Use firm hand pressure and a steel roller to totally adhere membrane in place. Extend membrane completely through the outer leaf and leave it exposed one-fourth inch (1/4") minimum. The surface-adhered membrane is UV resistant. Apply a bead of flashing mastic to all top termination edges.

C. Termination Bar: The surface-adhered membrane shall be installed using a termination bar for additional attachment to the inner leaf.

D. Weep holes shall be provided immediately above all flashing at 24-inch centers. A minimum of two baffle weeps shall be installed above any wall opening.

E. Flashing membrane shall be installed six inches (6") above finished grade level.

F. Stop end cloaks shall be installed at all windows, door heads, sills, and through-wall starts, stops, steps, etc.

G. Enveloped vertical flashing at wall openings shall extend onto the window unit one inch (1"). The door/window frame shall be installed with the flashing extending onto the back of the frame.

H. Enveloped vertical flashing shall be installed at all abutments of dissimilar exterior wall treatments: inside and outside nineties (90°), etc.

I. Cleaning: Flashing membrane shall not be damaged by cavity cleaning after installation. Precautions to be taken during subsequent work are:
   1. Use of cavity battens to prevent mortar droppings;
   2. Removal of droppings before they harden;
   3. Never use implements such as steel rods for cleaning the cavity; and
   4. Inspection of cavity flashing for damage as the work proceeds.

3.5 FLASHING MEMBRANE ADHESIVE

A. Application:
   1. Flashing adhesive shall be applied to clean, dry and relatively smooth surfaces.
   2. When joint two (2) pieces of flashing membrane, or joining flashing membrane to Cloaks:
      a) Apply two (2) one-fourth inch (1/4") beads of adhesive approximately one-half inch (1/2") and one and one-half inch (1-1/2"), respectively, from the edge of the bottom membrane along the entire width of the bottom membrane. Overlap the top membrane over the bottom membrane two inches (2") and roll lap with steel hand roller, causing excess to extrude the entire length of the overlap.
   3. Do not remove excess adhesive.

B. Safety, Storage and Handling: Keep container tightly closed when not in use. Store at room temperature. Clean up tools and hands with waterless hand cleaner.

3.6 SUBSTRATE PRIMER

A. Surface Preparation: Areas to be primed should be dry.

B. Application: Substrate primer may be applied using a soft roller or brush. It can be removed from masonry with soapy water while wet and a solvent-based cleaner if dry (mineral spirits or citrus cleaner).

C. Coverage: Depending on the condition of the surface, coverage may vary from as little as 150 square feet to 200 square feet per gallon.

D. Caution:
   1. Substrate primer should not be applied when temperatures are below 40° F or when rain is imminent.
   2. Keep substrate primer from freezing.
   3. During hot weather, the product should be stored in a cool shaded area.
   4. Do not thin this product.
   5. Curing rates will vary depending on the ambient temperature relative humidity, wind speed, sky condition and the proper rate of application. Generally speaking, Substrate primer will dry within 15 to 30 minutes when applied at 70° F or above. At 50° F, on a cloudy day, cure time may be extended to as much as one hour.
   6. Check several places on primed area for dryness prior to proceeding with the flashing application.

END OF SECTION

SECTION 04 20 00 - UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Brick.
   2. Mortar and grout materials.

B. Products Installed But Not Furnished Under This Section:
   1. Cast-stone trim in unit masonry.
   2. Stone trim units in unit masonry.
   3. Steel lintels in unit masonry.
   4. Steel shelf angles for supporting unit masonry.
   5. Cavity wall insulation adhered to masonry backup.

C. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 DEFINITIONS

A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:
   1. Masonry Units: Indicate sizes, profiles, coursing, and locations of special shapes.

C. Samples for Initial Selection:
   1. Clay face or Hollowbrick, in the form of straps of 5 or more bricks.
   2. Glazed brick.
   3. Colored mortar.

D. Samples for Verification: For each type and color of the following:
   1. Concrete face brick.
   2. [Clay face] [Hollow] brick[, in the form of straps of five or more bricks].
   3. Special brick shapes.
   4. Glazed brick.
   5. [Pigmented] [and] [colored-aggregate] mortar. Make samples using same sand and mortar ingredients to be used on Project.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.5 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
   2. Where 1 wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe, and hold cover in place.
B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
   1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 degrees F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain exposed masonry units, cementitious mortar components and mortar aggregate from single manufacturer.
B. For exposed masonry units and cementitious mortar components, obtain each color and grade from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 BASIS OF DESIGN PRODUCTS

A. Acme Brick:
   1. 3020 W. Front Street, Midland, Texas 79701.
B. Bilco Brick
   1. 2116 N. Lancaster-Hutchins Road, Lancaster, Texas 75134.
C. Caprock Brick
   1. 8708 County Road 6820, Lubbock, Texas 79407.

2.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Masonry to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.
B. Providestructuralunit masonry that develops indicated net-area compressive strengths at 28 days.
   1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) in accordance with TMS 602.
   2. Determine net-area compressive strength of masonry by testing masonry prisms in accordance with ASTM C1314.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
   2. Verify that foundations are within tolerances specified.
   3. Verify that reinforcing dowels are properly placed.
   4. Verify that substrates are free of substances that impair mortar bond.
B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
B. Build chases and recesses to accommodate items specified in this and other Sections.
C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested in accordance with ASTM C67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation, do not vary by more than plus 1/2-inch or minus 1/4-inch.
   2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2-inch.
   3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2-inch total.

B. Lines and Levels:
   1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4-inch in 10 feet, or 1/2-inch maximum.
   2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8-inch in 10 feet, 1/4-inch in 20 feet, or 1/2-inch maximum.
   3. For vertical lines and surfaces, do not vary from plumb by more than 1/4-inch in 10 feet, 3/8-inch in 20 feet, or 1/2-inch maximum.
   4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8-inch in 10 feet, 1/4-inch in 20 feet, or 1/2-inch maximum.
   5. For lines and surfaces, do not vary from straight by more than 1/4-inch in 10 feet, 3/8-inch in 20 feet, or 1/2-inch maximum.
   6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4-inch in 10 feet, or 1/2-inch maximum.
   7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16-inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:
   1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8inch, with a maximum thickness limited to 1/2-inch.
   2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8-inch.
   3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8-inch or minus 1/4-inch.
   4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8-inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8-inch.
   5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16-inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond ; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than [2 inches] [4 inches]. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors, and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors [48 inches] <**Insert spacing**> o.c. unless otherwise indicated.
3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 07 84 43 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set [**stone**] [**cast-stone**] trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
   1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
   2. Allow cleaned surfaces to dry before setting.
   3. Wet joint surfaces thoroughly before applying mortar.
   4. Rake out mortar joints for pointing with sealant.

D. Rake out mortar joints at to a uniform depth of 1/4-inch and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
   1. For glazed masonry units, use a nonmetallic jointer 3/4-inch or more in width.

F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

G. Cut joints flush where indicated to receive [**waterproofing**] [**cavity wall insulation**] [**air barriers**] unless otherwise indicated.

3.6 COMPOSITE MASONRY

A. Bond wythes of composite masonry together [**using one of the following methods**] [**as follows**]:
   1. Individual Metal Ties: Provide ties as indicated installed in horizontal joints, but not less than one metal tie for [4.5 sq. ft.] [2.67 sq. ft.] [1.77 sq. ft.] of wall area spaced not to exceed [36 inches] [24 inches] [16 inches] o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.
      a. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) ties.
   2. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
      a. Where bed joints of both wythes align, use [**ladder-type reinforcement extending across both wythes**] [**tab-type reinforcement**].
      b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement[**with continuous horizontal wire in facing wythe attached to ties**].
   3. Header Bonding: Provide masonry unit headers extending not less than 3 inches into each wythe. Space headers not more than [8 inches] [12 inches] clear horizontally and 16 inches clear vertically.

B. Bond wythes of composite masonry together using bonding system indicated on Drawings.

C. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.

D. Collar Joints in Clay Tile Masonry: After each course is laid, fill the vertical, longitudinal joint between wythes solidly with mortar at [**exterior walls, except cavity walls**] [**, and**] [**interior walls and partitions**].

E. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.
   1. Provide continuity with masonry-joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.

F. Intersecting and Abutting Walls: Unless vertical expansion or control joints are indicated at juncture, bond walls together as follows:
   1. Provide individual metal ties not more than [8 inches] [16 inches] o.c.
   2. Provide continuity with masonry-joint reinforcement by using prefabricated T-shaped units.
   3. Provide rigid metal anchors not more than [24 inches] [48 inches] o.c. If used with hollow masonry units, embed ends in mortar-filled cores.

3.7 CAVITY WALLS

A. Bond wythes of cavity walls together [**using one of the following methods**] [**as follows**]:
   1. Individual Metal Ties: Provide ties as indicated installed in horizontal joints, but not less than one metal tie for [4.5 sq. ft.] [2.67 sq. ft.] [1.77 sq. ft.] of wall area spaced not to exceed [36 inches] [24 inches] [16 inches] o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.
      a. Where bed joints of wythes do not align, use adjustable-type (2-piece-type) ties.
      b. Where 1 wythe is of clay masonry and the other of concrete masonry, use adjustable-type (2-piece-type) ties to allow for differential movement regardless of whether bed joints align.
   2. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
      a. Where bed joints of both wythes align, use [**ladder-type reinforcement extending across both wythes**] [**tab-type reinforcement**].
      b. Where bed joints of wythes do not align, use adjustable-type (2-piece-type) reinforcement[**with continuous horizontal wire in facing wythe attached to ties**].
      c. Where 1 wythe is of clay masonry and the other of concrete masonry, use adjustable-type (2-piece-type) reinforcement[**with continuous horizontal wire in facing wythe attached to ties**] to allow for differential movement regardless of whether bed joints align.
   3. Header Bonding: Provide masonry unit headers extending not less than 3 inches into each wythe. Space headers not more than [8 inches] [12 inches] clear horizontally and 16 inches clear vertically.
   4. Masonry-Veneer Anchors: Comply with requirements for anchoring masonry veneers.

B. Bond wythes of cavity walls together using bonding system indicated on Drawings.

C. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

D. Parge cavity face of backup wythe in a single coat approximately 3/8-inch-thick. Trowel face of parge coat smooth.

E. Installing Cavity Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as indicated.
   1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.8 ANCHORED MASONRY VENEERS

A. Anchor masonry veneers to [**wall framing**] [**and**] [**concrete and masonry backup**] with[**seismic**] masonry-veneer anchors to comply with the following requirements:
   1. Fasten [**screw-attached**] [**and**] [**seismic**] anchors [**through sheathing to wall framing**] [**and**] [**to concrete and masonry backup**] with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
   2. Embed [**tie sections**] [**connector sections and continuous wire**] in masonry joints.
   3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
   4. Space anchors as indicated, but not more than 18 inches o.c. vertically and 24 inches o.c. horizontally, with not less than one anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.
   5. Space anchors as indicated, but not more than 16 inches o.c. vertically and 25 inches o.c. horizontally, with not less than one anchor for each [2.67 sq. ft.] [3.5 sq. ft.] of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.
   6. Space anchors as indicated, but not more than 18 inches o.c. vertically and horizontally. Install additional anchors within 12 inches of openings and at intervals, not exceeding 24 inches, around perimeter.

B. Provide not less than [2 inches] [1 inch] <**Insert distance**> of airspace between back of masonry veneer and face of [**sheathing**] [**insulation**].
   1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

3.9 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8-inch on exterior side of walls, 1/2-inch elsewhere. Lap reinforcement a minimum of 6 inches.
   1. Space reinforcement not more than 16 inches o.c.
   2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
   3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings[**in addition to continuous reinforcement**].

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
C. Provide continuity at wall intersections by using prefabricated T-shaped units.
D. Provide continuity at corners by using prefabricated L-shaped units.
E. Cut and bend reinforcing units as directed by manufacturer for continuity at[**corners,**] returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.10 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
   1. Provide an open space not less than [1/2-inch-] [1 inch] [2 inches] wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
   3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.11 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry [**as follows**] [**using one of the following methods**]:
   1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
   2. Install preformed control-joint gaskets designed to fit standard sash block.
   3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
   4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

C. Form expansion joints in brick as follows:
   1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
   2. Build flanges of factory-fabricated, expansion-joint units into masonry.
   3. Build in compressible joint fillers where indicated.
   4. Form open joint full depth of brick wythe and of width indicated, but not less than [3/8-inch] [1/2-inch] <**Insert minimum width**> for installation of sealant and backer rod specified in Section 07 92 00 "Joint Sealants."

D. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 07 92 00 "Joint Sealants," but not less than [3/8-inch] <**Insert minimum width**>.
   1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.12 FLASHING, WEEP HOLES, AND CAVITY VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.[**Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.**]

B. Install flashing as follows unless otherwise indicated:
   1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape[**as recommended by flashing manufacturer**].
   2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of [4 inches] [8 inches], and through inner wythe to within 1/2 inch of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately 2 inches on interior face.
   3. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of [4 inches] [8 inches], and 1-1/2 inches into the inner wythe.[**Form** 1/4-inch **hook in edge of flashing embedded in inner wythe.**]
   4. At masonry-veneer walls, extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under [**water-resistive barrier**] [**air barrier**], lapping at least 4 inches.[**Fasten upper edge of flexible flashing to sheathing through termination bar.**]
   5. At lintels and shelf angles, extend flashing 6 inches minimum[**, to edge of next full unit**] at each end. At heads and sills, extend flashing 6 inches minimum[**, to edge of next full unit**] and turn ends up not less than 2 inches to form end dams.
   6. Interlock end joints of sawtooth sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 07 92 00 "Joint Sealants" for application indicated.
   7. Install metal [**drip edges**] [**and**] [**sealant stops**] with sawtooth sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 07 92 00 "Joint Sealants" for application indicated.
   8. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2-inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
   9. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2-inch back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
   10. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

D. Install reglets and nailers for flashing and other related construction where they are indicated to be built into masonry.

E. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.
   1. Use [**specified weep/cavity vent products**] [**or**] [**open-head joints**] to form weep holes.
   2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
   3. Space weep holes 24 inches o.c. unless otherwise indicated.
   4. Space weep holes formed from 16 inches o.c.
   5. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.
   6. Trim wicking material flush with outside face of wall after mortar has set.

F. Place pea gravel in cavities as soon as practical to a height equal to height of first course above top of flashing, but not less than 2 inches, to maintain drainage.
   1. Fill cavities full height by placing pea gravel in cavities as masonry is laid, so that at any point, masonry does not extend more than 24 inches above top of pea gravel.

G. Place cavity drainage material in [**cavities**] [**airspace behind veneers**] to comply with configuration requirements for cavity drainage material in "Accessories" Article.

H. Install cavity vents in head joints in exterior wythes at spacing indicated. Use [**specified weep/cavity vent products**] [**or**] [**open-head joints**] to form cavity vents.
   1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.13 REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
   1. Comply with requirements in TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
   2. Limit height of vertical grout pours to not more than [60 inches] [12.67 ft.] <**Insert height**>.

3.14 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4-inch. Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8-inch per foot. Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.15 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
7. Clean masonry with a proprietary acidic masonry cleaner applied according to manufacturer's written instructions.

3.16 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 31 20 00 "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Structural steel.
   2. Shrinkage-resistant grout.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 05 12 13 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
   3. Section 09 91 23 "Interior Painting" for painting requirements.

1.2 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication of structural-steel components.
   1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
   2. Include embedment Drawings.
   3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
   4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
   5. Identify members not to be shop primed.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU.
B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
    1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
    1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
    2. Clean and relubricate bolts and nuts that become dry or rusty before use.
    3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with applicable provisions of the following specifications and documents:
    1. ANSI/AISC 303.
    2. ANSI/AISC 360.
    3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."
B. Connection Design Information:
    1. Option 3 and 3B: Design connections and final configuration of member reinforcement at connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer.
        a. Use Load and Resistance Factor Design; data are given at factored-load level.
C. Moment Connections: Type PR, partially restrained.
D. Construction: Combined system of braced frame and shear walls.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes, Channels: ASTM A992.
B. Angles: ASTM A572, Grade 50.
C. Plate and Bar: ASTM A36.
D. Cold-Formed Hollow Structural Sections: ASTM A500, Grade C structural tubing.
E. Steel Pipe: ASTM A53, Type E or Type S, Grade B.
    1. Weight Class: Standard.
    2. Finish: Black.
F. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.
B. High-Strength A490 Bolts, Nuts, and Washers: ASTM F3125, Grade A490, Type 1, heavy-hex steel structural bolts or Grade F2280 tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.
C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125, Grade F1852, Type 1, heavy-hex head assemblies, consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers.
    1. Finish: Plain.

2.4 RODS

A. Unheaded Anchor Rods: ASTM F1554, Grade 36.
    1. Configuration: Straight.
    2. Nuts: ASTM A563 heavy-hex carbon steel.
    3. Plate Washers: ASTM A36 carbon steel.
    4. Washers: ASTM F436, Type 1, hardened carbon steel.
    5. Finish: Plain.

2.5 SLIDE BEARINGS

A. Structural Slide Bearings: Low-friction assemblies, of configuration indicated, that provide vertical transfer of loads and allow horizontal movement perpendicular to plane of expansion joint while resisting movement within plane of expansion joint.

2.6 PRIMER

A. Steel Primer:
    1. Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.7 SHRINKAGE-RESISTANT GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.8 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
   1. Camber structural-steel members where indicated.
   2. Fabricate beams with rolling camber up.
   3. Mark and match-mark materials for field assembly.
   4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
   1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 2.

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
   1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
   2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
   3. Weld threaded nuts to framing and other specialty items indicated to receive other Work.

2.9 SHOP CONNECTIONS

A. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure Specifications, weld quality, and methods used in correcting welding work.
   1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

2.10 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123.
   1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

2.11 SHOP PRIMING

A. Shop prime steel surfaces, except the following:
   1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
   2. Surfaces to be field welded.
   3. Surfaces of high-strength bolted, slip-critical connections.
   4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
   5. Surfaces enclosed in interior construction.

B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:
   1. SSPC-SP 3.

C. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
   1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.

B. Baseplates and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Weld plate washers to top of baseplate.
   3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
   4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.

C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
   2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
   1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

3.5 REPAIR

A. Touchup Painting:
   1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
      a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:
   1. Verify structural-steel materials and inspect steel frame joint details.
   2. Verify weld materials and inspect welds.
   3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
   1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
   2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1.
      a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1 and the following inspection procedures, at testing agency's option:
         1) Liquid Penetrant Inspection: ASTM E165.
         2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
         3) Ultrasonic Inspection: ASTM E164.
         4) Radiographic Inspection: ASTM E94.

END OF SECTION

SECTION 05 12 13 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Architecturally exposed structural steel (AESS).
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 05 12 00 "Structural Steel Framing" requirements that also apply to AESS.
   3. Section 09 91 23 "Interior Painting."

1.2 DEFINITIONS

A. AESS: Architecturally exposed structural steel.

1.3 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS.
   1. Identify AESS category for each steel member and connection, including transitions between AESS categories and between AESS and non-AESS.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU.
B. Mockups: Build mockups of AESS to set quality standards for fabrication and installation.
   1. Coordinate painting requirements with Section 09 91 23 "Interior Painting."
   2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Use special care in handling AESS to prevent twisting, warping, nicking, and other damage during fabrication, delivery, and erection. Store materials to permit easy access for inspection and identification. Keep AESS members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect AESS members and packaged materials from corrosion and deterioration.
   1. Do not store AESS materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.6 FIELD CONDITIONS

A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with requirements of ANSI/AISC 303, Sections 1 through 9 and as modified in Section 10, "Architecturally Exposed Structural Steel."

2.2 FILLER

A. Polyester filler intended for use in repairing dents in automobile bodies.

2.3 PRIMER

A. Steel Primer:
   1. Comply with Section 09 91 23 "Interior Painting."

2.4 FABRICATION

A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.
   1. Use special care handling and fabricating AESS before and after shop painting to minimize damage to shop finish.

B. Category AESS 1:
   1. Comply with overall profile dimensions of AWS D1.1 for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
   2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
   3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
   4. Make intermittent welds appear continuous, using filler or additional welding.
   5. Seal weld open ends of hollow structural sections with 3/8-inch closure plates.
   6. Limit butt and plug weld projections to 1/16-inch.
   7. Install bolt heads on the same side of each connection and maintain orientation consistently from 1 connection to another.
   8. Remove weld spatter, slivers, and similar surface discontinuities.
   9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
   10. Grind tack welds smooth unless incorporated into final welds.
   11. Remove backing and runoff tabs, and grind welds smooth.

C. Category AESS 2: In addition to requirements for Category AESS 1, comply with the following:
   1. Limit as-fabricated straightness tolerance to one-half that permitted for structural-steel materials in ANSI/AISC 303.
   2. Limit as-fabricated curved structural steel tolerance to that permitted for structural-steel materials in ANSI/AISC 303.

3. Limit as-fabricated straightness tolerance of welded built-up members to one-half that permitted by AWS D1.1.
4. Conceal fabrication and erection markings from view in the completed structure.
5. Make welds uniform and smooth.

D. Category AESS 3: In addition to requirements for Category AESS 1 and AESS-2, comply with the following:
1. Cut out mill marks from mill material or hide these markings from view in the completed structure. Where neither method is possible, remove mill marks by grinding and filling surfaces as approved by Architect.
2. Grind butt and plug welds smooth or fill, removing weld splatter exposed to view.
3. Orient HSS seams as indicated or away from view.
4. Align and match abutting member cross sections.
5. At visible open joints of copes, miters, and cuts, maintain uniform clear gaps of 1/8-nch. At closed joints, maintain uniform contact within 1/16-inch.
6. Fabricate with exposed surfaces smooth, square, and of surface quality approved by Architect.

E. Erection marks, painted marks, and other marks are permitted on galvanized steel surfaces of completed structure.

2.5 SHOP PRIMING

A. Shop prime steel surfaces, except the following:
1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Corrosion-resisting (weathering) steel surfaces.
5. Galvanized surfaces.

B. Surface Preparation: Clean nongalvanized surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 6 (WAB)/NACE WAB-3.

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

A. Take special care during erection to avoid marking or distorting the AESS and to minimize damage to shop painting. Set AESS accurately in locations and to elevations indicated and according to ANSI/AISC 303 and ANSI/AISC 360.
   1. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Take care to avoid any blemishes, holes, or unsightly surfaces resulting from the use or removal of temporary elements.
   2. Grind tack welds smooth.
   3. Remove backing and runoff tabs, and grind welds smooth.
   4. Orient bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
   5. Conceal fabrication and erection markings from view in the completed structure.

3.4 REPAIR

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to inspect AESS as specified in Section 05 12 00 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.
B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

END OF SECTION

SECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Acoustical roof deck.
   2. Composite floor deck.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 03 30 00 "Cast-in-Place Concrete" for normal-weight structural concrete fill over steel deck.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Acoustical roof deck.
B. Shop Drawings:
   1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 ACOUSTICAL ROOF DECK

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. New Millennium Building Systems, LLC.
B. Acoustical Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
   1. Prime-Painted Steel Sheet: ASTM A1008, Structural Steel (SS), Grade 80 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
      a. Color: Manufacturer's standard.
   2. Deck Profile: As indicated.
   3. Design Uncoated-Steel Thickness: As indicated.
   4. Side Laps: Overlapped.

2.2 COMPOSITE FLOOR DECK

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. New Millennium Building Systems, LLC.
   2. Nucor Corp.
B. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
   1. Galvanized-Steel Sheet: ASTM A653, Structural Steel (SS), Grade 33, G60 zinc coating.
   2. Profile Depth: As indicated.
   3. Span Condition: Triple span or more.

2.3 ACCESSORIES

A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
G. Flat Sump Plates: Single-piece steel sheet, 0.0747-inch-thick, of same material and finish as deck. For drains, cut holes in the field.
H. Galvanizing Repair Paint: ASTM A780.
I. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
C. Locate deck bundles to prevent overloading of supporting members.
D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
   1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
F. Cut and neatly fit deck panels and accessories around openings and other Work projecting through or adjacent to deck.
G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other Work.
H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOF DECK

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
   1. Weld Diameter: 3/4-inch, nominal.
B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals indicated, and as follows:
   1. Mechanically fasten with self-drilling, No. 12 diameter or larger, carbon-steel screws.
C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2 inches, with end joints as follows:
   1. End Joints: Butted.
D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.
E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. mechanically fasten to substrate to provide a complete deck installation.

3.4 INSTALLATION OF FLOOR DECK

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
   1. Weld Diameter: 5/8-inch, nominal.
   2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches apart, but not more than 18 inches apart.
B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 36 inches, and as follows:
   1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
   1. End Joints: Lapped.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.5 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.

B. Repair Painting:
   1. Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
   2. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

END OF SECTION

SECTION 06 06 60 - SCHEDULES FOR PLASTIC FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the plastic fabrication as shown and specified in the described system(s):
   1. Window Glazing.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 08 41 13 "Aluminum-Framed Entrances and Storefronts."

1.2 SUBMITTALS

A. General: Submit the following in accordance with conditions of contact and Section 01 33 00 “Submittal Procedures.”
B. Product Data: Submit manufacturer’s product data; include product description, fabrication information, and compliance with specified performance requirements.
C. Shop Drawings: Include Plans, elevations, sections, panel dimensions, details, and attachments to other work.
D. Samples for Verification:
   1. Submit minimum 4-inch by 4-inch sample for each type, texture, pattern and color of solid plastic fabrication.
E. Maintenance Data: Submit manufacturer’s care and maintenance data, including care, repair and cleaning instructions. Include in Project closeout documents.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver plastic fabrications, systems, and specified items in manufacturer’s standard protective packaging.
B. Do not deliver plastic fabrications, system, components, and accessories to Project site until areas are ready for installation.
C. Store materials in a flat orientation in a dry place that is not exposed to exterior elements.
D. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent damage or staining following installation for duration of Project.
E. Before installing plastic fabrications, permit them to reach room temperature.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not install solid polymer fabrications until spaces are enclosed and weatherproof, and ambient temperatures and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.5 WARRANTY

A. Manufacturer's Special Warranty on Plastic Fabrications: Manufacturer's standard form agreeing to repair or replace units that fail in material or workmanship within the specified warranty period.
B. Warranty Period: One year after the date of Substantial Completion.
C. The warranty shall not deprive the Owner of other rights or remedies the Owner may have under other provisions of the Contract Documents, and is in addition to and runs concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: 3form, LLC., Salt Lake City, Utah, USA, 801649.2500.

2.2 MATERIALS

A. Varia Ecoresin™ Sheet
   1. Engineered co-polyester resin produced in the USA.
   2. Sheet Size: Maximum 4 by 10 feet.
   3. Thickness: Per interior material legend in Drawings.
B. Sheet Minimum Performance Attributes:
   1. Rate of Burning: ASTM D635, material must attain CC1 Rating for a nominal thickness of 0.060-inch and greater.
   2. Self-Ignition Temperature: ASTM D1929, material must have a self-ignition temperature greater than 650 degrees F.
   3. Density of Smoke: ASTM D2843, material must have a smoke density less than 75 percent.
   4. Flame Spread and Smoke Developed Testing: ASTM E84, material must be able to meet a level of Class A (flame spread less than 25 and smoke less than 450) at thickness of 1/8-, 3/16-, and 1 inch.
   5. Room Corner Burn Test: NFPA 286, material must meet Class A criteria at 1/4-inch (walls only) and 3/8-inch (walls only/standoffs only) thickness as described by the 2012 *International Building Code.*
   6. Extent of Burning: UL 94, must submit UL card.
   7. Impact Strength: Minimum impact strength test as measured by ASTM D3763 of 20 foot pounds (for durability, shipping, installation, and use).

2.3 FABRICATION

A. General: Fabricate plastic fabrications to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes, profiles, and other characteristics are indicated on the Drawings.
B. Comply with manufacturer's written recommendations for fabrication.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide products of material, size, and shape required for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
B. Cleaner: Type recommended by manufacturer.
C. Fasteners: 3 Form Point support system.
D. Adhesives: As required for direct attach installation per written installation instructions.
   1. 3M VHB double sided foam tape.
   2. Momentive SCS 1201 Structural Silicone.
E. Corner Conditions - Reference details: Schluter Vinpro RO, color per Interior Material Legend in Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where installation of plastic fabrications will occur, with installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for installation and comply with requirements specified.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for the installation of plastic fabrications.
B. Manufacturer's shop to fabricate items to the greatest degree possible.
C. Utilize fasteners, adhesives, and bonding agents recommended by manufacturer for type of installation indicated. Material that is chipped, warped, hazed or discolored as a result of installation or fabrication methods will be rejected.
   1. Install panels directly to the wall using adhesive and grommets.
   2. Place 1/8-inch reveal between panels both horizontally and vertically. Leave 1/2-inch space on both sides and top and bottom of overall installation.
   3. Where 3 Form meets at outside corners, install Schluter Outside Corner Trim.
D. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved Shop Drawings and product data.
E. Form field joints using manufacturer's recommended procedures. Locate seams in panels so that they are not directly in line with seams in substrates.

3.3 CLEANING AND PROTECTION

A. Protect surfaces from damage until date of Substantial Completion. Repair Work or replace damaged Work, which cannot be repaired to Architect's satisfaction.

END OF SECTION

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wood blocking and nailers.
   2. Wood furring.
   3. Plywood backing panels.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 06 16 00 "Sheathing" for sheathing, subflooring, and underlayment.

1.2 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:
   1. Wood-preservative-treated wood.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
D. Application: Treat items indicated on Drawings, and the following:
    1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
    2. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.

2.3 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
    1. Blocking.
    2. Nailers.
    3. Furring.
B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:
    1. Hem-fir (north); NLGA.
    2. Mixed southern pine or southern pine; SPIB.
    3. Spruce-pine-fir; NLGA.
    4. Hem-fir; WCLIB or WWPA.
    5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.5 FASTENERS

A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
   1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153.

B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

2.6 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025-inch.

B. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
   1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

E. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
   1. Use inorganic boron for items that are continuously protected from liquid water.
   2. Use copper naphthenate for items not continuously protected from liquid water.

G. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
   2. ICC-ES evaluation report for fastener.

I. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 PROTECTION

A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 06 16 00 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.

1.2 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
B. Factory mark panels to indicate compliance with applicable standard.

2.2 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. For sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153.
2. For sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117.
B. Nails, Brads, and Staples: ASTM F1667.
C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.
E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.
1. For steel framing less than 0.0329-inch-thick, use screws that comply with ASTM C1002.
2. For steel framing from 0.033 to 0.112-inch-thick, use screws that comply with ASTM C954.

G. Screws for Fastening Composite Nail Base Insulated Roof Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117. Provide washers or plates if recommended by sheathing manufacturer.

2.3 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with ASTM D3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
C. Securely attach to substrate by fastening as indicated, complying with the following:
   1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
   2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
   3. ICC-ES evaluation report for fastener.
D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
E. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

END OF SECTION

SECTION 06 16 00.16 - SHEATHING (ZIP SYSTEM)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Combination insulating wall sheathing, water resistive barrier and air barrier.
   2. Self-adhering flexible flashing.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 06 10 00 "Rough Carpentry" for plywood backing panels.
   3. Section 07 27 26 "Fluid-Applied Membrane Air Barriers."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

B. Sustainable Design Submittals:
   1. Product Data: For composite wood products, indicating that product contains no urea formaldehyde.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Capable of demonstrating that all wood procurement operations are conducted in accordance with procedures and policies of the Sustainable Forestry Initiative (SFI) Program.

B. Code Compliance: Comply with requirements of the following:
   1. International Code Council (ICC), ICC-ESR1474.
   2. International Code Council (ICC), ICC-ESR2227.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Outdoor Storage. Comply with manufacturer's recommendations and as follows:
   1. Set panel bundles on supports to keep off ground.
   2. Cover panels loosely with waterproof protective material.
   3. Anchor covers on top of stack, but keep away from sides and bottom to assure adequate air circulation.
   4. When high moisture conditions exist, cut banding on panel stack to prevent edge damage.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sheathing system that fail due to manufacturing defects within specified warranty period.
   1. System Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested according to ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WOOD PANEL PRODUCTS

A. Oriented Strand Board: DOC PS 2-10.
B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated. Thickness shall satisfy minimum and maximum requirements for referenced performance category.
C. Factory mark panels to indicate compliance with applicable standard.

2.3 COMBINATION INSULATING WALL SHEATHING, AIR AND WATER-RESISTIVE BARRIER

A. Oriented-Strand-Board Wall Sheathing: With integral water-resistive barrier, Exposure 1 sheathing.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods LLC; ZIP System® Wall Sheathing or a comparable product.
   2. Characteristics:
      a. Span Rating and Performance Category of Sheathing Layer: Not less than 24/16; 7/16 Performance Category.
      b. Thickness: 1-1/2-inch.
      c. Thermal Resistivity (R Value): minimum of 7.5.
      d. Edge Profile: Square edge.
      e. Weather Barrier Facer: Medium-density, phenolic-impregnated polymer-modified sheet material meeting requirements for weather-resistvie barrier in accordance with ICC-ES AC38 - Water-Resistive Barriers, with fastner spacing symbols on exterior facer for 16-inch and 24-inch on center spacing, with the following characteristics
         1) Water Resistance of Coatings: Pass 14-day exposure test in accordance with ASTM D2247 - Standard Practice for Testing Water Resistance of Coatings in 100 percent Relative Humidity.
         2) Water-Vapor Permeance, Facer: Minimum 12 perms when tested in accordance with ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

2.4 FASTENERS

A. General: Size and type complying with manufacturer's written instructions for Project conditions and requirements of authorities having jursidiction.
   1. Corrosion Resistant.

2.5 MISCELLANEOUS MATERIALS

A. Self-Adhering Seam and Flashing Tape: Pressure-sensitive, self-adhering, cold-applied, proprietary seam tape consisting of polyolefin film with acrylic adhesive.
   1. Basis-of-Design Product: Subject to compliance with requirements provide Huber Engineered Woods; ZIP System® Seam and Flashing Tape or a comparable product.
   2. Thickness: 0.012-inch.
   3. Width: 3.75-inch.
   4. Code Compliance: Comply with requirements of authorities having jurisdiction and ICC Evaluation Service, Inc. "AC148 - Acceptance Criteria for Flexible Flashing Materials."
   5. International Code Council (ICC), ICC-ES ESR2227.

B. Liquid-Applied Flashing Membrane: Gun-grade, cold-applied, silyl-terminated polyether (STPE) liquid flashing membrane compatible with sheathing/weather barrier and self-adhering seam and flashing tape, and tested as part of an assembly meeting performance requirements. Follow manufacturer's recommendation for integration with self-adhering seam and flashing tape.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods; ZIP System® Liquid Flash or a comparable product.
   2. Hardness, Shore A, ASTM C661: 40 to 45.

C. Self-Adhering Flexible Flashing Tape: Pressure-sensitive, self-adhering, cold-applied, flexible flashing tape consisting of a flexible acrylic foam backing with acrylic adhesive.
   1. Basis-of-Design Product: Subject to compliance with requirements provide Huber Engineered Woods; ZIP System® Stretch Tape or a comparable product.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:
   1. Chapter 23 in the ICC's International Building Code.

D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 SHEATHING JOINT TREATMENT

A. Seal sheathing joints according to sheathing manufacturer's written instructions.
   1. Apply seam tape to joints between sheathing panels.
   2. Utilize tape gun or hard rubber roller provided by manufacturer to ensure tape is completely adhered to substrates.
   3. When using liquid-applied flashing to seal sheathing joints follow manufacturer's recommendations for sealing panel seams.

3.3 FLEXIBLE OR LIQUID-APPLIED FLASHING INSTALLATION

A. Apply tape flexible flashing or membrane where indicated to comply with manufacturer's written instructions.
   1. After flexible flashing tape has been applied, roll surfaces with a hard rubber to ensure that flashing is completely adhered to substrates.
   2. Width for flexible flashing: 6-inch.
   3. Apply liquid-applied flashing membrane at penetrations, gaps, and cracks to form continuous weathertight surface. Apply liquid membrane according to manufacturer's written instructions. Follow manufacturer's recommendation for integration with seam and flashing tape.

B. Apply liquid applied flashing membrane where indicated to comply with manufacturer's written instructions.
   1. After liquid applied flashing membrane has been applied, tool wet product with a plastic spreader, putty knife, or similar tool to ensure that flashing is opaque and substrate is no longer visible.
   2. Minimum Thickness for Liquid Flashing: 12 mils.
   3. Apply liquid flashing membrane according to manufacturer's written instructions. Follow manufacturer's recommendations for integration with seam and flashing tape or flexible flashing tape.

C. Apply flexible flashing tape where indicated to comply with manufacturer's written instructions.
   1. After flexible flashing tape has been applied, roll surfaces with a hard rubber to ensure that flashing is completely adhered to substrates.
   2. Width of flexible flashing: 6 inches or 10 inches.

END OF SECTION

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Extruded polystyrene foam-plastic board insulation.
   2. Glass-fiber blanket insulation.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 06 16 00 "Sheathing" for foam-plastic board sheathing installed directly over wood or steel framing.
   3. Section 07 22 16 "Roof Board Insulation."
   4. Section 07 27 26 "Fluid-Applied Membrane Air Barriers."
   5. Section 07 53 00 "Coal-Tar Elasometric."
   6. Section 09 29 00 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Extruded polystyrene foam-plastic board insulation.
   2. Glass-fiber blanket insulation.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:
   1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
   3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

A. Extruded Polystyrene Board Insulation, Type IV: ASTM C578, Type IV, 25-psi minimum compressive strength; unfaced.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Dow Chemical Company (The).
      b. Owens Corning.
   2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
   3. Smoke-Developed Index: Not more than 450 when tested in accordance with ASTM E84.
   4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.2 GLASS-FIBER BLANKET INSULATION

A. Glass-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I; passing ASTM E136 for combustion characteristics.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. CertainTeed Corporation.
      b. Johns Manville; a Berkshire Hathaway company Company.
      c. Knauf Insulation.
      d. Owens Corning.
   2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
   3. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.
   4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.3 ACCESSORIES

A. Insulation for Miscellaneous Voids:
   1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.
B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
C. Install insulation with manufacturer's R-value label exposed after insulation is installed.
D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer.
    1. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
    2. Press units firmly against inside substrates.
    3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 04 20 00 "Unit Masonry."

3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
    1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
    2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
    3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
    4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
    5. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
    1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.

3.5 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.
B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 07 22 16 – ROOF BOARD INSULATION

PART 1 – GENERAL

1.1 REFERENCES (INCLUDING LATEST REVISIONS)

A. Comply with governing local, state, and federal regulations, safety standards, and codes.

B. Testing Laboratory Services: Test results shall meet or exceed established standards.

C. Underwriters Laboratories, Inc. (Roofing Covering): Class A fire hazard classification.

D. American Society of Testing Materials (ASTM)

1.	C 177	Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
2.	C 209	Methods of Testing Insulating Board (Cellulosic Fiber), Structural and Decorative
3.	C 728	Perlite Thermal Insulation Board
4.	C 1289	Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
5.	D 41	Asphalt Primer Used in Roofing and Waterproofing
6.	D 312	Asphalt Used in Roofing
7.	D 1621	Test Method for Compressive Properties of Rigid Cellular Plastics
8.	D 4601	Asphalt Coated Glass Fiber Base Sheet Used in Roofing

E. The National Roofing Contractors Association (NRCA) - Roofing and Waterproofing Manual

F. American National Standards Institute/Single Ply Roofing Industry (ANSI/SPRI)

G. American Society of Civil Engineers - ASCE 7 Minimum Design Loads for Buildings and Other Structures (for wind uplift criteria)

1.2 QUALITY ASSURANCE

A. Regulatory Requirements
1. Classified by Underwriter's Laboratories (UL) as Class A roof covering.
2. Follow local, state, and federal regulations, safety standards, and codes.

B. Installation
1. Installation shall be in accordance with manufacturer's current published application procedures, NRCA general recommendations, and ASCE 7 wind uplift criteria.
2. Roof system manufacturer's technical specifications shall be considered part of this specification and shall be used as reference for specific application procedures.

C. Contract Documents
1. In the case of an inconsistency between the drawings and specifications or within either document not clarified by addendum, the better quality or greater quantity of work shall be provided in accordance with the Project Manager's/Architect's interpretation.

1.3 SUBMITTALS

A. Product Data: Submit Manufacturer's product data sheets for each product. Indicate each item or component to be used on project to include thicknesses, sizes, profiles, etc.

B. Shop Drawings: Layout of roof plan showing crickets, direction of slope, amount of slope, spot elevations indicating thicknesses at high and low points.
   1. Submit fastening requirements from manufacturer for each roof zone as per applicable building code.
   2. Submit manufacturer’s recommended fastener layout/placement pattern for each roof zone. Refer to Factory Mutual Loos Prevention Data Sheet (LPDS) 1-29 for more information.

C. Certification: Submit roof manufacturer's certification in writing that insulation is acceptable as substrate for application of specified roof system.

D. Pullout Tests in accordance to ANSI/SPRI FX-1.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials in accordance with manufacturer's recommendations.

B. When stored outdoors:
   1. Tarp and shield insulation from moisture and ultraviolet rays.
   2. Elevate insulation above substrate four inches minimum.
   3. Secure insulation to resist high winds.
   4. Distribute insulation stored on roof deck to prevent concentrated loads that would impose excessive stress or stain on deck or structural members. Verify that structure can accommodate additional loading.
   5. Wet insulation, or insulation that has been wet but which has dried, may not be used and shall be removed completely and immediately from the job site.
   6. Do not double stack bundles of insulation on the roof top.

1.5 SEQUENCING AND SCHEDULING

A. Substrate Acceptance: Roof system manufacturer's representative shall inspect roof deck and associated substrates and provide written acceptance of conditions.

B. Manufacturer's approved roofing contractor shall inspect and approve deck and substrates.

C. Plan roof layout with respect to roof deck slope to prevent rainwater drainage into completed roofing.

D. Do not install more insulation than can be covered with complete roof system in same day.

1.6 PRODUCT CONDITIONS

A. Environmental Requirements:
   1. Apply roofing and insulation in dry weather.
   2. Do not proceed with roof construction during inclement weather or when precipitation is predicted 40% or more possibility.
   3. Do not apply insulation over wet or moist deck or in foggy conditions.

4. Days with wind speeds of 30 mph or greater shall be considered "Bad Weather" days.

B. Emergency Equipment: Maintain on-site equipment and material necessary to apply emergency temporary seals in the event of sudden storms or inclement weather.

C. Costs for emergency roofing shall be borne by Contractor.

PART 2 – PRODUCTS

2.1 INSULATION – FLAT STOCK

A. All insulation shall be approved in writing by the membrane manufacturer as to thickness, type, and manufacturer. All insulation must be approved for the specific application, Underwriters Laboratory approved, and be listed in the FM Global Approval Guide.

B. Polyisocyanurate Roof Insulation: Insulation shall be two layers of rigid polyisocyanurate foam board; meeting Federal Specification No. HH-I-1972/1 or 2 with 20 psi minimum compressive strength and 2.0 pcf minimum density. First layer shall be a minimum thickness of one and one-half inch (1-1/2"). R-value over each roof area shall meet or exceed R-25. Board shall be surfaced on two (2) sides with non-asphaltic facer material.

2.2 INSULATION – TAPERED

A. Factory Tapered Polyisocyanurate Crickets: Factory cut twenty-four inch by forty-eight inch (24" x 48") polyisocyanurate board cut to one-half inch (1/2") per foot slope used in conjunction with standard thickness of polyisocyanurate board to provide positive slope.

2.3 COVER BOARD

A. Shall be impact-resistant, nonstructural, specially engineered gypsum and cellulose fiber panels with 95% recycled content; uniform water-resistance throughout core and surface. Board size four feet by four feet (4' x 4') thickness 1/2"; conforming to ASTM C 1278, meeting FM 4470 Class 1 criteria, classified by Underwriters Laboratories, and listed in the FM Global Approval Guide. Board will meet the following physical properties, Securock® Roof Board, as manufactured by USG Corporation, or approved equal.

Test	Typical Value	Test Method
Fire Resistance	Class A	UL 790
Permeance	≤ 30	ASTM C473
Surface water absorption	≤ 1.6 nominal grams	ASTM C473
Water resistance	Maximum 10% weight percentage gain	
Mold Resistance	Minimum rating of "10"	ASTM D3273

2.4 ASPHALT ROOF PRIMER

A. Quick-dry asphalt-based primer for priming of asphalt roof surfaces, as manufactured by GAF, or approved equal.

Applicable Federal Specification	SS-A-701B
ASTM	D 41
Flash Point	105° F
Viscosity at 80° F (ASTM D 217)	50-60 K.U.
Weight per gallon	7.4 pounds
Drying time (to touch)	Min. 4 hours

2.5 BITUMEN

A. Shall be ASTM D 312 Type IV extra steep asphalt.

B. Contractor shall mix with the hot asphalt an additive that eliminates the asphalt odor, such as Trumbull TruLo, as manufactured by Owens Corning, deScent, as manufactured by ArrMaz Custom Chemicals, or approved equal.

2.6 FASTENERS

A. Fasteners and fastening plates and/or termination bars shall be FM Approved and shall be listed in the FM Global Approval Guide, and as recommended by the insulation/fastener manufacturer for the specific application to meet the minimal requirements for wind uplift as required by the local jurisdiction and/or FM Global.

B. Heavy Duty Fastener for Steel Applications for 18-22 gauge Steel and Wood Substrates: Shall be a #14 fastener with a minimum .190 diameter shank and a thread diameter of .245 with ten (10) threads per inch and a 30 degree spade point. Fasteners shall be fluorocarbon coated with CR-10 corrosion resistant coating when subjected to 30 Kesternich cycles (DIN 50018) shows less than 15% red rust which surpasses FM Global Approval Standard 4470, as manufactured by OMG Roofing Products, or approved equal. All fasteners shall be used in conjunction with the manufacturers approved round pressure plate. Fasteners, plates, and/or bars shall be FM approved and listed in the FM Global Approval Guide.

PART 3 – EXECUTION

3.1 PROTECTION OF ROOFING

A. Provide special protection from traffic on yet to be removed roofing.

B. Provide special protection from traffic on completed work.

3.2 EXAMINATION AND PREPARATION

A. Do not install until defects are corrected and deck substrate meets roof system manufacturer's requirements.

B. Do not apply insulation unless asphalt application temperature, EVT of approximately 375° F to 425° F, can be maintained or when water or moisture is present on substrate. Do not heat asphalt above flashing point, or 525° F.

C. Examine substrate and related surfaces, and verify that there are no conditions such as inadequate anchorage, foreign materials, moisture, ridges, depressions, or other conditions which would prevent satisfactory installation of roof system.

D. Start of work constitutes acceptance of deck substrate and site conditions.

3.3 APPLICATION OF INSULATION – GENERAL INSTRUCTIONS

A. Manufacturer's Instructions: In regard to attachment, the manufacturer's instructions or specifications shall determine the suitability for an application. Installation must meet ASCE 7 criteria and meet local governing building codes.

B. Precautions: The surface of the insulation must not be ruptured due to overdriving of fasteners.

C. Thermal insulation boards shall be laid on the substrate in parallel rows with end joints staggered and butted as close as possible. All joints shall be tight and at the roof perimeter and roof penetrations, insulation shall be cut neatly and fitted to reduce openings to a minimum. All openings one-fourth inch (1/4") or larger shall be filled with insulation.

D. Insulation shall be tapered or feathered at drains and scuppers to provide proper drainage (if applicable).

E. No more insulation shall be installed than can be covered by the completed roof system by the end of the day or the onset of inclement weather.

F. Tapered insulation and crickets, when specified, shall be placed in accordance with the drawings and/or as required to minimum of NRCA standards.

3.4 APPLICATION OF INSULATION – LOOSE LAID and MECHANICALLY FASTENED WITH ADHERED COVER BOARD

A. Flat stock insulation shall be laid with edges parallel to flutes and bearing on deck surface/flats. The long dimension of first layer of insulation must be fully supported by the top flange of the metal deck. The edges of insulation boards must not cantilever over the flutes of the metal deck.

B. First layer of specified flat stock insulation shall be loose laid over the deck. Boards shall be staggered and butted as close as possible with voids over one-fourth inch (1/4") to be filled.

C. The second layer of specified flat stock insulation shall be applied over the first layer using offset joints, so that each layer breaks joints to a minimum of six inches (6") both ways with the preceding layer. Second layer of insulation shall be mechanically fastened through the first layer into the deck to conform to the ASCE 7 criteria for wind uplift as dictated by wind zone applicable to location of project.

D. The top surface of the last layer of insulation shall be coated with hot asphalt using twenty-five pounds (25#) ±20%, per one hundred (100) square feet of surface, and a one-half inch (1/2”) tapered layer of insulation shall be applied using offset joints, so that each layer breaks joints to a minimum of six inches (6") both ways with the preceding layer, and immediately walked in place.

PACKET 7.288 September 9, 2025

E. The top surface of the preceding layer of insulation shall be coated with hot asphalt using twenty-five pounds (25#) ±20%, per one hundred (100) square feet of surface, and specified cover board shall be applied using offset joints, so that each layer breaks joints to a minimum of six inches (6") both ways with the preceding layer, and immediately walked in place.

3.5 BACKNAILING/STRAPPING

A. On slopes greater than one inch (1") in twelve inches (12"), refer to NRCA and/or manufacturer's guidelines for backnailing procedures and follow the more stringent guidelines for all specified materials.

Slope	Interply& Top Pour	Backnail	Strap
0 - ½" per 12"	Type IV	No	No
½" - 2" per 12"	Type IV	Yes	Strap if possible
2" - 3" per 12"	Type IV	Yes	Yes

3.6 ADJUSTING

A. Remove insulation which has been damaged (broken, cracked, punctured, wet, etc.) and install acceptable new units before installation of roof system.

3.7 CLEANING

A. Remove debris and material wrappers from jobsite. Leave insulation clean and dry, ready to receive roofing membrane.

END OF SECTION

SECTION 07 27 26 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Vapor-permeable, fluid-applied air barriers.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 06 16 00 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.

1.2 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
C. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by Installer, who work on Project.
B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.
C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
   1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
B. Protect stored materials from direct sunlight.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.
   1. Protect substrates from environmental conditions that affect air-barrier performance.
   2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E2357.

2.3 LOW-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. Low-Build, Vapor-Permeable Air Barrier: Synthetic polymer material with an installed dry film thickness, according to manufacturer's written instructions, of 6 to 15 mils over smooth, void-free substrates.
   1. Physical and Performance Properties:
      a. Vapor Permeance: Minimum 10 perms; ASTM E96, Desiccant Method, Procedure A.
      b. Ultimate Elongation: Minimum 250 percent; ASTM D12, Die C.
      c. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested according to ASTM D4541.
      d. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
      e. UV Resistance: Can be exposed to sunlight for 180 days according to manufacturer's written instructions.

2.4 ACCESSORY MATERIALS

A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
B. Primer: Liquid primer recommended for substrate by air-barrier material manufacturer.
C. Stainless-Steel Sheet: ASTM A240, Type 304, 0.0187-inch-thick, and Series 300 stainless-steel fasteners.
D. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements and other conditions affecting performance of the Work.
    1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
    2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
    3. Verify that substrates are visibly dry and free of moisture. Test concrete substrates for capillary moisture by plastic sheet method according to ASTM D4263.
    4. Verify that masonry joints are flush and completely filled with mortar.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

H. Bridge expansion joints discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.3 ACCESSORIES INSTALLATION

A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
   1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
   2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
   3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
   4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply preformed silicone extrusion so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1-inch of full contact.
   1. Transition Strip: Roll firmly to enhance adhesion.
   2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.

F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

H. Seal top of through-wall flashings to air barrier with an additional 6-inch-wide, transition strip.

I. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.4 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.
   1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
   2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
   3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.

B. Low-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties.
   1. Vapor-Permeable, Low-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, applied in one or more equal coats. Apply additional material as needed to achieve void- and pinhole-free surface, but do not exceed thickness on which required vapor permeability is based.

C. Do not cover air barrier until it has been tested and inspected by testing agency.

D. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.5 FIELD QUALITY CONTROL

A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
   1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
   2. Air-barrier dry film thickness.
   3. Continuous structural support of air-barrier system has been provided.
   4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
   5. Site conditions for application temperature and dryness of substrates have been maintained.
   6. Maximum exposure time of materials to UV deterioration has not been exceeded.
   7. Surfaces have been primed, if applicable.
   8. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
   9. Termination mastic has been applied on cut edges.
   10. Strips and transition strips have been firmly adhered to substrate.

11. Compatible materials have been used.
12. Transitions at changes in direction and structural support at gaps have been provided.
13. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
14. All penetrations have been sealed.

D. Tests: As determined by testing agency from among the following tests:
1. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E1186, chamber pressurization or depressurization with smoke tracers.
2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to ASTM E783 or ASTM E2357.
3. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D4541 for each 600 sq. ft. f installed air barrier or part thereof.

E. Air barriers will be considered defective if they do not pass tests and inspections.
1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

G. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION

SECTION 07 42 13.23 - METAL COMPOSITE MATERIAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes MCM wall panels.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 DEFINITIONS

A. DBVR: Drained and back-ventilated rainscreen system; rainscreen system designed to drain and dry cavity entering water through drainage channels, weeps, and air ventilation.
B. MCM: Metal composite material; cladding material formed by joining two thin metal skins to polyethylene or fire-retardant core and bonded under precise temperature, pressure, and tension.
C. PER: Pressure equalized rainscreen system; rainscreen system designed for no water intrusion with equal pressure between interior system cavity and outside cladding barrier.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
B. Shop Drawings:
   1. Include fabrication and installation layouts of MCM panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
   2. Accessories: Include details of the flashing, trim and anchorage, at a scale of not less than 1-1/2 inches per 12 inches.
C. Samples for Initial Selection: For each type of MCM panel indicated with factory-applied color finishes.
   1. Include similar Samples of trim and accessories involving color selection.
D. Samples for Verification: For each type of exposed finish required, prepared on samples of size indicated below.
   1. MCM Panels: 12 inches long by actual panel width. Include fasteners, closures, and other MCM panel accessories. Submit custom color samples in paint manufacturer's standard size.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installer.
B. Product Test Reports: For each product, tests performed by a qualified testing agency.
   1. MCM Manufacturer's Material Test Reports: Certified test reports showing compliance with specific performance or third-party listing documenting compliance to comparable code sections IBC 1407.14 and IBC 1703.5.

2. MCM System Fabricator's Certified System Tests Reports: Certified system test reports showing system compliance with specific performance or third-party listing documenting compliance code section. Base performance requirements on MCM system type provided.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, MCM panels, and other manufactured items so as not to be damaged or deformed. Package MCM panels for protection during transportation and handling.
B. Unload, store, and erect MCM panels in a manner to prevent bending, warping, twisting, and surface damage.
C. Stack MCM panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store MCM panels to ensure dryness, with positive slope for drainage of water. Do not store MCM panels in contact with other materials that might cause staining, denting, or other surface damage.
D. Retain strippable protective covering on MCM panels during installation.

1.6 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of MCM panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

1.7 COORDINATION

A. Coordinate MCM panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.8 WARRANTY

A. Warranty on Panel Material: Manufacturer's standard form in which manufacturer agrees to replace MCM that fails within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.
B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace MCM panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide MCM panel systems capable of withstanding the effects of the following loads, based on testing in accordance with ASTM E330:
   1. Wind Loads: As indicated on Drawings.
   2. Deflection Limits: For wind loads, panel deflection no greater than L/60 of the span.
B. Thermal Movements: Include expansion and contraction points as needed to allow for free and noiseless thermal movements from surface temperature changes.

2.2 MCM WALL PANELS

A. MCM Wall Panel Systems: Provide factory-formed and -assembled, MCM wall panels fabricated from two metal facings that are bonded to a solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide 3A Composites USA Inc.; ALUCOBOND PLUS or comparable product by one of the following:
      a. Arconic Architectural Products (USA).
      b. Mitsubishi Chemical Composites.

B. Aluminum-Faced Composite Wall Panels: Formed with 0.020-inch-thick, anodized aluminum sheet facings.
   1. Core: Fire retardant.
   2. Exterior Finish: PVDF fluoropolymer with coats and thicknesses that comply with MCM panel manufacturer's performance and warranty requirements.
      a. Color: To match existing .
   3. Fire Performance: Flame spread less than 25 and smoke developed less than 450, in accordance with ASTM E84.

C. Attachment Assembly Components: Formed from extruded aluminum.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet ASTM A653, G90 hot-dip galvanized coating designation or ASTM A792, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide Fabricator's standard sections as required for support and alignment of MCM panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of MCM panels unless otherwise indicated.

C. Flashing and Trim: Provide flashing and trim formed from same material as MCM panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent MCM panels.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide 3A Composites USA Inc.; ALUCOBOND Axcent Trim or comparable product by one of the following:
      a. Arconic Architectural Products (USA).
      b. Mitsubishi Chemical Composites.
   2. Aluminum Trim: Formed with 0.040-inch-thick, coil-coated aluminum sheet facings.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of MCM panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in MCM panels and remain weathertight; and as recommended in writing by MCM panel manufacturer.

2.4 FABRICATION

A. General: Fabricate and finish MCM panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate MCM panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations or recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:
1. PVDF Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, MCM panel supports, and other conditions affecting performance of the Work.
1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by MCM wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by MCM wall panel manufacturer.
a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and assemblies penetrating MCM panels to verify actual locations of penetrations relative to seam locations of MCM panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages in accordance with ASTM C754 and MCM panel manufacturer's written recommendations.

3.3 MCM PANEL INSTALLATION

A. General: Install MCM panels in accordance with Fabricator's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor MCM panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Shim or otherwise plumb substrates receiving MCM panels.
2. Flash and seal MCM panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by MCM panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as MCM panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

7. Align bottoms of MCM panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:
1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by MCM panel manufacturer.

D. Attachment Assembly, General: Install attachment assembly required to support MCM wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.

E. Panel Installation: Attach MCM wall panels to supports at locations, spacings, and with fasteners recommended by Fabricator to achieve performance requirements specified.
1. Wet Seal Systems: Seal horizontal and vertical joints between adjacent MCM wall panels with sealant backing and sealant. Install sealant backing and sealant in accordance with requirements specified in Section 07 92 00 "Joint Sealants."
a. Clip Installation: Attach panel clips to supports at locations, spacings, and with fasteners recommended in writing by Fabricator. Attach routed-and-returned flanges of wall panels to panel clips with Fabricator's standard fasteners.
b. Panel Installation:
1) Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant in accordance with requirements specified in Section 07 92 00 "Joint Sealants."
2) Seal horizontal and vertical joints between adjacent MCM wall panels with Fabricator's standard gaskets.
c. Joint Sealing: Seal all joints in accordance with AAMA 501.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete MCM panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by MCM panel Fabricator; or, if not indicated, provide types recommended in writing by MCM system Fabricator.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, or SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch-deep, filled with mastic sealant (concealed within joints).

3.4 ERECTION TOLERANCES

A. Site Verifications of Conditions:
   1. Verify conditions of substrate previously installed under other Sections are acceptable for the MCM system installation. Provide documentation indicating detrimental conditions to the MCM system performance.
   2. Once conditions are verified, MCM system installation tolerances are as follows:
      a. Shim and align MCM wall panel units within installed tolerance of 1/4-inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing agency to perform field tests and inspections.
B. Water-Spray Test: After installation, test area of assembly for water penetration in accordance with AAMA 501.2.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as MCM panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of MCM panel installation, clean finished surfaces as recommended by MCM panel manufacturer. Maintain in a clean condition during construction.
B. After MCM panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
C. Replace MCM panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 53 00 – COAL-TAR ELASTOMERIC ROOFING SYSTEM

PART 1 – GENERAL

1.1 DESCRIPTION

A. Related Work
1. Documents affecting work of this Section include, but are not necessarily limited to, General Requirements / Conditions, Supplementary General Conditions, and Sections in Division 01 of these Specifications.
2. Section 04 05 23 – Through-Wall and Substrate Flashing System
3. Section 07 22 16 – Roof Board Insulation
4. Section 07 62 00 – Sheet Metal Flashing and Trim
5. Section 07 72 00 – Roof Accessories

B. Work shall include removal of the existing roof assembly down to the existing insulation. Remove and replace any wet or damaged as specified. Adhere all associated saddles and crickets as noted on the roof plan. Then adhere one layer of (25/32”) inch cover board set in the specified Type IV asphalt. Adhere a smooth surface modified bitumen base sheet set in Type IV asphalt then adhering the Coal-Tar Elastomeric Membrane as per the attached details.

1.2 INSTALLER QUALIFICATIONS

A. Roofing installer must be:
1. Currently prequalified with the Owner in accordance with Owner's prequalification requirements.
2. Currently in good standing with the manufacturer.
3. Installer must be an experienced single firm specializing in the type of roofing repair and/or removal and replacement work required, employing only experienced workers for the class of work in which they are employed, having at least five (5) years successful experience on projects similar in size and scope and acceptable as applicators by the Owner's representative.
4. Contractor must have successfully completed previous projects warranted by the manufacturer.

B. It shall remain each Bidder's responsibility to determine his current status with the manufacturer's certification plan.

1.3 QUALITY ASSURANCE

A. Testing Laboratory Services: Test results shall meet or exceed established standards.

B. Underwriters Laboratories, Inc. (Roofing Covering): Class A fire hazard classification.

C. Comply with governing local, state, and federal regulations, safety standards, and codes.

1.4 REFERENCES (INCLUDING LATEST REVISIONS)

A. American Society for Testing and Materials:
1. ASTM B 209 - 90, Specification for Aluminum and Aluminum Alloy Sheet and Plate

2. ASTM C 719 - 86, Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cycle Movement (Hockman Cycle)
3. ASTM C 794 - 80 (1986), Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
4. ASTM C 920 - 87, Specification for Elastomeric Joint Sealants
5. ASTM D 312 - 89, Specification for Asphalt Used in Roofing
6. ASTM D 1863 - 86, Specification for Mineral Aggregate Used on Built-up Roofs
7. ASTM D 2178 - 89, Specification for Asphalt Glass Felt Used in Roofing and Waterproofing
8. ASTM D 2824 - 85, Specification for Aluminum - Pigmented Asphalt Roof Coatings
9. ASTM D 4586 - 86, Specification for Asphalt Roof Cement, Asbestos Free
10. ASTM A 361 - 90, Sheet Steel, Zinc-Coated (Galv.) by the Hot-Dip Process for Roofing and Siding
11. ASTM C 177, Test for Thermal Laboratory Services
12. ASTM C 728, Perlite Thermal Insulation Board

B. Federal Specifications:
1. LLL-I-535B
2. SS-A-701B
3. SS-C-153
4. SS-C-153C
5. SS-R-620B
6. TT-C-498C
7. TT-P-320D
8. TT-S-00227E
9. TT-S-00230C
10. SS-S-001534 (GSA-FSS)
11. L-P-375

C. Industry Standards:
1. The National Roofing Contractors Association (NRCA) - Roofing and Waterproofing Manual
2. Sheet Metal and Air Conditioning Contractors National Association (SMACNA) - Architectural Sheet Metal Manual
3. American Society of Civil Engineers – ASCE 7

1.5 SUBMITTALS

A. Samples and Manufacturer's Submittals: Submit prior to delivery or installation.
1. Samples of all roofing system components including all specified accessories.
2. Submit samples of proposed warranty complete with any addenda necessary to meet the warranty requirements as specified.
3. Submit latest edition of manufacturer's specifications and installation procedures. Submit only those items applicable to this project.
4. A written statement from the roofing materials manufacturer approving the installer, specifications and drawings as described and/or shown for this project and stating the intent to guarantee the completed project.
5. Manufacturer's Equiviscous Temperatures (EVT) for the specified bitumens.

B. Shop Drawings: Provide manufacturer's approved details of all perimeter conditions, projection conditions, and any additional special job conditions which require details other than indicated in the drawings.

D. Maintenance Procedures: Within ten days of the date of Substantial Completion of the project, deliver to the Owner three copies of the manufacturer's printed instructions regarding care and maintenance of the roof.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened containers and rolls with all labels intact and legible including labels indicating appropriate warnings, storage conditions, lot numbers, and usage instructions. Materials damaged in shipping or storage shall not be used.

B. Manufacturer's packaging and/or roll plastic is not acceptable for exterior storage. Tarpaulin with grommets shall be minimum acceptable for exterior coverings. All materials stored as above shall be minimum of four inches (4") off the substrate, and the tarpaulin tied off with rope.

C. Deliver materials requiring fire resistance classification to the job with labels attached and packaged as required by labeling service.

D. Deliver materials in sufficient quantity to allow continuity of work.

E. Handle and store material and equipment in such a manner as to avoid damage. Liquid products shall be delivered sealed, in original containers.

F. Handle rolled goods so as to prevent damage to edge or ends.

G. Select and operate material handling equipment so as not to damage existing construction or applied roofing.

H. Moisture-sensitive products shall be maintained in dry storage areas and properly covered. Provide continuous protection of materials against wetting and moisture absorption. Store roofing and flashing materials on clean raised platforms with weather protective covering when stored outdoors.

I. Store rolled goods on end.

J. Protect materials against damage by construction traffic.

K. The proper storage of materials is the sole responsibility of the contractor and any wet or damaged roofing materials shall be discarded, removed from the project site, and replaced prior to application.

L. Comply with fire and safety regulations, especially with materials which are extremely flammable and/or toxic. Use safety precautions indicated on labels.

M. Products liable, such as emulsions, to degrade as a result of being frozen shall be maintained above 40° F in heated storage.

N. No storage of materials shall be permitted on roof areas other than those materials that are to be installed the same day. Any exception must be in written form.

O. The contractor is to erect a temporary chain link fence, minimum six feet (6') in height, around work area stage and kettles. Fence is to be secured on a daily basis.

1.7 SITE CONDITIONS

A. Job Condition Requirements:

1. Coordinate the work of the contractor with the work to be performed by the Owner's personnel, to ensure proper sequencing of the entire work. The Owner's personnel will be erecting interior protection for equipment, if required. The contractor is to schedule his work so that adequate time is allowed for the Owner's personnel to perform this work. No roof work shall be performed until the Owner's personnel have completed erection of the interior protection in that area.
2. Apply roofing in dry weather.
3. Do not apply roofing when ambient temperature is below 40° F (4° C).
4. Proceed with roofing work only when weather conditions are in compliance with manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with specifications.
5. For further information regarding roofing material manufacturer's recommendations for project conditions, refer to the manufacturer's published application manual.
6. Schedule the work so the building will be left watertight at the end of each day. Do not remove more roofing or insulation material than can be reinstalled in any working day.
7. All surfaces to receive new roofing shall be smooth, dry, and free from dirt, debris, and foreign material before any of this work is installed. Competent operators shall be in attendance at all times equipment is in use. Materials shall be stored neatly in areas designated by the Owner. Load placed on the roof at any point shall not exceed the safe load for which the roof is designed.
8. The contractor shall take all necessary precautions to protect the roof mat and deck from damage. The contractor shall be responsible for repairing all new areas of damage caused by the negligence of the contractor, at the contractor's expense. The Owner's on-site representative shall determine damage caused by contractor negligence.
9. The contractor is to be aware of the potential for roof leaks on the existing roof as a result of ruptured blisters and/or roof mat damage caused by the vacuum process, foot traffic, or material and equipment storage. The contractor is to take all necessary precautions to prevent damage to the existing roof. All damage to the existing roof that could result in roof leaks is to be repaired on a daily basis by the roofing contractor.
10. The contractor shall follow local, state, and federal regulations, safety standards, and codes for the removal, handling, and disposal of asbestos containing materials, if present. When a conflict exists, use the stricter document.
11. Follow insurance underwriter's requirements acceptable for use with specified products or systems.
12. Due caution should be exercised so as not to alter the structural integrity of the deck. When cutting through any deck, care should be taken so as not to damage the deck or any part of the deck, such as post tension cables, etc.
13. All kettles shall have a fume recovery system and temperature gauge, all in working order.
14. The contractor is to verify the location of all interior ducts, electrical lines, piping, conduit, and/or similar obstructions. The contractor is to perform all work in such a manner as to avoid contact with the above mentioned items.
15. Surface and air temperatures should be a minimum 45° F during applications of cleaner and waterproof coating and remain above 45° F for a minimum of four (4) hours following applications. Verify compatibility of cleaner with coatings, paints, primers and joint sealers specified. Advise Owner's representative of any problems in this regard prior to commencing cleaning operations.

16. Temporary Sanitary Facilities: The contractor shall furnish and maintain temporary sanitary facilities for employees' use during this project. These will be removed after the completion of the project. All portable facilities shall comply with local laws, codes, and regulations.

B. Protection of Work and Property:
1. Work: The contractor shall maintain adequate protection of all his work from damage and shall protect the Owner's and adjacent property from injury or loss arising from this contract. He shall provide and maintain at all times any OSHA required danger signs, guards, and/or obstructions necessary to protect the public and his workmen from any dangers inherent with or created by the work in progress. All federal, state, and city rules and requirements pertaining to safety and all EPA standards, OSHA standards, NESHAP regulations pertaining to asbestos as required shall be fulfilled by the contractor as part of his proposal.
2. Property: Protect existing planting and landscaping as necessary or required to provide and maintain clearance and access to the work of this contract. Examples of two categories or degrees of protection are generally as follows: a) removal, protection, preservation, or replacement and replanting of plant materials; b) protection of plant materials in place, and replacement of any damage resulting from the contractor's operations.
3. Twenty-four Hour Call: The contractor shall have personnel on call 24 hours per day, seven (7) days per week for emergencies during the course of a job. The Owner's Project Manager is to have the 24 hour numbers for the contact. Contractor must be able to respond to any emergency call and have personnel on-site within two (2) hours after contact. Numbers available to the Owner's Project Manager are to be home, mobile, and office numbers for:
   a) Job Foreman
   b) Job Superintendent
   c) Owner or Company Officer

C. Damage to Work of Others: The contractor shall repair, refinish, and make good any damage to the building or landscaping resulting from any of his operation. This shall include, but is not limited to, any damage to plaster, tile work, wall covering, paint, ceilings, floors, or any other finished work. Damage done to the building, equipment, or grounds must be repaired at the successful contractor's expense holding the Owner harmless from any other claims for property damage and/or personal injury.

P. Measurements: It will be the contractor's responsibility to obtain and/or verify any necessary dimensions by visiting the job site, and the contractor shall be responsible for the correctness of same. Any drawings supplied are for reference only.

E. Use of Premises:
1. The contractor is advised that the Owner will occupy the building at all times, and the contractor must provide all safeguards required to protect personnel and to keep noise levels as low as reasonably possible for each operation.
2. The contractor shall:
   a) Coordinate work in such a manner as to not interfere with the normal operation of the building.
   b) Assume full responsibility for protection and safekeeping of products stored on premises.
   c) Agree to hold the Owner harmless in any and all liability of every nature and description which may be suffered through bodily injuries, including death of any persons by reason of negligence of the contractor, agents, employees, or subcontractors.

F. Cleaning and Disposal of Materials:

1. Contractor shall keep the job clean and free from all loose materials and foreign matter. Contractor shall take necessary precautions to keep outside walls clean and shall allow no roofing materials to remain on the outside walls.
2. All waste materials, rubbish, etc., shall be removed from the Owner's premises as accumulated. Rubbish shall be carefully handled to reduce the spread of dust. A suitable scrap chute or hoist must be used to lower any debris. At completion, all work areas shall be left broom clean and all contractor's equipment and materials removed from the site.
3. All bituminous or roofing related materials shall be removed from ladders, stairs, railings, and similar parts of the building.
4. Debris shall be deposited at an approved disposal site.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate roofing schedule with work of other trades.

B. Plan lay up roofing membrane with respect to deck slope. Avoid situations where excessive drainage could pass into completed roofing.

C. Maintain communication with roofing manufacturer's representative to inform of progress and to schedule periodic sample testing.

D. All penetrations shall be made in roof prior to beginning with roof installation.

1.9 WARRANTY

A. Roofing - Manufacturer: Project shall be installed in such a manner that the roofing material manufacturer will furnish a written twenty (20) year NDL type warranty from the date of substantial completion of the completed project. Manufacturer issuing warranty shall provide historical data supporting hail resistance.

B. Roofing - Contractor: The contractor, jointly with any subcontractors employed by him, shall guarantee the work required and performed under this contract will be free from defects in workmanship and materials, and that the building will be and remain waterproof for a two (2) year warranty period, after the Owner accepts the work as substantially complete. The warranty shall be in approved notarized written form, to obligate the contractor and his subcontractors, if any, to make good the requirements of the warranty.

C. Warranty repairs shall be performed by a certified installer. The repairs shall be performed in accordance with the manufacturer's written instructions and recommended procedures so as to not void the warranty. Repair of the system, including materials and labor, shall be done at no cost to the Owner.

D. During the proposal period each Bidder shall make arrangements with the material manufacturer to provide the required warranty. Refer to SUBMITTALS Paragraph in this section for requirements concerning submittals of warranty.

PART 2 – PRODUCTS

2.1 GENERAL

A. All materials shall be furnished, specified, or approved in writing by the manufacturer issuing the warranty.

B. Samples of all materials used on the project, which are not supplied by the membrane manufacturer, shall be submitted to the membrane manufacturer for written approval prior to work starting.

C. All materials used on the project shall be asbestos free.

2.2 FINISH MEMBRANE

A. The coal-tar elastomeric membrane (CTEM) shall be 60 mil overall calendered thickness. The membrane shall be a high-performance elastomeric membrane incorporating a DuPont™ Elvaloy® KEE (ketone ethylene ester), extended with coal-tar pitch and reinforced with polyester fibers as manufactured by Hyload, Inc., or approved equal.

B. The coal-tar elastomeric membrane (CTEM) shall meet the following physical properties: Elongation 170%, ASTM D 412; Tensile Strength 1500 lbs/in2, ASTM D 412; Tear Strength 330 ppi, ASTM D 624; Density @ 70° F, 80 lbs/ft3; Low Temperature Flexibility, Pass, 37-GP-56M; and Water Absorption less than 0.1%, 37-GP-56M.

2.3 WHITE FLEECEBACK WELDED-SEAM FLASHING MEMBRANE

A. Membrane shall be nominal seventy-five (75) mil in overall thickness consisting of a white sixty (60) mil EIP elastomeric membrane with fifteen (15) mil thick backing of polyester fleece backing with a minimum one and one-half inch (1-1/2") dry selvage edge for welding. The white fleece backed welded-seam membrane shall be a high-performance elastomeric membrane incorporating a DuPont Ethylene Interpolymer (EIP) alloy, reinforced with polyester fibers as manufactured by Hyload, Inc., or approved equal.

2.4 BITUMEN

A. Shall be ASTM D 312 Type IV extra steep asphalt.

Slope	Interply	Top Pour	Backnail	Strap
0 - ½" per 12"	Type IV	Type IV	No	No
½" - 2" per 12"	Type IV	Type IV	Yes	Strap if possible
2" - 3" per 12"	Type IV	Type IV	Yes	Yes

B. Contractor shall mix with the hot asphalt an additive that eliminates the asphalt odor, such as descent, as manufactured by ArrMaz Custom Chemicals, or approved equal.

2.5 FELTS

A. Shall be Underwriters Laboratory approved and listed in the FM Global Approval Guide.

B. Shall be nominal ninety (90) mil, smooth surfaced, ModiFlex MP HD modified asphalt, glass fibered scrim base sheet, meeting ASTM D6163, Type 1, Grade S as manufactured by IKO, or approved equal.

2.6 INSULATION

A. All insulation shall be in compliance with Section 07 22 16 Roof Board Insulation.

B. All insulation shall be approved in writing by the membrane manufacturer as to thickness, type, and manufacturer. All insulation must be approved for the specific application, Underwriters Laboratory approved, and be listed in the FM Global Approval Guide.

2.7 CANT STRIP

A. Shall be wood fiber where used for non-structural purposes. Shall be treated solid wood where used for structural purposes meeting NRCA, FM Global and Underwriters Laboratory guidelines. If solid wood cant is used where insulation exists, cant is to be toe nailed into treated solid wood nailer the same height as insulation.

2.8 WOOD

A. All wooden nailers, cants, and curbs shall be treated lumber as required by NRCA, FM Global and Underwriters Laboratory guidelines.

2.9 CAULKS

A. One-part Urethane Sealant: Sealant for use at coping joints, reglet joints, etc., shall be a one-component urethane non-sag, gun grade sealant designed for use in active exterior joints, and shall meet or exceed Federal Specification No. 1 TT-S-00230C, Type II, Class A, ASTM C 920. Where joint surfaces are contained or are contaminated with bituminous materials, provide manufacturer's modified-type sealant (modified with coal-tar or asphalt as required), as manufactured by Sonneborn, or approved equal.

B. Silyl-terminated Polyether Sealant: To seal the leading edge of the CTEM membrane, to bond CTEM at terminations with metal, and for open CTEM seam repair, sealant shall be a thermosetting, solvent free, non-slump, self-fixturing, multipurpose structural sealant which shall meet the following physical and performance properties, M-1 as manufactured by Chem Link, Inc., or approved equal.

Properties	
Specific Gravity	1.62 (13.5 lbs./gallon)
Viscosity	800,000 cps Brookfield RTV, TF spindle, 4 rpm 70° F.
Shear Strength (ASTM D-1002)	300 psi+ (7 day ambient cure)
Elongation @ break (ASTM D-412)	300% (7 day ambient cure)
Hardness Shore A (ASTM C-661)	50 – 55 (14 day ambient cure)
Tack free time (ASTM C-679)	35 minutes
Low temperature flex	Minus 20° F: PASS
Slump (sag) (ASTM C-639)	Zero slump
Shrinkage (ASTM D-2453)	No measurable shrinkage (14 cay cure)
Service temperature	-40° F to 200° F

2.10 FASTENERS

A. Fasteners and fastening plates or bars shall be listed in the FM Global Approval Guide, and be as recommended by the fastener manufacturer for the specific application.

B. Fastener for Brick: Shall be one-fourth inch by two inches (1/4" x 2"), zinc with plated steel or stainless steel nail, one piece unit, flat head, as manufactured by Rawl Zamac Nailin, or approved equal.

2.11 ROOFING AGGREGATE

A. ASTM D 1863 covers the quality and grading of crushed stone and water worn gravel suitable for use as coarse mineral aggregate.

B. General Characteristics of Crushed Stone and Gravel: The stone and gravel at the time of application shall be hard, durable, surface dry (up to 2%) by weight moisture content), free of clay, loam, sand, or other foreign substances, and shall conform to size grading and property requirements.

C. Grading: The aggregate shall conform to sieve analysis as follows:

Sieve	Total Passing
3/4"	100
1/2"	90 to 100
3/8"	40 to 70
No. 4	0 to 15
No. 8	0 to 5

D. Physical Property Requirements:

Moisture, crushed stone and gravel	2.0% max.
Unit Weight (loose)	60 lbs./cu. ft., min.
Dust	0.5% max.
Hardness, amount passing No. 5 (3.36 mm) sieve when tested in accordance with ASTM D 1865	20% max.

2.12 ASPHALT PLASTIC ROOF CEMENT

A. Trowel-applied mastic used to repair blisters, splits, and flanges on gravel stops, stacks, vents, and similar applications, as manufactured by Johns-Manville, or approved equal.

Applicable Federal Specification	SS-C-153C, Type I
ASTM	D 4586
Flash Point	105° F
Weight per gallon (approximate)	11 lbs.
Viscosity @ 80° F (ASTM D 217)	270-330
% Non-Volatile (Fed. Test Method 141)	70% Min.
% Specially Processed Bitumen	30% Min.
% Total Solids, by Volume	75% Min.
Dry film thickness of 1 gal./15 sq. ft.	85 Mils
Drying time	2 to 3 days
Service Temperature, Extended Exposure	-20° to +150° F
Resistance to Oils & Solvents	Poor
Resistance to Sunlight	Good
Resistance to Chemicals	Good
Effects of Weathering	Slight chalking
Water Resistance	
Under Good Drainage Conditions	Excellent
Under Continuous Submersion	Fair

2.13 ASPHALT ROOF PRIMER

A. Quick-dry asphalt-based primer for priming of asphalt roof surfaces, as manufactured by GAF, or approved equal.

Applicable Federal Specification	SS-A-701B
ASTM	D 41
Flash Point	105° F
Viscosity at 80° F (ASTM D 217)	50-60 K.U.
Weight per gallon	7.4 pounds
Drying time (to touch)	Min. 4 hours

2.14 ASPHALT FLASHING CEMENT

A. Designed for laying-up cold process roof membrane flashings where fast-setting adhesive is required, as manufactured by GAF, or approved equal.

Applicable Federal Specification	SS-C-153C, Type I
ASTM	D 4586
Flash Point	105° F (41° C)
Weight per gallon (approximate)	10.8 lbs.
Viscosity @ 77° F (25° C) (ASTM D 217)	230-330
% Non-Volatile (Fed. Test Method 141)	68% Min.
% Specially Processed Bitumen	42% Min.
% Total Solids, by Volume	60% Min.
Cured film thickness of 1 gal./15 sq. ft.	75 Mils
Drying time	2 to 3 days
Service Temperature, Extended Exposure	-40° to +180° F
Resistance to Oils & Solvents	Poor
Resistance to Sunlight	Good
Resistance to Chemicals	Good
Effects of Weathering	Slight chalking
Water Resistance	
Under Good Drainage Conditions	Excellent
Under Continuous Submersion	Fair

2.15 LEAD JACKS

A. Shall be four pound (4#) lead, and of dimensions required to completely cover existing plumbing stack.

2.16 LEAD FLASHING DRAINS

A. Shall be four pound (4#) lead, minimum thirty-six inches by thirty-six inches (36" x 36"), used for flashing of internal drains.

2.17 PITCH PAN SEALANT

A. Pitch pan sealant shall be coal tar urethane which shall meet the following physical and performance properties, or approved equal.

Test	Typical Value	Test Method
Uniformity	Pass	ASTM D 4479
Elongation	450%	ASTM D 2370
Solids by Weight	98.5%	ASTM D 4479
Density	10.6 lbs/gal.	ASTM D 1475
Viscosity	20,000 – 25,000 cps	ASTM D 2196
Flash Point	250°F minimum	ASTM D 93
VOC	25 g/l	ASTM D 6511
Asbestos Content	0%	EPA 600/R-93/116

2.18 TERMINATION/PRESSURE BARS

A. Aluminum strip shall be extruded channel bar with a mill finish, height to be one inch (1"), thickness to be 0.25" ± 0.1", leg height to be one-fourth inch (1/4") top and bottom, leg angle to be ninety degrees (90°), for perimeter and curb anchorage, having predrilled holes six inches (6") on center, as manufactured by Olympic Fasteners, or approved equal.

2.19 DELIVERY AND STORAGE

A. All materials shall be delivered with appropriate carton and can labels indicating appropriate warnings, storage conditions, lot numbers, and usage instructions. Materials damaged in shipping or storage shall not be used.

2.20 PRECAUTIONS

A. Some of the indicated materials are extremely flammable and/or toxic. Use precautions indicated on can and carton labels.

2.21 ICE AND WATER SHIELD

A. A premium heavyweight, self-adhering underlayment, to use as an ice and water shield, such as: All Climate as manufactured by Elk Premium Building Products; Tamko TW Metal and Tile Underlayment as manufactured by Tamko Roofing Products, Inc.; or Vycor Ultra, as manufactured by Grace Construction Products; or approved equal.

2.22 MISCELLANEOUS MATERIALS

A. Other materials shall be as specified or of the best grade for the proposed use as recommended by the manufacturer.

PART 3 – EXECUTION

3.1 REFERENCE

A. The manufacturer's Technical Specifications and current NRCA, Underwriters Laboratory and IBC guidelines shall be considered a part of this specification and should be referred to for more specific application procedures and recommendations.

B. Application of materials shall be in strict accordance with the manufacturer's recommendations and current NRCA, Underwriters Laboratory and IBC guidelines, except where more stringent requirements are shown or specified. In the instance of a conflict between these specifications and those of the manufacturer and/or current NRCA, Underwriters Laboratory and IBC guidelines, the more stringent specifications shall take precedence.

C. General Installation:
1. Comply with governing local, state, and federal regulations, safety standards, and codes.
2. Protect adjacent areas with tarpaulin or other durable materials.
3. Contractor shall prevent overspray, and be responsible for parking lot areas and/or adjoining areas not part of this contract.
4. Contractor shall be responsible for sealing, as required, all openings that may allow bitumen migration or drippage, i.e. pitch dams, envelopes, and filler strips.
5. Prepare surfaces according to manufacturer's or applicator's published instructions. All metal that is to receive bitumen, or come in contact with bitumen or adhesive, shall be first primed with appropriate primer. Any prefinished galvanized sheet steel that is to receive bitumen, or come in contact with bitumen or adhesive, shall be scored, scuffed or abraded before receiving primer application.
6. Use cleaning materials or primers necessary to render an acceptable surface/substrate.

7. All surfaces/substrates shall be clean and dry prior to application of materials.
8. Prior to application of felts and membrane, all foreign matter, gravel, etc., shall be removed from the insulation and/or substrate. Gravel or debris between the insulation/substrate and plies is not acceptable.
9. Prior to application of flashing membranes, substrate shall be clean and free of any previously installed roofing materials. Contractor shall ensure that all components of substrate be structurally sound before application of flashing materials.
10. Bitumen kettle shall have a fume recovery system, and visible thermometer to provide positive monitoring of the bitumen temperature when it is heated in accordance with manufacturer's instructions.
11. Ambient temperature shall be 45° F and rising.
12. The maximum heating temperature of Type IV asphalt shall be 525° F.
13. The temperature of Type IV asphalt shall be approximately 475° F ± at the point of application.
14. Maintain kettle and/or tanker temperature at least 25° F below the actual flash point of the bituminous materials used.
15. Never heat the bituminous materials at high temperatures for prolonged periods of time.
16. Do not allow bituminous materials to stand in luggers for long periods.
17. Circulate bituminous materials.
18. Insulate hot transport lines if required.
19. The base sheets and the 60 mil coal-tar elastomeric membrane (CTEM) are to be laid in the direction of maximum roof slope, working from bottom of slope toward ridge.
20. All roof areas will be picture framed with the 60 mil coal-tar elastomeric membrane (CTEM) as the system is being applied. The outer edge of the picture frame sheet shall extend approximately two inches (2") above the top of the cant. All end laps of the field sheets of the 60 mil coal-tar elastomeric membrane shall lap the picture frame sheet a minimum of eight inches (8") or the picture frame sheet side laps shall lap the field sheet a minimum of eight inches (8").
21. Wrinkles, buckles, kinks, and fishmouths are not acceptable when laying felt and membrane.
22. Dry voids of felt on felt or membrane on membrane are not acceptable.
23. Where deteriorated base flashing is removed, primed cant strips shall be installed at the intersection of the deck and the vertical surfaces. All flashings shall be mechanically top-fastened with a termination bar a minimum of six inches (6") on center at the top leading edge, and be a minimum of eight inches (8") in height from finished membrane.
24. On slopes greater than one inch (1") in twelve inches (12"), refer to NRCA and/or manufacturer's guidelines for backnailing procedures and follow the more stringent guidelines for all specified materials.
25. All surfaces that are to receive the self-adhered membranes shall be primed with a fast drying asphaltic primer. Except when self-adhered membrane is to be installed over a CTEM surface.

3.2 CANTS

A. Toe of cant shall be level with the surface to receive new roof membrane and in all cases anchored according to NRCA, Underwriters Laboratory and IBC guidelines.

3.3 INSULATION

A. Installation of roof insulation shall be in accordance with Section 07 22 16 Roof Board Insulation.

B. Manufacturer's Instructions: In regard to attachment, the manufacturer's instructions or specifications shall determine the suitability for an application. Installation must meet ASCE 7 criteria and meet local governing building codes.

C. Precautions: The surface of the insulation must not be ruptured due to overdriving of fasteners.

D. Insulation shall be tapered or feathered at drains and scuppers to provide proper drainage (if applicable).

E. No more insulation shall be installed than can be covered by the completed roof system by the end of the day or the onset of inclement weather.

3.4 NAILERS

A. All nailers shall be installed in accordance with Section 06 10 53 Miscellaneous Carpentry.

B. Wooden nailers shall be installed at gravel stops, drip edges, and expansion joints on outside perimeter of building according to NRCA, Underwriters Laboratory and IBC guidelines.

C. All Construction: Nailers shall be the same height as the new recovery board being installed where required. Nailers shall be raised if necessary by anchoring an additional nailer of appropriate height to the existing nailer if the existing nailer is not to be replaced. Nailers shall be anchored to resist a pull-out force of one hundred seventy-five pounds (175#) per foot. Fasteners shall be no less than two (2) per nailer, and be spaced at three feet (3') on center maximum. Expansion joint nailers shall extend upward a minimum of eight inches (8") above finish roof height.

3.5 WOOD CANTS

A. All wood cants shall be installed in accordance with Section 06 10 53 Miscellaneous Carpentry.

B. Toe of cant shall be level with the surface to receive new roof membrane and in all cases anchored according to NRCA, Underwriters Laboratory and IBC guidelines.

3.6 APPLICATION OF PLY SHEETS

A. Insulation shall be covered with one (1) ply of nominal eighty-five (85) mil, smooth surfaced, SBS modified asphalt, glass reinforced base sheet, meeting ASTM D6163, Type 1, Grade S adhered as follows:

All layers shall be solid mopped at the nominal rate of thirty pounds (30#) ± 20% per one hundred (100) square feet using steep asphalt Type IV as required by slope, properly heated. Specified layers shall be applied in accordance with the manufacturer's recommendations and in accordance with general practices as set forth by the NRCA Roofing Manual.

3.7 APPLICATION OF FINISH MEMBRANE PLY

A. Unroll at least ten feet (10') of the 60 mil coal-tar elastomeric membrane (CTEM) and position the sheet. The properly heated steep asphalt (per specification) should be applied at the rate of approximately thirty pounds (30#) ± 20% per one hundred (100) square feet with a mop just ahead of the roll of the CTEM to form a pool of asphalt into which the membrane is to be rolled. The roll of CTEM should push a puddle of asphalt ahead of it with no voids. Care should also be taken not to trap air under the membrane. The pool of asphalt in front of the roll will eliminate entrapped air.

B. The asphalt must be mopped so as to extend beyond both edges of the sheet. The amount of asphalt should be just sufficient for excess asphalt to squeeze out along the edges.

C. Picture frame all roof areas with 60 mil coal-tar elastomeric membrane (CTEM) as finish membrane ply is being applied. Rectangular type projections should also be picture framed.

3.8 LAP SPLICE

A. Coal-tar elastomeric membrane (CTEM) shall be installed as above with side lap minimum three inches (3"), no maximum. End laps shall be minimum eight inches (8"), no maximum, and staggered a minimum of four feet (4'), no maximum.

B. Lap Splice with Bitumen: The membrane shall be laid in the same direction as the base sheet, but the laps shall not coincide with the base sheet. While asphalt is still hot, pressure shall be applied to the laps with a trowel or similar tool to ensure complete contact with the asphalt, and a squeeze-out of bitumen shall be visible. The side laps in the 60 mil coal-tar elastomeric membrane (CTEM) should not be located above those in the base sheet, but located to one side or other to avoid excessive ply build-up. Lack of or no side lap bitumen squeeze-out is not acceptable. Contractor shall cut away dry material to dry material, and install a minimum of twelve inch (12") wide membrane overlaid in hot bitumen.

C. Seams/Laps:
1. All hot-air welded seams/laps shall be welded daily and tested daily with a probe for integrity, no variance.
2. All laps/seams, cross seams, T-joints, seams/openings at penetrations, or other details shall be sealed and checked daily, no variance.
3. Laps: All laps shall be straight and free of wrinkles and/or fishmouths, no variance.

3.9 PERIMETER FASTENING

A. Wood nailers are required for perimeter gravel stops or drip edges. Field membrane and all plies shall be mechanically fastened to nailer on twelve inch (12") centers maximum.

3.10 FLEECE BACKED WELDED-SEAM VERTICAL WALL FLASHING

A. Base flashings shall be installed using the 60 mil calendered thickness fleece backed white welded seam elastomeric roof membrane flashing, with length of run not to exceed ten linear feet (10').

B. Wooden nailers or curbs shall be installed at all edges and openings in the roof, mechanically fastened to the deck.

C. Cant strips shall be installed at the intersection of the deck and all vertical surfaces.

D. The roofing field membrane shall extend up over and two inches (2") above the top of cant strips at all vertical intersections or out to the roof's edge.

E. All existing substrates receiving flashing membrane shall be clean and primed with asphalt primer, prior to application.

F. Flashing membrane shall always be installed with one (1) ply of SBS modified bitumen base sheet as an underlayment. Both the Type IV glass felt underlayment and the flashing membrane shall be set in hot asphalt. NOTE: Care shall be taken to avoid asphalt contamination at end laps where the vertical laps of the must be hot-air welded.

G. All flashings shall be mechanically fastened with a termination bar a maximum of six inches (6") on center, extend a minimum of nine inches (9") onto the field of horizontal roof membrane, and not exceed ten linear feet (10') of run in length.

H. After proper termination of the base flashing at approximate eight inch (8") height, a saw cut reglet with counterflashing shall be installed according to NRCA and SMACNA guidelines.

I. All vertical flashing lap seams of the flashing membrane shall be hot-air welded, and not exceed ten feet (10') on center.

J. All flashing membrane shall be hot mopped to the vertical flashing and to field of roof membrane; hot-air weld vertical laps. NOTE: Once the membrane has been contaminated with hot asphalt, it is not possible to clean the asphalt off and hot air weld it for long term effectiveness. A patch of membrane must be welded over the area large enough to be welded one and one-half inches (1-1/2") past any contaminated area.

K. Flashing laps shall be minimum three inch (3") width, no maximum. Hot-air weld of flashing lap shall be minimum one and one-half inch (1-1/2") width, no maximum.

L. Hot-Air Welding of Flashing Laps:
1. When using a hand-held hot-air welder, the seams should be pressed together using a hand-held roller. The speed and temperature settings of the welding equipment can be affected by the weather conditions at the site of application, therefore, these parameters should be set by trial and error using two (2) pieces of the elastomeric membrane. Minimum width of hot-air weld one and one-half inches (1-1/2"), no maximum.
2. Lay the laps together and apply pressure to the welded seam to ensure full adhesion.
3. Allow the seams to set fully, and probe the entire length for voids. Reseam voids immediately with a hot-air gun and roller.

L. All hot-air welded seams/laps shall be tested daily with a probe for integrity, no variance.

3.11 DRAIN FLASHINGS

A. All drains shall receive new lead flashings. Flashings shall be installed in strict accordance with manufacturer's recommendations and with practices as set forth in the NRCA Roofing Manual.

B. Drain shall be covered with the 60 mil coal-tar elastomeric roofing membrane (CTEM) and underlayment plies as specified, slitting the membranes over the drain hole with an "X".

C. Lead flashings as specified shall be installed and primed with asphalt base primer and allowed to dry prior to application of flashing layers.

D. Lead flashing shall be covered with flashing membranes consisting of one layer of fiberglass ply sheet and one layer of 60 mil coal-tar elastomeric roofing membrane (CTEM). Each layer shall be installed in a solid bed of asphalt bitumen as specified and shall extend a minimum of twelve inches (12") past the outer edges of the three by three foot (3' x 3') lead flashing. Flashing membranes and lead flashing shall be slit over the drain hole with an "X", cutting excess material from the interior of the drain bowl.

3.12 PROJECTION FLASHINGS

A. Plumbing Vents: Soil vent stack pipes shall receive new lead flashings installed in strict accordance with practices set forth in the NRCA Roofing Manual. The lead shall be carried up and over the top of the stack, and crimped down into the pipe to form a watertight seal. Projections that cannot be sealed thus should be boxed in and flashed as recommended by the roof membrane manufacturer.

B. Square Projections: Lay the 60 mil coal-tar elastomeric membrane (CTEM) up to the projection, and cut membrane so that it will extend twelve inches (12") beyond the projection. Cut a slit in the membrane to correspond with the position of the projection, and lay the membrane in hot asphalt. Apply another layer of membrane in exactly the same fashion, but from the opposite direction. For metal flange-type projections, after doing above, strip in with six inch (6") strips of membrane.

C. Round Projections: Cut membrane square and eighteen inches (18") from perimeter of projection. Slit square membrane with an "X" of proper size to ensure a close fit and positive seal. Place over projection, and adhere to clean membrane already on the roof. Cut a six inch (6") piece of membrane to apply as a collar, and secure with an all stainless steel clamp.

3.13 CURB FLASHINGS

A. The flashing substrate shall be free of any dirt and loose material.

B. The underlayment ply or plies and the coal-tar elastomeric membrane (CTEM) shall be brought to two inches (2") past the top of the cant strip and adhered.

C. Starting on the roof at least six inches (6") from the roofside edge of the cant strip, adhere one (1) ply of SBS modified bitumen base sheet extending over the cant and up the vertical a minimum of eight inches (8"). Each lap of the ply sheet shall be a minimum of three inches (3").

D. Over the Type IV ply sheet starting on the roof at least eight inches (8") from the roofside edge of the cant strip, adhere the coal-tar elastomeric membrane (CTEM) extending over the cant and up the vertical a minimum of eight inches (8"). Each lap of the coal-tar elastomeric membrane (CTEM) shall be a minimum of three inches (3"), hot-air welded, and shall not coincide with the laps of the underlayment sheet.

E. Fasten the top edge of the flashings on six inch (6") centers using approved termination bar and fasteners.

F. An NRCA-approved metal counterflashing shall extend down over the flashing a minimum of four inches (4").

3.14 EDGING FLASHINGS

A. An NRCA-approved gravel stop/fascia system shall be installed in strict accordance with published instructions.

B. The 60 mil coal-tar elastomeric field membrane (CTEM) shall extend a minimum of one inch (1") below the base of the nailer, and be fastened six inches (6") on center. A metal edge of proper gauge and dimensions shall be mechanically fastened, using a continuous clip fastened six inches (6") on center, to the wood nailer over the membrane. The metal shall have a minimum of a three inch (3") flange, set in asphalt mastic and fastened into nailer a minimum of six inches (6") on center, and a minimum of a four inch (4") fascia (match existing). The lower elevation of the metal edge shall extend a minimum of one inch (1") below the juncture of the bottom edge of the wood nailer and adjoining wall surface. The metal edge shall have a minimum of one inch (1") gravel stop.

C. All metal coming in contact with bituminous material shall be primed. Strip metal edge flange with one strip of Type IV fiberglass felt set in hot bitumen extending inward from the lip of the gravel guard a minimum of three inches (3") past metal flange. Strip in fiberglass felt with 60 mil coal-tar elastomeric membrane (CTEM) flashing from the lip of the gravel guard to a minimum of three inches (3") past the edge of the fiberglass underlayment using hot bitumen. At the leading edge of the CTEM along the lip of the gravel guard, a liberal bead of silyl-terminated polyether sealant shall be applied.

NOTE: If internal flange of metal edge detail is tapered, CTEM self-adhered membrane shall be used in lieu of the 60 mil CTEM. Any laps of the CTEM self-adhered membrane shall be covered with a four inch (4") wide piece of the 60 mil CTEM field membrane centered over the lap, hot-air welded and extending the full length of the lap. At the top leading edge where the self-adhered CTEM membrane does not have a selvedge edge for welding CTEM to CTEM, a liberal bead of silyl-terminated polyether sealant shall be applied.

D. The coal-tar elastomeric membrane (CTEM) finishing strip shall have a minimum of four inch (4") lap joints that are staggered from any joints in the gravel guard.

3.15 EXPANSION JOINT DETAILS

A. Expansion joints at walls and field of the roof shall be curbed as outlined in accordance with NRCA and SMACNA guidelines. The curbs will be flashed as outlined above in Curb Flashings.

3.16 SURFACE FINISH

A. Aggregate: Shall be applied at the minimum rate of five hundred pounds (500#) per one hundred (100) square feet set in hot (liquid) flood coat of steep asphalt Type IV applied at the minimum rate of sixty pounds (60#) per one hundred (100) square feet.

3.17 MEMBRANE PROTECTION

A. Where equipment pads, wood sleepers, or walkway slabs are to be installed over the roofing membrane, an additional layer of the roofing membrane shall be installed between the roofing membrane and the pad, sleeper, or slab. Due caution shall be exercised to prevent roofing membrane damage during placement. Where required, membrane shall be welded to field membrane to prevent slippage.

3.18 OVERNIGHT SEAL

A. Shall be performed according to accepted roofing practice as outlined in the NRCA Roofing Manual.

3.19 ICE AND WATER SHIELD

A. To all eave, rake, ridge, rise wall applications and all projections, equipment and miscellaneous flashing applications, provide one (1) full sheet of the respective ice/watershield in accordance with the manufacturer's specific recommendations and application procedures. All eave applications shall extend a minimum of three feet (3') upslope beyond the interior wall, and all valley applications shall be a minimum of two (2) plies, with one (1) full sheet laminated to the deck, and one-half (1/2) sheet adhered to the base ply. All vertical transitions shall extend up the vertical surface a minimum of twelve inches (12"). All fiberglass underlayment applications shall extend a minimum of nine inches (9") onto the ice/water shield membrane, no exceptions.

END OF SECTION

SECTION 07 62 00 – SHEET METAL AND MISCELLANEOUS ACCESSORIES

PART 1 - GENERAL

1.1 AREAS COVERED

A. Refer to roof plans for areas to be included in the scope of work.

1.2 DEFINITIONS

ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
EPA	Environmental Protection Agency
EVT	Equiviscous Temperatures
FM	Factory Mutual
IBC	International Building Code
NDL	No Dollar Limit
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NRCA	National Roofing Contractors Association
OSHA	Occupational Safety & Health Administration
SBS	Styrene-Butadiene-Styrene
SDI	Steel Deck Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UL	Underwriters Laboratories, Inc.

1.3 REFERENCES (INCLUDING LATEST REVISIONS)

A. Comply with governing local, state, and federal regulations, safety standards, and codes.

B. Testing Laboratory Services: Test results shall meet or exceed established standards.

C. Underwriters Laboratories, Inc. (Roofing Covering): Class A fire hazard classification.

D. American Society for Testing and Materials (ASTM)

E. The National Roofing Contractors Association (NRCA) - Roofing and Waterproofing Manual

F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA) - Architectural Sheet Metal Manual

G. American Society of Civil Engineers – ASCE 7

1.4 INSTALLER QUALIFICATIONS

A. Roofing installer must be:
1. Currently prequalified with the Owner in accordance with Owner's prequalification requirements.
2. Currently in good standing with the manufacturer.

3. Installer must be an experienced single firm specializing in the type of roofing repair and/or removal and replacement work required, employing only experienced workers for the class of work in which they are employed, having at least five (5) years successful experience on projects similar in size and scope and acceptable as applicators by the Project Manager/Architect.
4. Contractor must have successfully completed previous projects warranted by the manufacturer.

B. It shall remain each Bidder's responsibility to determine his current status with the manufacturer's certification plan.

1.5 MANUFACTURER QUALIFICATIONS

A. A qualified manufacturer is one that is UL listed and has FM approvals for a membrane roofing system similar to that used for this project for a minimum of fifteen (15) years.

1.6 CONTRACT DOCUMENT QUALITY ASSURANCE

A. In the case of an inconsistency between the drawings and specifications or within either document not clarified by addendum, the better quality or greater quantity of work shall be provided in accordance with the Project Manager's/Architect's interpretation

1.7 SUBMITTALS

A. Product Data: Provide technical data, installation instructions (as applicable) and general recommendations for each specified sheet material and fabricated product.

B. Shop Drawings: Showing layout, profiles, jointing methods, fastening details, locations, and installation details.
1. Submit shop drawings, product data and mockups of all sheet metal fabrications to be used on project.
2. Shop drawings shall be single line profile engineered drawings or CAD drawings of each fabrication component on 8-1/2” x 11” sheet and shall indicate date, project name, project number, Architect/Engineer name, name of component, sheet metal type, finish, gauge, securement, and approximate dimensions of finished product. All dimensions shall be field verified prior to fabrication.
3. Submit manufacturers and contractor’s sample warranty documents.
4. Submit ES-1 certifications of sheet metal fabrication shop and ES-1 certifications of each applicable sheet metal component. (ie: edge metals, copings, & gutters).

C. Samples: Submit six inch (6”) long samples of shop fabricated and/or factory products illustrating component design, finish, color and configuration.

1.8 QUALITY ASSURANCE

A. Comply with governing local, state, and federal regulations, safety standards, and codes. Provide products of acceptable manufacturers in satisfactory use in similar service for five (5) years. Use experienced installers. Deliver, handle and store materials in accordance with manufacturer's instructions.

B. Reference Standards: Applicable portions of ASCE, SMACNA, ASTM, and NAAMM publications.

1.9 PRE-INSTALLATION CONFERENCE

A. Convene a preinstallation conference two weeks prior to commencing the Work.

B. Require attendance of parties directly affecting the Work of this Section.

C. Review condition of roof deck and installation, installation procedures and coordination with related work.

1.10 WARRANTIES

A. Contractor's Warranty Period: For roofing flashing and sheet metal, provide a written warranty which shall warrant work to be free of leaks and defects in materials and workmanship for two (2) years, starting from date of substantial completion.

B. Defects of the sheet metal occurring during the warranty period shall be promptly corrected by the contractor, and defects of the roofing shall be promptly corrected by the manufacturer at no additional cost to the Owner. Upon notification from the Owner or the Owner's representative that evidence of a defect exists, the party responsible shall immediately inform the Owner's representative of the date on which corrective work will be scheduled, and shall notify the Owner's representative when the corrective work has been completed.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIAL

A. Stainless Steel for use as pitch pans: Minimum 24-gauge, commercial quality, ASTM A 653/A 653M.

B. Hot-dipped Galvanized Steel for use as continuous clips: Minimum 22-gauge, G-90, hot-dipped galvanized metal, commercial quality, ASTM A 653/A 653M.

C. Prefinished Galvanized Sheet Steel (where visible from the ground): Shall be 24-gauge flat stock, prefinished with Kynar finish meeting ASTM A 446, forty-five and one-half inches to forty-eight inches width by one hundred twenty inches in length (45-1/2" - 48" x 120") for use as new metal edge gravel guard, cover plates, downspouts, gutters, coping and miscellaneous metal.

D. Stainless Steel: QQ-S-766, Class 304 or 316; or ASTM A 167, Type 304 or 316; form and condition most suitable for the purpose.

E. All prefinished metal color shall be as selected by Owner/Architect from manufacturer's full range of colors, including metallics.

2.2 FASTENERS

A. Fasteners shall be same metal as flashing/sheet metal, or other non-corrosive metal as recommended by sheet manufacturer for the specific application. Match finish of exposed heads with material being fastened.

B. Fasteners and fastening plates or bars shall be listed in the FM Global Approval Guide.

C. Fastener for Brick: Shall be one-fourth inch by two inches (1/4" x 2"), zinc with plated steel or stainless steel nail, one piece unit, flat head.

D. Screws: Self-taping sheet metal type with neoprene washer, as appropriate.

E. Pop Rivets: Full stainless-steel Series 42 or 44, as appropriate.

F. Continuous Clip: Concealed hold-down clip type; of same materials as coping, gravel guard, sized to suit application. Use a continuous clip, minimum 22-gauge G-90 galvanized.

2.3 RELATED MATERIAL

A. Plastic Cement: FS SS-C-153, cutback asphalt type.

B. Solder: QQ-S-571 composition best suited for purpose; use high tin content, minimum 60/40, for stainless steel and Monel alloy.

C. Sealant (for Sheet Metal): One-component polyurethane, conforming to requirements of FS TT-S-230C, non-staining and non-bleeding.

D. Miscellaneous Materials:
1. Downspout Boots: Provide and install cast iron by Neenah Foundry Company, or pre-approved equal. Provide powder coating to match adjacent downspout color.
2. Splash Blocks: Concrete, 3000 psi, 28 days. Provide and install with protection pads at all downspouts. Dimensions shall be a minimum eighteen inches wide by thirty-six inches long (18" x 36").
3. Metal Accessories: Provide and install sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed, non-corrosive, size, and gauge required for performance.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set, cant strips and reglets in place, substrates are smooth and clean and nailing strips located.

B. Verify membrane termination and base flashings are in place, sealed and secure, prior to metal installation.

C. Beginning of installation means acceptance of conditions.

D. Compatibility: Provide materials that are recommended by manufacturers to be fully compatible with indicated substrates or provide separation materials as required to eliminate contact between incompatible materials.

3.2 PREPARATION

A. Field measure site conditions prior to fabricating work. Provide all shop drawings and mock-ups one month prior to installation to the Owner/Project Consultant for approval.

B. Install starter and edge strips and cleats before starting installation.

3.3 FABRICATION - GENERAL

A. Shop-fabricate work to greatest extent possible. Comply with details shown, and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form work to fit substrates. Comply with material manufacturer's instructions and recommendations. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels as indicated, with exposed edges folded back to form hems.

B. Fabricate gravel stops/fascia, gutters/downspouts, counterflashing’s, expansion joints, and copings with new galvanized sheet metal as specified. Fabricate gravel guard and fascia to size and dimensions as indicated on the drawings. Fabricate light metal coping, gutters and downspouts as indicated. Fabricate pitch pans with new stainless steel as specified.

C. Form sheet metal on bending brake.

D. Form materials with straight lines, sharp angles and smooth curves.

E. Fold back edges on concealed side of exposed edge to form hem (1/4" minimum).

F. Weld or solder joints on parts that are to be permanently and rigidly assembled.

G. Limit single-piece lengths to ten feet (10').

H. Fabricate corner pieces with eighteen inch (18") extensions, mitered and sealed by forming as one piece.

I. Where installing flashing directly to masonry or dissimilar materials, backpaint with bituminous paint.

J. Install new metal rooftop projections. New rooftop projection details shall be as recommended in NRCA or SMACNA handbooks. All rooftop projections shall be cleaned, all joints sealed, and painted with a rust inhibitive paint.

K. All sheet metal shall be sealed and watertight.

L. Metal work should be secured so as to prevent damage from buckling or wind. Where clips are shown, fabricate as detailed.

M. All metal to receive bitumen or adhesive shall be first primed with asphalt primer.

N. All prefinished metal shall be sanded and/or abraded prior to receiving primer.

O. Separations: Provide for separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

P. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.

3.4 INSTALLATION

A. General: All sheet metal termination to vertical wall shall have a through-wall with receiver installed on masonry walls or prefabricated "Z" bar flashing pre-installed to fluid applied wall finished prior to installation of sheet metal termination. This applies to edge metal, base flashing closures and all vertical surface intersections. Refer to NRCA, SMACNA, and metal manufacturer's guidelines.

B. Gravel Guard/Fascia:
1. Shall be installed with expansion joints, ten feet (10') on center, one-fourth inch (1/4") expansion leeway, with a cover plate.
2. Form sections identical to profiles as shown or approved similar, to match existing building.
3. Fabricate corner pieces with minimum eighteen inch (18"), maximum forty-eight inch (48") extensions, formed and sealed with rivets and sealant, as one piece.
4. Hem exposed edges one-half inch (1/2") minimum.
5. Backpaint flashing in contact with masonry or dissimilar materials with bituminous paint. Surface sand before applying primers.
6. Integrate flashing in a manner consistent with detailing.
7. Provide and install continuous clip, minimum 22 gauge.
8. Apply sealant at horizontal juncture of gravel guard metal to exterior vertical wall.
9. Shall be fabricated in accordance with published details.
10. Install bead of sealant at metal edge juncture at exterior wall surface.

C. Coping:
1. Install new pre-manufactured metal coping for a permanent watertight installation.
2. All coping shall be pre-manufactured to include low profile standing metal seam.
3. Shall be minimum 24-gauge prefinished Kynar installed in ten foot (10') sections maximum.
4. Vertical fascia shall extend minimum two and one-half inches (2-1/2") or be minimum one and one-half inches (1-1/2") below bottom of nailer, whichever is greater.
5. Fabricate corner pieces with minimum eighteen inch (18"), maximum forty-eight inch (48") extensions, formed and sealed with rivets and sealant, as one piece.
6. Hem exposed edges one-fourth inch (1/4") minimum.
7. Provide and install continuous clip, minimum 22-gauge.
8. Shall be fabricated in accordance with published details.

D. Expansion Joint Field and at Wall:
1. Shall be as outlined by details and be in full compliance with these specifications.
2. Lock seams and end joints.
3. Fabricate corner pieces with minimum eighteen-inch (18"), maximum forty-eight-inch (48") extensions, formed and sealed with rivets and sealant, as one piece.

4. Hem exposed edges one-fourth inch (1/4") minimum.
5. Back paint flashing in contact with masonry or dissimilar materials with bituminous paint. Surface sand before applying primers.
6. Integrate flashing in a manner consistent with detailing.
7. Provide and install continuous clip, minimum 22-gauge or one gauge thicker than flashing.
8. Shall be fabricated in accordance with published details.

E. Counterflashing:
1. Provide and install new two-piece sheet metal counterflashing as required for a permanent watertight installation.
2. Saw cut brick mortar joint to receive friction fit reglet and removable counterflashing as detailed in SMACNA 7th Edition Figure 4-4D.

F. Pitch Pans –
1. Install pitch pans of 24-gauge stainless steel according to NRCA standards, minimum of six inches by six inches (6" x 6").
2. Pitch pans shall be fabricated to minimum of four inches (4") above the finished roof membrane. Seams of pitch pans shall be soldered inside and out.
3. Mastic shall be applied under pitch pan flange a minimum of one-half pound (1/2#) per linear foot.
4. All metal flanges shall be primed with asphalt primer prior to flashing installation. Inside of pitch pan shall be cleaned and primed.
5. All projections enclosed in pitch pans shall be cleaned in any manner suitable and coated with a rust inhibitive coating as approved by the Owner/Project Consultant. Coating shall be allowed to dry prior to pitch pan fill.
6. Base of pitch pans shall be filled around penetration with M-1 sealant. Sprinkle mod bit granules over sealant 1/4" deep.
7. Top finish fill shall be coal-tar urethane, with minimum fill to top of pitch pan sides.
8. Strip metal flange of pitch pan with two plies of the modified base sheet set in hot bitumen extending from the outer edge of the flange a minimum of three inches (3") inward to base of pitch pan.

G. Bonnets/Hoods:
1. Fabricate and install above all pitch pans, where necessary, or reinstall as applicable, metal bonnets over all pitch pans, NO EXCEPTIONS.
2. Bonnets/Hoods shall be manufactured with metal compatible with metal to which bonnet is to be attached.
3. On beams and other steel, weld in place bonnets fabricated from one-fourth inch (1/4") steel plate.
4. Draw band bonnets fabricated from 22-gauge galvanized steel may be used on circular projections.

3.5 FINISH

A. Backpaint concealed metal surfaces with bituminous paint where expected to be in contact with cementitious materials or dissimilar metals. Exposed surfaces to be provided with a factory applied fluorocarbon Kynar finish meeting ASTM A 446 and AAMA specification 605.2 for high performance coating.

END OF SECTION 07 62 00

SECTION 07 72 00 – ROOF ACCESSORIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Equipment supports

1.3 SUBMITTALS

A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details for roof accessories. Show layouts of roof accessories including plans and elevations. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other work.

C. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
   1. Size and location of roof accessories specified in this Section.
   2. Method of attaching roof accessories to roof or building structure.
   3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.

D. Samples: For each type of exposed factory-applied finish required and for each type of roof accessory indicated, prepared on Samples of size to adequately show color.

E. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Pack, handle, and ship roof accessories properly labeled in heavy-duty packaging to prevent damage.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify required openings for each type of roof accessory by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane, base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
   1. With Architect's approval, adjust location of roof accessories that would interrupt roof drainage routes and roof expansion joints.

1.8 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
      a) Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b) Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c) Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: twenty (20) years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers listed in other Part 2 articles.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed in other Part 2 articles.

2.2 METAL MATERIALS

A. Aluminum Extrusions and Tubes: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use, mill finished.

B. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized to comply with ASTM A 123/A 123M, unless otherwise indicated.

C. Steel Tube: ASTM A 500, round tube, baked-enamel finished.

D. Galvanized Steel Tube: ASTM A 500, round tube, hot-dip galvanized to comply with ASTM A 123/A 123M.

E. Galvanized Steel Pipe: ASTM A 53/A 53M.

2.3 ROOF SUPPORTS

A. Pipe Roof Supports: Adjustable height, extruded-aluminum tube, urethane insulation filled, two inches (2") in diameter, with aluminum base plates and manufacturer's recommended hardware for mounting to structure and extruded-aluminum carrier assemblies, suitable for quantity of pipe runs and sizes, with EPDM end caps. Include manufacturer's standard hardware for mounting to structure or structural roof deck.
   1. Manufacturers:
      a) Advanced Pipe Supports
   2. Pipe Support Height: As indicated.
   3. Pipe Roller Assembly: Stainless-steel roller assembly sized for supported pipes with extruded aluminum.

B. Light-Duty Pipe Roof Supports: Extruded-aluminum base assembly and Type 304 stainless-steel roller assembly for pipe sizes indicated, including manufacturer's standard hardware for mounting to structure or structural roof deck.
   1. Manufacturers:
      a) Advanced Pipe Supports.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of work.
   1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored and is ready to receive roof accessories.
   2. Verify dimensions of roof openings for roof accessories.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Install roof accessories no further than ten feet apart, fit to substrates and to result in watertight performance.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
   1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
   2. Underlayment: Where installing exposed-to-view components of roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.

3. Bed flanges in thick coat of asphalt roofing cement where required by roof accessory manufacturers for waterproof performance.

D. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.

E. Equipment Support Installation:
1. Set equipment support so top surface of equipment support is level and no further than ten foot apart .

3.3 TOUCH UP

A. Touch up factory-primed surfaces with compatible primer ready for field painting in accordance with Division 9 painting Sections.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.4 CLEANING

A. Clean exposed surfaces according to manufacturer's written instructions.

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Nonstaining silicone joint sealants.
2. Urethane joint sealants.
3. Silyl-terminated polyether joint sealants.
4. Mildew-resistant joint sealants.
5. Polysulfide joint sealants.
6. Butyl joint sealants.
7. Latex joint sealants.

B. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each joint sealant product.

B. Joint-Sealant Schedule: Include the following information:
1. Joint sealant application, joint location, and designation.
2. Joint sealant manufacturer and product name.
3. Joint sealant formulation.
4. Joint sealant color.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data:
1. For installer.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.5 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:
   1. Architectural sealants shall have a VOC content of 250 g/L or less.
   2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
   3. Sealants and sealant primers for nonporous substrates shall have a VOC content of 775 g/L or less.

2.2 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C1248.

B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, non-sag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Pecora Corporation; 890FTS/TXTR or 890 NST.
      b. Sika Corporation U.S.; Sikasil-WS-290 FPS or Sikasil-WS-290.
      c. Tremco Incorporated; Spectrem 1.

C. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, non-sag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Dow Corning Corporation; 756 SMS or 795.
      b. GE Construction Sealants; Momentive Performance Materials Inc; SilPruf NB.
      c. Pecora Corporation; 864NST, 895NST, or 898NST.
      d. Sika Corporation U.S.; Sikasil-WS-295 FPS.
      e. Tremco Incorporated; Spectrem 2 or Spectrem 3.

D. Silicone, Nonstaining, S, NS, 100/50, T, NT: Nonstaining, single-component, non-sag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Dow Corning Corporation; 790.

E. Silicone, Nonstaining, M, NS, 50, NT: Nonstaining, multicomponent, non-sag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type M, Grade NS, Class 50, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Tremco Incorporated; Spectrem 4-TS.

2.3 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 25, NT: Single-component, non-sag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. BASF Construction Chemicals - Building Systems; Sonalastic TX1.
      b. Bostik, Inc.; Chem-Calk GPS1, 900, 915, 916, or 2000.
      c. ER Systems, an ITW Company; Pacific Polymers Elasto-Thane 230 MP.
      d. Pecora Corporation; Dynatrol I-XL.
      e. Polymeric Systems, Inc.; Flexiprene 1000.
      f. Schnee-Morehead, Inc., an ITW company; Permathane SM7108.
      g. Sherwin-Williams Company (The); Stampede-1 or Stampede-TX.
      h. Sika Corporation U.S.; Sikaflex Textured Sealant.
      i. Tremco Incorporated; Dymonic.

B. Urethane, S, NS, 100/50, T, NT: Single-component, non-sag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Sika Corporation U.S.; Sikaflex 15LM.

C. Urethane, S, NS, 25, T, NT: Single-component, non-sag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. LymTal International, Inc.; Iso-Flex 330 or Iso-Flex 875R.

D. Urethane, S, P, 35, T, NT: Single-component, pourable, plus 35 percent and minus 35 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade P, Class 35, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Bostik, Inc.; Chem-Calk 955-SL.

E. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade P, Class 25, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. BASF Construction Chemicals - Building Systems; Sonolastic SL 1.
      b. Pecora Corporation; NR-201.
      c. Polymeric Systems, Inc.; Flexiprene 952.
      d. Schnee-Morehead, Inc.; an ITW company; Permathane SM7101.
      e. Sherwin-Williams Company (The); Stampede 1SL.

F. Urethane, M, NS, 50, NT: Multicomponent, non-sag, plus 50 percent and minus 50 percent movement capability nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 50, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Pecora Corporation; Dynatrol II.

G. Urethane, M, NS, 25, NT: Multicomponent, non-sag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 25, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Sherwin-Williams Company (The); Stampede-2NS.

H. Urethane, M, NS, 50, T, NT: Multicomponent, non-sag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 50, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Tremco Incorporated; Dymeric 240.

I. Urethane, M, NS, 25, T, NT: Multicomponent, non-sag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 25, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Bostik, Inc.; Chem-Calk 505.
      b. LymTal International, Inc.; Iso-Flex 881 or Iso-Flex 885 SG.
      c. Sika Corporation U.S.; Sikaflex - 2c NS EZ Mix.

J. Urethane, M, P, 50, T, NT: Multicomponent, pourable, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade P, Class 50, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. LymTal International, Inc.; Iso-Flex 888QC.

K. Urethane, M, P, 25, T, NT: Multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade P, Class 25, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Bostik, Inc.; Chem-Calk 555-SL.
      b. LymTal International, Inc.; Iso-Flex 880 GB.
      c. Pecora Corporation; Dynatrol II SG or Urexpan NR 200.
      d. Sherwin-Williams Company (The); Stampede-2SL.
      e. Tremco Incorporated; THC 900/901.

2.4 SILYL-TERMINATED POLYETHER (STPE) JOINT SEALANTS

A. STPE, S, NS, 50, NT: Single-component, non-sag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. GE Construction Sealants; Momentive Performance Materials Inc; SCS7000.
      b. Pecora Corporation; DynaTrol I-XL Tru-White.
      c. Sherwin-Williams Company (The); Stampede 100.

B. STPE, S, NS, 35, NT: Single-component, non-sag, plus 35 percent and minus 35 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C920, Type S, Grade NS, Class 35, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Tremco Incorporated; Dymonic FC.

C. STPE, S, NS, 25, NT: Single-component, non-sag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Polymeric Systems, Inc.; Sil-Thane 803.
      b. Schnee-Morehead, Inc., an ITW company; SM2100.

D. STPE, S, NS, 100/50, T, NT: Single-component, non-sag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, silyl-terminated polyether joint sealant; ASTM C920, Type S, Grade NS, Class 100, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Soudal USA; SoudaSeal 150LM.

E. STPE, S, NS, 50, T, NT: Single-component, non-sag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, silyl-terminated polyether joint sealant; ASTM C920, Type S, Grade NS, Class 50, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Soudal USA; SoudaSeal 50LM.

F. STPE, S, NS, 35, T, NT: Single-component, non-sag, plus 35 percent and minus 35 percent movement capability, traffic- and nontraffic-use, silyl-terminated polyether joint sealant; ASTM C920, Type S, Grade NS, Class 35, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Soudal USA; SoudaSeal AP.

G. STPE, S, NS, 25, T, NT: Single-component, non-sag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, silyl-terminated polyether joint sealant; ASTM C920, Type S, Grade NS, Class 25, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Soudal USA; SoudaSeal CL or SoudaSeal FC.

H. STPE, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, silyl-terminated polyether joint sealant; ASTM C920, Type S, Grade P, Class 25, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Soudal USA; SoudaSeal SL.

2.5 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, non-sag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Dow Corning Corporation; 786-M White.
      b. GE Construction Sealants; Momentive Performance Materials Inc.; SCS1700 Sanitary.
      c. Sika Corporation U.S.; Sikasil-GP.
      d. Soudal USA; RTV GP.
      e. Tremco Incorporated; Tremsil 200.

C. STPE, Mildew Resistant, S, NS, 50, NT: Mildew-resistant, single-component, non-sag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. BASF Construction Chemicals - Building Systems; Sonolastic 150.

2.6 POLYSULFIDE JOINT SEALANTS

A. Polysulfide, S, NS, 25, NT: Single-component, non-sag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, polysulfide joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. W.R. Meadows, Inc.; Deck-O-Seal One Step.

B. Polysulfide, M, NS, 25, T, NT: Multicomponent, non-sag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, polysulfide joint sealant; ASTM C920, Type M, Grade NS, Class 25, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. W.R. Meadows, Inc.; Deck-O-Seal Gun Grade.

C. Polysulfide, M, P, 25, T, NT: Multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, polysulfide joint sealant; ASTM C920, Type M, Grade P, Class 25, Uses T and NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. W.R. Meadows, Inc.; Deck-O-Seal 125 or Deck-O-Seal 150.

2.7 BUTYL JOINT SEALANTS

A. Butyl-Rubber-Based Joint Sealants: ASTM C1311.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Bostik, Inc.; Chem-Calk 300.
      b. Pecora Corporation; BC-158.

2.8 LATEX JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. BASF Construction Chemicals - Building Systems; Sonolac.
      b. Pecora Corporation; AC-20.
      c. Sherwin-Williams Company (The); 850A, 950A, or PowerHouse.
      d. Sika Corporation U.S.; Sikacryl-20 FC.
      e. Tremco Incorporated; Tremflex 834.

2.9 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. BASF Construction Chemicals - Building Systems.
      b. Construction Foam Products, a division of Nomaco, Inc.

B. Cylindrical Sealant Backings: ASTM C1330, any of the following types; as approved in writing by joint sealant manufacturer for joint application indicated. Size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.10 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.
    d. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint sealant manufacturer or as indicated by preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C1193 unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
   1. Joint Locations:
      a. Control and expansion joints in brick pavers.
      b. Isolation and contraction joints in cast-in-place concrete slabs.
      c. Tile control and expansion joints.
      d. Joints between different materials listed above.
      e. Other joints as indicated on Drawings.
   2. Joint Sealant:
      a. Urethane, S, P, 35, T, NT.
      b. Urethane, S, P, 25, T, NT.
      c. Urethane, M, P, 50, T, NT.
      d. Urethane, M, P, 25, T, NT.
      e. STPE, S, P, 25, T, NT.
      f. Polysulfide, M, P, 25, T, NT.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
   1. Joint Locations:
      a. Construction joints in cast-in-place concrete.
      b. Joints between plant-precast architectural concrete units.
      c. Control and expansion joints in unit masonry.
      d. Joints in dimension stone cladding.
      e. Joints in exterior insulation and finish systems.
      f. Joints between metal panels.
      g. Joints between different materials listed above.
      h. Control and expansion joints in ceilings and other overhead surfaces.
      i. Other joints as indicated on Drawings.

2. Joint Sealant:
    a. Silicone, nonstaining, S, NS, 100/50, NT.
    b. Silicone, nonstaining, S, NS, 50, NT.
    c. Silicone, nonstaining, S, NS, 100/50, T, NT.
    d. Silicone, nonstaining, M, NS, 50, NT.
    e. Urethane, S, NS, 25, NT.
    f. Urethane, S, NS, 100/50, T, NT.
    g. Urethane, S, NS, 25, T, NT.
    h. Urethane, M, NS, 50, NT.
    i. Urethane, M, NS, 25, NT.
    j. Urethane, M, NS, 50, T, NT.
    k. Urethane, M, NS, 25, T, NT.
    l. STPE, S, NS, 50, NT.
    m. STPE, S, NS, 35, NT.
    n. STPE, S, NS, 25, NT.
    o. STPE, S, NS, 100/50, T, NT.
    p. STPE, S, NS, 50, T, NT.
    q. STPE, S, NS, 35, T, NT.
    r. STPE, S, NS, 25, T, NT.
    s. Polysulfide, S, NS, 25, NT.
    t. Polysulfide, M, NS, 25, T, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
    a. Isolation joints in cast-in-place concrete slabs.
    b. Control and expansion joints in tile flooring.
2. Joint Sealant:
    a. Urethane, S, P, 35, T, NT.
    b. Urethane, S, P, 25, T, NT.
    c. Urethane, M, P, 50, T, NT.
    d. Urethane, M, P, 25, T, NT.
    e. Polysulfide, M, P, 25, T, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
    a. Control and expansion joints on exposed interior surfaces of exterior walls.
    b. Tile control and expansion joints.
    c. Vertical joints on exposed surfaces of unit masonry, concrete, walls, and partitions.
    d. Joints on underside of plant-precast structural concrete beams andplanks.
2. Joint Sealant:
    a. Silicone, nonstaining, S, NS, 100/50, NT.
    b. Silicone, nonstaining, S, NS, 50, NT.
    c. Silicone, nonstaining, S, NS, 100/50, T, NT.
    d. Silicone, nonstaining, M, NS, 50, NT.

e. Urethane, S, NS, 25, NT.
f. Urethane, S, NS, 100/50, T, NT.
g. Urethane, S, NS, 25, T, NT.
h. Urethane, M, NS, 50, NT.
i. Urethane, M, NS, 25, NT.
j. Urethane, M, NS, 50, T, NT.
k. Urethane, M, NS, 25, T, NT.
l. STPE, S, NS, 50, NT.
m. STPE, S, NS, 35, NT.
n. STPE, S, NS, 25, NT.
o. STPE, S, NS, 100/50, T, NT.
p. STPE, S, NS, 50, T, NT.
q. STPE, S, NS, 35, T, NT.
r. STPE, S, NS, 25, T, NT.
s. Polysulfide, S, NS, 25, NT.
t. Polysulfide, M, NS, 25, T, NT.
u. Acrylic Latex.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
b. Tile control and expansion joints where indicated.
2. Joint Sealant:
a. Silicone, mildew resistant, acid curing, S, NS, 25, NT.
b. STPE, mildew resistant, S, NS, 50, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

F. Joint-Sealant Application: Concealed mastics.
1. Joint Locations:
a. Thresholds.
b. Sill plates.
2. Joint Sealant: Butyl-rubber based.

END OF SECTION

SECTION 07 92 19 - ACOUSTICAL JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Acoustical joint sealants.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 07 92 00 "Joint Sealants" for elastomeric, latex, and butyl-rubber-based joint sealants for nonacoustical applications.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Sustainable Design Submittals:
   1. Product Data: For sealants, indicating VOC content.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained between 40 and 95 degrees F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

PART 2 - PRODUCTS

2.1 ACOUSTICAL JOINT SEALANTS

A. Acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies in accordance with ASTM E90.
   1. Sealant shall have a VOC content of 250 g/L or less.
B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nonsag, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber acoustical sealant.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. OSI Sealants; Henkel Corporation.
      b. Pecora Corporation.
      c. Tremco Incorporated.
      d. USG Corporation.

2.2 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by acoustical joint-sealant manufacturer where required for adhesion of sealant to joint substrates.
B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive acoustical joint sealants, with installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.
B. Joint Priming: Prime joint substrates where recommended by acoustical joint-sealant manufacturer. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of acoustical joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect acoustical joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal work.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 08 11 19 "Stainless-Steel Doors and Frames" for hollow-metal doors and frames manufactured from stainless steel.
   3. Section 08 71 00 "Door Hardware" for door hardware for hollow-metal doors.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
B. Shop Drawings: Include the following:
   1. Elevations of each door type.
   2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
   3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
   4. Locations of reinforcement and preparations for hardware.
   5. Details of each different wall opening condition.
   6. Details of anchorages, joints, field splices, and connections.
   7. Details of accessories.
   8. Details of moldings, removable stops, and glazing.
   9. Details of conduit and preparations for power, signal, and control systems.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Ceco Door; ASSA ABLOY.
   2. Curries Company; ASSA ABLOY.
B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 INTERIOR DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
B. Maximum-Duty Doors and Frames: SDI A250.8, Level 4.
   1. Physical Performance: Level A according to SDI A250.4.
   2. Doors:
      a. Type: As indicated in the Door and Frame Schedule.
      b. Thickness: 1-3/4 inches.
      c. Edge Construction: Model 1, Full Flush..
      d. Core: Vertical steel stiffener.
   3. Frames:
      a. Construction: Knocked down.
   4. Exposed Finish: Prime.

2.3 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008, Commercial Steel (CS), Type B; suitable for exposed applications.
B. Metallic-Coated Steel Sheet: ASTM A653, Commercial Steel (CS), Type B.
C. Frame Anchors: ASTM A879, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

2.4 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:
   1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026-inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
   2. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.
   3. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.
   4. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4-inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
   1. Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
   2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
   4. Jamb Anchors: Provide number and spacing of anchors as follows:
      a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
         1) Two anchors per jamb up to 60 inches high.
         2) Three anchors per jamb from 60 to 90 inches high.
         3) Four anchors per jamb from 90 to 120 inches high.
         4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
      b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
         1) Three anchors per jamb up to 60 inches high.
         2) Four anchors per jamb from 60 to 90 inches high.
         3) Five anchors per jamb from 90 to 96 inches high.
         4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
   5. Door Silencers: Drill stops to receive door silencers where specified in Section 08 71 00 "Door Hardware." Keep holes clear during construction.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
   1. Reinforce doors and frames to receive non-templated, mortised, and surface-mounted door hardware.
   2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.5 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
   1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
B. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
B. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
   1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Steel Doors:
a. Between Door and Frame Jambs and Head: 1/8-inch plus or minus 1/32-inch.
b. Between Edges of Pairs of Doors: 1/8-inch to 1/4-inch plus or minus 1/32-inch.
c. At Bottom of Door: 3/4-inch plus or minus 1/32-inch.
d. Between Door Face and Stop: 1/16-inch to 1/8-inch plus or minus 1/32-inch.
2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" and with hollow-metal manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

SECTION 08 11 19 - STAINLESS-STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Stainless steel doors and frames.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 08 71 00 "Door Hardware" for door hardware for stainless steel doors.

1.2 COORDINATION

A. Coordinate anchorage installation for stainless steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Stainless steel doors and frames.
   2. Stainless steel panels.
B. Product Data Submittals: For each product.
   1. Include construction details, material descriptions, core descriptions, and finishes.
C. Sustainable Design Submittals:
   1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
D. Shop Drawings: Include the following:
   1. Elevations of each door type.
   2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
   3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
   4. Locations of reinforcement and preparations for hardware.
   5. Details of each different wall opening condition.
   6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
   7. Details of anchorages, joints, field splices, and connections.
   8. Details of accessories.
   9. Details of moldings, removable stops, and glazing.

E. Samples:
   1. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.

F. Product Schedule: For stainless steel doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver stainless steel doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store stainless steel doors and frames under cover at Project site with head up. Place units on minimum 4-inch-high wood blocking.

D. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 STAINLESS STEEL DOORS AND FRAMES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Ceco Door; AADG, Inc.; ASSA ABLOY.
   2. Curries, AADG, Inc.; ASSA ABLOY Group .
   3. Stainless Doors, Inc.

B. Construct stainless steel door and frame assemblies to comply with NAAMM-HMMA 866 for the application indicated, including materials, fabrication methods, hardware reinforcement, tolerances, and clearances, and as specified. Comply with SDI ANSI/A250.4, for Physical Performance Level A.

C. Doors and Frames for Aesthetic Environments: At locations indicated in the Door and Frame Schedule on Drawings.
   1. Stainless Steel Doors:
      a. Type: As indicated in the Door and Frame Schedule on Drawings.
      b. Thickness: 1-3/4 inches.
      c. Face Sheets: Type 304 stainless steel sheet, minimum thickness 0.062-inch.
      d. Edge Construction: Continuous Interlocking Vertical Edge Seam.
      e. Top and Bottom Edges: Inverted Top and Bottom Channels, minimum thickness 0.050-inch.
         1) Provide flush top and bottom closures for exterior doors, with weep holes at bottom edge.
      f. Core Construction: Polyisocyanurate, polystyrene, or polyurethane laminated to face sheets.
   2. Stainless Steel Frames:
      a. Materials: Type 304 stainless steel sheet.
      b. Construction: Knocked down.
   3. Finish: ASTM A480No. 4, Directional Satin.

2.2 MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
B. Stainless Steel Sheet: ASTM A240, austenitic stainless steel, Type 304.
C. Steel Sheet: ASTM A1008 or ASTM A1011, commercial steel, Type B.
D. Metallic-Coated Steel Sheet: ASTM A653, commercial steel, Type B; with minimum G60 or A60 metallic coating.
E. Foam-Plastic Insulation: Manufacturer's standard urethane board insulation with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, in accordance with ASTM E84. Enclose insulation completely within door.

2.3 FABRICATION

A. Stainless Steel Door Fabrication: Provide doors rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal.
    1. Tolerances: Fabricate doors to tolerances indicated in NAAMM-HMMA 866.
    2. Stops and Moldings: Factory cut openings in doors. Provide minimum 0.038-inch-thick, stainless steel stops and moldings around glazed lites. Form corners of stops and moldings with butted or mitered hairline joints.
        a. Glazed Lites: Provide fixed stops and moldings welded on secure side of door.
        b. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
B. Stainless Steel Frame Fabrication: Provide stainless steel frames rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal.
    1. Tolerances: Fabricate frames to tolerances indicated in NAAMM-HMMA 866.
    2. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
    3. Door Silencers: Except on weather-stripped and gasketed frames, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.
        a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
        b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
    4. Stops and Moldings: Provide stops and moldings formed integrally with stainless steel frames around glazed lites, minimum 5/8-inch high unless otherwise indicated. Form corners of stops and moldings with butted or mitered hairline joints.
        a. Loose Stops for Glazed Lites and Panels: 0.038-inch-thick, stainless steel.
        b. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of door or frame.
        c. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation.
        d. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

C. Hardware Preparation: Factory prepare stainless steel doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping, in accordance with the Door Hardware Schedule on Drawings, and templates.
   1. Reinforce doors to receive nontemplated mortised and surface-mounted door hardware.
   2. Comply with ANSI/BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

2.4 FINISHES

A. Stainless Steel Finishes: Remove tool and die marks and stretch lines, or blend into finish. Grind and polish surfaces to produce uniform finish, free of cross scratches. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
B. Grain Direction: For finishes exhibiting grain, run grain vertically on door faces and frame jambs.

2.5 ACCESSORIES

A. Glazing: Comply with requirements in Section 08 80 00 "Glazing."

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
B. Prior to installation and with installation spreaders in place, adjust and securely brace stainless steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
   1. Squareness: Plus or minus 1/16-inch, measured at door rabbet on a line 90 degrees from jamb, and perpendicular to frame head.
   2. Alignment: Plus or minus 1/16-inch, measured at jambs on a horizontal line parallel to plane of wall.
   3. Twist: Plus or minus 1/16-inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   4. Plumbness: Plus or minus 1/16-inch, measured at jambs on a perpendicular line from head to floor.
C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.2 INSTALLATION

A. Install stainless steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with approved Shop Drawings and with manufacturer's written instructions.

B. Stainless Steel Frames:
   1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, without damage to completed Work.
      a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
      b. Install frames with removable glazing stops located on secure side of opening.
   2. Solidly pack mineral-fiber insulation inside frames.
   3. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors.
   4. Installation Tolerances: Adjust stainless steel frames for squareness, alignment, twist, and plumb to the following tolerances:
      a. Squareness: Plus or minus 1/16-inch, measured at door rabbet on a line 90 degrees from jamb, and perpendicular to frame head.
      b. Alignment: Plus or minus 1/16-inch, measured at jambs on a horizontal line parallel to plane of wall.
      c. Twist: Plus or minus 1/16-inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
      d. Plumbness: Plus or minus 1/16- inch, measured at jambs at floor.

C. Stainless Steel Doors: Fit and adjust stainless steel doors accurately in frames within clearances specified below:
   1. Non-Fire-Rated Doors: Comply with NAAMM-HMMA 841 and NAAMM-HMMA 866.

3.3 ADJUSTING AND CLEANING

A. Clean grout and other bonding material off stainless steel doors and frames immediately after installation.

B. Stainless Steel Touchup: Immediately after erection, smooth any scratched or damaged areas of stainless steel; polish to match undamaged finish.

END OF SECTION

SECTION 08 33 23 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.
1. Obtain operators and controls from overhead coiling-door manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Sound-Control Doors: Assemblies tested in a laboratory for sound-transmission-loss performance according to ASTM E90, calculated according to ASTM E413, and rated for not less than the STC value indicated.
B. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design," the ABA standards of the Federal agency having jurisdiction, and ICC A117.1.
C. Structural Performance, Exterior Doors: Capable of withstanding the following design wind loads:
1. Design Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft., acting inward and outward.
2. Testing: According to ASTM E330 or DASMA 108 for garage doors and complying with acceptance criteria of DASMA 108.
3. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
4. Operability under Wind Load: Design overhead coiling doors to remain operable under uniform pressure (velocity pressure) of 20-lbf/sq. ft.wind load, acting inward and outward.
D. Windborne-Debris Impact Resistance: Provide glazedand impact-protective overhead coiling doors that pass ASTM E1886 missile-impact and cyclic-pressure tests according to ASTM E1996 for Wind Zone IIIor DASMA 115for enhanced protection.
1. Large-Missile Test: For overhead coiling doors located within 30 feetof grade.
2. Small-Missile Test: For overhead coiling doors located between 30 feet and 60 feet above grade.

E. Seismic Performance: Overhead coiling doors are to withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. Seismic Data:
      a. SS: 0.09.
      b. S1: 0.026.
      c. SMS: 0.12.
      d. SM1: 0.064.
      e. SDS: 0.081.
      f. SD1: 0.042.
      g. TL: 6.
      h. PGAM: 0.051.
      i. VS30: 260.
      j. Seismic Design Category: A.
   2. Component Importance Factor: 1.5.

2.3 MATERIALS, GENERAL

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
B. Examine locations of electrical connections.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
B. Install overhead coiling doors, hoods, controls, and operators at the mounting locations indicated for each door.
C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with the accessibility standard.
D. Smoke-Control Doors: Install according to NFPA 80 and NFPA 105.
E. Power-Operated Doors: Installautomatic garage doors openersaccording to UL 325.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.
   1. Complete installation and startup checks according to manufacturer's written instructions.
   2. After electrical circuitry has been energized, operate doors to confirm proper motor rotation and door performance.
   3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
   1. Adjust exterior doors and components to be weather resistant.
B. Lubricate bearings and sliding parts as recommended by manufacturer.
C. Adjust seals to provide tight fit around entire perimeter.

END OF SECTION

SECTION 08 33 33- SECURITY GRILLES SIDE-FOLDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Side Folding Security Grilles, manually operated.
B. Related Requirements:
   1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel supports, angle-framing of grille opening, and corner guards.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of coiling grille and accessory.
   1. Include construction details, material descriptions, dimensions of individual components, profiles for curtain components, and finishes.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
   1. Include plans, elevations, sections, and mounting details.
   2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
   4. Show locations of controls, locking devices, and other accessories.
C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
   1. Include similar Samples of accessories involving color selection.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

1.4 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of grilles that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain overhead coiling grilles from single source from single manufacturer.
   1. Obtain operators and controls from overhead coiling-grille manufacturer.

2.2 SIDE FOLDING SECURITY GRILLES

A. Side-Folding Open Aluminum Grilles: Basis of Design Overhead Door Coportation Model 683.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Overhead Door Corporation.

B. Curtain: Constructed of 1/8-inch by 5/8-inch by 6-inch horizontal clear anodized aluminum links that slide into 5/16-inch vertical rods. Links held in place by 1/2-inch clear anodized aluminum S-126 spacer tubes on alternate rods.
   1. Panel Width: 6-5/16-inch.
   2. Finish:
      a. Aluminum clear anodized or color selected by Architect.
   3. Track:
      a. Trolley assemblies shall be 1-1/8-inch and adjustable 1-inch upward or downward without the removal of the curtain.
      b. Track shall be heavy extruded aluminum 1-3/8-inch-wide by 1-5/8-inch-igh.
   4. Locking:
      a. Provide lead post with a concealed hook bolt lock activated by a keyed cylinder or thumb turn that engages a full height wall channel. Where required, provide a top and bottom spring loaded locking post with interior thumb turn and protection or keyed cylinder and dustproof floor sockets for all drop bolts. Provide rubber bumper at the edge of locking post.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify opening sizes, tolerances and conditions are acceptable.
B. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install equipment complete with necessary hardware, anchors, and equipment supports, according to manufacturer's written instructions and as specified.
B. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
C. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
D. Install perimeter trim and closures.

3.3 ADJUSTING

A. Adjust hardware and moving parts to function smoothly, so that grilles operate easily, free of warp, twist, or distortion.
B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.4 CLEANING

A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
B. Remove lables and visible markings.
C. Touch-up, repair or replace damaged products before Substantial Completion.

3.5 PROTECTION

A. Protect installed products until completion of Project.

END OF SECTION

SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Aluminum-framed storefront systems.
   2. Aluminum-framed entrance door systems.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
   1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
   2. Include full-size isometric details of each type of vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
      a. Joinery, including concealed welds.
      b. Anchorage.
      c. Expansion provisions.
      d. Glazing.
   3. Include point-to-point wiring diagrams showing the following:
      a. Power requirements for each electrically operated door hardware.
      b. Location and types of switches, signal device, conduit sizes, and number and size of wires.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1.3 INFORMATIONAL SUBMITTALS

A. Certificates:
   1. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
      a. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.

B. Test and Evaluation Reports:
   1. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by qualified testing agency.

C. Qualification Statements:
   1. For installer.

D. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For aluminum-framed entrances and storefronts.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installers: An entity that employs installers and supervisors who are trained and approved by manufacturer and that employs a qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors.

B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
   1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures, including, but not limited to, excessive deflection.
      b. Noise or vibration created by wind and thermal and structural movements.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
      d. Water penetration through fixed glazing and framing areas.
      e. Failure of operating components.
   2. Warranty Period: Five years from date of Substantial Completion.

B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.
   1. Deterioration includes, but is not limited to, the following:
      a. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D214.
      b. Cracking, peeling, or chipping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Arcadia, Inc.
   2. Commercial Architectural Products, Inc.
   3. Kawneer North America, an Arconic company.
   4. Nana Wall Systems, Inc.
   5. Oldcastle BuildingEnvelope (OBE); CRH Americas.
   6. Trulite Glass & Aluminum Solutions, LLC.
   7. Tubelite Inc.

B. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing spandrel panels venting windows and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design aluminum-framed entrances and storefronts.

B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
   1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
   2. Failure also includes the following:
      a. Thermal stresses transferring to building structure.
      b. Glass breakage.
      c. Noise or vibration created by wind and thermal and structural movements.
      d. Loosening or weakening of fasteners, attachments, and other components.
      e. Failure of operating units.

C. Structural Loads:
   1. Wind Loads: As indicated on Drawings.

D. Deflection of Framing Members Supporting Glass: At design wind load, as follows:
   1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans of up to 13 feet 6 inches and to 1/240 of clear span plus 1/4-inch for spans greater than 13 feet 6 inches.
   2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8-inch.
      a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
   3. Cantilever Deflection: Limited to 2L/175 at unsupported cantilevers.

E. Structural: Test in accordance with ASTM E330 as follows:
   1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.
   2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
   3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

F. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:
   1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft.

G. Water Penetration under Dynamic Pressure: Test in accordance with AAMA 501.1 as follows:
   1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft.
   2. Maximum Water Leakage: In accordance with AAMA 501.1. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
   1. Temperature Change: 120 degrees F, ambient; 180 degrees F, material surfaces.
   2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested in accordance with AAMA 501.5.
      a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 degrees F.
      b. Low Exterior Ambient-Air Temperature: 0 degrees F.
      c. Interior Ambient-Air Temperature: 75 degrees F.

2.3 STOREFRONT SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Arcadia, Inc.
   2. Commercial Architectural Products, Inc.
   3. Kawneer North America, an Arconic company.
   4. Oldcastle BuildingEnvelope (OBE); CRH Americas.
   5. Tubelite Inc.

B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   1. Interior Vestibule Framing Construction: Nonthermal.
   2. Glazing System: Retained mechanically with gaskets on four sides.
   3. Glazing Plane: Center.

4. Finish: Clear anodic finish.
5. Fabrication Method: Field-fabricated stick system.
6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
7. Steel Reinforcement: As required by manufacturer.

2.4 ENTRANCE DOOR SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Arcadia, Inc.
   2. Commercial Architectural Products, Inc.
   3. Kawneer North America, an Arconic company.
   4. Nana Wall Systems, Inc.
   5. Oldcastle BuildingEnvelope (OBE); CRH Americas.
   6. Tubelite Inc.

B. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.
   1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
      a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
   2. Door Design: Wide stile; 5-inch nominal width.
   3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
   4. Finish: Match adjacent storefront framing finish.

2.5 ENTRANCE DOOR HARDWARE

A. General:
   1. Door Hardware: Hardware not specified in this Section is specified in Section 08 71 00 "Door Hardware."
   2. Cylinders: As specified in Section 08 71 00 "Door Hardware."
   3. Door Hardware on Fire Rated Aluminum Entrances: Door manufacture must approve hardware.
   4. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

B. Hardware sets for aluminum doors located in Section 08 71 00.10 "Door Hardware Schedule."
   1. Weather Stripping: Manufacturer's standard replaceable components.
   2. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
   3. Thresholds: BHMA A156.21 raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2-inch.

2.6 GLAZING

A. Glazing: Comply with Section 08 80 00 "Glazing."Glazing."

2.7 MATERIALS

A. Sheet and Plate: ASTM B209.
B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
C. Structural Profiles: ASTM B308.

2.8 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
   1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
   2. Reinforce members as required to receive fastener threads.
B. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.
C. Rigid PVC filler.

2.9 FABRICATION

A. Form or extrude aluminum shapes before finishing.
B. Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints with ends coped or mitered.
   3. Physical and thermal isolation of glazing from framing members.
   4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   5. Provisions for field replacement of glazing from .
   6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
C. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
D. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
   1. At interior and exterior doors, provide compression weather stripping at fixed stops.
E. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
F. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
G. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.10 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions.
B. Do not install damaged components.
C. Fit joints to produce hairline joints free of burrs and distortion.
D. Rigidly secure nonmovement joints.
E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
F. Seal perimeter and other joints watertight unless otherwise indicated.
G. Metal Protection:
    1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
    2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
H. Set continuous sill members and flashing in full sealant bed, as specified in Section 07 92 00 "Joint Sealants," to produce weathertight installation.
I. Install joint filler behind sealant as recommended by sealant manufacturer.
J. Install components plumb and true in alignment with established lines and grades.

3.3 INSTALLATION OF GLAZING

A. Install glazing as specified in Section 08 80 00 "

3.4 INSTALLATION OF STRUCTURAL GLAZING

A. Prepare surfaces that will contact structural sealant in accordance with sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
B. Set glazing into framing in accordance with sealant manufacturer and framing manufacturer's written instructions and standard practice. Use a spacer or backer as recommended by manufacturer.
C. Set glazing with proper orientation so that coatings face exterior or interior as specified.
D. Hold glazing in place using temporary retainers of type and spacing recommended by manufacturer, until structural sealant joint has cured.
E. Apply structural sealant to completely fill cavity, in accordance with sealant manufacturer and framing manufacturer's written instructions and in compliance with local codes.
F. Apply structural sealant at temperatures indicated by sealant manufacturer for type of sealant.
G. Allow structural sealant to cure in accordance with manufacturer's written instructions.
H. Clean and protect glass as indicated in Section 08 80 00 "Glazing."

3.5 INSTALLATION OF ALUMINUM-FRAMED ENTRANCE DOORS

A. Install entrance doors to produce smooth operation and tight fit at contact points.
   1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
   2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware in accordance with entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.6 ERECTION TOLERANCES

A. Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
   1. Plumb: 1/8-inch in 10 feet; 1/4-inch in 40 feet.
   2. Level: 1/8-inch in 20 feet; 1/4-inch in 40 feet.
   3. Alignment:
      a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2-inch-wide, limit offset from true alignment to 1/16-inch.
      b. Where surfaces are separated by reveal or protruding element from 1/2- to 1-inch-wide, limit offset from true alignment to 1/8 inch.
      c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4-inch.
   4. Location: Limit variation from plane to 1/8-inch in 12 feet; 1/2-inch over total length.

3.7 FIELD QUALITY CONTROL

A. Retain this article for testing of aluminum-framed entrances and storefronts during installation or for testing of field mockups.
B. Retain first option in "Testing Agency" Paragraph below if Owner hires an independent testing agency.
C. Tests and Inspections: Perform the following tests on representative areas of aluminum-framed entrances and storefronts.
   1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested in accordance with AAMA 501.2 and shall not evidence water penetration.
      a. Perform a minimum of two tests in areas as directed by Architect.
      b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.
   2. Air Leakage: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
      a. Perform a minimum of two tests in areas as directed by Architect.
      b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.

3. Water Penetration: ASTM E1105 at a minimum uniform static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and shall not evidence water penetration.
4. Structural-Sealant Adhesion: Test structural sealant in accordance with recommendations in ASTM C1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.
    a. Test a minimum of two areas on each building facade.
    b. Repair installation areas damaged by testing.
5. Egress Door Inspections: Inspect each aluminum-framed entrance door equipped with panic hardware, each aluminum-framed entrance door located in an exit enclosure, each electrically controlled aluminum-framed egress door, and each aluminum-framed entrance door equipped with special locking arrangements, in accordance with NFPA 101, Section 7.2.1.15.

D. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION

SECTION 08 44 13 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Glazed aluminum curtain wall systems:
   1. Conventionally glazed.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 07 92 00 "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain walls and for sealants to the extent not specified in this Section.
   3. Section 08 80 00 "Glazing" for curtain wall glazing.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. For each type of product.
      a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
B. Sustainable Design Submittals:
   1. Product Data: For sealants, indicating VOC content.
C. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.
   1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
   2. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data:
   1. For professional engineer's experience with providing delegated design engineering services of the kind indicated, including documentation that engineer is licensed in the state in which Project is located.
B. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components from manufacturer.
   1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.
C. Product Test Reports: For glazed aluminum curtain walls, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer and that employs a qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AGM) contractors and that employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program.

B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
   1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.7 WARRANTY

A. Special Assembly Warranty: Manufacturer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: 10 years from date of Substantial Completion.

B. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of baked enamel, powder coat, or organic finishes within specified warranty period.
   1. Warranty Period: 10 years from date of Substantial Completion.

C. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design glazed aluminum curtain walls.

B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
   1. Glazed aluminum curtain walls shall withstand movements of supporting structure, including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

2. Failure also includes the following:
    a. Thermal stresses transferring to building structure.
    b. Glass breakage.
    c. Noise or vibration created by wind and thermal and structural movements.
    d. Loosening or weakening of fasteners, attachments, and other components.
    e. Failure of operating units.

C. Structural Loads:
1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

D. Deflection of Framing Members Supporting Glass: At design wind load, as follows:
1. Deflection Normal to Wall Plane: Limited to 1/175 of length of span of the framing member for lengths of up to 13 feet 6 inches and to 1/240 of length of span of the framing member plus 1/4-inch for lengths of greater than 13 feet 6 inches.
2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8-inch.
    a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
3. Cantilever Deflection: Limited to 2/175 of the unsupported length.

E. Structural: Test in accordance with ASTM E330 as follows:
1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

F. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft.

G. Energy Performance: Certified and labelled by manufacturer for energy performance as follows:
1. Thermal Transmittance (U-factor):
    a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.29 Btu/sq. ft. by h by degrees F as determined in accordance with NFRC 100.
2. Solar Heat Gain Coefficient (SHGC):
    a. Fixed Glazing and Framing Areas: SHGC for the system of not more than 0.25 as determined in accordance with NFRC 200.
3. Air Leakage:
    a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft. when tested in accordance with ASTM E283.
4. Condensation Resistance Factor (CRF):
    a. Fixed Glazing and Framing Areas: CRF for the system of not less than 80 as determined in accordance with AAMA 1503.

H. Windborne-Debris Impact Resistance: Pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 3 for basic protection.
   1. Large-Missile Test: For glazing located within 30 feet f grade.
   2. Small-Missile Test: For glazing located between 30 feet and 60 feet above grade.

I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
   1. Temperature Change: 120 degrees F, ambient; 180 degrees F, material surfaces.
   2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested in accordance with AAMA 501.5.
      a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 degrees F.
      b. Low Exterior Ambient-Air Temperature: 0 degrees F.

2.2 GLAZED ALUMINUM CURTAIN WALL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Kawneer Company, Inc.; Arconic Corporation.

B. Basis-of-Design Product:
   1. 1600 Wall System 1 Curtain Wall.
      a. Sightline 2-1/2 inches.
      b. System Depth: 10-1/2 inches with steel reinforcing.
      c. Outside-glazed pressure plate format.

C. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   1. Construction: Thermally broken.
   2. Glazing System: Retained mechanically with gaskets on four sides.
   3. Glazing Plane: Front.
   4. Finish: Clear anodic finish.
   5. System: Either stick or unitized system.
   6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   7. Steel Reinforcement: As required by manufacturer.

D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

E. Entrance Door Systems: Comply with Section 08 41 13 "Aluminum-Framed Entrances and Storefronts."

2.3 SUN CONTROL

A. Sunshades: Assemblies consisting of manufacturer's standard outrigger brackets, louvers, and fascia, designed for attachment to curtain wall with mechanical fasteners.

B. Basis-of-Design Product:
   1. Versoleil Single Blade Horizontal Sunshade.
   2. Projection from Wall: As indicated on Drawings.
   3. Finish: Match adjacent glazed aluminum curtain wall.
   4. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   5. Steel Reinforcement: As required by manufacturer.

2.4 GLAZING

A. Glazing: Comply with Section 08 80 00 "Glazing."
B. Glazing Gaskets: ASTM C509 or ASTM C864. Manufacturer's standard .
C. Glazing Sealants: As recommended by manufacturer.

2.5 MATERIALS

A. Sheet and Plate: ASTM B209.
B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
C. Structural Profiles: ASTM B308.
D. Steel Reinforcement:
   1. Structural Shapes, Plates, and Bars: ASTM A36.
   2. Cold-Rolled Sheet and Strip: ASTM A1008.
   3. Hot-Rolled Sheet and Strip: ASTM A1011.
E. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.
F. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.6 FABRICATION

A. Form or extrude aluminum shapes before finishing.
B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
C. Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints with ends coped or mitered.
   3. Physical and thermal isolation of glazing from framing members.
   4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   5. Provisions for field replacement of glazing from exterior.
   6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
D. Fabricate components to resist water penetration as follows:
   1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
   2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.
E. Curtain-Wall Framing: Fabricate components for assembly using manufacturer's standard assembly method.

F. Factory-Assembled Frame Units:
   1. Rigidly secure nonmovement joints.
   2. Prepare surfaces that are in contact with structural sealant in accordance with sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
   3. Seal joints watertight unless otherwise indicated.
   4. Install glazing to comply with requirements in Section 08 80 00 "Glazing."
G. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions.
B. Do not install damaged components.
C. Fit joints to produce hairline joints free of burrs and distortion.
D. Rigidly secure nonmovement joints.
E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
F. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
G. Seal joints watertight unless otherwise indicated.
H. Metal Protection:
   1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
   2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
I. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
J. Install components plumb and true in alignment with established lines and grades.

3.3 INSTALLATION OF GLAZING

A. Install glazing as specified in Section 08 80 00 "Glazing."

3.4 INSTALLATION OF WEATHERSEAL SEALANT

A. After structural sealant has completely cured, remove temporary retainers and insert backer rod between lites of glass, as recommended by sealant manufacturer.
B. Install weatherseal sealant to completely fill cavity, in accordance with sealant manufacturer's written instructions, to produce weatherproof joints.

3.5 ERECTION TOLERANCES

A. Install glazed aluminum curtain walls to comply with the following maximum tolerances:
   1. Plumb: 1/8-inch in 10 feet; 1/4-inch in 40 feet.
   2. Level: 1/8-inch in 20 feet; 1/4-inch in 40 feet.
   3. Alignment:
      a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2-inch-wide, limit offset from true alignment to 1/16-inch.
      b. Where surfaces are separated by reveal or protruding element from 1/2- to 1-nch-wide, limit offset from true alignment to 1/8-inch.
      c. Where surfaces are separated by reveal or protruding element of 1-inch-wide or more, limit offset from true alignment to 1/4-inch.
   4. Location: Limit variation from plane to 1/8-inch in 12 feet; 1/2-inch over total length.

3.6 FIELD QUALITY CONTROL

A. Field Quality-Control Testing: Perform the following test on representative areas of glazed aluminum curtain walls.
   1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested in accordance with AAMA 501.2 and shall not evidence water penetration.
      a. Perform a minimum of two tests in areas as directed by Architect.
B. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.
C. Prepare test and inspection reports.

END OF SECTION

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Hardware for fire-rated doors.
   2. Electrically operated and controlled hardware.
   3. Lock cylinders for doors with balance of hardware specified in other Sections.
   4. Thresholds.
   5. Weatherstripping and gasketing.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 08 1113 “Hollow Metal Doors and Frames.”
   3. Section 08 3323 “Overhead Coiling Doors”: Door hardware, except cylinders.

1.2 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
B. BHMA A156.1 - Standard for Butts and Hinges; 2021.
C. BHMA A156.3 - Exit Devices; 2020.
D. BHMA A156.4 - Door Controls - Closers; 2019.
E. BHMA A156.5 - Cylinders and Input Devices for Locks; 2020.
F. BHMA A156.6 - Standard for Architectural Door Trim; 2021.
G. BHMA A156.7 - Template Hinge Dimensions; 2016.
H. BHMA A156.13 - Mortise Locks & Latches Series 1000; 2022.
I. BHMA A156.16 - Auxiliary Hardware; 2018.
J. BHMA A156.21 - Thresholds; 2019.
K. BHMA A156.22 - Standard for Gasketing; 2021.
L. BHMA A156.26 - Standard for Continuous Hinges; 2021.
M. BHMA A156.28 - Standard for Recommended Practices for Mechanical Keying Systems; 2018.
N. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2016.
O. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames; 2006.
P. DHI (H&S) - Sequence and Format for the Hardware Schedule; 2019.
Q. DHI (KSN) - Keying Systems and Nomenclature; 2019.
R. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
S. ITS (DIR) - Directory of Listed Products; Current Edition.
T. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
U. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
V. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2022.
W. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
X. UL (DIR) - Online Certifications Directory; Current Edition.
Y. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
Z. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
B. Sequence installation to ensure facility services connections are achieved in an orderly and expeditious manner.
C. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; require attendance by affected installers and the following:
    1. Architect.
    2. Installer's Architectural Hardware Consultant (AHC).
    3. Hardware Installer.
    4. Owner's Security Consultant.
D. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
E. Keying Requirements Meeting:
    1. Attendance Required:
        a. Owner.
        b. Architect.
    2. Agenda:
        a. Establish keying requirements.
        b. Verify locksets and locking hardware are functionally correct for project requirements.
        c. Verify that keying and programming complies with project requirements.
        d. Establish keying submittal schedule and update requirements.
    3. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
        a. Access control requirements.
        b. Key control system requirements.
        c. Schematic diagram of preliminary key system.
        d. Flow of traffic and extent of security required.
    4. Record minutes and distribute copies within two days after meeting to participants, with 2 copies to Architect, Owner, participants, and those affected by decisions made.
    5. Deliver established keying requirements to manufacturers.

1.4 SUBMITTALS

A. See Section 01 30 00 “Administrative Requirements” for submittal procedures.
B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this Project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
C. Shop Drawings - Door Hardware Schedule: A detailed listing that includes each item of hardware to be installed on each door.
    1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
    2. Comply with DHI (H&S) using door numbering scheme and hardware set numbers as indicated in Contract Documents.
        a. Submit in vertical format.
    3. Include complete description for each door listed.

D. Shop Drawings - Electrified Door Hardware: Include diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
   1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).
   2. Elevations: Include front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
   3. Diagrams: Include point-to-point wiring diagrams that show each device in door opening system with related colored wire connections to each device.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Supplier's qualification statement.

I. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

J. Keying Schedule:
   1. Submit 3 copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.

K. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

L. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.

M. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 “Product Requirements,” for additional provisions.

1.5 QUALITY ASSURANCE

A. Standards for Fire-Rated Doors: Maintain 1 copy of each referenced standard on site, for use by Architect and Contractor.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum 3 years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least 3 years of documented experience.

D. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.7 WARRANTY

A. See Section 01 70 00 “Execution and Closeout Requirements” for additional warranty requirements.
B. Manufacturer Warranty: Provide manufacturer warranty against defects in material and workmanship for period indicated, from date of Substantial Completion. Complete forms in Owner's name and register with manufacturer. Unless otherwise indicated, warranty shall be 5 years from date of Substantial Completion.
   1. Closers: Lifetime warranty.
   2. Exit Devices: Five years, minimum.
   3. Locksets and Cylinders: Five years, minimum.
   4. Hinges: Lifetime warranty.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
B. Provide individual items of single type, of same model, and by same manufacturer.
C. Closers:
   1. Provide door closer on each exterior door, unless otherwise indicated.
   2. Provide door closer on each fire-rated and smoke-rated door.
   3. Spring hinges are not an acceptable self-closing device, unless otherwise indicated.
D. Drip Guards: Provide at head of out-swinging exterior doors unless protected by roof or canopy directly overhead.
E. Weatherstripping and Gasketing:
   1. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated.
   2. Provide door bottom sweep on each exterior door, unless otherwise indicated.
F. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.
G. Antimicrobial Coating: Where indicated in the Door Hardware Schedule with "AM" code, provide manufacturer's standard silver-based coating that inhibits the growth of fungus, mold, mildew and bacteria.
H. Fasteners:
   1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
      a. Aluminum fasteners are not permitted.
      b. Provide Phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
   2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
      a. Self-drilling (Tek) type screws are not permitted.
   3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
   4. Provide wall grip inserts for hollow wall construction.

5. Fire-Resistance-Rated Applications: Comply with NFPA 80.
    a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
    b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.

2.2 PERFORMANCE REQUIREMENTS

A. Provide door hardware products that comply with the following requirements:
1. Applicable provisions of federal, state, and local codes.
2. Accessibility: ADA Standards and ICC A117.1.
3. Fire-Resistance-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
4. Hardware on Fire-Resistance-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for application indicated.
5. Hardware for Smoke and Draft Control Doors: Provide door hardware that complies with local codes, and requirements of assemblies tested in accordance with UL 1784.
6. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
7. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
8. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.

2.3 HINGES

A. Acceptable Manufacturers:
1. ABH.
2. BEST; dormakaba Group: www.bestaccess.com/#sle.
3. Hager Hinges.
4. Select Hinges.

B. Properties:
1. Butt Hinges: As applicable to each item specified.
    a. Standard Weight Hinges: Minimum of 2 permanently lubricated non-detachable bearings.
    b. Template screw hole locations.
    c. Bearing assembly installed after plating.
    d. Bearings: Concealed fully hardened bearings.
    e. Bearing Shells: Shapes consistent with barrels.
    f. Pins: Easily seated, non-rising pins.
        1) Fully plate hinge pins.
        2) Non-Removable Pins: Slotted stainless-steel screws.
    g. UL 10C listed for fire-resistance-rated doors.

2. Continuous Hinges: As applicable to each item specified.
    a. Geared Continuous Hinges: As applicable to each item specified.
        1) Non-handed.
        2) Anti-spinning through-fastener.
        3) UL 10C listed for fire-resistance-rated doors.
            (a) Metal Door Installation: Rated up to 90 minutes.
            (b) Wood Door Installation: Rated up to 60 minutes.
        4) Sufficient size to permit door to swing 180 degrees

C. Sizes: See Door Hardware Schedule.
1. Hinge Widths: As required to clear surrounding trim.
2. Sufficient size to allow 180-degree swing of door.

D. Finishes: See Door Hardware Schedule.
1. Fully polish hinges; front, back, and barrel.

E. Grades:
1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
2. Continuous Hinges: Comply with BHMA A156.26, Grade 1.

F. Material: Base metal as indicated for each item by BHMA material and finish designation.

G. Types:
1. Butt Hinges: Include full mortise hinges.
2. Continuous Hinges: Include geared hinges.

H. Options: As applicable to each item specified.

I. Quantities:
1. Butt Hinges: Three hinges per leaves up to 90 inches in height. Add 1 for each additional 30 inches in height or fraction thereof.
    a. Hinge weight and size unless otherwise indicated in hardware sets:
        1) For doors up to 36 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.134-inch and a minimum of 4-1/2 inches in height.
        2) For doors from 36 inches wide up to 42 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.145-inch and a minimum of 4-1/2 inches in height.
        3) For doors from 42 inches wide up to 48 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.180-inch and a minimum of 5 inches in height.
        4) For doors greater than 1-3/4 inches thick provide hinges with a minimum thickness of 0.180-inch and a minimum of 5 inches in height.
2. Continuous Hinges: One per door leaf.

J. Applications: At swinging doors.
1. Provide non-removable pins at out-swinging doors with locking hardware and all exterior doors.

K. Products:
1. Butt Hinges:
    a. Concealed bearing, 5-knuckle.
2. Continuous Hinges:
    a. Aluminum geared hinges.

2.4 BOLTS

A. Acceptable Manufacturers:
1. ABH.
2. Don-Jo.
3. Rockwood, Assa Abloy Group.
4. Trimco, Allegion Group.

B. Properties:
1. Flush Bolts:
a. Manual Flush Bolts: Manually latching upon closing of door leaf.
1) Bolt Throw: 3/4-inch, minimum.
b. Automatic Flush Bolts: Automatically latching upon closing of door leaf.
1) Bolt Throw: 3/4-inch, minimum.
2. Dustproof Strikes: For bolting into floor, provide except at metal thresholds.

C. Options:
1. Extension Bolts: In leading edge of door, one bolt into floor, one bolt into top of frame.
2. Lever extensions: Provide for top bolt at oversized doors.

D. Products:
1. Manual flush bolts.
2. Automatic flush bolts.

2.5 EXIT DEVICES

A. Acceptable Manufacturers:
1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Von Duprin, Allegion Group.

B. Properties:
1. Actuation: Full-length touchpad.
2. Touchpads: 'T" style metal touchpads and rail assemblies with matching chassis covers end caps.
3. Latch Bolts: Stainless steel deadlocking with 3/4-inch projection using latch bolt.
4. Lever Design: Match project standard lockset trims.
5. Cylinder: Include where cylinder dogging or locking trim is indicated.
6. Strike as recommended by manufacturer for application indicated.
7. Sound dampening on touch bar.
8. Dogging:
a. Non-Fire-Resistance-Rated Devices: Cylinder dogging.
b. Fire-Resistance-Rated Devices: Manual dogging not permitted.
9. Touch bar assembly on wide style exit devices to have a 1/4-inch clearance to allow for vision frames.
10. All exposed exit device components to be of architectural metals and "true" architectural finishes.
11. Handing: Field-reversible.
12. Fasteners on Back Side of Device Channel: Concealed - exposed fasteners not allowed.
13. Vertical Latch Assemblies' Operation: Gravity, without use of springs.

C. Grades: Complying with BHMA A156.3, Grade 1.
1. Provide exit devices tested and certified by UL or by a recognized independent laboratory for mechanical operational testing to 10 million cycles minimum with inspection confirming Grade 1 Loaded Forces have been maintained.

D. Options:
   1. Internally mounted switch used to signal other components.
   2. MLR: Motorized latch retraction.
E. Products:
   1. 2000.

2.6 REMOVABLE MULLIONS

A. Acceptable Manufacturers:
   1. BEST, dormakaba Group: www.bestaccess.com/#sle.
   2. Von Duprin, Allegion Group.
B. Properties:
   1. Rectangular shape 3 inches by 2 inches tubes with minimum 1/8-inch wall thickness.
   2. Furnished by the same manufacturer as exit devices.
   3. Pre-drilled holes for installation of exit device strikes.
   4. Spacers: Provide as required for proper installation, based on frame profile and dimensions.
C. Grades: Complying with BHMA A156.3.
D. Materials: Manufacturer's standard for items specified.
   1. Top and Bottom Brackets: Investment-cast steel.
E. Options:
   1. Furnish Keyed Removable “KR” feature and corresponding cylinders as specified.
      a. Mullions capable of being installed without physical key present.
      b. Physical key required to operate.
F. Applications: As indicated on Drawings and in Door Hardware Schedule.
G. Products:
   1. 822 Series.

2.7 ELECTROMAGNETIC LOCKS

A. Acceptable Manufacturers:
   1. RCI; dormakaba Group: www.dormakaba.com/us-en/#sle.
B. Properties:
C. Standards Compliance: Fire-resistance-rated applications.
   1. Comply with UL 10C, with ratings up to 90 minutes.
D. Options:
   1. Voltage: 24 VDC.
E. Installation: Connect electromagnetic locks into fire alarm interface where doors are scheduled to release with fire or sprinkler alarm condition.
   1. Mounting: Surface mounted to door and frame on secure side, with fasteners, brackets, and spacer bars as required for application.
F. Products:
   1. Standard mag locks.

2.8 LOCK CYLINDERS

A. Acceptable Manufacturers:
   1. BEST, dormakaba Group: www.bestaccess.com/#sle.
B. Properties:
   1. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
      a. Provide cylinders from same manufacturer as locking device.
      b. Provide cams and/or tailpieces as required for locking devices.
      c. Provide cylinders with appropriate format interchangeable cores where indicated.
C. Grades:
   1. Standard Security Cylinders: Comply with BHMA A156.5.
D. Material:
   1. Manufacturer's standard corrosion-resistant brass alloy.
E. Types: As applicable to each item specified.
F. Applications: At locations indicated in hardware sets, and as follows
   1. As required for items with locking devices provided by other sections.
      a. When provisions for lock cylinders are referenced elsewhere in the Project Manual to this Section, provide compatible type of lock cylinder, keyed to building keying system, unless otherwise indicated.
G. Products:
   1. Rim/mortise.

2.9 MORTISE LOCKS

A. Acceptable Manufacturers:
   1. BEST, dormakaba Group: www.bestaccess.com/#sle.
B. Properties:
   1. Mechanical Locks: Manufacturer's standard.
      a. Fitting modified ANSI A115.1 door preparation.
      b. Door Thickness Coordination Fitting 1-3/4-inch- to 2-1/4-inch-thick doors.
      c. Latch: Solid, 1-piece, anti-friction, self-lubricating stainless steel.
         1) Latchbolt Throw: 3/4-inch, minimum.
      d. Auxiliary Deadlatch: 1-piece stainless steel, permanently lubricated.
      e. Backset: 2-3/4-inch.
      f. Lever Trim:
         1) Functionality: Allow the lever handle to move up to 45 degrees from horizontal position prior to engaging the latchbolt assembly.
         2) Strength: Locksets outside locked lever designed to withstand minimum 1,400 inch-lbs. of torque. In excess of that, a replaceable part will shear. Key from outside and/or inside lever will still operate lockset.
         3) Spindle: Designed to prevent forced entry from attacking of lever.
         4) Independent spring mechanism for each lever.
            (a) Trim to be self-aligning and thru-bolted.
         5) Handles: Made of forged or cast brass, bronze, or stainless-steel construction. Levers that contain a hollow cavity are not acceptable.
         6) Levers to operate a roller bearing spindle hub mechanism.
         7) Match existing #17M design.

2. Electrified Locks: Same properties as standard locks, and as follows:
   a. Voltage: 24 VDC.
   b. Function: Electrically locked (Fail Safe) or unlocked (Fail Secure), as indicated for each lock in Door Hardware Schedule.

C. Finishes: See Door Hardware Schedule.
   1. Core Faces: Match finish of lockset.

D. Grades:
   1. Comply with BHMA A156.13, Grade 1, Security Grade 2.
   2. Locksets shall match existing BEST 35H series with 45H series upgrades.

E. Options:
   1. Provide locksets made in a manufacturing facility to compliant with ISO 9001-Quality Management and ISO 14001-Environmental Management.

F. Products: Mortise locks, including standard and electrified types.
   1. 40H.

2.10 CLOSERS

A. Acceptable Manufacturers:
   1. dormakaba commercial, dormakaba Group: www.dormakaba.com/us-en/#sle.
   2. LCN, Allegion Group.

B. Properties:
   1. Surface Mounted Closers: Manufacturer's standard.
      a. Construction: Cast iron.
      b. Maximum Projection from Face of Door: 2-7/16 inches.
      c. Mechanism: Separate tamper-resistant adjusting valves for closing and latching speeds.
         1) Include delayed action feature.
      d. Hydraulic Fluid: All-weather type.
      e. Arm Assembly: Standard for product specified.
         1) Include hold-open, integral stop, or spring-loaded stop feature, as specified in Door Hardware Schedule.
         2) Parallel arm to be a heavy-duty rigid arm.
      f. Covers:
         1) Type: Standard for product selected.
            (a) Full.
         2) Material: Plastic.
         3) Finish: Painted.

C. Grades:
   1. Closers: Comply with BHMA A156.4, Grade 1.
      a. Underwriters Laboratories Compliance:
         1) Product Listing: UL (DIR) and ULC for use on fire-resistance-rated doors.
            (a) UL 228 - Door Closers-Holders, With or Without Integral Smoke Detectors.

D. Types:
   1. Rack-and-pinion, surface-mounted. 1-1/2 inches minimum bore.

E. Installation:
1. Mounting: Includes surface mounted installations.
2. Mount closers on non-public side of door and stair side of stair doors unless otherwise noted in hardware sets.
3. At outswinging exterior doors, mount closer on interior side of door.
4. Provide adapter plates, shim spacers, and blade stop spacers as required by frame and door conditions.
5. Where an overlapping astragal is included on pairs of swinging doors, provide coordinator to ensure door leaves close in proper order.

F. Products:
1. Surface Mounted:
a. QDC100.

2.11 PROTECTION PLATES

A. Acceptable Manufacturers:
1. ABH.
2. Don-Jo.
3. Rockwood, Assa Abloy Group.
4. Trimco, Allegion Group.

B. Properties:
1. Plates:
a. Armor Plates: Provide on bottom half of push side of doors that require protection from objects moving through openings that may damage door surface.
b. Kick Plates: Provide along bottom edge of push side of every wood door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
c. Mop Plates: Provide along bottom edge of push side of doors to provide protection from cleaning liquids and equipment damage to door surface.
d. Edges: Beveled, on 4 unless otherwise indicated.

C. Grades: Comply with BHMA A156.6.

D. Material: As indicated for each item by BHMA material and finish designation.
1. Metal Properties: Stainless steel.

E. Installation:
1. Fasteners: Countersunk screw fasteners

2.12 STOPS AND HOLDERS

A. Acceptable Manufacturers:
1. ABH.
2. Don-Jo.
3. Rockwood, Assa Abloy Group.
4. Trimco, Allegion Group.

B. General: Provide overhead stop/holder when wall or floor stop is not feasible.

C. Grades:
1. Door Holders, Wall Bumpers, and Floor Stops: Comply with BHMA A156.16 and Resilient Material Retention Test as described in this standard.

D. Material: Base metal as indicated for each item by BHMA material and finish designation.
E. Types:
   1. Wall Bumpers: Bumper, concave, wall stop.
F. Installation:
   1. Non-Masonry Walls: Confirm adequate wall reinforcement has been installed to allow lasting installation of wall bumpers.
G. Products:
   1. Wall Bumpers.

2.13 THRESHOLDS

A. Acceptable Manufacturers:
   1. National Guard Products, Inc: www.ngpinc.com/#sle.
   2. Pemko, Assa Abloy Group.
   3. Reese Industries.
B. Properties:
   1. Threshold Surface: Fluted horizontal grooves across full width.
C. Grades: Thresholds: Comply with BHMA A156.21.
D. Types: As applicable to project conditions. Provide barrier-free type at every location where specified.

2.14 WEATHERSTRIPPING AND GASKETING

A. Acceptable Manufacturers:
   1. National Guard Products, Inc: www.ngpinc.com/#sle.
   2. Pemko, Assa Abloy Group.
   3. Reese Industries.
B. Properties:
   1. Adhesive-Backed Perimeter Gasketing: Silicone gasket material applied to frame with self- adhesive.
   2. Rigid, Housed, Perimeter Gasketing: Sponge silicone gasket material held in place by aluminum housing; fastened to frame stop with screws.
   3. Door Sweeps: Silicone gasket material held in place by flat aluminum housing or flange; surface mounted to face of door with screws.
C. Grades: Comply with BHMA A156.22.

2.15 MISCELLANEOUS ITEMS

A. Acceptable Manufacturers:
   1. ABH.
   2. Don-Jo.
   3. Rockwood, Assa Abloy Group.
   4. Trimco, Allegion Group.
B. Properties:
   1. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
      a. Single Door: Provide three on strike jamb of frame.
      b. Pair of Doors: Provide two on head of frame, one for each door at latch side.
      c. Material: Rubber, gray color.
C. Products:
   1. Silencers.

2.16 ELECTRIFIED HARDWARE

A. Acceptable Manufacturers:
   1. BEST, dormakaba Group: www.bestaccess.com/#sle.
   2. dormakaba; dormakaba Group: www.dormakaba.com/us-en/#sle.
   3. Schlage, Allegion Group.

B. Properties:
   1. Door Position Switches: Recessed devices with balanced magnetic contacts.
      a. Power Requirement: 50mA Max, 100 VDC.
      b. SPDT configuration with magnetic tamper.
   2. Power Supply Units: Manufacturer's standard.
      a. Enclosures: Lockable NEMA Type 1, with hinged cover and knockouts.
      b. Emergency Release Terminals: Designed to release devices upon activation of fire alarm system.
      c. Auxiliary contacts for remote signaling.
      d. User-selectable time delay from 0 to 4 minutes.
      e. Fire Alarm System Interface: Standard.
         1) Fire alarm terminal with green LED indicating power is available.
      f. Output Distribution Board with indicator LEDs.
      g. On/Off LED power indicator.
   3. Power Transfers: Manufacturer's standard.
      a. Mortised Type with Wires & Connectors:
         1) Listed by UL and ULC.
         2) Stainless steel housing and spring conduit.
         3) Wire Harness: Pre-installed, twelve wire, equipped with ten 24-gauge wires and two 18-gauge wires.
         4) Accommodate 180-degree door swing.
         5) Quick-Connect Plugs: Pre-installed.
   4. Wire Harnesses: Of sufficient length, with quick connectors.
      a. Wire Harness End Connection to Power Supply or Junction Box: One end with bare leads.

C. Products:
   1. Door Position Switches:
      a. MC4.
   2. Power Supplies:
      a. RPSMLR2.
      a. DKPS Series.
   3. Power Transfers:
      a. EPT-12C.
   4. Wire Harnesses:
      a. BEST wire harnesses.

2.17 KEYS AND CORES

A. Acceptable Manufacturers:
   1. BEST, dormakaba Group: www.bestaccess.com/#sle.

B. Properties: Complying with guidelines of BHMA A156.28.
   1. Provide small format interchangeable core.
   2. Key to Owner's existing key system.
   3. Provide keying information in compliance with DHI (KSN) standards.

4. Keying Schedule: Arrange for a keying meeting, with Architect, Owner, and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying complies with Project requirements.
5. Keying: Master keyed.
6. Include construction keying and control keying with removable core cylinders.
7. Supply keys in following quantities:
   a. Master Keys: 4 each.
   b. Construction Master Keys: 6 each.
   c. Construction Keys: 15 each.
   d. Construction Control Keys: 2 each.
   e. Control Keys if New System: 2 each.
   f. Permanent Keys: 2 per keyed device.
8. Provide key collection envelopes, receipt cards, and index cards in quantity suitable to manage number of keys.
9. Deliver keys with identifying tags to Owner by security shipment direct from manufacturer.
10. Permanent Keys and Cores: Stamped with applicable key marking for identification. Do not include actual key cuts within visual key control marks or codes. Stamp permanent keys "Do Not Duplicate."
11. Include installation of permanent cores and return construction cores to hardware supplier. Construction cores and keys to remain property of hardware supplier.

C. Products:
   1. Standard.

2.18 FINISHES

A. Finishes: Identified in Hardware Sets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on Shop Drawings.
B. Correct all defects prior to proceeding with installation.
C. Verify that electric power is available to power operated devices and of correct characteristics.

3.2 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.
B. Install hardware using the manufacturer’s fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use “Riv-Nuts” or similar products.
C. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
D. Install hardware for smoke and draft control doors in accordance with NFPA 105.
E. Use templates provided by hardware item manufacturer.
F. Do not install surface mounted items until application of finishes to substrate are fully completed.

G. Wash down masonry walls and complete painting or staining of doors and frames.
H. Complete finish flooring prior to installation of thresholds.
I. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.
J. Include in installation for existing doors and frames any necessary field modification and field preparation of doors and frames for new hardware. Provide necessary fillers, reinforcements, and fasteners for mounting new hardware and to cover existing door and frame preparations.

3.3 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 01 40 00 “Quality Requirements.”

3.4 ADJUSTING

A. Adjust work under provisions of Section 01 70 00 “Execution and Closeout Requirements.”
B. Adjust hardware for smooth operation.
C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.5 CLEANING

A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
B. Clean adjacent surfaces soiled by hardware installation activities.
C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.6 PROTECTION

A. Protect finished Work under provisions of Section 01 70 00 “Execution and Closeout Requirements.”
B. Do not permit adjacent Work to damage hardware or finish.

3.7 HARDWARE SCHEDULE

Manufacturer list

ABH	Architectural Builders Hardware
BES	BEST
PRE	BEST (Precision)
D-J	DON-JO
DKA	dormakaba Architectural
DKC	dormakaba Commercial
NGP	National Guard Products

Option list

Code:	Name:
(1/4-20 MS/EA)	1/4-20 Machine Screw/Expansion Anchor
4" ODW	4" Over Door Width
B4E	Beveled 4 Edges
C	Pre-Terminated Quick Connect Plug
CSK	Countersunk Holes
DE	Delayed Egress
FL	Fire Rated Hardware
LAR	Length As Required
MLR	Motorized Latch Retraction
NRP	Non-Removable Pins
RQE	Request to Exit
TS	Touchbar Monitoring Switch
VIB	Double Visual Indicator

Finish list

Code:	Name:
26D	Satin Chrome
32D	Satin Stainless Steel
626	Satin Chrome
626AM	Satin Chrome w/Antimicrobial Coating
630	Stainless Steel Metal, Satin
630AM	Satin Stainless Steel - Antimicrobial Coating
689	Aluminum
A	Anodized Aluminum
AL	Aluminum
C	Charcoal

Specification Report

Set #1 - Storefront Pair - Alarmed Exit
Doors: E099

2	Hinge	661HDUL EPT12C 83IN	AL	BES
2	Power Transfer	EPT-12C		PRE
1	Keyed Removeable Mullion	KR822	689	PRE
1	Exit Device	C DE 2103 CA-03	630AM	PRE
1	Exit Device	C DE 2101	630AM	PRE
2	Rim Cylinder	12E 7 2 STD	626	BES
2	Mortise Cylinder	1E 7 4 STD	626	BES
2	Door Closer	QDC117 BF		DKC
1	Threshold	426 LAR (1/4-20 MS/EA)	A	NGP
1	Gasketing	5100N Mullion		NGP
1	Seal	By Frame Mfr.		
2	Sweep	200S LAR	A	NGP
1	Drip Cap	16 4" ODW	A	NGP
1	Power Supply	PS161-6		PRE
2	Door Position Switch	MC4		DKA
2	Wiring Harness	WH-12		BES
2	Wiring Harness	WH-192		BES
2	Wiring Harness	WH-6E		BES
1	Offset Pull	1156		

Set #2 - Exterior Pair - Alarmed Exit
Doors: E101

6	Hinge	CB191 NRP 45X45	32D	BES
2	Power Transfer	EPT-12C		PRE
1	Keyed Removeable Mullion	KR822	689	PRE
1	Exit Device	C DE 2101	630AM	PRE
1	Exit Device	C DE E 2103 4908 P17	630AM	PRE
2	Rim Cylinder	12E 7 2 STD	626	BES
2	Mortise Cylinder	1E 7 4 STD	626	BES
2	Door Closer	QDC117 BF		DKC
2	Protection Plate	90 10" 1" LDW CSK B4E	630	D-J
1	Threshold	426 LAR (1/4-20 MS/EA)	A	NGP
1	Gasketing	5100N Mullion		NGP
1	Gasketing	110S Head & Jambs (2)	A	NGP
2	Sweep	200S LAR	A	NGP
1	Drip Cap	16 4" ODW	A	NGP
1	Power Supply	PS161-6		PRE
2	Door Position Switch	MC4		DKA
2	Wiring Harness	WH-6E		BES
2	Wiring Harness	WH-192		BES
2	Wiring Harness	WH-12		BES
1	Offset Pull	1156		

1	Card Reader	By Owner's Security Vendor		

Set #3 - Stairway - Controlled Access F/R
Doors: B017

3	Hinge	CB168 NRP 5X45	26D	BES
1	Power Transfer	EPT-12C		PRE
1	Exit Device	C FL MLR TS 2103 4903 P17 48"	630AM	PRE
1	Rim Cylinder	12E 7 2 STD	626	BES
1	Door Closer	QDC115 BF	689	DKC
1	Protection Plate	90 10" 2" LDW CSK B4E	630	D-J
1	Gasketing	5050 Head & Jambs (2)	C	NGP
1	Power Supply	RPSMLR2		PRE
1	Door Position Switch	MC4		DKA
1	Wiring Harness	WH-6E		BES
1	Wiring Harness	WH-192		BES
1	Wiring Harness	WH-12		BES
1	Wall Stop	1413		
1	Card Reader	By Owner's Security Vendor		

Set #3.1 - Stairway - Controlled Access
Doors: L107, L093

3	Hinge	CB168 NRP 5X45	26D	BES
1	Power Transfer	EPT-12C		PRE
1	Exit Device	C MLR TS 2103 4903 P17 48"	630AM	PRE
1	Rim Cylinder	12E 7 2 STD	626	BES
1	Door Closer	QDC115 BF	689	DKC
1	Protection Plate	90 10" 2" LDW CSK B4E	630	D-J
3	Silencer	1608		
1	Power Supply	RPSMLR2		PRE
1	Door Position Switch	MC4		DKA
1	Wiring Harness	WH-6E		BES
1	Wiring Harness	WH-192		BES
1	Wiring Harness	WH-12		BES
1	Wall Stop	1413		
1	Card Reader	By Owner's Security Vendor		

Set #4 - Controlled Access
Doors: C053, L102, L098, L104, L106

3	Hinge	CB179 45X45	26D	BES
1	Power Transfer	EPT-12C		PRE
1	Electromechanical Lock	45HW 7 DEU 17 M STD C RQE	626AM	BES
1	Door Closer	QDC111 BF	689	DKC
1	Protection Plate	90 10" 2" LDW CSK B4E	630	D-J
3	Silencer	1608		
1	Power Supply	DKPS-2A		DKA
1	Door Position Switch	MC4		DKA

1	Wiring Harness	WH-192		BES
1	Wiring Harness	WH-6E		BES
1	Wiring Harness	WH-38		BES
1	Wall Stop	1413		
1	Card Reader	By Owner's Security Vendor		

Set #5 - Janitor
Doors: C052

3	Hinge	CB179 45X45	26D	BES
1	Mortise Lock	45H 7 D 17R M STD	626AM	BES
1	Door Closer	QDC111 BF	689	DKC
1	Protection Plate	90 34" 2" LDW CSK B4E	630	D-J
3	Silencer	1608		
1	Wall Stop	1413		

Set #6 - Pet Relief
Doors: C050

3	Hinge	CB179 45X45	26D	BES
1	Mortise Lock	45H 7 R 17R M STD	626AM	BES
1	Door Closer	QDC111 BF	689	DKC
1	Protection Plate	90 10" 2" LDW CSK B4E	630	D-J
3	Silencer	1608		
1	Wall Stop	1413		

Set #7 - Fire Rated Storage
Doors: B019, B018

3	Hinge	CB179 45X45	26D	BES
1	Mortise Lock	45H 7 D 17R M STD	626AM	BES
1	Door Closer	QDC111 BF	689	DKC
1	Protection Plate	90 10" 2" LDW CSK B4E	630	D-J
1	Gasketing	5050 Head & Jambs (2)	C	NGP
1	Wall Stop	1413		

Set #8 - Storage
Doors: L105

3	Hinge	CB179 45X45	26D	BES
1	Mortise Lock	45H 7 D 17R M STD	626AM	BES
3	Silencer	1608		
1	Wall Stop	1413		

Set #10 - Family
Doors: L095

3	Hinge	CB179 45X45	26D	BES
1	Mortise Lock	45H L 17R M VIB	626AM	BES
1	Door Closer	QDC111 BF	689	DKC
1	Protection Plate	90 10" 2" LDW CSK B4E	630	D-J
1	Protection Plate	90 6" 1" LDW CSK B4E	630	D-J
1	Gasketing	5050 Head & Jambs (2)	C	NGP
1	Wall Stop	1413		

Set #11 - Overhead
Doors: C049, L096

1	Mortise Cylinder	1E 7 4 STD	626	BES

NOTE: Remainder of hardware by door supplier. Coordinate with door supplier to verify quantity / type of cylinders required.

Set #12 - Hardware by Door Mfr.
Doors: GATE

NOTE: All hardware by door manufacturer.

Set #13 - Exterior Controlled Access
Doors: E094

3	Hinge	CB191 NRP 45X45	32D	BES
1	Power Transfer	EPT-12C		PRE
1	Electromechanical Lock	45HW 7 DEU 17 M STD C RQE	626AM	BES
1	Door Closer	QDC117 BF		DKC
1	Protection Plate	90 10" 2" LDW CSK B4E	630	D-J
1	Threshold	426 LAR (1/4-20 MS/EA)	A	NGP
1	Gasketing	110S Head & Jambs (2)	A	NGP
1	Sweep	200S LAR	A	NGP
1	Drip Cap	16 4" ODW	A	NGP
1	Power Supply	DKPS-2A		DKA
1	Door Position Switch	MC4		DKA
1	Wiring Harness	WH-192		BES
1	Wiring Harness	WH-6E		BES
1	Wiring Harness	WH-38		BES
1	Card Reader	By Owner's Security Vendor		

Set #14 - Storefront Pair - Turn Lock
Doors: TDC1, TDC2, TDC3, TDC4, TDC5, TDC6

2	Hinge	661HDUL 83IN	AL	BES
2	Flush Bolt	1550		
1	Dust Proof Strike	1570	626	D-J
1	Deadbolt	185 3		
1	Mortise Cylinder	1E 7 4 STD	626	BES
1	Mortise Cylinder	1E A 0 A1	626	BES
2	Push / Pull Bar	1156147		
2	Parallel Arm Holder	3500	S1	ABH
2	Door Closer	QDC111 BF	689	DKC

END OF SECTION

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Glass products.
   2. Laminated glass.
   3. Insulating glass.
   4. Glazing sealants.
   5. Glazing tapes.
   6. Miscellaneous glazing materials.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

C. IBC: International Building Code.

D. Interspace: Space between lites of an insulating-glass unit.

1.3 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Review temporary protection requirements for glazing during and after installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
   1. Insulating glass.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For glass.
B. Product Test Reports: For fabricated glass, for tests performed by a qualified testing agency.
   1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

1.7 QUALITY ASSURANCE

A. Fabricated-Glass Manufacturer Qualifications: A qualified manufacturer of fabricated glass units who is approved and certified by primary glass manufacturer.
B. Installer Qualifications: A qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors and who employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
   1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
   1. Warranty Period: 10 years from date of Substantial Completion.
B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
   1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.
   1. Warranty Period: 10 years from date of Substantial Completion.

D. Manufacturer's Special Warranty for Heat-Soaked Tempered Glass: Manufacturer agrees to replace heat-soaked tempered glass units that spontaneously break due to nickel sulfide (NiS) inclusions at a rate exceeding 0.3 percent within specified warranty period. Coverage for any other cause is excluded.
   1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. General Glass Manufactures: Unless specified otherwise and subject to compliance with requirements, provide products by the following:
   1. AGC Glass Company North America, Inc.
   2. Guardian Glass; SunGuard.
   3. Pilkington North America.
   4. Viracon, Inc.
   5. Vitro Architectural Glass.

B. Source Limitations for Glass: Obtain glass from single source from single manufacturer.

C. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:
   1. Design Wind Pressures: As indicated on Drawings.
   2. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.

C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
   1. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. by h by degrees F.
   2. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
   3. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

E. Acoustic Performance:
   1. Exterior Glazing: 28 OITC.
   2. Interior Glazing: 37 STC.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
   1. NGA Publications: "Glazing Manual."
   2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.

C. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

B. Tinted Annealed Float Glass: ASTM C1036, Type I, Class 2 (tinted), Quality-Q3.

C. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
   1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

D. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
   1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

E. Reflective- and Low-E-Coated Vision Glass: ASTM C1376.

2.5 LAMINATED GLASS

A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Eastman Chemical Company.
      b. Kuraray America, Inc.
   2. Construction: Laminate glass with polyvinyl butyral interlayer, ionoplast interlayer, or, cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written instructions.
   3. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
   4. Interlayer Color: Clear unless otherwise indicated.

2.6 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.
   1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
   2. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.7 GLAZING SEALANTS

A. General:
   1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
   2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
   3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range of industry colors.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
   1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
   2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
C. Setting Blocks:
    1. Type recommended in writing by sealant or glass manufacturer.
D. Spacers:
    1. Type recommended in writing by sealant or glass manufacturer.
E. Edge Blocks:
    1. Type recommended in writing by sealant or glass manufacturer.

2.10 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
    1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
        a. Temperature Change: 120 degrees F, ambient; 180 degrees F, material surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with installer present, for compliance with the following:
    1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
    2. Presence and functioning of weep systems.
    3. Minimum required face and edge clearances.
    4. Effective sealing between joints of glass-framing members.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
F. Provide spacers for glass lites where length plus width is larger than 50 inches.
    1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
    2. Provide 1/8-inch-minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.
H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
E. Do not remove release paper from tape until right before each glazing unit is installed.
F. Apply heel bead of elastomeric sealant.
G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.6 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.
B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
    1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
C. Remove and replace glass that is damaged during construction period.
D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.7 MONOLITHIC GLASS SCHEDULE

A. Clear Glass Type G02: Fully tempered float glass.
    1. Minimum Thickness: 6 mm.
    2. Safety glazing required.

3.8 INSULATING GLASS SCHEDULE

A. Low-E-Coated, Tinted Insulating Glass Type G12:
    1. Basis-of-Design Product: Subject to compliance with requirements, Guardian Clear Glass or comparable product from a manufacture listed listed in Part 2.
    2. Overall Unit Thickness: 25.4 mm.
    3. Minimum Thickness of Each Glass Lite: 6 mm.
    4. Outdoor Lite: Tinted annealed float glass.
    5. Tint Color: Match existing.
    6. Interspace Content: Air.
    7. Indoor Lite: Clear annealed float glass.
    8. Low-E Coating: Pyrolytic on third surface.
    9. Summer Daytime U-Factor: 0.46 maximum.
    10. Visible Light Transmittance: 50 percent minimum.
    11. SGHC: .25 maximum.
    12. Safety glazing required.

END OF SECTION

SECTION 08 87 00 – DECORATIVE FILM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Decorative films.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 08 80 00 “Glazing”: Substrate for application of decorative film.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM E903 - Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.

1.3 DEFINITIONS

A. Visible Light Transmittance: The ratio of the amount of visible light (380 to 780 nm) that is allowed to pass through a glazing system to the amount of visible light falling on the glazing system. The value is expressed as a percentage.
B. Diffuse Visible Light Reflectance (exterior): The percentage of visible light falling on a flat, non-mirrored surface that is neither transmitted nor absorbed but scattered backwardly at random angles from that surface. This value is also known as “non-specular reflectance”.
C. Privacy Film Rating: This number, between 0 (clear) and 10 (opaque), represents the relative difficulty an observer has in identifying the nature and character of an object located on the opposite side of the window, with the observer and the object both located at least 2 feet from the pane upon which the product has been installed.
D. Frost Series: These films have frosted and translucent finishes that ensure privacy without sacrificing natural light. They are ideal for commercial interior glazing applications such as office partitions or to meet interior design goals at a fraction of the cost of etched glass.

1.4 PERFORMANCE REQUIREMENTS

A. Provide Decorative films that do not have a masking sheet.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 33 00 “Submittal Procedures.”
B. Product Data: Submit for each product specified indicating:
   1. Performance properties.
   2. Preparation and installation instructions and recommendations.
   3. Storage and handling recommendations.

C. Verification Samples: For each type of decorative film specified, 2 samples, 12 inches square.
D. Qualification Data: Submit documentation indicating qualifications of decorative film manufacturer.
E. Operation and Maintenance Data: Submit for decorative film to include in maintenance manuals.
F. Warranty: Submit sample special warranty specified in this Section.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that has a minimum of 10 years of documented experience manufacturing decorative films similar to be used for this Project.
B. Installer Qualifications: A firm that is authorized by decorative film manufacturer to install film in accordance with guidelines set forth by the manufacturer.
C. Source Limitations: Obtain each type of decorative film from same manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle materials in manufacturer's protective packaging.
B. Store and protect materials according to manufacturer's written recommendations to prevent damage from condensation, temperature changes, direct exposure to sun, or other causes.

1.8 SITE CONDITIONS

A. Ambient Conditions: Maintain temperature, humidity, and ventilation within limits recommended by manufacturer.

1.9 LIMITED WARRANTY

A. Manufacturer's Limited Warranty: Certain restrictions apply.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: The design for decorative films is based on LLumar® Decorative Frost Films manufactured by an Eastman Chemical Company business: CPFilms Inc., 575 Maryville Centre Drive, St. Louis, Missouri 63141; Telephone: 800.255.8627; Email address: commercialalerts@eastman.com; Web Site: www.llumar.com.
B. Substitutions will be considered, subject to compliance with requirements of this Section, under provisions of Section 01 60 00 “Product Requirements.”

2.2 DECORATIVE FROST FILMS

A. Decorative Film: LLumar® NRMV80DCPS3 Decorative Frost Film with the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:

% Visible Light Transmission	87
% Diffuse Visible Light Reflectance (exterior)	11
Privacy Film Rating	7
Thickness without Liner	inches
Film Color	Dusted Crystal

2.3 DECORATIVE FILM ACCESSORIES

A. General: Provide accessories either manufactured by or acceptable to decorative film manufacturer for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
B. Pressure Sensitive Adhesive: This adhesive is activated by pressure and water. It is characterized by its permanently tacky nature and its installation ease.
C. Cleaners, Primers, and Sealers: Types recommended by film manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements and for conditions affecting performance of decorative film including glass that is broken, chipped, cracked, abraded, or damaged in any way.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Comply with manufacturer’s written instructions for surface preparation.
B. Clean substrates thoroughly prior to installation.
C. Prepare substrates using methods recommended by film manufacturer to achieve the best results for the substrate under project conditions.
D. Protect window frames and surrounding surfaces to prevent damage during installation.

3.3 INSTALLATION

A. Install in accordance with manufacturer’s written instructions.
B. Install with no gaps or overlaps.
C. If seamed, make seams non-overlapping.
D. Do not remove release liner from film until just before each piece of film is cut and ready for installation.
E. Custom cut to the glass with neat, square corners and edges to within 1/8-inch of the window frame.
F. Remove air bubbles, blisters, and other defects. Be careful to remove “fingers” to eliminate any contamination or excess water pockets. It is crucial to remove as much water as possible during installation.

3.4 FIELD QUALITY CONTROL

A. After installation, view film from a distance of 10 feet against a bright uniform sky or background. Film shall appear uniform in appearance with no visible streaks, wrinkles, banding, thin spots or pinholes.
B. If installed film does not meet these criteria, remove and replace with new film.

3.5 CLEANING AND PROTECTION

A. Remove excess mounting solution at finished seams, perimeter edges, and adjacent surfaces.
B. Use cleaning methods recommended by film manufacturer.
C. Replace films that cannot be cleaned.
D. Protect installed products until completion of Project.
E. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Non-load-bearing steel framing systems for interior partitions.
   2. Suspension systems for interior ceilings and soffits.
   3. Grid suspension systems for gypsum board ceilings.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 05 40 00 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; and roof rafters and ceiling joists.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

B. Evaluation Reports: From ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction for the following:
   1. Embossed, high-strength steel studs and tracks.
   2. Firestop tracks.

1.4 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, the Steel Stud Manufacturers Association, or the Supreme Steel Framing System Association.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Notify manufacturer of damaged materials received prior to installation.

B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI S202, "Code of Standard Practice for Cold-Formed Steel Structural Framing."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

B. Horizontal Deflection: For composite and non-composite wall assemblies, limited to following ratios of the wall height based on horizontal loading of 5 lbf/sq. ft.
   1. Ceramic and Stone Tile: 1/360.
   2. Plaster: 1/360.
   3. Gypsum Board and Other Finishes: 1/240.

C. Design framing systems in accordance with AISI S220, "North American Specification for the Design of Cold-Formed Steel Framing - Nonstructural Members," unless otherwise indicated.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with for conditions indicated.
   1. Steel Sheet Components: Comply with requirements for metal unless otherwise indicated
   2. Protective Coating: Comply with ASTM A653, G40; or coating with equivalent corrosion resistance. Galvannealed products are unacceptable.
      a. Coating demonstrates equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.

B. Studs and Track:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. CEMCO; California Expanded Metal Products Co.
      b. ClarkDietrich.
      c. Custom Stud.
      d. Jaimes Industries.
      e. MarinoWARE.
      f. MBA Building Supplies.
      g. MRI Steel Framing, LLC.
      h. Phillips Manufacturing Co.
      i. SCAFCO Steel Stud Company.
      j. Steel Construction Systems.
      k. Telling Industries.
      l. The Steel Network, Inc.
   2. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection.
   3. Depth: As indicated on Drawings.

C. Embossed, High Strength Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally comparable to conventional ASTM C645 steel studs and tracks.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. CEMCO; California Expanded Metal Products Co.
      b. ClarkDietrich.
      c. MarinoWARE.
      d. MBA Building Supplies.
      e. Phillips Manufacturing Co.
      f. SCAFCO Steel Stud Company.
      g. Steel Construction Systems.
      h. Telling Industries.
      i. The Steel Network, Inc.
      j. Minimum Base-Steel Thickness: As required by horizontal deflection performance requirements .
      k. Depth: As indicated on Drawings.

D. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. CEMCO; California Expanded Metal Products Co.
      b. ClarkDietrich.
      c. Fire Trak Corp.
      d. MarinoWARE.
      e. Metal-Lite.
      f. SCAFCO Steel Stud Company.
      g. Steel Construction Systems.
      h. The Steel Network, Inc.

E. Hat-Shaped, Rigid Furring Channels: ASTM C645.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. ClarkDietrich.
      b. Jaimes Industries.
      c. MarinoWARE.
      d. MBA Building Supplies.
      e. MRI Steel Framing, LLC.
      f. SCAFCO Steel Stud Company.
      g. Steel Construction Systems.
   2. Minimum Base-Steel Thickness: 0.0329-inch.
   3. Depth: As indicated on Drawings.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A641, Class 1 zinc coating, soft temper, 0.062-inch-iameter wire, or double strand of 0.048-inch-diameter wire.
B. Hanger Attachments to Concrete:
   1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 as appropriate for the substrate.
      a. Type: Torque-controlled, expansion anchor.
      b. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
      c. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.
C. Wire Hangers: ASTM A641, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
D. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538-inch and minimum 1/2-inch-wide flanges.
   1. Depth: 1-1/2 inches.
E. Furring Channels (Furring Members):
   1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4-inch-deep.
   2. Steel Studs and Tracks: ASTM C645.
   3. Embossed, High-Strength Steel Studs and Tracks: ASTM C645.
   4. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8-inch-deep.
F. Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Armstrong Ceiling & Wall Solutions.
      b. Certainteed; SAINT-GOBAIN.
      c. Rockfon (Rockwool International).
      d. USG Corporation.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.
   1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordination with Sprayed Fire-Resistive Materials:
   1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
   2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C754.
   1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
D. Install bracing at terminations in assemblies.
E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
C. Install studs so flanges within framing system point in same direction.
D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
   1. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
      a. Install two studs at each jamb unless otherwise indicated.
      b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
      c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
   2. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
   3. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

E. Direct Furring:
   1. Screw to wood framing.
   2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8-inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
   1. Hangers: 48 inches o.c.
   2. Carrying Channels (Main Runners): 48 inches o.c.
   3. Furring Channels (Furring Members): 16 inches o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
      a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
      a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
   3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

F. Installation Tolerances: Install suspension systems that are level to within 1/8-inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Tile backing panels.
4. Texture finishes.

B. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.
2. Section 06 16 00 "Sheathing" for gypsum sheathing for exterior walls.
3. Section 07 92 19 "Acoustical Joint Sealants" for acoustical joint sealants installed in gypsum board assemblies.
4. Section 09 22 16 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
5. Section 09 30 13 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:
1. Gypsum wallboard.
2. Gypsum board, Type X.
3. Gypsum ceiling board.
4. Mold-resistant gypsum board.
5. Glass-mat, water-resistant backing board.
6. Joint treatment materials.
7. Sound-attenuation blankets.
8. Acoustical sealant.
9. Textured finishes.

1.3 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C1396.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. CertainTeed Corporation; Saint-Gobain North America.
      b. Georgia-Pacific Gypsum LLC.
      c. National Gypsum Company.
      d. USG Corporation.
   2. Thickness: 5/8-inch.
   3. Long Edges: Tapered.
B. Gypsum Board, Type X: ASTM C1396.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. CertainTeed Corporation; Saint-Gobain North America.
      b. Georgia-Pacific Gypsum LLC.
      c. National Gypsum Company.
      d. USG Corporation.
   2. Thickness: 5/8-inch.
   3. Long Edges: Tapered.

C. Gypsum Ceiling Board: ASTM C1396.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. CertainTeed Corporation; Saint-Gobain North America.
      b. Georgia-Pacific Gypsum LLC.
      c. National Gypsum Company.
      d. USG Corporation.
   2. Thickness: 1/2-inch.
   3. Long Edges: Tapered.

D. Mold-Resistant Gypsum Board: ASTM C1396. With moisture- and mold-resistant core and paper surfaces.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. CertainTeed Corporation; Saint-Gobain North America.
      b. Georgia-Pacific Gypsum LLC.
      c. National Gypsum Company.
      d. USG Corporation.
   2. Core: 5/8-inch, Type X.
   3. Long Edges: Tapered.
   4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.4 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C1178, with manufacturer's standard edges.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. CertainTeed Corporation; Saint-Gobain North America.
      b. Georgia-Pacific Gypsum LLC.
      c. National Gypsum Company.
      d. USG Corporation.
   2. Core: 5/8-inch, Type X.
   3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
   4. Basis of Design: USG Durock Brand Glass-Mat Tile Backerboard.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.
   1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
   2. Shapes:
      a. Cornerbead.
      b. U-Bead: J-shaped; exposed short flange does not receive joint compound.
      c. Expansion (control) joint.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475.
B. Joint Tape:
   1. Interior Gypsum Board: Paper.
   2. Tile Backing Panels: As recommended by panel manufacturer.
C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
   2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
      a. Use setting-type compound for installing paper-faced metal trim accessories.
   3. Fill Coat: For second coat, use setting-type, sandable topping compound.
   4. Finish Coat: For third coat, use drying-type, all-purpose compound.
D. Joint Compound for Tile Backing Panels:
   1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
   2. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.7 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
   1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033- to 0.112-inch-thick.
   2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
C. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
   1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
D. Acoustical Sealant: As specified in Section 07 92 19 "Acoustical Joint Sealants."
E. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."
F. Vapor Retarder: As specified in Section 07 26 00 "Vapor Retarders."

2.8 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.
B. Polystyrene Aggregate Ceiling Finish: Water-based, job-mixed, polystyrene aggregate finish with flame-spread and smoke-developed indexes of not more than 25 when tested according to ASTM E84.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Georgia-Pacific Gypsum LLC.
      b. National Gypsum Company.
      c. USG Corporation.
   2. Texture: Fine.

C. Non-Aggregate Finish: Premixed, vinyl texture finish for spray application.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. CertainTeed Corporation; Saint-Gobain North America.
      b. National Gypsum Company.
      c. USG Corporation.
   2. Texture: Orange peel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with installer present, for compliance with requirements and other conditions affecting performance of the Work.
B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Comply with ASTM C840.
B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16-inch of open space between panels. Do not force into place.
D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
E. Form control and expansion joints with space between edges of adjoining gypsum panels.
F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Wallboard Type: As indicated on Drawings.
   2. Type X: Where required for fire-resistance-rated assembly.
   3. Ceiling Type: Ceiling surfaces.
   4. Glass-Mat Interior Type: As indicated on Drawings.

B. Single-Layer Application:
   1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
      a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
   3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
   4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:
   1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
   2. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
   3. Fastening Methods: Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners.

3.4 INSTALLATION OF TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.

B. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.

C. Water-Resistant Backing Board: Install where indicated with 1/4-inch gap where panels abut other construction or penetrations.

3.5 INSTALLATION OF TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.
C. Interior Trim: Install in the following locations:
    1. Cornerbead: Use at outside corners.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
B. Prefill open joints and damaged surface areas.
C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
    1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
    2. Level 2: Panels that are substrate for tile.
    3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
        a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."
E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.
F. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 INSTALLATION OF TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.
C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written instructions.

3.8 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
    1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
    2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 09 30 13 - CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Porcelain tile.
   2. Setting material.
   3. Grout materials.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 07 92 00 "Joint Sealants" for sealing of movement joints in tile surfaces.
   3. Section 09 29 00 "Gypsum Board" for tile backing panels.

1.2 DEFINITIONS

A. General: Definitions in ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. Face Size: Actual tile size, excluding spacer lugs.

C. Large Format Tile: Tile with at least one edge 15 inches or longer.

D. Module Size: Actual tile size plus joint width indicated.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Porcelain tile.
   2. Crack isolation membranes.
   3. Setting material.
   4. Grout materials.

B. Shop Drawings: Show locations, plans, and elevations, of each type of tile and tile pattern. Show widths, details, and locations of movement joints in tile substrates and finished tile surfaces.

C. Samples for Verification:
   1. Full-size units of each type and composition of tile and for each color and finish required.
   2. Metal flooring transitions 6-inch lengths.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installer.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish extra materials, from the same production run, to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
   2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Installer has 5 years documented experience of similar size and complexity of wall tile and large format tile.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
D. Store liquid materials in unopened containers and protected from freezing.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.9 WARRANTY

A. System Warranty: Manufacturer's non-prorated comprehensive warranty that agrees to repair and replace defective installation areas, material, and labor that fail under normal usage within specified warranty period.
   1. Warranty Period: Five years from date of Product Purchase.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Tile: Obtain tile of each type and color or finish from single source or producer.
   1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Tiling System: Obtain system products from single manufacturer and each aggregate from single source or producer.
   1. Obtain setting and grouting materials, except for unmodified portland cement and aggregate, from single manufacturer.
   2. Obtain joint sealants from manufacturer of setting and grouting materials.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
   1. Provide tile complying with Standard Grade requirements.
B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

2.3 PORCELAIN TILE

A. Porcelain Tile Type CT:
   1. Manufacturers: Basis of Design and subject to compliance with requirements, provide products by the following:
      a. As indicated on Interior Material Legend in Drawings.
   2. Face Size: As indicated on Interior Material Legend in Drawings.
   3. Thickness: Per Drawings.
   4. Tile Color, Glaze, and Pattern: As indicated on Interior Material Legend in Drawings.
   5. Grout Color: As indicated on Interior Material Legend in Drawings.

2.4 SETTING MATERIALS

A. Improved Modified Dry-Set Mortar (Thinset): ANSI A118.15.
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. ARDEX Americas.
   2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
   3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to other requirements in ANSI A118.15.

2.5 GROUT MATERIALS

A. Water-Cleanable Epoxy Grout: ANSI A118.3[, with a VOC content of 65 g/L or less].
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. ARDEX Americas.

2.6 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting and adhesive materials for installations indicated.
B. Metal Edge Trim: Profile designed for wall terminations and edge protection.
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. Schluter Systems L.P.
   2. Description: As indicated on Interior Material Legend in Drawings.
   3. Material and Finish: As indicated on Interior Material Legend in Drawings exposed-edge material.
C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
   2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
      a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
      b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
   3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
   4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove coatings, including curing compounds or other coatings, that are incompatible with tile-setting materials.
B. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

C. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1 and is sloped 1/4-inch per foot toward drains.

D. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

E. Substrate Flatness:
   1. For tile shorter than 15 inches, confirm that structure or substrate is limited to variation of 1/4-inch in 10 feet from the required plane, and no more than 1/16-inch in 12 inches when measured from tile surface high points.
   2. For large format tile, tile with at least one edge 15 inches or longer, confirm that structure or substrate is limited to 1/8-inch in 10 feet from the required plane, and no more than 1/16-inch in 24 inches when measured from tile surface high points.

F. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 INSTALLATION OF CERAMIC TILE SYSTEM

A. Install tile backing panels and treat joints in accordance with ANSI A108.11 and manufacturer's written instructions for type of application indicated.

B. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
   1. Add materials, water, and additives in accurate proportions.
   2. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

C. Install tile in accordance with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of ANSI A108 series that are referenced in TCNA installation methods and specified in tile installation schedules, and apply to types of setting and grouting materials used.
   1. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
   2. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
   3. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
   4. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
      a. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.

D. Movement Joints: Provide movement joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated on Drawings. Form joints during installation of setting materials, mortar beds, and tile. Keep joints free of dirt, debris, and setting materials prior to filling with sealants. Do not saw-cut joints after installing tiles.
   1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

E. Metal Wall Trim: Install at locations indicated on Drawings.

3.4 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
   1. Remove grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile in accordance with tile and grout manufacturer's written instructions. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.5 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.6 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Interior Wall Installations, Wood or Metal Studs or Furring:
   1. TCNA 244C-11.
      a. Porcelain tile.
      b. Grout - Epoxy.
      c. Joint width: 1/8-inch.
      d. Movement joints as need for installation.

END OF SECTION

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for interior ceilings.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on samples of sizes indicated below:
   1. Acoustical Panels: Set of 6-inch-square amples of each type, color, pattern, and texture.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Ceiling suspension-system members.
   2. Structural members to which suspension systems will be attached.
   3. Method of attaching hangers to building structure.
      a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
   4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
   5. Size and location of initial access modules for acoustical panels.
   6. Items penetrating finished ceiling and ceiling-mounted items including the following:
      a. Lighting fixtures.
      b. Diffusers.
      c. Sprinklers.
      d. Access panels.
   7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
   8. Minimum Drawing Scale: 1/8-inch equal to 1 foot.
B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
   2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: Class A according to ASTM E1264.
   2. Smoke-Developed Index: 50 or less.

2.3 ACOUSTICAL PANELS ACT1

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Armstrong World Industries, Inc. Match facility standard.
B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Classification: Provide panels as follows:
   1. Type and Form: A, Form A2.2.
   2. Pattern: E (lightly textured).
D. Color: as indicated on Interior Material Legend in Drawings.
E. Light eflectance (LR): Not less than 88.
F. Ceiling Attenuation Class (CAC): Not less than 35.
G. Noise Reduction Coefficient (NRC): Not less than 0.75.
H. Edge/Joint Detail: Tegular sized to fit flange of exposed suspension-system members.
I. Thickness: 3/4-inch.
J. Modular Size: As indicated on Drawings.

2.4 ACOUSTICAL PANELS ACT2

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Armstrong World Industries, Inc. Match facility standard.
B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
C. Classification: Provide panels as follows:
   1. Type and Form: A, Form A3.2.
   2. Pattern: G (smooth).
D. Color: as indicated on Interior Material Legend in Drawings.
E. Light eflectance (LR): Not less than 89.
F. Ceiling Attenuation Class (CAC): Not less than 33.
G. Edge/Joint Detail: Square.
H. Thickness: 5/8-inch.
I. Modular Size: As indicated on Drawings.

2.5 METAL SUSPENSION SYSTEM for ACT1 and ACT2

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Armstrong World Industries, Inc.
B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635 and designated by type, structural classification, and finish indicated.
   1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C635.
C. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
D. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch-wide metal caps on flanges.
   1. Structural Classification: Intermediate-duty system.
   2. End Condition of Cross Runners: Override (stepped) type.
   3. Cap Material: Cold-rolled steel or aluminum.
   4. Cap Finish: Painted white.

2.6 ACCESSORIES

A. Wire Hangers, Braces, and Ties: Provide wires as follows:
   1. Zinc-Coated, Carbon-Steel Wire: ASTM A641, Class 1 zinc coating, soft temper.
   2. Stainless-Steel Wire: ASTM A580, Type 304, nonmagnetic.
   3. Nickel-Copper-Alloy Wire: ASTM B164, nickel-copper-alloy UNS No. N04400.
   4. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch-diameter wire.

B. Hold-Down Clips: Manufacturer's standard hold-down.

C. Clean-Room Gasket System for use with ACT2 only: Where indicated, provide manufacturer's standard system, including manufacturer's standard gasket and related adhesives, tapes, seals, and retention clips, designed to seal out foreign material from and maintain positive pressure in clean room.

2.7 METAL EDGE MOLDINGS AND TRIM

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Armstrong World Industries, Inc.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
   1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
   2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

A. Install acoustical panel ceilings according to ASTM C636 and manufacturer's written instructions.
B. Suspend ceiling hangers from building's structural members and as follows:
    1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
    2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
    3. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
    4. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
    5. Do not attach hangers to steel deck tabs.
    6. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
    7. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
    1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
    2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
E. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
    1. Arrange directionally patterned acoustical panels as follows:
        a. Install panels with pattern running in one direction parallel to long axis of space.
    2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
    3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.

4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
5. Install hold-down clips where ACT2 is specified in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.
   a. Hold-Down Clips: Space o.c. on all cross runners.
6. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.

3.4 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8-inch in 12 feet, non-cumulative.
B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8-inch in 12 feet, non-cumulative.

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 54 23 - METAL PAN CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Linear metal ceilings.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 COORDINATION

A. Coordinate layout and installation of linear metal pans and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For linear metal ceilings.
B. Shop Drawings: For linear metal ceilings.
   1. Include reflected ceiling plans, sections, and details, drawn to scale, showing the following:
      a. Linear ceiling patterns and joints.
      b. Ceiling suspension members.
      c. Method of attaching hangers to building structure and locations of cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
      d. Ceiling-mounted items including, but not limited to, light fixtures, diffusers, grilles, speakers, sprinklers, and access panels.
      e. Ceiling perimeter and penetrations through ceiling; trim and moldings.
C. Samples for Verification: For the following products:
   1. Linear Metal Pans: 12 inches long by full-width samples of each type, color, and finish and a 12-inch-long spliced section.
   2. Suspension-System Members: 12-inch-long sample of each type.
   3. Exposed Molding and Trim: 12-inch-long samples of each type, color, and finish.
   4. Filler Strips: 12-inch-long samples of each type, color, and finish.
   5. Sound Absorbers: 12 inches long by full width.
   6. End Caps: Full size.
   7. Acoustical Infill.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Linear-Metal-Ceiling Components: Quantity of each pan, carrier, accessory, and exposed molding and trim equal to 2 percent of quantity installed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver ceiling components and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they are protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
B. Handle ceiling components and accessories in a manner that prevents damage.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install interior ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 METAL PAN CEILINGS MCP

A. Pans and Suspension System:
   1. Manufacturers: Basis of Design and Subject to compliance with requirements, provide products by one of the following:
      a. Armstrong Ceiling & Wall Solutions.
B. Metal Pans: Complying with ASTM E1264 for and formed to snap on to carriers securely, without separate fasteners.
   1. Surface-Burning Characteristics: For metal-pan assemblies, including backings, determined by testing in accordance with ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
      a. Flame-Spread Index: 25 or less.
      b. Smoke-Developed Index: 50 or less.
   2. Metal: Acceptable product:
      a. Armstrong Metal Works Torsion Spring by Armstrong Industries.
   3. Form: Perforated.
      a. Perforation Pattern: M15.
   4. Noise Reduction Coefficient (NRC) Rating: Not less than 0.90when tested in accordance with ASTM C423.
   5. Backing: 1-inch fiberglass infill, Black.
   6. Pan Thickness: Not less than 0.040-inch.
   7. Pan Edge Detail: Square.

8. Pan Width: As indicated on Drawings.
9. Metal-Pan Finish: Protected on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping and as follows:
    a. Color-Coated Finish: Manufacturer's standard baked paint finish complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film thickness.
        1) Color and Pattern: As indicated by manufacturer's product designation as indicated on Interior Material Legend in Drawings.

C. Adhesives: Do not use adhesives that contain urea formaldehyde.

D. Pan Splices: Formed for snap fit into butt-cut pans, long.
1. Finish: Matching pan.

E. End Caps: Manufacturer's standard material fabricated to fit and conceal exposed ends of pans.
1. Finish: Matching pan.

F. Filler Strips: Manufacturer's standard, fabricated to close voids between pans.
1. Finish: Matching pan.

G. Moldings and Trim: Manufacturer's standard for exposed members, to conceal edges of penetrations through ceiling, to conceal ends of pans and carriers, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching linear metal pans or extruded plastic unless otherwise indicated.

2.2 SUSPENSION SYSTEM

A. Components: All main beams and cross tees shall be commercial quality hot dipped galvanized steel as per ASTM A653. Main beams and cross tees are double-web steel construction with 15/16-inch type exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
1. 7301TS 360 Prelude® XL® 12-foot HD Main Beam – Slotted.
2. XL7341TS Prelude XL 4-foot Cross Tee.
3. XL7390TS Prelude XL 6-foot Cross Tee – Slotted.
4. XL7378 Prelude XL 30-inch Cross Tee.
5. XL8320 Prelude XL 2-foot Cross Tee.
6. XL7341 Prelude XL 4-foot Cross Tee.

B. Attachment Devices: Size for five times design load indicated in ASTM C635, Table 1, Direct Hung unless otherwise indicated.

C. Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least times-three design load, but not less than 12-gauge.

2.3 ACCESSORIES

A. Access Panels: For access at locations indicated, provide door hinge assembly, retainer clip, and retainer bar, assembled with ceiling panels and carrier sections into access doors permitting upward or downward opening.
1. Size: As indicated on Drawings.

B. Air-Distribution Devices: Where indicated on Drawings, provide independently suspended air-distribution devices that are relocatable and adjustable from below finished ceiling, that do not interrupt ceiling components, and that are fully concealed by and integrated with ceiling system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which linear metal ceilings attach or abut, with installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of linear metal ceilings.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of linear metal pans.
   1. Balance border widths at opposite edges of each ceiling.
   2. Avoid using less-than-half-width pans at borders.

3.3 INSTALLATION OF LINEAR METAL CEILINGS

A. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
   4. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts or postinstalled mechanical or adhesive anchors that extend through forms into concrete.
   5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
   6. Do not attach hangers to steel deck tabs.
   7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
   8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
   9. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

B. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns in 1-1/2 inches. Suspend bracing from building's structural members as required for hangers and without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

C. Install edge moldings and trim at perimeter of linear metal ceiling area and where necessary to conceal edges and ends of linear metal pans.
   1. Screw attach moldings to substrate at intervals of not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8-inch in 12 feet. Miter corners accurately and connect securely.
   2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

D. Install suspension-system carriers so they are aligned and securely interlocked with one another.
   1. Install stabilizer channels, tees, and bars at regular intervals to stabilize carriers and at light fixtures, air-distribution equipment, access doors, and other equipment; spaced as standard with manufacturer for use indicated.
   2. Remove and replace dented, bent, or kinked members.

E. Cut linear metal pans for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness.

F. Install linear metal pans in coordination with suspension system and exposed moldings and trim.
   1. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated on Drawings.
   2. Fit adjoining units to form flush, tight joints. Scribe and cut units for accurate fit at borders and around construction penetrating ceiling.
      a. Install pans with butt joints aligned using internal pan splices.
   3. Install directionally textured or patterned metal pans in directions indicated.
   4. Where metal pan ends are visible, install end caps unless trim is indicated.
   5. Install sound-absorbent pads at right angle to perforated metal pans so pads do not hang unsupported.

3.4 CLEANING

A. Clean exposed surfaces of linear metal ceilings, including trim and edge moldings, after removing strippable, temporary protective covering if any. Comply with manufacturer's written instructions for stripping of temporary protective covering, cleaning, and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

END OF SECTION

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Thermoplastic-rubber base.
   2. Rubber molding accessories.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size samples, but not less than 12 inches long.

C. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials[, from the same product run,] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 degrees F or more than 90 degrees F.

1.5 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 degrees F or more than 95 degrees F, in spaces to receive resilient products during the following periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 degrees F or more than 95 degrees F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE RB1

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. As indicated on Interior Material Legend in Drawings..
B. Product Standard: ASTM F1861, Type TP (rubber, thermoplastic).
   1. Group: II (layered).
   2. Style and Location:
      a. Style B, Cove: Provide in areas indicated on Drawings.
C. Thickness: 0.125-inch.
D. Height: 4 inches.
E. Lengths: Coils in manufacturer's standard length.
F. Outside Corners: Job formed.
G. Inside Corners: Job formed.
H. Colors: As indicated on Interior Material Legend in Drawings.

2.2 RUBBER MOLDING ACCESSORY RACC1

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Roppe Corporation, USA.
B. Description: As required per drawing conditions.
C. Profile and Dimensions: As required for transition to dissimilar materials.
D. Locations: Provide rubber molding accessories in areas indicated on Drawings.
E. Colors and Patterns: As indicated on Interior Material Legend in Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
B. Proceed with installation only after unsatisfactory conditions have been corrected.
   1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
   1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.
B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
E. Do not stretch resilient base during installation.
F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
G. Job-Formed Corners:
   1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 5 inches in length.
      a. Form without producing discoloration (whitening) at bends.
   2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 5 inches in length.
      a. Miter or cope corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.
B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
B. Perform the following operations immediately after completing resilient-product installation:
   1. Remove adhesive and other blemishes from surfaces.
C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION

SECTION 09 66 16 - TERRAZZO FLOOR TILE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Terrazzo floor tile covering and accessories.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Division 03 - Concrete (subfloors).
   3. Section 07 - Thermal and Moisture Protection.

1.2 REFERENCE STANDARDS

A. ASTM International:
   1. ASTM C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
   2. ASTM D2240 - Standard Test Method for Durometer Hardness.
   3. ASTM E648 - Standard Test Method for Critical Radiant Flux of Flooring Systems Using a Radiant Energy Source.
   4. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
   5. ASTM F925 - Standard Test Method for Resistance to Chemicals of Resilient Flooring.
   6. ASTM F970 - Standard Test Method for Static Load Limit.
   7. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
   8. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes.
B. Other Referenced Documents:
   1. National Fire Protection Association (NFPA) 253: Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source.
   2. LEED-NC, version 3.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Install floor covering after finishing operations, including painting and ceiling operations, have been completed.
B. Pre-installation Meetings: Meet to confirm Project requirements, substrate conditions, manufacturer’s installation instructions and warranty requirements in compliance with Division 01 requirements.
C. Sequencing: Do not install floor covering over concrete substrates until substrates have cured and are dry to bond with adhesive as determined using test methods specified in ASTM F710 and following adhesive manufacturer’s instructions.

1.4 ACTION SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Section 01 01 33 00 “Submittal Procedures.”
B. Product Data: For specified products, submit latest edition of product supplier’s technical specifications data.
C. Samples: Submit selection and verification samples showing the required style and color for flooring as well as cove or sanitary base, stair treads and wall protection units

1.5 INFORMATION SUBMITTALS

A. Test and Evaluation Reports:
   1. Product test reports: As required by Conditions of the Contract and Section 01 60 00 “Product Requirements,” submit test certificates from an independent test laboratory showing compliance with specified performance characteristics and physical properties.
   2. Compatibility and adhesion test reports: Submit test reports confirming adhesive’s effectiveness with the product(s) specified.
B. Manufacturer Instructions: For specified products, submit latest editions of product supplier’s installation, cleaning, and maintenance instructions.

1.6 CLOSEOUT SUBMITTALS

A. Warranty documentation: For specified products and accessories, submit product supplier’s warranty documents.

1.7 QUALITY ASSURANCE

A. Installer: To be qualified to install the material, installer shall fulfill 1 of the following requirements:
   1. Installing company shall utilize installers that are certified on the applicable Floorazzo installation process (Butt or Fusion Technique) by the supplier. Installers must be able to provide valid Certification documentation at the time of installation start.
   2. Installer shall hire the manufacturer’s representative to provide a minimum of 2 days of training and onsite supervision. Training shall be conducted prior to the start of the installation. Installing company shall provide installers ample time to participate in the training and certification process. This shall be included in the price of the installation from the Flooring Contractor.
B. Testing Agency: Agency shall be independent and qualified to perform concrete substrate moisture and humidity testing according to ASTM F710 prior to the flooring being installed.

C. Preconstruction Testing:
1. Concrete substrate: Reference Standard ASTM F710 for more detail. To partially summarize here, regardless of its age or grade level or history of use, perform the following concrete tests:
a. Concrete Moisture Test: Perform moisture tests (ASTM F1869 and ASTM F2170) on concrete with a minimum of three tests for the first 1,000 square feet and one additional test for each 1,000 square feet or fraction thereof. A diagram of the area showing the location and results of each test shall be dated and submitted to the Architect, General Contractor, and/or Owner. If test results exceed the floor covering manufacturer's limits, installation shall not commence until results conform to limits.
b. If test results on installations exceed the following limits, installation shall not commence until results conform to limits:

	Mapei Ultrabond ECO 373 OR ECO MS4 Adhesive
ASTM F1869	8 lbs/1,000 ft²/24 hrs
ASTM F2170	90% relative humidity

D. Concrete pH Test: Perform pH tests on concrete. Do not install when the pH is greater than or equal to 12. Readings below 7.0 and above 10.0 can adversely affect resilient flooring or adhesives, or both.

1.8 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Section 01 60 00 "Product Requirements."
B. Delivery and Acceptance Requirements: Comply with the product supplier's ordering and lead time requirements to avoid construction delays, and to allow material to acclimatize as required in the specified product's installation instructions. Accept delivery of materials only if they are in unopened, undamaged packaging that bears the name and brand of the manufacturer/product supplier, project identification, and shipping and handling instructions.
C. Storage and Handling Requirements: Upon receiving floor covering, immediately remove from pallet and lay on a flat surface. Store material, including underlayment panels, patching or underlayment compound, floor covering material and adhesive, in the original packaging (as delivered) in areas that are enclosed and weather tight with the permanent HVAC system set at a temperature of between 65 degrees F and 80 degrees F for a minimum of 48 hours prior to commencement of installation. In addition, comply with storage and handling requirements listed on product packaging, and described in the latest edition of the product's installation instructions.

1.9 AMBIENT SITE CONDITIONS

A. The permanent HVAC system shall be operational and set at a temperature of between 65 degrees F and 80 degrees F for a minimum of 48 hours prior to commencement of installation, during the time of installation, and for 48 hours after installation has been completed.
B. Minimum temperature shall be 55 degrees F. Refer to the latest version of the installation instructions for additional ambient requirements (humidity, completion of related Work or substrates, etc.) under which the Work must be performed in order for the Work results to provide the specified quality.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Supplier: Floorazzo Tile, LLC, 1217 Harold Andrews Road, Siler City, North Carolina 27344, Ph: 919.663.1684, www.floorazzo.com.
B. Product shall be Precast Terrazzo Tile product made with Polyester Resins for flexibility of installation. Products made from Epoxy Resins or Cementitious Materials shall not be allowed. Product must be designed for installation with resilient adhesive; thin-set and grouting is not allowed.
C. Obtain all materials including tile, adhesive, fusion, etc. from single manufacturer.
D. Product Installation Type:
    1. Butt install method: 2- by 2-foot terrazzo tile shall be installed in Butt Tile fashion, where tiles are laid next to each other without grout line.
E. Substitutions: Substitutions permitted where products are determined to be equal.
F. Product Options:
    1. Floorazzo Tiles, Custom:
        a. Size: 24 by 24 inches or 24 by 48 inches.
        b. Weight: 2.15 lb/ft^2.
        c. Gauge: 3/16-inch.
        d. Edges: Straight
        e. Install: Butt.
        f. Colors: Custom selection to match existing.
G. Performance: Physical properties of Floorazzo Tiles shall conform to the following minimums:
    1. Safety:
        a. Critical radiant flux ASTM E648: Class 1.
        b. Smoke density ASTM E662: Pass.
        c. Slip Resistance ASTM C1028: Wet: 0.7; Dry: 0.66.
    2. Durability:
        a. Static load limit ASTM F970: 1,000 psi.
        b. Chemical resistance ASTM F925: No change.
    3. LEED-NC v.2.2:
        a. MR Credit 4 Recycled content 18 percent pre-consumer recycled content.
            1) Gem (Glass): 18 percent post-consumer recycled content.
            2) Marbled: 18 percent pre-consumer recycled content.
        b. IEQ Credit 4.1: Low-emitting adhesives:
            1) Mapei Ultrabond ECO 373 Adhesive has a low VOC Content.
        c. IEQ Credit 4.2: Low-emitting sealers:
            1) Diversey Plaza Plus Sealer/Finish or equal.
        d. IEQ Credit 4.3: Low-emitting flooring:
            1) Floorazzo is manufactured with a mineral base.

2.2 ACCESSORY PRODUCTS

A. Cove Base: 4- or 6-inch cove base in matching color.
B. Divider Strips: Consult factory.
C. Sanitary Cove: Architect shall specify use of standard or sanitary cove as required by application.
D. Stair Tread: Stair tread shall be same material and color as specified for tiles.
E. Wall Protection: Wall Tiles shall be made of the same material and thickness as the floor tile material.
F. Adhesive: Architect to specify adhesive and trowel notch size per the latest edition of the installation instructions.
G. Sealer: Architect shall specify per the latest edition of the installation instructions.
H. Cleaning Products: Architect can specify per the latest edition of the maintenance instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Overall: Follow guidelines laid out in Section 01 40 00 “Quality Requirements.”
B. Verification of Conditions: Inspect all substrates and subfloors for proper tolerances and dryness and report any discrepancies to the General Contractor in writing.
C. Pre-installation Testing: Verify that concrete testing per ASTM F710 has been conducted by an independent testing agency, and that results are within the adhesive and floor covering manufacturers’ requirements.
D. Proper storage and acclimation of product according to manufacturer’s procedures

3.2 SURFACE PREPARATION

A. Follow guidelines laid out in Section 01 40 00 “Quality Requirements.”
B. Prepare concrete substrates per ASTM F710. All work required to put the concrete subfloor in acceptable condition shall be the responsibility of the General Contractor.
C. Close adherence to the manufacturer requirements for floor levelness and preparation.

3.3 INSTALLATION

A. Follow Division 01 relevant guidelines, and the latest edition of the manufacturer’s installation instructions. Only use written instructions from the manufacturer.
B. Interface with Other Work: If transitions are required to and/or from the specified floor covering, contact the supplier for suitable transition material.

3.4 FIELD QUALITY CONTROL

A. Manufacturer Services: Coordinate with supplier if an on-site manufacturer’s representative is required. Installers without prior experience must have manufacturer’s representative on site for training and oversight as required by the manufacturer.

3.5 CLEANING

A. General: Clean up job site, including sweeping or dust mopping the floor to remove all dirt or grit, and put all waste in General Contractor's dumpster. Follow overall cleaning guidelines described manufacturer's written instructions and documentation.
B. Initial Maintenance: Installer is responsible and must conduct the initial penetrating floor sealer and surface treatment. It must be conducted immediately after installation.
C. Initial maintenance shall be per the latest edition of the manufacturer's maintenance instructions.

3.6 CLOSEOUT ACTIVITIES

A. Follow stated requirements and Section 01 70 00 "Execution and Closeout Requirements," for protecting installed construction.

END OF SECTION

SECTION 09 66 23 - RESINOUS MATRIX TERRAZZO FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Thin-set, epoxy-resin terrazzo flooring.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to terrazzo including, but not limited to, the following:
      a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
      b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
      c. Review special terrazzo designs and patterns.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Sustainable Design Submittals:
   1. Product Data: For adhesives, indicating VOC content.
C. Shop Drawings: Include terrazzo installation requirements. Include plans, sections, component details, and relationship to other work. Show layout of the following:
   1. Divider strips.
   2. Control-joint strips.
   3. Accessory strips.
   4. Abrasive strips.
   5. Stair treads, risers, and landings.
   6. Precast terrazzo jointing and edge configurations.
   7. Terrazzo patterns.
D. Samples for Verification: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify manufacturer's matrix color and aggregate types, sizes, and proportions. Prepare samples of same thickness and from same material to be used for the Work, in sizes indicated below:
   1. Terrazzo: 6-inch-square samples.
   2. Accessories: 6-inch-long samples of each exposed strip item required.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installer.
B. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For terrazzo to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Installers must be pre-qualified prior to selection for work by Owner and Architect.
   2. Provide 3 references and projects of similar size and complexity for review and approval.
   3. Engage an installer who is a contractor member of NTMA.
   4. Engage an installer who is certified in writing by terrazzo manufacturer as qualified to install manufacturer's products.
B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
   1. Build mockups for terrazzo including accessories.
      a. Size: Minimum 100 sq. ft. of typical poured-in-place flooring[and base] condition for each color and pattern in locations directed by Architect.
      b. Include base first three stair treads and stringer.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number if any.
B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.
B. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.
C. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.
D. Control and collect water and dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain primary terrazzo materials from single source from single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.
B. Source Limitations for Aggregates: Obtain each color, grade, type, and variety of granular materials from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

A. NTMA Standards: Comply with NTMA's written recommendations for terrazzo type indicated unless more stringent requirements are specified.

2.3 EPOXY-RESIN TERRAZZO

A. Epoxy-Resin Terrazzo TER1: Comply with manufacturer's written instructions for matrix and aggregate proportions and mixing. Comply with "Terrazzo Specifications and Design Guide" and written intstructions for matrix and aggregate proportions and mixing.
    1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
        a. Terrazzo & Marble Supply Companies.
        b. Terroxy Resin Systems.
B. Mix Color and Pattern: As selected by Architect from manufacturer's full range. Match existing.
C. Thickness: 3/8-inch.
D. Materials:
    1. Moisture-Vapor-Emission-Control Membrane: Two-component, high-solids, high-density, low-odor, epoxy-based membrane-forming product produced by epoxy terrazzo manufacturer that reduces moisture emission from concrete substrate to not more than 3 lb of water/1,000 sq. ft. in 24 hours.
    2. Substrate-Crack-Suppression Membrane: Product of terrazzo-resin manufacturer, having minimum 120 percent elongation potential according to ASTM D412.
        a. Reinforcement: Fiberglass scrim.
    3. Primer: Manufacturer's product recommended for substrate and use indicated.
    4. Epoxy-Resin Matrix: and in color required for mix indicated.
        a. Physical Properties without Aggregates:
            1) Hardness: 60 to 85 per ASTM D2240, Shore D.
            2) Minimum Tensile Strength: 3,000 psi per ASTM D638 for a 2-inch specimen made using a "C" die per ASTM D412.
            3) Minimum Compressive Strength: 10,000 psi per ASTM D695, Specimen B cylinder.

4) Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D1308.
   a) Distilled water.
   b) Mineral water.
   c) Isopropanol.
   d) Ethanol.
   e) 0.025 percent detergent solution.
   f) 1.0 percent soap solution.
   g) 5 percent acetic acid.
   h) 10 percent sodium hydroxide.
   i) 10 percent hydrochloric acid.
   j) 30 percent sulfuric acid.

b. Physical Properties with Aggregates: For terrazzo blended according to manufacturer's recommendations with one part epoxy resin with three parts marble aggregate consisting of 60 percent No. 1 chips and 40 percent No. 0 chips that is ground and grouted to a 1/4-inch nominal thickness, and cured for 7 days at 75 degrees F plus or minus 2 degrees F and at 50 percent plus or minus 2 percent relative humidity.
   1) Flammability: Self-extinguishing, maximum extent of burning 1/4-inch according to ASTM D635.
   2) Thermal Coefficient of Linear Expansion: 0.0025-inch per degrees F according to ASTM C531.

5. Aggregates: Comply with NTMA gradation standards for mix indicated and contain no deleterious or foreign matter.
   a. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C131.
   b. 24-Hour Absorption Rate: Less than 0.75 percent.
   c. Dust Content: Less than 1.0 percent by weight.
6. Finishing Grout: Resin based.

2.4 PRECAST EPOXY-RESIN TERRAZZO

A. Precast Terrazzo Base : Minimum 3/8-inch thick, epoxy terrazzo units cast in maximum lengths possible, but not less than 36 inches. Comply with manufacturer's written instructions for fabricating precast terrazzo base units in sizes and profiles indicated.
   1. Type: As indicated Coved with minimum 3/4-inch radius.
   2. Top Edge: Straight, to match existing.
   3. Outside Corner Units: With finished returned edges at outside corner.
   4. Color, Pattern, and Finish: Match adjacent poured-in-place terrazzo flooring.

2.5 STRIP MATERIALS

A. Thin-Set Divider Strips: L-type angle in depth required for topping thickness indicated.
   1. Material: Match existing.
   2. Top Width: Match existing.

B. Heavy-Top Divider Strips: L-type angle in depth required for topping thickness indicated.
   1. Bottom-Section Material: Matching top-section material.
   2. Top-Section Material: Match existing.
   3. Top-Section Width: Match existing.

C. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material and color of divider strips and in depth required for topping thickness indicated.

D. Accessory Strips: Match divider-strip width, material, and color unless otherwise indicated. Use the following types of accessory strips as required to provide a complete installation:
   1. Base-bead strips for exposed top edge of terrazzo base.
   2. Edge-bead strips for exposed edges of terrazzo.
   3. Nosings for terrazzo stair treads and landings.

E. Abrasive Strips: Three-line abrasive inserts at nosings. Silicon carbide or aluminum oxide, or combination of both, in epoxy-resin binder and set in channel.
   1. Width: 1/2-inch.
   2. Depth: As required by terrazzo thickness.
   3. Length: 4 inches less than stair width.
   4. Color: As selected by Architect from full range of industry colors.

2.6 MISCELLANEOUS ACCESSORIES

A. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use.
   1. Adhesives shall have a VOC content of 70 g/L or less.

B. Anchoring Devices:
   1. Strips: Provide mechanical anchoring devices or adhesives for strip materials as recommended by manufacturer and as required for secure attachment to substrate.

C. Patching and Fill Material: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.

D. Joint Compound: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.

E. Resinous Matrix Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.

F. Sealer: Slip- and stain-resistant, penetrating-type sealer that is chemically neutral; does not affect terrazzo color or physical properties; and is recommended by sealer manufacturer. Water based:
   1. Surface Friction: Not less than 0.6 according to ASTM D2047.
   2. Acid-Base Properties: With pH factor between 7 and 10.
   3. Sealers shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and areas, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.2 PREPARATION

A. Clean substrates of substances, including oil, grease, and curing compounds, that might impair terrazzo bond. Provide clean, dry, and neutral substrate for terrazzo application.

B. Concrete Slabs:
   1. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with terrazzo.
      a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
      b. Repair damaged and deteriorated concrete according to terrazzo manufacturer's written instructions.
      c. Use patching and fill material to fill holes and depressions in substrates according to terrazzo manufacturer's written instructions.

C. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

D. Preinstallation Moisture Testing:
   1. Moisture Testing: Test for moisture content by method recommended in writing by terrazzo manufacturer.
   2. Proceed with terrazzo installation only after concrete substrates pass moisture testing.

E. Substrate-Crack-Suppression Membrane: Install to isolate and suppress substrate cracks according to manufacturer's written instructions.
   1. Prepare and prefill substrate cracks with membrane material.
   2. Install membrane at substrate cracks to produce full substrate coverage in areas to receive terrazzo.
   3. Reinforce membrane with fiberglass scrim.

F. Protect other work from water and dust generated by grinding operations. Control water and dust to comply with environmental protection regulations.
   1. Erect and maintain temporary enclosures and other suitable methods to limit water damage and dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

3.3 EPOXY-RESIN TERRAZZO INSTALLATION

A. Comply with NTMA's written recommendations for terrazzo and accessory installation.

B. Strip Materials:
   1. Divider and Control-Joint Strips:
      a. Locate divider strips in locations indicated.
      b. Install control-joint strips back to back and directly above concrete-slab control joints.
      c. Install control-joint strips with 1/4-inch gap between strips, and install sealant in gap.
      d. Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.
   2. Accessory Strips: Install as required to provide a complete installation.
   3. Abrasive Strips: Install with surface of abrasive strip positioned 1/16-inch higher than terrazzo surface.

C. Apply primer to terrazzo substrates according to manufacturer's written instructions.
D. Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer's written instructions.
   1. Installed Thickness: 3/8-inch nominal.
   2. Terrazzo Finishing: Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
      a. Rough Grinding: Grind with 24-grit or finer stones or with comparable diamond abrasives. Follow initial grind with 60/80-grit stones or with comparable diamond abrasives.
      b. Grouting: Before grouting, clean terrazzo with water, rinse, and allow to dry. Apply and cure epoxy grout.
      c. Fine Grinding/Polishing: Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted. Grind with 80-grit stones or with comparable diamond abrasives until grout is removed from surface.
   3. Installation Tolerance: Limit variation in terrazzo surface from level to 1/4-inch in 10 feet; noncumulative.
E. Install and finish poured-in-place terrazzo stairs at the same time the adjacent terrazzo flooring is installed.
F. Install and finish poured-in-place terrazzo base at the same time the adjacent terrazzo flooring is installed.

3.4 REPAIR

A. Cut out and replace terrazzo areas that evidence lack of bond with substrate. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by Architect.

3.5 CLEANING AND PROTECTION

A. Cleaning:
   1. Remove grinding dust from installation and adjacent areas.
   2. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow them to dry thoroughly.
B. Sealing:
   1. Seal surfaces according to NTMA's written recommendations.
   2. Apply sealer according to sealer manufacturer's written instructions.
C. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 09 67 26 – RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Labor, products, equipment and services necessary for resinous flooring Work in accordance with the Contract Drawings covering the following components:
      a. Primer: Sikafloor® 161.
      b. 1st Body Coat: Sikafloor® 217 W/ Broadcast Decorative Quartz to Rejection.
      c. 2nd Body Coat: Sikafloor® 217 W/ Broadcast Decorative Quartz to Rejection.
      d. 1st Grout Coat: Sikafloor® 217.
      e. Top Coat: Sikafloor® 315N.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Seciton.
   2. Section 03 30 00 “Cast-in-Place Concrete.”

1.2 REFERENCES

A. ASTM C579, Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
B. ASTM D2240, Standard Test Method for Rubber Property—Durometer Hardness.
C. ASTM D2369, Standard Test Method for Volatile Content of Coatings.
D. ASTM D4060, Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
E. ASTM D4541, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
F. For additional standards please refer to Product Data Sheets

1.3 SUBMITTALS

A. Comply with Section 01 33 00 “Submittal Procedures.”
B. Product Data: Submit manufacturer's product data, including physical properties and colors available.
C. Manufacturer’s Safety Data Sheet for each product being used.
D. Product Samples: Submit srchitectural standard samples representative of the final finish, as applied. The standard shall be approved in writing by the Architect and shall be the final standard of acceptance of the finish.
E. Maintenance Instructions: Submit manufacturer's maintenance instructions.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Acceptable Manufacturer: Sika Corporation, 201 Polito Drive, Lyndhurst, New Jersey 07071, Ryan Manchester, MANCHESTER, 214.914.5564.
      a. No request for substitution shall be considered that would change the generic type of system specified. Equivalent materials of other manufacturers may be substituted only on approval of the Architect. Requests for substitution will be considered only if submitted 10 days prior to Bid date. Requests shall include the respective manufacturer’s technical literature for each product giving the name, generic type, descriptive information, recommended dry film thickness (DFT), Material Safety Data Sheet (MSDS), and certified test reports showing results to equal performance criteria of products specified herein.

B. Applicator Qualifications:
   1. Pre-Qualification: Each Bidder for this project shall be pre-qualified and approved in writing by the material manufacturer. Ryan Manchester, MANCHESTER, 214.914.5564.
   2. Applicator Experience: Each bidder must have a minimum 5 years’ experience in the application of the type of system specified. Contractor shall submit a list of 5 projects of similar size, scope and complexity.

C. Mock-Up:
   1. Construct one 100 sq.ft. mock-up of each type and color of resinous flooring in location acceptable to Architect to demonstrate quality of finished system, complying with manufacturer's instructions.
   2. Arrange for Architect’s review and acceptance, obtain written acceptance before proceeding with Work.
   3. Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the Work of this Section. Mock-up shall be left in place for the duration of the Work.

D. Pre-application Meeting: Convene a pre-application meeting 2 weeks before start of application of floor coating. Require attendance of parties directly affecting Work of this Section, including Contractor, Architect, applicator, and manufacturer's representative. Review surface preparation, priming, application, curing, protection, and coordination with other Work.

1.5 DELIVERY, STORAGE AND HANDLING

A. Delivery:
   1. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name, manufacturer, batch or lot number, and date of manufacture.
   2. Material should be delivered to job site and checked for completeness and shipping damage prior to job start.

B. Storage:
   1. Store materials in accordance with manufacturer's written instructions.
   2. Keep containers sealed until ready for use. Material should be stored in a dry, enclosed, protected area from the elements.
   3. Do not subject material to excessive heat or freezing.
   4. Shelf life: Established based on manufacturer's written recommendation for each material being used.

C. Handling: Protect materials during handling and application to prevent damage or contamination.

D. Condition materials for use accordingly to manufacturer's written instructions prior to application.

E. Record material lot number and quantity delivered to jobsite/storage.

1.6 SITE CONDITIONS

A. Do not install the Work of this Section outside of the following environmental ranges with Manufacturers' written acceptance:
   1. Material Temperature: Precondition material for at least 24 hours between 65 degrees F to 75 degrees F.
   2. Ambient Temperature: Minimum 50 degrees F to Maximum 85 degrees F.
   3. Substrate Temperature: Minimum 50 degrees F to Maximum 85 degrees F. Substrate temperature must be at least 5 degrees F above measured dew Point.
   4. Mixing and Application attempted at Material, Ambient and/or Substrate Temperature conditions less than 65 degrees F will result in a decrease in product workability and slower cure rates.
   5. Relative Ambient Humidity: Minimum ambient humidity 30 percent, maximum ambient humidity 75 percent (during application and curing).
   6. Measure and confirm substrate moisture content, ambient relative humidity, ambient and surface temperature, and dew point.

B. Substrate moisture:
   1. Moisture content of concrete substrate must be less than or equal to 4 percent by mass as measured with a Tramex® CME/CMExpert type concrete moisture meter.
   2. Additionally, relative humidity tests may be conducted per ASTM F2170 and values must be less than or equal to 85 percent.
   3. If moisture content of concrete substrate is greater than 4 percent by mass as measured with Tramex® CME/CMExpert type and/or if relative humidity tests per ASTM F2170 exceed values greater than 85 percent, consider moisture mitigation systems or moisture tolerant primer.

C. Utilities, including electric, water, HVAC and permanent lighting to be supplied by General Contractor

D. Maintain constant ambient room temperature of plus or minus 15 degrees F with a minimum temperature of 50 degrees F and maximum temperature of 85 degrees F. Maintain constant ambient room temperature for 48 hours before, during and after installation, or until cured. Do not apply while ambient and temperatures are rising.

E. Erect suitable barriers and post legible signs at points of entry to prevent traffic and trades from entering the work area during application and cure period of the floor.

F. Protection of finished floor from damage by subsequent trades shall be the responsibility of the General Contractor.

G. Insure adequate ventilation and air flow.

1.7 WARRANTY

A. Manufacturer's warranty covering the resinous flooring against defects in materials for one year from date of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Manufacturer shall be certified under ISO 9001: 2008 All liquid materials, including primers, resins, curing agents, finish coats, and sealants are manufactured and tested under an ISO 9001:2008 registered quality system.
B. Approved Manufacturer shall be Sika Corporation, Industrial Flooring, 201 Polito Avenue, Lyndhurst, New Jersey 07071, 214.914-5564 Attn: Ryan Manchester.

2.2 SYSTEM

A. Resinous flooring system: Sikafloor Quartzite Broadcast System is a seamless, aesthetic, broadcast and sealed epoxy floor, composed of multicolored quartz aggregates finished with transparent top coats applied between 56 to 125 mils thick. System to consist of the following components:
   1. Primer: Sikafloor® 161 applied between 8 to 10 mils.
   2. 1st Body Coat: Sikafloor® 217 W/ Broadcast Decorative Quartz to Rejection applied at 16 mils.
   3. 2nd Body Coat: Sikafloor® 217 W/ Broadcast Decorative Quartz to Rejection applied at 16 mils.
   4. Top Coat: Sikafloor® 217 applied at 16 mils.
   5. Optional Top Coat: Sikafloor® 315N applied between 3 to 3.5 mils.

2.3 MATERIALS

A. Primer: Sikafloor 161 is a 2-part, epoxy resin for priming and leveling mortars with the following properties:
   1. Pull-off Strength (ASTM D4541): > 400 psi with 100 percent concrete failure.
   2. Shore D Hardness (ASTM D2240): 76 at 7 days.
   3. Solid Content: ~ 100 percent (by volume) / ~ 100 percent (by weight).
   4. VOC Content (ASTM D2369): ≤ 50 g/L.
   5. Permeability (ASTM E96): 9.0 g/m² (24 hours / +75 degrees F).
   6. Water Absorption (ASTM D570): 0.14 g/h - m2.
   7. Viscosity (approximately) of Components A + B: 775 (SP2/100).
B. Body Coats and Top Coat: Sikafloor 217 is a low odor, 100 pecent solids, epoxy resin coating system primarily designed for high build coatings and decorative quartz and flake applications. Sikafloor 217 may be used as a primer and may be in [clear] or [Refer to Sikafloor color chart color] color with the following properties:
   1. Pull-off Strength (ASTM D4541): > 400 psi with 100 percent concrete failure.
   2. Shore D Hardness (ASTM D2240): 78 to 82 at 7 days.

3. Solid Content: ~ 100 percent (by volume) / ~ 100 percent (by weight).
4. VOC Content (ASTM D2369): ≤ 50 g/L.
5. Compressive Strength (ASTM C579): 7,250 psi at 28 days.
6. Flexural Strength (ASTM C580): 2,900 psi at 28 days.

C. Broadcast Aggregate: Decorative Quartz aggregate.

D. Optional Top Coat: Sikafloor 315N is a high solids, low VOC abrasion resistant, aliphatic polyurethane coating in [Refer to Sikafloor color chart] color with the following properties:
1. Pull-off Strength to Primed Concrete (ASTM D4541): > 400 psi with 100 percent concrete failure.
2. Hardness (ASTM D3363 Pencil): 2H to 3H concrete failure.
3. VOC Content (ASTM D2369): With Wear Aggregate ≤ 100 g/L, With Sikafloor Urethane Color Add Only ≤ 50 g/L.
4. Tensile Strength (ASTM D2370): 2,882 psi.
5. Elongation: 2.29.
6. Abrasion Resistance (ASTM D4060): 0.01 to 0.02 grams (CS-17 Wheel, 1,000 gm load, 1,000 cycles).
7. Coefficient Of Friction (ASTM D2047): 0.6 to 0.7.
8. Slip Resistance: Equivalent to ASTM D2047 Passes.

E. Cove base: 293 Epoxy mortar cove based.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive flooring system. Notify Architect/General Contractor/Owner/Owner's representative if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected. Do not apply to substrate treatments for moisture, repair, or leveling not of the same Manufacturer.

B. Surface must be clean, sound and dry. Remove dust, laitance, grease, curing compounds bond inhibiting impregnations, waxes and any other contaminants. All projections, rough spots, etc., should be dressed off to achieve a level surface prior to the application.

C. Concrete substrate to have a minimum compressive strength of 3,500 psi at 28 days and a minimum of 215 psi in tension at time of application.

D. Substrate moisture:
1. Measure and confirm substrate moisture content, ambient relative humidity, ambient and surface temperature, and dew point.
2. Confirm and record above values at least once every 3 hours during installation, or more frequently whenever conditions change (e.g. Ambient Temperature rise/fall, Relative Humidity increase/decrease, etc.).

E. Ensure concrete substrate conforms to the minimum requirements of the flooring manufacturer.

F. Flooring system shall not be applied to sand-cement setting beds. Sand-cement beds shall be removed to structural concrete substrate and re-leveled/sloped as necessary to achieve grade and/or adequate drainage.

G. Flooring system shall not be applied to asphaltic or bitumen membranes, soft wood, aluminum, copper or fiberglass reinforced polyester/vinyl ester composites.

H. Application to glazed or vitrified brick and tile, structural wood, steel shall only be permitted with Manufacturer's written recommendation.

3.2 SURFACE PREPARATION

A. Prepare surface to receive flooring systems in accordance with manufacturer's written instructions.
B. Remove dirt, oil, grease, wax, laitance, curing compounds, water-soluble concrete hardeners, and other surface contaminants. Remove sealers, finishes, and paints. Remove unsound concrete by appropriate mechanical means.
C. Concrete: Shall be cleaned and prepared to achieve laitance-free and contaminant-free, open textured surface by shot blasting or equivalent mechanical means (CSP level as per ICRI guidelines and manufacturer’s written recommendation).
D. Chemical Surface Preparation: Chemical surface preparation (acid etching) is unacceptable and will void Manufacturer’s warranty.
E. Control joints and cracks: Provide repair and treatment of control joints and surface cracks utilizing manufacturer’s standard materials and installation details.

3.3 APPLICATION

A. Mix and apply material with strict adherence to manufacturer’s written installation procedures and coverage rates.
B. Follow Manufacturer’s written recommendations on terminations and connections to walls, drains, doorways, columns and floor-to-floor transitions.
C. Do not apply while ambient and substrate temperatures are rising.
D. Apply resinous flooring with care to ensure that no laps, voids, or other marks or irregularities are visible, and with an appearance of uniform color, sheen and texture, all within limitations of materials and areas concerned.
E. Match colors and textures of approved samples.
F. Install cove base [ ] high with [ ] radius in accordance with manufacturer’s written instructions.

3.4 CLEAN UP

A. Disposal of this product, solution and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.
B. Empty containers should be taken to an approved waste handling site for recycling or disposal.

3.5 PROTECTION

A. Freshly applied material should be protected from dampness, condensation and water for at least 72 hours.
B. Beware of air flow and changes in air flow. Introduction of dust, debris, and particles, etc., may result in surface imperfections and other defects.
C. Follow manufacturer’s written recommendation with respect to cure, wait time and return to service.

END OF SECTION

SECTION 09 68 13 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Carpet tile.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 09 65 13 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
   2. Include manufacturer's written installation recommendations for each type of substrate.
B. Shop Drawings: For carpet tile installation, showing the following:
   1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
   2. Carpet tile type, color, and dye lot.
   3. Type of subfloor.
   4. Type of installation.
   5. Pattern of installation.
   6. Pattern type, location, and direction.
   7. Pile direction.
   8. Type, color, and location of edge, transition, and other accessory strips.
   9. Transition details to other flooring materials.
C. Samples for Verification: Actual sample of finished products for each of the following products and for each color and texture required. Label each sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
   1. Carpet Tile: Full-size sample.
   2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long samples.
D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles. Include the following:
   1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
   2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish extra materials, from the same production run, to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Carpet Tile: Full-size units equal to 25 percent of amount installed for each type indicated, but no fewer than 10 full-size units.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.7 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.
B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended in writing by carpet tile manufacturer.

PART 2 - PRODUCTS

2.1 CARPET TILE CPT1

A. Manufacturers: Basis of Design and subject to compliance with requirements, provide products by the following:
   1. As indicated on Interior Material Legend in Drawings.
B. Color: As indicated on Interior Material Legend in Drawings..
C. Pattern: As indicated on Interior Material Legend in Drawings.
D. Construction: Textile Composite.
E. Dye Method: Solution Dyed.
F. Backing: Kinetex Felt Cushion.
G. Standard Adhesive : Kinetex Adhesive.
H. Total Recycled content: 47 percent.
I. Size: As indicated on Interior Material Legend in Drawings.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended in writing by carpet tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
B. Examine carpet tile for type, color, pattern, and potential defects.
C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 03 30 00 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
    1. Moisture Testing: Perform tests so that each test area does not exceed 500 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
        a. Perform moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates.
B. Use trowelable leveling and patching compounds, in accordance with manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8-inch wide or wider, and protrusions more than 1/32-inch unless more stringent requirements are required by manufacturer's written instructions.
C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.
B. Installation Method: As recommended in writing by carpet tile manufacturer and As indicated on Interior Material Legend in Drawings.
C. Maintain dye-lot integrity. Do not mix dye lots in same area.
D. Maintain pile-direction patterns indicated on Drawings.
E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
G. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:
   1. Remove excess adhesive and other surface blemishes using cleaner recommended in writing by carpet tile manufacturer.
   2. Remove yarns that protrude from carpet tile surface.
   3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 13.7.

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION

SECTION 09 77 00 - SPECIAL WALL SURFACES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pre-manufactured panel system including mounting hardware and specified accessories.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 06 10 00 "Rough Carpentry": Furring, blocking, and other carpentry work that is not exposed to view.
   3. Section 09 29 00 "Gypsum Board": Metal support systems not included in this section.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM) E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   1. Class 1/A - Flame Spread 0-25, Smoke Developed 450 or less.
   2. Class 2/B - Flame Spread 26-75, Smoke Developed 450 or less.

B. Architectural Woodwork Institute (AWI) Quality Standards.

1.3 SUBMITTALS

A. Submit under provisions of Section 01 30 00 "Submittal Procedures."

B. Product Data:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with adjacent Work.

D. Verification Samples: For each finish product specified, one set of color samples representing selections made on Drawings.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Firm experienced in successful production of wall systems similar to that indicated for the Project, with sufficient production capacity to produce required units without causing delay in the Work.
   2. Provide certificate signed by panel manufacturer certifying that products comply with specified requirements.

B. Installer Qualifications: Demonstrate successful experience in installing architectural woodwork similar in type and quality to those required for this Project.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver wall system until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate wall system have been completed in installation areas as specified by AWI 1700-G-3.
B. If panels are stored prior to installation, store them flat in completely enclosed areas, out of the weather. If panels must be stored in other than installation areas, store only in areas where environmental conditions comply with manufacturer's recommendations. Do not expose panels to continuous direct sunlight, nor to extremes in temperature and humidity. Store products in manufacturer's packaging until ready for installation.
C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.6 PROJECT CONDITIONS

A. Do not deliver or install wall system until building is enclosed, wet work is complete and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period as specified by AWI 1700-G-3.
B. Do not install wall system until normal lighting conditions exist. Normal lighting conditions are described as those in place when the project is finished. This includes, but not limited to, design lighting (wall washers, spotlights and flood lights, and similar fixtures) and natural lighting.
C. Wall, ceilings, floors, and openings must be level, plumb, straight, in-line and square as specified by AWI 1700-G-3.
D. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results, both during installation and subsequent occupancy. Do not install products under environmental conditions outside manufacturer's absolute limits. Panels shall be conditioned in the environment in which they will be installed for a minimum of 72 hours prior to installation. The recommended environment is 60 to 80 degrees F and 35 to 55 percent relative humidity.
E. Manufacturer warrants any product it has manufactured and sold against defects in materials or workmanship for a period of one year from the date of original purchase and acceptance for use. This warranty extends to products assembled / installed and used in the manner intended and does not cover damage or failure caused by misuse, abuse or accidents, exposure to extreme temperature, improper installation, improper maintenance and exposure to water or excessive humidity or excessive moisture.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: Panel Specialists, Inc.; 3115 Range Rd., Temple, Texas 76504. ASD. Toll Free Tel: 800.947.9422. Tel: 254.774.9800. Fax: 254.598.3222. Email: psiwalls@panelspec.com. Web: http://www.panelspec.com.
B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 "Product Requirements."

2.2 PANEL SYSTEMS

A. Provide prefinished decorative panels where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
B. Comply with applicable requirements of "Architectural Woodwork Quality Standards" in the production and installation of the wall panel system as published by the Architectural Woodwork Institute (AWl) unless otherwise indicated.
C. Panel System: #310/312 as manufactured by Panel Specialists, Inc.
    1. Panel Thickness: 7/16-inch.
    2. System to provide a 1/2-inch-wide recessed reveal between panels and system to provide a 1/16-inch reveal between panels
        a. Reference Interior Elevations for placement.
    3. Panel Edge Finish: Panel edges to be finished with 0.018-inch PVC edge banding.
    4. Panel Finish: Refer to Interior Material Legend in Drawings.
    5. Main Laminated Panel Fire Rating:
        a. Fire Rating: ASTM E84, Class B.
    6. Molding: All moldings to be 0.062-inch-thick (at structural areas) 6063 alloy aluminum with T5 temper.
        a. Divider Moldings:
            1) #312 1/2-inch-wide horizontal recessed channel divider molding.
            2) #302a 1/16-inch-wide Vertical Divider Molding.
        b. 1/2-Inch-Wide Edge Trims and 1-Inch Corners:
            1) #304 1/2-inch edge trim molding.
            2) #304A 1/2-inch edge trim molding (2-piece).
            3) #103-90 1-inch rounded 90-degree outside corner.
            4) #304-90 end cap for top and bottom of 90-degree outside corner.
D. Finishes:
    1. Panel Face:
        a. Finish #1: Per Interior Material Legend in Drawings.
    2. Panel Face Pattern Direction:
        a. Vertical.
        b. Reference Interior Elevations.
        c. Reference Interior Elevations for grain direction.
    3. Panel Edge Banding: (select one or enter custom color choice)
        a. 0.5mm PVC Custom Color: Reference Interior Material Legend on Drawings.
    4. Aluminum Molding Finish: (select one or enter custom color choice)
        a. Clear Anodized.

2.3 MATERIALS

A. High Pressure Decorative Laminates (SWS1):
    1. High Pressure Laminate (VGS, VGF.) and non-decorative backers (BKV) used to surface wall panels systems shall be manufactured to meet or exceed the National Electrical Manufacturing Association (NEMA LD3-2005) for thickness, performance properties and appearance.

B. Phenolic Panels (SWS2):
   1. Panels to be durable 3/8-inch compact laminate panels formed from melamine resin saturated overlay and decorative papers bonded to a core of phenolic resin impregnated kraft papers to provide superior impact and moisture resistance.
   2. Fire Rating ASTM- E84 Class A.
C. Panel core to be industrial grade M2 particle board used in Class II (B) panel composition.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared according to AWI 1700-G-3.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 FIELD DIMENSIONS

A. Where wall system is indicated to be fitted to other constructions, check actual dimensions of other constructions by accurate field measurements before manufacturing wall system; show recorded measurements on final Shop Drawings. Coordinate manufacturing schedule with construction progress to avoid delay of Work.
B. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with manufacture of wall system without field measurements coordinate other construction to ensure that actual dimensions correspond to guaranteed dimensions.

3.3 PREPARATION

A. Panels must be acclimated to ambient temperature and humidity conditions in accordance with manufacturer's specifications prior to installation. Refer to PSI installation guide for proper, handling, storage, and acclimation procedures.
B. Clean surfaces thoroughly prior to installation.
C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the Project conditions.

3.4 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. When interior paneling is on an exterior wall or in a wet area, provide a barrier sheet of plastic film between the outside wall and the panels in order to prevent condensation affecting the stability of the panels.
C. Field cutting of all wall systems should be accomplished using carbide tools. All face penetrations and cutouts should have a minimal 1/8-inch radius in corners according to NEMA Standards Publication LD 3-2005.

D. All wall systems should receive an "S" bead of panel mastic on the back of the panel during installation.
E. For vertical applications, wall systems shall be mechanically fastened to horizontal metal furring strapping spaced 24 inches O.C. Furring straps shall be no less than 18-gauge 3-1/2 inches wide, continuously. Metal strapping to be installed to the drywall studs prior to the application of the gypsum board by the framing contractor.

3.5 PROTECTION

A. Protect installed products until completion of Project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Surface preparation and the application of paint systems on the following interior substrates:
      a. Steel.
      b. Cast iron.
      c. Galvanized metal.
      d. Aluminum (not anodized or otherwise coated).
      e. Gypsum board.
      f. Plaster.
   2. Fire and smoke assembly identification.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523, a matte flat finish.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523, a high-side sheen flat, velvet-like finish.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523, an eggshell finish.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523, a satin-like finish.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523, a semi-gloss finish.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523, a gloss finish.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. LEED Submittals:
   1. Product Data for Credit EQ 4.2: For paints and coatings, including printed statement of VOC content.
   2. Laboratory Test Reports for Credit EQ 4: For paints and coatings, documentation indicating that they meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
   1. Submit samples on rigid backing, 8 inches square.
   2. Step coats on samples to show each coat required for system.
   3. Label each coat of each sample.
   4. Label each sample for location and application area.

D. Product List: For each product indicated, include the following:
   1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
   2. VOC content.

1.4 CLOSEOUT SUBMITTALS

A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: 5 percent, but not less than 1 gallon of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
   b. Other Items: Architect will designate items or areas required.
   2. Final approval of color selections will be based on mockups.
      a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacturer's label with the following information:
   1. Product name and type (description).
   2. Batch date.

3. Color number.
4. VOC content.
5. Environmental handling requirements.
6. Surface preparation requirements.
7. Application instructions.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 degrees F.
1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 degrees F.
B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company products indicated or comparable product from one of the following:
1. PPG Architectural Finishes, Inc.
B. Source Limitations: Obtain paint materials from single source from single listed manufacturer.
1. Manufacturer's designations listed on a separate color schedule are for color reference only and do not indicate prior approval.

2.2 PAINT, GENERAL

A. Standards: Provide products that comply with Manufacture's Premium 1st Quality standards indicated and like VOC limits.
B. Material Compatibility:
1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction[and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24)].
1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.

5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers

E. Colors: As selected by Architect from manufacturer's full range and as indicated on Interior Material Legend in Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.
   1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

B. Substrate Conditions:
   1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
      a. Concrete: 12 percent.
      b. Masonry (Clay and CMU): 12 percent.
      c. Gypsum Board: 12 percent.
   2. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

C. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

G. Aluminum Substrates: Remove loose surface oxidation.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
   1. Paint the following work where exposed in equipment rooms:
      a. Equipment, including panelboards and switch gear.
      b. Uninsulated metal piping.
      c. Uninsulated plastic piping.
      d. Pipe hangers and supports.
      e. Metal conduit.
      f. Plastic conduit.
      g. Tanks that do not have factory-applied final finishes.
   2. Paint the following work where exposed in occupied spaces:
      a. Equipment, including panelboards.
      b. Uninsulated metal piping.
      c. Uninsulated plastic piping.

d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

F. Fire and Smoke Assembly Identification: Where assembly types are identified in Drawings, provide stenciled identification in accessible concealed spaces and where noted in Drawings.
1. Assembly Types Requiring Identification: Fire walls, fire barriers, fire partitions, smoke barriers, and smoke partitions.
2. Accessible concealed spaces include below accessible floors, above ceilings, and attic spaces.
3. Locate within 15 feet of partition ends and at intervals not exceeding 30 feet measured horizontally.
4. Lettering not less than 3 inches in height with a minimum 3/8-inch stroke in a contrasting color.
5. Wording: Include hour rating and assembly type followed by "protect all openings."

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Pedestrian Traffic Surfaces:
1. Clear Acrylic System, Gloss Finish:
a. First Coat: S-W H&C Concrete Sealer Wet Look Water Base, at 100 to 200 sq. ft. per gal.
b. Second Coat: S-W H&C Concrete Sealer Wet Look Water Base, at 100 to 200 sq. ft. per gal.

B. Metal Substrates (Aluminum, Steel, Galvanized Steel):
   1. Water-Based Light Industrial Coating System: (Hollow metal door and frames)
      a. Prime Coat: Primer, rust-inhibitive, water based: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.
      b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
      c. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5): S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

C. Metal Substrates (Stair railing, nosings, stringers-reference Drawings for locations):
   1. Two-component, high solids, polyester-aliphatic urethane coating over Epoxy Primer System.
      a. Prime coat: Primer, epoxy, anti-corrosive SW Macropoxy 646.
      b. Intermediate coat: Two-component, high-solids polyester aliphatic urethane coating, interior, matching topcoat.
      c. Topcoat: Two-component, high-solids, polyester-aliphatic urethane coating, semi-gloss.

D. Gypsum Board Substrates:
   1. Latex System:
      a. Prime Coat: Primer, latex, interior: S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.5 mils dry.
      b. Intermediate Coat: Latex, interior, matching topcoat.
      c. Topcoat: Latex, interior, eggshell (Gloss Level 3): S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
   2. Water-Based Light Industrial Coating System:
      a. Prime Coat: Primer sealer, latex, interior: S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.5 mils dry.
      b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
      c. Topcoat: Light industrial coating, interior, water based, eggshell (Gloss Level 3): S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

END OF SECTION

SECTION 10 14 00 - SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Interior signs.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 22 05 53 "Identification for Plumbing Piping and Equipment" for nameplates, labeling, and identification methods for plumbing equipment and components.
   3. Section 23 05 53 "Identification for HVAC Piping and Equipment" for nameplates, labeling, and identification methods for HVAC equipment and components.

1.2 DEFINITIONS

A. VHB Tape: Very High Bond tape.

1.3 ALLOWANCES

A. Section 01 20 00 "Price and Payment Procedures": Material allowance procedures.
B. Allowance Includes: Purchase, delivery, and installation of interior signs.

1.4 SUBMITTALS

A. Section 01 33 00 "Submittal Procedures": Requirements for submittals.
B. Shop Drawings: Indicate sign styles, lettering font and size, foreground and background colors, locations, and overall dimensions of each sign.
C. Samples: Submit two signs, sizes to match existing, illustrating type, style, letter font and size, colors, and method of attachment.
D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 "Product Requirements": Requirements for transporting, handling, storing, and protecting products.
B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
C. Storage:
   1. Store materials according to manufacturer instructions.
   2. Store adhesive attachment tape at ambient room temperatures.
D. Protection:
   1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
   2. Provide additional protection according to manufacturer instructions.

1.6 AMBIENT CONDITIONS

A. Section 01 50 00 "Temporary Facilities and Controls": Requirements for ambient condition control facilities for product storage and installation.
B. Minimum Conditions: Do not install signs when ambient temperature is lower than recommended by manufacturer.
C. Subsequent Conditions: Maintain temperatures above minimum during and after installation of signs.

PART 2 - PRODUCTS

2.1 INTERIOR SIGNS

A. Manufacturers:
1. ASI Sign Systems, Inc.
2. Best Sign Systems, Inc.
3. Clarke Systems.
4. Mohawk Sign Systems.
5. Vista System.
6. Substitutions: As specified in Section 01 60 00 "Product Requirements."

2.2 ACCESSORIES

A. Tape:
1. Description:
a. Double-faced black foam tape.
b. Use in conjunction with silicone adhesive for installation of wall-mounted signs.
2. VHB tape, as manufacturers by 3M.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Use manufacturer's installation template and attachment devices.
B. Install signs after surfaces are finished.
C. Locations: As indicated on Drawings.
D. Locate sign on wall surface, level.

3.2 ATTACHMENTS

A. Office Door Signs: Match existing as shown.
B. Service Room Signs: Match existing as shown.
C. Restroom Door Graphic: Match existing as shown.

END OF SECTION

SECTION 10 21 13.14 - STAINLESS STEEL TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal toilet compartments.
   2. Metal urinal screens.

B. Related Requirements:
   1. Division 01 Specification Secitons apply to Work of this Section.
   2. Section 06 10 00 "Rough Carpentry": Blocking and supports.
   3. Section 10 28 13 "Toilet Accessories."

1.2 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
B. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2024b.
C. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
E. ASTM A743 - Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application; 2021.
F. ASTM B86 - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings; 2023.
G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
H. ASTM D1735 - Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus; 2021.
I. ASTM D2247 - Standard Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity; 2015 (Reapproved 2020).
J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
K. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate Work with placement of support framing and anchors in walls and ceilings.

1.4 SUBMITTALS

A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
B. Product Data: Provide data on panel construction, hardware, accessories, finishes.

C. Shop Drawings:
   1. Indicate plans, elevations, dimensions. Include door swings, toilet fixture centerlines, floor drains on plans.
   2. Indicate details of wall and floor supports and attachments.
   3. Indicate cutouts for through-partition toilet accessories.
   4. Indicate reinforcements in toilet partition panels for grab bar attachment.

D. Samples:
   1. For Verification: Submit 1 sample of partition materials, 3 inches by 3 inches in size, indicating color.

E. Manufacturer's qualification statement.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section, with at least 3 years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials and products in accordance with manufacturer's instructions and recommendations and industry standards.

B. Do not deliver materials or begin installation until building is enclosed, with complete protection from outside weather, and building temperature maintained at minimum of 60 degrees F.

C. Store products indoors in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer. Protect from damage.

D. Lay cartons flat, with adequate support to ensure flatness and prevent damage to prefinished surfaces.

E. Do not store where ambient temperature exceeds 120 degrees F.

1.7 FIELD CONDITIONS

A. Ambient Conditions: Maintain environmental conditions such as temperature, humidity, and ventilation within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Ambient Conditions: Maintain building temperature at minimum of 60 degrees F for 24 hours before, during, and after installation of toilet partitions.

C. Existing Conditions: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

1.8 WARRANTY

A. See Section 01 70 00 "Execution and Closeout Requirements" for additional warranty requirements.

B. Stainless Steel Finish Warranty: Provide 5-year manufacturer warranty against corrosion or discoloration of stainless-steel material properly maintained in accordance with manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: ASI Global Partitions: www.asi-globalpartitions.com/#sle.
B. Substitutions: See Section 01 60 00 "Product Requirements."
   1. Submit proposed substitutions in writing for approval by Architect minimum of 10 working days prior to bid date and make available to bidders. Accompany proposed substitutes with review of specification and the appropriate ASI Group partition company specifications noting compliance on line-by-line basis.
C. Source Limitations: Furnish products produced by single manufacturer

2.2 METAL TOILET COMPARTMENTS

A. Toilet Compartments with Integrated Privacy: Stainless steel, sightline blocking molding affixed to hinge and latch sides of door during fabrication. Field-applied, no-sight strips not permitted.
   1. Ultimate Privacy-72; floor-anchored, overhead-braced mounting.
B. Urinal Screens: Stainless steel, wall hung flat panel with integral flanges. Floor anchored post to ceiling.
C. Design Criteria:
   1. Accessibility: Design compartments indicated on Drawings
   2. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less (Class A), when tested in accordance with ASTM E84.
D. Fabrication:
   1. Fabricate toilet compartment components to sizes indicated.
   2. Coordinate requirements and provide cutouts for through-partition toilet accessories and reinforcement within panel where required for attachment of grab bars.
   3. Provide shoes at pilasters and posts to conceal anchors, supports, and leveling mechanisms.
   4. Provide Easy-Stall shoes at floor anchored, overhead braced toilet compartments.
   5. Provide manufacturer's standard corrosion-resistant supports, leveling mechanisms, anchors, and anchoring assemblies for pilasters and posts.
   6. Floor Anchored, Overhead Braced Units: Provide supports, leveling mechanisms, Easy-Stall shoes, and anchors at pilasters to suit floor conditions.
   7. Floor Anchored, Overhead Braced Units with Adjustable Pedestals: Provide adjustable pedestals at pilasters to suit floor conditions.
   8. Urinal Posts: Provide anchoring assemblies with leveling adjustment at tops of posts.

2.3 COMPONENTS

A. Doors, Panels, and Pilasters: Seamless sheet steel faces, pressure bonded to sound-deadening cellular honeycomb core. Provide doors with integral no-sightline system including integrated privacy component on latch and hinge sides that overlaps adjacent pilasters.
   1. Stainless Steel: Satin finish.

2. Panel Faces: 22-gauge, 0.0299-inch.
3. Door Faces: 22-gauge, 0.0299-inch.
4. Edge Moldings for Stainless Steel Doors: Integrated sightline continuous roll form 22-gauge, 0.0299-inch.
5. Pilaster Faces, Braced at Both Ends: 22-gauge, 0.0299-inch.
6. Side Seams: Interlocking continuous molding strip.
7. Internal Reinforcement: Provide reinforcement of size and material adequate for panel to withstand applied downward load on grab bar of at least 250 lbf without deformation of panel.

B. Door and Panel Dimensions:
1. Thickness: 1-inch.
2. Door Width: As indicated on Drawings
3. Door Width for Handicapped Use: 36 inches, swing as indicated on Drawings.
4. Ultimate Privacy-72:
a. Door Panel Height: 72 inches.
b. Door Height Above Floor: 9 inches.
5. Urinal Panel Height: 58 inches.
6. Urinal/Entrance Screen Panel Height Above Floor: 12 inches.

C. Pilasters: 1-1/4-inch-thick, of sizes required to suit compartment width and spacing.
1. Pilaster Height: 84 inches.
2. Easy-Stall Pilaster Shoes: Formed 20-gauge, 0.0359-inch, ASTM A666 Type 304 stainless steel with No.4 finish, 3 inches high, concealing floor fastenings and leveling bolts; secured to pilaster with stainless steel tamper-resistant screws; secured to floor with concrete anchors.
a. Provide height and leveling adjustment with machine thread leveling bolts and bottom of pilaster threaded inserts.
b. Provide Easy-Stall shoes at floor anchored, overhead braced toilet compartments.

D. Urinal Post: Manufacturer's standard post design of square aluminum tube with satin finish 1-3/4-inch by 1-3/4-inch, with shoe matching that on pilaster.

E. Head Rails: Hollow anodized aluminum tube, 1-inch by 1-5/8-inch size, with anti-grip surface and aluminum wall brackets.

2.4 MATERIALS

A. Aluminum Extrusions: ASTM B221**,** 6063 alloy, T6 temper
B. Stainless Steel Sheet: ASTM A240 or ASTM A666, Type 304, stretcher-leveled standard of flatness.
C. Stainless Steel Castings: ASTM A743.
D. Zamac: ASTM B86, commercial zinc-alloy die castings, chrome plated.

2.5 HARDWARE AND ACCESSORIES

A. Brackets:
1. Continuous Type: Brushed stainless steel, standard depth.

B. Door Hardware: Brushed stainless steel.
1. Hinges: Brushed stainless steel continuous hinge, cam type, swings to closed or partially open position, available only in 58-inch.

2. Latch and Keeper: Surface-mounted ASI integrated privacy slide latch with occupancy indicator and emergency access.
3. Coat Hook: Manufacturer's standard coat hook with rubber bumper; one per compartment, mounted on panel.
4. Door Pull: Provide door pull for out-swinging doors. Provide on both sides of doors designated as accessible.
5. Door Bumper: Provide rubber-tipped door bumpers at out-swinging doors.

C. Attachments, Screws, and Bolts: Stainless steel, tamper-resistant type.
1. For Attaching Panels and Pilasters to Brackets: Sex-type through-bolts and nuts, tamper-resistant.

2.6 SOURCE QUALITY CONTROL

A. See Section 01 40 00 "Quality Requirements" for additional requirements.
B. Confirm that exposed surfaces are free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting Work.
B. Verify that field measurements are as indicated on Shop Drawings.
C. Verify correct spacing of and between plumbing fixtures.
D. Verify correct location of built-in framing, anchorage, and bracing.

3.2 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's written instructions.
B. Attach Easy Stall shoe system to floor with 1/4- by 2-inch screws. Insert pilaster into Easy Stall shoe and secure after height adjustment.
C. Attach panel brackets securely to walls using anchor devices.
D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster centerlines.
E. Do not permit field touch-up of scratches or damaged finish. Replace damaged or scratched materials with new materials.

3.3 TOLERANCES

A. Maximum Variation From True Position: 1/4-inch.
B. Maximum Variation From Plumb: 1/8-inch.

3.4 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16-inch.
B. Adjust hinges to locate doors in partially opened position when unlatched. Return out-swinging doors to closed condition.
C. Adjust adjacent components for consistency of line or plane.

3.5 CLEANING

A. See Section 01 70 00 "Execution and Closeout Requirements" for additional requirements.
B. Clean partition and screen surfaces with materials and cleansers in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 10 26 00 - WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Corner guards.
   2. End-wall guards.
   3. Abuse-resistant wall coverings.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
   2. Include fire ratings of units recessed in fire-rated walls and listings for door-protection items attached to fire-rated doors.

B. Shop Drawings: For each type of wall and door protection showing locations and extent.
   1. Include plans, elevations, sections, and attachment details.[Show handrail design and support spacing required to withstand structural loads.]

C. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:
   1. [Corner] [and] [End-Wall] Guards: 12 inches long. Include example top caps.
   2. Abuse-Resistant Wall Covering: 6 by 6 inches square.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.
   1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
   1. Maintain room temperature within storage area at not less than 70 degrees F during the period plastic materials are stored.
   2. Keep plastic materials out of direct sunlight.
   3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 degrees F.
      a. Store corner-guard covers in a vertical position.
      b. Store covers in a horizontal position.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain wall- and door-protection products[**of each type**] from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 450 or less.

2.3 CORNER GUARDS

A. Surface-Mounted, Metal Corner Guards CG: Fabricated as one piece from formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.
   1. Manufacturers: Basis of Design and Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. As indicated on Interior Material Legend in Drawings.
   2. Material: Stainless-steel sheet, Type 304.
      a. Thickness: Minimum 14 gauge.
      b. Finish: Directional satin, No. 4.
   3. Wing Size: Nominal 2-1/2 by 2-1/2 inches.
   4. Corner Radius: 1/8-inch.
   5. Mounting: Adhesive.

2.4 END-WALL GUARDS

A. Surface-Mounted, Metal, End-Wall Guards CG2: Fabricated from one-piece, formed or extruded metal that covers entire end of wall; with formed edges.
   1. Manufacturers: Basis of Design and Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. As indicated on Interior Material Legend in Drawings.
   3. Material: Stainless-steel sheet, Type 304.
      a. Thickness: Minimum 14 Gauge.
      b. Finish: Directional satin, No. 4.
   4. Wing Size: Nominal 2-1/2 by 2-1/2 inches.
   5. Corner Radius: 1/8-inch.
   6. Mounting: Adhesive.

2.5 STAINLESS STEEL BASE

A. Hygenic Cover Base.
   1. Manufacturer: Basis of Design and Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. As indicated on Interior Material Legend in Drawings.
   3. Material: Stainless-steel sheet, Type 304.
      a. Thickness: Minimum 14 Gauge .
   4. Finish: Directional satin, No. 4.
   5. Equal product: Inpro Custom Riser Stainless Steel Hygienic Cove - SCR-CUSTOM. Toe of base shall align to top of flooring.

2.6 ABUSE-RESISTANT WALL COVERINGS

A. Abuse-Resistant Sheet Wall Covering FRP1: Fabricated from semirigid, plastic sheet wall-covering material.
   1. Manufacturers: Basis of Design and Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. InPro Corporation (IPC)- Equal Product Continuum Rigid Sheet.
   2. Size: As indicated on Drawings.
   3. Sheet Thickness: 0.080-inch.
   4. Color and Texture: As indicated by manufacturer's designations on Interior Material Legend in Drawings.
   5. Height: As indicated in Drawings.
   6. Trim and Joint Moldings: Extruded rigid plastic that matches wall-covering color.
   7. Mounting: Adhesive.

2.7 MATERIALS

A. Rigid Sheet:
   1. Material: 100 percent chemical and stain-resistant unplasticized polyvinyl chloride (uPVC)
   2. Extruded Vinyl trim: 100 percent chemical and stain-resistant unplasticized polyvinyl chloride (uPVC)
   3. Accessories: Top caps, inside corners, divider bars, and outside corners shall be made of extruded uPVC.
   4. Adhesives per Manufacturer with VOC less than 70 g/L or less.
B. Adhesive: As recommended by protection product manufacturer.
   1. Adhesives shall have a VOC content of 70 g/L or less.

2.8 FABRICATION

A. Fabricate wall and door protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.
B. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.9 FINISHES

A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and wall areas, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Examine walls to which wall and door protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
    1. For wall and door protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing wall and door protection.
B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
B. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
    1. Provide anchoring devices and suitable locations to withstand imposed loads.
    2. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches apart.
C. Abuse-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.
D. Stainless steel base: install per manufactuer's written instructions.

3.4 CLEANING

A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.
B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION

SECTION 10 28 13 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Public-use washroom accessories.
   2. Hand dryers.
   3. Childcare accessories.
   4. Custodial accessories.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 09 30 13 "Ceramic Tiling" for ceramic toilet and bath accessories.

1.2 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
   2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
   3. Include electrical characteristics.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.5 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, visible silver spoilage defects.

B. Manufacturer's Special Warranty for Toilet-Compartment Occupancy-Indicator Systems: Manufacturer agrees to repair or replace toilet-compartment occupancy-indicator systems that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Hand Dryers: Manufacturer agrees to repair or replace hand dryers that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Structural Performance: Design accessories and fasteners to comply with the following requirements:

1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.

B. Toilet Tissue (Jumbo-Roll) Dispenser TTD-1:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc.
   c. Bradley Corporation.
2. Description: [One-roll unit.
3. Mounting: Surface mounted.
4. Capacity: 9- or 10-inch-diameter rolls.
5. Material and Finish: Stainless steel, ASTM A480 No. 4 finish (satin) ABS plastic, gray, with translucent front cover Insert material and finish.
6. Lockset: Tumbler type.
7. Refill Indicator: Pierced slots at front.

C. Waste Receptacle:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc.
   c. Bradley Corporation.
   d. Tubular Specialties Manufacturing, Inc.
2. Basis of Design: Bobrick, Model No. B-35639, TrimlineSeries, Surface-Mounted Waste Receptacle with Disposal Door, Satin Finish, 3-Gallon, Stainless Steel Satin Finish.
3. Mounting: Surface mounted.
4. Minimum Capacity: 3-gal.
5. Material and Finish: Stainless steel, ASTM A480 No. 4 finish (satin) 18.8, Heavy Gauge, Type 304 Stainless Steel, all welded construction.
6. Lockset: Tumbler type for waste receptacle.

D. Combination Towel (Folded) Dispenser/Waste Receptacle PTDWR:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Specialties, Inc.
      b. Bobrick Washroom Equipment, Inc.
      c. Bradley Corporation.
   2. Basis-of-Design:
      a. Bobrick - Recessed Paper Towel Dispenser and Waste Receptacle, Satin Finish, 15-Gallon Waste.
   3. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle.
   4. Mounting: Surface mounted Surface mounted with stainless steel collar Recessed Recessed with projecting receptacle Semirecessed Under vanity Insert mounting.
      a. Designed for nominal 4-inch wall depth.
   5. Minimum Towel-Dispenser Capacity: 600 C-fold or 800 multifold paper towels.
   6. Material and Finish: Stainless steel, ASTM A480 No. 4 finish (satin).
   7. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.

E. Automatic Soap Dispenser:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Specialties, Inc.
      b. Bradley Corporation.
      c. Sloan Valve Company.
   2. Description: Automatic dispenser with infrared sensor to detect presence of hands; electrically operated, with adapter for 110- to 240-V ac power supply battery powered; designed for dispensing soap in liquid or lotion lather form.
   3. Mounting: Surface mounted.
   4. Refill Indicator: LED indicator.
   5. Low-Battery Indicator: LED indicator.

F. Grab Bar GB:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Specialties, Inc.
      b. Bobrick Washroom Equipment, Inc.
      c. Bradley Corporation.
   2. Mounting: Flanges with concealed exposed fasteners.
   3. Material: Stainless steel, 0.05-inch-thick.
      a. Finish: Smooth, ASTM A480 No. 4 finish (satin) on ends and slip-resistant texture in grip area.
   4. Outside Diameter: 1-1/2 inches.
   5. Configuration and Length: As indicated on Drawings; straight, 36 inches long.

G. Sanitary-Napkin and Tampon Vendor:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. AJW Architectural Products.
      b. American Specialties, Inc.
      c. Bobrick Washroom Equipment, Inc.
      d. Bradley Corporation.
      e. GAMCO Specialty Accessories; a division of Bobrick.
      f. Tubular Specialties Manufacturing, Inc.
   2. Exposed Material and Finish: Stainless steel, ASTM A480 No. 4 finish (satin).
   3. Lockset: Tumbler type with separate lock and key for coin box.

H. Sanitary-Napkin Disposal Unit:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Specialties, Inc.
      b. Bobrick Washroom Equipment, Inc.
      c. Bradley Corporation.
   2. Mounting: Surface mounted.
   3. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset..
   4. Receptacle: Removable.
   5. Material and Finish: Stainless steel, ASTM A480 No. 4 finish (satin) ABS plastic, gray Insert material and finish.

I. Seat-Cover Dispenser:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Specialties, Inc.
      b. Bobrick Washroom Equipment, Inc.
      c. Bradley Corporation.
   2. Mounting: Surface mounted Recessed Partition mounted, dual access.
   3. Minimum Capacity: 500 seat covers.
   4. Exposed Material and Finish: Stainless steel, ASTM A480 No. 4 finish (satin) ABS plastic, gray Insert material and finish.
   5. Lockset: Tumbler type.

J. Purse Shelf :
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
      a. AJW Architectural Products.
      b. American Specialties, Inc.
      c. Bobrick Washroom Equipment, Inc.
      d. Bradley Corporation.
      e. Brey-Krause Manufacturing Co.
      f. GAMCO Specialty Accessories; a division of Bobrick.
      g. Tubular Specialties Manufacturing, Inc.
   2. Material and Finish: Stainless steel, ASTM A480 No. 4 finish (satin).

K. Mirror Unit:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc.
c. Bradley Corporation.
2. Size: As indicated on Drawings .

L. Pet Bag Dispenser:
1. Manufacturers: Subject to compliance with requirements, provide products by the following
a. Zero Waste USA12316 World Trade Drive, Suite 102, San Diego, California 92128, 800.789.2563.
2. Mounting: Surface mounted, per manufacturer's instructions.

2.3 HAND DRYERS

A. Multiple-Airflow Hand Dryer:
1. Manufacturers: Subject to compliance with requirements, provide products by the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. American Specialties, Inc.
b. Bradley Corporation.
c. Dyson Technologies Limited.
d. Mitsubishi Electric Corporation.
e. Saniflow Hand Dryer Corporation.
f. World Dryer Corporation.
2. Water Collection: Removable reservoir.
3. Filter: HEPA, replaceable.
4. Cover Materials and Finish: Steel, ASTM A480, No. 4 finish (satin).

2.4 CHILDCARE ACCESSORIES

A. Source Limitations: Obtain childcare accessories from single source from single manufacturer.

B. Diaper-Changing Station:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. American Specialties, Inc.
b. Bradley Corporation.
c. GAMCO Specialty Accessories; a division of Bobrick.
d. Koala Kare Products; a Division of Bobrick.
2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
3. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: HDPE in manufacturer's standard color Stainless steel, ASTM A480 No. 4 finish (satin), with replaceable insulated polystyrene tray liner and rounded plastic corners.

C. Diaper-Pack Vendor:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Foundations Children's Products.
b. Foundations Worldwide.
c. Koala Kare Products; a Division of Bobrick.
2. Mounting: Surface mounted.
3. Minimum Capacity: 24 diaper packs.
4. Material and Finish: Stainless steel, ASTM A480 No. 4 finish (satin).

2.5 CUSTODIAL ACCESSORIES

A. Source Limitations: Obtain custodial accessories from single source from single manufacturer.
B. Custodial Utility Shelf:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc.
c. Bradley Corporation.
2. Description: With exposed edges turned down not less than 1/2-inch and supported by two triangular brackets welded to shelf underside.
3. Material and Finish: Not less than nominal 0.05-inch-thick stainless steel, ASTM A480 No. 4 finish (satin).
C. Custodial Paper Towel (Roll) Dispenser:
1. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Tubular Specialties Manufacturing, Inc.
2. Material and Finish: Stainless steel, ASTM A480 No. 4 finish (satin).
3. Lockset: Tumbler type.

2.6 MATERIALS

A. Stainless Steel: ASTM A240 or ASTM A666, Type 304, 0.031-inch-inimum nominal thickness unless otherwise indicated.
B. Steel Sheet: ASTM A1008, Designation CS (cold rolled, commercial steel), 0.036-inch-minimum nominal thickness.
C. Galvanized-Steel Sheet: ASTM A653, with G60 hot-dip zinc coating.
D. Galvanized-Steel Mounting Devices: ASTM A153, hot-dip galvanized after fabrication.
E. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.
F. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.7 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
   1. Remove temporary labels and protective coatings.
B. Grab Bars: Install to comply with specified structural-performance requirements.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
B. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION

SECTION 10 44 13 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fire-protection cabinets for the following:
a. Portable fire extinguisher.
B. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.
2. Section 10 44 16 "Fire Extinguishers" for portable, hand-carried fire extinguishers accommodated by fire-protection cabinets

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
B. Shop Drawings: For fire-protection cabinets.
1. Include plans, elevations, sections, details, and attachments to other Work.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

2.3 FIRE-PROTECTION CABINET (FEC)

A. Cabinet Type: Suitable for fire extinguisher.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Activar Construction Products Group, Inc. - JL Industries.
      b. Larsens Manufacturing Company.
      c. Potter Roemer LLC; a Division of Morris Group International.

B. Fire-Rated Cabinets: Refer to drawings for fire ratings.

C. Cabinet Material: Cold-rolled steel sheet.

D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).

E. Cabinet Trim and Door Material: Steel sheet.

F. Door Style: Fully glazed panel with frame.

G. Door Glazing: Tempered float glass (clear).

H. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide manufacturer's standard hinge, permitting door to open 180 degrees.

I. Accessories:
   1. Identification: Verify lettering with authorities having jurisdiction for letter style, size, spacing, and location.
      a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
         1) Location: Applied to cabinet door.
         2) Lettering Color: Red.
         3) Orientation: Vertical.

J. Materials:
   1. Cold-Rolled Steel: ASTM A1008, Commercial Steel (CS), Type B.
      a. Finish: Baked enamel, TGIC polyester powder coat, HAA polyester powder coat, epoxy powder coat, or polyester/epoxy hybrid powder coat, complying with AAMA 2603.
      b. Color: As selected by Architect from manufacturer's standard range.
   2. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.4 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
   1. Weld joints and grind smooth.
   2. Miter corners and grind smooth.
   3. Provide factory-drilled mounting holes.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
   1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2-inch-thick.
   2. Miter and weld perimeter door frames and grind smooth.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.
B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
C. Finish fire-protection cabinets after assembly.
D. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated in Drawings. If not indicated in Drawings, at height indicated below:
   1. General Fire-Protection Cabinet Mounting Height: 42 inches above finished floor to top of fire extinguisher.
B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
   1. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 10 44 16 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers.
B. Related Requirements:
   1. Divisions 01 Specification Sections apply to Work of this Section.
   2. Section 10 44 13 "Fire Protection Cabinets."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher.
B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet (FEC) and mounting bracket (FEB) indicated.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. JL Industries, Inc.; a division of the Activar Construction Products Group.
      b. Larsens Manufacturing Company.
      c. Potter Roemer LLC.
B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb ominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.3 MOUNTING BRACKETS (FEB)

A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. JL Industries, Inc.; a division of the Activar Construction Products Group.
      b. Larsens Manufacturing Company.
      c. Potter Roemer LLC.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
   1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.
   1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
   1. Mounting Brackets:
      a. Fire extinguishers weighing 40 pounds or less: 54 inches above finished floor to top of cabinet.
      b. Fire extinguishers weighing more than 40 pounds: 42 inches above finished floor to top of cabinet.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION

SECTION 10 75 16 - GROUND-SET FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes ground-set flagpoles made from:
   1. Aluminum.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 03 30 00 "Cast-In-Place Concrete" for concrete footing for flagpoles.
   3. Section 07 92 00 "Joint Sealants" for elastomeric sealants filling the top of the foundation tube.

1.2 PERFORMANCE REQUIRMENTS

A. Structural Performance: Provide flagpole assemblies, including anchorages and supports, capable of withstanding the effects of wind loads, determined according to NAAMM FP 1001, "Guide Specifications for Design of Metal Flagpoles."
   1. Base flagpole design on polyester flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.
   2. Basic Wind Speed: Three-second gust speed at 33 feet aboveground.

1.3 SUBMITTALS

A. Product Data: For each type of flagpole required.
B. Shop Drawings: Include elevations and details showing general arrangement, jointing, fittings and accessories, grounding, and anchoring and supporting systems.
   1. Include details of foundation system for ground-set flagpoles.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain flagpole as a complete unit, including fittings, accessories, bases, and anchorage devices, from a single manufacturer.
   1. Obtain flagpoles through 1 source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. General: Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. American Flagpole; a Kearney-National Inc. Company.
   2. Concord Industries, Inc.
   3. Eder Flag Manufacturing Company, Inc.
   4. Ewing International.
   5. PLP Composite Technologies, Inc.
   6. Pole-Tech Company Inc.
   7. Substitutions: In accordance with Division 01.

2.2 FLAGPOLES

A. Flagpole Construction, General: Construct flagpoles in 1-piece if possible. If more than 1-piece is necessary, comply with the following:
   1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
   2. For tapered flagpoles, provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.

B. Exposed Height: 35 feet (two).

C. Aluminum Flagpoles: Cone -tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B241, Alloy 6063, with a minimum wall thickness of 0.188-inch.Heat treat after fabrication to comply with ASTM B 597, Temper T6.
   1. Thirty-five-foot Flagpole: Provide one 35-foot pole with an 8-inch butt diameter, with a 0.188-inch wall thickness. The finish shall be satin aluminum finish. Pole shall have a gold anodized ball top, a key based cleat box, and a heavy-duty spur aluminum collar.

D. Foundation Tube: Galvanized corrugated-steel foundation tube, 0.064-inch minimum nominal wall thickness. Provide with 3/16-inch steel bottom plate and support plate; 3/4-inch-diameter, steel ground spike; and steel centering wedges all welded together. Galvanize steel parts, including foundation tube, after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.

2.3 FITTINGS

A. Internal Halyard: Ball-bearing, nonfouling, revolving truck assembly of cast metal with continuous 5/16-inch-diameter, braided polypropylene halyard and 9-inch, cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.
   1. Provide one halyard and one cleat at each flagpole.
   2. Provide cast-metal cleat covers, finished to match flagpole, secured with cylinder locks.

B. Halyard Flag Snaps: Provide 4 stainless-steel swivel snap hooks per halyard.
   1. Provide with neoprene or vinyl covers.

2.4 MISCELLANEOUS MATERIALS

A. Concrete: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3,000 psi.
B. Sand: ASTM C33, fine aggregate.
C. Elastomeric Joint Sealant: jJoint sealant complying with requirements in Section 07 92 00 "Joint Sealants" or Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, O-joint substrates.

2.5 FINISHES

A. Metal Finishes, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
B. Aluminum: Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
    1. Light Bronze Anodized: Provide fine, directional, light bronze finish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.

PART 3 - EXECUTION

3.1 PREPARATION

A. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete.
B. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.
C. Place concrete immediately after mixing. Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than 7 days or use nonstaining curing compound.
D. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.2 FLAGPOLE INSTALLATION

A. General: Install flagpoles where indicated and according to Shop Drawings and manufacturer's written instructions.
B. Foundation Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION

SECTION 12 36 16 - METAL COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Stainless-steel countertops.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Shop Drawings: For metal fabrications.
   1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
   2. For countertops, show locations and sizes of cutouts and holes for items installed in metal countertops.

PART 2 - PRODUCTS

2.1 STAINLESS-STEEL FABRICATIONS

A. Countertops: Fabricate from 0.062-inch-thick, stainless-steel sheet. Provide smooth, clean exposed tops and edges in uniform plane, free of defects. Provide front and end overhang of 1 inch over the base cabinets.
   1. Joints: Fabricate countertops without field-made joints.
   2. Sound deaden the undersurface with heavy-build mastic coating.
   3. Extend the top down to provide a 1-inch-thick edge .

2.2 MATERIALS

A. Stainless-Steel Sheet: ASTM A240, Type 304.
B. Sealant for Countertops: Manufacturer's standard sealant that complies with applicable requirements in Section 07 92 00 "Joint Sealants" and the following:
   1. Mildew-Resistant Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, silicone.
   2. Joint Sealant: Latex.
   3. Color: Clear.
   4. Sealant shall have a VOC content of 250 g/L or less.

2.3 STAINLESS-STEEL FINISH

A. Grind and polish surfaces to produce uniform, directional satin finish matching No. 4 finish, with no evidence of welds and free of cross scratches. Run grain with long dimension of each piece. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces clean.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install metal countertops level, plumb, and true; shim as required, using concealed shims.
B. Secure countertops with adhesive.
C. Seal junctures of countertops, splashes, and walls with sealant for countertops.
D. Protection: Provide 6-mil plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION

SECTION 12 36 23.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Plastic-laminate-clad countertops.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 ACTION SUBMITTALS

A. Samples: Plastic laminates in each type, color, pattern, and surface finish required in manufacturer's standard size.
B. Samples for Verification: As follows:
   1. Plastic Laminates: For each type, color, pattern, and surface finish required, 8 by 10 inches in size.
   2. Wood-Grain Plastic Laminates: For each type, color, pattern, and surface finish required, [12 by 24 inches] [24 by 24 inches] in size.
   3. Fabrication Sample: For each type and profile of countertop required, provide one sample applied to core material with specified edge material applied to one edge.

1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
   1. Shop Certification: [AWI's Quality Certification Program accredited participant] [WI's Certified Compliance Program licensee].

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver countertops only after casework and supports on which they will be installed have been completed in installation areas.
B. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
C. Keep surfaces of countertops covered with protective covering during handling and installation.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
B. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 degrees F and relative humidity between 17 and 50 percent during the remainder of the construction period.

C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD COUNTERTOPS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.
B. Grade: Custom.
C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. As indicated on Interior Material Legend in Drawings.
D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
   1. As indicated by manufacturer's designations and as indicated on Interior Material Legend in Drawings.
E. Edge Treatment: 3.0-mm PVC edging.
F. Core Material: Particleboard or MDF.
G. Core Material at Sinks: Particleboard made with exterior glue.
H. Core Thickness: 3/4-inch.
   1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.
   1. Wood Moisture Content: 4 to 9 percent.
B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of countertop and quality grade specified unless otherwise indicated.
   1. Recycled Content of MDF and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <Insert value> percent.
   2. MDF: Medium-density fiberboard, ANSI A208.2, Grade 130.
   3. Particleboard: ANSI A208.1, Grade M-2.

2.3 ACCESSORIES

A. Wire-Management Grommets: Circular, molded-plastic grommets and matching plastic caps with slot for wire passage.
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. Doug Mockett & Company, Inc.
   2. Outside Diameter: 2 inches.
   3. Color: As indicated on Interior Material Legend in Drawings.

2.4 MISCELLANEOUS MATERIALS

A. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
   1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.
B. Installation Adhesive:
   1. Adhesives shall have a VOC content of 70 g/L or less.

2.5 FABRICATION

A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:
   1. Solid-Wood (Lumber) Members: 1/16-inch unless otherwise indicated.
B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
   1. Notify Architect seven days in advance of the dates and times countertop fabrication will be complete.
   2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended, and check measurements of assemblies against field measurements before disassembling for shipment.
C. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
   1. Seal edges of cutouts by saturating with varnish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing.

3.2 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.
B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
   1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
   1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch in 96-inches variation from a straight, level plane.
   2. Secure backsplashes to walls with adhesive.
   3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects. Where not possible to repair, replace countertops. Adjust joinery for uniform appearance.

B. Clean countertops on exposed and semiexposed surfaces.

C. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION

SECTION 12 36 61.16 - SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Solid surface material countertops.
   2. Solid surface material backsplashes.
   3. Solid surface material end splashes.
   4. Solid surface material sinks.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For countertop materials and sinks.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
   1. Show locations and details of joints.
   2. Show direction of directional pattern, if any.

C. Samples for Verification: For the following products:
   1. Countertop material, 6 inches square.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by installer and names, addresses, and telephone numbers of local sources for products.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

1.5 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.6 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ISFA 2-01.
   1. Manufacturers: Basis of Designa and subject to compliance with requirements, provide products by the following:
      a. As indicated on Interior Material Legend in Drawings.
      b. Delete option in "Type" Subparagraph below if 1/4-inch-thick material is not used.
   2. Type: Provide Standard type unless Special Purpose type is indicated.
   3. Integral Sink Bowls: Comply with CSA B45.5/IAPMO Z124.
      a. Style and color per Interior Material Legend in Drawings.
   4. Colors and Patterns: As indicated on Interior Material Legend in Drawings.

B. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.

C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 FABRICATION

A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
   1. Grade: Custom.

B. Configuration:
   1. Front: Straight, slightly eased at top.
   2. Backsplash: Straight, slightly eased at corner.
   3. End Splash: Matching backsplash.

C. Countertops:
   1. 1/2-inch-thick, solid surface material with front edge built up with same material.

D. Backsplashes: 1/2-inch-thick, solid surface material.

E. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
   1. Fabricate with loose backsplashes for field assembly.
   2. Install integral sink bowls in countertops in the shop.

F. Joints:
   1. Fabricate countertops in sections for joining in field.
      a. Joint Locations: Not within 18 inches of a sink and not where a countertop section less than 36 inches long would result, unless unavoidable.

2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by solid surface material manufacturer.
   1. Adhesives shall have a VOC content of 70 g/L or less.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install countertops level to a tolerance of 1/8-inch in 8 feet, 1/4-inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
B. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
C. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
    1. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
D. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
E. Apply sealant to gaps at walls; comply with Section 07 92 00 "Joint Sealants."

END OF SECTION

SECTION 14 24 00 - HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Hydraulic elevators.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 31 20 00 "Earth Moving."

1.2 DEFINITIONS

A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.
B. Service Elevator: A passenger elevator that is also used to carry freight.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials, components and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.4 COORDINATION

A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
B. Furnish well casing and coordinate delivery with related excavation work.
C. Coordinate locations and dimensions of other work specified in other Sections that relates to hydraulic elevators, including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, pits, and machine rooms.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
B. Accessibility Standard: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

C. Seismic Performance: Elevator system withstands the effects of earthquake motions determined according to ASCE/SEI 7 and complies with elevator seismic requirements in ASME A17.1/CSA B44.
   1. Seismic Data:
      a. SS: 0.09.
      b. S1: 0.026.
      c. SMS: 0.12.
      d. SM1: 0.064.
      e. SDS: 0.081.
      f. SD1: 0.042.
      g. TL: 6.
      h. PGAM: 0.051.
      i. VS30: 260.
      j. Seismic Design Category: A.

D. Note Where values of the multi-period 5 percent damped MCER response spectrum are not available from the USGS Seismic Design Geodatabase, the design response spectrum shall be permitted to be determined in accordance with Section 11.4.
   1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."
   2. Project Seismic Design Category: A.
   3. Elevator Component Importance Factor: 1.5.
   4. Design earthquake spectral response acceleration short period (Sds) for Project is 0.081.
   5. Provide earthquake equipment required by ASME A17.1/CSA B44.
   6. Provide seismic switch required by ASCE/SEI 7.

2.2 FINISH MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008, commercial steel, Type B, exposed, matte finish.
B. Hot-Rolled Steel Sheet: ASTM A1011, commercial steel, Type B, pickled.
C. Stainless Steel Sheet: ASTM A240, Type 304.
D. Textured Stainless Steel Sheet: ASTM A240, Type 304, with embossed texture rolled into exposed surface.
   1. Product: Subject to compliance with requirements, provide by TK Elevators Americas, Frisco TX.
   2. Metal surface is satin polished after texturing.
E. Stainless-Steel Bars: ASTM A276, Type 304.
F. Stainless-Steel Tubing: ASTM A554, Grade MT 304.
G. Bronze Plate and Sheet: ASTM B36, Alloy UNS No. C28000 (muntz metal).
H. Bronze Extrusions: ASTM B455, Alloy UNS No. C38500 (architectural bronze).
I. Bronze Tubing: ASTM B135, Alloy UNS No. C23000 (red brass, 85 percent copper).
J. Aluminum Extrusions: ASTM B221, Alloy 6063.
K. Nickel Silver Extrusions: ASTM B151, Alloy UNS No. C74500 or No. C77600.
L. Plastic Laminate: High-pressure type complying with ISO 4586-3, Type HGS for flat applications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elevator areas, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify critical dimensions and examine supporting structure and other conditions under which elevator work is to be installed.
B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF HYDRAULIC ELEVATORS

A. Excavation for Cylinder: Drill well hole in elevator pit to accommodate installation of cylinder; comply with applicable requirements in Section 31 20 00 "Earth Moving."
B. Provide waterproof well casing to retain well-hole walls.
C. Install cylinder in protective casing within well hole. Before installing protective casing, remove water and debris from well hole, and provide permanent waterproof seal at bottom of well casing.
    1. Fill void space between protective casing and cylinder with corrosion-protective filler.
    2. Align cylinder and fill space around protective casing with fine sand.
D. Install cylinder plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor. Seal between well casing and pit floor with 4 inches of nonshrink, nonmetallic grout.
E. Install cylinder plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor and braced at intervals as needed to maintain alignment. Anchor cylinder guides at spacing needed to maintain alignment and avoid overstressing guides.
F. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS workmanship and welding operator qualification standards.
G. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.
H. Install piping above the floor, where possible. Install underground piping in casing.
    1. Excavate for piping and backfill encased piping according to applicable requirements in Section 31 20 00 "Earth Moving."
I. Lubricate operating parts of systems as recommended by manufacturers.
J. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
K. Leveling Tolerance: 1/4-inch, up or down, regardless of load and travel direction.
L. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

M. Locate hall signal equipment for elevators as follows unless otherwise indicated:
   1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
   2. Place hall lanterns either above or beside each hoistway entrance.
   3. Mount hall lanterns at a minimum of 72 inches above finished floor.

3.3 PROTECTION

A. Temporary Use: Limit temporary use of elevator for construction purposes. Comply with the following requirements for elevator used for construction purposes:
   1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
   2. Provide strippable protective film on entrance and car doors and frames.
   3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
   4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
   5. Do not load elevators beyond their rated weight capacity.
   6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
   7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate elevator.
B. Check operation of elevator with Owner's personnel present before date of Substantial Completionand again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

3.5 MAINTENANCE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service includes (amount to be determined by Owner) months' full maintenance by skilled employees of elevator installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation. Parts and supplies are manufacturer's authorized replacement parts and supplies.
   1. Perform maintenance during normal working hours.
   2. Perform emergency callback service during normal working hours with response time of (amount to be determined by Owner) hours or less.
   3. Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of (amount to be determined by Owner)hours or less.
B. Elevator maintenance agreement is to be determined by owner).

END OF SECTION

SECTION 14 31 00 - ESCALATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Escalators.
B. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.

1.2 DEFINITIONS

A. High-Traffic Escalators: Escalators designed specifically for high-traffic-volume use that produces dense occupancy, resulting in structural, machinery, and brake loads much higher than normal.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.4 COORDINATION

A. Coordinate installation of sleeves, block outs, escalator equipment with integral anchors, and other items that are embedded in concrete or masonry for escalator equipment. Furnish templates, sleeves, escalator equipment with integral anchors, and installation instructions; deliver to Project site in time for installation.
B. Coordinate locations and dimensions of other work relating to escalators, including sumps and floor drains in pits; electrical outlets, lights, and switches in pits; and electrical service.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
B. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design escalators.
C. Drive System Energy Performance: Provide regenerative drive system and motor that complies with requirements of the International Green Construction Code (IgCC).
D. Step/Skirt Performance Index: Not more than 0.15.

E. Seismic Performance: Escalators shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. Seismic Data:
      a. SS: 0.09.
      b. S1: 0.026.
      c. SMS : 0.12.
      d. SM1: 0.064.
      e. SDS: 0.081.
      f. SD1: 0.042.
      g. TL: 6.
      h. PGAM: 0.051.
      i. VS30: 260.
      j. Seismic Design Category: A.
   2. Escalator Component Importance Factor: 1.5.

F. Structural and Mechanical Performance for High-Traffic Escalators: For the purposes of structural design and driving machine, power transmission, and brake calculations, design high-traffic escalators for loads of not less than two times the design loads required by ASME A17.1/CSA B44.

G. Structural Performance of Balustrades, Deck Barricades, and Handrails: Provide components and assemblies capable of withstanding the effects of loads indicated in ASCE/SEI 7 for handrail assemblies and guardrail systems.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine escalator areas, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine supporting structure, machine spaces, and pits; verify critical dimensions; and examine conditions under which escalators are to be installed.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF ESCALATORS

A. Comply with manufacturer's written instructions.

B. Set escalators true to line and level, properly support, and anchor to building structure. Use established benchmarks, lines, and levels to ensure dimensional coordination of the Work.

C. Adjust installed components for smooth, efficient operation, complying with required tolerances and ensuring they are free of hazardous conditions. Lubricate operating parts, including bearings, tracks, chains, guides, and hardware. Test operating devices, equipment, signals, controls, and safety devices. Install oil drip pans and verify that no oil drips outside of pans.

D. Repair damaged finishes so no evidence remains of correction work. Return items to the shop that cannot be refinished in the field, make required repairs, and refinish entire unit, or provide new units as required.

3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate escalators.
B. Check operation of escalators with Owner's personnel present before date of Substantial Completion and not more than 1 month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION

SECTION 21 05 00 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes pipe, fittings, valves, and connections for sprinkler systems.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 09 91 23 "Interior Painting": Execution requirements for piping painting specified by this Section.
C. Fire Protection Contractor to match materials, devices, etc. already on-site concerning the existing fire sprinkler system to extend and provide fire sprinkler coverage of the terminal expansion. Not all materials, devices, etc. listed on the Specifications may apply to this Project. Contractor to verify at Project site.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
   2. ASME B16.11 - Forged Steel Fittings - Socket-Welding and Threaded.
   3. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
   4. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
   5. ASME B16.25 - Buttwelding Ends.
   6. ASME B16.3 - Malleable Iron Threaded Fittings.
   7. ASME B16.4 - Gray Iron Threaded Fittings.
   8. ASME B16.5 - Pipe Flanges and Flanged Fittings.
   9. ASME B16.9 - Factory-Made Wrought Steel Buttwelding Fittings.
   10. ASME B36.10M - Welded and Seamless Wrought Steel Pipe.
B. ASTM International:
   1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded, and Seamless.
   2. ASTM A135 - Standard Specification for Electric-Resistance-Welded Steel Pipe.
   3. ASTM A234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High-Temperature Service.
   4. ASTM A795 - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
   5. ASTM B32 - Standard Specification for Solder Metal.
   6. ASTM B75 - Standard Specification for Seamless Copper Tube.
   7. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
   8. ASTM B251 - Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.
C. American Welding Society:
   1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
   2. AWS D1.1 - Structural Welding Code - Steel.

D. American Water Works Association:
   1. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. for Water and Other Liquids.
   2. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
   3. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
E. National Fire Protection Association:
   1. NFPA 13 - Installation of Sprinkler Systems.
   2. NFPA 14 - Standard for the Installation of Standpipe, Private Hydrants and Hose Systems.
   3. NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances.
F. Underwriter Laboratories, Inc.:
   1. UL 1887 - Fire Tests of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics.

1.3 SUBMITTALS

A. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor, and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
B. Product Data:
   1. Submit manufacturer's catalogue information. Indicate valve data and ratings.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of components and tag numbering.
B. Operation and Maintenance Data: Submit spare parts lists.

1.5 QUALITY ASSURANCE

A. Provide fire sprinkler piping located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet when tested in accordance with UL 1887.
B. Perform Work in accordance with NFPA 13, State, and local standard.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' experience.
B. Installer: Company specializing in performing Work of this Section with minimum 3 years' experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers, with labeling in place.
B. Furnish cast iron and steel valves with temporary protective coating.
C. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.8 WARRANTY

A. Furnish 5-year manufacturer warranty for basic fire suppression materials and methods.

PART 2 - PRODUCTS

2.1 VALVES

A. Gate Valves:
   1. Up to and including 2 inches: Bronze body and trim, rising stem, hand wheel, solid wedge or disc, threaded ends.
   2. Over 2 inches: Iron body, bronze trim, rising stem pre-grooved for mounting tamper switch, hand wheel, OS&Y, solid bronze or cast iron wedge, and flanged or grooved ends.
   3. Over 4 inches: Iron body, bronze trim, non-rising stem with bolted bonnet, solid bronze wedge, flanged ends, and iron body indicator post assembly.

B. Globe Valves:
   1. Up to and including 2 inches: Bronze body, bronze trim, rising stem and hand wheel, inside screw, renewable rubber disc, threaded ends, with back seating capacity packable under pressure.
   2. Over 2 inches: Iron body, bronze trim, rising stem, hand wheel, OS&Y, plug-type disc, flanged ends, renewable seat, and disc.

C. Ball Valves:
   1. Up to and including 2 inches: Bronze 2-piece body, brass, chrome plated bronze, or stainless steel ball, Teflon seats and stuffing box ring, lever handle, threaded ends with union.
   2. Over 2 inches: Manufacturers: Cast steel body, chrome plated steel ball, Teflon seat and stuffing box seals, lever handle or gear drive hand wheel for sizes 10 inches and over, flanged.

D. Butterfly Valves:
   1. Bronze Body: Stainless steel disc, resilient replaceable seat, threaded or grooved ends, extended neck, hand wheel, gear drive, and integral indicating device, and built-in tamper proof switch rated 10 amp at 115 volt AC.
   2. Cast or Ductile Iron Body: Cast or ductile iron, chrome or nickel plated ductile iron or aluminum bronze disc, resilient replaceable EPDM seat, wafer, lug, or grooved ends. With extended neck, hand wheel, gear drive, and integral indicating device, and internal tamper switch rated 10 amp at 115 volt AC.

E. Check Valves:
   1. Up to and including 2 inches: Bronze body and swing disc, rubber seat, threaded ends.
   2. Over 2 inches: Iron body, bronze trim, swing check with rubber disc, renewable disc and seat, flanged ends with automatic ball check.
   3. Four inches and Over: Iron body, bronze disc with stainless steel spring, resilient seal, threaded, wafer, or flanged ends.

F. Drain Valves:
   1. Compression Stop: Bronze with hose thread nipple and cap.
   2. Ball Valve: Brass with cap and chain; 3/4-inch hose thread.

2.2 ABOVE GROUND PIPING - WET SPRINKLER

A. Steel Pipe: ASTM A53, Grade B; ASTM A135; ASTM A795 Schedule 40 black.
   1. Steel Fittings: ASME B16.9, wrought steel, butt welded; ASME B16.25, butt weld ends; ASTM A234, wrought carbon steel and alloy steel; ASME B16.5, steel flanges and fittings; ASME B16.11, forged steel socket welded and threaded.
   2. Cast Iron Fittings: ASME B16.4, threaded fittings.
   3. Malleable Iron Fittings: ASME B16.3, threaded fittings (ASTM B47).
   4. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
   5. Mechanical Formed Fittings: Carbon-steel housing with integral pipe stop and O-ring pocked and O-ring uniformly compressed into permanent mechanical engagement onto pipe.

B. Mechanical Formed Fittings: Carbon-steel housing with integral pipe stop and O-ring pocked and O-ring uniformly compressed into permanent mechanical engagement onto pipe.

2.3 PIPE HANGERS AND SUPPORTS

A. Conform to NFPA 13.
B. Hangers for Pipe Sizes 1/2-to 1-1/2-Inch: Malleable iron, adjustable swivel, split ring.
C. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
E. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
F. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
G. Vertical Support: Steel riser clamp.
H. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive sleeves.
B. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Remove scale and foreign material, from inside and outside, before assembly.
B. Prepare piping connections to equipment with flanges or unions.
C. Do not drill or cut structural members.
D. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

3.3 INSTALLATION

A. Install piping in accordance with NFPA 13 for sprinkler systems and NFPA 24 for service mains.
B. Install Work in accordance with State and local standards.
C. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
D. Install piping to conserve building space, to not interfere with use of space and other work.
E. Group piping whenever practical at common elevations.
F. Install pipe sleeve at piping penetrations through footings, partitions, walls, and floors. Seal pipe and sleeve penetrations to maintain fire resistance equivalent to fire separation.
G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
H. Pipe Hangers and Supports:
    1. Install in accordance with NFPA 13.
    2. Install hangers to with minimum 1/2-inch space between finished covering and adjacent work.
    3. Place hangers within 12 inches of each horizontal elbow.
    4. Use hangers with 1-1/2-inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
    5. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
    6. Where installing several pipes in parallel and at same elevation, provide multiple or trapeze hangers.
    7. Manufactured hangers are normally supplied in black steel.
    8. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
I. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding. Refer to Section 09 91 23 "Interior Painting."
J. Do not penetrate building structural members unless indicated.
K. Where more than one piping system material is specified, install compatible system components and joints. Install flanges, union, and couplings at locations requiring servicing.
L. Die-cut threaded joints with full-cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.
M. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.
N. Install ball or butterfly valves for shut-off or isolating service.
O. Install drain valves at main shut-off valves, low points of piping, and apparatus.
P. Where inserts are omitted, drill through concrete slab from below and install through-bolt with recessed square steel plate and nut flush with top of slab.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Inserts:
   1. Install inserts for placement in concrete forms.
   2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Install hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

3.5 CLEANING

A. Clean entire system after other construction is complete.
B. Clean adjacent surfaces of firestopping materials.

END OF SECTION

SECTION 21 13 13 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wet-pipe sprinkler system.
   2. System design, installation, and certification.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

C. Fire Protection Contractor to match materials, devices, etc. already on-site concerning the existing fire sprinkler system to extend and provide fire sprinkler coverage of the terminal expansion. not all materials, devices, etc. listed in the Specifications may apply to this Project. Contractor to verify at Project site.

1.2 REFERENCE STANDARDS

A. National Electrical Manufacturers Association:
   1. NEMA 250 - Enclosures for Electrical Equipment (1,000 Volts Maximum).

B. National Fire Protection Association:
   1. NFPA 13 - Standard for the Installation of Sprinkler Systems.

1.3 PREINSTALLATION MEETINGS

A. Section 01 30 00 "Administrative Requirements" for requirements for preinstallation meeting.

1.4 SUBMITTALS

A. Section 01 33 00 "Submittal Procedures" for requirements for submittals.

B. Product Data:
   1. Submit manufacturer information regarding sprinklers, valves, and specialties.
   2. Submit performance ratings, rough-in details, weights, and requirements for supports and piping connections.

C. Shop Drawings:
   1. Indicate layout of finished-ceiling areas, indicating sprinkler locations to be coordinated with ceiling installation.
   2. Indicate detailed pipe layout, hangers and supports, sprinklers, components, and accessories.
   3. Indicate system controls.

D. Samples: Submit 1 of each style of specified sprinkler.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for following items:
   1. Performance requirements and analysis data showing compliance with performance criteria.
   2. Data for water supply, hazard assessment, and system design concept.
   3. Hydraulic calculations to substantiate compliance with hydraulic design requirements.

4. Hydrant flow test report with static and residual pressures. Municipal calculated data from computer generated models are not allowed for static and residual pressure wet pipe fire sprinkler system hydraulic calculations.
5. Information provided in construction documents are for bidding purposes only, the final fire sprinkler system design, material selection, fire alarm integration, and installation directives shall be the responsibility of the fire sprinkler system design engineer of record.

G. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
H. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
I. Manufacturer Reports: Certify that equipment has been installed according to manufacturer instructions.
J. Qualifications Statements:
1. Submit qualifications for manufacturer, installer, and licensed professional.
2. Submit manufacturer's approval of installer.
3. Submit fire sprinkler system drawings with approval stamp from the local authority having jurisdiction.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 "Execution and Closeout Requirements" for requirements for submittals.
B. Project Record Documents:
1. Record actual locations of sprinklers and deviations of piping from Drawings.
2. Indicate drain and test locations.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Section 01 70 00 "Execution and Closeout Requirements" for requirements for maintenance materials.
B. Extra Stock Materials: Furnish extra sprinklers according to NFPA 13.
C. Tools:
1. Furnish suitable operating wrenches for each sprinkler type.

1.7 QUALITY ASSURANCE

A. Perform Work according to NFPA 13.
B. Seismic Performance: Comply with NFPA 13.
C. Perform Work according to local fire marshal requirements.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' experience.
B. Installer: Company specializing in performing Work of this Section with minimum 3 years' experience.
C. Licensed Professional: Certified fire protection engineer experienced in design of specified Work and licensed in State of Texas. Upon final fire sprinkler system design and approval of design by local AHJ, the certified fire protection engineer will be the engineer of record for this system.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 "Product Requirements" for requirements for transporting, handling, storing, and protecting products.
B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
C. Store materials according to manufacturer instructions.
D. Protection:
   1. Furnish piping with temporary inlet and outlet caps until installation.
   2. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
   3. Provide additional protection according to manufacturer instructions.

1.10 EXISTING CONDITIONS

A. Field Measurements:
   1. Verify field measurements prior to fabrication.
   2. Indicate field measurements on Shop Drawings.

1.11 WARRANTY

A. Section 01 70 00 "Execution and Closeout Requirements" for requirements for warranties.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Provide coverage for building areas as indicated on Drawings.
B. Volume and Pressure of Water Supply:
   1. Source: Hydrant water-flow test data.
   2. If data is not available, do not use system based on computer modeling.
C. Connection Interfaces: Building automatic fire-alarm system.
D. Fire-Department Connections: At locations as indicated on Drawings.
E. Fire sprinkler piping and head locations shall be coordinated with structural and architectural Drawings and architectural design features as described/detailed on architectural and interior design construction Drawings. Architect of record will have final say in main fire sprinkler piping visible from occupied public areas of the terminal.

2.2 SPRINKLERS

A. Manufacturers:
   1. Globe Fire Sprinkler Corporation.
   2. Reliable Automatic Sprinkler Co., Inc. (The).
   3. Tyco Fire Products LP.
   4. Venus Fire Protection Ltd.
   5. Victaulic Company.

6. Viking Corporation.
7. Grinnell Corp.
8. Substitutions: Refer to Section 22 05 00 "Hangers and Supports for Plumbing Piping and Equipment."

B. Suspended-Ceiling Type:
1. Type: Concealed pendant sprinklers, with matching push-on escutcheon plate.
2. Materials:
a. Sprinkler: Brass.
b. Escutcheon Plate: Enamel.
3. Fusible Link:
a. Type: Fusible solder or glass bulb.
b. Temperature Rating: As required for specific area hazard.
4. Finishes:
a. Sprinkler: Brass.
b. Color: To be determined by Architect.

C. Exposed-Area Type:
1. Type: Upright sprinklers with guard.
2. Material: Brass.
3. Fusible Link:
a. Type: Fusible solder or glass bulb.
b. Temperature Rating: As required for specific area hazard.
4. Finishes:
a. Sprinkler: Brass.

D. Sidewall Type:
1. Type: Semi-Recessed, horizontal sidewall with matching escutcheon plate, and guard.
2. Materials:
a. Sprinkler: Brass.
b. Escutcheon Plate: Chrome plated.
3. Fusible Link:
a. Type: Fusible solder or glass bulb.
b. Temperature Rating: As required for specific area hazard.
4. Finishes:
a. Sprinkler: Brass.

E. Sprinkler Guards: Corrosion-resistant wire cage with finish to match sprinkler.

2.3 PIPING SPECIALTIES

A. Wet-Pipe Sprinkler Alarm Check Valve with Trim:
1. Type: Alarm check.
2. Furnish divided-seat-ring, rubber-faced clapper to automatically actuate electric alarm, pressure retard chamber, pressure gages, pressure switches, and trim for variable water supply pressure with test and drain valve.

B. Electric Alarm: Electrically-operated, red-enameled gong, with pressure alarm switch.

C. Water-Flow Switch:
1. Description: Vane type for mounting horizontally or vertically.
2. Contacts:
a. Quantity: Two.
b. Rating: 10A at 125 V ac, and 2.5A at 24 V dc.

D. Fire-Department Connections:
   1. Description: Flush-mounted wall type, constructed of brass.
   2. Description: Freestanding type, with ductile-iron pedestal with cast-brass finish.
   3. Outlets:
      a. Type: Two-way.
      b. End Connections:
         1) Minimum Size: 2-1/2 inches.
         2) Fittings: Threaded swivel type to match fire-department hardware.
      c. Furnish threaded cap and chain of matching material and finish.
   4. Label: SPRINKLER - FIRE-DEPARTMENT CONNECTION.
   5. Provide Locking Fire Department Connection (FDC) cover with swivel-guard of appropriate size for each FDC indicated on Drawings. Contact Fire Department and knoxbox.com to determine necessary options.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 "Execution and Closeout Requirements" for requirements for installation examination.
B. Verify that water-flow, pressure, supervisory, and alarm devices are installed and connected to automatic fire-alarm and smoke-detection system.

3.2 INSTALLATION

A. Comply with NFPA 13.
B. Install buried shutoff valves in valve box and provide post indicator and fire-alarm supervision, where required by local AHJ.
C. Backflow Preventer:
   1. Install double-check backflow preventer assembly at sprinkler system water source connection.
   2. As specified in Section 22 11 00 "Facility Water Distribution."
D. Clearances:
   1. Locate fire-department connection, check valve, and automatic drip with sufficient clearance from walls, obstructions, or adjacent fire-department connections, to allow full swing of fire-department wrench handle.
   2. Provide for forward full-flow testing of backflow preventer.
E. Piping:
   1. Minimize obstructions with other Work.
   2. Install in concealed spaces above finished ceilings where possible.
F. Center sprinklers in 2 directions in ceiling tile and install piping offsets.
G. Install and connect to fire pump system according to NFPA 13.
H. Install guards on sprinklers.
I. Install sprinklers to accommodate architectural features as shown and described on architectural, structural, and interior design construction drawings and specifications.

3.3 CLEANING

A. Section 01 70 00 "Execution and Closeout Requirements" for requirements for cleaning.
B. Flush entire piping system of foreign matter.

3.4 PROTECTION

A. Section 01 70 00 "Execution and Closeout Requirements" for requirements for protecting finished Work.
B. Apply masking tape or paper cover to protect concealed sprinklers, cover plates, and sprinkler escutcheons not receiving field paint finish.
C. Remove protection after painting and replace painted sprinklers with new.

END OF SECTION

SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pipe hangers and supports.
   2. Hanger rods.
   3. Equipment bases and supports.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME B31.1 - Power Piping.
   2. ASME B31.5 - Refrigeration Piping.
   3. ASME B31.9 - Building Services Piping.

B. ASTM International:
   1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
   3. ASTM E814 - Standard Test Method for Fire Tests of Through Penetration Fire Stops.
   4. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
   5. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

C. American Welding Society:
   1. AWS D1.1 - Structural Welding Code - Steel.

D. FM Global:
   1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

E. Manufacturers Standardization Society of the Valve and Fittings Industry:
   1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
   2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
   3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum 3 years' experience.

B. Installer: Company specializing in performing Work of this Section with minimum 3 years' experience.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
B. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.5 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.6 WARRANTY

A. Refer to Section 23 05 00 "General Mechanical Requirements" for product warranties.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Plumbing Piping - DWV:
1. Conform to ASME B31.9, ASTM F708, MSS SP58, MSS SP69, or MSS SP89.
2. Hangers for Pipe Sizes 1/2-to 1-1/2-Inch: Malleable iron or Carbon steel, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 Inches and Larger: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes 3 Inches and Smaller: Cast iron hook.
6. Wall Support for Pipe Sizes 4 Inches and Larger: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Copper-plated, carbon-steel adjustable, ring.

B. Plumbing Piping - Water:
1. Conform to ASME B31.9, ASTM F708, MSS SP58, MSS SP69, or MSS SP89.
2. Hangers for Pipe Sizes 1/2-to 1-1/2-Inch: Malleable iron or Carbon steel, adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 Inches and Larger: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
5. Hangers for Hot Pipe Sizes 6 Inches and Larger: Adjustable steel yoke, cast iron roll, double hanger.
6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Larger: Steel channels with welded spacers and hanger rods, cast iron roll.
8. Wall Support for Pipe Sizes 3 Inches and Smaller: Cast iron hook.
9. Wall Support for Pipe Sizes 4 Inches and Larger: Welded steel bracket and wrought steel clamp.

10. Wall Support for Hot Pipe Sizes 6 Inches and Larger: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
11. Vertical Support: Steel riser clamp.
12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes 4 Inches and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
14. Floor Support for Hot Pipe Sizes 6 Inches and Larger: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
15. Copper Pipe Support: Copper-plated, Carbon-steel ring.

2.2 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive sleeves.
B. Verify the existing conditions before starting Work.

3.2 PREPARATION

A. Obtain permission from Architect before using powder-actuated anchors.
B. Obtain permission from Architect before drilling or cutting structural members.

3.3 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install in accordance with ASME B31.1, ASME B31.5, ASME 31.9, ASTM F708, MSS SP 58, MSS SP 69, or MSS SP 89.
B. Support horizontal piping as scheduled.
C. Install hangers with minimum 1/2-inch space between finished covering and adjacent work.
D. Place hangers within 12 inches of each horizontal elbow.
E. Use hangers with 1-1/2-inch minimum vertical adjustment.
F. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
G. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
H. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
I. Support riser piping independently of connected horizontal piping.
J. Provide copper plated hangers and supports for copper piping.
K. Design hangers for pipe movement without disengagement of supported pipe.
L. Manufactured hangers are normally supplied in black steel.
M. Prime coat exposed steel hangers and supports. Refer to Division 09. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
N. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 00 "Plumbing Insulation."

3.4 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of concrete, minimum 4 inches thick and extending 6 inches beyond supported equipment.
B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
C. Construct supports of steel members, formed steel channel, or steel pipe and fittings. Brace and fasten with flanges bolted to structure.
D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.5 INSTALLATION - FLASHING

A. Flashing for new construction is usually specified with walls, floor, and roofs.
B. Provide flexible flashing and metal counterflashing where piping penetrates weather or waterproofed walls, floors, and roofs.
C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36- by 36-inch sheet size. Fasten flashing to drain clamp device.
D. Seal floor and mop sink drains watertight to adjacent materials.
E. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.6 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.7 PROTECTION OF FINISHED WORK

A. Protect adjacent surfaces from damage by material installation.

3.8 SCHEDULES

A. Pipe Hanger Spacing:

PIPE MATERIAL	MAXIMUM HANGER SPACING	HANGER ROD DIAMETER
Cast Iron, all pipe sizes	5 feet	5/8-inch
Copper tube, 1-1/4-inch and smaller	6 feet	1/2-inch
Copper tube, 1-1/2-inch and larger	10 feet	1/2-inch

END OF SECTION

SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nameplates.
   2. Tags.
   3. Stencils.
   4. Pipe markers.
   5. Ceiling tacks.
   6. Labels.
   7. Lockout devices.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 09 91 23 "Interior Painting": Execution requirements for painting specified by this section.

C. Contractor shall match the labeling and identification standard for plumbing systems as required by the Midland International Air & Space Port system.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.3 CLOSEOUT SUBMITTALS

A. Section 01 70 00 "Execution and Closeout Requirements": Closeout procedures.

B. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.4 QUALITY ASSURANCE

A. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.

B. Maintain 1 copy of each document on site.

1.5 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 NAMEPLATES

A. Product Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

2.2 TAGS

A. Plastic Tags:
   1. Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches diameter.
B. Metal Tags:
   1. Stainless Steel with stamped letters; tag size minimum 1-1/2 inches diameter with finished edges.
C. Information Tags:
   1. Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 by 5-5/8 inches with grommet and self-locking nylon ties.
D. Tag Chart: Typewritten letter size list of applied tags and location plastic laminated.

2.3 STENCILS

A. Stencils: With clean cut symbols and letters of following size:
   1. Up to 2 inches Outside Diameter of Insulation or Pipe: 1/2-inch-igh letters.
   2. 2-1/2 to 6 inches Outside Diameter of Insulation or Pipe: 1-inch-high letters.
   3. Over 6 inches Outside Diameter of Insulation or Pipe: 1-3/4-inch-high letters.
   4. Ductwork and Equipment: four inches high letters.
B. Stencil Paint: As specified in Section 09 91 23 "Interior Painting," semi-gloss enamel, colors and lettering size conforming to ASME A13.1.

2.4 PIPE MARKERS

A. Color and Lettering: Conform to ASME A13.1.
B. Plastic Pipe Markers:
   1. Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
C. Plastic Tape Pipe Markers:
   1. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
D. Plastic Underground Pipe Markers:
   1. Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.5 CEILING TACKS

A. Description: Steel with 3/4-inch-diameter color-coded head.
B. Color code as follows:
   1. Plumbing valves: Green.
   2. Mechanical dampers and valves: Blue.

2.6 LABELS

A. Description: Aluminum, size 1.9 by 0.75 inches, adhesive backed with printed identification and bar code if required as owner standard labeling.

2.7 LOCKOUT DEVICES

A. Lockout Hasps:
   1. Anodized aluminum or Reinforced nylon hasp with erasable label surface; size minimum 7-1/4 by 3 inches.
B. Valve Lockout Devices:
   1. Nylon, Steel, or Plastic device preventing access to valve operator, accepting lock shackle.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.
B. Prepare surfaces in accordance with Section 09 91 23 "Interior Painting" for stencil painting.

3.2 INSTALLATION

A. Apply stencil painting in accordance with Section 09 91 23 "Interior Painting."
B. Install identifying devices after completion of coverings and painting.
C. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
D. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.
E. Install tags using corrosion resistant chain. Number tags consecutively by location.
F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
G. Identify water heaters, pumps, tanks, and water treatment devices with plastic nameplates or stencil painting. Identify in-line pumps and other small devices with tags.
H. Identify control panels and major control components outside panels with plastic nameplates.
I. Identify valves in main and branch piping with tags.
J. Identify piping, concealed or exposed, with plastic pipe markers or stenciled painting. Use tags on piping 3/4-inch-diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
K. Provide ceiling tacks to locate valves and dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 22 07 00 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Plumbing piping insulation, jackets, and accessories.
2. Plumbing equipment insulation, jackets, and accessories.

B. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCES

A. ASTM International:
1. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar.
3. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
4. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
5. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
6. ASTM C450 - Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging.
7. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
8. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
9. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
10. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
11. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
12. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
13. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
14. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
15. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
16. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

17. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
18. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
19. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

1.3 SUBMITTALS

A. Product Data: Submit product description, thermal characteristics, and list of materials and thickness for each service, and location.

1.4 QUALITY ASSURANCE

A. Use smoke developed index of 50 within plenums.
B. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 50 in accordance with ASTM E84.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' experience.
B. Applicator: Company specializing in performing Work of this Section with minimum 3 years' experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on Site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
B. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage, by storing in original wrapping.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.8 WARRANTY

A. Refer to and Section 23 05 00 "General Mechanical Requirements" for product warranties.
B. Piping Systems Conveying Fluids Below Ambient Temperature:
    1. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible, connections, and expansion joints.
    2. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
    3. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor retarder adhesive.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Glass Fiber and Mineral Fiber Insulation
   1. Manufacturers:
      a. Johns Manville; a Berkshire Hathaway companyCompany.
      b. Knauf Insulation.
      c. Owens Corning.
      d. Substitutions: Refer to Division 01 and Section 23 05 00 "General Mechanical Requirements."

B. Closed Cell Elastomeric Insulation:
   1. Manufacturers:
      a. Aeroflex USA, Inc.
      b. Armacell LLC.
      c. K-Flex USA.
      d. Substitutions: Refer to Division 01 and Section 23 05 00 "General Mechanical Requirements."

2.2 PIPE INSULATION

A. Type P-1: ASTM C547, molded glass fiber pipe insulation.
   1. Thermal Conductivity: 0.23 at 75 degrees F.
   2. Operating Temperature Range: 0 to 850 degrees F.
   3. Vapor Barrier Jacket: ASTM C1136, Type I, factory applied reinforced foil kraft with self-sealing adhesive joints.
   4. Jacket Temperature Limit: minus 20 to 150 degrees F.

B. Type P-2: ASTM C534, Type I, flexible, closed cell elastomeric insulation, tubular.
   1. Thermal Conductivity: 0.27 at 75 degrees F.
   2. Operating Temperature Range: Range: Minus 70 to 180 degrees F.

C. Type P-3: ASTM C1290, Type II, flexible glass fiber, commercial grade with factory-applied reinforced aluminum foil jacket meeting ASTM C1136, Type II.
   1. Thermal Conductivity: 0.25 at 75 degrees F.
   2. Maximum Operating Temperature: 250 degrees F.
   3. Density: 1.0 pound per cubic foot

2.3 PIPE INSULATION JACKETS

A. Aluminum Pipe Jacket:
   1. ASTM B209.
   2. Thickness: 0.020-inch-thick sheet.
   3. Finish: Embossed.
   4. Joining: Longitudinal slip joints and 2-inch laps.
   5. Fittings: 0.016-inch-thick die shaped fitting covers with factory attached protective liner.
   6. Metal Jacket Bands: 3/8-inch-wide; 0.015-inch-thick aluminum.

2.4 PIPE INSULATION ACCESSORIES

A. Vapor Retarder Lap Adhesive: Compatible with insulation.
B. Covering Adhesive Mastic: Compatible with insulation.
C. Closed Cell Elastomeric Insulation Pipe Hanger: Polyurethane insert with single piece construction with self-adhesive closure. Thickness to match pipe insulation.
D. Adhesives: Compatible with insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify piping has been tested before applying insulation materials.
B. Verify surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION - PIPING SYSTEMS

A. Piping Exposed to View in Finished Spaces: Locate insulation and cover seams in least visible locations.
B. Piping Systems Conveying Fluids Below Ambient Temperature:
   1. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
   2. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
   3. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor retarder adhesive.
C. Hot Piping Systems Less Than 140 Degrees F:
   1. Furnish factory-applied or field-applied standard jackets. Secure with outward clinch expanding staples or pressure sensitive adhesive system on standard factory-applied jacket and butt strips or both.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive.
   3. Do not insulate unions and flanges at equipment, but bevel and seal ends of insulation at such locations.

D. Inserts and Shields:
   1. Piping 1-1/2 Inches Diameter and Smaller: Install galvanized steel shield between pipe hanger and insulation.
   2. Piping 2 Inches Diameter and Larger: Install insert between support shield and piping and under finish jacket.
      a. Insert Configuration: Minimum 6 inches long, of thickness and contour matching adjoining insulation; may be factory fabricated.
      b. Insert Material: Compression resistant insulating material suitable for planned temperature range and service.
   3. Piping Supported by Roller Type Pipe Hangers: Install galvanized steel shield between roller and inserts.

E. Insulation Terminating Points:
   1. Condensate Piping: Insulate entire piping system and components to prevent condensation.

F. Closed Cell Elastomeric Insulation:
   1. Push insulation on to piping.
   2. Miter joints at elbows.
   3. Seal seams and butt joints with manufacturer's recommended adhesive.
   4. When application requires multiple layers, apply with joints staggered.
   5. Insulate fittings and valves with insulation of like material and thickness as adjacent pipe.

G. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces: Finish with aluminum jacket and fitting covers.

H. Piping Exterior to Building: Provide vapor retarder jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor retarder cement. Cover with aluminum jacket with seams located at 3 or 9 o'clock position on side of horizontal piping with overlap facing down to shed water or on bottom side of horizontal piping.

I. Buried Piping: Insulate only where insulation manufacturer recommends insulation product may be installed in trench, tunnel or direct buried. Install factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with 1 milthick aluminum foil sandwiched between 3 layers of bituminous compound; outer surface faced with polyester film.

J. Prepare pipe insulation for finish painting. Refer to Division 09.

3.3 SCHEDULES

A. Water Supply Services Piping Insulation Schedule:
   1. Domestic Hot Water Supply and Recirculation:
      a. Type: P-1.
      b. Thickness:
         1) Pipe Size 1-1/4 Inches and Smaller: Required for R-6.0 installed value.
         2) Pipe Size 1-1/2 Inches and Larger: Required for R-6.0 installed value.
   2. Domestic Cold Water:
      a. Type: P-1.
      b. Thickness:
         1) Pipe Size all sizes: Required for R-6.0 installed value.

B. Drainage Services Piping Insulation Schedule:
   1. Storm Piping and Roof Drain bodies:
      a. Horizontal Above Ground Within Building:
         1) Type: P-3.
         2) Thickness: Required for R-6.0 installed value.
      b. Vertical:
         1) 2-inchExposed Areas:
            a) Type: P-1.
            b) Thickness: Required for R-6.0 installed value.

C. Cooling System Schedule:
   1. Interior Condensate:
      a. Type: P-2.
      b. Thickness: Required for R-6.0 installed value.

END OF SECTION

SECTION 22 08 00 - COMMISSIONING OF PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes Cx process requirements for the following plumbing systems, assemblies, and equipment:
   1. Domestic hot- and cold-water piping.
   2. Sanitary waste and vent piping.
   3. Storm drainage piping.
   4. Plumbing pumps.
   5. Plumbing equipment.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 DEFINITIONS

A. Cx: Commissioning, as defined in Section 01 91 13 "General Commissioning Requirements."

B. CxA: Commissioning Authority, as defined in Section 01 91 13 "General Commissioning Requirements."

C. IAPMO: International Association of Plumbing and Mechanical Officials.

D. IgCC: International Green Construction Code.

E. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For plumbing testing technician.

B. Construction Checklists:
   1. Draft Cx plan, including draft construction checklists to be prepared by CxA under Section 01 91 13 "General Commissioning Requirements." Contractor is to review Construction Checklist in accordance with requirements in Section 01 91 13 "General Commissioning Requirements" and ASHRAE 202 and to resolve any issues with the CxA.

1.4 QUALITY ASSURANCE

A. Plumbing Testing Technician Qualifications: Technicians to perform plumbing Construction Checklist verification tests. Construction Checklist verification test demonstrations, Cx tests, and Cx test demonstrations shall have the following minimum qualifications:
   1. Journey level or equivalent skill level with knowledge of plumbing system, electrical concepts, and building operations.
   2. Minimum three years' experience installing, servicing, and operating systems manufactured by approved manufacturer.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 Cx PROCESS

A. Perform Cx process for plumbing systems in accordance with:
   1. IgCC, which requires compliance with ASHRAE 202.
   2. Commissioning standards acceptable to the authority having jurisdiction.

3.2 CONSTRUCTION CHECKLISTS

A. Preliminary detailed construction checklists are to be prepared under Section 01 91 13 "General Commissioning Requirements" for each plumbing system, assembly, subsystem, equipment, and component required to be commissioned, as detailed in IgCC. Contractor performs the following:
   1. Review plumbing preliminary construction checklists and provide written comments on Construction Checklist items where appropriate.
   2. Return preliminary Construction Checklist with review comments within 10 days of receipt.
   3. When review comments have been resolved, the CxA will provide final construction checklists marked "Approved for Use, (date)."

B. Systems Required to Be Commissioned under IgCC:
   1. Domestic hot-water systems and controls.

C. Additional Systems Required to Be Commissioned:
   1. Domestic water piping, including the following:
      a. Domestic cold- and hot-water piping, fittings, and specialties inside the building.
      b. Pumps, motors, accessories, and controls.
      c. Sleeves and sleeve seals.
      d. Meters and gauges.
      e. General-duty and specialty valves.
      f. Hangers and supports.
   2. Sanitary waste and vent piping, including the following:
      a. Gravity and forced-main sewerage piping, fittings, and specialties.
      b. Sanitary waste interceptors.
      c. Pumps, motors, accessories, and controls.
      d. Drains.
      e. Sleeves and sleeve seals.
      f. Meters and gauges.
      g. Hangers and supports.
   3. Storm-water piping, including the following:
      a. Drainage piping, fittings, and specialties.
      b. Drains and collection basins.
      c. Rainwater-collection and storage equipment.
      d. Sleeves and sleeve seals.
      e. Hangers and supports.

4. Plumbing fixtures, including the following:
    a. Water closets, supports and connections, supplies, and flush valves.
    b. Urinals, supports and connections, supplies, and flush valves.
    c. Lavatories, supports, supplies, drain connections, and faucets.
    d. Sinks, supports, supplies, drain connections, and faucets.
    e. Tubs, drain connections, and faucets.

3.3 Cx TESTING PREPARATION

A. Certify that plumbing systems, subsystems, and equipment have been installed, calibrated, and started and that they are operating in accordance with the Contract Documents and approved submittals.

B. Certify that plumbing system instrumentation and control systems have been completed and calibrated, point-to-point checkout has been successfully completed, and systems are operating in accordance with their design sequence of operation, Contract Documents, and approved submittals. Certify that all sensors are operating within specified accuracy and that all systems are set to and maintaining set points as required by the design documents.

C. Set systems, subsystems, and equipment into operating mode to be tested in accordance with approved test procedures (for example, normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

3.4 Cx TEST CONDITIONS

A. Perform tests using design conditions, whenever possible.
    1. Simulated conditions may, with approval of Architect, be imposed using an artificial load when it is impractical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by CxA, and document simulated conditions and methods of simulation. After tests, return configurations and settings to normal operating conditions.
    2. Cx test procedures may direct that set points be altered when simulating conditions is impractical.
    3. Cx test procedures may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are impractical.

B. If tests cannot be completed because of a deficiency outside the scope of the plumbing system, document the deficiency and report it to Architect. After deficiencies are resolved, reschedule tests.

C. If seasonal testing is specified, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.5 CONSTRUCTION CHECKLIST EXAMPLES

A. Supervision of Alarms in Plumbing Systems:
    1. Prerequisites: Acceptance of results of construction checklists for plumbing systems specified in the following Sections:
        a. Section 22 14 29 "Sump Pumps."
        b. Section 22 34 00 "Fuel-Fired, Domestic-Water Heaters."
    2. Test Scope:
        a. Monitored plumbing system alarms.

3. Test Purpose:
   a. Verify reporting of monitored plumbing alarm at building management system.
4. Test Conditions:
   a. Alarm monitoring systems operating in normal, automatic mode.
   b. Activate monitored plumbing alarms, one at a time.
5. Acceptance Criteria:
   a. Activation of monitored plumbing alarm generates alarm at building management systemcontrol panel.
6. Test Scope:
   a. Monitored plumbing system water meters.
7. Test Purpose:
   a. Verify accuracy of reporting of monitored plumbing system water meters at building management system.
8. Test Conditions:
   a. Plumbing system water meter recording systems operating in normal, automatic mode.
   b. Compare cumulative consumption data at plumbing system water meter recording systems with independent, calibrated, flow-measuring instrumentation under the following conditions:
      1) High Flow: 90 percent of maximum design flow rate for a period of 20 minutes.
   c. Activate monitored plumbing alarms, one at a time.
9. Acceptance Criteria:
   a. Cumulative flow reported for high-flow condition is within 1 percent flow recorded by calibrated flow-measuring instrumentation.

END OF SECTION

SECTION 22 10 00 - PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Pipe and pipe fittings for the following systems:
   1. Domestic water piping, within 5 feet of building.
   2. Sanitary sewer piping, within 5 feet of building.
   3. Storm water piping.
   4. Equipment drains and over flows.
   5. Unions and flanges.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 09 91 23 "Interior Painting": Product and execution requirements for painting specified by this Section.
   3. Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment": Product requirements for pipe hangers and supports and firestopping for placement by this Section.
   4. Section 22 07 00 "Plumbing Insulation": Product requirements for piping insulation for placement by this Section.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
   2. ASME B16.3 - Malleable Iron Threaded Fittings.
   3. ASME B16.4 - Gray Iron Threaded Fittings.
   4. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
   5. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
   6. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings (DWV).
   7. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
   8. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
   9. ASME B31.9 - Building Services Piping.
   10. ASME B36.10M - Welded and Seamless Wrought Steel Pipe.
   11. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.

B. ASTM International:
   1. ASTM A47 - Standard Specification for Ferritic Malleable Iron Castings.
   2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
   3. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
   4. ASTM A234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
   5. ASTM A395 - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.

6. ASTM A536 - Standard Specification for Ductile Iron Castings.
7. ASTM B32 - Standard Specification for Solder Metal.
8. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.
9. ASTM B43 - Standard Specification for Seamless Red Brass Pipe, Standard Sizes.
10. ASTM B75 - Standard Specification for Seamless Copper Tube.
11. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
12. ASTM B251 - Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.
13. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
14. ASTM B302 - Standard Specification for Threadless Copper Pipe, Standard Sizes.
15. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV).
16. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.
17. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
18. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.

C. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
2. AWS D1.1 - Structural Welding Code - Steel.

D. American Water Works Association:
1. AWWA C104 - American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
2. AWWA C105 - American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. for Water and Other Liquids.
4. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.

E. Cast Iron Soil Pipe Institute:
1. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
2. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

F. National Fire Protection Association:
1. NFPA 99 - Standard for Health Care Facilities.

1.3 SUBMITTALS

A. Product Data: Submit data on pipe materials and fittings. Submit manufacturers catalog information.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.
B. Perform Work in accordance with State of Texas Public Works' standard.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 "Product Requirements": Requirements for transporting, handling, storing, and protecting products.
B. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.
C. Protect piping from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 "Product Requirements": Environmental conditions affecting products on site.
B. Do not install underground piping when bedding is wet or frozen.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.8 COORDINATION

A. Section 01 30 00 "Administrative Requirements": Requirements for coordination.
B. Coordinate installation of buried piping with trenching.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Ductile Iron Pipe: AWWA C151, C104.
   1. Fittings: AWWA C110, ductile iron, standard thickness.
   2. Joints: AWWA C111, rubber gasket with rods.
   3. Jackets: AWWA C105 polyethylene jacket Double layer, half lapped, 10 mil polyethylene tape.
B. Copper Tubing: ASTM B88, Type K annealed.
   1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
   2. Joints: Compression connection or Brazed, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1,190 to 1,480 degrees F.

2.2 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tubing: ASTM B88, Type L drawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead free solder or AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze.
B. Copper Tubing: ASTM B88, Type L drawn, rolled grooved ends.
   1. Fittings: ASME B16.18 cast copper alloy, or ASME B16.22 wrought copper and bronze, or ASTM B584 bronze sand castings, grooved ends.

2. Joints: Grooved mechanical couplings meeting ASTM F1476.
   a. Housing Clamps: ASTM A395 and ASTM A536 ductile iron, enamel coated, compatible with copper tubing sizes, to engage and lock designed to permit some angular deflection, contraction, and expansion.
   b. Gasket: Elastomer composition for operating temperature range from minus 30 degrees F to 180 degrees F.
   c. Accessories: Stainless steel bolts, nuts, and washers.

2.3 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Soil Pipe: ASTM A74, service weight, bell and spigot ends.
   1. Fittings: Cast iron, ASTM A74.
   2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
B. Cast Iron Pipe: CISPI 301, hub-less.
   1. Fittings: Cast iron, CISPI 301.
   2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.
C. PVC Pipe: ASTM D1785, Schedule 40, polyvinyl chloride (PVC) material, bell and spigot style solvent sealed joint ends.
   1. Fittings: ASTM D2466, Schedule 40, PVC.
   2. Joints: ASTM D2855, solvent weld with ASTM D2564 Solvent cement.

2.4 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.
   1. Fittings: Cast iron, ASTM A74.
   2. Joints: ASTM C564, rubber gasket joint devices or lead and oakum.
B. Cast Iron Pipe: CISPI 301, hub-less, service weight.
   1. Fittings: Cast iron, CISPI 301.
   2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

2.5 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74, service weight, bell and spigot ends.
   1. Fittings: Cast iron, ASTM A74.
   2. Joints: ASTM C564, rubber gasket joint devices or lead and oakum.
B. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron, CISPI 301.
   2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.
C. PVC Pipe: ASTM D2729, polyvinyl chloride (PVC) material, bell and spigot solvent sealed ends.
   1. Fittings: PVC, ASTM D2729.
   2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

2.6 STORM WATER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74 service weight, bell and spigot ends.
   1. Fittings: Cast iron, ASTM A74.
   2. Joints: ASTM C564, neoprene gasket system or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron, CISPI 301.
   2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

2.7 EQUIPMENT DRAINS AND OVERFLOWS

A. Copper Tubing: ASTM B88 Type L drawn.
   1. Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.
   2. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead free solder.
   3. To be used for hot condensate or drain piping from equipment such as water heaters and gas-fired heater condensate, refer to Division 23 Specifications.

2.8 UNIONS AND FLANGES

A. Unions for Pipe 2 Inches and Smaller:
   1. Ferrous Piping: Class 250, malleable iron, threaded.
   2. Copper Piping: Class 150, bronze unions with soldered or brazed joints.
   3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
B. Flanges for Pipe 2-1/2 Inches and Larger:
   1. Ferrous Piping: Class 250, forged steel, slip-on flanges.
   2. Copper Piping: Class 150, slip-on bronze flanges.
   3. Gaskets: 1/16-inch-thick preformed neoprene gaskets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 "Administrative Requirements": Verification of existing conditions before starting work.
B. Verify excavations are to required grade, dry, and not over-excavated.
C. Verify trenches are ready to receive piping.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
B. Remove scale and dirt on inside and outside before assembly.
C. Prepare piping connections to equipment with flanges or unions.
D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.3 INSTALLATION - BURIED PIPING SYSTEMS

A. Verify connection to existing piping system contractor to verify exact size, location, and inverts at the Project site.
B. Establish elevations of buried piping with not less than 3 feet of cover.
C. Establish minimum separation of domestic water from other services and sanitary sewer piping in accordance with local code.

D. Install pipe on prepared bedding.
E. Route pipe in straight line.
F. Install pipe to allow for expansion and contraction without stressing pipe or joints.

3.4 INSTALLATION - ABOVE GROUND PIPING

A. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
B. Install piping to maintain headroom without interfering with use of space or taking more space than necessary.
C. Group piping whenever practical at common elevations.
D. Sleeve pipe passing through partitions, walls and floors. Refer to Section 22 05 29 "Hangers and Supports for Plumbing Piping."
E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 00 "Plumbing Insulation."
G. Provide access where valves and fittings are not accessible. Coordinate size and location of access doors with Architectural Drawings.
H. Install non-conducting dielectric connections wherever jointing dissimilar metals.
I. Slope piping and arrange systems to drain at low points.
J. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.
K. Install piping penetrating roofed areas to maintain integrity of roof assembly.
L. Insulate piping. Refer to Section 22 07 00 "Plumbing Insulation."
M. Install pipe identification in accordance with Section 22 05 53 "Indentification for Plumbing Piping and Equipment."

3.5 INSTALLATION - DOMESTIC WATER PIPING SYSTEMS

A. Install domestic water piping system in accordance with ASME B31.9.

3.6 INSTALLATION - SANITARY WASTE AND VENT PIPING SYSTEMS

A. Install sanitary waste and vent piping systems in accordance with local plumbing code.
B. Install bell and spigot pipe with bell end upstream.
C. Support cast iron drainage piping at every joint.

3.7 INSTALLATION - STORM DRAINAGE PIPING SYSTEMS

A. Install storm drainage piping systems piping in accordance with ASME B31.9.
B. Install bell and spigot pipe with bell end upstream.
C. Support cast iron drainage piping at every joint.

3.8 CLEANING

A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for cleaning.

END OF SECTION

SECTION 22 14 29 - SUMP PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Sump pumps.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 23 05 00 "General Mechanical Requirements."

1.2 SUBMITTALS

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for submittal procedures.
B. Product Data: Submit data for specified products.

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum 3 years' experience.
B. Installer: Company specializing in performing Work of this Section with minimum 3 years' experience.

1.4 DELIVERY, STORAGE AND HANDLING

A. Prepare pumps and accessories for shipment to prevent entry of foreign matter into product body.
B. Store products in areas protected from weather, moisture, or possible damage; do not store products directly on ground; handle products to prevent damage to interior or exterior surfaces.

PART 2 - PRODUCTS

2.1 SUMP PUMPS

A. Manufacturers:
   1. Grundfos Pumps Corporation U.S.A, Basis of Design: Model Unilift AP50B.50.08.A1V.
   2. Bell and Gossett.
   3. Taco.
   4. Substitutions: Refer to section 23 05 00 "General Mechanical Requirements."
B. Impeller: 304 Stainless-Steel, semi-open, non-clog.
C. Casing: 304 Stainless-Steel.
D. Double Shaft Seal: Intermediate oil chamber pre-filled with non-toxic special oil.

E. Shaft: Stainless-steel.
F. Designed for continuous operation.
G. Bearings: Upper and lower heavy duty ball bearings.
H. Level switch for automatic start and stop.
I. Discharge Port: 2-Inch.

2.2 PUMP MOTORS

A. Fully submerged in high-grade turbine oil for lubrication and efficient heat transfer.
B. Power Cable: Severe duty rated, oil and water resistant, epoxy seal on motor end.
C. Built-in overload with automatic reset.
D. Class B insulation.

2.3 BUILDING MANAGEMENT SYSTEM

A. DDC system to provide 1 low level wet sensor and one high level wet sensor in sump pump pit. Refer to DDC and Sequence of Operations Specifications for more information.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify connections, size, and location are as indicated on Drawings.

3.2 INSTALLATION

A. Install sump pumps according to Drawings and manufacturer instructions.
B. Provide necessary piping, fittings, and valves as indicated on Drawings.

END OF SECTION

SECTION 22 33 00 - ELECTRIC DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.
2. Section 23 05 00 "General Mechanical Requirements."

1.2 REFERENCES

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
1. ASHRAE 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
B. American Society of Mechanical Engineers:
1. ASME PTC 25 - Pressure Relief Devices.
2. ASME Section VIII - Boiler and Pressure Vessel Code - Pressure Vessels.

1.3 SUBMITTALS

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for submittal procedures.
B. Product Data: Submit dimensioned drawings of water heaters indicating components and connections to other equipment and piping. Submit electrical characteristics and connection locations.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' experience.
B. Installer: Company specializing in performing Work of this Section with minimum 3 years' experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept water heaters on site in original labeled cartons. Inspect for damage.
B. Protect tanks with temporary inlet and outlet caps. Maintain caps in place until installation.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.7 WARRANTY

A. Refer to Division 01 and Section 23 05 00 "General Mechanical Requirements."
B. Furnish 3-year manufacturer warranty for domestic water heaters.

PART 2 - PRODUCTS

2.1 COMMERCIAL ELECTRIC WATER HEATERS

A. Manufacturers:
   1. A. O. Smith Corporation.
   2. Rheem Manufacturing Company.
   3. State Industries.
   4. Substitutions: Division 01 and Section 23 05 00 "General Mechanical Requirements" for submittal procedures.
B. Type: Factory-assembled and wired, electric, vertical storage.
C. Tank: Glass-lined welded steel; 4-inch-diameter inspection port, thermally insulated with minimum 2 inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.
D. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60 to 180 degrees F, flanged or screw-in nichrome elements, high temperature limit thermostat.
E. Accessories: Brass water connections and dip tube, drain valve, magnesium anode, and ASME rated temperature and pressure relief valve.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Maintain manufacturer's recommended clearances around and over water heaters.
B. Install water heater on concrete housekeeping pad, minimum 3-1/2 inches high and 6 inches larger than water heater base on each side.
C. Connect domestic hot and cold-water piping to supply and return water heater connections.
D. Install the following piping accessories.
   1. On Supply:
      a. Shutoff valve.
      b. Flexible Looped Heat Trap.
   2. On Return:
      a. Thermometer well and thermometer.
      b. Shutoff valve.
      c. Flexible Looped Heat Trap.
E. Install discharge piping from relief valves and drain valves to nearest floor drain.
F. Install water heater trim and accessories furnished loose for field mounting.
G. Install electrical devices furnished loose for field mounting.
H. Install control wiring between water heater control panel and field mounted control devices.
I. Install Work according to state and local standards.

END OF SECTION

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Water closets.
   2. Urinals.
   3. Lavatories.
   4. Sinks.
   5. Service sinks.
   6. Electric water coolers.
   7. Drinking fountains.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 23 05 00 "General Mechanical Requirements."

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
   2. ANSI Z358.1 - Emergency Eyewash and Shower Equipment.

B. Air-Conditioning and Refrigeration Institute:
   1. ARI 1010 - Self-Contained, Mechanically Refrigerated Drinking-Water Coolers.

C. American Society of Mechanical Engineers:
   1. ASME A112.6.1 - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use.
   2. ASME A112.18.1 - Plumbing Fixture Fittings.
   3. ASME A112.19.1M - Enameled Cast Iron Plumbing Fixtures.
   4. ASME A112.19.2M - Vitreous China Plumbing Fixtures.
   5. ASME A112.19.4 - Porcelain Enameled Formed Steel Plumbing Fixtures.
   6. ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks and Urinals.

1.3 SUBMITTALS

A. Only request submittals needed to verify compliance with Project requirements.

B. Division 01 and Section 23 05 00 "General Mechanical Requirements" for submittal procedures.

C. Product Data: Submit catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' experience

B. Installer: Company specializing in performing Work of this Section with minimum 3 years' experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Division 01 Section 23 05 00 "General Mechanical Requirements" for product storage and handling requirements.
B. Accept fixtures on site in factory packaging. Inspect for damage.
C. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.6 WARRANTY

A. Division 01 Section 23 05 00 "General Mechanical Requirements" for product warranties and product bonds.

PART 2 - PRODUCTS

2.1 FIXTURES

A. Refer to Plumbing Fixture Schedule for make, model number, and type.
B. Manufacturers:
    1. Fixtures:
        a. American Standard.
        b. Sloan.
        c. Kohler.
        d. Bradley Corp.
        e. Zurn Industries.
        f. Symmons.
        g. Woodford.
        h. Stern Williams.
        i. Halsey Taylor.
    2. Stainless Steel Fixtures:
        a. Just mfg.
        b. Elkay.
        c. Acorn.
        d. Bradley Corp.
    3. Commercial Brass:
        a. Moen.
        b. Kohler.
        c. T & S Brass.
        d. Chicago Faucets.
        e. Sloan.
    4. Drainage Products:
        a. Watts.
        b. Wade.
        c. Josam.
        d. Sioux Chief.

e. J.R. Smith.
f. Zurn.
g. Proset Trap guard.
h. Green drain.

5. Mixing Valves:
   a. Armstrong.
   b. Bradley Corp.
   c. Leonard.
   d. Watts.
6. Separators:
   a. Vaughn Concrete.
   b. Schier Products.0
   c. Striem.
   d. Zurn-Green Turtle.
   e. Orion.

C. Substitutions: Division 01 and Section 23 05 00 "General Mechanical Requirements" for substitutions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify walls and floor finishes are prepared and ready for installation of fixtures.
B. Verify electric power is available and of correct characteristics.
C. Confirm millwork is constructed with adequate provision for installation of counter top lavatories and sinks.

3.2 PREPARATION

A. Rough-in fixture piping connections according to minimum sizes indicated on the Plumbing fixture schedule for particular fixtures.

3.3 INSTALLATION

A. Install Work according to state and local codes.
B. Install each fixture with trap, easily removable for servicing and cleaning.
C. Provide chrome-plated rigid or flexible supplies to fixtures with quarter turn stops, reducers, and escutcheons.
D. Install components level and plumb.
E. Install and secure fixtures in place with wall supports or carriers and bolts.
F. Seal fixtures to wall and floor surfaces with sealant as specified, color to match fixture.
G. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.
H. For TAS or ADA accessible water closets, install flush valve with handle to wide side of stall.
I. For any plumbing fixture with an exposed p-trap provide a chrome plated cast brass p-trap with a cleanout plug, chrome plated outlet, and chrome plated cast brass escutcheon with set screw. Also provide a manufactured insulation kit made from molded closed cell vinyl that is anti-microbial and seamless. Each kit shall cover the tailpiece, p-trap, wall bend, both water supply stops, and both water risers.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Review millwork shop-drawings. Confirm location and size of fixtures and openings before rough in and installation.

3.5 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING

A. Clean plumbing fixtures and equipment.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Do not permit use of fixtures before final acceptance.

END OF SECTION

SECTION 23 05 00 - GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Work covered by this Division consists of furnishing labor, equipment, supplies, and materials and in performing Work necessary for the installation of complete and operating mechanical systems as required by these Specifications and/or shown in the Drawings, subject to the terms and conditions of the Contract. The Work also includes completion of mechanical and electrical details not indicated that are necessary for the successful operation of systems described in the Drawings or required by these Specifications; including the furnishing materials for the filling the systems to make them operable, including water, refrigerant, oil, grease, and other lubrication. If requested, prove satisfactory operation of equipment and controls to Architect/Engineer.

B. Work Not Included: Certain labor, material, and equipment may be furnished and/or installed under other Divisions of these Specifications. Coordinate with other trades and arrange his Work to make the part fit together. The following items are to be accomplished under other Divisions of these Specifications:
   1. Temporary Heat: Refer to paragraph in this Section.
   2. Temporary Water and Toilet: Refer to General Conditions.
   3. Roof Curbs: Refer to paragraph in this Section.
   4. Electrical Equipment and Wiring: Refer to paragraph in this Section.
   5. Concrete: Refer to paragraph in this Section.

C. Equipment Furnished by Owner: Rough-in services to locations as required by Architectural and Mechanical Drawings and equipment shop drawings. Provide service valves on pipes except waste and vent pipes. Making final connections to equipment is included in this Contract.

D. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 07 84 13 "Penetration Firestopping."
   3. Section 23 05 93 "Testing, Adjusting, and Balancing of HVAC."

1.2 BIDDING

A. Provide new mechanical equipment unless specified otherwise in the Specifications or in the Drawings.

B. Base bids or proposals only on the equipment and materials as scheduled in the Drawings and as specified or on approved equivalent equipment and materials. Contractors who assume equivalence of products and who base their proposal on this assumption do so at their own risk.

C. Listing of approved alternative manufacturers does not indicate that all products of a particular manufacturer are acceptable alternatives to scheduled items. Fixtures and devices are required to be submitted according to the prescribed procedures. In addition, some items that have an important visual affect, such as electric water coolers, may be required to receive Owner’s or Architect/Engineer's approval.

1.3 EXISTING UTILITIES

A. Drawings indicate the locations, type, and sizes of various utilities within the site where known. Known utilities are indicated as accurately as possible based on site surveys. If utilities are discovered during construction that are not shown in the Drawings and interfere with Work, obtain instructions from Architect prior to proceeding with Work. If required, a Change Order will address relocation or remodeling necessary. Contractor assumes responsibility for protection of utilities, shown or not, and for repair required by this construction.

B. Verify location, size, elevation, pressure, and any other pertinent data of the existing utilities. Additional costs incurred due to failure to verify such data and to coordinate associated work with respective utility providers will be borne by Contractor and not be Owner.

C. Include costs associated with providing utilities including, but not limited to, connection fees, boring under roads, etc., in proposal price, whether such costs are incurred by Contractor or charged by the utility company.

D. Submission of a Proposal by Contractor will be considered an acknowledgment by Contractor of their compliance with this Section.

1.4 CODES, PERMITS, AND FEES

A. Comply with local, state, and national codes and pay for applicable costs, fees, permits, licenses, and inspections for this Project.

1.5 TEMPORARY HEAT

A. General Contractor will furnish temporary heat. Use of the permanent heating system will not be allowed without written authorization from Architect/Engineer and Owner. In case the permanent heating system is used for temporary heat, the General Contractor will pay all the costs until acceptance by Owner. Warranties for equipment will not start until the date of Substantial Completion.

1.6 DRAWINGS

A. Contract Drawings are diagrammatic only and are not intended to be scaled for dimensions. Obtain dimensions from Architectural Drawings, certified equipment drawings, and from site conditions before fabricating and Work. Verify and coordinate space requirements and equipment locations with other trades. It is Contractors' responsibility to install the systems complete in the space provided at no additional cost to Owner.

B. It is intended that equipment or material, that is usually furnished as part of equipment specified and is necessary for operation, is furnished as part of the Contract without additional cost, whether shown or described.

C. Conceal piping in finished areas of the building except where otherwise noted in the Drawings.

D. Install equipment in accordance with manufacturer's recommendations unless approval is given in writing by Architect for deviation.

1.7 REQUIREMENTS OF REGULATORY AGENCIES

A. Provide mechanical Work in accordance with local and state codes, ordinances, and regulations governing the specified Work involved. Furnish, without extra charge, additional material and labor when and where required to comply with these Rules and Regulations, whether the Work is mentioned in the Specifications or shown in the Drawings or not. When the Specifications or Drawings indicate describe materials or construction of better quality or larger sizes than required by the above-mentioned Rules and Regulations, the provisions of these Specifications and accompanying Drawings will take precedence.

1.8 QUALIFICATIONS

A. Provide mechanics that are capable journeymen, skilled in the work assigned to them with licensing required by the inspecting authority. Welders must have been certified within the past 3 years to perform required welding.

1.9 WARRANTY

A. Warrant workmanship, material, and equipment and replace defective material, equipment, or systems, at no additional cost to Owner, for 1 year after the Date of Substantial Completion as defined in General Conditions.
B. Provide warranty durations over 1 year as described above (that covers equipment installed on this Project) to Owner in the Operation and Maintenance Manual, along with the start and end of warranty dates.
C. Refer to General Conditions for additional information regarding specific warranty requirements.

1.10 PROJECT RECORD DOCUMENTS

A. Prior to final payment, provide Architect/Engineer with set of Drawings and Specifications corrected up to date as job progresses. These documents will reflect the As-Built conditions. Refer to General Conditions for additional information.

1.11 SUBSTITUTED PRODUCTS

A. Material or equipment specified by manufacturer's name is being used as a basis of standard, unless otherwise noted. Architect will be the sole judge on the equivalence of substituted equipment and materials.
B. It is Contractor's responsibility to verify that submitted equipment will fit in space available. Contractor's submittal for requesting approval of the substitution will include a written statement of whether or not such acceptance would require any subsequent or associated changes to the Drawings or Specifications. Completely describe necessary changes in an Request for Information (RFI). Refer to Section 01 30 00 "Administrative Requirements" and 01 60 00 "Product Requirements."
C. Contractor will be responsible for the costs of Project modifications due to substitution of materials or equipment for what was specified or scheduled. The cost will be complete, including the costs necessary to accommodate modifications effecting other trades.
D. Architect may request detailed Shop Drawing or plan layouts of mechanical rooms or systems of the substituted equipment.

1.12 SAFETY

A. General: Contractor will be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work, and Contractor will comply with all laws governing safety, specifically state and federal "Occupational Safety and Health Standards" and the "Safety and Health Regulations for Construction."

B. According to OSHA, a hazardous chemical is any chemical that is a physical hazard or a health hazard. This may include items such as paints, solvents, adhesives, sealants, cleaners, etc. If a Contractor produces, uses, or stores hazardous chemicals at the workplace, then Contractor will develop, implement, and maintain a hazard communication program in compliance with the latest OSHA requirements. Provide required methods of training, information, handling, ventilation, labeling, storing, disposal, and removal of hazardous chemicals.

1. In Projects with multiple tenants in which the building is partially occupied during all or part of the Project, Contractor will inform the Building Manager or Owner, according to OSHA guidelines, of any hazardous chemicals being produced, stored, or used in the building so that other tenants may be notified.

1.13 LABELING

A. Each device where an independent testing authority has established a standard will have affixed a label indicating its compliance and listing. Refer to Section 01 42 00 "References" for list of independent testing authorities.

1.14 SITE VISIT REPORTS

A. During the course of the Project, Architect/Engineer will make site visits to observe Work in progress and will subsequently prepare a written site visit report, that will be sent to Contractor and to other parties as necessary. Prepare a written response addressing items requiring clarifications or explanation within 7 calendar days of receiving the site visit report. Include in response the following information.

1. Date of site visit by Architect.
2. Date of receipt of the site visit report.
3. Name and title of the preparer of the response.
4. An item number referenced to the site report.
5. A brief 3- or 4-word description of the item.
6. Contractor or Subcontractor affected.
7. The proposed course of action.
8. An expected time of completion of the action.

1.15 CUTTING AND PATCHING

A. Do not cut, drill, or alter joists, beams, girders, columns, slabs, or other structural elements without first obtaining written permission and instructions from Architect.
B. Where it is necessary to cut through non-structural elements of walls, floors, or ceilings to permit the installation of Work under this Contract, or to repair defects that may appear during warranty duration, provide cutting with as little damage as possible to the construction being cut or to adjacent construction.
C. After the necessary Work has been completed, damage will be repaired by the respective Contractor, and pay all costs of such cutting, repairs, and patching. Patching or sealing of cuts, penetrations, and other alterations necessary, including final appearance of same, will be accomplished to the approval of Architect.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials will be new, free from defects, and of specified quality, unless specifically noted otherwise. Manufacturer names mentioned in the Specifications or in the Drawings are to establish a standard of quality, performance, and construction.
B. Contractor will be responsible for transportation of his material to and from the job site and for the storage and protection of his materials and Work until the date of Substantial Completion. At the end of each day of Work, each Contractor is responsible for covering or protecting their Work and/or materials that may be susceptible to damage even if damage is the result of unforeseen weather events. Failure to do so will be sufficient cause for rejection of items in question, and any such items will be replaced by Contractor at no additional cost to Owner.
C. Verify that all pieces of equipment will fit through available openings in the building and that all equipment can be installed without modification to the building structure.

2.2 EQUIPMENT SCHEDULE

A. Equipment specified in the equipment schedules on the Drawings will be new and furnished complete with all accessories normally supplied with the catalog item listed and all other accessories necessary for a complete and operational installation.
B. Indicated equipment will require start-up by factory-trained personnel. Equipment so noted will require factory-approved service personnel who will provide service, including parts and labor, during the warranty period of equipment.

2.3 EQUIPMENT RATINGS

A. Equipment capacities as scheduled in the Drawings are at Project site altitude. Capacities of submitted equipment must be corrected for Project site altitude unless otherwise noted.

2.4 WORKMANSHIP

A. Provide workmanship and construction according to the best practices of the trade. Conceal Piping, ducting, and conduit unless otherwise noted, and installed square to the building lines. Work not meeting this requirement will be replaced or rebuilt without extra expense to Owner.

2.5 V-BELT DRIVES

A. Provide V-belt drives of fabric and rubber construction approved by the manufacturer. Match multiple belts, adjusted to drive the apparatus properly, and to prevent slippage and undue wear in starting motor nameplate rating.

2.6 BELT GUARDS

A. Provide for each V-belt drive a painted steel belt guard, constructed around a steel angle frame, securely bolted to the floor or apparatus. Completely enclose drives and pulleys to comply with safety requirements. Provide hinged access doors not less than 6 by 6 inches for access to motors and fan shafts for test purposes.

2.7 ELECTRICAL WIRING AND CONTROL EQUIPMENT

A. Provide disconnects, motor starters, relays, wiring, etc., that comply with requirements of this Section.
B. Mechanical Contractor must refer to the electrical control equipment and wiring shown on the Electrical Drawings. Any changes or additions required by specified or substituted equipment furnished will be the complete responsibility of Contractor furnishing the equipment.
C. Verify electrical equipment characteristics (voltage, etc.) by Mechanical Contractor prior to ordering. It is imperative that voltage and phase characteristics are verified with the Electrical Drawings.
D. Provide motors that comply with current applicable IEEE, ASA, and NEMA standards. Provide general-purpose motors that are open drip-proof machines for installation indoors and/or in protected locations.
    1. Provide totally enclosed fan cooled (TEFC) motors used in areas of exposure to weather or other environmental contamination.
    2. Provide rated explosion-proof motors when located in hazardous atmospheres.
    3. Type II weather-protected motors may be used instead of TEFC motors on roof fan units and similar equipment.
    4. Provide shields for motors mounted in direct sun to prevent direct radiation from the sun when the sun is 45 degrees F or greater above the horizon.
E. Unless indicated otherwise, provide motors that are NEMA Design B with a service factor of 1.15 with 40 degrees C rise and total temperature rise of 65 degrees C ambient and when powered from the system voltage feeding the motor.
    1. Provide TEFC motors that have a service factor of 1.00 with total temperature rise of 65 degrees C in the above conditions.
    2. Provide single-phase motors that are NEMA Type N split-phase induction motors with built-in thermal protectors. Single-phase motors connected to loads requiring high starting torque will be capacitor-start induction motors.
F. Provide motors that are copper wound, high power factor rated. Electric motors will be an energy-efficient type as defined in the latest edition of ANSI/NEMA Document MG 1: Motors and Generators. Provide motor efficiency information if requested by Architect.
G. If there is not a separate "Controls Contractor" for this Project, Mechanical Contractor is responsible for providing and installing necessary control wiring. Wiring and conduit are to be provided and installed as indicated in Division 26 Specifications.

2.8 EQUIPMENT AND PIPING SUPPORTS

A. Supporting systems for piping, equipment, and materials supported by the building structure will be submitted to Architect for approval prior to purchase and installation.

B. Roof Supports: Provide and install roof supports for uninsulated piping routed on the roof.

1. For single pipes up to 5 inches in size, such as gas pipes, provide MAPA, MS-4RA or MS-5RA roof supports, that consist of a 1-piece combination roof deck base, adjustable height pipe supports, and hard cast rubber roller with nylon bushings. Provide walk pad under pipe support as recommended by the pipe support manufacturer. Anchor pad and support to roof as recommended by support manufacturer.
2. Manufacturer's installation recommendations may vary depending on roof types. Installer is responsible for verifying the roof type and adhering to the applicable installation instructions.
3. Space roof supports as recommended by the manufacturer.

2.9 ROOF PENETRATIONS

A. Piping: Provide penetrations with factory-made assemblies designed specifically for the purpose. The use of pitch pans or pitch pockets is not allowed. Provide a factory-made penetration assembly as follows:

1. For pipes and conduits up to 3 inches in diameter that can or are intended to be turned to horizontal after passing through the roof (e.g., small electrical conduit, gas piping, refrigerant lines, water pipes, etc.) provide a device consisting of a curb assembly with a welded 18-gauge galvanized steel shell and base, 1-1/2 inches thick 3 pcf rigid insulation, 0.50-inch aluminum or 20-gauge galvanized cap with minimum 3-inch overhang and 1-inch rigid insulation, and 2- by 6-inch treated wood nailer; Custom Curb Model CPC, ThyCurb Model RP-2 with TC-1, 2, or 3 curb, or approved equivalent.

B. Ductwork without Equipment: Provide penetrations with a factory-made insulated roof curb. Fabricate curb of welded 18-guage galvanized steel shell and base plate, lined with 1-1/2-inch 3 pcf rigid insulation, a minimum 2- by 2-inch treated wood nailer, and be reinforced with 1-inch by 1-inch by 1-ft.-8-in. steel angel on sides 24 inches and larger; Custom Curb, Inc., ThyCurb, Roof Products and Systems, Pate, or approved equivalent.

C. Ductwork with Equipment: Provide roof-mounted equipment such as exhaust or supply fans, relief or intake hoods, packaged rooftop air conditioners, air handlers, etc., with an insulated roof curb designed to mate with the equipment and include a weatherproof enclosure. If a pre-insulated curb is not available, an uninsulated curb is acceptable if Contractor provides and installs field insulation per manufacturer's instructions. Deliver roof curbs to Roofing Contractor for installation.

D. General:

1. Coordinate roof flashing assemblies and roof curbs with other Work through Roofing Contractor to ensure that flashing, canting, insulation type and location is correct and appropriate for the specified roof construction type.
2. Select and provide roof curb so that the top of the curb will be level after installation. Provide tapered curb as required to match roof slope. The curb will provide a minimum clearance of 10 inches between the top of the finished roof surface and the top of the wood nailer, continuous around the curb perimeter.

3. Curb Fabrication: Unless otherwise noted, provide welded 18-gauge galvanized steel shell and base, mitered 3-inch cant, variable step to match roof insulation, 1-1/2-inch-thick insulation, and factory-installed treated wood nailer. Provide tapered curbs to match roof slope.
4. Roof penetration location indicated on the Drawings is approximate. Refer to the Architectural and Structural Drawings for the structural openings. Refer to "Cutting and Patching" paragraph in this Section for more information.
5. Provide other options for roof curbs as scheduled in the Drawings.

2.10 ACCESSIBILITY

A. Access Panels: Provide access panels where necessary for possible future replacement, adjustment, or maintenance of operating devices such as machinery, valves, dampers, switches, relays, etc., or to other critical non-operating devices such as pull boxes, inspection parts, gauges, etc. Access panels will be provided and installed by Contractor, whether or not shown in the Drawings, and approved by Architect of type, color and application.
   1. Where access panels are installed in fire rated construction, provide panels that are UL rated to maintain rating of the construction penetrated.

B. Access to Equipment:
   1. Pipes, tubing, conduit, etc., including but not limited to draining piping, electrical conduit, wiring not in conduit, and pneumatic control tubing will be installed in such a way so as allow convenient and serviceable removal, operation, use, or maintenance of equipment, access panels or doors, pathways (especially in attics or crawlspaces), observation ports, measurement, balancing devices, or junction boxes.
   2. If access for these purposes is prevented or made unreasonably difficult in the opinion of Architect, make modifications or repairs at no additional cost. Modifications or repairs will be considered neither complete nor adequate until Architect is satisfied that access for the above purpose is achieved.

2.11 PROTECTION OF PENETRATION

A. Penetrations of fire or smoke barriers will be sealed, sleeves (if any), insulation (if any), and vibration isolation (if any) that maintain the fire or smoke resistance rating of the barrier in accordance with the latest edition of NFPA 101 Life Safety Code. Refer to Section 07 84 13 "Penetration Firestopping" for penetration requirements.

B. Verify locations and type of partition penetrations from the Drawings. Provide Sealing material and methods per UL requirements.

2.12 BEDDING COURSE

A. Bedding Course: A naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

PART 3 - EXECUTION

3.1 STORAGE

A. Provide for proper storage of all materials and equipment and assume responsibility for losses due to any cause. Storage will be within the contract limits of the building site or in a bonded warehouse. Cover, store, and protect equipment and materials from inclement or detrimental conditions. Items that have become damaged, rusted, or rendered unusable will not be permitted to be installed.

B. Provide temporary storage facilities suitable for equipment stored at the job site. Provide rainproof and lockable storage as required. Materials or equipment stored on site that is not in a lockable rainproof storage facility will be stored above ground or above slab. Take necessary precautions to prevent entry of and/or damage from dirt, trash, water, or vermin. Equipment not properly stored and protected will be, at the discretion of Architect/Engineer, replaced at no additional cost to Owner. Do not store equipment or material on roofs unless specifically allowed in by Architect.

3.2 INSTALLATION AND ARRANGEMENT

A. Install Work to permit removal (without damage to other parts) of coils, heat exchanger bundles, boiler tubes, fan shafts and wheels, filters, belt guards, sheaves, and drives, and all other parts that might require periodic replacement or maintenance. Arrange pipes, ducts, and equipment to permit ready access to valves, traps, starters, motors, control components, and to clear opens of doors and of access panels.

B. Offsets, transitions, and changes in direction in pipes and ducts will be made as required to maintain proper headroom and pitch of sloping pipes whether indicated in the Drawings or not. Furnish and install all traps, air vents, sanitary vents, etc., as required to affect these offsets, transitions, and changes in direction.

C. Duct transitions and offsets required to connect ductwork to equipment will be made as required whether or not indicated in the Drawings.

3.3 PROTECTION OF WORK AND PROPERTY

A. Protect existing facilities, whether or not such facility is to be removed or relocated or remain as installed. Move or remove facilities so as not to cause interruption to the Work or Owner's Operation.

B. Cover and protect pipe and duct openings with caps or plugs during installation. Cover and protect fixtures against damage. At final completion, clean and deliver Work in an unblemished condition or refinished and repainted at the discretion of Architect.

3.4 CONCEALED AND EXPOSED WORK

A. "Concealed" is intended to mean within such spaces as pipe chases, pipe trenches, above plaster ceilings, in walls and buried pipe is inaccessible when building is completed. "Exposed" is intended to be within equipment rooms, unfinished spaces, above "pushup" ceilings, accessible pipe tunnels, etc., where pipe is accessible.

3.5 CONCRETE

A. Mechanical Contractor will coordinate requirements for concrete supporting or necessary mechanical equipment. All concrete will be furnished under the Architectural Divisions of these Specifications.

3.6 FIELD MEASUREMENTS

A. Verify the dimensions and conditions governing Work at the Project site and examine adjoining Work on which Work is dependent, for Project efficiency. Report Project conditions that require correction to Architect.

3.7 LUBRICATION

A. Provide oil and grease for the operation of equipment until acceptance. Repair or replace damaged bearings operated prior to Date of Substantial Completion. Protect bearings and shafts during installation and thoroughly lubricate the steel shafts to prevent corrosion.

3.8 MANUFACTURER'S DIRECTION

A. Install equipment in accordance with directions and recommendations provided by the manufacturer. Where manufacturer’s instructions conflict with the Drawings and Specifications, report conflicts to Architect, who will determine changes deemed necessary and desirable.

3.9 FLUSHING, CLEANING, AND STERILIZING

A. Before final connections are made in the piping systems, blow-out piping with air and completely wash-out with cleaning compounds. Flush the systems for complete removal of foreign and deleterious materials. Furnish temporary connections, valves, etc., required for this purpose.
B. After flushing, sterilize domestic water systems with an approved chlorinating agent to provide a dosage of not less than 50 ppm. After a minimum contact period of 8 hours, flush the system with clean water until the residual chlorine is no greater than the municipal water supply.

3.10 TESTS

A. Test storm, vent, and waste lines with either a 5-psi air test or a standing water test of 10 feet of head pressure. Do not test plastic pipe with air. Hold test for a minimum of one hour, or as required by local code.
B. Test new domestic cold, hot, and recirculating hot water service lines as follows:
    1. Test hydrostatically at not less than the working pressure of the system or by an air test of 50 psig. Do not test plastic pipe with air. Hold test for a minimum of 1 hour, or as required by local code. Use potable water for the hydrostatic test.
C. Test new gas lines at 1-1/2 times the proposed maximum working pressure, but not less than 5 psig. Hold test a minimum of 2 hours, or as required by local code.
D. Test fire protection system at 200 psig. Hold test for a minimum of 2 hours, or as required by local code.
E. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.

F. Tests will be witnessed and approved by Architect and the local Authority Having Jurisdiction (AHJ) before covering or insulating. Demonstrate satisfactory operation of blowers, pumps, and other equipment with moving parts to Architect. Equipment without movable parts will have pressure or other tests performed by Contractor to demonstrate satisfactory operation.
G. Furnish instruments, pumps, blowers, and equipment required for the testing.
H. Provide test result reports for inclusion on the Operations and Maintenance Manuals and submit one copy to Architect.

3.11 PAINTING

A. Thoroughly clean, primed (if not factory primed), and finish coat surfaces of equipment and material not provided with a factory finish coat with a high-quality alkyd industrial enamel of a color selected by Architect or Owner.

3.12 SPECIAL OPENINGS

A. Schedule delivery of large equipment requiring special openings for installation before enclosing of area. Where this is not possible, written notice of required openings that must be provided will be listed by size and location and submitted to General Contractor prior to enclosing the areas involved. Work required to construct openings and the associated cost of enclosing them will be done at no additional cost to Owner.

3.13 PLACING IN OPERATION

A. Ducts, pipes, equipment, controls, etc., will be cleaned of foreign debris and other deleterious material.
B. Prior to Date of Substantial Completion, thoroughly clean or replace strainers, lubricate bearings, and clean-out and prime drains. Clean filters permanent filters. Replace throwaway-type filters with new filters.
C. Place systems in operation.
D. Verify that controls are set to meet specified operating conditions.
    1. Example: Boiler operating control set at 180 degrees F. Limit control set at 200 degrees F.
E. Verify that parts of equipment are operable and that sequences of controls are properly set.
F. Adjust seating through the first year as required by Architect/Engineer.

3.14 BALANCING, TESTING, AND ADJUSTING THE MECHANICAL SYSTEMS

A. Include in proposal the cost of testing, adjusting, and balancing (TAB). Refer to the TAB Specification (Section 23 05 93 "Testing, Adjusting, and Balancing of HVAC"). Coordinate with TAB Contractor to correct deficiencies noted by the TAB Contractor during TAB testing.
B. Commissioning:
    1. Mechanical Contractor will coordinate and cooperate with the Commissioning Agent to correct deficiencies noted by the Commissioning Agent.

3.15 OPERATION AND MAINTENANCE INSTRUCTIONS

A. Prepare operating and maintenance manuals and deliver O&M manuals to Architect/Engineer for approval. Index manuals with dividers for each Section. Delivery and approval of required documents is a condition for final acceptance and payment. Refer to Section 01 70 00 "Execution and Closeout Requirements."

B. Each manual will contain, but not limited to, the following general sections:
   1. Certificates of acceptance from the inspecting authorities.
   2. Waiver of liens.
   3. Warranties with starting dates and end dates for each piece of equipment and/or for each system (warranties will begin on the date of Substantial Completion and acceptance by Owner).
   4. Names, telephone, and fax numbers, and addresses of all subcontractors, vendors, manufacturer's representatives, and warranty providers.
   5. Certification letters from each Contractor that each system furnished and installed by that Contractor and/or subcontractors is started up, balanced, adjusted, and checked for proper operation in accordance with the intent of the Contract Documents.
   6. Spare parts lists for each piece of equipment.
   7. Lubrication charts showing types of lubrication and application methods and frequencies.
   8. Filter cleaning or replacement schedule (on Contractor's letterhead stationery).
   9. Preventative maintenance schedule for checking all items such as belt drives, safety controls, oil and refrigerant charges, and seasonal change over recommendations. Cleaning of all strainers, traps, coils, tower pans, tubes, sprays, etc. (on Contractor's letterhead stationery).
   10. Normal operating instructions including a sequence of operations (on Contractor's letterhead stationery).
   11. Instructions as to procedures to be followed for emergency situations, such as alarms or safety items being tripped (on Contractor's letterhead stationery).
   12. Instruction on who to call for service during guarantee period (on Contractor's letterhead stationery).
   13. As-Built Drawings.
   14. Copy of approved Shop Drawing submittals including nameplate date, design parameters, name, telephone and fax numbers, address of vendor, manufacturer's representative, and warranty provider.

C. Final payment approval will not be granted until tests, balancing, and operating instruction portions have been completed.

3.16 INSTRUCTIONS TO OWNER

A. Instruct Owner's operating personnel in the operations and maintenance of mechanical systems and equipment. Provide a minimum of 8 hours of training. Furnish special servicing tools required for maintenance.

B. Conduct a demonstration of the installation upon completion and final acceptance of the Work. Provide a minimum 8-hour demonstration. Prior to the demonstration, ensure that Work has been completed, tested, balanced, and placed in proper operation. Provide qualified personnel to be present at demonstrations to operate systems and prove the proper performance of equipment. Coordinate demonstration schedule with Architect and Owner.

3.17 EXCAVATION FOR PIPE AND CONDUIT

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

1. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade. Level bottom of all trenches and cover all PVC pipe with processed chat (small gravel).
    a. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
    b. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
    c. Excavate trenches 4 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

C. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

D. Backfill piping and conduit trenches across pavement with 2-sack lean concrete fill to within 12 inches of finished grade.

E. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D698:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 92 percent.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 85 percent.

F. Install detectable warning tape above conduits and pipe, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

G. Protection:

1. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
2. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
    a. Scarify or remove and replace soil material to depth as directed by Architect/Engineer; reshape and recompact.
3. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
    a. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

H. Disposal of Surplus and Waste Materials:
   1. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property unless otherwise directed by Owner.
   2. Repair: Repair to original condition damage to shrubs, grass, or structures by Contractor at no additional expense to Owner.

I. Bracing and Sheeting: Sheet and brace open cut trenches as required by Federal OSHA and the requirements of the State of Texas as necessary for the safety of workers or the protection of property.

END OF SECTION

SECTION 23 05 00.20 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. The following basic mechanical materials and methods to complement other Division 23 Sections.
      a. Piping materials and installation instructions common to most piping systems.
      b. Concrete equipment base construction requirements.
      c. Equipment nameplate data requirements.
      d. Labeling and identifying mechanical systems and equipment is specified in Section 23 05 53 "Identification for HVAC Piping and Equipment."
      e. Nonshrink grout for equipment installations.
      f. Field-fabricated metal and wood equipment supports.
      g. Installation requirements common to equipment Specification Sections.
      h. Cutting and patching.
      i. Touch-up painting and finishing.
   2. Pipe and pipe fitting materials are specified in piping system Sections.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 23 05 00 "General Mechanical Requirements."
   3. Section 23 05 53 "Identification for HVAC Piping and Equipment."

1.2 DEFINITIONS

A. Pipe, pipe fittings, and piping include tube, tube fittings, and tubing.

B. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below the roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

C. Exposed Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

D. Exposed Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

E. Concealed Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and duct shafts.

F. Concealed Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.3 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 01 and Section 23 05 00 "General Mechanical Requirements."

B. Product data for following piping specialties:
   1. Mechanical sleeve seals.
   2. Dielectric Fittings.
   3. Access Doors.

1.4 QUALITY ASSURANCE

A. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications."
   1. Comply with provisions of ASME B31 Series "Code for Pressure Piping."
   2. Certify that each welder has passed AWS qualification tests for the welding processes involved and that certification is current.
B. ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
C. Equipment Selection: Equipment of greater or larger power, dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. No additional costs will be approved for these increases if larger equipment is approved. If minimum energy ratings or efficiencies of the equipment are specified, the equipment must meet the design requirements and commissioning requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied endcaps. Maintain endcaps through shipping, storage, and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.
B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. When stored inside, do not exceed structural capacity of the floor.
C. Protect flanges, fittings, and piping specialties from moisture and dirt.
D. Protect stored plastic pipes from direct sunlight. Support to prevent sagging and bending.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate mechanical equipment installation with other building components.
B. Arrange for chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
C. Coordinate the installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in the building.
E. Coordinate connection of electrical services.
F. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
G. Coordinate requirements for access panels and doors where mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in this Section and Division 08.
H. Coordinate installation of identifying devices after completing covering and painting where devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 PIPE AND PIPE FITTINGS

A. Refer to individual piping system Specification Sections for pipe and fitting materials and joining methods.
B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual piping system Specification Sections in Division 23 for special joining materials not listed below.
B. Pipe Flange Gasket Materials: Suitable for the chemical and thermal conditions of the piping system contents.
   1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, except where thickness or specific material is indicated.
      a. Full-Face Type: For flat-face, Class 125 cast-iron and cast-bronze flanges.
      b. Narrow-Face Type: For raised-face, Class 250 cast-iron and steel flanges.
   2. ASME B16.20 for grooved, ring-joint, steel flanges.
   3. AWWA C110, rubber, flat face, 1/8-inch-thick, except where other thickness is indicated; and full-face or ring type, except where type is indicated.
C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, except where other material is indicated.
D. Plastic Pipe Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, except where other type or material is indicated.
E. Solder Filler Metal: ASTM B32.
   1. Alloy Sn95 or Alloy Sn94: Tin (approximately 95 percent) and silver (approximately 5 percent), having 0.10 percent lead content.
F. Brazing Filler Metals: AWS A5.8.
   1. BCuP Series: Copper-phosphorus alloys.
   2. BAg1: Silver alloy.
G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
H. Solvent Cements: Manufacturer's standard solvents complying with the following:
   1. Chlorinated Poly (Vinyl Chloride) (CPVC): ASTM F493.
   2. Poly (Vinyl Chloride) (PVC): ASTM D2564.
I. Plastic Pipe Seals: ASTM F477, elastomeric gasket.
J. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon steel bolts, and nuts.
K. Couplings: Iron body sleeve assembly, fabricated to match outside diameters of plain-end pressure pipes.
   1. Sleeve: ASTM A126, Class B, gray iron.
   2. Followers: ASTM A47, Grade 32510, or ASTM A536 ductile iron.
   3. Gaskets: Rubber.
   4. Bolts and Nuts: AWWA C111.
   5. Finish: Enamel paint.

2.3 PIPING SPECIALTIES

A. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type where required to conceal protruding fittings and sleeves.
   1. Inside Diameter: Closely fit around pipe, tube, and insulation.
   2. Outside Diameter: Completely cover opening.
   3. Cast Brass: One-piece, with setscrew.
      a. Finish: Rough brass.
      b. Finish: Polished chrome plate.
   4. Cast Brass: Split casting, with concealed hinge and setscrew.
      a. Finish: Rough brass.
      b. Finish: Polished chrome plate.
   5. Stamped Steel: One-piece, with setscrew and chrome-plated finish.
   6. Stamped Steel: One-piece, with spring clips and chrome-plated finish.
   7. Stamped Steel: Split plate, with concealed hinge, setscrew, and chrome-plated finish.
   8. Stamped Steel: Split plate, with concealed hinge, spring clips, and chrome-plated finish.
   9. Stamped Steel: Split plate, with exposed-rivet hinge, setscrew, and chrome-plated finish.
   10. Stamped Steel: Split plate, with exposed-rivet hinge, spring clips, and chrome-plated finish.
   11. Cast-Iron Floor Plate: One-piece casting.

B. Dielectric Fittings: Assembly or fitting having insulating material isolating joined dissimilar metals to prevent galvanic action and stop corrosion.
   1. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld neck end types and matching piping system materials.
   2. Insulating Material: Suitable for system fluid, pressure, and temperature.
   3. Dielectric Unions: Factory-fabricated, union assembly for 250-psig minimum working pressure at a 180 degrees F temperature.
   4. Dielectric Flanges: Factory-fabricated, companion-flange assembly for 150- or 300-psig minimum pressure to suit system pressures.
   5. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
      a. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure to suit system pressures.
   6. Dielectric Couplings: Galvanized-steel coupling, having inert and noncorrosive, thermoplastic lining, with threaded ends and 300-psig minimum working pressure at 225 degrees F temperature.
   7. Dielectric Nipples: Electroplated steel nipple, having inert and noncorrosive thermoplastic lining, with combination of plain, threaded, or grooved end types and 300-psig working pressure at 225 degrees F temperature.

C. Mechanical Sleeve Seals: Modular, watertight mechanical type. Components include interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve. Connecting bolts and pressure plates cause rubber-sealing elements to expand when tightened.

D. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:

1. Steel Sheet Metal: 24-gauge or heavier galvanized sheet metal, round tube closed with welded longitudinal joint.
2. Steel Pipe: ASTM A53, Type E, Grade A, Schedule 40, galvanized, plain ends.
3. Cast-Iron: Cast or fabricated wall pipe equivalent to ductile-iron pressure pipe, having plain ends and integral water stop, except where other features are specified.
4. Wall Penetration Systems: Wall sleeve assembly, consisting of housing, gaskets, and pipe sleeve, with 1 mechanical-joint end conforming to AWWA C110 and 1 plain pipe-sleeve end.
   a. Penetrating Pipe Deflection: Five percent without leakage.
   b. Housing: Ductile-iron casting having waterstop and anchor ring, with ductile-iron gland, steel studs and nuts, and rubber gasket conforming to AWWA C111, of housing and gasket size as required to fit penetrating pipe.
   c. Pipe Sleeve: AWWA C151, ductile-iron pipe.
   d. Housing-to-Sleeve Gasket: Rubber or neoprene push-on type of manufacturer's design.
5. Cast-Iron Sleeve Fittings: Commercially made sleeve having an integral clamping flange, with clamping ring, bolts, and nuts for membrane flashing.
   a. Underdeck Clamp: Clamping ring with setscrews.

2.4 GROUT

A. Nonshrink, Nonmetallic Grout: ASTM C1107, Grade B.

1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5,000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.5 ACCESS DOORS

A. Flush-mounted steel access doors with 16-gauge frame and 14-gauge panel. Prime coat finish. Concealed spring hinges, screwdriver cam-lock. Provide doors in fire-rated construction that are UL listed and labeled. Doors to be Milcor or approved equivalent.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. General: Install piping as described below, except where system Sections specify otherwise. Individual piping system Specification Sections in Divisions 21, 22, and 23 specify piping installation requirements unique to the piping system.

B. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, except where deviations to layout are approved on Coordination Drawings.
C. Install piping at indicated slope.
D. Install components having pressure rating equal to or greater than system operating pressure.
E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.
F. Install piping free of sags and bends.
G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, except where indicated.
H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.
I. Install piping to allow application of insulation plus 1-inch clearance around insulation.
J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
K. Install fittings for changes in direction and branch connections.
L. Install couplings according to manufacturer's printed instructions.
M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wallboard partitions, and suspended ceilings according to the following:
    1. Chrome-Plated Piping: Cast-brass, one-piece, with setscrew, and polished chrome-plated finish. Use split-casting escutcheons, where required, for existing piping.
    2. Uninsulated Piping Wall Escutcheons: Cast-brass or stamped-steel, with setscrew.
    3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
    4. Insulated Piping: Cast-brass or stamped-steel, with concealed hinge, spring clips, and chrome-plated finish.
    5. Piping in Utility Areas: Cast-brass or stamped-steel, with setscrew or spring clips.
N. Sleeves are required for core-drilled holes.
O. Install sleeves for pipes passing through concrete and masonry walls, concrete floor, roof slabs, and where indicated.
P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, concrete floor, and roof slabs, and where indicated.
    1. Cut sleeves to length for mounting flush with both surfaces.
        a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 4 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring where specified.
    2. Build sleeves into new walls and slabs as work progresses.
    3. Install large enough sleeves to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
        a. Steel Pipe Sleeves: For pipes smaller than 6 inches.
        b. Steel Sheet-Metal Sleeves: For pipes 6 inches and larger that penetrate gypsum board partitions.
        c. Cast-Iron Sleeve Fittings: For floors having membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 4 inches above finished floor level. Flashing is specified in Division 07.
            1) Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.
    4. Except for below-grade wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants specified in Division 07.

Q. Above Grade, Exterior Wall, and Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installation of mechanical seals.
   1. Install steel pipe for sleeves smaller than 6 inches.
   2. Install cast-iron wall pipes for sleeves 6 inches and larger.
   3. Assemble and install mechanical seals according to manufacturer's printed instructions.

R. Below Grade, Exterior Wall, and Pipe Penetrations: Install cast-iron wall pipes for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installation of mechanical seals.
   1. Below Grade, Exterior Wall, and Pipe Penetrations: Install ductile-iron wall penetration system sleeves according to manufacturer's printed installation instructions.

S. Fire Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping sealant material. Firestopping materials are specified in Division 07.

T. Verify final equipment locations for roughing in.

U. Refer to equipment specifications in other Sections for roughing-in requirements.

V. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping system Sections.
   1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
   2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
   3. Soldered Joints: Construct joints according to AWS "Soldering Manual," in "The Soldering of Pipe and Tube" chapter.
   4. Brazed Joints: Construct joints according to AWS "Brazing Manual" in the "Pipe and Tube" chapter.
   5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full inside diameter. Join pipe fittings and valves as follows:
      a. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
      b. Apply appropriate tape or thread compound to external pipe threads (except where dry seal threading is specified).
      c. Align threads at point of assembly.
      d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
      e. Damaged Threads: Do not use pipe or pipe fittings having threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
   6. Welded Joints: Construct joints according to AWS D10.12 "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe" using qualified processes and welding operators according to the "Quality Assurance" Article.
   7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

W. Piping Connections: Except as otherwise indicated, make piping connections as specified below.
   1. Install unions in piping 2 inches and smaller adjacent to each valve and at final connection to each piece of equipment having a 2-inch or smaller threaded pipe connection.
   2. Install flanges in piping 2-1/2 inches and larger adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
   3. Dry Piping Systems (Gas): Install dielectric unions and flanges to connect piping materials of dissimilar metals.
   4. Wet Piping Systems (Water): Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to provide the maximum possible headroom where mounting heights are not indicated.
B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.
C. Install equipment level and plumb, parallel, and perpendicular to other building systems and components in exposed interior spaces, except where otherwise indicated.
D. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
E. Install equipment giving right-of-way to piping systems installed at a required slope.

3.3 ACCESS DOORS

A. Furnish an access door for each pipe chase for each floor. This includes both toilet plumbing chases and pipe riser chases. Access doors assembly to be 16 by 16 inches. Access doors are not shown on floor plans. Access door locations shall be field verified.
B. Also, furnish access doors in all non-removable ceilings and in partitions and walls where necessary access to plumbing cleanouts, shock absorbers, fire dampers, manual dampers, valves, and other mechanical devices requiring access. Size these as required for access with minimum of 12 by 12 inches.
C. Any access doors furnished for installation in fire-rated surfaces or assembly shall carry an approved fire rating for that use.
D. Any access doors furnished for installation in glued-on acoustical surfaces or assembly shall have recessed doors to allow installation of tiles.
E. Provide all access doors to General Contractor for them to construct into the building.

3.4 PAINTING AND FINISHING

A. Refer to Division 09 for field painting requirements.
B. Damage and Touch-Up: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.5 CONCRETE BASES

A. Construct concrete equipment bases of dimensions indicated, but not less than 4 inches larger than supported unit in both directions. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3,000-psi, 28-day compressive strength concrete and reinforcement use fibrillated or monofilament polypropylene fibers engineered and designed for use in concrete, complying with ASTM C1116, Type III, 1/2-inch to 1-1/2 inches long. Uniformly disperse in concrete mix at manufacturer’s recommended rate, but not less than 1.5 lb./cu. yd.

3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
B. Field Welding: Comply with AWS D1.1 "Structural Welding Code - Steel."

3.7 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.
B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.
C. Attach to substrates as required to support applied loads.

3.8 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of the trades involved.
B. Repair cut surfaces to match adjacent surfaces.

3.9 GROUTING

A. Install non-metallic, non-shrink grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's printed instructions.
B. Clean surfaces that will come into contact with grout.
C. Provide forms for placement of grout, as required.
D. Avoid air entrapment when placing grout.
E. Place grout to completely fill equipment bases.
F. Place grout on concrete bases to provide a smooth bearing surface for equipment.
G. Place grout around anchors.
H. Cure placed grout according to manufacturer's printed instructions.

3.10 DEMOLITION

A. Disconnect, demolish, and remove work specified under Divisions 21, 22, and 23 and as indicated.
B. Where pipe, ductwork, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.
C. Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.
D. Abandoned Work: Cut and remove buried pipe abandoned in place, 2 inches beyond the face of adjacent construction. Cap and patch surface to match existing finish.
E. Removal: Remove indicated equipment from the Project site.
F. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

END OF SECTION

SECTION 23 05 29 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pipe hangers and supports.
   2. Hanger rods.
   3. Equipment bases and supports.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 03 30 00 "Cast-in-Place Concrete."
   3. Section 23 05 00 "General Mechanical Requirements."

1.2 REFERENCE STANDARDS

A. American Welding Society:
   1. AWS D1.1 - Structural Welding Code - Steel.

B. ASME International:
   1. ASME B31.1 - Power Piping.
   2. ASME B31.5 - Refrigeration Piping and Heat Transfer Components.
   3. ASME B31.9 - Building Services Piping.

C. ASTM International:
   1. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
   2. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.
   3. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
   4. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

D. FM Global:
   1. FM - Approval Guide.

E. Manufacturers Standardization Society of the Valve and Fittings Industry:
   1. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

F. UL:
   1. UL - Fire-resistance-rated Systems and Products.
   2. UL 263 - Fire Tests of Building Construction and Materials.
   3. UL 1479 - Fire Tests of Through-Penetration Firestops.
   4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' experience.

B. Installer: Company specializing in performing Work of this Section with minimum 3 years' experience.

C. Welders: AWS qualified within previous 12 months for employed weld types.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on site in manufacturer's original packaging and inspect for damage.
B. Store materials according to manufacturer instructions.
C. Protection:
1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.5 EXISTING CONDITIONS

A. Field Measurements:
1. Verify field measurements prior to fabrication.

1.6 WARRANTY

A. Refer to Division 01 and Section 23 05 00 "General Mechanical Requirements."

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Refrigerant Piping:
1. Conform to ASME B31.5, ASTM F708, or MSS SP-58.
2. Hangers for Pipe Sizes 1/2-Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 Inches and Larger: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes 3 Inches and Smaller: Cast iron hook.
6. Vertical Support: Steel riser clamp.
7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
8. Copper Pipe Support: Copper-plated carbon-steel ring.
B. Accessories:
1. Hanger Rods: Mild steel continuously threaded.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that openings are ready to receive sleeves.
B. Verify that openings are ready to receive firestopping.

3.2 INSTALLATION

A. Pipe Hangers and Supports:
1. Comply with ASME B31.1, B31.5, or B31.9.
2. Comply with ASTM F708, or MSS SP-58.
3. Support horizontal piping as scheduled.
4. Minimum Hanger Spacing: 1/2-inch between finished covering and adjacent Work.
5. Place hangers within 12 inches of each horizontal elbow.
6. Minimum Vertical Hanger Adjustment: 1-1/2 inches.
7. Support vertical piping at every floor.
8. If piping is installed in parallel and at same elevation, provide multiple-pipe or trapeze hangers.
9. Support riser piping independently of connected horizontal piping.
10. Provide copper-plated hangers and supports for copper piping.
11. Design hangers for pipe movement without disengagement of supported pipe.
12. Painting and Coating:
a. Prime coat exposed steel hangers and supports.
b. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
13. Insulation:
a. Provide clearance in hangers and from structure and other equipment for installation of insulation.

B. Equipment Bases and Supports:
1. Provide housekeeping pads of concrete as specified in Section 03 30 00 "Cast-in-Place Concrete."
2. Minimum Size: Four inches thick and extending 6 inches beyond supported equipment.
3. Use templates furnished with equipment to install equipment anchor bolts and accessories.

3.3 FIELD QUALITY CONTROL

A. Inspect installed fire-stopping for compliance with Specifications and submitted schedule.

3.4 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.5 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

3.6 SCHEDULES

A. Hydronic Piping Hanger Spacing:

PIPE MATERIAL	MAXIMUM HANGER SPACING	HANGER ROD DIAMETER
Copper tube, 1-1/4-inch and smaller	6 feet	1/2-inch
Copper tube, 1-1/2-inch and larger	10 feet	1/2-inch
Steel, 3 inches and smaller	12 feet	1/2-inch
Steel, 4 inches and larger	12 feet	5/8-inch

END OF SECTION

SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nameplates.
   2. Tags.
   3. Stencils.
   4. Pipe Markers.
   5. Ceiling Tacks.
   6. Labels.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 23 05 00 "General Mechanical Requirements."

C. Contractor shall match the labeling and identification standard for HVAC systems as required by the Midland International Air & Space Port system.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.3 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Seton Identification Products
B. Brimar Industries
C. Substitutions: Refer to Section 23 05 00 "General Mechanical Requirements."

2.2 NAMEPLATES

A. Product Description: Laminated 3-layer plastic with engraved black letters on light contrasting background color.

2.3 TAGS

A. Metal Tags:
   1. Brass with stamped letters; tag size minimum 1-1/2 inches diameter with finished edges.

B. Information Tags:
   1. Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 by 5-5/8 inches with grommet and self-locking nylon ties.

C. Tag Chart: Typewritten letter size list of applied tags and location in anodized aluminum frame.

2.4 STENCILS

A. Stencils: With clean-cut symbols and letters of following size:
   1. Up to 2 Inches Outside Diameter of Insulation or Pipe: 1/2-inch-high letters.
   2. 2-1/2 to 6 Inches Outside Diameter of Insulation or Pipe: 1-inch-high letters.
   3. Over 6 Inches Outside Diameter of Insulation or Pipe: 1-3/4-inch-high letters.
   4. Ductwork and Equipment: 1-3/4-inch-high letters.

B. Stencil Paint: As specified in Division 09, semi-gloss enamel, colors, and lettering size conforming to ASME A13.1.

2.5 PIPE MARKERS

A. Color and Lettering: Conform to ASME A13.1.
   1. Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.

B. Plastic Tape Pipe Markers
   1. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

C. Plastic Underground Pipe Markers
   1. Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 milsthick, manufactured for direct burial service.

2.6 CEILING TACKS

A. Description: Steel with 3/4-inch-diameter color-coded head.

B. Color code as follows:
   1. HVAC Equipment: Yellow.
   2. Plumbing valves: Green.

2.7 LABELS

A. Description: Aluminum size 1.9- by 0.75-inch, adhesive-backed, with printed identification.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces per Division 09 for stencil painting.

3.2 INSTALLATION

A. Apply stencil painting per Division 09.
B. Install identifying devices after completion of coverings and painting.
C. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
D. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.
E. Install tags using corrosion resistant chain. Number tags consecutively by location.
F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
G. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Identify in-line pumps and other small devices with tags.
H. Identify control panels and major control components outside panels with plastic nameplates.
I. Identify valves in main and branch piping with tags.
J. Identify air terminal units and radiator valves with numbered tags.
K. Tag automatic controls, instruments, and relays. Key to control schematic.
L. Identify piping, concealed, or exposed, with plastic pipe markers, plastic tape pipe markers, or stenciled painting. Use tags on piping 3/4-inch-diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
M. For exposed natural gas lines other than steel pipe, attach yellow pipe labels with "GAS" in black lettering, at maximum 5-foot spacing.
N. Identify ductwork with plastic nameplates or stenciled painting. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
O. Provide ceiling tacks to locate valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Testing, adjusting, and balancing of air systems.
   2. Testing, adjusting, and balancing of hydronic and refrigerating systems.
   3. Measurement of final operating condition of HVAC systems.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 23 05 00 "General Mechanical Requirements."

1.2 REFERENCES

A. Associated Air Balance Council:
   1. AABC MN-1 - National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems.

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
   1. ASHRAE 111 - Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning and Refrigeration Systems.

C. Natural Environmental Balancing Bureau:
   1. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

D. Testing Adjusting and Balancing Bureau:
   1. TABB - International Standards for Environmental Systems Balance.

1.3 SUBMITTALS

A. Division 01 and Section 23 05 00 "General Mechanical Requirements."

B. Prior to commencing Work, submit proof of latest calibration date of each instrument.

C. Test Reports: Indicate data on AABC MN-1 National Standards for Total System Balance forms or NEBB Report forms.

D. Field Reports: Indicate deficiencies preventing proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.

E. Prior to commencing Work, submit report forms or outlines indicating adjusting, balancing, and equipment data required. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty or NEBB Certificate of Conformance Certification.

F. Submit draft copies of report for review before final acceptance of Project.

G. Furnish reports in pdf electronic format, complete with table of contents page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets and indicating thermostat locations.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of balancing valves and rough setting.
B. Operation and Maintenance Data: Furnish final copy of testing, adjusting, and balancing report inclusion in operating and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with AABC MN-1 National Standards for Field Measurement and Instrumentation, Total System Balance or NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

1.6 QUALIFICATIONS

A. Perform Work under supervision of AABC Certified Test and Balance Engineer or NEBB Certified Testing, Balancing, and Adjusting Supervisor registered professional engineer experienced in performance of this Work and licensed in State of Texas.

1.7 SEQUENCING

A. Sequence balancing between completion of systems tested and date of Substantial Completion.

1.8 SCHEDULING

A. Schedule and provide assistance in final adjustment.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify systems are complete and operable before commencing work. Verify the following:
1. Systems are started and operating in safe and normal condition.
2. HVAC control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed, and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.

12. Hydronic systems are flushed, filled, and vented.
13. Pumps are rotating correctly.
14. Proper strainer baskets are clean and in place or in normal position.
15. Service and balancing valves are open.

3.2 PREPARATION

A. Furnish instruments required for testing, adjusting, and balancing operations.
B. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

3.3 INSTALLATION TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 10 percent of design.
B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.4 ADJUSTING

A. Verify recorded data represents actual measured or observed conditions.
B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
C. After adjustment, take measurements to verify balance has not been disrupted. If disrupted, verify correcting adjustments have been made.
D. Report defects and deficiencies noted during performance of services, preventing system balance.
E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
F. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by Owner.
G. Check and adjust systems approximately 6 months after final acceptance and submit report.

3.5 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to obtain required or design supply, return, and exhaust air quantities at site altitude.
B. Make air flow rate measurements in main ducts by Pitot tube traverse of entire cross-sectional area of duct.
C. Measure air quantities at air inlets and outlets.
D. Use volume control devices to regulate air quantities only to extent adjustments do not create objectionable air motion or sound levels. Effect volume control by using volume dampers located in ducts.
E. Vary total system air quantities by adjustment of fan speeds. Provide sheave drive changes to vary fan speed. Vary branch air quantities by damper regulation.
F. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
G. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across fan. Make allowances for 50 percent loading of filters.
H. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
I. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

J. At modulating damper locations, take measurements and balance at extreme conditions.
K. For variable air volume system powered units set volume controller to airflow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable-air-volume temperature control.

3.6 WATER SYSTEM PROCEDURE

A. Adjust water systems, after air balancing, to obtain design quantities.
B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow-metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in system.
C. Confirm air bleeds indicate system is full of water.
D. Adjust systems to obtain specified pressure drops and flows through heat transfer elements before thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
E. Perform system balance with automatic control valves fully open triple duty valves fully open, and pump VFDs at 100 percent speed.
F. Confirm pump rotation and differential pressure at full flow.
G. Perform adjustment of water distribution systems by the following measures:
    1. Reduce total system flow rate first by reducing speed of VFD.
    2. Use balancing cocks, valves, and fittings.
H. Do not use service or shut-off valves for balancing unless designed for balancing and shut-off functions. Where available pump capacity is less than total flow requirements or individual system parts, simulate full flow in one part by temporary restriction of flow to other parts.

3.7 SCHEDULES

A. Equipment Requiring Testing, Adjusting, and Balancing:
    1. Plumbing Pumps.
    2. HVAC Pumps.
    3. Air-Cooled Refrigerant Condensers.
    4. Computer Room Air Conditioning Units.
    5. Air Handling Units.
    6. All New Exhaust Fan Systems.
    7. Air Inlets and Outlets.
    8. Refrigerant Leakage Detection System.
    9. CO2 Detection System.
    10. New Boilers and Associated Pumps (Refer to renovation/HVAC Upgrades portion of construction Drawings).
B. Report Forms:
    1. Title Page:
        a. Name of Testing, Adjusting, and Balancing Agency.
        b. Address of Testing, Adjusting, and Balancing Agency.
        c. Telephone and facsimile numbers of Testing, Adjusting, and Balancing Agency.
        d. Project name.
        e. Project location.
        f. Project Architect.
        g. Project Engineer.
        h. Project Contractor.

i. Project altitude.
j. Report date.

2. Summary Comments:
   a. Design versus final performance.
   b. Notable characteristics of system.
   c. Description of systems operation sequence.
   d. Summary of outdoor and exhaust flows to indicate building pressurization.
   e. Nomenclature used throughout report.
   f. Test conditions.
3. Instrument List:
   a. Instrument.
   b. Manufacturer.
   c. Model number.
   d. Serial number.
   e. Range.
   f. Calibration date.
4. Electric Motors:
   a. Manufacturer.
   b. Model/Frame.
   c. HP/BHP and kW.
   d. Phase, voltage, amperage; nameplate, actual, no load.
   e. RPM.
   f. Service factor.
   g. Starter size, rating, heater elements.
   h. Sheave Make/Size/Bore.
5. V-Belt Drive:
   a. Identification/location.
   b. Required driven RPM.
   c. Driven sheave, diameter, and RPM.
   d. Belt, size, and quantity.
   e. Motor sheave diameter and RPM.
   f. Center-to-center distance, maximum, minimum, and actual.
6. Pump Data:
   a. Identification/number.
   b. Manufacturer.
   c. Size/model.
   d. Impeller.
   e. Service.
   f. Design flow rate, pressure drop, BHP and kW.
   g. Actual flow rate, pressure drop, BHP and kW.
   h. Discharge pressure.
   i. Suction pressure.
   j. Total operating head pressure.
   k. Shut off, discharge, and suction pressures.
   l. Shut off, total head pressure.
7. Air Cooled Condenser:
   a. Identification/number.
   b. Location.
   c. Manufacturer.
   d. Model number.
   e. Serial number.

f. Entering DB air temperature, design and actual.
g. Leaving DB air temperature, design and actual.
h. Number of compressors.

8. Cooling Coil Data:
   a. Identification/number.
   b. Location.
   c. Service.
   d. Manufacturer.
   e. Air flow, design and actual.
   f. Entering air DB temperature, design and actual.
   g. Entering air WB temperature, design and actual.
   h. Leaving air DB temperature, design and actual.
   i. Leaving air WB temperature, design and actual.
   j. Saturated suction temperature, design and actual.
   k. Air pressure drop, design and actual.
9. Heating Coil Data:
   a. Identification/number.
   b. Location.
   c. Service.
   d. Manufacturer.
   e. Airflow, design and actual.
   f. Entering air temperature, design and actual.
   g. Leaving air temperature, design and actual.
   h. Air pressure drop, design and actual.
10. Air Moving Equipment:
   a. Location.
   b. Manufacturer.
   c. Model number.
   d. Serial number.
   e. Arrangement/class/discharge.
   f. Air flow, specified and actual.
   g. Return air flow, specified and actual.
   h. Outside air flow, specified and actual.
   i. Total static pressure (total external), specified and actual.
   j. Inlet pressure.
   k. Discharge pressure.
   l. Sheave make/size/bore.
   m. Number of belts/make/size.
   n. Fan RPM.
11. Return Air/Outside Air Data:
   a. Identification/location.
   b. Design airflow.
   c. Actual air flow.
   d. Design return airflow.
   e. Actual return airflow.
   f. Design outside airflow.
   g. Actual outside airflow.
   h. Return air temperature.
   i. Outside air temperature.
   j. Required mixed air temperature.
   k. Actual mixed air temperature.

l. Design outside/return air ratio.
m. Actual outside/return air ratio.

12. Exhaust Fan Data:
    a. Location.
    b. Manufacturer.
    c. Model number.
    d. Serial number.
    e. Air flow, specified and actual.
    f. Total static pressure (total external), specified and actual.
    g. Inlet pressure.
    h. Discharge pressure.
    i. Sheave make/size/bore.
    j. Number of belts/make/size.
    k. Fan RPM.
13. Duct Traverse:
    a. System zone/branch.
    b. Duct size.
    c. Area.
    d. Design velocity.
    e. Design air flow.
    f. Test velocity.
    g. Test air flow.
    h. Duct static pressure.
    i. Air temperature.
    j. Air correction factor.
14. Duct Leak Test:
    a. Description of ductwork under test.
    b. Duct design operating pressure.
    c. Duct design test static pressure.
    d. Duct capacity, air flow.
    e. Maximum allowable leakage duct capacity times leak factor.
    f. Test apparatus.
        1) Blower.
        2) Orifice, tube size.
        3) Orifice size.
        4) Calibrated.
    g. Test static pressure.
    h. Test orifice differential pressure.
    i. Leakage.
15. Air Monitoring Station Data:
    a. Identification/location.
    b. System.
    c. Size.
    d. Area.
    e. Design velocity.
    f. Design air flow.
    g. Test velocity.
    h. Test air flow.
16. Flow Measuring Station:
    a. Identification/number.
    b. Location.

c. Size.
d. Manufacturer.
e. Model number.
f. Serial number.
g. Design flow rate.
h. Design pressure drop.
i. Actual/final pressure drop.
j. Actual/final flow rate.
k. Station calibrated setting.

17. Air Distribution Test Sheet:
a. Air terminal number.
b. Room number/location.
c. Terminal type.
d. Terminal size.
e. Area factor.
f. Design velocity.
g. Design air flow.
h. Test (final) velocity.
i. Test (final) air flow.
j. Percent of design air flow.

END OF SECTION

SECTION 23 07 00 - HVAC INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. HVAC piping insulation, jackets, and accessories.
   2. HVAC ductwork insulation, jackets, and accessories.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 07 84 13 "Penetration Firestopping."
   3. Section 23 05 00 "General Mechanical Requirements."

1.2 REFERENCES

A. ASTM International:
   1. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
   2. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar.
   3. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
   4. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
   5. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
   6. ASTM C450 - Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging.
   7. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
   8. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
   9. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
   10. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
   11. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
   12. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
   13. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
   14. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
   15. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

16. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
17. ASTM C1071 - Standard Specification for Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material).
18. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
19. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.
20. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
21. ASTM D4637 - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane.
22. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
23. ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.

B. Sheet Metal and Air Conditioning Contractors Association:
1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

C. Underwriters Laboratories Inc.:
1. UL 1978 - Standard for Safety for Grease Ducts.

1.3 SUBMITTALS

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for submittal procedures.
B. Product Data: Submit product description, thermal characteristics and list of materials and thickness for each service, and location.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' experience.
B. Applicator: Company specializing in performing Work of this Section with minimum 3 years' experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for product storage and handling requirements.
B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
C. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage, by storing in original wrapping.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.7 WARRANTY

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for product warranties and product bonds.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Glass Fiber and Mineral Fiber Insulation:
   1. Manufacturers:
      a. Johns Manville.
      b. Knauf Insulation.
      c. Manson Insulation Inc.
      d. Owens Corning.
      e. Substitutions: Division 01 and Section 23 05 00 "General Mechanical Requirements" for substituted products.

B. Closed Cell Elastomeric Insulation:
   1. Manufacturers:
      a. Aeroflex USA, Inc.
      b. Armacell LLC.
      c. Substitutions: Division 01 and Section 23 05 00 "General Mechanical Requirements" for substituted products.

2.2 PIPE INSULATION

A. Type P-1: ASTM C547, molded glass fiber pipe insulation.
   1. Thermal Conductivity: 0.23 at 75 degrees F.
   2. Operating Temperature Range: 0 to 850 degrees F.
   3. Vapor Barrier Jacket: ASTM C1136, Type I, factory-applied reinforced foil kraft with self-sealing adhesive joints.
   4. Jacket Temperature Limit: minus 20 to 150 degrees F.

B. Type P-4: ASTM C534, Type I, flexible, closed cell elastomeric insulation, tubular.
   1. Thermal Conductivity: 0.27 at 75 degrees F.
   2. Operating Temperature Range: Range: Minus 70 to 180 degrees F.

2.3 DUCTWORK INSULATION

A. Type D-1: ASTM C1290, Type II, flexible glass fiber, commercial grade with factory applied reinforced aluminum foil jacket meeting ASTM C1136, Type II.
   1. Thermal Conductivity: 0.25 at 75 degrees F.
   2. Maximum Operating Temperature: 250 degrees F.
   3. Density: 1.0 pound per cubic foot.

2.4 DUCTWORK INSULATION JACKETS

A. Aluminum Duct Jacket:
   1. ASTM B209.
   2. Thickness: 0.025-inch-thick sheet.
   3. Finish: Embossed.
   4. Joining: Longitudinal slip joints and 2-inch laps.
   5. Fittings: 0.016-inch-thick die shaped fitting covers with factory-attached protective liner.
   6. Metal Jacket Bands: 3/8-inch-wide; 0.015-inch-thick aluminum.

2.5 DUCTWORK INSULATION ACCESSORIES

A. Vapor Retarder Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber-based adhesive.
B. Vapor Retarder Lap Adhesive: Compatible with insulation.
C. Adhesive: Waterproof, ASTM E162 fire-retardant type.
D. Liner Fasteners: Galvanized steel, impact applied with press-on head.
E. Tie Wire: 0.048-inchstainless steel with twisted ends on maximum 12-inchcenters.
F. Lagging Adhesive: Fire retardant type with maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
G. Impale Anchors: Galvanized steel, 12-gauge self-adhesive pad.
H. Adhesives: Compatible with insulation.
I. Membrane Adhesives: As recommended by membrane manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify piping, and ductwork has been tested before applying insulation materials.
B. Verify surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION - PIPING SYSTEMS

A. Piping Exposed to View in Finished Spaces: Locate insulation and cover seams in least visible locations.
B. Continue insulation through penetrations of building assemblies or portions of assemblies having fire resistance rating of 1 hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions. Refer to Section 07 84 13 "Penetration Firestopping" for penetrations of assemblies with fire resistance rating greater than 1-hour.
C. Piping Systems Conveying Fluids Below Ambient Temperature:
   1. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
   2. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
   3. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor retarder adhesive or PVC fitting covers.
D. Glass Fiber Board Insulation:
   1. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
   2. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retarder cement.
   3. Cover wire mesh or bands with cement to a thickness to remove surface irregularities.

E. Hot Piping Systems Less Than 140 Degrees F:
   1. Furnish factory-applied or field-applied standard jackets. Secure with outward clinch expanding staples or pressure sensitive adhesive system on standard factory-applied jacket and butt strips or both.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
   3. Do not insulate unions and flanges at equipment, but bevel and seal end of insulation at such locations.

F. Inserts and Shields:
   1. Piping 1-1/2 Inches Diameter and Smaller: Install galvanized steel shield between pipe hanger and insulation.
   2. Piping 2 inchesDiameter and Larger: Install insert between support shield and piping and under finish jacket.
      a. Insert Configuration: Minimum 6 inches long, of thickness and contour matching adjoining insulation; may be factory fabricated.
      b. Insert Material: Compression resistant insulating material suitable for planned temperature range and service.
   3. Piping Supported by Roller Type Pipe Hangers: Install galvanized steel shield between roller and inserts.

G. Insulation Terminating Points:
   1. Condensate Piping: Insulate entire piping system and components to prevent condensation.

H. Closed Cell Elastomeric Insulation:
   1. Push insulation on to piping.
   2. Miter joints at elbows.
   3. Seal seams and butt joints with manufacturer's recommended adhesive.
   4. When application requires multiple layers, apply with joints staggered.
   5. Insulate fittings and valves with insulation of like material and thickness as adjacent pipe.

I. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces: Finish with PVC jacket and fitting covers.

J. Piping Exterior to Building: Provide vapor retarder jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor retarder cement. Cover with aluminum jacket with seams located at 3 or 9 o’clock position on side of horizontal piping with overlap facing down to shed water or on bottom side of horizontal piping.

K. Buried Piping: Insulate only where insulation manufacturer recommends insulation product may be installed in trench, tunnel or direct buried. Install factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with 1 mil thick aluminum foil sandwiched between 3 layers of bituminous compound; outer surface faced with polyester film.

L. Prepare pipe insulation for finish painting. Refer to Division 09.

3.3 INSTALLATION - DUCTWORK SYSTEMS

A. Duct dimensions indicated on Drawings are finished inside dimensions.
B. Insulated ductwork conveying air below ambient temperature:
   1. Provide insulation with vapor retarder jackets.
   2. Finish with tape and vapor retarder jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
C. Insulated ductwork conveying air above ambient temperature:
   1. Provide with or without standard vapor retarder jacket.
   2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
D. External Glass Fiber Duct Insulation:
   1. Secure insulation with vapor retarder with wires and seal jacket joints with vapor retarder adhesive or tape to match jacket.
   2. Secure insulation without vapor retarder with staples, tape, or wires.
   3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
   4. Seal vapor retarder penetrations by mechanical fasteners with vapor retarder adhesive.
   5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
E. External Elastomeric Duct Insulation:
   1. Adhere to clean oil-free surfaces with full coverage of adhesive.
   2. Seal seams and butt joints with manufacturer's recommended adhesive.
   3. When application requires multiple layers, apply with joints staggered.
   4. Insulate standing metal duct seams with insulation of like material and thickness as adjacent duct surface. Apply adhesive at joints with flat duct surfaces.
   5. Lift ductwork off trapeze hangers and insert spacers.
F. Duct and Plenum Liner:
   1. Adhere insulation with adhesive for 100 percent coverage.
   2. Secure insulation with mechanical liner fasteners. Comply with SMACNA Standards for spacing.
   3. Seal and smooth joints. Seal and coat transverse joints.
   4. Seal liner surface penetrations with adhesive.
   5. Cut insulation for tight overlapped corner joints. Support top pieces of liner at edges with side pieces.
G. Prepare duct insulation for finish painting. Refer to Division 09.

3.4 SCHEDULES

A. Cooling Services Piping Insulation Schedule:
   1. Condenser Water:
      a. Type: P-1.
      b. Thickness: Size required for R-6.0 installed value.

2. Condensate Piping from Cooling Coils:
   a. Type: P-4.
   b. Thickness: min. 0.75-inch.
3. Refrigerant Suction and Liquid:
   a. Type: P-4.
   b. Thickness: 1-inch.

B. Ductwork Insulation Schedule:
1. Supply Ducts - Externally Insulated, Installed Thickness:
   a. Type: D-1.
   b. Thickness: As required to meet minimum R-6 installed value.
2. Return Ducts - Externally Insulated, Installed Thickness:
   a. Type: D-1.
   b. Thickness: As required to meet minimum R-6 installed value.
3. Exhaust Ducts:
   a. Type: None.
4. Transfer Air Ducts - Internally Insulated:
   a. Type: D-1.
   b. Thickness: 1.0 inches.

END OF SECTION

SECTION 23 08 00 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. HVAC commissioning description.
2. HVAC commissioning responsibilities.

B. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.
2. Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC" for requirements and procedures concerning testing, adjusting, and balancing of mechanical systems.
3. Section 23 09 23 "Direct-Digital Control System for HVAC" for submittal, training, and programming requirements.
4. Section 23 33 00 "Air Duct Accessories" for product requirements for ductwork test holes.
5. Section 22 08 00 "Commissioning of Plumbing" systems commissioning requirements.

1.2 REFERENCES

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
1. ASHRAE Guideline 1 - The HVAC Commissioning Process.

B. Building Commissioning Association:
1. BCA - Commissioning Handbook.

C. National Environmental Balancing Bureau:
1. NEBB - Procedural Standards for Building Systems Commissioning.

D. Testing Adjusting and Balancing Bureau:
1. TABB - Commissioning Manual.

1.3 COMMISSIONING DESCRIPTION

A. HVAC commissioning process includes the following tasks:
1. Testing and startup of HVAC equipment and systems.
2. Equipment and system verification checks.
3. Assistance in functional performance testing to verify testing and balancing, and equipment and system performance.
4. Provide qualified personnel to assist in commissioning tests, including seasonal testing.
5. Complete and endorse functional performance test checklists provided by Commissioning Authority to assure equipment and systems are fully operational and ready for functional performance testing.
6. Provide equipment, materials, and labor necessary to correct deficiencies found during commissioning process to fulfill contract and warranty requirements.

7. Provide operation and maintenance information and record drawings to Commissioning Authority for review verification and organization, prior to distribution.
8. Provide assistance to Commissioning Authority to develop, edit, and document system operation descriptions.
9. Provide training for systems specified in this Section with coordination by Commissioning Authority.

B. Equipment and Systems to Be Commissioned:
1. New HVAC systems that were installed under this Contract.
2. Existing HVAC systems that were modified, adjusted, upgraded, or affected by the work performed under this Contract.

C. The following is a partial list of equipment that may be included in this HVAC Commissioning:
1. Air-Cooled Condensing Units.
2. Piping systems.
3. Ductwork.
4. Variable frequency drives.
5. Air handling units.
6. Unit heaters.
7. IT room units.
8. Fans.
9. Automatic HVAC control system.
10. Testing, Adjusting and Balancing work.
11. Pet area drainage wash-down system.
12. Refrigerator leakage detection system.
13. CO2 detection system.

D. Perform seasonal function performance tests for the following equipment and systems:
1. Heating equipment during heating season.
2. Cooling equipment during cooling season.

1.4 COMMISSIONING SUBMITTALS

A. Section 01 91 13 "General Commissioning Requirements": Requirements for commissioning submittals.
B. Draft Forms: Submit draft of system verification form and functional performance test checklist.
C. Test Reports: Indicate data on system verification form for each piece of equipment and system as specified. Use submit data in metric units.
D. Field Reports: Indicate deficiencies preventing completion of equipment or system verification checks equipment or system to achieve specified performance.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ASHRAE Guideline 1, NEBB, AABC, or TABB requirements.

1.6 COMMISSIONING RESPONSIBILITIES

A. Equipment or System Installer Commissioning Responsibilities:
   1. Attend commissioning meetings.
   2. Ensure temperature controls installer performs assigned commissioning responsibilities as specified below.
   3. Ensure testing, adjusting, and balancing agency performs assigned commissioning responsibilities as specified.
   4. Provide instructions and demonstrations for Owner's personnel.
   5. Ensure subcontractors perform assigned commissioning responsibilities.
   6. Ensure participation of equipment manufacturers in appropriate startup, testing, and training activities when required by individual equipment specifications.
   7. Develop startup and initial checkout plan using manufacturer's startup procedures and functional performance checklists for equipment and systems to be commissioned.
   8. During verification check and startup process, execute HVAC related portions of checklists for equipment and systems to be commissioned.
   9. Perform and document completed startup and system operational checkout procedures, providing copy to Commissioning Authority.
   10. Provide manufacturer's representatives to execute starting of equipment. Ensure representatives are available and present during agreed upon schedules and are in attendance for duration to complete tests, adjustments and problem-solving.
   11. Coordinate with equipment manufacturers to determine specific requirements to maintain validity of warranties.
   12. Provide personnel to assist Commissioning Authority during equipment or system verification checks and functional performance tests.
   13. Prior to functional performance tests, review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during tests.
   14. Prior to startup, inspect, check, and verify correct and complete installation of equipment and system components for verification checks included in commissioning plan. When deficient or incomplete work is discovered, ensure corrective action is taken and re-check until equipment or system is ready for startup.
   15. Perform verification checks and startup on equipment and systems as specified.
   16. Assist Commissioning Authority in performing functional performance tests on equipment and systems as specified.
   17. Perform operation and maintenance training sessions scheduled by Commissioning Authority.
   18. Conduct HVAC system orientation and inspection.

B. Temperature Controls Installer Commissioning Responsibilities:
   1. Attend commissioning meetings.
   2. Review design for ability of systems to be controlled including the following:
      a. Confirm proper hardware requirements exists to perform functional performance testing.
      b. Confirm proper safeties and interlocks are included in design.
      c. Confirm proper sizing of system control valves and actuators and control valve operation will result capacity control identified in Contract Documents.

d. Confirm proper sizing of system control dampers and actuators and damper operation will result in proper damper positioning.
e. Confirm sensors selected are within device ranges.
f. Review sequences of operation and obtain clarification from Architect.
g. Indicate delineation of control between packaged controls and building automation system, listing BAS monitor points and BAS adjustable control points.
h. Provide written sequences of operation for packaged controlled equipment. Equipment manufacturers' stock sequences may be included, when accompanied by additional narrative to reflect Project conditions.

3. Inspect, check, and confirm proper operation and performance of control hardware and software provided in other HVAC Sections.
4. Submit proposed procedures for performing automatic temperature control system point-to-point checks to Commissioning Authority and Architect/Engineer.
5. Inspect check and confirm correct installation and operation of automatic temperature control system input and output device operation through point-to-point checks.
6. Perform training sessions to instruct Owner's personnel in hardware operation, software operation, programming, and application in accordance with commissioning plan.
7. Demonstrate system performance and operation to Commissioning Authority during functional performance tests including each mode of operation.
8. Provide control system technician to assist during Commissioning Authority verification check and functional performance testing.
9. Provide control system technician to assist testing, adjusting, and balancing agency during performance of testing, adjusting, and balancing work.
10. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.

C. Testing, Adjusting, and Balancing Agency Commissioning Responsibilities:
1. Attend commissioning meetings.
2. Participate in verification of testing, adjusting, and balancing report for verification or diagnostic purposes. Repeat sample of 10 percent of measurements contained in testing, adjusting, and balancing report as selected by Commissioning Authority.
3. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.

1.7 COMMISSIONING MEETINGS

A. Section 01 91 13 "General Commissioning Requirements" for commissioning meetings.
B. Attend initial commissioning meeting and progress commissioning meetings as required by Commissioning Authority.

1.8 SCHEDULING

A. Section 01 30 00 "Administrative Requirements" for requirements for scheduling.
B. Prepare schedule indicating anticipated start dates for the following:
1. Piping system pressure testing.
2. Piping system flushing and cleaning.
3. Ductwork cleaning.
4. Ductwork pressure testing.

5. Equipment and system startups.
6. Automatic temperature control system checkout.
7. Testing, adjusting, and balancing.
8. HVAC system orientation and inspections.
9. Operation and maintenance manual submittals.
10. Training sessions.

C. Schedule seasonal tests of equipment and systems during peak weather conditions to observe full-load performance.

D. Schedule occupancy sensitive tests of equipment and systems during conditions of both minimum and maximum occupancy or use.

1.9 COORDINATION

A. Section 01 30 00 "Administrative Requirements" for requirements for coordination.

B. Notify Commissioning Authority minimum of 4 weeks in advance of the following:
1. Scheduled equipment and system startups.
2. Scheduled automatic temperature control system checkout.
3. Scheduled start of testing, adjusting, and balancing work.

C. Coordinate programming of automatic temperature control system with construction and commissioning schedules.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install additional balancing dampers, balancing valves, access doors, test ports, and pressure and temperature taps required to meet performance requirements.

B. Place HVAC systems and equipment into full operation and continue operation during each working day of commissioning.

C. Install replacement sheaves and belts to obtain system performance, as requested by Commissioning Authority.

D. Install test holes in ductwork and plenums as requested by Commissioning Authority for taking air measurements. Refer to Section 23 33 00 "Air Duct Accessories."

E. Prior to start of functional performance test, install replacement filters in equipment.

3.2 FIELD TESTS AND INSPECTIONS

A. Seasonal Sensitive Functional Performance Tests:
1. Test heating equipment at winter design temperatures.
2. Test cooling equipment at summer design temperatures.
3. Participate in testing delayed beyond Final Completion to test performance at peak seasonal conditions.

B. Be responsible to participate in initial and alternate peak season test of systems required to demonstrate performance.

C. Occupancy Sensitive Functional Performance Tests:
   1. Test equipment and systems affected by occupancy variations at minimum and peak loads to observe system performance.
   2. Participate in testing delayed beyond Final Completion to test performance with actual occupancy conditions.

END OF SECTION

SECTION 23 09 23 - DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes control equipment and software.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 23 05 00 "General Mechanical Requirements."
   3. Section 23 09 93 "Sequence of Operations for HVAC/Plumbing Controls" for sequences of operation implemented using products specified in this Section.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI MC85.1 - Terminology for Automatic Control.

1.3 SYSTEM DESCRIPTION

A. Provide equipment, devices, and programming required to add new terminal addition HVAC and plumbing equipment to the existing DDC/BMS system. Coordinate with Owner to verify exact system and devices required to provide control and monitoring of all new HVAC and plumbing systems described in Section 29 09 23 "Sequence of Operations for HVAC/Plumbing Controls." Not all items contained within this Specification may be required for a complete and operational DDC/BMS system extension of the existing DDC/BMS system currently being utilized at the Midland International Airport. Automatic temperature controls field monitoring and controls system using field programmable microprocessor based units. Mechanical contractor to provide devices, such as dampers, integral manufacturer-supplied controllers, and internal controls, that are integral to HVAC equipment, with DDC contractor to provide actuators, variable frequency drives (does not apply to AHUs; these are ingegral to each AHU), sensors, relays, etc., required for achieving the required Sequence of Operations for each system and piece of HVAC/Plumbing equipment called out in Section 23 09 93 "Sequence of Operations for HVAC/Plumbing Controls." Mechanical contractors, manufacturer representatives, and DDC controls contractor to coordinate to provide a complete and operational HVAC/Plumbing system for the Midland International Air & Space Port.
B. Base system on distributed system of fully intelligent, stand-alone controllers, operating in a multi-tasking, multi-user environment on token passing network, with central and remote hardware, software, and interconnecting wire and conduit.
C. Provide computer software and hardware, operator input/output devices, control units, local area networks (LAN), sensors, control devices, actuators.
D. Provide control systems consisting of thermostats, control valves, dampers and operators, indicating devices, interface equipment and other apparatus and accessories to operate mechanical systems, and to perform functions specified.
E. Provide installation and calibration, supervision, adjustments, and fine tuning necessary for complete and fully operational system.

1.4 SUBMITTALS

A. Section 01 33 00 "Submittal Procedures" for Submittal procedures.
B. Shop Drawings: Indicate the following:
   1. Trunk cable schematic showing programmable control-unit locations and trunk data conductors.
   2. Connected data points, including connected control unit and input device.
   3. System graphics showing monitored systems, data (connected and calculated) point addresses, and operator notations.
   4. System configuration with peripheral devices, batteries, power supplies, diagrams, modems, routers, and interconnections.
   5. Description and sequence of operation for operating, user, and application software.
   6. Use terminology in submittals conforming to ASME MC85.1.
   7. Coordinate submittals with information requested in Section 23 09 93 "Sequence of Operations for HVAC/Plumbing Controls."
C. Product Data: Submit data for each system component and software module.

1.5 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this Section with minimum 3 years' documented experience.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.7 WARRANTY

A. Section 01 70 00 "Execution and Closeout Requirements" for product warranties and product bonds.
B. Furnish 5-year manufacturer warranty for direct digital controls.

1.8 MAINTENANCE SERVICE

A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for maintenance service.
B. Furnish service and maintenance of control systems for 1-year from date of Substantial Completion.
C. Include systematic examination, adjustment, and lubrication of unit, and controls checkout and adjustments. Repair or replace parts in accordance with manufacturer's operating and maintenance data. Use parts produced by manufacturer of original equipment.
D. Perform Work without removing units from service during building normal occupied hours.
E. Provide emergency call back service during working hours for this maintenance period.
F. Maintain locally, near place of the Work, adequate stock of parts for replacement or emergency purposes. Have personnel available to ensure fulfillment of this maintenance service, without unreasonable loss of time.

G. Perform maintenance work using competent and qualified personnel under supervision and in direct employ of manufacturer or original installer.
H. Do not assign or transfer maintenance service to agent or subcontractor without prior written consent of Owner.

PART 2 - PRODUCTS

2.1 DIRECT DIGITAL CONTROLS

A. Existing DDC system is by Control Technologies, Inc., no exceptions.
   1. Products: Electric, Electronic, and Direct Digital Control system field controllers and devices to be provided by Schneider-Electric and Schneider-Electric BACnet MSTP Nework protocol to integrate into existing DDC system. Provide required infrastructure to expand existing system to accommodate new terminal expansion.
B. All HVAC equipment manufacturers must be compatible and fully integrability with the existing DDC/BMS system without the loss of data point information.
C. Refer to Division 23 equipment Specifications, details, and schematics for more DDC information.

2.2 OPERATOR WORKSTATION

A. Coordinate with owners existing workstation/server and provide devices, equipment, programming required to add terminal addition HVAC and Plumbing equipment to existing BMS system.

2.3 CONTROL UNITS

A. Units: Modular in design and consisting of processor board with programmable RAM memory, local operator access and display panel, and integral interface equipment.
B. Battery Backup: For minimum of 48 hours for complete system including RAM without interruption, with automatic battery charger.
C. Control Units Functions:
   1. Monitor or control each input/output point.
   2. Completely independent with hardware clock/calendar and software to maintain control independently.
   3. Acquire, process, and transfer information to operator station or other control units on network.
   4. Accept, process, and execute commands from other control unit's or devices or operator stations.
   5. Access both data base and control functions simultaneously.
   6. Record, evaluate, and report changes of state or value occurring among associated points. Continue to perform associated control functions regardless of status of network.
   7. Perform in stand-alone mode:
      a. Start/stop.
      b. Duty cycling.
      c. Automatic Temperature Control.
      d. Demand control via a sliding window, predictive algorithm.
      e. Event initiated control.

f. Calculated point.
g. Scanning and alarm processing.
h. Full direct digital control.
i. Trend logging.
j. Global communications.
k. Maintenance scheduling.

D. Global Communications:
1. Broadcast point data onto network, making information available to other system controls units.
2. Transmit input/output points onto network for use by other control units and use data from other control units.

E. Input/output Capability:
1. Discrete/digital input (contact status).
2. Discrete/digital output.
3. Analog input.
4. Analog output.
5. Pulse input (5 pulses/second minimum).
6. Pulse output (0-655 seconds in duration with 0.01-second resolution minimum).

F. Monitor, control, or address data points. Include analog inputs, analog outputs, pulse inputs, pulse outputs and discrete inputs/outputs. Furnish control units with minimum 30 percent spare capacity.

G. Point Scanning: Set scan or execution speed of each point to operator selected time from 1 to 250 seconds.

H. Upload/Download Capability: Download from or upload to operator station. Upload/Download time for entire control unit database maximum 10 seconds on hard-wired LAN or 60 seconds over voice grade phone lines.

I. Test Mode Operation: Place input/output points in test mode to allow testing and developing of control algorithms on line without disrupting field hardware and controlled environment. In test mode:
1. Inhibit scanning and calculation of input points. Issue manual control to input points (set analog or digital input point to operator determined test value) from workstation.
2. Control output points but change only database state or value; leave external field hardware unchanged.
3. Enable control-actions on output points but change only data base state or value.

J. Local display and adjustment panel: Portable or Integral to control-unit containing digital display, and numerical keyboard. Display and adjust:
1. Input/output point information and status.
2. Controller set points.
3. Controller tuning constants.
4. Program execution times.
5. High and low limit values.
6. Limit differential.
7. Set/display date and time.
8. Control outputs connected to the network.
9. Automatic control outputs.
10. Perform control unit diagnostic testing.

K. Points in "Test" mode.

2.4 LOCAL AREA NETWORKS (LAN):

A. Furnish communication between control units over local area network (LAN).
B. LAN Capacity: As required to provide a complete and operational DDC / BMS system.
C. Break in Communication Path: Alarm and automatically initiate LAN reconfiguration.
D. Communication Techniques: Allow interface into network by multiple operation stations and by auto-answer/auto-dial modems. Support communication over high speed internet access utilizing devices approved by owner IT systems department.
E. Network Support: Time for global point to be received by any station, less than 3 seconds. Furnish automatic reconfiguration when station is added or lost. In event transmission cable is cut, reconfigure two sections with no disruption to system's operation, without operator intervention.

2.5 OPERATING SYSTEM SOFTWARE

A. Input/output Capability From Operator Station:
1. Request display of current values or status in tabular or graphic format.
2. Command selected equipment to specified state.
3. Initiate logs and reports.
4. Change analog limits.
5. Add, delete, or change points within each control unit or application routine.
6. Change point input/output descriptors, status, alarm descriptors, and unit descriptors.
7. Add new control units to system.
8. Modify and set up maintenance scheduling parameters.
9. Develop, modify, delete or display full range of color graphic displays.
10. Automatically archive select data even when running third party software.
11. Capability to sort and extract data from archived files and to generate custom reports.
12. Support two printer operations.
13. Alarm printer: Print alarms, operator acknowledgments, action messages, system alarms, operator sign-on and sign-off.
14. Data printer: Print reports, page prints, and data base prints.
15. Select daily, weekly or monthly as scheduled frequency to synchronize time and date in digital control units. Accommodate daylight savings time adjustments.
16. Print selected control unit database.
B. Data Base Creation and Support: Use standard procedures for changes. Control unit automatically checks workstation data base files upon connection and verify data base match. Include the following minimum capabilities:
1. Add and delete points.
2. Modify point parameters.
3. Change, add, or delete English language descriptors.
4. Add, modify, or delete alarm limits.
5. Add, modify, or delete points in start/stop programs, trend logs, and other items.
6. Create custom relationship between points.
7. Create or modify DDC loops and parameters.
8. Create or modify override parameters.
9. Add, modify, and delete applications programs.
10. Add, delete, develop, or modify dynamic color graphic displays.

C. Dynamic Color Graphic Displays:
   1. Utilizes custom symbols or system supported library of symbols.
   2. Sixteen colors.
   3. Sixty outputs of real-time live dynamic data for each graphic.
   4. Dynamic graphic data.
   5. 1,000 separate graphic pages.
   6. Modify graphic screen refresh rate between 1 and 60 seconds.
   7. Integrate new HVAC systems for this terminal expansion into existing graphical user interface.

D. Alarm Processing:
   1. Off normal condition: Cause alarm and appropriate message, including time, system, point descriptor, and alarm condition. Select alarm state or value and alarms causing automatic dial-out.
   2. Critical alarm or change-of-state: Display message, stored on disk for review and sort, or print.
   3. Display alarm reports on video. Display multiple alarms in order of occurrence.
   4. Define time delay for equipment start-up or shutdown.
   5. Allow unique routing of specific alarms.
   6. Operator specifies when alarm requires acknowledgment.
   7. Continue to indicate unacknowledged alarms after return to normal.
   8. Alarm notification:
   9. Print automatically.
   10. Display indicating alarm condition.
   11. Selectable audible alarm indication.

E. Event Processing: Automatically initiate commands, user defined messages, take specific control actions or change control strategy and application programs resulting from event condition. Event condition may be value crossing operator defined limit, change of state, specified state, or alarm occurrence or return to normal.

F. Automatic Restart: Automatically start field equipment on restoration of power. Furnish time delay between individual equipment restart and time of day start/stop.

G. Messages:
   1. Automatically display or print user-defined message subsequent to occurrence of selected events.
   2. Compose, change, or delete message.
   3. Display or log message at any time.
   4. Assign any message to event.

H. Reports:
   1. Manually requested with time and date.
   2. Long term data archiving to hard disk.
   3. Automatic directives to download to transportable media including floppy diskettes for storage.
   4. Data selection methods to include data base search and manipulation.
   5. Data extraction with mathematical manipulation.
   6. Data reports to allow development of XY curve plotting, tabular reports (both statistical and summary), and multi-point timed based plots with not less than 4 variables displayed.
   7. Generating reports either normally at operator direction, or automatically under workstation direction.

8. Either manually display or print reports. Automatically print reports on daily, weekly, monthly, yearly or scheduled basis.
9. Include capability for statistical data manipulation and extraction.
10. Capability to generate four types of reports: Statistical detail reports, summary reports, trend graphic plots, x-y graphic plots.

I. Parameter Save/Restore: Store most current operating system, parameter changes, and modifications on disk or diskette.

J. Data Collection:
1. Automatically collect and store in disk files.
2. Daily electrical energy consumption, peak demand, and time of peak demand for up to electrical meters over a 2 year period.
3. Daily consumption for up to 30 meters over a 2 year period.
4. Daily billable electrical energy consumption and time for up to 1,024 zones over a 10 year period.
5. Archiving of stored data for use with system supplied custom reports.

K. Graphic Display: Support graphic development on work station with software features:
1. Page linking.
2. Generate, store, and retrieve library symbols.
3. Single or double height characters.
4. Sixty dynamic points of data for each graphic page.
5. Pixel level resolution.
6. Animated graphics for discrete points.
7. Analog bar graphs.
8. Display real time value of each input or output line diagram fashion.
9. Integrate new HVAC systems for this terminal expansion into existing graphical user interface and label new equipment per Owner requested nomenclature.

L. Maintenance Management:
1. Run time monitoring, for each point.
2. Maintenance scheduling targets with automatic annunciation, scheduling and shutdown.
3. Equipment safety targets.
4. Display of maintenance material and estimated labor.
5. Target point reset, for each point.

M. Advisories:
1. Summary containing status of points in locked out condition.
2. Continuous operational or not operational report of interrogation of system hardware and programmable control units for failure.
3. Report of power failure detection, time and date.
4. Report of communication failure with operator device, field interface unit, point and programmable control unit.

2.6 LOAD CONTROL PROGRAMS

A. General: Support inch-pounds units of measurement.

B. Demand Limiting:
1. Monitor total power consumption for each power meter and shed associated loads automatically to reduce power consumption to an operator set maximum demand level.
2. Input: Pulse count from incoming power meter connected to pulse accumulator in control unit.

3. Forecast demand (kW): Predicted by sliding window method.
4. Automatically shed loads throughout the demand interval selecting loads with independently adjustable on and off time of between one and 255 minutes.
5. Demand Target: Minimum of 3 for each demand meter; change targets based upon (1) time, (2) status of pre-selected points, or (3) temperature.
6. Load: Assign load shed priority, minimum "ON" time and maximum "OFF" time.
7. Limits: Include control band (upper and lower limits).
8. Output advisory when loads are not available to satisfy required shed quantity, advise shed requirements and requiring operator acknowledgment.

C. Duty Cycling:
1. Periodically stop and start loads, based on space temperature, and according to various On/Off patterns.
2. Modify off portion of cycle based on operator specified comfort parameters. Maintain total cycle time by increasing on portion of cycle by equal quantity off portion is reduced.
3. Set and modify following parameters for each individual load.
   a. Minimum and maximum off time.
   b. On/Off time in one-minute increments.
   c. Time period from beginning of interval until cycling of load.
   d. Manually override the DDC program and place a load in an On or Off state.
   e. Cooling Target Temperature and Differential.
   f. Heating Target Temperature and Differential.
   g. Cycle off adjustment.

D. Automatic Time Scheduling:
1. Self-contained programs for automatic start/stop/scheduling of building loads.
2. Support up to 7 normal day schedules, 7 "special day" schedules and 2 temporary day schedules.
3. Special days schedule supporting up to 30 unique date/duration combinations.
4. Number of loads assigned to time program; with each load having individual time program.
5. Each load assigned at least 16 control actions for each day with 1 minute resolution.
6. Furnish the following time schedule operations:
   a. Start.
   b. Optimized Start.
   c. Stop.
   d. Optimized Stop.
   e. Cycle.
   f. Optimized Cycle.
7. Capable of specifying minimum of 30 holiday periods up to 100 days in length for the year.
8. Create temporary schedules.
9. Broadcast temporary "special day" date and duration.

E. Start/Stop Time Optimization:
1. Perform optimized start/stop as function of outside conditions, inside conditions, or both.
2. Adaptive and self-tuning, adjusting to changing conditions unattended.
3. For each point under control, establish and modify:
   a. Occupancy period.
   b. Desired temperature at beginning of occupancy period.
   c. Desired temperature at end of occupancy period.

F. Night Setback/Setup Program: Reduce heating space temperature set point or raise cooling space temperature set-point during unoccupied hours; in conjunction with scheduled start/stop and optimum start/stop programs.

G. Calculated Points: Define calculations and totals computed from monitored points (analog/digital points), constants, or other calculated points.
   1. Employ arithmetic, algebraic, Boolean, and special function operations.
   2. Treat calculated values like any other analog value; use for any function where a "hard wired point" might be used.

H. Event Initiated Programming: Any data point capable of initiating event, causing series of controls in a sequence.
   1. Define time interval between each control action between 0 to 3,600 seconds.
   2. Output may be analog value.
   3. Provide for "skip" logic.
   4. Verify completion of one action before proceeding to next action. When not verified, program capable of skipping to next action.

I. Direct Digital Control: Furnish with each control unit Direct Digital Control software so operator is capable of customizing control strategies and sequences of operation by defining appropriate control loop algorithms and choosing optimum loop parameters.
   1. Control loops: Defined using "modules" are analogous to standard control devices.
   2. Output: Paired or individual digital outputs for pulse width modulation, and analog outputs.
   3. Firmware:
      a. PID with analog or pulse-width modulation output.
      b. Floating control with pulse-width modulated outputs.
      c. Two-position control.
      d. Primary and secondary reset schedule selector.
      e. Hi/Low signal selector.
      f. Single pole double-throw relay.
      g. Single pole double throw time delay relay with delay before break, delay before make and interval time capabilities.
   4. Direct Digital Control loop: Downloaded upon creation or on operator request. On sensor failure, program executes user defined failsafe output.
   5. Display: Value or state of each of lines interconnecting DDC modules.

J. Fine Tuning Direct Digital Control PID or floating loops:
   1. Display information:
      a. Control loop being tuned.
      b. Input (process) variable.
      c. Output (control) variable.
      d. Set-point of loop.
      e. Proportional band.
      f. Integral (reset) Interval.
      g. Derivative (rate) Interval.
   2. Display format: Graphic, with automatic scaling; with input and output variable superimposed on graph of "time" versus "variable".

K. Trend logging:
   1. Each control unit capable of storing samples of control unit's data points.
   2. Update file continuously at operator assigned intervals.
   3. Automatically initiate upload requests and then stores data on hard disk.

4. Time synchronize sampling at operator specified times and intervals with sample resolution of one minute.
5. Co-ordinate sampling with specified on/off point- state.
6. Display trend samples on workstation in graphic format. Automatically scale trend graph with minimum 60 samples of data in plot of time versus data.

2.7 HVAC CONTROL PROGRAMS

A. General:
   1. Support Inch-pounds and S.I. metric units of measurement.
   2. Identify each HVAC Control system.

B. Optimal Run Time:
   1. Control start-up and shutdown times of HVAC equipment for both heating and cooling.
   2. Base on occupancy schedules, outside air temperature, seasonal requirements, and interior room mass temperature.
   3. Start-up systems by using outside air temperature, room mass temperatures, and adaptive model prediction for how long building takes to warm up or cool down under different conditions.
   4. Use outside air temperature to determine early shut down with ventilation override.
   5. Analyze multiple building mass sensors to determine seasonal mode and worse case condition for each day.
   6. Operator commands:
      a. Define term schedule.
      b. Add/delete fan status point.
      c. Add/delete outside air temperature point.
      d. Add/delete mass temperature point.
      e. Define heating/cooling parameters.
      f. Define mass sensor heating/cooling parameters.
      g. Lock/unlock program.
      h. Request optimal run-time control summary.
      i. Request optimal run-time mass temperature summary.
      j. Request HVAC point summary.
      k. Request HVAC saving profile summary.
   7. Control Summary:
      a. HVAC Control system begin/end status.
      b. Optimal run time lock/unlock control status.
      c. Heating/cooling mode status.
      d. Optimal run time schedule.
      e. Start/Stop times.
      f. Selected mass temperature point ID.
      g. Optimal run-time system normal start-times.
      h. Occupancy and vacancy times.
   8. Mass temperature summary:
      a. Mass temperature point type and ID.
      b. Desired and current mass temperature values.
      c. Calculated warm-up/cool-down time for each mass temperature.
      d. Heating/cooling season limits.
      e. Break point temperature for cooling mode analysis.

9. HVAC point summary:
    a. Control system identifier and status.
    b. Point ID and status.
    c. Outside air temperature point ID and status.
    d. Mass temperature point ID and status.
    e. Calculated optimal start and stop times.
    f. Period start.

2.8 PROGRAMMING APPLICATION FEATURES

A. Trend Point:
1. Output trend logs as line-graphs or bar graphs. Output graphic on terminal, with each point for line and bar graphs designated with a unique pattern or color, vertical scale either actual values or percent of range, and horizontal scale time base. Print trend logs up to 12 columns of 1 point/column.

B. Alarm Messages:
1. Assign alarm messages to system messages including point's alarm condition, point's off-normal condition, totaled point's warning limit, hardware elements advisories.
2. Output assigned alarm with "message requiring acknowledgment."
3. Operator commands include define, modify, or delete; output summary listing current alarms and assignments; output summary defining assigned points.

C. Weekly Scheduling:
1. Automatically initiate equipment or system commands, based on selected time schedule for points specified.
2. Automatically generate alarm output for points not responding to command.
3. Operator commands:
    a. System logs and summaries.
    b. Start of stop point.
    c. Lock or unlock control or alarm input.
    d. Add, delete, or modify analog limits and differentials.
    e. Adjust point operation position.
    f. Change point operational mode.
    g. Open or close point.
    h. Enable/disable, lock/unlock, or execute interlock sequence or computation profile.
    i. Begin or end point totals.
    j. Modify total values and limits.
    k. Access or secure point.
    l. Begin or end HVAC or load control system.
    m. Modify load parameter.
    n. Modify demand limiting and duty cycle targets.
4. Output summary: Listing of programmed function points, associated program times, and respective day of week programmed points by software groups or time of day.

D. Interlocking:
1. Permit events to occur, based on changing condition of one or more associated master points.
2. Binary contact, high/low limit of analog point or computed point capable of being used as master. Master capable of monitoring or commanding multiple slaves.

3. Operator commands:
    a. Define single master/multiple master interlock process.
    b. Define logic interlock process.
    c. Lock/unlock program.
    d. Enable/disable interlock process.
    e. Execute terminate interlock process.
    f. Request interlock type summary.

2.9 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Electrical Characteristics: In accordance with Division 26.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 "Administrative Requirements" for coordination and Project conditions.
B. Verify conditioned power supply is available to control units and to operator workstation.
C. Verify field end devices and wiring is installed prior to installation proceeding.

3.2 INSTALLATION

A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.
B. Install software in control units and in operator workstation. Implement features of programs to specified requirements and appropriate to sequence of operation. Refer to Section 23 09 93 "Sequence of Operations for HVAC/Plumbing Controls."
C. Install with 120 volts alternating current, 15 amp dedicated emergency power circuit to each programmable control unit.
D. Install conduit and electrical wiring in accordance with Division 26.
E. Install electrical material and installation in accordance with appropriate requirements of Division 26.

3.3 MANUFACTURER'S FIELD SERVICES

A. Section 01 40 00 "Quality Requirements" for manufacturers field services.
B. Start and commission systems. Allow adequate time for start-up and commissioning prior to placing control systems in permanent operation.
C. Furnish service technician employed by system installer to instruct Owner's representative in operation of systems plant and equipment for 3 day period.

3.4 DEMONSTRATION AND TRAINING

A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for demonstration and training.
B. Furnish basic operator training for 3 persons on data display, alarm and status descriptors, requesting data, execution commands and log requests. Include a minimum of 40 hours instructor time. Furnish training on site.
C. Demonstrate complete and operating system to Owner.

3.5 SCHEDULES

A. Alarm Schedule:
1. Types:
a. A1: High Limit.
b. A2: Low Limit.
c. A3: Run Time.
d. A4: Maintenance.
e. A5: Status.
f. A6: Override.
g. A7: Freeze.
h. A8: Low Pressure.

END OF SECTION

SECTION 23 09 93 - SEQUENCE OF OPERATIONS FOR HVAC/PLUMBING CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes sequence of operation for:
   1. Air Handling Units.
   2. Air-Cooled DX Condensing Units.
   3. Exhaust fans.
   4. Radiant Electric Unit Heaters.
   5. Pet Area Wash-Down System.
   6. IT Room AC Unit System.
   7. Refrigerant Leak System.
   8. Draft-Inducing Exhaust Fan System.
   9. Sump Pump Pit Systems.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 23 09 23 "Direct-Digital Control System for HVAC" for equipment, devices, system components, and software to implement sequences of operation.

C. The existing HVAC and Plumbing systems currently operating at the Airport terminal are not contained within this Specification. The renovation of the existing air handling units, water-cooled chillers, cooling towers, and new gas-fired boilers (replacing the existing boilers), and all associated pumps and devices shall be restored to their current control and sequence of operations once required renovations have been finished.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 AIR HANDLING UNITS

A. Standard Operations: The expansion HVAC system is designed to be 100 percent redundant; AHU-15-25 and AHU-16-25 and their associated air-cooled condensing units will not operate at the same time. AHU-17-25 and AHU-18-25 and their associated air-cooled condensing units will not operate at the same time. System is designed to allow either AHU-15-25 or AHU-16-25 to operate with either AHU-17-25 or AHU-18-25 and their associated air-cooled condensing units. Coordinate with owner to determine their preferred system rotation time schedule. Each AHU has corresponding control air dampers for the supply air, outside air (minimum and economizer), return air, and relief air dampers. For each system, open the unit dampers for system being operated and close the corresponding control air dampers on the unit not currently operating. Log run-times for each system to provide historical data for owner. In heating mode, DIF-1-25 shall operate with either AHU-15-25 or AHU-16-25 and DIF-2-25 shall operate with either AHU-17-25 or AHU-18-25. Exhaust fans EF-1, EF-2, and EF-3 shall operate continuously. Intake air louver (IL-1) shall be divided into four quadrants, modulate the two upper quadrants to provide minimum outside air for new expansion AHU's and for the six AHU's serving the existing portions of the south side of the terminal. All 4 quadrants shall open when the existing and new AHU's are in economizer mode.

B. In Cooling Mode: Multiple room temperature sensors (for averaging zone temperatures) shall provide input to DDC / BMS system to maintain a constant space temperature (75 degrees F, owner adjustable) by cycling the air-cooled condensing unit, by staging the various refrigeration stages on each air-cooled condensing unit associated with its air handling unit. The minimum outside air damper shall open, the relief air damper shall modulate to minimum relief air position. "Weighted" averaging zone temperature sensors allow Owner to provide percentages for each temperature sensor to make up 100 percent input to unit or allow room sensors to be turned OFF/ON by Owner to maintain desired zone temperature.

C. In Heating Mode: Multiple room temperature sensors (for averaging zone temperatures) shall provide input to DDC / BMS system to maintain a constant space temperature (70 degrees F, owner adjustable) by staging the indirect gas-fired heating section as needed. Provide constant draft induced exhaust flue fan operation to maintain required CFM for proper flue exhaust differential pressure in the heating section. Refer to Induced Draft Exhaust Fan Schedule. Coordinate with air-handling unit manufacturer for pressure differential required for proper gas-fired heater operation. Provide variable speed controller and pressure differential sensors to operate and maintain ductwork pressure system.

D. Dry-Bulb Economizer Mode: During periods of time when the outside air dry bulb temperature is capable of sustaining the interior zone average temperature, the relief air damper shall fully open, the economizer outside air damper shall fully open with minimum OA damper fully open, and the air handling unit shall operate to maintain set-point zone temperatures.

E. Provide "Occupied" and "Unoccupied" Modes: The sequences stated above shall be for both occupied and unoccupied modes. The occupied modes shall modulate the air handling units and associated air-cooled condensing units shall maintain 75 degrees F (in cooling) and 70 degrees F (in heating). The unoccupied modes shall modulated the air handling units and associated air-cooled condensing units to maintain 85 degrees F (in cooling) and 65 degrees F (in heating). Occupied and Unoccupied mode temperatures shall be Owner adjustable.

F. Display:
   1. System graphic.
   2. Air Handling Unit - on/off indication.
   3. Unit supply air temperature.
   4. Unit return air temperature.
   5. Unit outside air temperature.
   6. Indirect Gas-Fired Heater Section - Chamber Pressure Differential.
   7. Induced Draft Exhaust Fan (DEF-#) Status.
   8. Pre-Filter Status.
   9. Final Filter Status.
   10. Outside Air Flow Measuring Station.
   11. Return Air Flow Measuring Station.
   12. Supply Air Flow Measuring Station.

3.2 AIR-COOLED DXCONDENSING UNIT SYSTEMS

A. Based on the average zone requirements, engage each AHU's associated air-cooled condensing unit to maintain zone temperature set-point. The internal condensing unit controls shall govern the modulation and activation of each compressor circuits to maintain the average zone temperature.

B. Display:
   1. System graphic.
   2. Air-Cooled Condensing unit on/off indication.
   3. Unit Suction temperature/pressure.
   4. Unit Liquid temperature/pressure.
   5. Current percent level of Air-Cooled Condensing unit operation.
   6. Provide standard unit alarms/errors from manufacturer to DDC/BMS system.

3.3 EXHAUST FANS

A. Refer to Exhaust Fan Schedule notes on Sheet M-601 for each exhaust fan sequence of operation.

B. Refer to Induced Draft Exhaust Fan Schedule notes and Air-Handling Units sequence of operations for sequence of operation.

C. Exhaust Fan (EF-4) shall operate based on the Refrigerant Leak Detection System and on the CO2 Detection System. If a refrigerant leak or high levels of CO2 is detected, EF-4 shall engage, associated control damper (CD-1) shall close, and audible / visible alarms shall engage and report to DDC front-end.

3.4 RADIATION UNIT HEATERS

A. Average the temperature room with multiple thermostat sensors set at 45 degrees F(owner adjustable) to maintain constant space temperature by staging electric unit heaters to engage as described on Radiant Electric Unit Heater Schedule.

3.5 ELECTRIC UNIT HEATER

A. Integral thermostat on unit heater to maintain room temperature at minimum 45 degrees. F. Provide sensor to DDC front-end to allow for monitoring of riser room temperature. If room temperature falls below 35 degrees F, alarm front-end of potential freezing conditions.

3.6 SUMP PUMPS

A. Elevator Sump Pump: Pump shall operate based on integral float switch provided by manufacturer. DDC controls shall monitor if pump is operational, turn off operational notification when pump is not operating, wet sensor shall alarm DDC front-end that pit is 3/4 full.
B. Condensate Sump Pump: Pump shall operate based on integral float switch provided by manufacturer. DDC controls shall monitor pump operational status, no alarm require. Pump is designed to operate intermittently as needed to remove condensate from basement. Provide wet sensor to alarm DDC front-end if pit becomes 80 percent full.

3.7 DOMESTIC WATER HEATER SYSTEM

A. DDC to monitor outlet domestic hot water temperature, alarm DDC front-end if temperature falls below 120 degrees F and if temperature goes above 140 degrees F.
B. Monitor the domestic hot water recirculation pump, alarm front-end if pump is not operational.

3.8 PET AREA WASHDOWN SYSTEM

A. DDC front-end shall monitor system operation with flow switch to packaged wash-down system. DDC to monitor and record time and duration of system operation via domestic water flow to system.

3.9 IT ROOM AC UNIT SYSTEM

A. Ductless split system manufacturers integral controls shall control the system to maintain the set-point required be the owner. DDC front-end shall monitor room temperature via DDC supplied temperature sensor and alarm DDC front-end if room temperature rises above 80 degrees F, Owner adjustable.

END OF SECTION

SECTION 23 11 23 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Natural gas piping beyond 5 feet of building.
2. Natural gas piping buried within 5 feet of building.
3. Natural gas piping above grade.
4. Unions and flanges.
5. Valves.
6. Press-Connect fittings.

B. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.
2. Section 07 84 13 "Penetration Firestopping."
3. Section 09 91 13 "Interior Painting."
4. Section 23 05 00 "General Mechanical Requirements."
5. Section 23 05 29 "Hangers and Supports for Plumbing Piping and Equipment."

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI Z21.15 - Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves.

B. American Society of Mechanical Engineers:
1. ASME B16.3 - Malleable Iron Threaded Fittings.
2. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
3. ASME B16.33 - Manually Operated Metallic Gas Valves for Use in Gas Piping Systems Up to 125 psig (sizes 1/2 - 2).
4. ASME B31.9 - Building Services Piping.
5. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.

C. ASTM International:
1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
2. ASTM A234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
3. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
4. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
5. ASTM B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products.
6. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

D. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.

E. American Water Works Association:
   1. AWWA C105 - American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
F. Manufacturers Standardization Society of the Valve and Fittings Industry:
   1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
   2. MSS SP 67 - Butterfly Valves.
   3. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
   4. MSS SP 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
   5. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
   6. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
G. National Fire Protection Association:
   1. NFPA 54 - National Fuel Gas Code.
H. Underwriters Laboratories Inc.:
   1. UL 842 - Valves for Flammable Fluids.

1.3 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections when joining dissimilar metals in systems.
B. Provide flanges, unions, or couplings at locations requiring servicing. Use unions, flanges, or couplings downstream of valves and at equipment connections. Do not use direct welded or threaded connections to valves, equipment.
C. Provide pipe hangers and supports in accordance with ASME B31.9, ASTM F708, MSS SP 58, MSS SP 69, and MSS SP 89.
D. Use plug, ball, or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.

1.4 SUBMITTALS

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for submittal procedures.
B. Product Data:
   1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
   2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
   3. Piping Specialties: Submit manufacturers catalog information including capacity, rough-in requirements, and service sizes for the following:
      a. Natural gas pressure regulators.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit for valves and gas pressure regulators installation instructions, spare parts lists, and exploded assembly views.

1.6 QUALITY ASSURANCE

A. Perform natural gas Work in accordance with NFPA 54.
B. Furnish shutoff valves complying with ASME B16.33 or ANSI Z21.15.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' experience.
B. Installer: Company specializing in performing Work of this Section with minimum 3 years' experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
B. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation. Furnish temporary protective coating on cast iron and steel valves.

1.9 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.10 WARRANTY

A. Section 23 05 00 "General Mechanical Requirements" for product warranties.
B. Warranty period for Viega MegapressG fittings: Fifteen years from date of installation.

PART 2 - PRODUCTS

2.1 NATURAL GAS PIPING, BURIED BEYOND 5 FEET OF BUILDING

A. Steel Pipe: ASTM A53 Schedule 40 black.
   1. Fittings: ASTM A234 forged steel welding type.
   2. Joints: ASME B31.9, welded.
   3. Jacket: AWWA C105 polyethylene jacket or double layer, half-lapped 10-mil polyethylene tape.

2.2 NATURAL GAS PIPING, BURIED WITHIN 5 FEETOF BUILDING

A. Steel Pipe: ASTM A53 Schedule 40 black.
   1. Fittings: ASTM A234 forged steel welding type.
   2. Joints: ASME B31.9, welded.
   3. Jacket: AWWA C105 polyethylene jacket or double layer, half-lapped 10-mil polyethylene tape.

2.3 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53 Schedule 40 black.
   1. Fittings: ASME B16.3, malleable iron, or ASTM A234 forged steel welding type.
   2. Joints: Threaded for pipe 2 inchand smaller; welded for pipe 2-1/2 inchesnd larger.

2.4 UNIONS AND FLANGES

A. Unions for Pipe 2 Inches and Smaller:
   1. Ferrous Piping: Class 150, malleable iron, threaded.
   2. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
B. Flanges for Pipe 2-1/2 Inches and Larger:
   1. Ferrous Piping: Class 150, forged steel, slip-on flanges.
   2. Gaskets: 1/16-inch-thick preformed neoprene gaskets.

2.5 BALL VALVES

A. Substitutions: Division 01 and Section 23 05 00 "General Mechanical Requirements" for substituted Products.
B. 1/4-Inch to 1-Inch: MSS SP 110, Class 125, 2-piece, threaded ends, bronze body, chrome plated bronze ball, reinforced Teflon seats, blow-out proof stem, lever handle, UL 842 listed for flammable liquids and LPG, full port.
C. 1-1/4 Inches to 3 Inches: MSS SP 110, Class 125, 2-piece, threaded ends, bronze body, chrome plated bronze ball, reinforced Teflon seats, blow-out proof stem, lever handle, UL 842 listed for flammable liquids and LPG, conventional port.

2.6 PLUG VALVES

A. Substitutions: Division 01 and Section 23 05 00 "General Mechanical Requirements" for substituted Products.
B. Two Inches and Smaller: MSS SP 78, Class 150 semi-steel construction, rectangular port, regular opening, pressure lubricated, Teflon packing, threaded ends. Furnish 1 plug valve wrench for every 10 plug-valves with minimum of 1 wrench.
C. PL-2 2-1/2 Inches and Larger: MSS SP 78, Class 150 semi-steel construction, rectangular port, regular opening, pressure lubricated, Teflon packing, flanged ends. Furnish valve wrench.

2.7 NATURAL GAS PRESSURE REGULATORS

A. Product Description: Spring loaded, general purpose, self-operating service regulator including internal relief type diaphragm assembly and vent valve. Diaphragm case can be rotated 360 degrees in relation to body.
   1. Comply with ANSI Z21.80.
   2. Temperatures: -20 degrees F to 150 degrees F.
   3. Body: Cast iron steel.
   4. Spring case, lower diaphragm casing, union ring, seat ring and disk holder: Aluminum.
   5. Disk, diaphragm, and O-ring: Nitrile.
   6. Maximum inlet pressure: 150 psig.
   7. Furnish sizes 2 inches and smaller with threaded ends. Furnish sizes 2-1/2 inches and larger with flanged ends.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe**.**
B. Remove scale and dirt, on inside and outside, before assembly.
C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install hangers and supports in accordance with ASME B31.9, ASTM F708, and MSS SP 89.
B. Support horizontal piping hangers as scheduled.
C. Install hangers to provide minimum 1/2-inchspace between finished covering and adjacent work.
D. Place hangers within 12 inches of each horizontal elbow.
E. Install hangers to allow 1-1/2-inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
F. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
G. Where installing several pipes in parallel and at same elevation, provide multiple pipe hangers or trapeze hangers.
H. Prime coat exposed steel hangers and supports in accordance with Section 09 91 23 "Interior Painting." Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
I. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
J. Install pipe hangers and supports in accordance with Section 23 05 29 "Hangers and Supports for Plumbing Piping and Equipment."
K. Refer to Section 23 05 00 "General Mechanical Requirements" for roof-mounted pipping supports.

3.4 INSTALLATION - BURIED PIPING SYSTEMS

A. Install natural gas piping in accordance with NFPA 54.
B. Verify connection size, location, and invert are as indicated on Drawings.
C. Establish elevations of buried piping with not less than 2 feetof cover.
D. Establish minimum separation of from other services piping in accordance with applicable code.
E. Remove scale and dirt on inside of piping before assembly.
F. Excavate pipe trench in accordance with Section 23 05 00 "General Mechanical Requirements."
G. Install pipe to elevation as indicated on Drawings.

H. Install pipe on prepared bedding.
I. Route pipe in straight line.
J. Install pipe to allow for expansion and contraction without stressing pipe or joints.
K. Install plastic ribbon tape continuous over top of pipe; 12 inches above pipeline.
L. Non-metallic pipe: Install trace wire continuous over top of pipe; 12 inches below finish grade, above pipeline.
M. Pipe Cover and Backfilling: In accordance with Section 23 05 00 "General Mechanical Requirements."

3.5 INSTALLATION - ABOVE GROUND PIPING SYSTEMS

A. Install natural gas piping in accordance with NFPA 54.
B. Provide non-conducting dielectric connections wherever joining dissimilar metals.
C. Route piping in orderly manner and maintain gradient.
D. Where required, bend pipe with pipe bending tools in accordance with procedures intended for that purpose.
E. Install piping to conserve building space and not interfere with use of space.
F. Size and install gas piping to provide sufficient gas to supply maximum appliance demand at pressure higher than appliance minimum inlet pressure.
G. Group piping whenever practical at common elevations.
H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
I. Sleeve pipe passing through partitions, walls and floors. Refer to Section 23 05 00 "General Mechanical Requirements."
J. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Refer to Section 07 84 13 "Penetration Firestopping."
K. Provide clearance for installation of insulation and access to valves and fittings.
L. Provide access where valves and fittings are not exposed.
M. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply 1 coat of zinc rich primer.
N. Provide support for utility meters in accordance with requirements of utility company.
O. Install vent piping from gas pressure reducing valves to outdoors and terminate in weatherproof hood. Protect vent against entry of insects and foreign material.
    1. Minimum Vent Size: Connection size at regulator vent connection.
    2. Run individual vent line from each relief device, independent of breather vents.
    3. Do not terminate vent within 10 feet of any outside air intake.
P. Breather vents may be manifolded together with piping sized for combined appliance vent requirements.
Q. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting. Refer to Section 09 91 13 "Interior Painting."
R. Install identification on piping systems including underground piping.
S. Install valves with stems upright or horizontal, not inverted.
T. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.
U. Contractor shall paint all exposed natural gas piping visible above grade from public areas both inside and outside the building.

3.6 FIELD QUALITY CONTROL

A. Where gas appliance will be damaged by test pressure, disconnect appliance and cap piping during pressure test. Reconnect appliance after pressure test and leak test connection.
B. Pressure test natural gas piping in accordance with NFPA 54.
C. Inspect, test and purge gas piping in accordance with applicable code and local gas company requirements.
D. When pressure tests do not meet specified requirements, remove defective Work, replace and retest.
E. Immediately after gas is applied to a new system, or a system has been restored after gas service interruption, check pipe for leakage.
    1. Where leakage is detected, shut off gas supply until necessary repairs are complete.
F. Do not place appliances in service until leak testing and repairs are complete.

END OF SECTION

SECTION 23 23 00 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Refrigerant piping.
2. Unions, flanges, and couplings.
3. Valves.
4. Refrigerant strainers.

B. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.
2. Section 23 05 00 "General Mechanical Requirements."
3. Section 23 07 00 "HVAC Insulation."

1.2 REFERENCES

A. Air-Conditioning and Refrigeration Institute:
1. ARI 495 - Refrigerant Liquid Receivers.
2. ARI 710 - Liquid-Line Driers.
3. ARI 730 - Flow-Capacity Rating and Application of Suction-Line Filters and Filter Dryers.
4. ARI 750 - Thermostatic Refrigerant Expansion Valves.
5. ARI 760 - Solenoid Valves for Use with Volatile Refrigerants.

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
1. ASHRAE 15 - Safety Code for Mechanical Refrigeration.

C. American Society of Mechanical Engineers:
1. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
2. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
3. ASME B31.5 - Refrigeration Piping.
4. ASME Section VIII - Boiler and Pressure Vessel Code - Pressure Vessels.

D. ASTM International:
1. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
2. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
3. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

E. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
2. AWS D1.1 - Structural Welding Code - Steel.

F. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

G. Underwriters Laboratories Inc.:
1. UL 429 - Electrically Operated Valves.

1.3 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections when joining dissimilar metals in systems.
B. Provide flanges, unions, or couplings at locations requiring servicing. Use unions, flanges, or couplings downstream of valves and at equipment connections. Do not use direct welded or threaded connections to valves or equipment.
C. Provide pipe hangers and supports in accordance with ASME B31.5, ASTM F708, MSS SP 58, MSS SP 69, and MSS SP 89.

1.4 SUBMITTALS

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for submittal procedures.
B. Product Data:
   1. Piping: Submit data on pipe materials, fittings, and accessories.
   2. Valves: Submit manufacturer's catalog information with valve data and ratings for each service.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years; experience.
B. Fabricator or Installer: Company specializing in performing Work of this Section with minimum 3 years' experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Dehydrate and charge refrigeration components including piping and receivers, seal prior to shipment. Maintain seal until connected into system.
B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not install underground piping when bedding is wet or frozen.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.9 WARRANTY

A. Division 01 and Section 23 05 00 "General Mechanical Requirements."

PART 2 - PRODUCTS

2.1 REFRIGERANT PIPING (ABOVE GRADE AND UNDERGROUND)

A. Copper Tubing: ASTM B280, drawn.
   1. Fittings: ASME B16.22 wrought copper.
   2. Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1,190 to 1,480 degrees F.
   3. Provide polyethylene jacket or double layer, half-lapped 10-mil polyethylene tape on all underground refrigerant piping for all underground refrigerant piping.

2.2 UNIONS, FLANGES, AND COUPLINGS

A. Two inches and Smaller:
   1. Copper Pipe: Bronze, soldered joints.
B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.3 VALVES

A. Ball Valves:
   1. Two-piece bolted forged brass body with Teflon ball seals and copper tube extensions, brass bonnet and seal cap, chrome plated ball, stem with neoprene ring stem seals, soldered ends.
   2. Maximum working pressure: 500 psig.
   3. Maximum working temperature: 325 degrees F.
B. Service Valves:
   1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or solder ends.
   2. Maximum working pressure: 500 psig.
C. Refrigerant Check Valves:
   1. Straight Through Type:
      a. Spring, neoprene seat.
      b. Maximum working pressure: 500 psig.
      c. Maximum working temperature: 250 degrees F.

2.4 REFRIGERANT STRAINERS

A. Straight Line or Angle Line Type:
   1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or monel reinforced with brass.
   2. Maximum working pressure: 430 psig.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs.
B. Remove scale and dirt on inside and outside before assembly.
C. Prepare piping connections to equipment with flanges or unions.
D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.3 INSTALLATION - INSERTS

A. Provide inserts for placement in concrete forms.
B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.4 INSTALLATION - BURIED PIPING SYSTEMS

A. Establish elevation of buried piping with not less that 2 feet 0 inches of cover.
B. Remove scale and dirt on inside of piping before assembly.
C. Excavate pipe trench in accordance with Section 23 05 00 "General Mechanical Requirements."
D. Install piping on prepared bedding and route piping in as straight a line as possible.
E. Provide polyethylene jacket or double layer, half-lapped 10-mil polyethylene tape on all underground refrigerant piping.

3.5 INSTALLATION - ABOVE GROUND PIPING SYSTEMS

A. Route piping parallel to building structure and maintain gradient.
B. Install piping to conserve building space, and not interfere with use of space.
C. Group piping whenever practical at common elevations.
D. Sleeve pipe passing through partitions, walls and floors. Refer to Section 23 05 00 "General Mechanical Requirements."
E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
F. Provide access where valves and fittings are not exposed.
G. Arrange refrigerant piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.
H. Flood refrigerant piping system with nitrogen when brazing.
I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
J. Install valves with stems upright or horizontal, not inverted.

K. Insulate piping; refer to Section 23 07 00 "HVAC Insulation." Both liquid and suction piping lines shall be insulated with aluminum jacketing on both suction and liquid piping runs. THIS APPLIES TO BOTH OUTSIDE AND INSIDE ABOVE GRADE APPLICATIONS.
L. Fully charge completed system with refrigerant after testing.
M. Follow ASHRAE 15 procedures for charging and purging of systems and for disposal of refrigerant.
N. Install refrigerant piping in accordance with ASME B31.5.

3.6 FIELD QUALITY CONTROL

A. Test refrigeration system in accordance with ASME B31.5.
B. Pressure test refrigeration system with dry nitrogen to 200 psig.
C. Repair leaks.
D. Retest until no leaks are detected.

3.7 SCHEDULES

A. Copper Tube Hanger Spacing:
   1. Pipe Size 1/2-Inch:
      a. Maximum Hanger Spacing: 5 feet.
      b. Hanger Rod Diameter: 3/8-inch.
   2. Pipe Size 3/4-Inch:
      a. Maximum Hanger Spacing: 5 feet.
      b. Hanger Rod Diameter: 3/8-inch.
   3. Pipe Size 1-Inch:
      a. Maximum Hanger Spacing: 6 feet.
      b. Hanger Rod Diameter: 3/8-inch.
   4. Pipe Size 1-1/4 Inches:
      a. Maximum Hanger Spacing: 7 feet.
      b. Hanger Rod Diameter: 3/8-inch
   5. Pipe Size 1-1/2 Inches:
      a. Maximum Hanger Spacing: 8 feet.
      b. Hanger Rod Diameter: 3/8-inch.
   6. Pipe Size 2 Inches:
      a. Maximum Hanger Spacing: 8 feet.
      b. Hanger Rod Diameter: 3/8-inch.
   7. Pipe Size 2-1/2 Inches:
      a. Maximum Hanger Spacing: 9 feet.
      b. Hanger Rod Diameter: 1/2-inch.
   8. Pipe Size 3 Inches:
      a. Maximum Hanger Spacing: 10 feet.
      b. Hanger Rod Diameter: 1/2-inch.
   9. Pipe Size 4 Inches:
      a. Maximum Hanger Spacing: 10 feet.
      b. Hanger Rod Diameter: 1/2-inch.

END OF SECTION

SECTION 23 31 00 - HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Duct materials.
   2. Insulated flexible ducts.
   3. Casings.
   4. Ductwork fabrication.
   5. Duct cleaning.
   6. Fabric ductwork.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCE STANDARDS

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
   1. ASHRAE Handbook - Fundamentals.

B. American Welding Society:
   1. AWS D1.1 - Structural Welding Code - Steel.
   2. AWS D1.2 - Structural Welding Code - Aluminum.
   3. AWS D9.1 - Sheet Metal Welding Code.

C. ASTM International:
   1. ASTM A36 - Standard Specification for Carbon Structural Steel.
   2. ASTM A90 - Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
   3. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
   4. ASTM A568 - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
   5. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   6. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
   7. ASTM A1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
   8. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
   9. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

10. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.
11. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
12. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. International Code Council:
1. International Energy Conservation Code (IECC).
2. International Mechanical Code (IMC).

E. NFPA:
1. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.
2. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.
3. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.

F. Sheet Metal and Air Conditioning Contractors' National Association:
1. SMACNA 016 - HVAC Air Duct Leakage Test Manual.
2. SMACNA 1767 - Kitchen Ventilation Systems and Food Service Equipment Guidelines.
3. SMACNA 1884 - Fibrous Glass Duct Construction Standards.
4. SMACNA 1966 - HVAC Duct Construction Standards - Metal and Flexible.

G. UL:
1. UL 181 - Factory-Made Air Ducts and Air Connectors.
2. UL 181A - Closure Systems for Use With Rigid Air Ducts.
3. UL 1978 - Grease Ducts.

1.3 SUBMITTALS

A. Division 01 33 00 "Submittal Procedures" for requirements for submittals.
B. Product Data: Submit manufacturer information for duct materials.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years ' experience.
B. Installer: Company specializing in performing Work of this Section with minimum 3 years' experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on site in manufacturer's original packaging and inspect for damage.
B. Store materials according to manufacturer instructions.
C. Protection:
1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.6 AMBIENT CONDITIONS

A. Minimum Conditions: Do not install duct sealant when temperatures are less than those recommended by sealant manufacturer.
B. Subsequent Conditions: Maintain temperatures during and after installation of duct sealant.

1.7 EXISTING CONDITIONS

A. Field Measurements:
1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 DUCTS

A. Performance and Design Criteria:
1. Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission of Engineer.
2. Size round ducts installed in place of rectangular ducts according to ASHRAE Handbook - Fundamentals.
B. Galvanized-Steel Ducts:
1. Material: ASTM A653 galvanized-steel sheet.
2. Quality: Lock forming.
3. Finish: G90 zinc coating according to ASTM A90.
C. Stainless-Steel Ducts: Comply with ASTM A240, Type 304.
D. Fasteners: Rivets, bolts, or sheet metal screws.
E. Hanger Rod:
1. Material: Galvanized steel.
2. Comply with ASTM A36.
3. Type: Threaded continuously.

2.2 INSULATED FLEXIBLE DUCTS

A. Description:
1. Two-ply vinyl film supported by helical-wound spring steel wire.
2. Insulation: Fiberglass.
3. Vapor Barrier Film: Polyethylene (PE) or Aluminized.
4. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
5. Maximum Velocity: 4,000 fpm.
6. Temperature Range: Minus 10 to plus 160 degrees F .
7. Thermal Resistance: R-6 installed value or greater.

2.3 DOUBLE WALL METAL STACKS (FLUE VENT AIR DUCT FROM AIR HANDLING UNITS)

A. Manufacturers:
   1. Simpson Dura-Vent Co.: Model DuraStack Pro-DIS, Basis of Design
   2. Industrial Chimney Company.
   3. HeatFab.
   4. Selkirk Corporation.
   5. Substitutions: Division 01 and Section 23 05 00 “General Mechanical Requirements” for substitutions.

B. Furnish double wall metal stacks, tested to UL 103 and UL listed, for use with building heating equipment, in compliance with NFPA 211.

C. Fabricate with 2-inch minimum insulation between walls. Construct inner jacket of 20 gage ASTM A240 or ASTM A666 Type 316 stainless steel. Construct outer jacket of Type 304 stainless steel 24 gage for sizes 10 inches up to 24 inches and 20 gage for sizes 28 inches to 48 inches.

D. The pre-fabricated chimney, breeching and components shall be listed as an Industrial Chimney by Intertek in the United States and Canada according to UL/ULC standard for use with building heating appliances which produce exhausted flue gases at a maximum temperature of 1,000 degrees F under continuous firing. The chimney shall be listed for temperatures of 1,000 degrees F under continuous firing and 1,400 degrees F in brief forced firing according to UL-103, ULC-S604, and ULC/ORD-C959. The factory-built breeching system shall be made in accordance with NFPA 211. This stack system shall be designed and installed to be gas tight. It shall be listed by Intertek in accordance with UL103 to withstand up to 60-inch internal water column pressure. Each duct section shall be made of 2 steel cylinders separated by 2-inch of high temperature fiber insulation. The published clearance of 1 inch to combustible shall be the result of UL/ULC standard. Each duct section shall be made of two steel cylinders separated by 2 inches of air. The published clearance of 4 inches to combustible shall be the result of UL/ULC standard. The inner wall (flue) shall be constructed from 304 or 316 stainless steel, 0.035-inch-hick. The outer wall (casing) shall be constructed from galvalume, 304 stainless or 316 stainless steel, 0.018-inch-thick for diameter 5-inch to 24-inch and 0.024-inch for diameter 26-inch to 36-inch. Non-stainless steel surfaces exposed outside shall be protected by a minimum of one base coat of primer and one finish coat of corrosion resistant paint suitable for high temperature. All primer and paint must be supplied by the contractor and shall be equivalent to series 4100 or 9400 as manufactured by Rust-Oleum. n outer wall made of 304 or 316 stainless steel doesn’t need to be painted. The inner wall (flue) shall be laser or plasma welded. All section joints shall be self-centering to ensure proper spacing between the inner wall (flue) and the outer wall (casing). All section joints are connected and sealed with factory supplied locking bands at the outer wall (casing) only. Use appropriate sealant as specified in the manufacturer’s installation manual. The chimney shall be designed to compensate for thermal expansion.

E. Accessories, UL labeled.

2.4 CASINGS

A. Fabricate casings according to SMACNA 1966 and construct for indicated operating pressures.
B. Doors:
   1. Reinforce access door frames with steel angles tied to horizontal and vertical plenum supporting angles.
   2. Furnish hinged access doors where indicated or required for access to equipment for cleaning and inspection.
C. Acoustic Casings:
   1. Fabricate acoustic casings with reinforcing turned inward.
   2. Furnish 16-gauge back facing and 22-gauge perforated front facing, with 3/32-inch-diameter holes at 5/32-inch o.c.
   3. Construct panels 3 inches thick and packed with 4.5-pcf inimum glass-fiber media, on 16-gauge inverted channels.

2.5 FABRICATION

A. Rectangular Ducts:
   1. According to SMACNA 1966.
   2. Provide duct material, gauges, reinforcing, and sealing for indicated operating pressures.
B. Round Ducts:
   1. According to SMACNA 1966 and as indicated on Drawings.
   2. Seams: Longitudinal.
   3. Provide duct material, gauges, reinforcing, and sealing for indicated operating pressures.
C. Tees, Bends, and Elbows:
   1. Minimum Radius:
      a. 1-1/2 times centerline duct width.
      b. If not possible or if rectangular elbows are used, provide single thickness airfoil turning vanes.
   2. If acoustical lining is indicated, furnish turning vanes of perforated metal with glass-fiber insulation.
D. Divergence:
   1. Increase duct sizes gradually, not exceeding 15 degrees of divergence wherever possible.
   2. Upstream of Equipment: Maximum 30 degrees.
   3. Downstream of Equipment: Maximum 45 degrees.
E. Welding:
   1. Continuously Welded Round and Oval Duct Fittings: Two gauges heavier than duct gauges according to SMACNA 1966.
   2. Cemented Slip Joints:
      a. Minimum 4 inches.
      b. Brazed or electric welded.
   3. Prime coat welded joints.

F. Takeoffs:
   1. Provide standard 45-degree lateral wye takeoffs.
   2. If not possible due to space limitations, provide 90-degree conical tee connections.

G. Sealing:
   1. Seal joints between duct sections and duct seams with welds, gaskets, mastic adhesives, mastic plus embedded fabric systems, or tape.
   2. Sealants, Mastics, and Tapes: Comply with UL 181A and provide products bearing appropriate UL 181A markings.

2.6 FABRIC DUCTWORK

A. Air diffusers shall be constructed with internal framing to provide cylindrical tension textile along the entire length of textile duct, including all fittings. System shall include full 360 degree tensioning of duct runs. Interior structure to include multiple mechanically adjustable tension devices. Textile components supported solely by metal cylindrical rings. Each cylindrical ring shall require a vertical metal to metal cable safety attachment.
   1. Vertical galvanized steel supports available lengths of 5 feet (standard), 10 feet, 15 feet, and 30 feet. Fabric ductwork to be available for diameters from 8 inches to 84 inches.
   2. Approved Fabric Ductwork manufacturers and models:
      a. DuctSox - Sedona - XM with SkeleCore Inner Frames.
      b. Prihoda - NMI/Prihoda Premium with internal ring supports suspension system.
      c. KE Fibertec - KE-DireJet Hybrid with Safetrack 360 Arch suspension system.

B. Textile Construction: Filament/filament twill polyester treated with a machine washable anti-microbial agent by the fabric manufacturer, fire retardant in accordance with UL 2518. Air Permeability: 2 (+2/-1) CFM/ft^2 per ASTM D737. The air permeability of the fabric must NOT be created by perforating the fabric. The air permeability must be confirmed third party tested to eliminate the formation of condensate on the fabric. Weight: 6.8 oz. /yd^2 per ASTM D3776.
   1. Warranty: Minimum 10 years with standard inlet velocity.

C. Textile Color: To be determined by architectural interior design, provide physical fabric duct samples of manufacturer colors. Physical samples to be returned to manufacturer's representative or manufacturer.

D. Minimum Fabrication Requirements: Textile system to be constructed in modular lengths (zippered) with proper radial securing clips (inlets, end-caps and mid-sections) and top access zippers for vertical cable safety attachment. Integrated air dispersion shall be specified and approved by manufacturer.
   1. Linear Vents:
      a. Air dispersion accomplished by linear vent and permeable fabric. Linear vents must be sized in 1 CFM per linear foot increments (based on .5-inch SP), starting at 1 CFM through 90 CFM per linear foot. Linear vent is to consist of an array of open orifices rather than a mesh style vent to reduce maintenance requirements of mesh style vents. Linear vents should also be designed to minimize dusting on fabric surface.
      b. Size of vent openings and location of linear vents to be specified and approved by manufacturer.

2. Orifices (where applicable):
    a. Air dispersion and extended throws are accomplished by reinforced orifices and permeable fabric. Reinforced laser-cut orifices retain the integrity of the opening and withstand laundry processes.
    b. Diameter, quantity, and location of reinforced orifices to be specified and approved by manufacturer.
3. Fixed Nozzles (where applicable):
    a. Air dispersion accomplished by using conical aerodynamic nozzles and permeable fabric. Diameter of nozzles height to be minimum 1/2-inch. Due to exact requirements of throw and maximum level of noise alternative flow models are not acceptable. Color of nozzles must match color of fabric.
    b. Location and number of nozzles to be specified and approved by manufacturer. Provide orifices at 135 degrees, 180 degrees, and 225 degrees.
4. Inlet connection to metal duct via fabric draw band with anchor patches as supplied by manufacturer. Anchor patches to be secured to metal duct via. zip screw fastener supplied by Contractor.
    a. Inlet connection includes zipper for easy removal / maintenance.
    b. Lengths to include required intermediate zippers as specified by manufacturer.
    c. System to include Adjustable Flow Devices to balance turbulence, airflow, and distribution as needed. Flow restriction device shall include ability to adjust the airflow resistance from 0.06 to 0.60 in w.g. static pressure.
    d. End cap includes zipper for easy maintenance.
    e. Each section of the textile shall include identification labels documenting order number, section diameter, section length, piece number, code certifications, and other pertinent information.
5. Ductwork track mounting material system, single row. Mounting rails made of extruded aluminum with a 10-micron anodized finish. The length of the rails must correspond to the Drawings or be adapted for the installation of textile ducts. The manufacturer must cut the rails to the required length. The textile ducts are suspended in the rails by means of an integrated flexible bulb that slides into the extruded aluminum rails. The rails are mounted to the ceiling using vertical strap-ups either galvanized threaded rod or steel cable. The strap-ups are clicked onto the rails with an aluminum suspension profile.

E. Installation of Fabric Ductwork System:
1. Install chosen suspension system in accordance with the requirements of the manufacturer. Instructions for installation shall be provided by the manufacturer with product. Contractor to install fabric ductwork suspension system at height as shown on architectural elevation drawings. Coordinate all vertical supports with respect to architectural hanging features and lighting fixtures.
2. Clean air handling unit and ductwork prior to the fabric ductwork system unit-by-unit as it is installed. Clean external surfaces of foreign substance which may cause corrosive deterioration of facing.
3. Temporary Closure: At ends of ducts which are not connected to equipment or distribution devices at time of ductwork installation, cover with polyethylene film or other covering which will keep the system clean until installation is completed.
4. If fabric ductwork systems become soiled, dirty, or damaged during installation, they should be removed and cleaned or replaced following the manufacturers standard terms of installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify sizes of equipment connections before fabricating transitions.

3.2 PREPARATION

A. Obtain manufacturer's inspection and acceptance of fabrication and installation at beginning of installation.
B. Install temporary closures of metal or taped PE on open ductwork to prevent construction dust from entering ductwork system.

3.3 INSTALLATION

A. Install and seal ducts according to SMACNA 1966.
B. Glass-Fiber-Reinforced Ducts: Comply with SMACNA 1884.
C. Insulated Flexible Duct Fittings:
    1. Join each flexible duct section to main trunk duct through sheet metal fittings.
    2. Equip fittings with factory-installed volume damper having positive locking regulator.
    3. Provide insulation guard with fittings installed in lined ductwork.
D. Use crimp joints with or without bead or beaded sleeve couplings for joining round duct sizes 8 inches and smaller.
E. Hanger and Supports:
    1. Fabricate and support ducts according to SMACNA 1966.
    2. Threaded Rods: Provide double nuts and lock washers.
    3. Building Attachments:
        a. Provide concrete inserts or structural-steel fasteners appropriate for construction materials to which hangers are attached.
        b. If possible, install concrete inserts before placing concrete.
        c. Powder-Actuated Concrete Fasteners:
            1) Use only for slabs more than 4 inches thick.
            2) Install after concrete is placed and completely cured.
            3) Do not use powder-actuated concrete fasteners for seismic restraints.
    4. Hanger Spacing:
        a. Comply with SMACNA 1966.
        b. Install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
        c. Extend strap supports down both sides of ducts and turn under bottom at least 1 inch.
        d. Secure hanger to sides and bottom of ducts with sheet metal screws.
    5. Hangers Exposed to View: Provide threaded rod and angle or channel supports.
    6. Vertical Ducts:
        a. Support with steel angles or channel secured to sides of duct with welds, bolts, sheet metal screws, or blind rivets.
        b. Support at each floor and at maximum intervals of 16 feet.

7. Upper Attachments:
    a. Attach to structures.
    b. Selection and Sizing: Provide pull-out, tension, and shear capacities as required for supported loads and building materials.
8. Penetrations:
    a. Avoid penetrations of ducts with hanger rods.
    b. If unavoidable, provide airtight rubber grommets at penetrations.

F. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.

G. Plenum Doors:
1. Location: 6 to 12 inches above floor.
2. Arrange door swing such that fan static pressure holds door in closed position.

H. Casings:
1. Floor Mounting:
    a. Install on 4-inch-high concrete curbs.
    b. At floor, rivet panels to angles 8 inches o.c.

I. Outdoor Ductwork: Protect ductwork and ductwork supports, linings, and coverings from weather.

J. Exhaust Outlet Locations:
1. Minimum Distance from Property Lines: Three feet.
2. Minimum Distance from Building Openings: Three feet.
3. Minimum Distance from Outside Air Intakes: Ten feet.

K. Interface with Other Work:
1. Install openings in ductwork as required to accommodate thermometers and controllers.
2. Install pitot tube openings for testing of systems, complete with metal can with spring device or screw to prevent air leakage.
3. If openings are provided in insulated ductwork, install insulation material inside metal ring.
4. Connect diffusers or light troffer boots to low-pressure ducts directly or with 5-footmaximum length of flexible duct held in place with strap or clamp.
5. Connect air terminal units and/or air outlets and inlets to supply ducts directly or with 5-footmaximum length of flexible duct; do not use flexible duct to change direction.

3.4 INSTALLATION OF DOUBLE WALLED FLUE VENT PIPE (FLUE VENT AIR DUCT FROM AIR HANDLING UNITS)

A. Install in accordance with NFPA 54 and SMACNA Guide for Free Standing Steel Stack Construction.

B. Install double walled flue vent with minimum of joints. Align accurately at connections, with internal surfaces smooth.

C. Support double walled flue vent from building structure, rigidly with suitable ties, braces, hangers and anchors to hold to shape and prevent buckling. Support vertical breeching, chimneys, and stacks at 12 foot spacing, to adjacent structural surfaces, or at floor penetrations. Refer to SMACNA HVAC Duct Construction Standards - Metal and Flexible for equivalent duct support configuration and size.

D. Pitch breeching with positive slope up from fuel-fired equipment to vertical stack.

E. Coordinate installation of dampers, and induced draft fans.

F. Insulate double walled flue vent in accordance with Section 23 07 00.
G. Assemble and install stack sections in accordance with NFPA 82, industry practices, and in compliance with UL listing. Join sections with acid-resistant joint cement. Connect base section to foundation using anchor lugs.
H. Level and plumb chimney and stacks.
I. Clean breeching, chimneys, and stacks during installation, removing dust and debris.
J. Install slip joints allowing removal of appliances without removal or dismantling of double walled flue vent insulation or vertical stacks.
K. Where appliance requires induced draft hood fans, install manufacturer furnished listed devices in accordance with manufacturer's instructions and applicable

3.5 FIELD QUALITY CONTROL

A. Testing:
   1. Ductwork designed for 2-inch wg or less, above ambient pressure:
      a. Pressure test minimum 25 percent of ductwork after duct cleaning but before duct insulation is applied or ductwork is concealed.
      b. Comply with SMACNA 016.
      c. Maximum Allowable Leakage: According to IECC.

3.6 CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust.
B. To obtain sufficient airflow, clean one half of system completely before proceeding to other half.
C. Protect sensitive equipment with temporary filters or bypass during cleaning.

3.7 ATTACHMENTS

A. Ductwork Material Schedule:
   1. Supply: Steel.
   2. Return and Relief: Steel.
   3. General Exhaust: Steel .
   4. Flue Vent Exhaust: Stainless steel.
   5. Outside Air Intake: Steel.
B. Ductwork Pressure Class Schedule:
   1. Constant Volume Supply: 1-inch wg, regardless of velocity.
   2. Return and Relief: 1/2-inch wg.
   3. General Exhaust: 1/2-inch wg.

END OF SECTION

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Back-draft dampers.
   2. Duct access doors.
   3. Volume control dampers.
   4. Flexible duct connections.
   5. Duct test holes.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 23 05 00 "General Mechanical Requirements."
   3. Section 23 31 00 "HVAC Ducts and Casings."

1.2 REFERENCES

A. Air Movement and Control Association International, Inc.:
   1. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.

B. ASTM International:
   1. ASTM E1 - Standard Specification for ASTM Thermometers.

C. National Fire Protection Association:
   1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
   2. NFPA 92A - Recommended Practice for Smoke-Control Systems.

D. Sheet Metal and Air Conditioning Contractors:
   1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

E. Underwriters Laboratories Inc.:
   1. UL 555 - Standard for Safety for Fire Dampers.
   2. UL 555C - Standard for Safety for Ceiling Dampers.
   3. UL 555S - Standard for Safety for Smoke Dampers.

1.3 SUBMITTALS

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for submittal procedures.

B. Product Data: Submit data for shop fabricated assemblies and hardware used.

C. Product Data: Submit for the following. Include where applicable electrical characteristics and connection requirements.
   1. Backdraft dampers.
   2. Flexible duct connections.
   3. Volume control dampers.
   4. Duct access doors.
   5. Duct test holes.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.
B. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
C. Storage: Store materials in a dry area indoor, protected from damage.
D. Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.7 COORDINATION

A. Coordinate Work where appropriate with building control Work.

1.8 WARRANTY

A. Section 23 05 00 "General Mechanical Requirements" for product warranties.

PART 2 - PRODUCTS

2.1 BACK-DRAFT DAMPERS

A. Product Description: Multi-Blade, back-draft dampers: Parallel-action, gravity-balanced, Galvanized 16-gauge thick steel, or extruded aluminum. Blades, maximum 6-inch width, with felt or flexible vinyl sealed edges. Blades linked together in rattle-free manner with 90-degree stop, steel ball bearings, and plated steel pivot pin. Furnish dampers with adjustment device to permit setting for varying differential static pressure.

2.2 DUCT ACCESS DOORS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated on Drawings.
B. Fabrication: Rigid and close fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, furnish minimum 1-inch-hick insulation with sheet metal cover.
    1. Less than 12 inches square, secure with sash locks.
    2. Up to 18 inches Square: Furnish 2 hinges and 2 sash locks.
    3. Up to 24 by 48 inches: Three hinges and 2 compression latches.
    4. Larger Sizes: Furnish additional hinge.
    5. Access panels with sheet metal screw fasteners are not acceptable.

2.3 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated on Drawings.
B. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized frame channel with suitable hardware.
C. End Bearings: Except in round ductwork 12 inches and smaller, furnish end bearings. On multiple blade dampers, furnish oil-impregnated nylon or sintered bronze bearings. Furnish closed end bearings on ducts having pressure classification over 2 inches wg.
D. Quadrants:
    1. Furnish locking, indicating quadrant regulators on single and multi-blade dampers.
    2. On insulated ducts mount quadrant regulators on standoff mounting brackets, bases, or adapters.
    3. Where rod lengths exceed 30 inchesfurnish regulator at both ends.

2.4 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
B. Connector: Fabric crimped into metal edging strip.
    1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric conforming to NFPA 90A, minimum density 30 oz per sq yd.
    2. Net Fabric Width: Approximately 6 inches wide.
    3. Metal: Three inches wide, 24 gauge thick galvanized steel.

2.5 DUCT TEST HOLES

A. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Furnish extended neck fittings to clear insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify rated walls are ready for fire damper installation.
B. Verify ducts and equipment installation are ready for accessories.
C. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

3.2 INSTALLATION.

A. Install in accordance with NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 "HVAC Ducts and Casings" for duct construction and pressure class.
B. Install Work in accordance with State and local standards.
C. Install back-draft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated on Drawings.

D. Access Doors: Install access doors at the following locations and as indicated on Drawings.
   1. Before and after each duct mounted filter.
   2. Before and after each duct mounted coil.
   3. Before and after each duct mounted fan.
   4. Before and after each automatic control damper.
   5. Before and after each fire damper, smoke damper, or combination fire and smoke damper.
   6. Install at locations for cleaning kitchen exhaust ductwork in accordance with NFPA 96.

E. Access Door Sizes: Install minimum 8- by 8-inch size for hand access, 18- by 18-inch size for shoulder access, and as indicated on Drawings. Review locations prior to fabrication.

F. Install temporary duct test holes and required for testing and balancing purposes. Cut or drill in ducts. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

END OF SECTION

SECTION 23 34 00 - HVAC FANS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Downblast centrifugal roof fans.
   2. Flue Vent Draft Inducer Fans.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 23 05 00 "General Mechanical Requirements."
   3. Section 23 33 00 "Air Duct Accessories."

1.2 REFERENCES

A. American Bearing Manufacturers Association:
   1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
   2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

B. Air Movement and Control Association International, Inc.:
   1. AMCA 99 - Standards Handbook.
   2. AMCA 204 - Balance Quality and Vibration Levels for Fans.
   3. AMCA 210 - Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
   4. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.
   5. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

C. American Refrigeration Institute:
   1. ARI 1060 - Air-to-Air Energy Recovery Ventilation Equipment Certification Equipment Program.

D. ASTM International:
   1. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.

E. National Electrical Manufacturers Association:
   1. NEMA MG 1 - Motors and Generators.
   2. NEMA 250 - Enclosures for Electrical Equipment (1,000 Volts Maximum).

F. Underwriters Laboratories Inc.:
   1. UL 705 - Power Ventilators.

1.3 SUBMITTALS

A. Division 01 and Section 23 05 00 "General Mechanical Requirements."

B. Product Data: Submit data on each type of fan and include accessories, fan curves with specified operating point plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, electrical characteristics and connection requirements.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' experience.
B. Installer: Company specializing in performing Work of this Section with minimum 3 years' experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect motors, shafts, and bearings from weather and construction dust.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 DOWNBLAST CENTRIFUGAL ROOF FANS

A. Manufacturers:
   1. Greenheck Fan Corporation.
   2. Loren Cook Company.
   3. Substitutions: Section Refer to Section 23 05 00 "General Mechanical Requirements."
B. General Description:
   1. Downblast fan will be for roof mounted applications.
   2. Maximum continuous operating temperature is 180 degrees F.
   3. Each fan will bear a permanently affixed manufacturer's engraved metal nameplate containing the model number and individual serial number.
C. Wheel:
   1. Constructed of aluminum.
   2. Non-overloading, backward inclined centrifugal.
   3. Statically and dynamically balanced in accordance with AMCA Standard 204-05.
   4. The wheel cone and fan inlet will be matched and will have precise running tolerances for maximum performance and operating efficiency.
D. Electronically Commutated Motor:
   1. Motor Enclosure: ODP.
   2. Motor to be a DC electronic commutation type motor (ECM) specifically designed for fan applications. AC induction type motors are not acceptable. Examples of unacceptable motors are: Shaded Pole, Permanent Split Capacitor (PSC), Split Phase, Capacitor Start and 3-phase induction type motors.
   3. Motor will be speed controllable down to 20 percent full speed (80 percent turndown). Speed will be controlled by either a potentiometer dial mounted to the motor or by a 0-10 VDC signal.

E. Housing:
   1. Motor cover, shroud, curb cap, and lower windband will be constructed of heavy gauge aluminum.
   2. Shroud will have an integral rolled bead for extra strength.
   3. Shroud will be drawn from a disc and direct air downward.
   4. Lower windband will have a formed edge for added strength.
   5. Motor cover will be drawn from a disc.
   6. All housing components will have final thicknesses equal to or greater than preformed thickness.
   7. Curb cap will have pre-punched mounting holes to ensure correct attachment.
   8. Rigid internal support structure.
   9. Leak proof.

F. Housing Supports and Drive Frame: Drive frame assemblies will be constructed of heavy gauge steel and mounted on vibration isolators.

G. Vibration Isolation:
   1. Rubber isolators,
   2. Sized to match the weight of each fan.

H. Disconnect Switches: Refer to Division 26.

2.2 FLUE VENT DRAFT INDUCER FANS

A. Manufacturers:
   1. Tjernlund Products, Inc. - Model RT750, Basis of Design.
   2. Enervex.
   3. Substitutions: Refer to Section 23 05 00 "General Mechanical Requirements."

B. Product Description: Exterior mount, rooftop inducer is ETL Listed for vertical venting of gas, oil, solid fuel, dryer venting and general ventilation. Manual speed control adjustment with optional controls. Keeps the entire vent system under a negative pressure. Patented thermally actuated motor cooling system extends motor life. Hinged housing with removable hinge pins simplifies installation and provides quick access to impeller and chimney interior. 4” x 4” weatherproof junction box with 4’ conduit, PSA-1 fan proving switch, mounting plates and hardware for metal chimney, DH series discharge hood with damper.

C. Housing Construction: High temperature powder coated, heavy gauge aluminized steel.

D. Impeller Construction: High performance, backward inclined, material handling type 304 stainless steel impeller.

E. Motor: PSC, 115 VAC, 60 Hz, permanently lubricated with minus 40 degrees F lubricant, sealed ball bearings. Speed adjustable.

F. Temperature Rating: 1,000 degrees F

G. Listings: ETL # 56826, UL 378 - Draft Equipment, ANSI/UL 705-2004 Power Ventilators.

H. Warranty: 2 - year mechanical.

I. Controls:
   1. UC1 Universal Control.
   2. UCRT Universal Control with speed control.
   3. COP2 Constant Operating Pressure Control.
   4. MAC1E, MAC4E Multiple Appliance controls.
   5. WHKE Millivolt Interlock kit.

J. Roof Curb: 12-inch-high self-flashing of galvanized steel construction with continuously welded seams , built-in cant strips, 1-inch insulation and curb bottom, hinged curb adapter, and factory installed nailer strip.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify roof curbs are installed and dimensions are as instructed by manufacturer.

3.2 INSTALLATION

A. Secure roof fans with cadmium plated steel lag screws to roof curb.
B. Suspended Fans: Install flexible connections specified in Section 23 33 00 "Air Duct Accessories" between fan and ductwork. Ensure metal bands of connectors are parallel with minimum 1-inch flex between ductwork and fan while running.
C. Install backdraft dampers on inlet to roof exhaust fans.
D. Provide backdraft dampers on outlet from cabinet and ceiling fans and as indicated on Drawings.
E. Install safety screen where inlet or outlet is exposed.
F. Pipe scroll drains to nearest floor drain.
G. Install backdraft dampers on discharge of exhaust fans**.**
H. Provide sheaves required for final air balance.

3.3 CLEANING

A. Vacuum clean coils and inside of fan cabinet.

3.4 DEMONSTRATION

A. Demonstrate fan operation and maintenance procedures.

3.5 PROTECTION OF FINISHED WORK

A. Do not operate fans until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

SECTION 23 37 00 - AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Diffusers.
   2. Registers
   3. Grilles.
   4. Louvers.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 23 05 00 "General Mechanical Requirements."

1.2 REFERENCES

A. Air Movement and Control Association International, Inc.:
   1. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.
B. American Society of Heating, Refrigerating, and Air-Conditioning Engineers:
   1. ASHRAE 70 - Method of Testing for Rating the Performance of Air Outlets and Inlets.
C. Sheet Metal and Air Conditioning Contractors:
   1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.3 SUBMITTALS

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for submittal procedures.
B. Product Data: Submit sizes, finish, and type of mounting. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' documented experience.

1.5 WARRANTY

A. Section 01 70 00 "Execution and Closeout Requirements" for product warranties and product bonds.

PART 2 - PRODUCTS

2.1 DIFFUSERS, GRILLES, AND REGISTERS: Refer to Drawings for Air Distribution Schedules.

A. Manufacturers:
1. Nailor Industries Inc.
2. Price Industries.
3. Titus.
4. Substitutions: Section 23 05 00 "General Mechanical Requirements."

2.2 LOUVERS: Refer to Drawings for Louver Schedules.

A. Manufacturers:
1. Greenheck Fan Corporation.
2. Ruskin Company.
3. Pottorff
4. Substitutions: Section 23 05 00 "General Mechanical Requirements."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify inlet and outlet locations.
B. Verify ceiling or wall systems are ready for installation.

3.2 INSTALLATION

A. Install diffusers to ductwork with airtight connection.
B. Install balancing dampers on duct take-off to diffusers, grilles, and registers, whether or not dampers are furnished as part of diffuser, grille, and register assembly. All supply and exhaust air diffusers, grilles, and registers require MBD's.
C. Paint visible portion of ductwork behind air outlets and inlets matte black.
D. Do not locate air registers, diffusers or grilles in floors of toilet or bathing rooms.

3.3 INTERFACE WITH OTHER PRODUCTS

A. Check location of outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

3.4 SCHEDULES

A. Refer to Drawings for all Schedules.

END OF SECTION

SECTION 23 63 13 - AIR-COOLED REFRIGERANT CONDENSERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes refrigerant condenser package, charge of refrigerant and oil, controls and control connections, refrigerant piping and connections, motor starters, electrical power connections

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 23 05 00 "General Mechanical Requirements."
   3. Section 23 23 00 "Refrigerant Piping."

1.2 REFERENCES

A. Air-Conditioning and Refrigeration Institute:
   1. ARI 210/240 - Unitary Air-Conditioning and Air-Source Heat Pump Equipment.
   2. ARI 365 - Commercial and Industrial Unitary Air-Conditioning Condensing Units.
   3. ARI 460 - Remote Mechanical-Draft Air-Cooled Refrigerant Condensers.

B. American Society of Heating, Refrigerating, and Air-Conditioning Engineers:
   1. ASHRAE 15 - Safety Code for Mechanical Refrigeration.
   2. ASHRAE 20 - Method of Testing for Rating Remote Mechanical-Draft Air-Cooled Refrigerant Condensers.
   3. ASHRAE 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

C. National Electrical Manufacturers Association:
   1. NEMA 250 - Enclosures for Electrical Equipment (1,000 Volts Maximum).

D. Underwriters Laboratories Inc.:
   1. UL 207 - Refrigerant-Containing Components and Accessories, Nonelectrical.

1.3 SUBMITTALS

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for submittal procedures.

B. Shop Drawings: Indicate components, assembly, dimensions, weights and loading, required clearances, and location and size of field connections. Include schematic layouts showing condenser, refrigeration compressors, cooling coils, refrigerant piping and accessories required for complete system.

C. Product Data: Submit rated capacities, weights, accessories, electrical requirements, and wiring diagrams.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' experience.

B. Installer: Company specializing in performing Work of this Section with minimum 2 years' experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for product storage and handling requirements.
B. Comply with manufacturer's installation instruction for rigging, unloading and transporting units.
C. Protect units on site from physical damage.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.7 WARRANTY

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for product warranties and product bonds.
B. Furnish 5 year manufacturer warranty for compressors.

1.8 MAINTENANCE SERVICE

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for requirements for maintenance service.
B. Perform maintenance work using competent and qualified personnel under supervision and in direct employ of manufacturer or original installer.
C. Do not assign or transfer maintenance service to agent or subcontractor without prior written consent of Owner.

PART 2 - PRODUCTS

2.1 CONDENSING UNITS

A. Manufacturers:
1. Trane, Model RAUKC604E-13BBDF0001111110.
2. Carrier Corporation.
3. York.
4. Substitutions: Refer to Section 23 05 00 "General Mechanical Requirements" for substitute or acceptable alternate manufacturers information.

B. Product Description:
1. All air-cooled condensing units shall have scroll compressors and are factory assembled and wired. Each unit shall ship from the factory with a nitrogen holding charge. Units shall be constructed of 14-gauge welded galvanized steel frame with 14- and 16-gauge galvanized steel panels and access doors. Units shall have factory mounted, louvered, full-length steel grilles to protect the condenser coils and piping. Unit surface shall be finished with an air-dry paint. This air-dry paint finish shall be durable enough to withstand a minimum of 672-consecutive-hour salt spray application in accordance with standard ASTM B117.2.2

C. Refrigeration Circuits.
   1. Units shall be dual circuited.
   2. Unit shall be listed for use with R454B only. Equipment shall be dry shipped and charged in the field by a qualified technician.
   3. Manufacturer shall provide balanced condensing unit to air handler selection to meet scheduled performance values. Manufacturer shall confirm refrigerant velocities, volume and proper coil sizing to reduce concerns of premature equipment failure and optimize compressor operation. Manufacturer shall provide recommended parts list, available TXV options, coordination notes and example component layout.
   4. Equipment manufacturer shall provide piping layout and recommendations for component pairing.
   5. Pressure Gauges - shall be provided for monitoring suction and discharge pressure. One set shall be provided for each circuit. The gauges shall be ship-with for field installation.
   6. Frostat - Provide with Frostat to protect the evaporator coil from frosting under part load conditions.
   7. Refrigerant Specialties - TXV and refrigerant specialties to be supplied by manufacturer. Provide Bleed Thermal Expansion Valves. Installation shall require use of 30 percent or 15 percent bleed, Thermal Expansion Valves. Valves shall be manufacturer supplied and contractor installed.

D. Symbio 800 Unit Controller:
   1. The SymbioTM 800 controller is an application-specific, programmable controller that is factory installed and designed to control packaged HVAC equipment. A 7–inch user interface features a touch-sensitive color screen that provides facility managers with at-a-glance operating status, performance monitoring, scheduling changes, and operating adjustments. Other advanced features include automated controller backup and optional features such as secure remote connectivity, wireless building communications, mobile device connectivity, and custom programming with expandable I/O.
   2. Unit shall have flexible and secure access for multiple users allows monitoring, overriding/releasing points, release of all overrides, custom report editing, and tracking changes by user
   3. Provide with real time refrigerant monitoring that can be viewed via the touch screen display and Symbio app.
   4. To protect compressors from running with unsafe refrigerant charge levels, unit shall calculate an estimated refrigerant charge using a combination of measured temperatures, calculated saturated temperatures, refrigerant mass flow and the expansion valve opening. At the touch screen interface, a warning diagnostic shall be displayed when a low charge has been detected on the circuit, but is not critical enough to force a circuit shutdown. When a critical low charge has been detected on a circuit, shut down shall be triggered, and a shutdown diagnostic shall be displayed at the touch screen interface.
   5. Upon loss of power and changeover to emergency backup generator, the Rapid Restart shall provide full cooling in 120 seconds or less after regaining electrical power. Rapid restart shall be fully integrated into the controls logic via the standard human interface. Field installed solutions shall be tested and documented by the emergency generator vendor to demonstrate full cooling within 120 seconds of changeover.

6. BACnet Communication Protocol - Remote condenser controller communication interface shall use the BACnet® protocol with an Ethernet (IEEE 802.3) or RS485 (EIA-485) physical interface and an appropriate data link technology as defined in ANSI®/ASHRAE® Standard 135-2012 (for example, BACnet/IP, BACnet/MSTP). The rooftop controller shall be BTL listed as a BACnet Advanced Application Controller (B-AAC) as defined in ANSI/ ASHRAE Standard 135-2012.
7. Leak Detection - The condenser section shall accept an isolated closure input suitable for customer connection to hard wire the leak detection system in the paired air handler or mechanical room.
8. User Interface - A 7-inch user interface features a touch-sensitive color screen that provides operating status, performance monitoring, and scheduling changes, and operating adjustments.
9. WiFi Connectivity – Unit control shall be configurable via wifi connection to mobile device.
10. The controller shall have the ability to expand the factory controller up to 19 points. This shall be accomplished with a combination of a factory installed XM70 plus a XM30 and a XM32 expansion modules. The IO points shall have editable renamable write custom control loops customizable by field technicians by Trane

E. Unit control:
1. Factory shall provide 115-volt control circuit which includes fusing and control power transformer. The unit shall be wired with magnetic contactors for compressor and condenser motors and high-pressure cutouts. Charge isolation, reset relay and anti-recycle compressor timer shall be provided. Across-the-line start is standard.
2. System shall allow direct control of compressor staging while providing refrigerant system oversight.

F. Phase Monitor:
1. The unit shall be equipped with a phase monitor in the control box. The phase monitor shall protect against phase loss, imbalance and reversal of the line voltage.

G. Compressors:
1. Scroll type compression shall provide low vibration. Compressors shall provide a completely enclosed compression chamber with no leakage paths. The compressor shall be suction gas cooled, direct drive, with 3600 RPM hermetic motors. The Scroll compressor shall include a centrifugal oil pump, oil level sight glass, and an oil charging valve.
2. Each compressor shall have crankcase heaters installed, properly sized to minimize the amount of liquid refrigerant present in the oil sump during off cycles. Additionally, the condensing unit shall have controls to initiate refrigerant Isolation at system shut down on each refrigerant circuit. To be operational, the refrigerant Isolation cycle requires a field-installed isolation solenoid valve on the common liquid line near the evaporator.
3. Suction Service Valve - shall consist of a refrigerant shutoff valve to isolate the compressor for servicing.

H. Condenser Coils:
1. Condenser coils shall have all aluminum microchannel coils. All coils shall be leak tested at the factory to ensure pressure integrity. The condenser coil shall be pressure tested to 650 psig.

I. Condenser Fans:
   1. All condenser fans shall be vertical discharge, direct drive fans, statically balanced, with aluminum blades and zinc plated steel hubs. Condenser fan motors shall be three-phase motors with permanently lubricated ball bearings, built in current and thermal overload protection and weather-tight slingers over motor bearings.
   2. Wide Ambient Control - Allow operation From 0 degrees F to 125 degrees F ambient through the use of fan cycling and head pressure control dampers. The control shall consist of a heavy gauge damper assembly that is modulated by an actuator. The actuator shall be controlled by measured head pressure. All components are factory-mounted.

J. Electrical:
   1. Provide Non-Fused Unit Disconnect Switch - shall be mounted in the control box and provides for interruption of power for servicing the unit. Lugs shall be suitable for copper wires only. No overcurrent or short circuit protection shall be provided for unit by this switch. Option shall include external handle to allow power disconnection without having to open the control box door.
   2. Provide Powered convenience outlet - shall include a factory installed 15 amp, 115 volt ground fault interrupter convenience outlet with a single point power entry from a factory mounted transformer. Option shall meet NEC 210-63 requirements. This outlet shall include a separate disconnect switch so that the outlet is powered when the unit disconnect switch is off. The unit mounted non-fused disconnect switch option with external handle is required when ordering the convenience outlet.
   3. Low voltage control cabinet shall be separately accessible from the high voltage control cabinet application.

K. Refer to Division 26 for more electrical information.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with ASHRAE 15.
B. Install refrigerant piping from unit to condensing unit. Install refrigerant specialties furnished with unit specified in Section 23 23 00 "Refrigerant Piping."
C. Install connection to electrical power wiring in accordance with Division 26.

3.2 INTERFACE WITH OTHER PRODUCTS

A. Install units on vibration isolators on concrete foundations.

3.3 MANUFACTURER'S FIELD SERVICES

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for manufacturer's field services.
B. Provide startup by a technician employed by the equipment manufacturer. Startup provided by mechanical contractor or a technician from equipment rep firm is not permitted. Provide cooling season start-up and winter season shutdown service, for first year of operation. If initial start-up and testing takes place in winter and machines are to remain inoperative. Repeat start-up and testing operation at beginning of first cooling season.

3.4 ADJUSTING

A. Section 01 70 00 "Execution and Closeout Requirements" for testing, adjusting, and balancing.

3.5 DEMONSTRATION AND TRAINING

A. Division 01 requirements for demonstration and training.
B. Demonstrate starting, maintenance, and operation of unit.
C. Demonstrate low ambient operation during winter testing or service specified above.

3.6 SCHEDULES

A. Refer to Drawings for Schedule.

END OF SECTION

SECTION 23 73 00 - INDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes modular factory-fabricated air-handling units and accessories.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 23 05 00 "General Mechanical Requirements."
   3. Section 23 23 00 "Refrigerant Piping."

1.2 REFERENCES

A. American Bearing Manufacturers Association:
   1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
   2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
B. Air Movement and Control Association International, Inc.:
   1. AMCA 99 - Standards Handbook.
   2. AMCA 210 - Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
   3. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.
   4. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
   5. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.
C. Air-Conditioning and Refrigeration Institute:
   1. ARI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.
   2. ARI 430 - Central-Station Air-Handling Units.
   3. ARI Guideline D - Application and Installation of Central Station Air-Handling Units.
D. National Electrical Manufacturers Association:
   1. NEMA MG 1 - Motors and Generators.
E. Sheet Metal and Air Conditioning Contractors:
   1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
F. Underwriters Laboratories Inc.:
   1. UL 900 - Air Filter Units.
   2. UL - Fire Resistance Directory.

1.3 SUBMITTALS

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for submittal procedures.
B. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, electrical characteristics, and connection requirements.

C. Product Data, Submit the following:
   1. Published Literature: Indicate capacities, ratings, gauges and finishes of materials, and electrical characteristics and connection requirements.
   2. Filters: Data for filter media, filter performance data, filter assembly, and filter frames.
   3. Fans: Performance and fan curves with specified operating point plotted, power, RPM.
   4. Sound Power Level Data: Fan outlet and casing radiation at rated capacity.
   5. Dampers: Include leakage, pressure drop, and sample calibration curves. Indicate materials, construction, dimensions, and installation details.
   6. Electrical Requirements: Power supply wiring including wiring diagrams for interlock and control wiring. Indicate factory installed and field installed wiring.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' experience.
B. Installer: Company specializing in performing Work of this Section with minimum 2 years' experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Division 01 and Section 23 05 00 "General Mechanical Requirements" for storage and handling requirements.
B. Accept units and components on site in factory protective containers, with factory shipping skids and lifting lugs. Inspect for damage.
C. Protect units from weather and construction traffic by storing in dry, roofed location.

1.6 WARRANTY

A. Division 01 for product warranties and product bonds.

PART 2 - PRODUCTS

2.1 AIR HANDLING UNITS

A. Manufacturers:
   1. Trane: Basis of Design
   2. AAON.
   3. Carrier Corporation.
   4. Thermal Corporation.
   5. Marcraft Custom HVAC Systems.
   6. Temtrol.
   7. Substitutions: Refer to Section 23 05 00 "General Mechanical Requirements."

2.2 GENERAL

A. Unit layout and configuration shall be as defined in project plans and schedule.
B. Manufacturer to provide a full perimeter 6-inch integral base frame to support and raise all sections of the unit for proper trapping. Contractor will be responsible for providing a housekeeping pad when unit base frame is not of sufficient height to properly trap unit. Unit base frames not constructed of galvanized steel shall be chemically cleaned and coated with both a rust-inhibiting primer and finished coat of rust-inhibiting enamel. Unit base height to be included in total height required for proper trap height.

2.3 UNIT CASING

A. Unit manufacturer shall ship unit in segments as specified by the contractor for ease of installation in tight spaces. The entire air handler shall be constructed of galvanized steel except the internal liner in wet sections (cooling coil, humidifier, etc) shall be stainless steel. Casing finished to meet ASTM B117 125-hour salt-spray test. The removal of access panels or access doors shall not affect the structural integrity of the unit. All removable panels shall be gasketed. All doors shall have gasketing around full perimeter to prevent air leakage. Contractor shall be responsible to provide connection flanges and all other framework that is needed to properly support the unit.
B. Casing performance - Casing air leakage shall not exceed leak class 6 (CL equals 6) per ASHRAE 111 at specified casing pressure, where maximum casing leakage (cfm/100 ft^2 of casing surface area) equal to CL X P0.65.
C. Air leakage shall be determined at 1.00 times maximum casing static pressure up to 8 inches w.g. Specified air leakage shall be accomplished without the use of caulk. Total estimated air leakage shall be reported for each unit in CFM, as a percentage of supply air, and as an ASHRAE 111 Leakage Class.
D. Under 50 degrees F supply air temperature and design conditions on the exterior of the unit of 87 degrees F dry bulb and 73 degrees F wet bulb, condensation shall not form on the casing exterior. The AHU manufacturer shall provide tested casing thermal performance for the scheduled supply air temperature plotted on a psychrometric chart. The design condition on the exterior of the unit shall also be plotted on the chart. If tested casing thermal data is not available, AHU manufacturer shall provide, in writing to the Engineer and Owner, a guarantee against condensation forming on the unit exterior at the stated design conditions above. The guarantee shall note that the AHU manufacturer will cover all expenses associated with modifying units in the field should external condensate form on them. In lieu of AHU manufacturer providing a written guarantee, the installing contractor must provide additional external insulation on AHU to prevent condensation.
E. Unit casing (wall/floor/roof panels and doors) shall be able to withstand up to 1.5 times design static pressure, or 8-inch w.g., whichever is less, and shall not exceed 0.0042 per inch of panel span (L/240).
F. Floor panels shall be double-wall construction and designed to support a 300-lb load during maintenance activities and shall deflect no more than 0.0042 per inch of panel span.
G. Unit casing panels (roof, walls, floor) and doors shall be provided with a minimum thermal resistance (R-value) of 13 Hr by Ft^2 by degrees F/BTU.
H. Unit casing panels (roof, walls, floor) and external structural frame members shall be completely insulated filling the entire panel cavity in all directions so that no voids exist. Panel insulation shall comply with NFPA 90A.

I. Casing panel inner liners must not extend to the exterior of the unit or contact the exterior frame. A mid-span, no-through-metal, internal thermal break shall be provided for all unit casing panels.
J. Access panels and/or access doors shall be provided in all sections to allow easy access to drain pan, coil(s), motor, drive components and bearings for cleaning, inspection, and maintenance.
K. Access panels and doors shall be fully removable without the use of specialized tools to allow complete access of interior surfaces.

2.4 ACCESS DOORS

A. Access doors shall be 2-inch double-wall construction. Interior and exterior shall be of the same construction as the interior and exterior wall panels.
B. All doors shall be provided with a thermal break construction of door panel and door frame.
C. Gasketing shall be provided around the full perimeter of the doors to prevent air leakage.
D. Door hardware shall be surface-mounted to prevent through-cabinet penetrations that could likely weaken the casing leakage and thermal performance.
E. Handle hardware shall be designed to prevent unintended closure.
F. Access doors shall be hinged and removable without the use of specialized tools.
G. Hinges shall be interchangeable with the door handle hardware to allow for alternating door swing in the field to minimize access interference due to unforeseen job site obstructions.
H. Hinges shall be stainless steel.
I. Door handle hardware shall be adjustable and visually indicate locking position of door latch external to the section.
J. All doors shall be a 60-inch-high when sufficient unit height is available, or the maximum height allowed by the unit height.
K. A single door handle shall be provided for each door linking multiple latching points necessary to maintain the specified air leakage integrity of the unit.
L. Provide dual pane, shatterproof window on all access doors. Window shall be capable of withstanding unit operating pressures and shall be safe for viewing UV-C lamps.
M. Test ports shall be supplied in access doors as defined in the unit schedule to facilitate the field commissioning by the test and balance contractor. Test ports shall not compromise the ASHRAE leakage class of the unit.

2.5 PRIMARY DRAIN PANS

A. All cooling coil sections shall be provided with an insulated, double-wall, stainless steel drain pan.
B. The drain pan shall be designed in accordance with ASHRAE 62.1 being of sufficient size to collect all condensation produced from the coil and sloped in 2 planes, pitched toward drain connections, promoting positive drainage to eliminate stagnant water conditions when unit is installed level and trapped per manufacturer's requirements.
C. The outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition.
D. All drain pan threaded connections shall be visible external to the unit. Threaded connections under the unit floor shall not be accepted.
E. Drain connections shall be of the same material as the primary drain pan and shall extend a minimum 2-1/2 inches beyond the base to ensure adequate room for field piping of condensate traps.

F. The installing contractor is responsible to ensure the unit is installed level, trapped in accordance with the manufacturer's requirements, and visually inspected to ensure proper drainage of condensate.

G. Coil support members inside the drain pan shall be of the same material as the drain pan and coil casing.

2.6 FANS

A. Fan sections shall have a minimum of one hinged and latched access door located on the drive side of the unit to allow inspection and maintenance of the fan, motor, and drive components.

B. Provide fans of type and class as specified on the schedule. All fans shall be statically and dynamically tested by the manufacturer for vibration and alignment as an assembly at the operating RPM to meet design specifications. Fans that are selected with inverter balancing shall first be dynamically balanced at design RPM. The fans then will be checked in the factory from 25 percent to 100 percent of design RPM to insure they are operating within vibration tolerance specifications, and that there are no resonant frequency issues throughout this operating range. Inverter balancing that requires lockout frequencies inputted into a variable frequency drive to in order to bypass resonant frequencies shall not be acceptable. If supplied in this manner by the unit manufacturer, the contractor will be responsible for rebalancing in the field after unit installation. Fans selected with inverter balancing shall have a maintenance free grounding assembly installed on the fan motor to discharge both static and induced shaft currents to ground.

C. Direct drive plenum fans with integral frame motors, shall be mounted on isolation bases. Fan shall be dynamically balanced throughout the operating range to a BV-3 (0.20 in/s) per AMCA 204 test standard. Fan and motor shall be internally isolated with spring isolators. A flexible connection shall be installed between fan and unit casing to ensure complete isolation. Flexible connection shall comply with NFPA 90A and UL 181 requirements. If fans and motors are not internally isolated, then the entire unit shall be externally isolated from the building, including supply and return duct work, piping, and electrical connections. External isolation shall be furnished by the installing contractor in order to avoid transmission of noise and vibration through the ductwork and building structure.

D. Exhaust fans - Direct plenum fans provided with electronically commutated external- rotor motor with integrated control electronics, radial aluminum impeller with backward curved, continuously welded blades.

1. Individual Fan Assemblies shall be statically and dynamically balanced in two planes as per DIN / ISO 1940 to balancing grade G 6.3.
2. Fan-to-fan interaction can cause a significant increase in individual fan vibration when mounted to the same structure. Fans applied in an array shall be tested as a system and the total fan vibration shall be less that 0.42 (in/s) RMS including all fan-to-fan interaction. This system effect shall be accounted for by the air handler manufacturer. Individual fan vibration performance values shall not be acceptable.
3. Fan performance shall be rated in accordance with AHRI 430-2020. Fan shall be spaced to minimize aerodynamic fan interaction. Minimum center-to-center spacing between fans shall be 1.6 diameter ratio to ensure proper performance.
4. Fan wheels shall be constructed of materials that comply with UL 1995 requirements of flame and smoke spread per NFPA 90A. The flame spread index not exceeding 25 and a smoke-developed index not, exceeding 50.

5. Fan Electrical Power (FEP) rated in accordance with AHRI 430-2020.
6. Motor shall contain integrated PID controller and accept a 0-10VDC input signal for variable speed control.
7. Motorized impeller fan section shall include expanded metal door guard(s) supplied on the access door(s) to the fan. Door guard is intended to deter unauthorized entry and incidental contact with rotating components.
8. Motor efficiency class shall comply with IE4
9. Fan system manufacturer must stock replacement parts in North America
10. Fan array shall be designed and constructed for easy field assembly and maintenance. Fan shall be assembled to bulkhead wall with minimal fasteners and the fan shall have quick disconnects for the high voltage and low voltage connections.

E. Each horizontal direct drive fan in a multiple-fan array shall be provided with integral back flow prevention: a backdraft damper that prohibits recirculation of air in the event a fan or multiple fans become disabled. Dampers are tested and rated based on AMCA Standard 500. Dampers to be heavy duty type capable of a maximum back pressure that exceeds the design total static pressure with minimal leakage. The dampers should have a minimal total effect on airflow performance both pressure drop when open and system effect on the fan. The damper blades and frame shall be extruded aluminum with blade edge seals locked into the blade edge. Adhesive type seals are unacceptable. AHU manufacturer responsible for providing proper spacing upstream of dampers to ensure full, uniform airflow through upstream components. For units where the damper(s) are supplied at the jobsite, the installing contractor shall contract a certified TAB contractor to verify uniform airflow thru upstream components.

2.7 MOTORS AND DRIVES

A. Motors shall meet or exceed all NEMA Standards Publication MG 1 - 2006 requirements and comply with NEMA Premium efficiency levels when applicable. Motors shall comply with applicable requirements of NEC and shall be UL Listed.
B. Fan Motors shall be heavy duty, open drip-proof operable at scheduled voltage. If applicable, motor efficiency shall meet or exceed NEMA Premium efficiencies.
C. Direct driven fans utilizing integral frame motors shall use 2-pole (3,600 rpm), 4-pole (1,800 rpm) or 6-pole (1,200 rpm) motors, NEMA Design B, with Class B insulation capable to operate continuously at 104 degrees F without tripping overloads.
D. Motors shall have a plus or minus 10 percent voltage utilization range to protect against voltage variation.

2.8 COILS

A. Coils section header end panel shall be removable to allow for removal and replacement of coils without impacting the structural integrity of the unit.
B. Install coils such that headers and return bends are enclosed by unit casing to ensure that if condensate forms on the header or return bends, it is captured by the drain pan under the coil.
C. Coils shall be manufactured with plate fins to minimize water carryover and maximize airside thermal efficiency. Fin tube holes shall have drawn and belled collars to maintain consistent fin spacing to ensure performance and air pressure drop across the coil as scheduled. Tubes shall be mechanically expanded and bonded to fin collars for maximum thermal conductivity. Use of soldering or tinning during the fin-to-tube bonding process is not acceptable due to the inherent thermal stress and possible loss of bonding at that joint.

D. All coils shall be completely cleaned prior to installation into the air handling unit. Complete fin bundle in direction of airflow shall be degreased and steam cleaned to remove any lubricants used in the manufacturing of the fins, or dirt that may have accumulated, in order to minimize the chance for water carryover.

E. When two or more cooling coils are stacked in the unit, an intermediate drain pan shall be installed between each coil. The intermediate drain pan shall be designed being of sufficient size to collect all condensation produced from the coil and sloped to promote positive drainage to eliminate stagnant water conditions. The intermediate drain pan shall be constructed of the same material as the sections primary drain pan.

F. The intermediate drain pan shall begin at the leading face of the water-producing device and be of sufficient length extending downstream to prevent condensate from passing through the air stream of the lower coil.

G. Intermediate drain pan shall include downspouts to direct condensate to the primary drain pan. The intermediate drain pan outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition.

H. Refrigerant Cooling Coils:

1. Coils shall be proof tested to 450 psig and leak tested to 300 psig air pressure under water. After testing, insides of tubes shall be air dried, charged with dry nitrogen or dry air, and sealed to prevent contamination.
2. Refrigerant suction and liquid headers shall be constructed of copper tubing. Suction and liquid connections shall penetrate unit casings to allow for sweat connections to refrigerant lines.
3. Tubes shall be 1/2-inch with aluminum fins.
4. Coils shall have equalizing type vertical distributors sized in conjunction with capacities of coils.
5. Manufacturer shall provide balanced condensing unit to air handler selection to meet scheduled performance values. Manufacturer shall confirm refrigerant velocities, volume and proper coil sizing to reduce concerns of premature equipment failure and optimize compressor operation. Manufacturer shall provide recommended parts list, available TXV options, coordination notes and example component layout.

2.9 FILTERS

A. Provide factory-fabricated filter section of the same construction and finish as unit casings. Filter section shall be provided with front loading filter frames. Filter holding frames shall be constructed of galvanized steel and equipped with foam gaskets to seal filters against filter frames. Frame seams shall be sealed to eliminate air bypass. Access door(s) shall be provided to facilitate filter removal. Construct doors in accordance with Section 2.04. Manufacturer to provide necessary filter clips to lock primary and secondary prefilters (if ordered) tightly to filter frame without the need for special tools, bolts or nuts. Filter holding frames shall be of a universal type to accommodate standard filters of 12 by 24 and 24 by 24 nominal size as well as appropriate fasteners.

B. Provide 4-inch MERV 8 pre-filter.

C. Provide 12-inch MERV 15 Carbon final filter.

1. Air filters shall be compact adsorber type with combination sorbent/particulate removal media, impact-resistant plastic end caps, plastic vertical support channels, and a nominal 1-inch header for front access applications.

2. Manufacturer shall provide evidence of facility certification to ISO 9001:2008. Filters shall be Camfil CityCarb I pleated V-Cell Cartridges or equal.
3. Filter media shall be specifically manufactured for the removal of molecular and particulate contaminants. Sorbent shall be broad spectrum grade of carbon incorporating Rapid Adsorption Dynamics (RAD) designed for the removal of a wide range of odors and VOCs.
4. Total media area shall be at least 0.038 square feet per rated cfm of filter.
5. Initial resistance to airflow shall not exceed 0.6 inches w.g. (plus or minus 10 percent) at 500 feet per minute velocity.

2.10 DAMPERS

A. All dampers shall be internally mounted. Dampers shall be premium ultra low leak and located as indicated on the schedule and plans. Blade arrangement (opposed) shall be provided as indicated on the schedule and drawings. Dampers shall be Ruskin CD60 double-skin airfoil design or equivalent for minimal air leakage and pressure drop. Leakage rate shall not exceed 3 CFM/square foot at one inch water gauge complying with ASHRAE 90.1 maximum damper leakage and shall be AMCA licensed for Class 1A. All leakage testing and pressure ratings shall be based on AMCA Standard 500-D. Manufacturer shall submit brand and model of damper(s) being furnished, if not Ruskin CD60.

B. Airflow measuring stations shall be provided and located in the outside and/or return air paths as indicated on the schedule and plans to measure airflow. Airflow measuring stations shall be tested per AMCA Standard 611 and licensed to bear the AMCA Ratings Seal for airflow measurement performance. Integral control damper blades shall be provided as galvanized steel and housed in a galvanized steel frame. Leakage rate shall not exceed 4 CFM/square foot at one inch water gauge complying with ASHRAE 90.1 maximum damper leakage.
   1. The airflow measurement station shall measure up to 100 percent of the total outside air and/or return air. The airflow measurement station shall be capable of measuring down to 300 fpm. The airflow measuring device shall adjust for temperature variations. Output shall be provided from the station as a 2-10 VDC signal. Signal shall be proportional to air velocity. The accuracy of the measuring station shall be no greater than plus or minus 5 percent. Airflow measuring stations shall be mounted on the AHU interior.
   2. Airflow measuring station shall automatically correct for temperature effects on air density. Station shall also operate from 0 to 100 percent RH over the complete temperature range (negative 40 degrees F to 158 degrees F). Programmable altitude adjustment to be included.
   3. The installing contractor shall provide duct-mounted pleated media MERV 8 filtration upstream of airflow monitoring stations requiring air straightening vanes to prevent blockage of vanes. A filter access door shall be provided for filter replacement that does not degrade the specified duct leakage class. Duct-mounted filtration section with access door for filter removal shall be tested for compliance to specified duct leakage class on the schedule and plans.
   4. AHU must be provided with factory openings to match locations and dimensions per mechanical Drawings. Openings shall not be field cut or utilize complex duct transitions to match standard openings.

2.11 ACCESS SECTIONS

A. Access sections shall be provided where indicated in the schedule and plans to allow additional access for inspection, cleaning, and maintenance of unit components. he unit shall be installed for proper access. Procedure for proper access, inspection and cleaning of the unit shall be provided in the AHU manufacturer's maintenance manual.

2.12 DIFFUSER SECTIONS

A. Diffuser sections shall be provided immediately downstream of the fan section as indicated in the schedule and plans. The diffuser shall provide equal air distribution to blow-thru components immediately downstream of the diffuser.

2.13 INDIRECT GAS HEAT SECTION

A. Indirect-fired gas heaters shall be provided as indicated on the schedule and drawings. Indirect-fired gas heaters shall be completely factory assembled, piped, and operationally fire tested at the factory prior to shipment. The heat exchanger primary drum and secondary tubes shall constructed from 14-gage, 409 stainless steel. The industrial / commercial burner shall be UL listed, forced draft, and fully modulating. The control panel shall be equipped with Honeywell RM7800 flame management controls and appropriate safeties. The gas heat section construction shall match the rest of the air handling unit and be an integral part of the unit. All burner and control components shall be housed in a burner vestibule with a large access door. The entire section shall bear a UL or CUL label for Commercial-Industrial Gas Heating Equipment (ANSI / UL Standard 795) and Industrial Gas-Fired Package Furnaces (CGA Standard 3.2-1976).
B. Gas heaters shall be fueled by natural gas with 20:1 turndown as indicated on the schedule. Burner combustion shall be clean and odor-free throughout the entire operating range. Nitrogen oxide emissions levels shall not exceed 75 ppm. Gas train shall be FM Heater shall include force draft exhaust fan on heaters of 1250 output MBH or higher.
C. Field connection requirements include 9- to 14-inch wc gas pressure in appropriate volume, high voltage power as specified 460v/3ph, start / stop dry contact, modulating 0 to 10v dc control signal, condensate drain, recommended hard wired fan interlock.
D. Flue Stack shall be field provided and field installed.

2.14 MARINE LIGHTS

A. Marine lights shall be provided throughout AHUs as indicated on the schedule and plans. Lights shall be instant-on, light-emitting diode (LED) type to minimize amperage draw and shall produce lumens equivalent to a minimum 75W incandescent bulb (1,200 lumens). LED lighting shall provide instant-on, white light and have a minimum 25,000 hr life.
B. Light fixture shall be weather-resistant, enclosed and gasketed to prevent water and dust intrusion.
C. Fixtures shall be designed for flexible positioning during maintenance and service activities for best possible location providing full light on work surface of interest and not being blocked by technician.

D. All lights on a unit shall be wired in the factory to a single on-off switch.
E. Installing contractor shall be responsible for providing 115V supply to the factory-mounted marine light circuit (unless single-point power is specified to be provided by AHU manufacturer).

2.15 CONVENIENCE OUTLETS

A. A 15-amp, 115V GFCI convenience outlet shall be provided by the AHU manufacturer. The outlet shall be separate from the load side of the equipment per NEC requirements. Installing contractor shall be responsible for providing 115V supply to the factory-mounted GFCI outlet circuit per NEC (even when single-point power is specified to be provided by AHU manufacturer).
B. Motorized Impeller Controller Panel.
C. The fan section shall be provided with a factory installed NEMA 1 or NEMA 3R motorized impeller motor control panel. The control panel provides a common externally accessible disconnect means, motor over current protection for each fan and a terminal block for ease of control wiring. The box shall include:
    1. Individual motor protection with individual disconnecting means with lockable feature. Fusible motor protection is not permissible.
    2. Fused main panel disconnect with lock out tag out capability
    3. Common control terminal block for common signal wiring. Single 0-10vdc signal used for fan speed control. Control panel box shall be UL508a compliant and manufactured by a UL508a approved manufacturer or UL certified during air handler installation.
    4. Control panel box shall be UL508a compliant and manufactured by a UL508a approved manufacturer or UL certified during air handler installation.
D. VFD per Fan:
    1. Multiple VFDs on a common panel, shall be provided for each fan array to provide redundancy in case of loss of function of one of the VFDs or motors. Individual VFD shall be sized based on motor FLA to reduce overall panel input current. In the event of a VFD failure, the remaining VFDs must be capable of compensating and maintaining normal fan array operation.
    2. VFD panel shall have a common disconnect that is accessible from the outside of the unit. Disconnect shall open input power to all VFDs simultaneously. Disconnect shall be lockable in the off position. Disconnect shall utilize circuit breaker to provide overcurrent and short circuit protection.
    3. VFD panel shall be provided with a common point connection for speed input signal, start/stop signal, fault status, and field interlock connection.
    4. VFD panel shall be provided with a single point of field connection for field input power. Each VFD shall be supplied with independent input fusing, as required. Panel shall be provided with short circuit current of 5kA RMS symmetrical.
    5. VFD panel shall be provided with a single point of field connection for field input power. Each VFD shall be supplied with independent input fusing, as required. Panel shall be provided with short circuit current of 65kA RMS symmetrical.
    6. Externally mounted VFDs shall be provided with independent keypad.
    7. Factory Wiring of Lights, VFDs, Motorized Impeller Control Panels, and Combination Starters/Disconnects.

E. VFDs shall be wired per NEC, UL, and NFPA 90A requirements. Units with factory-mounted controls shall also include power wiring from the VFD or starter/disconnect control transformer to the control system transformers. Units with VFDs and factory-mounted controls shall have a binary start-stop signal and an analog speed signal wired from the direct digital controller to the VFD.

F. All power wiring for voltages greater than 24V and traveling through multiple unit sections shall be contained in an enclosed, metal, power-wiring raceway or EMT. Sections less than 6-inch in length may be contained in FMC.

G. After mounting and wiring of VFDs, on the AHUs, trained factory personnel shall ensure proper operation of each VFD, through a thorough factory test. Testing shall include a Hypot test of unit wiring to ensure that no weaknesses exist in wiring or motor. Each VFD shall be energized and the fan run to ensure the VFD will operate throughout the usable range of the drive and that the fan rotation is correct. Each VFD with bypass shall also be tested in the bypass position to ensure the bypass is operational.

H. After mounting and wiring of the motorized impeller control panel (MICP), on the AHUs, trained factory personnel shall ensure proper operation of each MICP, through a thorough factory test. Testing shall include a Hypot test of unit wiring to ensure that no weaknesses exist in wiring or motor. Each MICP shall be energized and the fan run to ensure the MICP and MI fan will operate throughout the usable range of the drive and that the fan rotation is correct.

2.16 SHIPPING

A. Paper copies of the IOM shall also be shipped with each AHU.

B. The AHU manufacturer shall identify all shipments with the order number. Enough information shall be provided with each shipment to enable the Mechanical Contractor to confirm the receipt of units when they are received. For parts too small to mark individually, the AHU manufacturer shall place them in containers. Contractor to coordinate with AHU manufacturer to provide units broke down to allow installation though available areaway and louver opening, verify exact sizes with structural and architectural Drawings.

C. To protect equipment during shipment and delivery, all indoor units shall be completely stretch or shrink wrapped. Wrap shall be a minimum of 7 mil plastic. Pipe ends and pipe connection holes in the casing shall be capped or plugged prior to shipment

D. After loading the equipment for shipment, the AHU manufacturer shall contact the shipping contact on the order and provide the name of the carrier, description of equipment, order number, shipping point, and date of shipment.

2.17 ON-SITE STORAGE

A. If equipment is to be stored for a period of time prior to installation, the Mechanical Contractor shall remove all stretch or shrink wrap from units upon receipt to prevent unit corrosion and shall either place the units in a controlled indoor environment or shall cover the units with canvas tarps and place them in a well-drained area. Covering units with plastic tarps shall not be acceptable.

2.18 FIELD EXAMINATION

A. Mechanical Contractor shall verify that the mechanical room and/or roof are ready to receive work and the opening dimensions are as indicated on the Shop Drawings and Contract Documents.
B. Mechanical Contractor shall verify that the proper power supply is available prior to starting of the fans.

2.19 INSTALLATION

A. Mechanical Contractor shall be responsible to coordinate ALL of his installation requirements with the Owner and the Owner's selected Mechanical Contractor to ensure that a complete installation for each unit is being provided. Coordination efforts shall include such items as unloading and hoisting requirements, field wiring requirements, field piping requirements, field ductwork requirements, requirements for assembly of field-bolted or welded joints, and all other installation and assembly requirements.
B. The AHU manufacturer shall provide all screws and gaskets for joining of sections in the field.
C. The Mechanical Contractor shall verify that the following items have been completed prior to scheduling the AHU manufacturer's final inspection and start up:
    1. All spring-isolated components have had their shipping restraints removed and the components have been leveled.
    2. On all field-joined units, that all interconnections have been completed, i.e., electrical and control wiring, piping, casing joints, bolting, welding, etc.
    3. All water and steam piping connections have been completed and hydrostatically tested and all water flow rates have been set in accordance with the capacities scheduled on the Drawings.
    4. All ductwork connections have been completed and all ductwork has been pressure tested for its intended service.
    5. All power wiring, including motor starters and disconnects, serving the unit has been completed.
    6. All automatic temperature and safety controls have been completed.
    7. All dampers are fully operational.
    8. All shipping materials have been removed.
    9. All (clean) filter media has been installed in the units.

2.20 LEVELING

A. Mechanical Contractor shall level all unit sections in accordance with the unit manufacturer's instructions. Mechanical Contractor shall provide and install all necessary permanent shim material to ensure individual sections and entire assembled units are level.

2.21 FINAL INSPECTION AND START UP SERVICE

A. After Mechanical Contractor has provided all water and steam piping connections, ductwork connections, and field control wiring, and Electrical Contractor has provided all the field power wiring, Mechanical Contractor shall inspect the installation. Mechanical Contractor shall then perform startup of the equipment.

B. Automatic Temperature Control (Building Direct Digital Control) Contractor shall be scheduled to be at the job site at the time of the equipment start up.
C. Mechanical Contractor, shall perform the following tests and services and submit a report outlining the results:
   1. Record date, time, and person(s) performing service.
   2. Lubricate all moving parts.
   3. Check all motor and starter power lugs and tighten as required.
   4. Verify all electrical power connections.
   5. Conduct a start up inspection per the AHU manufacturer's recommendations.
   6. Record fan motor voltage and amperage readings.
   7. Check fan rotation and spin wheel to verify that rotation is free and does not rub or bind.
   8. Check fan for excessive vibration.
   9. Remove all foreign loose material in ductwork leading to and from the fan and in the fan itself.
   10. Disengage all shipping fasteners on vibration isolation equipment.
   11. Check safety guards to insure they are properly secured.
   12. Secure all access doors to the fan, the unit and the ductwork.
   13. Switch electrical supply "on" and allow fan to reach full speed.
   14. Physically check each fan at start up and shut down to insure no abnormal or problem conditions exist.
   15. Check entering and leaving air temperatures (dry bulb and wet bulb) and simultaneously record entering and leaving chilled water temperatures and flow, steam pressures and flow, and outside air temperature.
   16. Check all control sequences.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with ARI 430.
B. Install flexible connections between unit and inlet and discharge ductwork. Install metal bands of connectors parallel with minimum 1-inchflex between ductwork and fan while running.
C. Install assembled units with vibration isolators. Install isolated fans with resilient mountings and flexible electrical leads. Install restraining snubbers as required. Adjust snubbers to prevent tension in flexible connectors when fan is operating.
D. Install floor mounted units on concrete housekeeping pads at least 3-1/2 inches high and 6 inches wider than unit.
E. Provide fixed sheaves required for final air balance.
F. Insulate coil headers located outside airflow as specified for piping.
G. Install condensate piping with trap and route from drain pan to nearest floor drain.
H. Install heating section condensate drain piping through a neutralizing unit, then route to nearest floor drain.

3.2 INSTALLATION - REFRIGERANT COILS

A. Install sight glass in liquid line within 12 inches of coil.
B. Install piping specialties in accordance with Section 23 23 00 "Refrigerant Piping."

3.3 INSTALLATION - INDIRECT GAS-FIRED HEATING COIL

A. Make connections to coils with unions or flanges.
B. Install natural gas piping to unit with minimum 12 inches flexible piping connection.
C. Install the following piping accessories on steam piping connections.
    1. On natural gas supply:
        a. Shutoff valve.
        b. 6-Inch Dirt Leg.
        c. Control valve.

3.4 MANUFACTURER'S FIELD SERVICES

A. Section 01 40 00 "Quality Requirements" for requirements for manufacturer's field services.
B. Furnish services of factory trained representative for minimum of 1 day to leak test, refrigerant pressure test, evacuate, dehydrate, charge, start-up, calibrate controls, and instruct Owner on operation and maintenance.

3.5 CLEANING

A. Section 01 70 00 "Execution and Closeout Requirements" for requirements for cleaning.
B. Vacuum clean coils and inside of unit cabinet.
C. Install new throwaway filters in units at Substantial Completion.

3.6 DEMONSTRATION

A. Section 01 70 00 "Execution and Closeout Requirements" for requirements for demonstration and training.
B. Demonstrate unit operation and maintenance.
C. Furnish services of manufacturer's technical representative for one 8-hour day to instruct Owner's personnel in operation and maintenance of units. Schedule training with Owner.

3.7 PROTECTION OF FINISHED WORK

A. Section 01 70 00 "Execution and Closeout Requirements" for requirements for protecting finished Work.
B. Do not operate units until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

SECTION 23 81 26.10 - DUCTLESS-SPLIT SYSTEM AIR CONDITIONERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes mini-split system air conditioners, with remote air-cooled condensing units.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 23 05 00 "General Mechanical Requirements."

1.2 REFERENCES

A. ARI 210/240 - Unitary Air-Conditioning and Air-Source Heat Pump Equipment.
B. ARI 270 - Sound Rating of Outdoor Unitary Equipment.
C. ARI 340/360 - Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment.
D. ASHRAE 52.1 - Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter.
E. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

1.3 SUBMITTALS

A. Refer to Division 01 and Section 23 05 00 "General Mechanical Requirements" for submittals.
B. Product Data: Submit data indicating:
   1. Cooling and heating capacities.
   2. Dimensions.
   3. Rough-in connections and connection requirements.
   4. Electrical requirements with electrical characteristics and connection requirements.
   5. Controls.
   6. Accessories.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' experience.
B. Installer: Company specializing in performing Work of this Section with minimum 3 years' experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept equipment on site in factory packaging. Inspect for damage.
B. Protect equipment from damage by providing temporary covers until construction is complete in adjacent space.

1.6 WARRANTY

A. Furnish 5-year manufacturer’s warranty for compressors.

PART 2 - PRODUCTS

2.1 MINI SPLIT SYSTEM AIR CONDITIONERS

A. Manufacturers:
1. Carrier.
2. Daikin.
3. Mitsubishi Electric - Basis of Design.
4. L.G.
5. Trane.
6. Substitutions: Refer to Section 23 05 00 "General Mechanical Requirements."

B. Wall-Mounted Indoor Unit:
1. Provide indoor unit that is factory assembled, wired, and run tested. Provide within the unit all necessary factory wiring, piping, control circuit board, and fan motor.
   a. Provide units with a self-diagnostic function, 3-minute time-delay mechanism, an auto restart function, an emergency operation function, and a test run switch.
   b. Charge indoor unit and refrigerant pipes with dry air instead of refrigerant before shipment from the factory.
2. Unit Cabinet - Provide:
   a. Casings with a white finish.
   b. Standard multi-directional drain and refrigerant piping offering four directions for refrigerant piping and two directions for draining.
   c. A separate back plate that secures the unit firmly to the wall.
3. Fan - Provide:
   a. Evaporator fan assembly with a line-flow fan direct driven by a single motor.
   b. Statically and dynamically balance fan and run on a motor with permanently lubricated bearings.
   c. A manually adjustable guide vane with the ability to change the airflow from side to side (left to right).
   d. A motorized air sweep flow louver with an automatic change in airflow by directing the air up and down to provide for uniform air distribution.
   e. Indoor fan consisting of three speeds: High, Medium, and Low.
4. Filter: Filter return air using an easily removable washable filter.
5. Coil - Provide:
   a. Evaporator coil of nonferrous construction with smooth plate fins on copper tubing.
   b. Tubing with inner grooves for high-efficiency heat exchange.
   c. Brazed tube joints with phos copper or silver alloy.
   d. Pressure testing of coils at the factory.
   e. Condensate pan and drain under the coil.
6. Electrical:
   a. Power indoor unit from the outdoor unit.
   b. Indoor units with supplemental electrical heat elements is not acceptable.

7. Controls Provide:
    a. A wireless controller to perform input functions necessary to operate the system.
    b. Controller consisting of a power on-off switch, mode selector, temperature setting, timer control, fan speed select, and auto vane selector.
    c. Temperature changes by 2 degrees F increments with a range of 59 to 89 degrees F.
    d. Microprocessor located in the indoor unit with the capability of sensing return air temperature and indoor coil temperature, receiving and processing commands from the wireless controller, providing emergency operation, and controlling the outdoor unit.
    e. System will be capable of automatic restart when power is restored after power interruption.
    f. Control system will control the continued operation of the air sweep louvers, as well as provide on/off and system/mode function switching. Provide control modules to allow DDC / BMS system to monitor room temperature, set temperature set-points, set schedules, and report alarms.

C. Outdoor Unit - Provide:
1. Unit designed specifically for use with the indoor unit, completely factory assembled, piped and wired. Run-test units at the factory.
2. Cabinet casing fabricated of corrosion-resistant galvanized steel, bonderized, and a powder-coated baked enamel finish. Supply units with manufacturer's standard hail guard.
3. Fan - Provide:
    a. Units with a direct drive propeller type fan.
    b. Inherent protection motors, and permanently lubricated bearings.
    c. Designed and mounted for quiet operation.
    d. A raised guard to prevent contact with moving parts.
    e. Horizontal discharge airflow for outdoor units.
4. Coils - Provide:
    a. Condenser coils of nonferrous construction with lanced or corrugated plate fins on copper tubing.
    b. Protected with an integral metal guard.
    c. Control refrigerant flow from the condenser using a metering orifice.
    d. Either a factory or field-installed hail screen.
5. Compressor - Provide :
    a. High-performance rotary compressors.
    b. An accumulator for outdoor units.
    c. Compressor equipped with an internal thermal overload.
    d. Outdoor unit with the ability to operate with a maximum height difference of 25 feet and have refrigerant tubing length of 49 feet between indoor and outdoor units without the need for line size changes, traps or additional oil.
    e. Compressor mounted to avoid the transmission of vibration.
6. Electrical:
    a. Provide unit electrical power as scheduled.
    b. Control outdoor unit by the microprocessor located in the indoor unit.

2.2 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Electrical Characteristics: In accordance with Division 26 Electrical.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify piping rough-in is at correct location.
B. Verify electrical rough-in is at correct location.

3.2 INSTALLATION

A. Install refrigerant piping from unit to remote condensing unit. Install refrigerant specialties furnished with unit.
B. Pipe condensate from drain pan to condensate drainage system. Refer to Drawings.
C. Install accessories furnished loose for field mounting.
D. Install electrical devices furnished loose for field mounting.
E. Install control wiring between unit control panel and field-mounted control devices.

3.3 CLEANING

A. After construction is completed, clean exposed surfaces of units.
B. Vacuum clean coils and inside of cabinets.
C. Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.

3.4 DEMONSTRATION

A. Demonstrate unit operation and maintenance.
B. Furnish services of manufacturer's technical representative for 2 hours to instruct Owner's personnel in operation and maintenance of units. Schedule and coordinate training date with Owner.

3.5 PROTECTION OF FINISHED WORK

A. Protect finished surfaces of cabinets with protective covers during remainder of construction.

END OF SECTION

APPENDIX

EXISTING COOLING TOWER O&M MANUAL (FOR REFERENCE ONLY)

/ Marley QuadraFlow® Cooling Tower /

User Manual 92-1333H

Marley
AN SPX BRAND

Contents

Note

This manual contains vital information for the proper installation and operation of your cooling tower. Carefully read the manual before installation or operation of the tower and follow all instructions. Save this manual for future reference.

	Page
Tower Location	4
Tower Shipment	5
Receiving Tower	5
Tower Assembly	5
Motor Wiring	5
Tower Start-Up	10
Tower Maintenance	13
Water Treatment and Blowdown	13
Schedule of Tower Maintenance	15
Seasonal Shutdown Instructions	18
Motor Relubrication Instructions	19
Prolonged Shutdown	19
Additional Services	20
Additional Information	21
Troubleshooting	22

⚠ Warning

Indicates presence of a hazard which can cause severe personal injury, death or substantial property damage if ignored.

⚠ Caution

Indicates presence of a hazard which will or can cause personal injury or property damage if ignored.

Note

Indicates special instructions on installation, operation or maintenance which are important but not related to personal injury hazards.

Installation

The Marley QuadraFlow cooling tower purchased for this installation represents the current state of the art in corrosion resistant cooling tower design and construction. The QuadraFlow represents a major step forward in low-maintenance, long-life cooling towers.

These instructions–as well as those offered separately on motors, fans, Geareducers, driveshafts, float valves, etc.–are intended to assure that the tower serves you properly for the maximum possible time. Since the QuadraFlow's warrantability may well depend upon your actions, please read these instructions thoroughly prior to operation.

If you have questions about the operation and/or maintenance of this tower, and you don't find the answers in this manual, please contact your Marley sales engineer. When writing for information, or when ordering parts, please mention tower serial number shown on the tower's nameplate.

Tower Location

Space available around the tower should be as generous as possible to promote ease of maintenance–and to permit freedom of airflow into and through the tower. If you have questions about the adequacy of the available space and the intended configuration of the tower, please contact your Marley sales engineer for guidance.

Prepare a stable, level support foundation for the tower, utilizing weight, wind load, and dimensional information appearing on appropriate Marley submittal drawings. Supports must be level to insure proper operation of the tower.

⚠ Warning

The cooling tower must be located at such distance and direction to avoid the possibility of contaminated tower discharge air being drawn into building fresh air intake ducts. The purchaser should obtain the services of a Licensed Professional Engineer or Registered Architect to certify that the location of the tower is in compliance with applicable air pollution, fire, and clean air codes.

Tower Shipment

QuadraFlow towers ship by truck (on flat bed trailers) in an unassembled condition. Single cell towers ship on one truck. Multicell towers, depending on their size, may require more than one truck. Responsibility for the condition of the tower upon its arrival belongs to the trucker–as does the coordination of multiple shipments, if required.

Installation

Receiving Tower

Prior to unloading the tower from the delivering carrier, inspect the shipment for evidence of damage in shipment. If damage is apparent, note the freight bill accordingly. This will support your future recovery claim.

Tower Assembly

Your Marley sales representative is able to provide for the tower assembly by SPX's construction division or through a qualified subcontractor. Our subcontractors provide safe, efficient assembly which complies with all requirements for five-year warranty protection of your tower by SPX.

Motor Wiring

Wire motor leads as shown on the motor nameplate matching the supply voltage. Do not deviate from the motor nameplate wiring.

Either of following symbols may be shown on the motor nameplate – Δ, Δ Δ, Y, or YY. These symbols represent how the motor is constructed on the inside and in no way have anything to do with a Delta or Wye electrical distribution system serving the motor.

When using a starter:

- Set motor overload protection to 110% of motor nameplate amps. This setting allows the fan motor to operate during cooler weather. During cooler weather it is common for the motor to draw 6 to 10% higher than the nameplate amps. High amps are common during tower commissioning when the tower is dry and the ambient air temperature is cool.

Note

Do not start the motor more than four to five times per hour. Short cycling the tower will cause fuses, breakers or O.L.s to operate and will decrease motor life.

When using a *two-speed* starter:

- Motor rotation must be the same at slow speed and high speed.
- Single winding motor requires a starter with a shorting contactor.
- Two-winding motor requires a starter with out a shorting contactor.
- All two-speed starters must have a 20 second time delay relay when switching from high speed to low speed.

Installation

Note

Do not start the motor more than four to five times per hour (each low speed start and each high speed start count as one start).

When using a VFD:

Note

Before beginning, ensure that the motor is rated for "Inverter Duty" per NEMA MG-1, part 31.

- Set the VFD solid state overload protection to 119% of motor nameplate amps and set "maximum current parameter" in the VFD to motor nameplate amps. "Maximum current parameter" will reduce fan speed and limit amp draw to nameplate amps during cold weather operation. If furnished with a mechanical O.L. set this at 110% over motor nameplate amps.
- Motor rotation must be the same in both VFD mode and By-pass mode.
- If cable distance between the VFD and motor is greater than 100 feet a DV/DT output filter is recommended to avoid damage to the motor. 100 feet distance is based on our field experience, the VFD manufacture may state different distances and distance does vary depending on the VFD manufacture.
- Program the VFD for variable torque output. Flux vector and constant torque modes may damage the gearbox.
- Do not start and stop the motor using the safety switch at the motor. If the drive is being commanded to run and the load side is cycled ON and OFF with the safety switch this may damage the VFD.

Using a VFD in cooling applications has advantages over traditional single or two speed motor control. A VFD can reduce the cost of electrical energy being used and provide better temperature control. In addition, it reduces the mechanical and electrical stress on the motor and mechanical equipment. Electrical savings can be large during periods of low ambient temperature when the cooling requirement can be satisfied at reduced speeds. To benefit from these advantages, it is important that the drive be installed correctly.

Marley supplies VFD and VFD controls specifically designed for our cooling products. If you have purchased a Marley VFD and/or controls package, please follow the instructions in the *User Manual* for that system. Most VFD

problems can be avoided by purchasing the Marley drive system. If you are installing a VFD other than the Marley drive, please refer to that drives installation manual.

⚠ Warning

Improper use of a VFD may cause damage to equipment or personal injury. Failure to correctly install the VFD drive will automatically void all warranties associated with the motor and any equipment that is either electrically or mechanically (directly) attached to the VFD drive system. The length of this warranty avoidance will be contingent on properly installing the VFD system and repairing any damage that may have occurred during its operation. SPX Cooling Technologies does not assume responsibility for any technical support or damages for problems associate with non-Marley brand VFD systems.

⚠ Warning

Changing the operational fan speed from the factory settings could cause the fan to operate in an unstable region which may result in damage to the equipment and possible injury.

Mechanical Equipment

⚠ Warning

Always make certain that mechanical equipment is inoperable during periods of maintenance–or during any situation of possible endangerment to personnel. If your electrical system contains a disconnect switch, lock it out until the period of exposure to injury is over.

1. Check the Geareducer oil level at the sight glass near the motor. If oil is required, fill to the proper level.
2. Spin the fan manually to assure that all fan blades properly clear the inside of the fan cylinder. Observe the action of the driveshaft couplings to be sure that the motor and Geareducer are properly aligned. If necessary, correct the alignment in accordance with the included driveshaft manual.
3. Momentarily energize ("bump") the motor and observe rotation of the fan. The fan should rotate in a counterclockwise direction when viewed from below. If rotation is backwards, shut off the fan and reverse two of the three primary leads supplying power to the motor.

Installation

⚠ Caution

If tower is equipped with a two-speed motor, check for proper rotation at both speeds. Check also to see that starter is equipped with a 20-second time delay which prevents direct switching from high speed to low speed. This delay will allow the fan to slow down and will prevent abnormal stress from being applied to the mechanical equipment and the electrical circuit components.

4. Run the motor and observe the operation of the mechanical equipment. Operation should be stable, and there should be no evidence of oil leakage.

Note

If the water supply system is not being operated–or if there is no heat load on the system–motor amps read at this time may indicate an apparent overload of as much as 10–20%. This is because of the increased density of unheated air flowing through the fan. Determination of an accurate motor load should await the application of the design heat load.

General

The cold water temperature obtained from an operating cooling tower will vary with the following influences:

1. **Heat Load:** With the fan in full operation, if the heat load increases, the cold water temperature will rise. If the heat load reduces, the cold water temperature will reduce.

$$\text{Range (°F)} = \frac{\text{Heat Load (Btu/hr)}}{\text{GPM x 500}}$$

   Note that the number of degrees ("range") through which the tower cools the water is established by the system heat load and the amount of water being circulated, in accordance with the following formula:

   The cooling tower establishes only the cold water temperature attainable under any operating circumstance.

2. **Air Wet-Bulb Temperature:** Cold water temperature will also vary with the wet-bulb temperature of the air entering the louvered faces of the tower. Reduced wet-bulb temperatures will result in colder water temperatures. However, the cold water temperature will not vary to the same extent as the wet-bulb. For example, a 20°F reduction in wet-bulb may result in only a 15°F reduction in cold water temperature.

3. **Water Flow Rate:** Increasing the water flow rate (GPM) will cause a slight elevation in cold water temperature, while reducing the water flow rate will cause the cold water temperature to lower slightly. However, at a given heat load (see formula above), GPM reductions also cause an increase in the incoming hot water temperature. Use care to prevent the hot water from exceeding 125°F, in order to prevent damage to the tower components.
4. **Airflow Rate:** Reducing airflow through the tower causes the cold water temperature to rise. This is the approved method by which to control leaving water temperature.

   If your tower is equipped with a single-speed motor, the motor may be shut off when the water temperature becomes too cold. This will cause the water temperature to rise. When the water temperature then becomes too warm for your process, the motor can be restarted.

Fan cycling limits:

Note

Considering the normal fan and motor sizes utilized on MCW towers, anticipate that approximately 4 to 5 starts per hour are allowable.

If your tower is equipped with a two-speed motor, greater opportunity for temperature control is afforded you. When the water temperature becomes too cold, switching the fan to half-speed will cause the cold water temperature to rise–stabilizing at a temperature a few degrees higher than before. With a further reduction in water temperature, the fan may be cycled alternately from half-speed to off.

Note

Do not start the motor more than four to five times per hour (each low speed start and each high speed start count as one start).

If your tower consists of two or more cells, cycling of motors may be shared between cells, increasing your steps of operation accordingly. For greater insight on cold water temperature control, please read *Marley Technical Report #H-001-A*, "Cooling Tower Energy and its Management" available for download at spxcooling.com.

Operation

Tower Start-Up

⚠ **Warning**

Among other sources, outbreaks of Legionnaires' Disease have reportedly been traced to cooling towers. Maintenance and water treatment procedures that prevent amplification and dissemination of Legionella and other airborne bacteria should be formulated and implemented BEFORE systems are operated and continued regularly thereafter to avoid the risk of sickness or death.

Water System

1. New installations should be cleaned and treated with biocides by a water treatment expert before startup.
2. Remove any and all accumulated debris from tower. Pay particular attention to inside areas of cold water basin, entire hot water basin, and hot water inlet. Make sure that cold water suction screens are clear and installed in place.
3. Fill the water system to an approximate depth of 3" in the elevated section of the cold water basin. This is the recommended operating water level. Adjust the float valve so that it is essentially closed at that level. Continue filling the system until the water reaches a level approximately ⅛" **below the lip of the overflow.**
4. Start your pump(s). Observe system operation. Since the water system external to the tower will have been filled only to the level achieved in the cold water basin, a certain amount of "pump-down" of the basin water level will occur before water completes the circuit and begins to fall from the fill. The amount of initial pump-down may be insufficient to cause the float valve to open. However, you can check its operation by pressing down on the operating lever to which the stem of the float valve is attached.
5. Continue pump operation for about 15 minutes, after which it is recommended that the water system be drained, flushed, and refilled in order to clean the system.
6. While operating the condensing water pump(s) and prior to operating the cooling tower fan, execute one of the two alternative biocidal treatment programs described in the following:
   - Resume treatment with the biocide which had been used prior to shutdown. Utilize the services of the water treatment supplier. Maintain the maximum recommended biocide residual (for the specific biocide) for

a sufficient period of time (residual and time will vary with the biocide) to bring the system under good biological control

or

- Treat the system with sodium hypochlorite to a level of 4 to 5 mg/L (ppm) free chlorine residual at a pH of 7.0 to 7.6. The chlorine residual must be held at 4 to 5 mg/L (ppm) for six hours, measurable with standard commercial water test kits.

If the cooling tower has been in operation and then shut down for a duration of time and not drained, perform one of the two previous biocidal treatment programs directly to the cooling water storage vessel (cooling tower sump, drain down tank, etc.) without circulating stagnant water over the cooling tower fill or operating the cooling tower fan.

After biocidal pretreatment has been successfully completed, cooling water may be circulated over the tower fill with the fan off.

When biocidal treatment has been maintained at a satisfactory level for at least six hours, the fan may be turned on and the system returned to service. Resume the standard water treatment program, including biocidal treatment.

Wintertime Operation

During operation in subfreezing weather, the opportunity exists for ice to form in the colder regions of the tower. Your primary concern is to prevent the formation of destructive ice on the cooling tower fill. Your understanding of cold weather operation will be enhanced if you read *Marley Technical Report #H-003*, "Operating Cooling Towers in Freezing Weather," available for download at spxcooling.com, augmented by the following guidelines:

1. ***Do not allow the tower's leaving water temperature to drop below a minimum allowable level–about 40°F–established as follows:***

   During the coldest days of the first winter of operation, observe whether any ice is forming on the louver face, particularly near the bottom of the louver face. If hard ice is present on the louvers, an appropriate elevation in the allowable cold water temperature is mandatory. If the coldest possible water is beneficial to your process, ice of a mushy consistency can be tolerated–but routine periodic observation is advisable.

   If the minimum allowable cold water temperature is established at or near minimum heat load, it should be safe for all operating conditions.

Having established the minimum allowable cold water temperature, maintaining that temperature can be accomplished by fan manipulation, as outlined in **Item 4** under **Tower Operation** on page 8. *However, in towers of more than one cell, the limiting temperature established applies to the water temperature of the cell or cells operating at the highest fan speed–not necessarily the net cold water temperature produced by the entire tower.*

2. As cold air enters the louvers, it causes the falling water to be drawn inward toward the center of the tower. Thus, under fan operation, the louvers and lower periphery of the tower structure remain partly dry, seeing only random splashing from within the tower–plus normal atmospheric moisture from the entering air. Such lightly wetted areas are most subject to freezing.

   Although ice is unlikely to cause structural damage to the fill, it may build up sufficiently to restrict the free flow of air through the louvers. This will have the effect of reducing the tower's thermal performance efficiency. When excessive ice forms on the louvers, stop the fan for a few minutes. With the fan off, the increase in the water temperature and the action of the cascading water will reduce the ice buildup on the louvers.

Intermittent Wintertime Operation

If periods of shutdown (nights, weekends, etc.) occur during freezing weather, measures must be taken to prevent the water in the cold water basin –and all exposed pipework–from freezing. Several methods are used to combat this, including automatic basin heater systems available from Marley. It is recommended that you discuss your freeze prevention options with your local Marley sales representative.

⚠ Caution

Unless some means of freeze prevention is incorporated into your system, the tower basin and exposed pipework should be drained at the beginning of each wintertime shutdown period.

⚠ Warning

If tower basin is drained, verify that all basin heaters have been shut off either by automatic cutoff or disconnect switch.

Maintenance

Water Treatment and Blowdown

Maintaining Water Quality:

The materials used in the QuadraFlow tower are selected to offer long, corrosion-free service in a "normal" cooling tower environment, defined as follows:

- Circulating water with a pH between 6 and 8; a chloride content (as NaCl) below 750 ppm; a sulfate content (SO_4) below 1200 ppm; a maximum inlet water temperature not to exceed 125°F; no significant contamination with unusual chemicals or foreign substances; and adequate water treatment to minimize scaling.
- Chlorine (if used) shall be added intermittently, with a free residual not to exceed 1 ppm – maintained for short periods. Excessive chlorine levels may deteriorate sealants and other materials of construction.
- An atmosphere surrounding the tower no worse than "moderate industrial," where rainfall and fog are no more than slightly acid, and they do not contain significant chlorides or hydrogen sulfide (H_2S).

Cooling Tower Cleaning

⚠ Warning

Any evaporative-type cooling tower must be thoroughly cleaned on a regular basis to minimize the growth of bacteria, including Legionella Pneumophila, to avoid the risk of sickness or death. Service personnel must wear proper personal protective equipment during decontamination. Do NOT attempt any service unless the fan motor is locked out.

Operators of evaporative cooling equipment, such as water cooling towers, should follow maintenance programs which will reduce to an absolute minimum the opportunity for bacteriological contamination. US Public Health Service publications have recommended that "good housekeeping" procedures be followed, such as: regular inspections for concentrations of dirt, scale, and algae; periodic flushing and cleaning; and the following of a complete water treatment program including biocidal treatment. See Tower start-up instructions on page 10.

Maintenance

The visual inspection should take place at least once a week during the operating season. The periodic flushing and cleaning should be done before and after each cooling season, but in any event at least twice a year. The louvers, drift eliminators, and easily accessible fill surfaces should be flushed by use of a moderate-pressure water nozzle, being careful not to cause physical damage. A reliable water treatment program should be installed and maintained. Filtration devices may be employed to reduce the suspended solids concentrations, thus increasing the effectiveness of the water treatment program.

Blowdown

A cooling tower cools water by continuously causing a portion of it to evaporate. Although the water lost by evaporation is replenished by the makeup system, it exits the tower as pure water–leaving behind its burden of dissolved solids to concentrate in the remaining water. Given no means of control, this increasing concentration of contaminants can reach a very high level.

In order to achieve water quality which is acceptable to the cooling tower (as well as the remainder of your circulating water system), the selected water treatment company must work from a relatively constant level of concentrations. This stabilization of contaminant concentrations is usually accomplished by blowdown, which is the constant discharge of a portion of the circulating water to waste. As a rule, acceptable levels on which to base a treatment schedule will be in the range of 2-4 concentrations. The following table gives approximate rates of blowdown (percent of total water flow rate constantly wasted) to achieve those concentrations at various cooling ranges.*

	Blowdown Rate	
Cooling	Two	Four
Range (°F)	Concentrations	Concentrations
10	0.7%	0.17%
15	1.1%	0.30%
20	1.5%	0.43%

*Range = Difference between hot water temperature entering the tower and cold water temperature leaving the tower.

Note

When water treatment chemicals are added, they should not be introduced into the circulating water system via the cold water basin of the cooling tower. Water velocities are lowest at that point, which results in inadequate mixing.

Maintenance

Schedule of Tower Maintenance

Included with this instruction packet are separate Service Manuals on each major operating component of the tower, and it is recommended that you read them thoroughly. Where discrepancies may exist, the separate Service Manuals will take precedence.

⚠ Warning

Do not use the top horizontal surface of the tower as a working platform. The tower is designed so that all maintenance can be performed from the exterior and interior of the tower. Do not use the upper basin covers as a walking surface or working platform. Remove basin covers and use portable ladders whenever performing service on the hot water basin. Use of ladder should be in accord with manufacturer's recommendations

The following is recommended as a minimum routine of scheduled maintenance:

⚠ Warning

Always shut off electrical power to the tower fan motor prior to performing any inspections that may involve physical contact with the mechanical or electrical equipment in or on the tower. Lock out and tag out any electrical switches to prevent others from turning the power back on. Service personnel must wear proper personal protective clothing and equipment.

Weekly: Inspect for bacterial growth and general operation conditions. Bacterial growth should be reported to your water treatment expert for immediate attention.

Monthly (Weekly at Start-up): Observe, touch, and listen to the tower. Become accustomed to its normal appearance, sound, and level of vibration. Abnormal aspects relating to the rotating equipment should be considered reason to shut down the tower until the problem can be located and corrected. Observe operation of the motor, driveshaft, Geareducer and fan. Become familiar with the normal operating temperature of the motor, as well as the sight and sound of all components as a whole.

Check Geareducer oil level. Shut down the unit and allow 5 minutes for the oil level to stabilize. Add oil if required. Check system for leaks if the amount of oil required appears unusual. (If oil is added at the external fill port, allow adequate time for the level to stabilize before reading final level.)

Maintenance

Inspect louvers, drift eliminators and basin trash screens and remove any debris or scale which may have accumulated. Replace any damaged or worn out components. Use of high-pressure water may damage the eliminator and louver material.

Observe operation of the float valve. Depress the operating lever to make sure that the valve is operating freely. Inspect the suction screen for plugging. Remove any debris that may have accumulated.

Check for any buildup of silt on the floor of the cold water basin. Mentally note the amount, if any, so future inspections will enable you to determine the rate at which it is forming.

Semi-Annually: Relubricate motor according to the manufacturer's instructions. See instructions on page 19.

Check to see that all bolts are tight in the fan and mechanical equipment region, including the fan guard. Use torque settings prescribed on the fan nameplate.

Clean and disinfect cooling tower with biocides. Systems with biofouling, high general bacterial counts, or positive cultures of legionella may require additional cleaning. Refer to "Cooling Tower Cleaning" section on page 13. Consult your water treatment expert as to prudent biological evaluation testing..

Note

To maintain five-year change intervals, use only oil designed specifically for these Geareducers. If, after five years, turbine-type mineral oil is used, the oil must be changed semiannually. Refer to *Geareducer User Manual* for oil recommendations and further instructions.

Annually: Inspect the tower thoroughly, making maximum use of instructions given in the separate service manuals. Check structural bolted connections and tighten as required. Make preventive maintenance repairs as necessary.

Every 5 Years: Change Geareducer oil. Refer to *Geareducer User Manual* for instructions.

Maintenance Schedule

Maintenance Service	Monthly	Semi-annually	Seasonal Startup or Annually
Inspect General Condition and Operation	x		x
Observe Operation of:			
Mechanical–motor, fan and drive mechanism	x		x
Makeup valve (if equipped)	x		x
Inspect for unusual noise or vibration	x		x
Inspect and Clean:			
Air inlet	x		x
PVC drift eliminators	x		x
Distribution basin, nozzles and collection basin	x		x
Fan motor exterior	x		x
Check:			
Collection water basin level	x		x
Blowdown–adjust as required	x		x
Geareducer Drive			
Check for loose fasteners including oil drain plug			x
Check for / repair oil leaks	x		x
Check oil level	x		x
Change oil		R	
Make sure vent is open			x
Check driveshaft alignment			x
Check for loose driveshaft or coupling fasteners			x
Check driveshaft flex element for unusual wear		x	x
Lube lines:			
Check for oil leaks in hoses or fittings	x		x
Fan:			
Check and tighten blade and hub fasteners			x
Check fan blade pitch and tip clearance			x
Check fan cylinder for loose fasteners			x
Motor:			
Lubricate (grease as required)			R
Check mounting bolts for tightness			x
Operate at least	3 hours a month	3 hours a month	3 hours a month
Basin Heater (if equipped):			
Check for proper operation of temp/low water level sensor			x
Inspect/clean buildup of contaminant from sensor		x	x
Structure:			
Inspect/tighten all fasteners		x	x
Inspect and touch up all metal surfaces			x

R – Refer to Component User Manual

Note: It is recommended at least weekly, that the general operation and condition be observed. Pay attention to any changes in sound or vibration that may signify a need for closer inspection.

Maintenance

Seasonal Shutdown Instructions

When the system is to be shut down for an extended period of time, it is recommended that the entire system (cooling tower, system piping, heat exchangers, etc.) be drained. Leave the basin drain open.

During shutdown, clean the tower and make any necessary repairs. Pay particular attention to mechanical equipment supports and driveshafts.

Tower Framework: Check structural bolted connections and tighten as required.

Driveshaft: Check driveshaft alignment, tightness of cap screws and set screws, and condition of all components. Refer to driveshaft service manual.

Fan: Check fan assembly bolting and tighten as required. Use torque settings prescribed on the fan nameplate. Refer to fan service manual.

Electric Motor: Clean and lubricate motor at close of each operating season. (Refer to motor manufacturer's recommendations.) Check motor anchor bolts and tighten as required. See Page 19 for motor lubrication instructions.

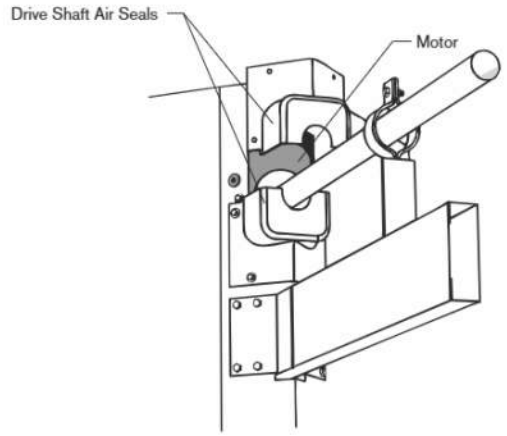
⚠ Warning

Do not start motor before determining that there will be no interference with free rotation of the fan drive.

The motor should be operated for three hours at least once a month. This serves to dry out windings and re-lubricate bearing surfaces. Refer to "Marley Electric Motor User Manual" *Manual 92-1475*.

At start of new operating season, make sure bearings are adequately lubricated before returning motor to service.

Maintenance



Motor Lubrication Instructions

⚠ **Warning**

Open and lock out disconnect switch to make certain motor cannot be started.

1. Remove interior driveshaft air seals as shown above. Opposite end motor bearing is accessible by removing motor cover (24000 models do not have a motor cover) on the exterior of the tower.
2. Relubricate motor according to the manufacturer's instructions.

Fiberglass Components: Check all fiberglass parts for exposed glass fibers. If found, the affected surfaces should be roughened up and solvent wiped. Surfaces must be clean and dry and free of oil, grease or other contaminants before applying new coating. The best coating system requires using a two-part polyamide epoxy primer to promote adhesion and a two-part acrylic polyurethane enamel for the topcoat. Contact your Marley sales representative if additional information is required.

Prolonged Shutdown

If shutdown period is longer than seasonal, contact your Marley sales engineer for additional information.

Maintenance

Additional Services

SPX's interest in your Marley QuadraFlow cooling tower does not end with the sale. Having conceived, designed, and manufactured the most reliable and longest lasting cooling tower of its class, we want to make sure that you gain the maximum possible benefit from its purchase.

Therefore, the following services are available which are intended to assure the maximum possible service life under your operating conditions, tailor the operating characteristics to your specific needs, and maintain consistent optimum thermal performance capability. They are available by contacting your Marley sales representative.

Replacement Parts

With the exception of the motor, every component of your tower is designed and manufactured by SPX Cooling Technologies. We do this because commercially available components have not proved capable of withstanding the harsh environment of a cooling tower– nor do they contribute their share to the thermal capability and operating characteristics intended.

A complete stock of all parts and components is maintained at one or more of the various Marley plants. In cases of emergency, they can normally be shipped within 24 hours–by air freight, if necessary. However, you would obviously benefit from anticipating your need in advance, thus avoiding the cost of special handling.

Be sure to mention your tower serial number (from the tower nameplate) when ordering parts. Refer to assembly manual for part identification.

Periodic Maintenance

You may wish to contract with Marley for regularly scheduled visits–for the purpose of inspecting and reporting your tower's condition–to make recommendations intended to prevent emergencies–and to perform maintenance considered outside the norm.

This service is not intended to replace the important function performed by your maintenance staff. Their attention assures the tower's routine operating performance, and is invaluable. However, Marley recognizes that the unusual manner in which a cooling tower performs its function–as well as the unique forces which act upon it–may be considerations which occasionally require the services of an expert technician.

Additional Information

Increased Load Requirements: QuadraFlow towers are designed such that cells of either equal or unequal capacity can be added in the future. This allows you to compensate for the load increases that normally occur with the replacement or addition of production equipment–and still retain continuity with respect to your cooling tower system.

Tower Renewal: Marley routinely rebuilds and upgrades cooling towers of all materials and manufacture. If your tower ever reaches the limit of its service life, we recommend that you investigate the cost of rebuilding before you routinely order a new replacement tower.

Each QuadraFlow tower includes a document package containing general orientation drawings and manuals to accomplish field assembly and installation. ***These drawings and manuals contain important information relating to safe installation and operation of the cooling tower.*** A separate installation drawing for each purchased option is included in the document package. If you have purchased an option and can't find the appropriate installation drawing, contact your local Marley sales representative before proceeding.

SPX also provides several sets of a separate packet of pertinent operating and maintenance manuals. The manuals vary somewhat depending on the tower model purchased.

In addition, SPX publishes numerous technical reports including more detailed information on a variety of cooling tower operation and service topics available to download at spxcooling.com. For complete parts and service assistance, contact the Marley sales or representative office in your area. If you need help locating the office nearest you, please phone 913 664 7400 or check the web at spxcooling.com.

Troubleshooting

Trouble	Cause	Remedy
Motor will not start	Power not available at motor terminals	1. Check power at starter. Correct any bad connections between the control apparatus and the motor. 2. Check starter contacts and control circuit. Reset overloads, close contacts, reset tripped switches or replace failed control switches. 3. If power is not on all leads at starter, make sure overload and short circuit devices are in proper condition.
	Wrong connections	Check motor and control connections against wiring diagrams.
	Low voltage	Check nameplate voltage against power supply. Check voltage at motor terminals.
	Open circuit in motor winding	Check stator windings for open circuits.
	Motor or fan drive stuck	Disconnect motor from load and check motor and Geareducer for cause of problem.
	Rotor defective	Look for broken bars and rings.
Unusual motor noise	Motor running single-phase	Stop motor and attempt to start it. Motor will not start if single-phased. Check wiring, controls and motor.
	Motor leads connected incorrectly	Check motor connections against wiring diagram on motor.
	Bad bearings	Check lubrication. Replace bad bearings.
	Electrical unbalance	Check voltage and currents of all three lines. Correct if required.
	Air gap not uniform	Check and correct bracket fits or bearing.
	Rotor unbalance	Rebalance.
	Cooling fan hitting end bell guard	Reinstall or replace motor fan.
Fan noise	Blade rubbing inside of fan cylinder	Adjust cylinder to provide blade tip clearance.
	Loose bolts in blade clamps	Check and tighten if necessary. Check fan blade pitch. Refer to Fan Service Manual.
Scale or foreign substance in water system	Lack of or insufficient bleed-off	See "Water Treatment" section of this manual.
	Water treatment	Consult competent water treating specialist. See "Water Treatment" section of this manual.
Motor does not come up to speed	Voltage too low at motor terminals because of line drop	Check transformer and setting of taps. Use higher voltage on transformer terminals or reduce loads. Increase wire size or reduce inertia.
	Broken rotor bars	Look for cracks near the rings. A new rotor may be required. Have motor service center check motor.
Wrong rotation (Motor)	Wrong sequence of phases	Switch any two of the three motor leads.
Excessive water drift	Faulty drift elimination	1. See if all louvers and eliminators are in place and clean. 2. Check to see that nozzles are in place and clean of debris.
	Overpumping	Reduce water flow rate to tower to design conditions.
Cold water too warm (See "Tower Operation")	Overpumping	Reduce water flow rate to tower to design conditions.
	Not enough air	Check motor current and voltage to be sure of correct contract horsepower. Clean louvers, fill and eliminators.

Troubleshooting

Trouble	Cause	Remedy
Unusual fan drive vibration	Loose bolts and cap screws	Tighten all bolts and cap screws on all mechanical equipment and supports.
	Unbalanced driveshaft or worn couplings	Make sure motor and Geareducer shafts are in proper alignment and "match marks" properly matched. Repair or replace worn couplings. Rebalance driveshaft by adding or removing weights from balancing cap screws. See Driveshaft Service Manual.
	Unbalanced fan	Be sure blades are properly positioned in correct sockets. (See match numbers.) Make certain all blades are as far from center of hub as safety devices permit. All blades must be pitched the same. See Fan User Manual. Clean off deposit buildup on blades.
	Worn Geareducer bearings	Check fan and pinion shaft endplay. Replace bearings as necessary.
	Unbalanced motor	Disconnect load and operate motor. If motor still vibrates, rebalance rotor.
	Bent Geareducer shaft	Check fan and pinion shafts with dial indicator. Replace if necessary.
Motor runs hot	Motor overload, wrong voltage or unbalanced voltage	Check voltage and current of all three lines against nameplate values.
	Wrong motor RPM	Check nameplate against power supply. Check RPM of motor and gear ratio.
	Bearings overgreased	Remove grease reliefs. Run motor up to speed to purge excessive grease.
	Wrong lubricant in bearings	Change to proper lubricant. See motor manufacturer's instructions.
	One phase open	Stop motor and attempt to start it. Motor will not start if single-phased. Check wiring, controls and motor.
	Poor ventilation	Clean motor and check ventilation openings. Allow ample ventilation around motor.
	Winding fault	Check with Ohmmeter.
	Bent motor shaft	Straighten or replace shaft.
	Insufficient grease	Remove plugs and regrease bearings.
	Too frequent starting	Limit cumulative starting time to a total of 30 seconds each hour.
	Deterioration of or foreign material in grease	Flush bearings and re-lubricate.
	Bearings damaged	Replace bearings.
	Incorrect fan blade pitch	Measure actual fan pitch and compare to that recommended. Correct, if necessary. See Fan User Manual.
Geareducer noise	Geareducer bearings	If new, see if noise disappears after one week of operation. Refer to Geareducer User Manual.
	Gears	Correct tooth engagement. Replace badly worn gears. Replace gears with imperfect tooth spacing or form.

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COOLING TECHNOLOGIES

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SECTION 26 05 00 - BASIC ELECTRICAL METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 REQUIREMENTS OF REGULATORY AGENCIES AND STANDARDS

A. Regulatory Agencies: Installation, materials, equipment and workmanship shall conform to the applicable provisions of the following:
B. National Electrical Code (NEC).
C. National Electrical Safety Code (NESC).
D. Terms and conditions of the electrical utility and other authorities having lawful jurisdiction pertaining to the work required.
E. All temperature control wiring and associated conduit and boxes, shall be provided under other Sections of the Specifications. All power and control wiring, not identified under Divisions 22 and 23, shall be provided under Division 26.
F. The work covered by Division 26 of the Specifications includes the furnishing of all materials, labor, transportation, tools, permits, and fees for the complete installation of all electrical work required in the Contract Drawings.
G. In the event that additional or special construction is required, Contractor is responsible for providing all material and equipment which are usually furnished with such construction in order to complete the installation, whether indicated or not.
H. Contractor shall familiarize himself with the existing conditions of the site and advise Architect of any discrepancy or conflict prior to bidding.
I. Contractor shall be responsible for all permits, fees, and licenses required for the Project. All cost of such permits or fees shall be included in the bid.
J. All equipment and material shall be installed in accordance with applicable manufacturer's recommendations and standards.
K. Install sleeves, sealant pans, and roof penetrations as required for the installation of the electrical work. All such work is subject to the approval of Architect.
L. Contractor shall be responsible for coordinating with the utility service provider to verify all locations, routing, equipment and labor that will be furnished as a part of this Contract.
M. Any fees or charges associated with delivering permanent power for the Project shall be included in Contractor's bid.

1.3 SUBMITTALS

A. The intent of this Section is to give general submittal information; refer to specific submittal information in the subsequent Mechanical Sections.
B. Within 10 days after award of the Contract, and before orders are placed, Contractor shall submit specific information on list of equipment and principal materials specified. Contractor shall indicate and/or provide names of manufacturers, catalog and model numbers, cut sheets, and such other supplementary information as necessary for evaluation. Minimum of six copies, or as directed by Architect, of each shall be submitted and shall include all items mentioned by model number and/or manufacturer's name in the Specifications or in schedules on the Drawings.

C. Requirements for Each Submittal:
   1. Bear a dated stamp or specific written indication that Contractor has reviewed and approved all submittal prior to submission to Architect.
   2. Have all information deleted by Contractor that pertains to the means and methods of construction or to fabrication, assembly, installation, or erection (approval by Architect shall not extend to these areas unless specifically noted by Architect).
   3. Be clearly and SPECIFICALLY marked as to which specific piece of equipment is being submitted, by use of a permanent marker, stamp, etc., so as to distinguish it from other pieces of equipment that may occur on the same page.
   4. Be clearly marked as to which available options are being submitted that are associated with a piece of equipment.
   5. Be complete with respect to quantities, dimensions, specific performance, materials, and similar data to enable Architect to review the proposed equipment.

D. Omission by Contractor of any of the above requirements or submittals will subject submittal to automatic rejection without review.

E. Any submittals received by Architect that were not requested shall be returned without review of any kind.

PART 2 - PRODUCTS

2.1 EQUIPMENT REQUIREMENTS

A. The electrical requirements for equipment specified or indicated on the Drawings are based on information available at the time of design. If equipment furnished for installation has electrical requirements other than indicated on the Electrical Drawings, Contractor shall make any required changes to wire and conduit size, controls, overcurrent protection, and installation as required to accommodate the equipment supplied, without additional charge to Owner. The complete responsibility and costs for such adjustments shall be assigned to the respective Section of this Specification under which the equipment is furnished.

2.2 MATERIALS

A. All similar materials and equipment shall be the product of the same manufacturer unless specified otherwise.

B. Materials and equipment shall be the standard products of manufacturers regularly engaged in the production of such material and shall be the manufacturer's current and standard design.

C. Altitude: Equipment affected by altitude shall perform satisfactorily for the function intended at the altitude of the Project site.

D. Detectable Warning Tape: Acid and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6-inch-wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inch deep; colored as follows:
   1. Red: Electric.
   2. Yellow: Gas, oil, steam, and dangerous materials.
   3. Orange: Telephone and other communications.
   4. Blue: Water systems.
   5. Green: Sewer systems.

E. Backfill Material:
   1. Material 4 inches below and 12 inches above pipes and conduit shall be natural or manufactured sand complying to ASTM C 33.
   2. Material more than 12 inches above pipes and conduits shall be sand indicated above or native fill free of rock or gravel larger than 3/8 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

PART 3 - EXECUTION

3.1 GENERAL

A. Fabrication, erection, and installation of the complete electrical system shall be done in accordance with accepted good practice by qualified personnel experienced in such work and shall proceed in an orderly manner so as not to impede the progress of the Project. Electrical Contractor shall check all areas and surfaces where electrical equipment material is to be installed, removed, or relocated and report any unsatisfactory conditions before starting work. Commencement of work signifies this Contractor's acceptance of existing conditions. In the acceptance or rejection of the finished installation, no allowance will be made for lack of skill on the part of workers. Surfaces requiring coatings will be completed prior to installation of any electrical work on these surfaces.

B. The Electrical Drawings are diagrammatic. The installation requirements shall be carefully coordinated with structural, architectural, and mechanical conditions and shall be adjusted to avoid conflict.

C. All work shall be concealed in walls, ceilings, and chases unless specifically noted to be exposed or otherwise approved.

D. The locations of electrical equipment are approximate and are not intended to convey the exact details and mounting of location of outlets, equipment, and other items. Exact locations are to be field determined by actual measurements.

E. The location height and projection of fixtures illuminating signs or special features shall be approved by Architect prior to installation.

F. Contractor shall coordinate the location of all exterior fixtures with architectural Drawings and Specifications.

G. Consult architectural Drawings to determine wall finishes and locations of wall-mounted equipment, countertop splashes, and similar items to avoid conflict with electrical equipment. At locations where surface or pendant mounted light fixtures are noted, provide for all necessary framing channels, pendants, chains, canopies, and other hardware as required for a complete and operable system.

H. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

I. Excavation for Pipe and Conduit:
   1. Excavate trenches to indicated gradients, lines, depths, and elevations.
   2. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
   3. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
      a. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.

b. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
c. Excavate trenches 4 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

4. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

J. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D698:
a. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inch of existing subgrade and each layer of backfill or fill material at 95 percent.
b. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 92 percent.
c. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 85 percent.

2. Install detectable warning tape above conduits and pipe, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
3. Protection:
a. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
b. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
1) Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
c. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
1) Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

4. Disposal of Surplus and Waste Materials:
a. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property unless otherwise directed by Owner.
b. Repair: Any damage to shrubs, grass or structures shall be repaired to previous condition by Contractor at no additional expense to Owner.

K. It shall be the responsibility of Division 26 Contractor to provide for all disconnecting and motor control devices for all equipment. Contractor shall coordinate to determine voltage, phase, and configurations. Any changes necessary to coordinate these items between Divisions 22, 23, and 26 shall be considered part of this Contract.

L. Division 26 Contractor shall be responsible for providing for all power requirements associated with the mechanical systems including power, control devices, smoke dampers, etc. Refer to Division 22 and 23 Drawings for locations and requirements. Connect all smoke dampers to the fire alarm control panel.

3.2 PERFORMANCE TESTS

A. Thoroughly test all control circuits, fixtures, services, and all circuits for proper operating condition and freedom from grounds and short circuits before acceptance is requested. All equipment, appliances, and devices shall be operated under load conditions.
B. After the interior wiring system installation is complete conduct operating tests for approval. When requested, test all the wire, cable, devices, and equipment after installation, to assure that all material continues to possess all the original characteristics as required by governing codes and standards listed in these Specifications.
C. After motor operation has been verified make voltage readings at all panelboards and starters. Based on these readings, make final adjustments of primary taps on all transformers in the building as directed, or coordinate with the utility proper building voltage.
D. Perform such other tests as required by other Sections of these Specifications or as requested to prove acceptability.
E. Furnish all instruments and labor for testing.
F. All material installed shall be listed, inspected, and approved by a nationally accepted testing laboratory such as UL and/or ETL. All material shall bear the UL or ETL label where available.

3.3 SUBMITTAL AND APPROVAL OF MATERIALS

A. All requirements for submittals shall comply with the applicable provisions included in the individual Specification Sections.
B. Unless identified as a sole source item, the listing of product manufacturers, catalog numbers, etc., on Drawings is intended to establish a standard of quality of the product. It is the responsibility of Contractor to review all items he intends to submit. If equipment other than that indicated on Drawings is proposed by Contractor, the information will be reviewed at the time of the submission of the submittal.

END OF SECTION

SECTION 26 05 13 - BUILDING WIRE AND CABLE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Building wire and cable.
   2. Wiring connectors and connections.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 01 40 00 "Quality Requirements" for requirements for references and standards.
   3. Section 26 05 53 "Electrical Identification."

1.2 REFERENCES

A. NECA Standard of Installation (National Electrical Contractors Association).
B. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).
C. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS FOR REVIEW

A. Refer to Section 01 33 00 "Submittal Procedures" for procedures for submittals.
B. Product Data: Provide for each cable assembly type.

1.4 SUBMITTALS FOR INFORMATION

A. Refer to Section 01 33 00 "Submittal Procedures" for procedures for submittals.
B. Test Reports: Indicate procedures and values obtained.
C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

A. Refer to Section 01 70 00 "Execution and Closeout Requirements" for procedures for submittals.
B. Project Record Documents: Record actual locations of components and circuits.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to NFPA 70.
B. Furnish products listed and classified by UL as suitable for the purpose specified and indicated.

1.8 FIELD SAMPLES

A. Provide under provisions of Section 01 40 00 "Quality Requirements."

1.9 PROJECT CONDITIONS

A. Refer to Section 01 30 00 "Administrative Requirements."
B. Verify that field measurements are as indicated.
C. Conductor sizes are based on copper.
D. Wire and cable routing indicated is approximate unless dimensioned.

1.10 COORDINATION

A. Coordinate Work under provisions of Section 01 30 00 "Administrative Requirements."
B. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Manufacturers:
   1. American Cable.
   2. Houston Wire and Cable.
   3. Southwire.
   4. Substitutions: Refer to Section 01 60 00 "Product Requirements."
B. Description: Single conductor insulated wire.
C. Conductor: Copper.
D. Insulation Voltage Rating: 600 volts.
E. Insulation: NFPA 70, Type indicated herein.
F. MC Cable: Shall not be utilized on this Project.

2.2 WIRING CONNECTORS

A. Split Bolt Connectors:
   1. Buchanan.
   2. Burndy.
   3. Ilsco.
   4. Substitutions: Refer to Section 01 60 00 "Product Requirements."

B. Solderless Pressure Connectors:
   1. Buchanan.
   2. Burndy.
   3. Ilsco.
   4. Substitutions: Refer to Section 01 60 00 "Product Requirements."
C. Spring Wire Connectors:
   1. Ideal.
   2. Substitutions: Refer to Section 01 60 00 "Product Requirements."
D. Compression Connectors:
   1. Buchanan.
   2. Burndy.
   3. Ilsco.
   4. Substitutions: Refer to Section 01 60 00 "Product Requirements."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Refer to Section 01 30 00 "Administrative Requirements" for verification of existing conditions before starting Work.
B. Verify that interior of building has been protected from weather.
C. Verify that mechanical work likely to damage wire and cable has been completed.
D. Verify that raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 WIRING METHODS

A. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
B. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
C. Above Accessible Ceilings: Use only building wire, Type THHN/THWN insulation, in raceway.
D. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
E. Exterior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
F. Use wiring methods indicated.

3.4 INSTALLATION

A. Refer to Section 01 40 00 "Quality Requirements" for manufacturer's instructions.
B. Route wire and cable as required to meet Project Conditions.
C. Install cable in accordance with the NECA "Standard of Installation."
D. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
E. Use stranded conductors for control circuits.

F. Use conductor not smaller than 12 AWG for power and lighting circuits with the exception of pre-manufactured fixture whips, listed for such use and not exceeding 6 feet in length.
G. Use conductor not smaller than 14 AWG for control circuits.
H. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 100 feet and as indicated on the Drawings.
I. Install all conductors in conduit.
J. Pull all conductors into raceway at same time.
K. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
L. Protect exposed cable from damage.
M. All cables shall be neatly supported.
N. Use suitable cable fittings and connectors.
O. Neatly train and lace wiring inside boxes, equipment, and panelboards.
P. Clean conductor surfaces before installing lugs and connectors.
Q. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
R. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
S. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
T. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
U. Identify and color code wire and cable under provisions of Section 26 05 53 "Electrical Identification." Identify each conductor with its circuit number or other designation indicated.
V. The number of conductors in each conduit run shall be limited to the requirements as indicated on the Drawings and indicated in Article 310 of the National Electrical Code.

3.5 FIELD QUALITY CONTROL

A. Refer to Section 01 40 00 "Quality Requirements" for field inspection, testing, and adjusting.
B. Inspect and test in accordance with NETA ATS, except Section 4.
C. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION

SECTION 26 05 19 - EQUIPMENT WIRING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes basic electrical connections to equipment specified under other Sections.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 26 05 00 "Basic Electrical Methods."

1.2 REFERENCES

A. NEMA WD 1 - General Purpose Wiring Devices.
B. NEMA WD 6 - Wiring Device Configurations.
C. ANSI/NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

A. Submit under provisions of Section 01 33 00 "Submittal Procedures."
B. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.
B. Furnish products listed and classified by UL as suitable for purpose specified and shown.

1.5 COORDINATION

A. Coordinate work under provisions of Section 01 30 00 "Submittal Procedures."
B. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other Sections.
C. Determine connection locations and requirements.
D. Sequence rough-in of electrical connections to coordinate with installation schedule for equipment.
E. Sequence electrical connections to coordinate with startup schedule for equipment.

PART 2 - PRODUCTS

2.1 CORDS AND CAPS

A. Attachment Plug Construction: Conform to NEMA WD 1.
B. Configuration: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
C. Cord Construction: ANSI/NFPA 70, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
D. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

E. Division 26 Contractor shall be responsible for providing matching cord/receptacle for all equipment not furnished with such equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify conditions under provisions of Section 01 30 00 "Submittal Procedures."
B. Verify that equipment is ready for electrical connection, wiring, and energization.

3.2 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.
B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
C. Make wiring connections using wire and cable with insulation suitable for temperatures encountered in heat producing equipment.
D. Provide receptacle outlet where connection with attachment plug is indicated. Provide cord and cap where field-supplied attachment plug is indicated.
E. Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
F. Install disconnect switches, controllers, control stations, and control devices as indicated.
G. Modify equipment control wiring with terminal block jumpers as indicated.
H. Provide interconnecting conduit and wiring between devices and equipment where indicated.
I. Check and modify phase connections as required for proper motor rotation.
J. Provide power to equipment only after equipment supplier verifies acceptance to receive and approves.
K. Contractor shall coordinate with all equipment to verify exact power and control wiring as required to properly serve equipment.

END OF SECTION

SECTION 26 05 26 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Rod electrodes.
   2. Mechanical connectors.
   3. Exothermic connections.
   4. Wire.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 01 40 00 "Quality Requirements" for requirements for references and standards.

1.2 REFERENCES

A. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).
B. NFPA 70 - National Electrical Code.

1.3 GROUNDING SYSTEM DESCRIPTION

A. Metal underground water pipe.
B. Metal frame of the building.
C. Rod electrodes.

1.4 PERFORMANCE REQUIREMENTS

A. Grounding System Maximum Resistance: 10 ohms.

1.5 SUBMITTALS FOR REVIEW

A. Refer to Section 01 33 00 "Submittal Procedures."
B. Product Data: Provide for grounding electrodes and connections.

1.6 SUBMITTALS FOR CLOSEOUT

A. Refer to Section 01 70 00 "Execution and Closeout Requirements" for procedures for submittals.
B. Project Record Documents: Record actual locations of components and grounding electrodes.
C. Certificate of Compliance: Indicate approval of installation by authority having jurisdiction.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience, and with service facilities within 100 miles of Project.

1.8 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.
B. Products: Listed and classified by UL as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 ROD ELECTRODES

A. Material: Copper.
B. Diameter: 3/4-inch.
C. Length: 10 feet.

2.2 MECHANICAL CONNECTORS

A. Description: In lieu of exothermic connections, high compression type as manufactured by Burndy using the 12 ton Hy-Ground series.

2.3 EXOTHERMIC CONNECTIONS

A. Manufacturers: Cadweld.

2.4 WIRE

A. Material: Stranded copper.
B. Grounding Electrode Conductor: Minimum size to meet NFPA 70 requirements or as indicated on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Refer to Section 01 30 00 "Administrative Requirements" for verification of existing conditions prior to beginning Work.
B. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.2 INSTALLATION

A. Refer to Section 01 40 00 "Quality Requirements" for manufacturer's instructions.
B. Install rod electrodes. Install additional rod electrodes as required to achieve a resistance to ground of 10 ohms or less. Rods shall be installed with a minimum separation of 6 feet.
C. Provide bonding to meet Regulatory Requirements.
D. Bond together metal siding not attached to grounded structure; bond to ground.
E. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
F. Grounding Electrode System: The new grounding electrode system shall consist of the common bonding of building steel, underground steel water piping and supplemental ground rods, concrete re-enforcing bar, as detailed on the Drawings.
G. Provide proper bonding of the electrical system's grounded conductor (neutral) and the grounding electrode system sized in accordance with NEC Article 250. This bonding shall occur at all locations where there are separately derived systems.

3.3 FIELD QUALITY CONTROL

A. Refer to Section 01 40 00 "Quality Requirements" for field inspection, testing, and adjusting.
B. Inspect and test in accordance with NETA ATS, except Section 4.
C. Perform inspections and tests listed in NETA ATS, Section 7.13.

END OF SECTION

SECTION 26 05 29 - SUPPORTING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCES

A. NECA - National Electrical Contractors Association.
B. NFPA 70 - National Electrical Code.

1.3 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.
B. Furnish products listed and classified by UL as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.1 MATERIALS AND FINISHES

A. Provide adequate corrosion resistance.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation."
C. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
D. Obtain permission from Architect before drilling or cutting structural members.
E. Fabricate supports from structural steel as indicated on drawings. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use lock washers under all nuts.
F. Install surface-mounted cabinets and panelboards with minimum of four anchors.
G. In wet and damp locations, use steel channel supports to stand cabinets and panelboards 1 inch off wall.
H. Install conduit supports a maximum spacing specified in the NEC.

END OF SECTION

SECTION 26 05 33 - CONDUIT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal conduit.
   2. Flexible metal conduit.
   3. Liquidtight flexible metal conduit.
   4. Electrical metallic tubing.
   5. Fittings and conduit bodies.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 26 05 33.16 "Boxes."
   3. Section 26 05 53 "Electrical Identification."

1.2 REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
C. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
D. NECA "Standard of Installation."
E. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.
F. NFPA 70 - National Electrical Code.

1.3 DESIGN REQUIREMENTS

A. Conduit Size: NFPA 70.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00 "Submittal Procedures."
B. Product Data: Provide for metallic conduit, flexible metal conduit, liquidtight flexible metal conduit, nonmetallic conduit, fittings and conduit bodies.

1.5 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01 70 00 "Execution and Closeout Requirements."
B. Accurately record actual routing of conduits.

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.
B. Furnish products listed and classified by UL as suitable for purpose specified and shown.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 01 60 00 "Product Requirements."
B. Accept conduit on site. Inspect for damage.
C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
D. Protect PVC conduit from sunlight.

1.8 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.
B. Verify routing and termination locations of conduit prior to rough-in.
C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS

A. Minimum Size: 3/4-inch for all branch circuits located above ceiling. Contractor may use 1/2-inch conduit down the wall to receptacles and light switches.
B. Wet and Damp Locations above grade: Use rigid steel or liquid tight flexible conduit.
C. Dry Locations: Use electrical metallic tubing for concealed and exposed locations.
D. Below Slab: Non-metallic PVC conduit is acceptable within limitations specified.
E. Below Grade: Use only PVC coated rigid galvanized steel, wrapped rigid steel, or non-metallic PVC conduit within limitations specified.
F. MC Cable: Shall not be utilized on this Project.

2.2 METAL CONDUIT

A. Manufacturers:
   1. Allied.
   2. Wheatland.
   3. Substitutions: Under provisions of Section 01 60 00 "Product Requirements."
B. Rigid Steel Conduit: ANSI C80.1.
C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; all steel fittings.

2.3 FLEXIBLE METAL CONDUIT

A. Manufacturers:
   1. Allied Tube.
   2. Electri-Flex.
   3. Greenfield.
   4. Substitutions: Under provisions of Section 01 60 00 "Product Requirements."

B. Description: Interlocked steel construction. Aluminum is not permitted.
C. Fittings: ANSI/NEMA FB 1 with fittings approved for steel flex.
D. Applications: Use for final connections to motorized equipment, connections to recessed lighting fixtures located in accessible ceilings, and connections to dry type transformers. Utilization of 3/8 inch in lieu of the minimum 1/2 inch is acceptable under the limitations of the National Electrical Code.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Manufacturers:
1. Electri-flex.
2. Ultratite.
3. Substitutions: Under provisions of Section 01 60 00 "Product Requirements."
B. Description: Interlocked steel construction with PVC jacket.
C. Fittings: ANSI/NEMA FB 1.
D. Applications: Use for final connections to motorized equipment in exterior locations and areas subjected to moisture (kitchen).

2.5 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
1. Allied.
2. Substitutions: Under provisions of Section 01 60 00 "Product Requirements."
B. Description: ANSI C80.3; galvanized tubing.
C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; all steel, compression or set screw type.
D. Applications: Do not use below grade or in exterior locations. Use only in interior locations.

2.6 PVC COATED METAL CONDUIT

A. Manufacturers:
1. Levy.
2. Robroy Industries.
3. Substitutions: Under provisions of Section 01 60 00 "Product Requirements."
B. Description: NEMA RN-1, rigid steel conduit with external PVC coating, 20 mil thick.
C. General: Protective layer may be factory applied or galvanized rigid steel conduit may be applied with two layers of corrosion resistant tape.
D. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel fittings with external PVC coatings to match conduit.

2.7 NON-METALLIC PVC CONDUIT

A. Manufacturers:
1. Allied.
2. Carlon.
3. Substitutions: Under provisions of Section 01 60 00 "Product Requirements."
B. Description: NEMA TC2; Schedule 40 PVC. Flame retardant type resistant to bending and cracking.

C. Fittings and conduit bodies: NEMA TC3.
D. Vertical risers and ells installed below grade shall be rigid steel with wrapping.
E. Do not use above grade.
F. Joints made with PVC fittings shall be applied with solvent compound after thorough cleaning.
G. Refer to Part 3. Do not use PVC conduit for conduits passing vertically through the slab.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install conduit in accordance with NECA "Standard of Installation."
B. Install nonmetallic conduit in accordance with manufacturer's instructions.
C. Arrange supports to prevent misalignment during wiring installation.
D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
E. Group related conduits; support using conduit rack. Construct rack using steel channel.
F. Fasten conduit supports to building structure and surfaces under provisions of Section 26 05 29 "Supporting Devices."
G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
H. Do not attach conduit to ceiling support wires.
I. Arrange conduit to maintain headroom and present neat appearance.
J. Route exposed conduit parallel and perpendicular to walls.
K. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
L. Maintain adequate clearance between conduit and piping.
M. Maintain 12-inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
N. Cut conduit square using saw or pipecutter; de-burr cut ends.
O. Bring conduit to shoulder of fittings; fasten securely.
P. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
Q. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2-inch size.
R. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
S. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
T. Provide suitable pull string in each empty conduit except sleeves and nipples.
U. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
V. Ground and bond conduit under provisions of Section 26 05 26 "Grounding and Bonding."
W. Identify conduit under provisions of Section 26 05 53 "Electrical Identification."
X. Ducts shall be cleaned with a flexible mandrel assembly.
Y. All conduits passing vertically through slabs or through earth on grade shall be PVC-coated, rigid steel. Rigid steel conduits shall be applied with protective coatings as indicated herein. All transitions from PVC to rigid steel shall occur below the slab.

Z. Underground branch circuit extensions to parking lot lighting fixtures and other branch circuits may be direct buried PVC conduit. Service entrance PVC conduit shall be concrete encased in accordance with the Drawings unless otherwise approved by Primary Designer.

AA. Minimum cover for underground conduits shall be 24 inches unless otherwise noted.

BB. All conduit shall be routed concealed as much as possible including conduit serving roof-mounted equipment. Roof penetrations for conduits shall adhere to the requirements and details as indicated on the Architectural Drawings.

3.2 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods under the provisions of Section 07 84 13 "Penetration Firestopping."

B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.

END OF SECTION

SECTION 26 05 33.16 - BOXES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCES

A. NECA - Standard of Installation.
B. NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
C. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
D. NEMA 250 - Enclosures for Electrical Equipment (1,000 Volts Maximum).
E. NFPA 70 - National Electrical Code.

1.3 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.
B. Provide Products listed and classified by UL as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 WALL AND CEILING OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
B. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2-inch male fixture studs where required.
C. Cast Boxes: NEMA FB 1, Type FD, cast feralloy. Provide gasketed cover by box manufacturer.
D. Wall Plates for Finished Areas: As specified in Section 26 27 26 "Wiring Devices."
E. Boxes for 15A and 20A, 125V, and 250V receptacles installed in interior or exterior "Wet" locations shall be provided with "While-In-Use" shield and shall be listed as "extra-duty" in accordance with the N.E.C Article 406.9.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify locations of outlets in all locations areas prior to rough-in.

3.2 INSTALLATION

A. Install boxes in accordance with NECA "Standard of Installation."
B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
C. Set wall mounted boxes at elevations to accommodate mounting heights specified in Section for outlet device.
D. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet if required to accommodate intended purpose.
E. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26 "Wiring Devices."
F. Maintain headroom and present neat mechanical appearance.
G. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
H. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
I. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 13 "Penetration Firestopping."
J. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes with Architectural Drawings and other trades.
K. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
L. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
M. Use flush mounting outlet box in finished areas.
N. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
O. Do not install flush mounting box back-to-back in walls; provide minimum 6-inch separation. Provide minimum 24-inch separation in acoustic rated walls.
P. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
Q. Use stamped steel bridges to fasten flush mounting outlet box between studs.
R. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
S. Use adjustable steel channel fasteners for hung ceiling outlet box.
T. Do not fasten boxes to ceiling support wires.
U. Support boxes independently of conduit.
V. Use gang box where more than one device is mounted together. Do not use sectional box.
W. Use gang box with plaster ring for single device outlets.
X. Use cast outlet box in exterior locations exposed to the weather and wet locations and at all locations serving kitchen equipment.
Y. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.
Z. Coordinate with other trades for box rough-in, such that control devices are grouped (i.e., thermostats, wall switches, volume controls, etc.).

3.3 INTERFACE WITH OTHER PRODUCTS

A. Coordinate installation of outlet box for equipment connected under Section 26 05 19 "Equipment Wiring Systems."

3.4 ADJUSTING

A. Refer to Section 01 70 00 "Execution and Closeout Requirements" for adjusting installed Work.
B. Adjust flush-mounting outlets to make front flush with finished wall material.
C. Install knockout closures in unused box openings.

3.5 CLEANING

A. Refer to Section 01 70 00 "Execution and Closeout Requirements" for cleaning installed Work.
B. Clean interior of boxes to remove dust, debris, and other material.
C. Clean exposed surfaces and restore finish.

3.6 REPAIR

A. Repair any areas or surfaces damaged during conduit installation.
B. Paint (resurface) to original condition.

END OF SECTION

SECTION 26 05 36 - CABLE TRAYS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wire basket.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCES

A. UL.
B. AISI.
C. ASTM.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and protect on-site.
B. Accept wire management products on-site and inspect for damage.

1.4 PROJECT CONDITIONS

A. Verify field measurements to determine actual length, fittings, and offsets.
B. Indicated routing is approximate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that the building is ready to accept application.
B. Verify mechanical work that is likely to damage the wire basket has been completed.
C. Verify wire basket system has been supported along its entire length.

3.2 PREPARATION

A. Verify that bend radii of turns are in compliance with all information provided on the Drawings.
B. Verify there are no sharp edges to damage cable.

3.3 INSTALLATION

A. Install wire baskets in accordance with manufacturer's requirements.
B. Supports shall be as recommended by the manufacturer to provide for the maximum loading. Manufacturer's span loading criteria shall represent the maximum spacing between supports.
C. Utilize approved hangers attached to the building structure.
D. Utilize grounding/bonding connectors for attaching sections at basket to provide a continuous grounding path.
E. At locations where wire basket sections penetrate rated walls, provide UL classified fiberglass pillows with mineral fill. Provide insertion plates and retaining screen as recommended by fire stop manufacturer. Fire stop bags shall be as manufactured by IPC, Model KBS Sealbags.
F. Contractor shall carefully review the Architectural Drawings and field conditions to verify changes in elevation and locations with high ceilings that may require conduit extensions.

END OF SECTION

SECTION 26 05 53 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

3.2 APPLICATION

A. Install nameplate and label parallel to equipment lines.
B. Secure nameplate to equipment front using screws or rivets.
C. Identify underground conduits using underground warning tape. Install one tape per trench at 12 inches below finished grade. Identify all conduit at exposed locations into all boxes, cabinets, etc. (see Specification Section 26 05 00 "Basic Electrical Methods").
D. Identify all conductors at every termination indicating endpoints of termination and tag identification as required.
E. Color Coding for Phase Identification:

120/208 Volts	Phase	277/480 Volts
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray
Green	Ground	Green

F. Conductor phase and voltage identification shall be made by color-coded insulation for all conductors smaller than No. 6 AWG. For conductors No. 6 AWG and larger, identification shall be made by color-coded insulation, or conductors with black insulation may be furnished and identified by colored electrical tape. Conductor identification shall be provided within each enclosure where a tap, splice, or termination is made.

END OF SECTION

SECTION 26 05 73 - POWER SYSTEM STUDIES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 26 09 24 - LIGHTING CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Lighting control system and components:
      a. Low voltage wall stations.
      b. Power interfaces.
      c. Wired sensors.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCES

A. Underwriters Laboratories (UL):
   1. UL 508 - Industrial Control Equipment American National Standards Institute (ANSI)
   2. UL 924 - Emergency Lighting and Power Equipment

B. National Fire Protection Association (NFPA):
   1. NFPA 70 - National Electric Code

C. IEC 61000-4-2 Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques-Electrostatic Discharge Immunity Test; 2008

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate placement of daylight and occupancy sensors to achieve optimum performance. Proper sensor placement should be coordinated with others in order to avoid obstructions that would interfere with maintaining prescribed light levels.
   2. Coordinate the Work to provide luminaires and lamps that are compatible with the lighting controls to be installed.
   3. Notify Architect of any conflicts or deviations from the Contract Documents to obtain direction prior to proceeding with Work.

1.4 PROJECT CLOSEOUT DOCUMENTATION

A. Section 01 70 00 "Execution and Closeout Requirements": Submittals for Project closeout.

B. Provide a factory published manual:
   1. Warranty.
   2. Technical support contact.
   3. Submit manufacturer's operation and maintenance instructions for each product.

1.5 PROJECT CONDITIONS

A. Only install equipment after the following site conditions are maintained:
   1. Ambient Temperature 14 to 105 degrees F.
   2. Relative Humidity less than 90 percent non-condensing.
B. Standard electrical enclosures are permanently installed.
C. Equipment is protected from dust, debris, and moisture.

1.6 WARRANTY

A. Refer to Section 01 70 00 "Execution and Closeout Requirements" for additional warranty requirements.
B. Five year 100 percent parts replacement.

1.7 MAINTENANCE AND SUSTAINABILITY

A. Provide new parts, upgrades, and/or replacements available for a minimum of 5 years available to the end user.
B. Provide free telephone technical support.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on Drawings.
B. Verify that ratings and configurations of system components are consistent with indicated requirements.
C. Verify that mounting surfaces are ready to receive system components.
D. Verify that conditions are satisfactory for installation prior to starting Work.

3.2 INSTALLATION

A. Follow manufacturer's instructions for all installation steps.
B. Provide a complete installation per Contract Documents.
C. Ensure sensor locations provide complete coverage of associated areas and are placed to avoid conflicts with equipment and appurtenances of other trades.
D. Ensure daylight sensor placement minimizes sensor view of electric light sources. Locate ceiling-mounted and luminaire-mounted daylight sensors to avoid direct view of luminaires.
E. Identify system components in accordance with Section 26 05 53 "Electrical Identification."

3.3 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.4 CLOSEOUT ACTIVITIES

A. Refer to Section 01 70 00 "Execution and Closeout Requirements" for closeout submittals.
B. Demonstration:
   1. Demonstrate proper operation of lighting control devices to Owner and correct deficiencies or make adjustments as directed.
   2. On-Site Performance-Verification Walkthrough: Provide on-site demonstration of system functionality to commissioning agent.
C. Training:
   1. Include services of manufacturer's certified service representative to perform on-site training of Owner's personnel on operation, adjustment, and maintenance of lighting control system as part of on-site start-up services.

3.5 STARTUP AND PROGRAMMING

A. Provide telephone support via toll free line.
B. Factory trained service.

3.6 MAINTENANCE

A. Refer to Section 01 70 00 "Execution and Closeout Requirements," for additional related maintenance service.
B. Factory trained service technicians available within the continental US.
C. Offer integrated help on-screen and via online videos.
D. Factory telephone support via toll free line.

3.7 PROTECTION

A. Protect installed products from subsequent construction operations.

END OF SECTION

SECTION 26 12 16 - DRY TYPE TRANSFORMERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes dry type two-winding transformers.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCES

A. ANSI/NEMA ST 1 - Specialty Transformers.
B. ANSI/NEMA ST 20 - Dry Type Transformers for General Applications.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Store transformers in a clean and dry space and protected from weather.
B. Transformer shall not be used as work tables, scaffolds or ladders.
C. Handle transformers carefully to avoid damage to material components, enclosure, and finish. Use only lifting eyes and brackets provided for that purpose. Damaged transformers shall be rejected and not be installed on Project.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Transformers shall be of dry type complying with the design function requirements of the Project. Design characteristics shall be as noted in manufacturer's submittal data.
B. Provide barrel type coils vacuum impregnated with high-grade insulating varnish, non-hydroscopic thermo-setting type.
C. Furnish copper windings, continuous without splice.
D. Use non-aging silicon steel cores held together with steel channels or angles, with low flux density, quiet operating, and vibration isolated from enclosure and support channels.

PART 3 - EXECUTION

3.1 INSPECTION

A. Installer shall examine the areas and conditions under which dry type transformers are to be installed and notify Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install dry type transformers as indicated, in accordance with the applicable requirements of the NEC and the National Electrical Contractors Association's "Standard of Installation."
B. Check for damage and tight connections prior to energizing transformer.
C. Measure primary and secondary voltages and make appropriate tap adjustments.
D. Set transformer plumb and level.
E. Use flexible conduit, 2-foot minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
F. Mount transformers on vibration isolating pads suitable for isolating the transformer noise from the building structure.
    1. For floor transformer installations, use one pad type Korfund Elasto-Grip, waffle, or equal, at each corner of the transformer, sized for load of 50 lbs./sq. in.
    2. For wall hung transformer installations, use spring type Korfund Series P, or equal. Provide sound pads at each corner of the transformer, sized for 1/2-inch deflection.
G. Exact transformer mounting type and location shall be determined by actual field conditions.

END OF SECTION

SECTION 26 18 39 - ENCLOSED MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Manual controllers.
   2. Automatic controllers.
   3. Disconnects.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCES

A. NFPA 70 - National Electrical Code.
B. UL 1 98C - High-Interrupting Capacity Fuses; Current Limiting Type.
C. UL 1 98E - Class R Fuses.
D. NECA "Standard of Installation," published by National Electrical Contractors Association.
E. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
F. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
G. NEMA KS 1 - Enclosed Switches.

1.3 SUBMITTALS

A. Submit under provisions of Section 01 33 00 "Submittal Procedures."
B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
C. Test Reports: Indicate field test and inspection procedures and test results.
D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with NECA Standard of Installation.
B. Maintain one copy of each document on-site.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' documented experience.

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.
B. Furnish products listed and classified by UL as suitable for purpose specified and indicated.

PART 2 - PRODUCTS

2.1 MANUAL CONTROLLERS

A. Manual Motor Controller: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller with overload element, NO auxiliary contact, and toggle operator.
B. Fractional Horsepower Manual Controller: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, with thermal Overload unit, and toggle operator.
C. Enclosure: NEMA ICS 6; Type 1.

2.2 AUTOMATIC CONTROLLERS

A. Magnetic Motor Controllers: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower.
B. Coil Operating Voltage: 120 volts, 60 Hertz.
C. Overload Relay: NEMA ICS; electronic type; with phase loss and unbalance protection.
D. Enclosure: NEMA ICS 6, Type 1.

2.3 PRODUCT OPTIONS AND FEATURES

A. Auxiliary Contacts: NEMA ICS 2, 2 each field convertible contacts in addition to seal-in contact.
B. Cover Mounted Pilot Devices: NEMA ICS 2, heavy duty type.
C. Pushbuttons: Recessed type.
D. Indicating Lights: LED type.
E. Selector Switches: Rotary type.
F. Relays: NEMA ICS 2.
G. Control Power Transformers: 120 volt secondary. Provide fused primary and secondary, and bond unfused leg of secondary to enclosure.

2.4 DISCONNECTS

A. Combination Controllers: Combine motor controllers with fusible switch disconnect in common enclosure.
B. Fusible Switch Assemblies: NEMA KS 1, enclosed knife switch with externally operable handle. Fuse clips: Designed to accommodate Class R fuses.

2.5 FUSES

A. Description: Dual element, current limiting, time delay, one-time fuse, 250V volt, UL 198E, Class RK 5.
B. Interrupting Rating: 200,000 rms amperes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install enclosed controllers where indicated, in accordance with manufacturer's instructions. Provide a motor controller for all equipment not furnished as integral with equipment. Coordinate actual motor loads with overload protection.
B. Install enclosed controllers plumb. Provide supports in accordance with Section 26 05 29 "Supporting Devices."
C. Height: 5 feet to operating handle.
D. Install fuses in fusible switches.
E. Select and install overload heater elements in motor controllers to match installed motor characteristics.
F. Provide engraved plastic nameplates under the provisions of Section 26 05 53 "Electrical Identification."
G. Provide neatly typed label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

3.2 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of other Sections.
B. Inspect and test each enclosed controller to NEMA ICS 2.

END OF SECTION

SECTION 26 24 16 - SWITCHBOARDS AND PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCES

A. NECA (National Electrical Contractors Association) "Standard of Installation."
B. NEMA AB 1 - Molded Case Circuit Breakers.
C. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
D. NEMA KS 1 - Enclosed Switches.
E. NEMA PB 1 - Panelboards.
F. NEMA PB-2 - Switchboards.
G. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
H. NFPA 70 - National Electrical Code.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with NECA Standard of Installation.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 5 years' experience.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70. Furnish products listed and classified by UL as suitable for purpose specified and indicated.

1.6 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated.

1.7 MAINTENANCE MATERIALS

A. Provide maintenance materials under provisions of General Conditions. Provide 2 of each panelboard key if required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards in accordance with NEMA PB 1.1. Install panelboards plumb. Provide supports in accordance with drawings and Section 26 05 29 "Supporting Devices." Height: 6 feet maximum to top of panelboard. Provide filler plates for unused spaces in panelboards. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads. Spare slots shall be labeled as such in erasable pencil on directory. Provide engraved plastic nameplates under the provisions of Section 26 05 53 "Electrical Identification."

B. Provide two empty 1-inch conduits from each recessed panelboard to an accessible location above and label as "spare."

C. Ground each panelboard in accordance with Section 26 05 26 "Grounding and Bonding."

D. Prove a 4-inch concrete housekeeping pad for switchboard.

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCES

A. NECA - Standard of Installation.
B. NEMA WD 1 - General Requirements for Wiring Devices.
C. NEMA WD 6 - Wiring Device - Dimensional Requirements.
D. NFPA 70 - National Electrical Code.

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' documented experience.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.
B. Provide products listed and classified by UL as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Refer to Section 01 30 00 "Administrative Requirements" for verification of existing conditions prior to beginning Work.
B. Verify that outlet boxes are installed at proper height.
C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
E. Verify installation location of all boxes to be installed in millwork with Architect.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean debris from outlet boxes.

3.3 INSTALLATION

A. Install in accordance with NECA "Standard of Installation."
B. Install devices plumb and level.
C. Install switches with OFF position down.
D. Do not share neutral conductor on load side of dimmers.
E. Install receptacles with grounding pole located on the bottom as required by Owner.
F. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
G. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
H. Connect wiring devices by wrapping conductor around screw terminal.
I. Use jumbo size plates for outlets installed in masonry walls.
J. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
K. Install blank cover plate to match other wall plates on all unused boxes.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 "Boxes" to obtain mounting heights specified and indicated on drawings.
B. Install all wall switches, thermostats, and fire alarm pull stations at 48 inches above finished floor.
C. Install convenience receptacle 18 inches above finished floor.
D. Install convenience receptacle 6 inches above backsplash of counter unless otherwise directed by Architect.
E. Install telephone jack 18 inches above finished floor.
F. Install telephone for jack wall telephone to position top of telephone at 48 inches above finished floor.

3.5 ADJUSTING

A. Refer to Section 01 70 00 "Execution and Closeout Requirements" for adjusting installed work.
B. Adjust devices and wall plates to be flush and level.

3.6 CLEANING

A. Refer to Section 01 70 00 "Execution and Closeout Requirements" for cleaning installed Work.
B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 26 28 16.16 - ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCES

A. NEMA KS 1 - Enclosed Switches.
B. NFPA 70 - National Electrical Code.
C. UL 198C - High-Interrupting Capacity Fuses; Current Limiting Type.
D. UL 198E - Class R Fuses.
E. NEMA AB 1 - Molded Case Circuit Breakers.
F. NECA - Standard of Installation.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with NECA Standard of Installation.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' documented experience.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.
B. Furnish products listed and classified by UL as suitable for purpose specified and shown.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with NECA Standard of Installation.
B. Install fuses in all fusible disconnects.
C. Apply adhesive tag on the inside door of all disconnects indicating the NEMA class fuse and size installed.
D. Provide a disconnect switch for all equipment where indicated or required by the National Electrical Code. Coordinate with other disciplines to determine where disconnects are furnished with equipment.

END OF SECTION

SECTION 26 31 00 - PHOTOVOLTAIC COLLECTORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. PV system description.
   2. Mounting structures.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 DEFINITIONS

A. CEC: California Energy Commission.
B. ETFE: Ethylene tetrafluoroethylene.
C. FEP: Fluorinated ethylene propylene.
D. IP Code: Required ingress protection to comply with IEC 60529.
E. MPPT: Maximum power point tracking.
F. PTC: PVUSA Test Condition. Commonly regarded as a "real-world" measure of PV output. See below for definition of "PVUSA."
G. PV: Photovoltaic.
H. PVUSA: Photovoltaics for Utility Systems Applications.
I. STC: Standard Test Conditions defined in IEC 61215.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for PV panels.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
B. Shop Drawings: For PV modules.
   1. Include plans, elevations, sections, and mounting details.
   2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Detail fabrication and assembly.
   4. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.
B. Sample Warranty: For manufacturer's special materials and workmanship warranty and minimum power output warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For PV modules to include in operation and maintenance manuals.

1.6 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of PV modules that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Hazardous Locations: FM Global approved for NFPA 70, Class 1, Division 2, Group C and Group D.

2.2 PV CAPACITIES AND CHARACTERISTICS

A. Minimum Electrical Characteristics:
   1. Rated Open-Circuit Voltage: 90 V (plus or minus 3 percent).
   2. Maximum System Voltage: 1500 V IEC and 1500 V UL.
   3. Rated Short-Circuit Current (Isc): 6.55 A (plus or minus 3 percent).
   4. Rated Operation Current (Imp): 6.00 A.
   5. Maximum Power at STC (Pmax): 470 to 485 W.
B. Additional Electrical Characteristics:
   1. Tolerance of Pmax: 5 percent.
   2. Wind Loading or Surface Pressure: 3,600 Pa, 367 kg/m^2.
   3. Hailstone Impact Withstand: 45 mm diameter at 30 m/s wind velocity.
   4. Series Fuse Rating: 15 A.
C. Normal Operating Temperature Characteristics (NOTC):
   1. Temperature at Nominal Operating Cell Temperature: Minus 40 degrees C to plus 85 degrees C.

2.3 PV SYSTEMS DESCRIPTION

A. Stand-Alone PV System: Collectors connected to provide power to Project dc and ac loads through an energy storage system.
   1. System Components:
      a. PV modules.
      b. Array frame.
      c. Charge controller.
      d. Inverter.
      e. Overcurrent protection, disconnect, and rapid shutdown devices.
      f. Mounting structure.

2.4 MOUNTING STRUCTURES

A. Roof Mount: Extruded aluminum, four rails, tilt legs, and roof standoffs.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrate areas and conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Do not begin installation until mounting surfaces have been properly prepared.
C. If preparation of mounting surfaces is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
D. Examine modules and array frame before installation. Reject modules and arrays that are wet, moisture damaged, or mold damaged.
E. Examine roofs, supports, and supporting structures for suitable conditions where PV system will be installed.
F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with NECA 1.
B. Coordinate layout and installation of PV panels with roof assembly and other construction.
C. Support PV panel assemblies independent of supports for other elements such as roof and support assemblies, enclosures, vents, pipes, and conduits. Support assembly to prevent twisting from eccentric loading.
D. Install weatherseal fittings and flanges where PV panel assemblies penetrate exterior elements such as walls or roofs. Seal around openings to make weathertight. See Section 07 92 00 "Joint Sealants" for materials and application.
E. Wiring Method: Install cables in raceways.
F. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.3 CONNECTIONS

A. Coordinate PV panel cabling to equipment enclosures to ensure proper connections.
B. Coordinate installation of utility-interactive meter with utility.
C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
D. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

END OF SECTION

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCES

A. NEMA WD 6 - Wiring Devices-Dimensional Requirements.
B. NFPA 70 - National Electrical Code.
C. NFPA 101 - Life Safety Code.

1.3 SUBSTITUTIONS

A. Refer to Section 26 05 00 "Basic Electrical Methods" for requirements.

1.4 CLOSEOUT SUBMITTALS

A. Refer to Section 01 70 00 "Execution and Closeout Requirements" for submittals for Project closeout.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' documented experience.

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.
B. Conform to requirements of NFPA 101.
C. Products: Listed and classified by UL as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install suspended luminaires using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
B. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
C. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

D. Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling directly from building structure.
E. Install recessed luminaires to permit removal from below.
F. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating in locations where fire rated ceilings are present.
G. Install clips to secure recessed grid-supported luminaires in place.
H. Install wall mounted luminaires, emergency lighting units and exit signs at height as indicated on the Drawings or as scheduled.
I. Install accessories furnished with each luminaire.
J. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
K. Bond products and metal accessories to branch circuit equipment grounding conductor.
L. Install specified lamps in each emergency lighting unit, exit sign, and luminaire.

3.2 ADJUSTING

A. Refer to Section 01 70 00 "Execution and Closeout Requirements" for adjusting installed work.
B. Aim and adjust luminaires as directed.
C. Position exit sign directional arrows as indicated.

3.3 CLEANING

A. Refer to Section 01 70 00 "Execution and Closeout Requirements" for cleaning installed Work.
B. Clean electrical parts to remove conductive and deleterious materials.
C. Remove dirt and debris from enclosures.
D. Clean photometric control surfaces as recommended by manufacturer.
E. Clean finishes and touch up damage.

3.4 DEMONSTRATION AND INSTRUCTIONS

A. Refer to Section 01 70 00 "Execution and Closeout Requirements" for demonstrating installed Work.

3.5 PROTECTION OF FINISHED WORK

A. Refer to Section 01 70 00 "Execution and Closeout Requirements" for protecting installed Work.
B. Relamp luminaires that have failed lamps at Substantial Completion.

END OF SECTION

SECTION 28 35 00 - EMERGENCY RADIO COMMUNICATION ENHANCEMENT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 REQUIREMENTS OF REGULATORY AGENCIES AND STANDARDS

A. Regulatory Agencies: Installation, materials, equipment, and workmanship shall conform to the applicable provisions of the following:
   1. U.L., Inc.
   2. National Fire Protection Association (NFPA)
   3. International Fire Code (IFC).

B. Terms and conditions of the authorities having lawful jurisdiction pertaining to Work required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL

A. As a part of base bid of this Project, provide for testing of radio frequency signal throughout building to determine if Emergency Radio Communication Enhancement System (ERCES) is required. Testing shall be done at direction of Authority Having Jurisdiction. This testing shall include documentation of qualifications of person performing tests, signal strength measurements documented on a building floor plan for both internal to rooms of building as well as areas surrounding building. All testing methods, qualifications, and other requirements shall be in accordance with International Fire Code-2015 (IFC-2015).

B. If testing proves that the system is required, provide and install a complete and operational Emergency Radio Communication Enhancement System (ERCES) for coverage throughout building and surrounding areas around building. Contractor shall provide design, installation and certification of the system. This Work shall be done in accordance with the International Fire Code-2015 (IFC-2015).
   1. Provide submittal documentation of all correspondence with AHJ, product data, certification of compliance with standards, and a plan layout of all system components on building floor plan. Include wiring diagrams and equipment diagrams.
   2. All power, conduit, controls, etc. required for ERCES shall be included in Project.

END OF SECTION

SECTION 28 51 29.10 - TWO-WAY COMMUNICATION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.

1.2 GENERAL

A. The IP Command Center is to be located at a central control point on the first floor or as determined by local authority having jurisdiction. Command Center IP Call Boxes are to be located on all floors above and below the first floor, ideally next to a stairwell emergency exit or elevator landing on each floor.
B. The IP Command Center must be capable of connecting to an existing Network and providing inputs for the IP Call Boxes. Visual indicators on the IP Command Center allow rescue personnel to know which IP Call Box needs assistance. The IP Command Center must allow rescue personnel to speak to each IP Call Box individually. The IP Command Center must include both a handset and speakerphone to communicate back to the IP Call Boxes.
C. The emergency communication hardware shall comply with the Americans with Disabilities Act (ADA). The IP Call Box shall have the ability to be programmed with up to two emergency phone numbers (either both off-site or Base Station and off-site). Upon activation of the emergency push button, a call will be automatically placed to the IP Command Center. If no one answers at the IP Command Center, the IP Call Box must dial a secondary location (911) outside the building to activate two-way, off-site, person-to-person voice communications.

1.3 WARRANTY

A. Command center and call boxes shall be warranted for a period of three years.

PART 2 - PRODUCTS

2.1 CONSTRUCTION

A. The IP Command Center (2500 series) shall include both the Base Station and Distribution Module. The Base Station must have a powder coated steel housing (surface or flush mount) or be desk mounted, include a black handset with coil cord and be powered from the Distribution Module.
B. Distribution Module must be a surface mount enclosure, include connections for the IP Call Boxes and power the Base Station. The Distribution Module shall be powered from 120vac power with a battery backup that provides power for a minimum of four hours (RP7700104).

C. The IP Call Boxes must be in full compliance with the ADA. IP Call Boxes require a hands-free speakerphone with an LED to indicate status of call.
D. The IP Call Boxes must allow the programming in of a specific location message of the unit. This allows rescue personnel to know the location of the activated IP Call Box.
E. The IP Call Boxes are to be located no higher than 48-inch front reach or 54-inch side reach to the center of the push button above ground level to ensure conformance with ADA requirements.
F. The IP Call Boxes must have a Braille faceplate to ensure conformance with ADA requirements.
G. The IP Command Center must provide an audible and visual indicator that an IP Call Box has been activated.
H. The 120vac Power Supply model RP7700104 must be capable of supplying power to a minimum of one Base Station and one Distribution Module.

2.2 MOUNTING

A. The IP Command Center is to be mounted on a flat wall surface or a desk top.
B. The IP Call Boxes are to be wall surface or flush mounted.

2.3 ELECTRICAL

A. The IP Command Center is to be powered by the Distribution Module. The IP Call Boxes are to be powered by PoE at 802.3af or a separate battery backed up 12v source.
B. Distribution Module shall be powered by the Rath model RP7700104 Power Supply. It shall require 120vac power and provide battery backup capable of providing a minimum of 4 hours of electrical backup in case of building power failure.
C. The Base Station shall connect to the Distribution Module with a single wire pair (10 zone) 2-wire pairs (16-64 zone) or three-wire pairs (80-Up).
D. Each IP Call Box shall connect to the Distribution Module through an Ethernet connection. Maximum run is 300 feet between Network Switches.
E. System shall be in compliance with all state and local Electrical Codes.

2.4 COMMUNICATIONS

A. The IP Call Boxes shall be an ADA-compliant and vandal-resistant speakerphone.
B. The IP Call Boxes shall be hands-free and be a push-button-once to talk system. Once the button has been pushed, the IP Call Box will call the Base Station. If no answer at the Base Station, it will automatically call a preprogrammed emergency number. The IP Call Box must be capable of being programmed with up to TWO emergency phone numbers (either both off-site or Base Station and off-site).
C. The IP Call Box shall have location message capability. The IP Call Box must have a minimum 18 second recordable message capability, programmable to play one or two times. IP Call Box shall notify called party of the location of the call upon being received at the emergency dispatch center.
D. The IP Call Box shall be capable of allowing the called party to replay the location message if necessary to ensure an understanding of the caller location.
E. If system is not attended to 24 hours a day, the IP Call Box must dial a secondary location (911) outside the building to activate two-way, off-site, person-to-person voice communications.

F. Once call has been made (button pushed), the call can only be terminated by the called party.
G. The IP Call Box must have a red LED that will light up upon push of the button. The light shall be a solid color when the IP Call Box is activated, and will flash when call has been answered.
H. The IP Call Box must be capable of being programmed and reprogrammed on-site.
I. Standard IP Call Box features:
    1. Two number programming (either both off-site or Base Station and off-site).
    2. Operating temperature of between minus 40 degrees F to plus 150 degrees F.
    3. On-site programmable.
    4. Powered from PoE at 802.3af or separate battery backed up 12v source.
    5. EEPROM memory to protect programming.

2.5 GRAPHICS

A. IP Command Center must include wording identifying the location of each IP Call Box and light an LED when a particular IP Call Box has been activated.
B. The IP Call Box wording must include "Emergency Phone," International Phone symbol, and raised Braille lettering.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Removing surface debris.
   2. Removing above- and below-grade site improvements.
   3. Removing designated trees, shrubs, and other plant life.
   4. Disconnecting, capping or sealing, and removing site utilities.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 01 50 00 "Temporary Facilities and Controls" for temporary erosion- and sedimentation-control measures."
   3. Section 02 41 19 "Selective Demolition" for partial demolition of buildings, structures, and site improvements.
   4. Section 31 20 00 "Earth Moving" for excavating and backfilling for controlling surface-water runoff and ponding, and for dewatering excavations.

1.2 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath topsoil layers of a naturally-occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil present at the top layer of existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, surface soil can be subsoil.

C. Topsoil: Top layer of soil profile consisting of existing native surface topsoil or existing in-place surface soil; zone where plant roots grow. Appearance is generally friable, pervious, and black or darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches in diameter; free of weeds, roots, toxic materials, or other nonsoil materials.

D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.3 MATERIAL OWNERSHIP

A. Except for materials indicated to stockpile or otherwise remain Owner property, cleared materials shall become Contractor property and removed from Project site.

1.4 SUBMITTALS

A. Section 01 33 00 "Submittal Procedures" for requirements for submittals.

1.5 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Contractor shall document existing trees, plantings, adjoining construction, and site improvements to document preconstruction conditions that might be misconstrued as damage caused by site clearing.
   1. Use sufficiently detailed photographs or video recordings.
   2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Conform to applicable code for environmental requirements, disposal of debris, and use of herbicides.

1.7 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property obtained by Owner before award of Contract.
   1. Do not proceed with work on adjoining property until directed by Architect.

C. Salvageable Improvements: Carefully remove items indicated to salvage and store on Owner premises where indicated.

D. Utility Locator Service: Contractor shall notify utility locator service for area where Project is located before site clearing.

E. Do not commence site-clearing operations until temporary erosion- and sedimentation-control measures are in place.

F. Soil Stripping, Handling, and Stockpiling: Perform only when soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 20 00 "Earth Moving."
   1. Obtain approved borrow soil material off-site when satisfactory soil material not available on-site.

B. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with MPI #23 (surface-tolerant, anticorrosive metal primer)or SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.

PART 3 - EXECUTION

3.1 PREPARATION

A. Call Local Utility Line Information service at not less than 3 working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

3.2 PROTECTION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.
B. Protect existing site improvements to remain from damage during construction.
   1. Restore damaged improvements to original condition, as acceptable to Owner.
C. Identify salvage area for placing removed materials.

3.3 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
B. Verify flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation is established.
D. Remove erosion and sedimentation controls. Restore and stabilize areas disturbed during removal.

3.4 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor. Verify utilities are disconnected and capped before proceeding with site clearing.
B. Locate, identify, disconnect, seal or cap, cut, and plug utilities indicated to remove or be abandoned in place.
   1. Arrange with utility companies to shut off indicated utilities.
   2. Owner will arrange to shut off indicated utilities when requested by Contractor.
C. Locate, identify, disconnect, cut, and plug utilities indicated to abandon in place.
D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions, then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Architect not less than 2 days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Architect's written permission.
E. Excavate for and remove underground utilities indicated to remove.
F. Removal of underground utilities is included in earthwork sections, applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security, and utilities sections, and Section 02 41 19 "Selective Demolition."

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
   1. Do not remove trees, shrubs, and other vegetation indicated to remain or be relocated.
   2. Grind down or remove stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
   3. Use only hand methods or air spade for grubbing within protection zones.
   4. Chip removed tree branches and dispose off-site.
   5. Clear undergrowth and deadwood without disturbing subsoil.
   6. Apply herbicide to remaining stumps to inhibit growth.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
   1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
   1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
   2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces remaining exposed.

3.7 DISPOSE SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose off Owner property.

B. Burning tree, shrub, and other vegetation waste permitted per burning requirements and permitting of authorities having jurisdiction. Control such burning to produce least smoke or air pollutants and minimum annoyance to surrounding properties. Burning other waste and debris is prohibited.

C. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport to recycling facilities. Do not interfere with other Project work.

END OF SECTION

SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Excavating and filling for rough grading the Site.
   2. Preparing subgrades for walks and pavements .

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 31 10 00 "Site Clearing" for site stripping, grubbing, stripping topsoil, and removal of above- and below-grade improvements and utilities.

C. Attachments:
   1. Geotechnical Engineering Report prepared by Terracon for this Project. Terracon Project No. A4245183.

1.2 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
   1. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

F. Fill: Soil materials used to raise existing grades.

G. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D1586.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.
B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
   1. Classification according to ASTM D2487.
   2. Laboratory compaction curve according to ASTM D698.

1.4 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.

1.5 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
B. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth-moving operations.
C. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 01 50 00 "Temporary Facilities and Controls" and Section 31 10 00 "Site Clearing" are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
B. Satisfactory Soils: Acceptable fill materials should be classified as 'structural fill' and 'general fill.' Structural fill is material used for below, or within, 10-feet of structures, pavements, or constructed slopes. General fill material is used outside of these areas. For all applications, fill shall be free of organic matter and debris. Frozen materials should not be used, and fill should not be placed on frozen subgrade.
   1. Structural fill:
      a. On-site material can generally be reused as structural fill, as long as it meets the following requirements.
         1) Free of deleterious material.
         2) Maximum particle size: 4 inches.
         3) Maximum liquid limit: 40.
         4) Maximum plasticity index: 20.

b. Imported material used for structural fill shall meet the following requirements:
1) Free of deleterious material.
2) Maximum particle size: 4 inches.
3) For low-plasticity cohesive import soils (CL, CL-ML), the liquid limit shall be less than 40 and the plasticity index shall be less than 20.
4) For granular import soils (GW, GP, GM, GC, SW, SP, SM, SC) shall have 10 to 50 percent passing the No. 200 sieve.

2. General fill:
a. On-site material can be reused as general fill, as long as it meets the following requirements.
1) Free of deleterious material.
2) Maximum particle size: 6 inches.
3) Plasticity: Not limited.

C. Unsatisfactory Soils: Soils that do not meet the requirements listed for satisfactory soils.
1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
2. Soil satisfactory for general fill is unsatisfactory for use in areas requiring structural fill if it does not also meet the requirements for structural fill. Soil satisfactory for structural fill is also satisfactory for use as general fill.

D. Bedding Course: ASTM C33, Grade #8, or approved equal.

2.2 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
B. Classified Excavation: Excavate to subgrade elevations.

3.5 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.6 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.
   1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
   1. Clearance: 12 inches each side of pipe or conduit.
C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
   1. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
   2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.

3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
4. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.7 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.
B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
C. Proof-roll subgrade with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring, bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.10 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
B. Place and compact fill material in layers to required elevations as follows:
   1. Under building slabs, see Sections prepared by others.
   2. Under and 10 feet beyond pavement areas, use satisfactory structural fill.
   3. For utility trench backfill, use satisfactory structural fill.
   4. For all other areas, use satisfactory general fill.
C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.11 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
   1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
B. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698:
   1. For all fill areas, compact to at least 95 percent of the material's maximum dry density.

3.13 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
   1. Turf or Unpaved Areas: Plus or minus 1-inch.
   2. Walks: Plus or minus 1/4- inch.
   3. Pavements: Plus or minus 1/4-inch.

3.14 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. See Section 32 11 23 "Aggregate Base Courses."

3.15 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
C. Testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, ASTM D2937, and ASTM D6938, as applicable. Tests will be performed at the following locations and frequencies:
    1. Each lift of fill material shall be tested for density and water content at a frequency of one test for every 2,500 square feet.
    2. Trench backfill: One density and water content test shall be performed for every 50 linear feet, per lift, of compacted utility trench backfill.
D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.16 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
    1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
    1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.
B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
    1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 31 23 16.13 - TRENCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Excavating trenches for utilities from 5 feet outside building to utility service.
2. Compacted fill from top of utility bedding to subgrade elevations.
3. Backfilling and compaction.

B. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.
2. Section 31 20 00 "Earth Moving": Soils for fill.
3. Section 33 14 16 "Site Water Utility Distribution": Water piping and bedding from building to utility service.
4. Section 33 31 00 "Sanitary Sewerage Piping": Sanitary sewer piping and bedding from building to utility service.
5. Section 33 42 00 "Stormwater Conveyance": Storm sewer piping and bedding from building connection to main tie-in point.

C. Attachments:
1. Geotechnical Engineering Report prepared by Terracon for this Project. Terracon Project No. A4245183.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg Rammer and a 457-mm Drop.

B. ASTM International:
1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort12,400 ft-lbf/ft3.
2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort 56,000 ft-lbf/ft3.
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with City of Midland standards.

1.5 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.6 COORDINATION

A. Section 01 30 00 "Administrative Requirements": Coordination and project conditions.
B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. Provide pipe bedding and encasement per municipality details in the Plans.
B. Bedding material shall be ASTM C33, Grade #8 or approved equal.
C. Provide trench backfill using satisfactory structural fill as defined in 31 20 00 "Earth Moving" in accordance with the utility details in the Plans.

PART 3 - EXECUTION

3.1 LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.
   1. Architect/Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.
B. Use laser-beam instrument with qualified operator to establish lines and grades, as Contractor's option.
C. Maintain grade alignment of pipe using string line parallel with grade line and vertically above centerline of pipe.
   1. Establish string line on level batter boards at intervals of not more than 25 feet.
   2. Install batter boards spanning trench, rigidly anchored to posts driven into ground on both sides of trench.
   3. Set 3 adjacent batter boards before laying pipe to verify grades and line.
   4. Determine elevation and position of string line from elevation and position of offset points or stakes located along pipe route.
   5. Do not locate pipe using side lines for line or grade.

3.2 PREPARATION

A. Call Local Utility Line Information service not less than 3 working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.
B. Identify required lines, levels, contours, and datum locations.
C. Protect plant life, lawns, and other features remaining as portion of final landscaping.
D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
E. Maintain and protect above and below grade utilities indicated to remain.
F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.3 TRENCHING

A. Excavate subsoil required for utilities to utility service.
B. Remove lumped subsoil, boulders, and rock.
C. Do not advance open trench more than 200 feet ahead of installed pipe.
D. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.
E. Excavate bottom of trenches maximum 2 feet wider than outside diameter of pipe.
F. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe.
G. Do not interfere with 45 degree bearing splay of foundations.
H. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls can not be sloped, provide sheeting and shoring to protect excavation as specified in this section.
I. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered.
J. Cut out soft areas of subgrade not capable of compaction in place. Backfill with satisfactory structural fill and compact to density equal to or greater than requirements for subsequent backfill material.
K. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
L. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Architect/Engineer.
M. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
N. Remove excess subsoil not intended for reuse, from site.

3.4 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.
B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
C. Place fill material in continuous layers and compact in equal layers not exceeding 8 inches compacted depth.

D. Employ placement method that does not disturb or damage existing or planned facilities.
E. Maintain optimum moisture content of fill materials to attain required compaction density.
F. Do not leave more than 50 feet of trench open at end of working day.
G. Protect open trench to prevent danger to the public.

3.5 TOLERANCES

A. Section 01 40 00 "Quality Requirements": Tolerances.
B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1/2-inch from required elevations.
C. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.6 FIELD QUALITY CONTROL

A. Section 01 40 00 "Quality Requirements": Field inspecting, testing, adjusting, and balancing.
B. Testing agency: Owner will engage a qualified geotechnical engineering testing facility to perform tests and inspections.
C. Perform laboratory material tests in accordance with ASTM D698.
D. Perform in place compaction tests in accordance with the following:
E. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.
F. Frequency of Tests: 1 density and water content test per 50 linear feet of trench, per lift, unless otherwise allowed by Engineer or the municipality inspector.

3.7 PROTECTION OF FINISHED WORK

A. Section 01 70 00 "Execution and Closeout Requirements": Protecting finished work.
B. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION

SECTION 32 11 23 - AGGREGATE BASE COURSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Aggregate subbase.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 31 23 16.13 "Trenching": Compacted fill under base course.
   3. Section 32 12 16 "Asphalt Paving": Binder and finish asphalt courses.
   4. Section 32 13 13 "Concrete Paving": Finish concrete surface course.
   5. Section 33 05 61 "Concrete Manholes": Manholes including frames.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Aggregate Subbase:
   1. Basis of Measurement: By the square yard to elevations indicated on Drawings.
   2. Basis of Payment: Includes supplying fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.

1.3 REFERENCES

A. ASTM International:
   1. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
   2. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
   3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   4. ASTM D2940 - Standard Specification for Graded Aggregate Material For Bases or Subbases for Highways or Airports.
   5. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
B. Texas Department of Transportation - Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, adopted September 1, 2024.
   1. Item 247 - Flexible Base
C. Texas Department of Transportation - Material Test Procedures

1.4 SUBMITTALS

A. Section 01 33 00 "Submittal Procedures": Requirements for submittals.
B. Samples: Submit, in air-tight containers, each type of aggregate fill to testing laboratory.
C. Materials Source: Submit name of aggregate materials suppliers.
D. Submit all product information and quality test results.
E. Submit all haul tickets after each day's delivery of materials to the job site.

1.5 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout the Work.

PART 2 - PRODUCTS

2.1 AGGREGATE MATERIALS

A. Subbase Aggregate: 2024 TxDOT Item 247 - Flexible Base, Type A, Grade 1-2.
   1. When called for in the Drawings for new or supplementary base material, the material will conform to 2024 TxDOT, Item 247, Type A, Grade 1-2.
   2. When properly slaked and tested using TxDOT standard material test procedures, the flexible base material shall meet the following requirements:
      a. Cumulative Percent Retained per Sieve Size (Tex-110-E):
         1) 2-1/2-inch: 0 percent.
         2) 1-3/4-inch: 0 to 10 percent.
         3) 7/8-inch: 10 to 35 percent.
         4) 3/8-inch: 30 to 65 percent.
         5) No. 4: 45 to 75 percent.
         6) No. 40: 65 to 90 percent.
         7) No. 200: 85 to 95 percent.
      b. Material Properties:
         1) Liquid Limit, Percent Maximum (Tex-104-E): 40.
         2) Plasticity Index, Maximum (Tex-106-E): 10.
         3) Wet Ball Mill, Percent Maximum (Tex-116-E): 40.
         4) Wet Ball Mill, Percent Max Increase Passing No. 40 Sieve (Tex-116-E): 20.
      c. Minimum Compressive Strength (Tex-117-E):
         1) Lateral Pressure 0 psi: 35 psi.
         2) Lateral Pressure 15 psi: 175 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 "Administrative Requirements": Verification of existing conditions before starting Work.
B. Verify compacted substrate is dry and ready to support paving and imposed loads.
   1. Proof roll substrate in minimum two perpendicular passes to identify soft spots.
   2. Remove soft substrate and replace with compacted fill as specified in Section 31 20 00 "Earth Moving."
C. Verify substrate has been inspected, gradients and elevations are correct.

3.2 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
B. Do not place fill on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

A. Spread aggregate over prepared substrate to total compacted thickness indicated on Drawings.
B. Roller compact aggregate to density indicated on Drawings.
C. Level and contour surfaces to elevations, profiles, and gradients indicated.
D. Maintain optimum moisture content of fill materials to attain specified compaction density.
E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.4 TOLERANCES

A. Section 01 40 00 "Quality Requirements": Tolerances.
B. Maximum Variation From Flat Surface: 1/4-inch measured with 10-foot straight edge.
C. Maximum Variation From Thickness: 1/4-inch.
D. Maximum Variation From Elevation: 1/4-inch.

3.5 FIELD QUALITY CONTROL

A. Compaction testing will be performed according to ASTM D1557.
B. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
C. Frequency of Tests: One test for every 300 sq. yd.of each layer compacted aggregate.

END OF SECTION

SECTION 32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Asphalt materials.
B. Related Requirement:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 32 11 23 "Aggregate Base Courses," compacted subbase for paving.

1.2 REFERENCE STANDARDS

A. AASHTO M17 - Standard Specification for Mineral Filler for Bituminous Paving Mixtures.
B. AASHTO M29 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
C. AASHTO M140 - Standard Specification for Emulsified Asphalt.
D. AASHTO M208 - Standard Specification for Cationic Emulsified Asphalt.
E. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
F. AASHTO M320 - Standard Specification for Performance-Graded Asphalt Binder.
G. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
H. AASHTO MP1a - Standard Specification for Performance-Graded Asphalt Binder.
I. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot- Mix Types.
J. AI MS-19 - Basic Asphalt Emulsion Manual.
K. AI SP-2 - Superpave Mix Design.
L. ASTM D242 - Standard Specification for Mineral Filler For Bituminous Paving Mixtures.
M. ASTM D692 - Standard Specification for Coarse Aggregate for Asphalt Paving Mixtures.
N. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Binder for Use in Pavement Construction.
O. ASTM D977 - Standard Specification for Emulsified Asphalt.
P. ASTM D1073 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
Q. ASTM D1188 - Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
R. ASTM D2027 - Standard Specification for Cutback Asphalt (Medium-Curing Type).
S. ASTM D2397 - Standard Specification for Cationic Emulsified Asphalt.
T. ASTM D2726 - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
U. ASTM D2950 - Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods.
V. ASTM D3381 - Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.

W. ASTM D3515 - Standard Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
X. ASTM D3549 - Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
Y. ASTM D3910 - Standard Practices for Design, Testing, and Construction of Slurry Seal.
Z. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
AA. Texas Department of Transportation
    1. 2024 Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges.
        a. Item 300 - Asphalts, Oils, and Emulsions.
        b. Item 341 - Dense-Graded Hot-Mix Asphalt.
    2. TxDOT Materials Test Procedures.

1.3 SUBMITTALS

A. Section 01 33 00 "Submittal Procedures."
B. Product Data:
    1. Submit product information for asphalt and aggregate materials.
    2. Submit mix design with laboratory test results supporting design.
C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Mixing Plant: Certified by State of Texas.
B. Obtain materials from same source throughout.
C. Perform Work in accordance with City of Midland standards.

1.5 AMBIENT CONDITIONS

A. Section 01 50 00 "Temporary Facilities and Controls," for ambient conditions control facilities for product storage and installation.
B. Do not place asphalt mixture when ambient air or base surface temperature is less than 50 degrees F, or surface is wet or frozen.
C. Place asphalt mixture when temperature is not more than 15 degrees F less than initial mixing temperature.

PART 2 - PRODUCTS

2.1 ASPHALT PAVING

A. Asphalt Materials:
    1. Asphalt Cement: ASTM D3381; viscosity grade AC-10.
    2. Primer: ASTM D2027, MC-30; medium curing, cutback asphalt. In accordance with 2024 TxDOT Item 300, Table 5.
    3. Tack Coat: RC-250; rapid curing, cutback asphalt. In accordance with 2024 TxDOT Item 300, Table 4.
    4. Reclaimed Asphalt Pavement (RAP): Processed material obtained by milling or full depth removal of existing asphalt paving.

B. Aggregate Materials:
   1. Coarse Aggregate: Crushed stone, gravel, or blast furnace slag, in accordance with TxDOT Item 341, Section 2.1 and 2.1.1.
      a. Coarse aggregate shall meet the quality requirements given in TxDOT Item 341, Table 1.
   2. Fine Aggregate: Natural sand or sand manufactured from stone, gravel, or blast furnace slag, in accordance with TxDOT Item 341, Section 2.1 and 2.1.3.
      a. Fine aggregate shall meet the quality requirements given in TxDOT Item 341, Table 1.
      b. Fine aggregate shall meet the gradation requirements according to TxDOT Item 341, Table 3.
   3. Mineral Filler: Finely ground mineral particles, free of foreign matter, in accordance with TxDOT Item 341, Section 2.2.
      a. Mineral filler shall meet the gradation requirements according to TxDOT Item 341, Table 3.

C. Aggregate Subbase: Specified in Section 32 11 23 "Aggregate Base Courses."

2.2 MIXES

A. Use dry material to avoid foaming. Mix uniformly.
B. Asphalt Paving Mixtures: Designed in accordance with 2024 TxDOT Item 341.
   1. Wearing Course: Type DG-D.
   2. Where multiple lifts are required, Type DG-B or DG-C will be used under the wearing course.

2.3 SOURCE QUALITY CONTROL

A. Section 01 40 00 "Quality Requirements," for testing, inspection and analysis requirements.
B. Submit proposed mix design of each class of mix for review prior to beginning of Work.
C. Test samples in accordance with 2024 TxDOT Item 341.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 "Execution and Closeout Requirements," for installation.
B. Verify utilities indicated under paving are installed with excavations and trenches backfilled and compacted.
C. Verify compacted subbase is dry and ready to support paving and imposed loads.
   1. Proof roll subbase in minimum 2 perpendicular passes to identify soft spots.
   2. Remove soft subbase and replace with compacted fill as specified in Section 32 11 23 "Aggregate Base Courses".
D. Verify gradients and elevations of base are correct.

3.2 DEMOLITION

A. Saw cut and notch existing paving as indicted on Drawings.
B. Clean existing paving to remove foreign material, excess joint sealant and crack filler from paving surface.
C. Repair surface defects in existing paving to provide uniform surface to receive new paving.

3.3 INSTALLATION

A. Subbase:
   1. Aggregate Subbase: Install as specified in Section 32 11 23 "Aggregate Base Courses."
B. Primer:
   1. Apply primer on aggregate subbase at residual rate of 0.20 to 0.30 gal/sq.yd.
   2. Use clean sand to blot excess primer.
C. Tack Coat:
   1. Apply tack coat on asphalt and concrete surfaces over subgrade surface at uniform rate.
      a. New Surfaces: 0.04 to 0.10 residual gal/sq. yd.
   2. Apply tack coat to contact surfaces of curbs, gutters and <_____>.
   3. Coat surfaces of manhole and catch basin frames with oil to prevent bond with asphalt paving. Do not tack coat these surfaces.
D. Single Course Asphalt Paving:
   1. Install Work in accordance with TxDOT Item 341.
   2. Place asphalt within 24 hours of applying primer or tack coat.
   3. Place asphalt wearing course to thickness indicated on Drawings.
   4. Compact paving by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
   5. Pavement to be compacted to contain between 3.8 and 8.5 percent in-place air voids.
   6. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.4 TOLERANCES

A. Section 01 40 00 "Quality Requirements."
B. Flatness: Maximum variation of 1/8-inch measured with 10-foot straight edge.
C. Scheduled Compacted Thickness: Within 1/4-inch.
D. Variation from Indicated Elevation: Within 1/4-inch.

3.5 FIELD QUALITY CONTROL

A. Take samples and perform tests including mat density tests in accordance with TxDOT standards.
B. Asphalt Paving Mix Temperature: Measure temperature at time of placement.

C. Asphalt Paving Thickness: ASTM D3549; test 1 core sample from every lot, with a lot being the amount of surface laid in one day.
   1. No lot shall exceed 10,000 square yards. If a day's laying exceeds 10,000 square yards, that day's laying shall be divided into 2 approximately equal lots.
   2. For testing, each lot shall be subdivided into 4 equal sublots.
   3. One sample shall be taken from each sublot using Tex-225-F to determine a random location within the sublot.

D. Asphalt Paving Density: Tex-207-F and Tex-227-F; test 1 core sample from each sublot.
   1. In place air voids shall be between 3.8 and 8.5 percent.
   2. Pavement with in-place air voids less than 2.7 percent or greater than 9.9 percent shall be removed and replaced, at Contractor's expense.

3.6 PROTECTION

A. Section 01 70 00 "Execution and Closeout Requirements," for protecting finished Work.
B. Immediately after placement, protect paving from mechanical injury until surface temperature is less than 140 degrees F.

END OF SECTION

SECTION 32 13 13 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes Concrete Paving Including the Following:
   1. Parking lots.
   2. Curbs and gutters.
   3. Walks.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.
B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.
B. Material Certificates: For the following, from manufacturer:
   1. Cementitious materials.
   2. Steel reinforcement and reinforcement accessories.
   3. Fiber reinforcement.
   4. Admixtures.
   5. Curing compounds.
   6. Applied finish materials.
   7. Bonding agent or epoxy adhesive.
   8. Joint fillers.
C. Material Test Reports: For each of the following:
   1. Aggregates: Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

1.4 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.
B. Testing Agency Qualifications: Qualified according to ASTM C1077 and ASTM E329 for testing indicated.
   1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing on concrete paving mixtures.

1.6 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
   1. When air temperature has fallen to or is expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement.
   2. Do not use frozen materials or materials containing ice or snow.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
C. Hot-Weather Concrete Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
   1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
   2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
   3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
   1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.
B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

A. Plain-Steel Welded-Wire Reinforcement: ASTM A1064, fabricated from as-drawn steel wire into flat sheets.
B. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064, flat sheet.
C. Epoxy-Coated Welded-Wire Reinforcement: ASTM A884, Class A, plain steel.
D. Reinforcing Bars: ASTM A615, Grade 60; deformed.
E. Epoxy-Coated Reinforcing Bars: ASTM A775 or ASTM A934; with ASTM A615, Grade 60 deformed bars.
F. Steel Bar Mats: ASTM A184; with ASTM A615, Grade 60 deformed bars; assembled with clips.
G. Plain-Steel Wire: ASTM A1064, as drawn.
H. Deformed-Steel Wire: ASTM A1064.
I. Epoxy-Coated-Steel Wire: ASTM A884, Class A; coated, plain.
J. Joint Dowel Bars: ASTM A615, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.
K. Epoxy-Coated, Joint Dowel Bars: ASTM A775; with ASTM A615, Grade 60 plain-steel bars.
L. Tie Bars: ASTM A615, Grade 60; deformed
M. Hook Bolts: ASTM A307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
N. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
    1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
    2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
O. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.

2.4 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:
    1. Portland Cement: ASTM C150, gray portland cement Type I.
B. Normal-Weight Aggregates: ASTM C33, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.
    1. Coarse-Aggregates:
        a. Provide coarse aggregates graded according to the following percentages by weight passing each listed sieve size.
            1) 2-inch: 100 percent.
            2) 1-1/2-inch: 95 to 100 percent.
            3) 3/4-inch: 35 to 70 percent.
            4) 3/8-inch: 10 to 30 percent.
            5) No. 4: 0 to 5 percent.

b. The aggregate shall have a maximum loss of 18 percent when subjected to 5 cycles of the Magnesium Sulfate Soundness Test (ASTM C88).

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
   a. Provide fine aggregates acoording to the following percentages by weight passing each listed sieve size.
      1) 3/8-inch: 100 percent.
      2) No. 4: 95 to 100 percent.
      3) No. 8: 80 to 100 percent.
      4) No. 16: 50 to 85 percent.
      5) No. 30: 25 to 60 percent.
      6) No. 50: 10 to 30 percent
      7) No. 100: 2 to 10 percent.

C. Air-Entraining Admixture: ASTM C260.

D. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
   1. Water-Reducing Admixture: ASTM C494, Type A.
   2. Water-Reducing and Retarding Admixture: ASTM C494, Type D.
   3. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
   4. High-Range, Water-Reducing and Retarding Admixture: ASTM C494, Type G.

E. Water: Potable and complying with ASTM C94.

2.5 FIBER REINFORCEMENT

A. Synthetic Fiber: Monofilament polypropylene fibers engineered and designed for use in decorative concrete paving, complying with ASTM C1116, Type III, 1/2-inch to 1-1/2 inches long.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Euclid Chemical Company (The); an RPM company; PSI Fiberstrand 100.
      b. FORTA Corporation; .
      c. Grace Construction Products; W.R. Grace & Co. -- Conn.; Grace MicroFiber.
      d. Metalcrete Industries; Polystrand 1000.
      e. Nycon, Inc.; ProCon-M.
      f. Propex; Fibermesh 150.
      g. QC Construction Products; QC FIBERS.
      h. Sika Corporation; .

2.6 CURING MATERIALS

A. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

B. Water: Potable.

C. White, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 2, Class B, dissipating.

2.7 RELATED MATERIALS

A. Joint Fillers: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork in preformed strips.

2.8 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
   1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
   2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.

B. Cementitious Materials:**[Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.][Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:]**

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.5 lb/cu. yd.

E. Concrete Mixtures:
   1. Concrete Paving:
      a. Flexural Strength (28 Days): 650 psi.
      b. W/C Ratio: As follows.
         1) 5.5 sacks of cement per cubic yard.
         2) 5.5 gallons of water per sack of cement.
      c. Slump Limit: 1 to 2-1/2 inches, 5 inches if high-range water-reducing admixture is used.
      d. Entrained Air: 5.5 percent, plus or minus 1.5 percent.
   2. Curbs & Sidewalks
      a. Compressive Strength (28 Days): 4,000 psi.
      b. Max W/C Ratio: 0.45.
      c. Slump Limit: 3 to 5 inches, plus or minus 1 inch.
      d. Entrained Air: 5.5 percent, plus or minus 1.5 percent.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94 and ASTM C1116. Furnish batch certificates for each batch discharged and used in the Work.
   1. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
   1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
   2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
   3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2-inch according to requirements in Section 31 20 00 "Earth Moving."
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
E. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D3963.
F. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

A. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
   1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
   2. Provide tie bars at sides of paving strips where indicated.
   3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
   4. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

B. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent concrete paving:
   1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
      a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.
   2. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
   1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
   1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
   1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture; or
   2. Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/8-inch-deep with a stiff-bristled broom, transverse to largest dimension.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing moisture-retaining-cover curing curing compound or a combination of these as follows:
   1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Continuous water-fog spray.
      b. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:
   1. Elevation: 3/4-inch. However, all pavements shall be graded to drain. Depressions resulting in standing water over 1/8-inch-deep shall be repaired.
   2. Thickness: Plus 3/8-inch, minus 1/4-inch.
   3. Surface: Gap below 10-feet-long; unleveled straightedge not to exceed 1/8inch.
   4. Joint Spacing: 3 inches.
   5. Joint Width: Plus 1/8-inch, no minus.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
B. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain at least 1 composite sample for each **[**100 cu. yd.**] [**5,000 sq. ft.**]** or fraction thereof of each concrete mixture placed each day.
      a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   2. Flexural Strength Testing: ASTM C78.
      a. For concrete pavement, flexural strength testing will be performed on a lot basis. A lot will consist of each day's production.
      b. Two sets of 4 beams will be made for each lot, molded in accordance with ASTM C31. Random samples will be taken from the plastic concrete at the site in accordance with accepted statistical procedures.
   3. Slump: ASTM C143; 1 test at point of placement for each composite sample, but not less than 1 test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   4. Air Content: ASTM C231, pressure method; 1 test for each composite sample, but not less than 1 test for each day's pour of each concrete mixture.
   5. Concrete Temperature: ASTM C1064; 1 test hourly when air temperature is 40 degrees F and below and when it is 80 degrees F and above, and 1 test for each composite sample.
   6. Compression Test Specimens: ASTM C31; cast and laboratory cure 1 set of 3 standard cylinder specimens for each composite sample.
   7. Compressive-Strength Tests: ASTM C39; test 1 specimen at seven days and 2 specimens at 28 days.
      a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
C. Strength of the pavement concrete mixture will be satisfactory if the average of the flexural strength tests meets or exceeds the specified flexural strength.

D. Strength of the curb/sidewalk concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

E. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressivestrength and flexural strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design strength at 28 days, concrete mixture proportions and materials, breaking strength, and type of break for both 7- and 28-day tests.

F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

G. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

H. Concrete paving will be considered defective if it does not pass tests and inspections.

I. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

J. Prepare test and inspection reports.

3.11 REPAIR AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 32 18 13 - SYNTHETIC GRASS SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes synthetic grass surfacing.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 31 20 00 "Earth Moving" for preparation, compaction, and grading of granular base.

1.2 ACTION SUBMITTALS

A. Product Data: For each size of pet relief station.
B. Shop Drawings: For synthetic grass surfacing.
   1. Include sections and details.
   2. Show locations of seams and method of seaming.
   3. Show locations of trench drain, and flushing system piping.
   4. Show location of nailer board, concrete anchor, and aluminum tack strip.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials in location and manner to allow installation of synthetic grass surfacing without excess disturbance of granular base.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace synthetic grass surfacing that fails in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Deterioration and excessive wear.
      b. Deterioration from UV light.
      c. Excessive loss of shock attenuation.
      d. Seam separation, including game lines and markings.
   2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYNTHETIC GRASS SURFACING

A. Synthetic Grass Surfacing: Complete surfacing system, consisting of synthetic yarns bound to water-permeable backing and infill indicated, suitable for indoor pet relief areas.
   1. PManufacturers: Provide as indicated on drawings:
      a. K9Grass by Forever Lawn
         1) Model: Classic
         2) Installation: Over K9Grass Flushing System and Air Grid.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine base and other conditions, with installer present, for compliance with requirements for installation tolerances, permeability, and other conditions affecting performance of the Work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Contact local dealer for installation. Avoid disturbance of base during installation of shock-attenuation pad and turf fabric.
B. Shock-Attenuation Pad Installation: Roll out pad and allow to relax a minimum of 6 hours prior to final fit and trim. Stagger head seams between adjacent rows. Fit seams snugly without stretching or forcing.
C. Provide seams flat and snug, with no gaps or fraying. Remove yarns that are trapped within seams. Attach turf fabric to perimeter restraint system as recommended by the manufacturer.
D. Install inlaid game lines and markings by cutting through turf fabric and installing snugly fitting game line turf fabric. Provide seaming tape that extends minimum 6 inches beyond seam.
E. Repair loose seams and bubbles formed due to expansion of turf fabric prior to installation of infill.
F. Evenly broadcast and groom infill by machine in proportions and depth after settling as recommended by the manufacturer, and to meet indicated performance requirements. Rake fibers trapped by infill to surface.

3.3 DEMONSTRATION

A. Train Owner's maintenance personnel in proper maintenance procedures for synthetic grass surfacing.

END OF SECTION

SECTION 32 33 00 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Seating
2. Vinyl Gates

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For site furnishings manufactured with preservative-treated wood.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For site furnishings to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

PART 2 - PRODUCTS

2.1 SEATING

A. Products: Subject to compliance with requirements, provide the following:
1. Manufacterer: Robinson Steel Company, Norristown, Pennsylvania.
2. Product Name: ADA Plastic Wall Mounted Locker Room Bench.
3. Color: Grey - Stock.
4. SKU: ADAWMB-P.

2.2 VINYL GATES

A. Products: Subject to compliance with requirements, provide 1 of the following:
1. Manufacterer: Superior Plastic 1296 West 2550 South Ogden, Utah 84401.
2. Product Name: Vinyl Fencing, Picket Fence.
3. Style: Classic.
4. Color: White.
5. Product Type: Gate and hardware for installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
B. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

END OF SECTION

SECTION 32 84 00 - PLANTING IRRIGATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Piping.
   2. Manual valves.
   3. Automatic control valves.
   4. Transition fittings.
   5. Dielectric fittings.
   6. Miscellaneous piping specialties.
   7. Sprinklers.
   8. Quick couplers.
   9. Drip irrigation specialties.
   10. Controllers.
   11. Boxes for automatic control valves.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 DEFINITIONS

A. Lateral Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.

B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.

C. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.3 PERFORMANCE REQUIREMENTS

A. Irrigation zone control shall be automatic operation with controller and automatic control valves.

B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.

C. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:
   1. Irrigation Main Piping: 200 psig.
   2. Circuit Piping: 200 psi.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.
B. Zoning Chart: Show each irrigation zone and its control valve.
C. Controller Timing Schedule: Indicate timing settings for each automatic controller zone.
D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sprinklers controllers and automatic control valves to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers that include a Licensed Irrigator by the State of Texas.
B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.9 PROJECT CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
   1. Notify Owner no fewer than two days in advance of proposed interruption of water service.
   2. Do not proceed with interruption of water service without Owner's written permission.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.
B. Ductile-Iron Pipe with Mechanical Joints: AWWA C151, with mechanical-joint bell and spigot ends.
   1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
      a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

C. PVC Pipe: ASTM D1785, PVC 1120 compound, Schedules 40 and 80.
   1. PVC Socket Fittings: ASTM D2466, Schedules 40 and 80.
   2. PVC Threaded Fittings: ASTM D2464, Schedule 80.
   3. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket ends.

D. PVC Pipe, Pressure Rated: ASTM D2241, PVC 1120 compound, SDR 21.
   1. PVC Socket Fittings: ASTM D2467, Schedule 80.
   2. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket or threaded ends.

2.2 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8-inch-thick unless otherwise indicated; full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solvent Cements for Joining PVC Piping: ASTM D2564. Include primer according to ASTM F656.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.3 MANUAL VALVES

A. Bronze Ball Valves:
   1. Description:
      a. Standard: MSS SP-110.
      b. SWP Rating: 150 psi.
      c. CWP Rating: 600 psi.
      d. Body Design: Two piece.
      e. Body Material: Bronze.
      f. Ends: Threaded or solder joint if indicated.
      g. Seats: PTFE or TFE.
      h. Stem: Bronze.
      i. Ball: Chrome-plated brass.
      j. Port: Full.

B. Plastic Ball Valves:
   1. Description:
      a. Standard: MSS SP-122.
      b. Pressure Rating: 150 psi.
      c. Body Material: PVC.
      d. Type: Union.
      e. End Connections: Socket or threaded.
      f. Port: Full.

C. Bronze Gate Valves:
   1. Description:
      a. Standard: MSS SP-80, Type 2.
      b. Class: 125.
      c. CWP Rating: 200 psi.
      d. Body Material: ASTM B 62 bronze with integral seat and screw-in bonnet.
      e. Ends: Threaded or solder joint.
      f. Stem: Bronze, nonrising.
      g. Disc: Solid wedge; bronze.
      h. Packing: Asbestos free.
      i. Handwheel: Malleable iron, bronze, or aluminum.

2.4 AUTOMATIC CONTROL VALVES

A. Plastic, Automatic Control Valves:
   1. Rainbird XCZ-PRB-100-COM, 120 mesh filter, drip control zone values.
   2. Description: Molded-plastic body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24-V ac solenoid.

2.5 TRANSITION FITTINGS

A. General Requirements: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
B. Plastic-to-Metal Transition Fittings:
   1. Description: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-socket or threaded end.

2.6 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.

2.7 MISCELLANEOUS PIPING SPECIALTIES

A. Pressure Gages: ASME B40.1. Include 4-1/2-inch- diameter dial, dial range of two times system operating pressure, and bottom outlet. Install downstream of backflow prevention.

2.8 SPRINKLERS

A. Not Used.

2.9 DRIP IRRIGATION SPECIALTIES

A. Rainbird XFS-09-12-NP:
B. Drip Tubes with Integral Emitters:
   1. Tubing: Flexible PE.
   2. Emitters: Devices to deliver water at approximately 40 psi.
      a. Body Material: PE, with flow control and check valve.
      b. Mounting: Integral with tubing at set intervals.

3. Capacities and Characteristics:
   a. Tubing Size: 17 mm.
   b. Emitter Spacing: 12 inches.
   c. Emitter Flow: 0.9 GPH.

C. Application Pressure Regulators: Plastic housing, with corrosion-resistant internal parts; capable of controlling outlet pressure to approximately 40 psi.
D. Filter Units: Plastic housing, with corrosion-resistant internal parts; of size and capacity required for devices downstream from unit.
E. Air Relief Valves: Brass or plastic housing, with corrosion-resistant internal parts.
F. Vacuum Relief Valves: Brass or plastic housing, with corrosion-resistant internal parts.
G. Steel Ground Stakes: Install as per manufacturer's specifications.

2.10 CONTROLLERS

A. Utilize existing controllers on-site as indicated on the Drawings.

2.11 BOXES FOR AUTOMATIC CONTROL VALVES

A. Plastic Boxes:
   1. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.
      a. Size: As required for valves and service.
      b. Shape: Rectangular.
      c. Sidewall Material: PE.
      d. Cover Material: PE.
         1) Lettering: "IRRIGATION."
B. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/4-inch minimum to 3 inches maximum.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 31 23 16.13 "Trenching."
B. Install warning tape directly above pressure piping, 12 inches below finished grades, except 6 inches below subgrade under pavement and slabs.
C. Provide minimum cover over top of underground piping according to the following:
   1. Irrigation Main Piping: Minimum depth of 18 inches below finished grade, or not less than 18 inches below average local frost depth, whichever is deeper.
   2. Lateral Piping: 12 inches.
   3. Drain Piping: 12 inches.
   4. Sleeves: 18 inches.

3.2 PREPARATION

A. Set stakes to identify locations of proposed irrigation system. Obtain Architect's approval before excavation.

3.3 PIPING INSTALLATION

A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.
B. Install piping free of sags and bends.
C. Install groups of pipes parallel to each other, spaced to permit valve servicing.
D. Install fittings for changes in direction and branch connections.
E. Install unions adjacent to valves and to final connections to other components with NPS 2 or smaller pipe connection.
F. Install flanges adjacent to valves and to final connections to other components with NPS 2-1/2 or larger pipe connection.
G. Lay piping on solid subbase, uniformly sloped without humps or depressions.
H. Install ductile-iron piping according to AWWA C600.
I. Install PVC piping in dry weather when temperature is above 40 degrees F. Allow joints to cure at least 24 hours at temperatures above 40 degrees F before testing.
J. Install piping in sleeves under parking lots, roadways, and sidewalks.
K. Install sleeves made of Schedule 40 PVC pipe and socket fittings, and solvent-cemented joints.
L. Install transition fittings for plastic-to-metal pipe connections according to the following:
    1. Underground Piping:
        a. NPS 1-1/2 and Smaller: Plastic-to-metal transition fittings.
        b. NPS 2 and Larger: AWWA transition couplings.
    2. Aboveground Piping:
        a. NPS 2 and Smaller: Plastic-to-metal transition fittings.
        b. NPS 2 and Larger: Use dielectric flange kits with one plastic flange.
M. Install dielectric fittings for dissimilar-metal pipe connections according to the following:
    1. Underground Piping:
        a. NPS 2 and Smaller: Dielectric coupling or dielectric nipple.
        b. NPS 2-1/2 and Larger: Prohibited except in control-valve box.
    2. Aboveground Piping:
        a. NPS 2 and Smaller: Dielectric union.
        b. NPS 2-1/2 to NPS 4: Dielectric flange.
        c. NPS 5 and Larger: Dielectric flange kit.
    3. Piping in Control-Valve Boxes:
        a. NPS 2 and Smaller: Dielectric union.
        b. NPS 2-1/2 to NPS 4: Dielectric flange.
        c. NPS 5 and Larger: Dielectric flange kit.

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
    1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
    2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Flanged Joints: Select rubber gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
E. Ductile-Iron Piping Gasketed Joints: Comply with AWWA C600 and AWWA M41.
F. Copper-Tubing Brazed Joints: Construct joints according to CDA's "Copper Tube Handbook," using copper-phosphorus brazing filler metal.
G. Copper-Tubing Soldered Joints: Apply ASTM B813 water-flushable flux to tube end unless otherwise indicated. Construct joints according to ASTM B828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B32.
H. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
    1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
    2. PVC Pressure Piping: Join schedule number, ASTM D1785, PVC pipe and PVC socket fittings according to ASTM D2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D2855.
    3. PVC Nonpressure Piping: Join according to ASTM D2855.

3.5 VALVE INSTALLATION

A. Underground Gate Valves, Resilient Seat: Comply with AWWA C600 and AWWA M44. Install in valve casing with top flush with grade.
    1. Install valves and PVC pipe with restrained, gasketed joints.
B. Aboveground Valves: Install as components of connected piping system.

3.6 SPRINKLER INSTALLATION

A. Install sprinklers after hydrostatic test is completed.
B. Install sprinklers at manufacturer's recommended heights.
C. Locate part-circle sprinklers to maintain a minimum distance of 4 inches from walls and 2 inches from other boundaries unless otherwise indicated.

3.7 DRIP IRRIGATION SPECIALTY INSTALLATION

A. Install drip tubes with integral emitters on ground below mulch and weed barrier fabric.
B. Install application pressure regulators and filter units in control-valve boxes.
C. Install air relief valves in piping, and in control-valve boxes.

3.8 AUTOMATIC IRRIGATION-CONTROL SYSTEM INSTALLATION

A. Equipment Mounting: Install interior controllers on wall.
    1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    2. Install anchor bolts to elevations required for proper attachment to supported equipment.
B. Equipment Mounting: Install exterior freestanding controllers on precast concrete bases.
    1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    2. Install anchor bolts to elevations required for proper attachment to supported equipment.

C. Install control cable in same trench as irrigation piping and at least 2 inches below piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

3.9 CONNECTIONS

A. Comply with requirements for piping for water supply from exterior water service piping, water meters, protective enclosures, and backflow preventers. Drawings indicate general arrangement of piping, fitting and special ties.
B. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.
C. Connect wiring between controllers and automatic control valves.

3.10 IDENTIFICATION

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on each automatic controller.
   1. Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
B. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches.

3.11 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
B. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
C. Tests and Inspections:
   1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
   2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
   3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
D. Any irrigation product will be considered defective if it does not pass tests and inspections.
E. Prepare test and inspection reports.

3.12 STARTUP SERVICE

A. Perform startup service.
   1. Complete installation and startup checks according to manufacturer's written instructions.
   2. Verify that controllers are installed and connected according to the Contract Documents.
   3. Verify that electrical wiring installation complies with manufacturer's submittal.

3.13 ADJUSTING

A. Adjust settings of controllers.
B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.
C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than 1/2-inch above, finish grade.

3.14 CLEANING

A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.15 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain automatic control valves and controllers.

3.16 PIPING SCHEDULE

A. Install components having pressure rating equal to or greater than system operating pressure.
B. Piping in control-valve boxes and aboveground may be joined with flanges or unions instead of joints indicated.
C. Underground irrigation main piping, NPS 4 and smaller, shall be the following:
   1. Schedule 40, PVC pipe and socket fittings, and solvent-cemented joints.
D. Underground irrigation main piping, NPS 5 and larger, shall be the following:
   1. SDR 21, PVC, pressure-rated pipe; Schedule 80, PVC socket fittings; and solvent-cemented joints.
E. Lateral piping, NPS 2 shall be the following:
   1. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
F. Lateral piping, NPS 2-1/2 to NPS 4, shall be the following:
   1. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
G. Underground Branches and Offsets at Sprinklers and Devices:
   1. Flex Nipples: Plastic assemblies, with offsets for flexible joints, manufactured for this application.

3.17 VALVE SCHEDULE

A. Underground, Shutoff-Duty Valves: Use the following:
   1. NPS 2 and Smaller: PVC Ball Valve.
   2. NPS 3 and Larger: Iron gate valve, resilient seated; iron gate valve casing; and operating wrench(es).

3.18 FINAL ACCEPTANCE

A. When Contractor is satisfied that the system is operating properly, that it is balanced and adjusted, and that all work and clean-up is completed, he shall issue notice of completion to Owner's Representative requesting a final inspection. Owner's Representative will respond to the notice of completion by Contractor and shall appear with Owner for an inspection of the Project. At that time, Contractor shall demonstrate the operation of each system in its entirety. In judging the Work, no allowance for deviation from the original Drawings and Specifications will be made unless prior approval has been obtained.

B. Any inconsistency to the Specifications or the Drawings shall be noted by Owner's Representative and a written copy of required corrections shall be given to Contractor.

3.19 SYSTEM MAINTENANCE AND GUARANTEE

A. Maintenance of the irrigation system shall begin immediately following the installation of the system and shall continue until the entire Project is accepted. Maintenance shall include repair of defects or damages, and adjustments and fine tuning of the system, and repairs of damages resulting from vandalism, erosion, weather, and the like.

B. For a period of one year from Final Acceptance of the system, Contractor shall promptly furnish and install, without cost to Owner, any and all parts or materials which prove defective in material or workmanship. Damage due to irrigation system line breaks shall be repaired and brought to original condition by Contractor at no expense to Owner.

C. In the fall, at Owner's request, Contractor shall drain the system, and otherwise prepare the system for winter. In the spring, at Owner's request, Contractor will reactivate the system, repair any defects or damage, and adjust the system. As these services are performed, Contractor shall instruct Owner.

D. For a period of one year from final acceptance of the system, Contractor shall repair any settlement of trenches by one of the following methods as directed by Owner's Representative:
   1. Bring to grade by top-dressing (raking topsoil into the planting bed).
   2. Bring to grade with topsoil.
   3. Remove existing plant material, fill depression with topsoil, and replace with new plant material to match original plantings.
   4. Repair by any of the above methods shall result in a smooth, level area. Maintenance of repaired areas shall be the responsibility of Owner.

END OF SECTION

PART 1 - SECTION 32 91 15 - SOIL PREPARATION (PERFORMANCE SPECIFICATION) GENERAL

1.1 SUMMARY

A. Section includes planting soils specified according to performance requirements of the mixes.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 31 10 00 "Site Clearing" for topsoil stripping and stockpiling.
   3. Section 32 93 00 "Plants" for placing planting soil for plantings.

1.2 DEFINITIONS

A. AAPFCO: Association of American Plant Food Control Officials.
B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.
C. CEC: Cation exchange capacity.
D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.
E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
F. Imported Soil: Soil that is transported to Project Site for use.
G. Layered Soil Assembly: A designed series of planting soils, layered on each other, that together produce an environment for plant growth.
H. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.
I. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.
J. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."
K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
L. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.
M. SSSA: Soil Science Society of America.
N. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
O. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

P. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
Q. USCC: U.S. Composting Council.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include recommendations for application and use.
   2. Include test data substantiating that products comply with requirements.
   3. Include sieve analyses for aggregate materials.
   4. Material Certificates: For each type of imported soil, soil amendment, and fertilizer before delivery to the site, according to the following:
      a. Manufacturer's qualified testing agency's certified analysis of standard products.
      b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
      c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.
B. Samples: For each bulk-supplied material, 1-quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For each testing agency.
B. Preconstruction Test Reports: For preconstruction soil nalyses specified in "Preconstruction Testing" Article.
C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.
   1. Laboratories: Subject to compliance with requirements, provide testing by one of the following:
      a. A & L Plains Agricultural Laboratories, Lubbock, Texas 79408-1590, 806.763.4278.
      b. Texas A&M Soil, Water and Forage Testing Laboratory, College Station, Texas 77843-2478, 979.845.4816.
   2. Multiple Laboratories: At Contractor's option, Work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on existing, on-site soil, and any imported soil required.
   1. Notify Architect 7 days in advance of the dates and times when laboratory samples will be taken.
B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
   1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.8 SOIL-SAMPLING REQUIREMENTS

A. General: Extract soil samples according to requirements in this article.
B. Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of Architect or state-certified, -licensed, or -registered soil scientist under the direction of the testing agency.
   1. Number and Location of Samples: Minimum of three representative soil samples from varied locations for each soil to be used or amended for landscaping purposes.
   2. Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing and Sampling Soils."
   3. Division of Samples: Split each sample into 2, equal parts. Send half to the testing agency and half to Owner for its records.
   4. Labeling: Label each sample with the date, location keyed to a Site Plan or other location system, visible soil condition, and sampling depth.

1.9 TESTING REQUIREMENTS

A. General: Perform tests on soil samples according to requirements in this article.
B. Physical Testing:
   1. Soil Texture: Soil-particle, size-distribution analysis by one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
      a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
      b. Hydrometer Method: Report percentages of sand, silt, and clay.
   2. Bulk Density: Analysis according to core method of SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
   3. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
   4. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
   5. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85 percent compaction according to ASTM D698 (Standard Proctor).

C. Chemical Testing:
   1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
   2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
   3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
   4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.

D. Fertility Testing: Soil fertility analysis according to standard laboratory protocol of SSSA NAPT SERA-6, including the following:
   1. Percentage of organic matter.
   2. CEC, calcium percent of CEC, and magnesium percent of CEC.
   3. Soil reaction (acidity/alkalinity pH value).
   4. Buffered acidity or alkalinity.
   5. Nitrogen parts per million.
   6. Phosphorous parts per million.
   7. Potassium parts per million.
   8. Manganese parts per million.
   9. Manganese-availability parts per million.
   10. Zinc parts per million.
   11. Zinc availability parts per million.
   12. Copper parts per million.
   13. Sodium parts per million and sodium absorption ratio.
   14. Soluble-salts parts per million.
   15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
   16. Other deleterious materials, including their characteristics and content of each.

E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3-Chemical Methods."

F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
   1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1,000 square feet for 6-inch depth of soil.
   2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1,000 square feet for 6-inch depth of soil.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and federal laws if applicable.
B. Bulk Materials:
   1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
   2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
   3. Do not move or handle materials when they are wet or frozen.
   4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED ACCORDING TO PERFORMANCE REQUIREMENTS

A. Planting-Soil Type (Existing Topsoil on Site Harvested and Stockpiled during Site Clearing/Grading Operations): Existing, on-site surface soil, with the duff layer, if any, retained; and stockpiled on-site; modified to produce viable planting soil. Using preconstruction soil analyses and materials specified in other articles of this Section, amend existing, on-site surface soil to become planting soil complying with the following requirements:
   1. Soil Reaction: pH of 6 to 7.
   2. Soluble-Salt Content: 5 to 10 dS/m measured by electrical conductivity.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
   1. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.
   2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through a No. 60 sieve.
   3. Form: Provide lime in form of ground dolomitic limestone or calcitic limestone.
B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.
C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
D. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.
E. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C33.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
   1. Feedstock: Cotton burrs.
   2. Reaction: pH of 5.5 to 8.
   3. Soluble-Salt Concentration: Less than 4 dS/m.
   4. Moisture Content: 35 to 55 percent by weight.
   5. Organic-Matter Content: 50 to 60 percent of dry weight.
   6. Particle Size: Minimum of 98 percent passing through a 1/2-inch sieve.

B. Wood Derivatives: Shredded and composted, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.
   1. Partially Decomposed Wood Derivatives: In lieu of shredded and composted wood derivatives, mix shredded and partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 pounds per cubic feet of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 pounds per cubic feet of loose sawdust or ground bark.

C. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.4 FERTILIZERS

A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
   1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water- insoluble nitrogen, phosphorus, and potassium in the following composition:
   1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

D. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

PART 3 - EXECUTION

3.1 GENERAL

A. Place planting soil and fertilizers according to requirements in other Specification Sections.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

C. Proceed with placement only after unsatisfactory conditions have been corrected.

3.2 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

A. Excavation: Excavate soil from designated area(s) to a depth of 6 inches and stockpile until amended.
B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
C. Unsuitable Materials: Clean soil to contain a combined maximum of 8 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.

3.3 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
B. Subgrade Preparation: Till subgrade to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
C. Mixing: Spread unamended soil to total depth of 6 inches, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
    1. Amendments: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.
        a. Mix lime and sulfur with dry soil before mixing fertilizer.
        b. Mix fertilizer with planting soil no more than seven days before planting.
    2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
D. Compaction: Compact each blended lift of planting soil to 82 percent of maximum standard proctor density according to ASTM D698 except where a different compaction value is indicated on Drawings.
E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 BLENDING PLANTING SOIL IN PLACE

A. General: Mix amendments with in-place, unamended soil to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
B. Preparation: Till unamended, existing soil in planting areas to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
C. Mixing: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them into full depth of unamended, in-place soil to produce planting soil.
    1. Mix lime and sulfur with dry soil before mixing fertilizer.
    2. Mix fertilizer with planting soil no more than seven days before planting.

D. Compaction: Compact blended planting soil to 82 percent of maximum Standard Proctor density according to ASTM D698 except where a different compaction value is indicated on Drawings.
E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
B. Perform the following tests:
   1. Compaction: Test planting-soil compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing according to ASTM D698. Space tests at no less than one for each 10,000 square feet of in-place soil or part thereof.
   2. Performance Testing: For each amended planting-soil type, demonstrating compliance with specified performance requirements. Perform testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
   3. Testing shall include the following as a minimum: pH, NO3-N, P, K, Ca, Mg, Na, S, conductivity, and organic matter analysis.
C. Soil will be considered defective if it does not meet or exceed fertility levels recommended in preconstruction test reports.
D. Prepare test and inspection reports.
E. Label each sample and test report with the date, location keyed to a Site Plan or other location system, visible conditions when and where sample was taken, and sampling depth.

3.6 PROTECTION

A. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Vehicle traffic.
   4. Foot traffic.
   5. Erection of sheds or structures.
   6. Impoundment of water.
   7. Excavation or other digging unless otherwise indicated.
B. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by A/E and replace contaminated planting soil with new planting soil.

3.7 CLEANING

A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.

B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION

SECTION 32 93 00 - PLANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Plants.
   2. Tree stabilization.
   3. Landscape edgings.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.

1.2 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
C. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
D. Finish Grade: Elevation of finished surface of planting soil.
E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.
F. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
G. Planting Area: Areas to be planted.
H. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 32 91 13 "Soil Preparation" for drawing designations for planting soils.
I. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
J. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
K. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
L. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.3 COORDINATION

A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
   1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
   2. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 lants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
B. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
   1. Experience: Three years' experience in landscape installation in addition to requirements in Section 01 40 00 "Quality Requirements."
   2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
   3. Pesticide Applicator: State licensed, commercial.
B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
   1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
   2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.
B. Bulk Materials:
   1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
   2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
   3. Accompany each delivery of bulk materials with appropriate certificates.
C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
D. Handle planting stock by root ball.
E. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
F. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
   1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
   2. Do not remove container-grown stock from containers before time of planting.
   3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.10 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
      b. Structural failures including plantings falling or blowing over.
      c. Faulty performance of tree stabilization and edgings .
      d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Warranty Periods: From date of Substantial Completion.
      a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
      b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
      c. Annuals: Two months.
   3. Include the following remedial actions as a minimum:
      a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
      b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
      c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
      d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
   1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4-inch in diameter; or with stem girdling roots are unacceptable.
   2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.

E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

2.2 FERTILIZERS

A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
   1. Size: 10-gram tablets.
   2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.3 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
   1. Type: Shredded hardwood.
   2. Size Range: 3 inches maximum, 1/2-inch minimum.
   3. Color: Natural.

B. Mineral Mulch: Hard, durable stone, washed free of loam, sand, clay, and other foreign substances, of the following type, size range, and color:
   1. Type: Rounded riverbed gravel or smooth-faced stone.
   2. Size Range: 1-1/2 inches maximum, 3/4-inch minimum.
   3. Color: Uniform tan-beige color range acceptable to Architect.

2.4 WEED-CONTROL BARRIERS

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally encountered chemicals, alkalis, and acids.

2.5 PESTICIDES

A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.6 TREE-STABILIZATION MATERIALS

A. Root-Ball Stabilization Materials:
1. Proprietary Root-Ball Stabilization Devices: Proprietary at- or below-grade stabilization systems to secure each new planting by root ball and that do not encircle the trunk; sized according to manufacturer's written recommendations unless otherwise indicated.
a. Products: Subject to compliance with requirements, provide one of the following:
1) Tree Stake Solutions; Root Anchor.

2.7 LANDSCAPE EDGINGS

A. Steel Edging: Standard commercial-steel edging, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Russell, J. D. Company (The).
b. Sure-loc Edging Corporation.
2. Edging Size: 1/4-inch-thick by 5 inches deep.
3. Stakes: Tapered steel, a minimum of 12 inches long.
4. Accessories: Standard tapered ends, corners, and splicers.
5. Finish: Manufacturer's standard paint.
a. Paint Color: Black.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants, with installer present, for compliance with requirements and conditions affecting installation and performance of the Work.
1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable or which is dusty.
B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.
D. Lay out plants at locations directed by Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

3.3 PLANTING AREA ESTABLISHMENT

A. General: Prepare planting area for soil placement and mix planting soil according to Section 32 91 13 "Soil Preparation."
B. Placing Planting Soil: Place manufactured planting soil over exposed subgrade.
C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits.
    1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
    2. Excavate approximately three times as wide as ball diameter for balled and burlapped and container-grown stock.
    3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
    4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
    5. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
    6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
    7. Maintain supervision of excavations during working hours.
    8. Keep excavations covered or otherwise protected after working hours.
    9. If drain tile is indicated on Drawings or required under planting areas, excavate to top of porous backfill over tile.
B. Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated.

C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
   1. Hardpan Layer: Drill 6-inch-diameter holes, 24 inches sapart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above djacent finish grades.
   1. Backfill: Planting soil - Manufactured Planting Bed Mix. For trees, use excavated soil for backfill.
   2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
   3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
   4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
      a. Quantity: Two per plant.
   5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.
   1. Backfill: Planting soil - Manufactured Planting Bed Mix. For trees, use excavated soil for backfill.
   2. Carefully remove root ball from container without damaging root ball or plant.
   3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
   4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
      a. Quantity: Two per plant.
   5. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 MECHANIZED TREE-SPADE PLANTING

A. Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.
B. Use the same tree spade to excavate the planting hole as will be used to extract and transport the tree.
C. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.
D. Cut exposed roots cleanly during transplanting operations.
E. Plant trees following procedures in "Tree, Shrub, and Vine Planting" Article.
F. Where possible, orient the tree in the same direction as in its original location.

3.7 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.
B. Do not apply pruning paint to wounds.

3.8 TREE STABILIZATION

A. Root-Ball Stabilization: Install at- or below-grade stabilization system to secure each new planting by the root ball unless otherwise indicated.
    1. Proprietary Root-Ball Stabilization Device: Install root-ball stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

3.9 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawingsin even rows with triangular spacing.
B. Use planting soil - Manufactured Planting Bed Mixfor backfill.
C. Dig holes large enough to allow spreading of roots.
D. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.
E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.10 PLANTING AREA MULCHING

A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 12 inches and secure seams with galvanized pins.
B. Mulch backfilled surfaces of planting areas and other areas indicated.
   1. Trees and Treelike Shrubs in Turf Areas: Apply mineral mulch ring of 3-inch average thickness, with 36-inch radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.
   2. Organic Mulch in Planting Areas: Apply 3-inch average thickness of organic mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.
   3. Mineral Mulch in Planting Areas: Apply 3-inch average thickness of mineral mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.11 EDGING INSTALLATION

A. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30 inches apart, driven below top elevation of edging.
B. Mow-Strip Installation:
   1. Excavate for mow strip.
   2. Compact subgrade uniformly beneath mow strip.
   3. Apply nonselective, pre-emergent herbicide that inhibits growth of grass and weeds.
   4. Install steel edging, delineating the edge of mow strip.
   5. Install weed-control barrier before mulching, covering area of mow strip, and overlapping and pinning edges of barrier at least 6 inches and according to manufacturer's written instructions.
   6. Place indicated thickness of organic mulch, fully covering weed barrier.
   7. Rake mulch to a uniform surface level with adjacent finish grades.

3.12 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.13 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.
C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.14 REPAIR AND REPLACEMENT

A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Architect.
   1. Submit details of proposed pruning and repairs.
   2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
   3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.
B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.
   1. Provide new trees of same size as those being replaced for each tree of 4 inches or smaller in caliper size.
   2. Provide one new tree of 6-inch caliper size for each tree being replaced that measures more than 4 inches in caliper size.
   3. Species of Replacement Trees: Species selected by Architect.

3.15 CLEANING AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.
C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
D. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

END OF SECTION

SECTION 33 01 10.58 - DISINFECTION OF WATER UTILITY PIPING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Disinfection of potable water distribution and transmission system.
   2. Testing and reporting of results.
B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 22 40 00 "Plumbing Fixtures."

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 01 20 00 "Price and Payment Procedures."
B. Disinfection:
   1. Basis of Measurement: Include costs for disinfection in unit cost for installing pipe.
   2. Basis of Payment: Includes labor, equipment, and materials necessary for disinfecting all potable water lines.

1.3 REFERENCE STANDARDS

A. AWWA B300 - Hypochlorites.
B. AWWA C651 - Disinfecting Water Mains.
C. AWWA C655 - Field Dechlorination.
D. Texas Commission on Environmental Quality (TCEQ), Title 30 Texas Administrative Code (30 TAC) Chapter 290 Subchapter D, Rules and Regulations for Public Water Systems.

1.4 SUBMITTALS

A. Section 01 33 00 "Submittal Procedures."
B. Product Data: Submit manufacturer information for proposed chemicals and treatment doses.
C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
D. Certify that final water complies with disinfectant quality standards of TCEQ.
E. Test and Evaluation Reports: Indicate testing results comparative to specified requirements.
F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
G. Qualifications Statements:
   1. Submit qualifications for manufacturer and applicator.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 "Execution and Closeout Requirements."
B. Submit a Disinfection Report to include:
   1. Type and form of disinfectant used.
   2. Date and time of disinfectant injection start and completion.
   3. Time, date, and test location.
   4. Field Quality Control Test Results.
   5. Name of person collecting samples.
   6. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.
   7. Date and time of flushing start and completion.
   8. Disinfectant residual after flushing in ppm for each outlet tested.

1.6 QUALITY ASSURANCE

A. Perform Work according to AWWA C651.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' documented experience and approved by Engineer.
B. Applicator: Company specializing in manufacturing products specified herein with minimum 3 years' documented experience and approved by Engineer.

PART 2 - PRODUCTS

2.1 DISINFECTION CHEMICALS

A. Forms of Chlorine for Disinfection:
   1. Liquid Chlorine, AWWA B301, Section 4.2 Chemical Requirements:
      a. Liquid Chlorine shall not be less than 99.5 percent pure by volume.
   2. Hypochlorites, AWWA B300, Section 4.2 Chemical Requirements:
      a. Chlorinated Lime shall contain no less than 25 percent available chlorine by weight.
      b. Calcium Hypochlorite shall contain no less than 65 percent available chlorine by weight when shipped.
      c. Sodium Hypochlorite shall contain no less than 100g/L available chlorine.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 "Execution and Closeout Requirements."
B. Before placing any water line into service and after completing pressure tests, thoroughly flush all pipes with water until all entrained dirt and mud is removed before introducing chlorinating material.

3.2 INSTALLATION

A. Provide required equipment to perform Work of this Section.
B. Methods for Disinfection:
   1. Tablet/Granule Method: Per AWWA C651 Disinfecting Water Mains, Section 4.3.
   2. Continuous-Feed Method: Per AWWA C651 Disinfecting Water Mains, Section 4.4.
   3. Slug Method: Per AWWA C651 Disinfecting Water Mains, Section 4.5.
   4. Spray Disinfection: Per AWWA C651 Disinfecting Water Mains, Section 4.6.
C. Open and close all valves on lines disinfected several times during contact period.
D. Flush line with clean water until residual chlorine is reduced to no less than 0.5 ppm.
E. Flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 "Quality Requirements."
B. Take 1 sample of water per 1,000 linear feet of water line, minimum 1 sample for each section disinfected, in properly sterilized containers.
C. Repeat disinfection until 3 consecutive-day tests (second taken 24 hours after first and third taken 24 hours after second) indicate absence of coliform organisms.
D. Bacterial examinations shall be made by a Texas Department of Health-certified laboratory.
E. RPR shall verify certified laboratory will accept 3 consecutive-day samples without charging a weekend testing fee. If weekend testing fee is charged, RPR shall notify party responsible for payment.
F. Do not accept water line Work until satisfactory bacteriological results are obtained.
G. If first round of bacterial examinations does not pass TCEQ standards, Contractor shall pay for all bacterial examinations until 3 consecutive-day tests pass and are recorded in a Disinfection Report issued by certified laboratory.
H. Arrange for satisfactory disposal of water flushed from lines, using pipe, dikes, or channels to adequately drain, so no nuisance is created. If chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water in accordance with AWWA C655 Field Dechlorination.

END OF SECTION

PACKET 7-837 September 9, 2025

SECTION 33 05 09.33 - THRUST RESTRAINT FOR UTILITY PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
B. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.
2. Section 31 23 16.13 "Trenching": Trenching and backfilling requirements for Site utilities.
3. Section 33 14 16 "Site Water Utility Distribution Piping": Requirements for piping Work as required by this Section.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 01 20 00 "Price and Payment Procedures": Contract Sum/Price modification procedures.
B. Tied Joint Restraint System:
1. Basis of Measurement: By unit.
2. Basis of Payment: Includes tied joint restraint system and accessories.

1.3 REFERENCE STANDARDS

A. American Water Works Association:
1. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
B. ASME International:
1. ASME B1.1 - Unified Inch Screw Threads, UN and UNR Thread Form.
C. ASTM International:
1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
5. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
6. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
7. ASTM A588 - Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi Minimum Yield Point, with Atmospheric Corrosion Resistance.
8. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
9. ASTM F436 - Standard Specification for Hardened Steel Washers.

1.4 COORDINATION

A. Section 01 30 00 "Administrative Requirements": Requirements for coordination.
B. Coordinate Work of this Section with installation of fittings and joints that require restraint.

1.5 SUBMITTALS

A. Section 01 33 00 "Submittal Procedures": Requirements for submittals.
B. Product Data: Submit manufacturer catalog information for restrained joint details and installation instructions.
C. Shop Drawings:
    1. Indicate restrained joint details and materials being used.
    2. Submit layout drawings showing piece numbers and locations.
    3. Indicate restrained joint locations.
D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
E. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

1.6 QUALITY ASSURANCE

A. Perform Work according to City of Midland standards.
B. Perform Work according to AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
C. Perform concrete work according to ACI 301 standards.
D. Conform to ACI 305R when concreting during hot weather.
E. Conform to ACI 306R when concreting during cold weather.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 "Product Requirements": Requirements for transporting, handling, storing, and protecting products.
B. Inspection: Accept materials on site in manufacturer's original packaging and inspect for damage.
C. Store materials according to manufacturer instructions.
D. Protection:
    1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
    2. Provide additional protection according to manufacturer instructions.

1.8 EXISTING CONDITIONS

A. Field Measurements:
    1. Verify field measurements prior to fabrication.
    2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Provide pressure pipeline with restrained joints at each bend, tee, and change in direction.

2.2 TIED JOINT RESTRAINT SYSTEMS

A. Manufacturers:
   1. Bulldog Restraint System; S&B Technical Products.
   2. Substitutions: As specified in Section 01 60 00 "Product Requirements."

B. Tie Bolts:
   1. Mechanical and Flanged Joints on 4- to 12-Inch Pipe:
      a. Size: 3/4-inch.
      b. Comply with ASTM A588, Grade B.
      c. Comply with ASTM A325, Type 3, except increase tensile strength of full-body threaded section to 40,000 lb. minimum for 5/8-inch and 60,000 lb. minimum for 3/4-inch by heat-treating (quenching and tempering) to manufacturer's reheat and hardness specifications.

C. Tie Nut:
   1. Description: Hex nut for each tie bolt and tie rods.
   2. Comply with ASTM A563, Grade C3.

D. Tiepin:
   1. Bends and Hydrants: 3/4-inch round bar stock.
   2. Size and Shape: 6-inch hairpin.
   3. Comply with ASME B1.1 and ASTM A588.

E. Tie Coupling:
   1. Description: Extension of continuous-threaded rods.
   2. Provide with center stop to aid installation.
   3. Comply with ASTM A588.

F. Tie Clamp:
   1. Description: Retainer clamp for ductile iron, asbestos-cement, and PVC push-on pipe.
   2. Location: In front of bell.
   3. Comply with ASTM A36, ASTM A307, Grade A, and ASTM A563, Grade A.

G. Tie Rod:
   1. Description: Continuous-threaded rod for cutting to desired lengths.
   2. Comply with ASTM A588, Grade B, ASTM A325, Type 3, and ASME B1.1.

H. Tie Bar:
   1. Description: Steel bar used to restrain push-in plugs.
   2. Comply with ASTM A36.

I. Tie Washer:
   1. Description: Round flat washers.
   2. ASTM A588, ASTM F436, Type 1.

2.3 MATERIALS

A. Steel:
   1. Carbon Steel: Comply with ASTM A36.
B. Concrete:
   1. Cement: ASTM C150, Portland Cement, Type I/II.
      a. All cement shall be from the same manufacturer unless approved by Engineer.
   2. Fine and Coarse Aggregates: ASTM C33.
   3. Water: Potable, not detrimental to concrete.
C. Admixtures:
   1. Air Entrainment: ASTM C260.
   2. Chemical: ASTM C494.
      a. Type A - Water Reducing.
      b. Type B - Retarding.
      c. Type C - Accelerating.
      d. Type D - Water Reducing and Retarding.
      e. Type E - Water Reducing and Accelerating.
   3. Fly Ash: ASTM C618.
D. Concrete Mix:
   1. Mix and deliver concrete in accordance with ASTM C94, Alternative No. 2 and 3.
   2. Select proportions for normal weight concrete in accordance with ACI 301 Methods 1, 2, and 3.
   3. Provide concrete to the following criteria:
      a. 28-Day Compressive Strength: 3,000 psi.
      b. Slump: 1 to 4 inches.
      c. Use fly ash only when approved.
      d. Minimum Water/Cement Ratio: 3 sacks/yard.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pipe and fittings are ready to receive Work.
B. Field measure and verify conditions for installation of Work.

3.2 PREPARATION

A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for installation preparation.
B. Clean surfaces of pipe and fittings that are to receive tied joint restraint systems.
C. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels, and pack solid with non-shrink grout.

3.3 INSTALLATION

A. According to AWWA C600.
B. Install joint restraint system such that joints are mechanically locked together to prevent joint separation.
C. Utility Piping:
   1. According to AWWA C600.
   2. Install joint restraint system such that joints are mechanically locked together to prevent joint separation.
D. Concrete:
   1. Place concrete in accordance with ACI 304.
   2. Ensure reinforcement, inserts, embedded parts, formed joint fillers are not disturbed during concrete placement.

3.4 TOLERANCES

A. Section 01 40 00 "Quality Requirements": Requirements for tolerances.
B. Torque 5/8-inch nuts on mating threaded fasteners from 45 to 60 ft.-lbf.
C. Torque 3/4-inch nuts on mating threaded fasteners from 75 to 90 ft.-lbf.
D. Torque 1-inch nuts from 100 to 120 ft.-lbf.

END OF SECTION

SECTION 33 05 61 - CONCRETE MANHOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Modular precast concrete manholes and structures with tongue-and-groove joints and transition to cover frame, covers, anchorage, and accessories.
   2. Cast-in-place concrete manholes and structures with transition to cover frame, covers, anchorage, and accessories.
   3. Doghouse manhole connections to existing storm sewer lines.
   4. Vertical adjustment of existing manholes and structures.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 33 42 00 "Stormwater Conveyance": Piping connections to manholes and structures.

1.2 DEFINITIONS

A. Bedding: Specialized material placed under manhole prior to installation and subsequent backfill operations.

1.3 REFERENCE STANDARDS

A. American Association of State Highway Transportation Officials:
   1. AASHTO M91 - Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale).
   2. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
   3. AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.

B. American Concrete Institute:
   1. ACI 530/530.1 - Building Code Requirements and Specification for Masonry Structures.

C. ASTM International:
   1. ASTM A48 - Standard Specification for Gray Iron Castings.
   2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   3. ASTM C32 - Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale).
   4. ASTM C55 - Standard Specification for Concrete Building Brick.
   5. ASTM C361 - Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
   6. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
   7. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.

8. ASTM C877 - Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections.
9. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
10. ASTM C923 - Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
11. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
12. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
13. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

1.4 COORDINATION

A. Section 01 30 00 "Administrative Requirements": Requirements for coordination.
B. Coordinate Work of this Section with connection to municipal sewer utility service and trenching.

1.5 SUBMITTALS

A. Section 01 33 00 "Submittal Procedures": Requirements for submittals.
B. Product Data: Submit manufacturer information for manhole covers, component construction, features, configuration, and dimensions.
C. Shop Drawings:
    1. Indicate structure locations and elevations.
    2. Indicate sizes and elevations of piping, penetrations, and entry.
D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

A. Perform Work according to City of Midland standards.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 "Product Requirements": Requirements for transporting, handling, storing, and protecting products.
B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
C. Handling: Comply with precast concrete manufacturer instructions and ASTM C913 for unloading and moving precast manholes and drainage structures.
D. Storage:
    1. Store materials according to manufacturer instructions.
    2. Store precast concrete manholes and drainage structures to prevent damage to Owner's property or other public or private property.
    3. Repair property damaged from materials storage.
E. Protection:
    1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
    2. Provide additional protection according to manufacturer instructions.

1.8 AMBIENT CONDITIONS

A. Section 01 50 00 "Temporary Facilities and Controls": Requirements for ambient condition control facilities for product storage and installation.
B. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry Work.
C. Cold Weather Requirements: Comply with ACI 530/530.1.

1.9 EXISTING CONDITIONS

A. Field Measurements:
1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 CONCRETE AND MASONRY MANHOLES

A. Manufacturers:
1. Armorcast Products Company.
2. Hanson Pipe & Precast.
3. Monarch Products, Inc.
4. Oldcastle Precast, Inc.
5. Substitutions: As specified in Section 01 60 00 "Product Requirements."
B. Manhole Sections:
1. Materials:
a. Reinforced Precast Concrete: Comply with ASTM C478.
b. Gaskets: Comply with ASTM C923.
2. Joints:
a. Comply with ASTM C913.
b. Maximum Leakage: 0.025 gallons per hour per foot of joint at 3 feet of head.
C. Reinforcement:
1. Formed steel reinforcing rods.
2. Finish: Unfinished.
D. Shaft and Concentric Cone Top Sections:
1. Pipe Sections: Reinforced precast concrete.
2. Joints:
a. Lipped male/female.
b. Dry.
3. Sleeved to receive pipe sections.
E. Clear Inside Dimensions:
1. As indicated on Drawings.
F. Design Depth:
1. As indicated on Drawings.

G. Clear Cover Opening:
   1. As indicated on Drawings.
H. Pipe Entry: Furnish openings as indicated on Drawings.
I. Structure Joint Gaskets:
   1. Comply with ASTM C361.
   2. Material: Rubber.

2.2 FRAMES AND COVERS

A. Manufacturers:
   1. EJ.
   2. Neenah Foundry Company.
   3. Substitutions: As specified in Section 01 60 00 "Product Requirements."
   4. Furnish materials according to City of Midland standards.
B. Description:
   1. Material:
      a. Cast iron.
      b. Comply with ASTM A48, Class 30B.
   2. Lid:
      a. Bearing Surface: Machined flat.
      b. Configuration: Removable.
   3. Cover Design: Closed.
   4. Live-Load Rating: 18,000 psf, AASHTO HS-20.
   5. Furnish sealing gasket.
   6. Cover: Molded with City of Midland name and logo.

2.3 RISER RINGS

A. Manufacturers:
   1. EJ.
   2. Neenah Foundry Company.
   3. Substitutions: As specified in Section 01 60 00 "Product Requirements."
   4. Furnish materials according to City of Midland standards.
B. Riser Rings:
   1. Thickness of 4 to 6 Inches:
      a. Precast concrete.
      b. Comply with ASTM C478.
   2. Thickness Less Than 4 Inches:
      a. Cast iron.
      b. Comply with AASHTO M306.
   3. Rubber Seal Wraps:
      a. Wraps and Band Widths: Comply with ASTM C877, Type III.
      b. Cone/Riser Ring Joint: Minimum 3-inch overlap.
      c. Frame/Riser Ring Joint: 2-inch overlap.
      d. Additional Bands: Overlap upper band by 2 inches.
   4. As specified in Section 31 20 00 "Earth Moving" and Section 31 23 16.13 "renching."

2.4 FINISHES

A. Bituminous Interior Manhole Coating:
   1. Manufacturers:
      a. Polyglass USA, Inc.
      b. Substitutions: As specified in Section 01 60 00 "Product Requirements."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that items provided by other Sections of Work are properly sized and located.
B. Verify that built-in items are in proper location and are ready for roughing into Work.
C. Verify that excavation base is ready to receive Work and excavations and that dimensions and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.
B. Coordinate placement of inlet and outlet pipe or duct sleeves as required by other Sections.
C. Do not install manholes and structures where site conditions induce loads exceeding structural capacity of manholes or structures.
D. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

3.3 INSTALLATION

A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities in immediate or adjacent areas.
B. Correct over-excavation with fine aggregate.
C. Remove large stones or other hard matter impeding consistent backfilling or compaction.
D. Protect manhole from damage or displacement while backfilling operation is in progress.
E. Excavating:
   1. As specified in Section 31 23 16.13 "Trenching," and in indicated locations and depths.
   2. Provide clearance around sidewalls of manhole or structure for construction operations and granular backfill.
   3. If ground water is encountered, prevent accumulation of water in excavations; place manhole or structure in dry trench.
   4. Where possibility exists of watertight manhole or structure becoming buoyant in flooded excavation, anchor manhole or structure to avoid flotation as approved by Architect/Engineer.

F. Base and Alignment:
   1. Install manholes supported at proper grade and alignment on compacted crushed-stone bedding.
   2. Grout base of shaft sections to achieve slope to exit piping, trowel smooth, and contour to form continuous drainage channel.
   3. Form and place manhole or structure cylinders plumb and level, to correct dimensions and elevations.

G. Attachments:
   1. Cut and fit for pipe.
   2. Set cover frames and covers level to correct elevations without tipping.

H. Backfilling: As specified in Section 31 23 16.13 "Trenching."

I. Coating: Paint interior with two coats of bituminous interior coating at rate of 120 sq. ft./gal. for each coat.

J. Precast Concrete Manholes:
   1. Lift precast components at lifting points designated by manufacturer.
   2. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
   3. Assembly:
      a. Assemble multisection manholes and structures by lowering each section into excavation.
      b. Install rubber gasket joints between precast sections according to manufacturer recommendations.
      c. Lower, set level, and firmly position base section before placing additional sections.
   4. Remove foreign materials from joint surfaces and verify that sealing materials are placed properly.
   5. Maintain alignment between sections by using guide devices affixed to lower section.
   6. Joint sealing materials may be installed on Site or at manufacturer's plant.
   7. Verify that installed manholes and structures meet required alignment and grade.
   8. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe; fill annular spaces with mortar.
   9. Cut pipe flush with interior of structure.
   10. Shape inverts through manhole and structures as indicated on Drawings.

K. Doghouse Manholes and Structures:
   1. Stake out location and burial depth of existing sewer line in area of proposed manhole or structure.
   2. Carefully excavate around existing sewer line to adequate depth for foundation slab installation.
   3. Protect existing pipe from damage.
   4. Cut out soft spots and replace with granular fill compacted to 95 percent maximum density.
   5. Bear firmly and fully on support system as indicated on Drawings.
   6. Install precast concrete manhole or structure around existing pipe according to applicable Paragraphs in this Section.
   7. Grout pipe entrances.
   8. Block upstream flow at existing manhole or structure with expandable plug.

9. Use hydraulic saw to cut existing pipe at manhole or structure entrance and exit and along pipe length at a point halfway up OD on each side of pipe.
10. Bottom half of pipe is to remain as manhole flow channel.
11. Saw cut to smooth finish with top half of pipe flush with interior of manhole or structure.
12. Grout base of manhole or structure to achieve slope to manhole or structure channel.

L. Sanitary Manhole Drop Connections: As indicated on Drawings.

M. Installation Standards: Install Work according to City of Midland standards.

3.4 ADJUSTING

A. Vertical Adjustment of Existing Manholes and Structures:
1. If required, adjust top elevation of existing manholes and structures to finished grades as indicated on Drawings.
2. Frames, Grates, and Covers:
   a. Remove frames, grates, and covers cleaned of mortar fragments.
   b. Reset to required elevation according to requirements specified for installation of castings.
3. Reinforcing Bars:
   a. Remove concrete without damaging existing vertical reinforcing bars if removal of existing concrete wall is required.
   b. Clean vertical bars of concrete and bend into new concrete top slab or splice to required vertical reinforcement as indicated on Drawings.
4. Clean and apply sand-cement bonding compound on existing concrete surfaces to receive cast-in-place concrete.

END OF SECTION

SECTION 33 14 16 - SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pipe and fittings for Site water line, including , fire water line.
   2. Valves and boxes.
   3. Fire hydrants.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 31 23 16.13 "Trenching": Execution requirements for trenching.
   3. Section 33 01 10.58 "Disinfection of Water Utility Piping Systems": Disinfection of water mains and appurtenances.
   4. Section 33 05 09.33 "Thrust Restraint for Utility Piping": Tied joint- restraint system to anchor and resist forces developed in underground closed pipeline systems.

1.2 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:
   1. AASHTO T 180 - Standard Method of Test for Moisture- Density Relations of Soils Using a 4.54- kg (10- lb) Rammer and a 457- mm (18- in.) Drop.

B. American Society of Mechanical Engineers:
   1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
   2. ASME B16.18 - Cast Copper Alloy Solder- Joint Pressure Fittings.
   3. ASME B16.22 - Wrought Copper and Copper Alloy Solder- Joint Pressure Fittings.

C. American Society of Sanitary Engineering:
   1. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent.
   2. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers.

D. ASTM International:
   1. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
   2. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft- lbf/ft3 (600 kN- m/m3).
   3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft- lbf/ft3 (2,700 kN- m/m3).
   4. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
   5. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
   6. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

7. ASTM D2855 - Standard Practice for the Two- Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
8. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR- PR) Based on Controlled Outside Diameter.
9. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
10. ASTM D6938 - Standard Test Method for In- Place Density and Water Content of Soil and Soil- Aggregate by Nuclear Methods (Shallow Depth).

E. American Water Works Association:
1. AWWA C104 - Cement- Mortar Lining for Ductile- Iron Pipe and Fittings.
2. AWWA C105 - Polyethylene Encasement for Ductile- Iron Pipe Systems.
3. AWWA C111 - Rubber- Gasket Joints for Ductile- Iron Pressure Pipe and Fittings.
4. AWWA C151 - Ductile- Iron Pipe, Centrifugally Cast.
5. AWWA C200 - Steel Water Pipe, 6 In. and Larger.
6. AWWA C203 - Coal- Tar Protective Coatings and Linings for Steel Water Pipe.
7. AWWA C205 - Cement- Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. and Larger - Shop Applied.
8. AWWA C206 - Field Welding of Steel Water Pipe.
9. AWWA C207 - Steel Pipe Flanges for Waterworks Service, Sizes 4 In. Through 144 In..
10. AWWA C208 - Dimensions for Fabricated Steel Water Pipe Fittings.
11. AWWA C213 - Fusion- Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings.
12. AWWA C300 - Reinforced Concrete Pressure Pipe, Steel- Cylinder Type.
13. AWWA C301 - Prestressed Concrete Pressure Pipe, Steel- Cylinder Type.
14. AWWA C500 - Metal- Seated Gate Valves for Water Supply Service.
15. AWWA C600 - Installation of Ductile- Iron Mains and Their Appurtenances.
16. AWWA C606 - Grooved and Shouldered Joints.
17. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In., for Water Transmission and Distribution.
18. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In.(13 mm) Through 3 In. for Water Service.
19. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 63 In., for Waterworks.

F. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.

G. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP- 60 - Connecting Flange Joints between Tapping Sleeves and Tapping Valves.

H. NSF International:
1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

1.3 SUBMITTALS

A. Section 01 33 00 "Submittal Procedures": Requirements for submittals.
B. Product Data: Submit manufacturer information regarding pipe materials, pipe fittings, valves, and hydrants.
C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
D. Qualifications Statements:
    1. Submit qualifications for manufacturer and installer.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for submittals.
B. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.
C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

A. Valves: Mark valve body with manufacturer's name and pressure rating.
B. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.
C. Perform Work according to City of Midland standards.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 "Product Requirements": Requirements for transporting, handling, storing, and protecting products.
B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
C. Storage:
    1. Store materials according to manufacturer instructions.
    2. Block individual and stockpiled pipe lengths to prevent moving.
    3. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
    4. Store PE and PVC materials out of sunlight.
D. Protection:
    1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
    2. Provide additional protection according to manufacturer instructions.

1.7 EXISTING CONDITIONS

A. Field Measurements:
    1. Verify field measurements prior to fabrication.
    2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PIPING

A. PVC Pipe:
1. Comply with AWWA C900, Class 305.
2. Fittings:
a. Material: Cast iron.
b. Comply with AWWA C111.
3. Joints:
a. Comply with ASTM D3139.
b. Furnish compression gasket ring.

2.2 VALVES AND HYDRANTS

A. Valves and Valve Boxes:
1. General:
a. Valves 12-inch and smaller shall be gate valves.
b. Valves 14-inch and larger shall be butterfly valves, unless otherwise noted on the Plans or specified herein.
c. All valves shall be designed for a working pressure of at least 150 psi.
2. Gate Valves:
a. All gate valves shall be resilient seat, iron body, bronze mounted throughout and shall meet all requirements of AWWA C509.
b. All valves shall open by turning to the left. Valves shall be furnished with a 2-inch operating nut when outside of buildings. Valves inside of buildings or valve vaults shall have a hand wheel. Gate valves shall be furnished with O-ring stem packing.
c. All valves shall be Mueller Company A-2370 of approved equal.
d. All interior cast iron surfaces shall be epoxy coated in accordance with the appropriate paragraphs of this Section.
3. Tapping Sleeves and Valves:
a. Tapping sleeves shall be mechanical joint, or as required to make the connection. Tapping sleeves shall be Mueller, ductile iron, with duck-tipped gaskets or approved equal.
4. Valve Boxes and Extension Stems:
a. Extension stems shall be furnished on buried valves where the top of the operation nut is more than 36-inches below finished grade. Top of the extension stem shall not be more than 9-inches below the top of the valve box.
b. Buried valves shall be provided with cast iron valve boxes. The boxes shall be designed to fit over a section of 6-inch C900 PVC riser pipe which will be used as an extension from the top of the valve to within 8-inches of the ground surface. The box shall have a heavy cast iron cover. The box shall have a flange type base, with the base being approximately 4-inches larger in diameter than the outside diameter of the barrel of the box. The necessary length of riser pipe required for the extension shall be considered as a part of the box.

5. Internal Epoxy Coating:
    a. All interior wetted ferrous surfaces of all types of valves will be coated with a 2-part, thermal setting, epoxy protective coating.
    b. The coating shall be nontoxic and shall not impart taste of water. The coating shall be forumated from material deemed acceptable per the Food and Drug Administration document Title 21 of the Federal Regulations on Food Additives, Section 121.2514, Resin and Polymeric Coatings.
    c. The coating shall have a satin finish and shall be suitable for field overcoating and touch-up without sanding or special surface preparation.
    d. The coating shall have a successful record of performance in valves, pipe, or other related equipment for a minimum of 2 years.
    e. The coating adhesion to the substrate shall exceed the cohesion of the coating film as demonstrated by the following test:
        1) Prepare test panel and apply coating per manufacturer's instructions.
        2) After sample has properly cured, scribe an "X" through the coating, to the metal substrate, using a sharp knife or scalpel.
        3) At the juncture of the two scribes, use the point of the knife to attempt to lift off the coating. The coating should not lift off the substrate or between coats readily, but should break up, leaving coating material on the substrate of this damaged area.
        4) No disbondment of the film shall be noted as tested above after immersion in tap water for 1,500 hours at 100 degrees Fahrenheit.
    f. A falling sand abrasion test using ASTM D968 shall produce an abrasion coefficient of 25.30 liters per mil. As an alternative, a Taber Abrader Test should find 3.5-3.7 milligrams of coating loss per 100 cylces when using a CSFS #10 wheel (1,000-gram weight).

B. Fire Hydrants:
1. All hydrants shall be AWWA C-502 dry-barrel type and shall be Mueller Centurion Hydrants or approved equal.
    a. Hydrants shall have self-oiling reservoirs.
    b. Hydrants shall be epoxy coated as described in "Valves and Valve Boxes" section above.
    c. Hydrants shall have a 5-1/4-inch valve opening, two 2-1/2-inch hose nozzles, and a 4-1/2-inch pumper nozzle. A swivel flange shall be used to face the hydrant nozzles in any position.
    d. Hydrants shall have National Standard Threads.
    e. Operating nut shall be standard 1-1/2-inch pentagon opening counter-clockwise.
    f. Hydrants shall be painted in accordance with the standards of the local municipality.
    g. The hydrants shall be designed for a bury length of 5 feet. Contractor to provide extensions where field conditions require more than 5 feet to achieve the top of flange elevation note on the Plans.
    h. The base of the hydrant shall have placed around the base not less than 7-cubic feet of sound broken stone or gravel.
    i. Hydrants shall have a breakable safety flange, located approximately 2-inches above the ground, and a breakable stem coupling and barrel.

j. Each hydrant shall be connected to the main with a 6-inch PVC branch controlled by an independent 6-inch resilient seat gate valve.
k. Each hydrant shall be set on a stone or a concrete slab not less than 4-inches thickand not less than 1-square foot of surface area.
l. All hydrants shall be set plumb to the grade as established by Engineer. Nozzles shall be set parallel with and/or at right angles to the curb, with the pumper nozzle facing the curb according to the details in the Plans.

2.3 MATERIALS

A. Bedding and Cover:
1. As specified in Section 31 23 16.13 "Trenching."

2.4 ACCESSORIES

A. Thrust Restraints: As specified in Section 33 05 09.33 "Thrust Restraint for Utility Piping."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that building service connections and municipal utility water main sizes, locations, and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.
B. Remove scale and dirt on inside and outside before assembly.
C. Prepare pipe connections to equipment with flanges or unions.
D. Protect and support existing distribution piping and appurtenances as Work progresses.

3.3 INSTALLATION

A. Bedding:
1. Excavate pipe trench as specified in Section 31 23 16.13 "Trenching."
2. Placement:
a. Place bedding material as indicated on Drawings.
b. Level fill materials in one continuous layer not exceeding 8 inches of compacted depth.
c. Compact to 95 percent maximum density.
3. Backfill around sides and to top of pipe with cover fill, tamp in place, and compact to 95 percent maximum density.
4. Maintain optimum moisture content of fill material to attain required compaction density.
B. Pipe and Fittings:
1. Maintain separation of water main from sewer piping according to TCEQ code.
2. Group piping with other Site piping work whenever practical.

3. Install pipe to elevations indicated on Drawings.
4. Install ductile- iron piping and fittings according to AWWA C600.
5. Route pipe in straight line.
6. Install access fittings to permit disinfection of water system performed under Section 33 01 10.58 "Disinfection of Water Utility Piping Systems."
7. Thrust Restraints:
    a. Form and place concrete for pipe thrust restraints at each elbow or change of pipe direction.
    b. Place concrete to permit full access to pipe and pipe accessories.
    c. Provide bearing area as indicated on Drawings.
8. Establish elevations of buried piping with not less than 3.5 feet of cover.
9. Installation Standards: Install Work according to City of Midland standards.

C. Disinfection: As specified in Section 33 01 10.58 "Disinfection of Water Utility Piping Systems."

3.4 TOLERANCES

A. Section 01 40 00 "Quality Requirements": Requirements for tolerances.
B. Install pipe within tolerance of 5/8-inch.

3.5 FIELD QUALITY CONTROL

A. Section 01 40 00 "Quality Requirements": Requirements for inspecting and testing.
B. Section 01 70 00 "Execution and Closeout Requirements": Requirements for testing, adjusting, and balancing.
C. Testing:
    1. Pressure test piping system according to AWWA C600 and following:
        a. Test Pressure: Not less than 200 psig or 50 psi in excess of maximum static pressure, whichever is greater.
        b. Conduct hydrostatic test for a minimum of 2 hours.
        c. Slowly fill section to be tested with water; expel air from piping at high points.
        d. Install corporation cocks at high points.
        e. Close air vents and corporation cocks after air is expelled.
        f. Raise pressure to specified test pressure.
        g. Observe joints, fittings, and valves under test.
        h. Remove and renew cracked pipes, joints, fittings, and valves showing visible leakage, and retest.
        i. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
        j. Maintain pressure within plus or minus 5 psi of test pressure.
        k. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.
        l. Compute maximum allowable leakage using following formula:
            1) L = SD x sqrt(P)/C.
            2) L = testing allowance, gph.
            3) S = length of pipe tested, feet.
            4) D = nominal diameter of pipe, inches.
            5) P = average test pressure during hydrostatic test, psig.
            6) C = 148,000.

m. If pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

n. Leakage:

1) If test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.

2) Correct visible leaks regardless of quantity of leakage.

2. Compaction Testing:

a. Comply with ASTM D1557 and ASTM D698.

b. Frequency of Compaction Tests: 1 density and water content test, each lift, for every 50 linear feet of compacted utility trench backfill.

c. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

END OF SECTION

SECTION 33 31 00 - SANITARY SEWERAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Sanitary sewerage piping.
B. Related Requirements:
1. Division 01 Specification Sections apply to Work of this Section.
2. Section 31 23 16.13 "Trenching": Requirements for trenching as required by this Section.

1.2 DEFINITIONS

A. Bedding: Fill placed under, beside, and directly over pipe, prior to subsequent backfill operations.

1.3 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:
1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
B. American Water Works Association:
1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C150 - Thickness Design of Ductile-Iron Pipe.
6. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
7. AWWA C153 - Ductile-Iron Compact Fittings.
C. ASTM International:
1. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
2. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.
3. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
4. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
5. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
6. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
7. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
8. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3).

9. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
10. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
11. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
12. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
13. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
14. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
15. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
16. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
17. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.4 COORDINATION

A. Section 01 30 00 "Administrative Requirements": Requirements for coordination.
B. Coordinate Work of this Section with termination of sanitary sewer connection outside building, connection to existing sewer utility service, and trenching.

1.5 SUBMITTALS

A. Section 01 33 00 "Submittal Procedures": Requirements for submittals.
B. Product Data: Submit manufacturer information indicating pipe material to be used and pipe accessories.
C. Source Quality-Control Submittals: Indicate results of shop tests and inspections.
D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
E. Qualifications Statement:
    1. Submit qualifications for manufacturer and installer.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for submittals.
B. Project Record Documents: Record finished locations of pipe runs, connections, manholes, cleanouts, and invert elevations.

1.7 QUALITY ASSURANCE

A. Perform Work according to City of Midland standards.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 "Product Requirements": Requirements for transporting, handling, storing, and protecting products.
B. Inspection: Accept materials on site in manufacturer's original packaging and inspect for damage.
C. Storage:
    1. Store materials according to manufacturer instructions.
    2. Store valves in shipping containers with labeling in place.
D. Protection:
    1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
    2. Block individual and stockpiled pipe lengths to prevent moving.
    3. Provide additional protection according to manufacturer instructions.

1.10 EXISTING CONDITIONS

A. Field Measurements:
    1. Verify field measurements prior to fabrication.
    2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 SANITARY SEWERAGE PIPING

A. Plastic Pipe:
    1. Material: PVC.
    2. Comply with ASTM D3034, SDR-35.
    3. Inside Nominal Diameter: 4 inches,
    4. End Connections: Bell and spigot with rubber-ring-sealed gasket joint.
    5. Fittings: PVC.
    6. Joints:
        a. Elastomeric gaskets.
        b. Comply with ASTM F477.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that trench cut is ready to receive Work of this Section.
B. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Correct over-excavation with fine aggregate.
B. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.
C. Protect and support existing sewer lines, utilities, and appurtenances.
D. Utilities:
   1. Maintain profiles of utilities.
   2. Coordinate with other utilities to eliminate interference.
   3. Notify Architect/Engineer if crossing conflicts occur.

3.3 INSTALLATION

A. Bedding:
   1. Excavate pipe trench as specified in Section 31 23 16.13 "Trenching."
   2. Place bedding material at trench bottom.
   3. Level materials in continuous layer not exceeding 8 inches.
   4. Maintain optimum moisture content of bedding material to attain required compaction density.
B. Piping:
   1. Install pipe, fittings, and accessories according to ASTM D2321, and seal joints watertight.
   2. Lay pipe to slope gradients as indicated on Drawings.
   3. Begin at downstream end of system and progress upstream.
   4. Bedding: As indicated on Drawings.
   5. Lay bell-and-spigot pipe with bells upstream.
   6. Backfill and compact as specified in Section 31 23 16.13 "Trenching."
   7. Do not displace or damage pipe when compacting.
   8. Connect to building sanitary sewer outlet through installed sleeves.
C. Backfilling:
   1. Backfill around sides and to top of pipe with cover fill in minimum lifts of 8 inches.
   2. Tamp fill in place, and compact to 95 percent of maximum density.
   3. Place and compact material immediately adjacent to pipes to avoid damage to pipe and prevent pipe misalignment.
   4. Maintain optimum moisture content of bedding material as required to attain specified compaction density.

3.4 TOLERANCES

A. Section 01 40 00 "Quality Requirements": Requirements for tolerances.
B. Maximum Variation from Indicated Slope: 1/8-inch in 10 feet.

3.5 FIELD QUALITY CONTROL

A. Section 01 40 00 "Quality Requirements": Requirements for inspecting and testing.
B. Section 01 70 00 "Execution and Closeout Requirements": Requirements for testing, adjusting, and balancing.

C. Testing:
1. If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.
2. Perform testing on site sanitary sewage system according to City of Midland standards.
3. Pipe Testing: Testing shall not be performed on piping until all backfill has been placed and allowed to densify for a period of 30 days.
   a. Pressure Testing:
      1) Perform air test in accordance with City of Midland standards and ANSI/ASTM C828, latest revision.
   b. Deflection Testing:
      1) Deflection test shall be performed in accordance with City of Midland standards.
      2) Deflection test shall be run using a rigid Go/No-Go mandrel with a diameter equal to 95 percent of the inside diameter of the pipe.
      3) No mechanical pulling device shall be used for the test. Whenever possible, testing shall be done from downstream to upstream.
4. Compaction Testing:
   a. Comply with ASTM D1557 ASTM D6938.
   b. Testing Frequency: One density and water content test, per lift, for each 50 linear feet of compacted utility trench.

3.6 PROTECTION

A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for protecting finished Work.
B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.
C. Cap open ends of piping during periods of Work stoppage.

END OF SECTION

SECTION 33 42 00 - STORMWATER CONVEYANCE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Stormwater drainage piping.

B. Related Requirements:
   1. Division 01 Specification Sections apply to Work of this Section.
   2. Section 31 23 16.13 "Trenching": Execution requirements for trenching as required by this Section.
   3. Section 33 05 61 "Concrete Manholes": Manholes and accessories as required by this Section.

1.2 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:
   1. AASHTO M036 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains.
   2. AASHTO M196 - Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains.
   3. AASHTO M218 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized), for Corrugated Steel Pipe.
   4. AASHTO M245 - Standard Specification for Corrugated Steel Pipe, Polymer-Precoated, for Sewers and Drains.
   5. AASHTO M246 - Standard Specification for Steel Sheet, Metallic-Coated and Polymer-Precoated, for Corrugated Steel Pipe.
   6. AASHTO M252 - Standard Specification for Corrugated Polyethylene Drainage Pipe.
   7. AASHTO M274 - Standard Specification for Steel Sheet, Aluminum-Coated (Type 2), for Corrugated Steel Pipe.
   8. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
   9. AASHTO M289 - Standard Specification for Aluminum-Zinc Alloy Coated Sheet Steel for Corrugated Steel Pipe.
   10. AASHTO M294 - Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter.
   11. AASHTO T241 - Standard Method of Test for Helical Continuously Welded Seam Corrugated Steel Pipe.
   12. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
   1. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
   2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

3. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. ASTM A746 - Standard Specification for Ductile Iron Gravity Sewer Pipe.
5. ASTM B745 - Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains.
6. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.
7. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
8. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
9. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
10. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
11. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3).
12. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
13. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
14. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
15. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping.
16. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
17. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
18. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
19. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
20. ASTM F405 - Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings.
21. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
22. ASTM F667 - Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings.

1.3 COORDINATION

A. Section 01 30 00 "Administrative Requirements": Requirements for coordination.
B. Coordinate Work of this Section with termination of storm sewer connection outside building, trenching, connection to building storm drainage network.

1.4 SUBMITTALS

A. Section 01 33 00 "Submittal Procedures": Requirements for submittals.
B. Product Data: Submit manufacturer information describing pipe and pipe accessories.
C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
D. Manufacturer Instructions: Submit special procedures required to install specified products.
E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
F. Qualifications Statement:
    1. Submit qualifications for manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for submittals.
B. Project Record Documents: Record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.
C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

A. Perform Work according to City of Midland standards.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 "Product Requirements": Requirements for transporting, handling, storing, and protecting products.
B. Inspection: Accept materials on site in manufacturer's original packaging and inspect for damage.
C. Store materials according to manufacturer instructions.
D. Protection:
    1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
    2. Provide additional protection according to manufacturer instructions.

1.8 EXISTING CONDITIONS

A. Field Measurements:
    1. Verify field measurements prior to fabrication.
    2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 STORM DRAINAGE PIPING

A. Reinforced Concrete Piping:
1. Pipe:
a. Comply with ASTM C76, Class III, with Wall Type B.
b. Reinforcement: Bar.
c. Inside Nominal Diameter: 15 inches.
d. End Connections: Bell and spigot.
2. Fittings: Reinforced concrete.
3. Joints:
a. Comply with ASTM C443.
b. Gaskets: Rubber, compression.

B. PVC Piping:
1. Pipe:
a. Comply with ASTM D3034; SDR 35.
b. Inside Nominal Diameter: 10 inches.
c. Style: Bell and spigot with rubber-ring sealed gasket joint.
2. Fittings: PVC.
3. Joints:
a. Comply with ASTM F477.
b. Gaskets: Elastomeric.

2.2 MANHOLES

A. As specified in Section 33 05 61 "Concrete Manholes."

2.3 MATERIALS

A. Bedding and Cover:
1. As specified in Section 31 20 00 "Earth Moving and Section 31 23 16.13 "Trenching."

2.4 MIXES

A. Mortar: Mixture of 1 part portland cement and 2 parts mortar sand, by volume.
1. Portland cement shall conform to the requirements of AASHTO M85, Type 1.
2. Sand shall conform to the requirements of AASHTO M45.
3. Hydrated lime may be added to the mixture of sand and cement in an amount equal to 15 percent of the weight of cement used.
a. Hydrated lime shall meet the requirements of ASTM C6.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that trench cut is ready to receive Work of this Section.
B. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Correct over-excavation with fine aggregate.
B. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

3.3 INSTALLATION

A. Excavation and Bedding:
   1. Excavate trench to as specified in Section 31 23 16.13 Trenching."
   2. Hand trim excavation for accurate placement of piping to indicated elevations.
   3. Place bedding material at trench bottom.
   4. Level materials in continuous layers not exceeding 8-inch compacted depth.
   5. Maintain optimum moisture content of bedding material to attain required compaction density.
   6. Level fill materials in continuous layers not exceeding 8 inches in depth, and compact to 95 percent maximum density.
   7. Install pipe on compacted subgrade meeting bedding requirements, and cradle bottom 20 percent of diameter.
B. Piping:
   1. Seal joints watertight.
   2. Place pipe on bedding course.
   3. Cradle bottom 20 percent of pipe diameter to avoid point load.
   4. Backfilling and Compaction:
      a. As specified in Section 31 23 16.13 "Trenching."
      b. Do not displace or damage pipe while compacting.
   5. Connect to building sewer outlet.
   6. Install Site storm drainage system piping to within 5 feet of building.

3.4 TOLERANCES

A. Section 01 40 00 "Quality Requirements": Requirements for tolerances.
B. Maximum Variation from Indicated Pipe Slope: 1/8-inch in 10 feet.

3.5 FIELD QUALITY CONTROL

A. Section 01 40 00 "Quality Requirements": Requirements for inspecting and testing.
B. Testing:
   1. Compaction Test:
      a. Comply with ASTM D1557 and ASTM D698.
   2. Manholes: As specified in Section 33 05 61 "Concrete Manholes."
   3. Piping:
      a. Infiltration and Exfiltration Testing:
         1) Air Test Methods; ANSI/ASTM C828 (latest revision), on each section of storm line.
         2) Water test shall be done to test leakage in manhole.
            a) Allowable leakage in manhole shall not be more than the allowable leakage for the smallest diameter pipe connected into the manhole being tested.
      b. Deflection Testing: Test shall not be made until all backfill on that section has been placed and allowed to densify for a period of 30 days, unless allowed by Engineer.
         1) Deflection test shall be perfomed with a Go/No-Go mandel with a diameter equal to 95 percent of the base inside diameter of the pipe.
         2) The test shall be performed without using mechanical pulling devices.
         3) When possible, testing shall be performed from downstream to upstream.
         4) No pipe shall exceed 5 percent deflection. All excess deflection shall be corrected and retested. If the pipe falls the retest, the pipe shall be replaced.
         5) All testing and repair work shall be done at Contractor's expense.
         6) Contractor shall submit shop drawings of the mandrel to the Architect prior to testing.
   4. If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.

3.6 PROTECTION

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

PACKET 7.868 September 9, 2025

City Council Meeting

Item Number: 8

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Britton Murry, Planner

Subject: MOTION APPROVING, WITH STAFF'S RECOMMENDED CONDITIONS, A PRELIMINARY PLAT OF DAHLIA WAREHOUSE DISTRICT, BEING A PLAT OF A 131.00-ACRE TRACT OF LAND OUT OF SECTIONS 25 AND 36, BLOCK 41, T-1-S, T&P RR CO. SURVEY, MIDLAND COUNTY, TEXAS (GENERALLY LOCATED ON THE WEST SIDE OF NORTH FARM-TO-MARKET ROAD 1788, APPROXIMATELY 200 FEET SOUTH OF WEST COUNTY ROAD 60) (EXTRATERRITORIAL JURISDICTION) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)

Recommended Planning and Zoning Commission Action:

__X__ **Approve** _____ **Deny** _____ **Directional/Informational**

Details of Request:

Magrym Consulting, on behalf of DWD 1788, LLC, is requesting to plat a 131.00-acre tract of land located on the west side of North Farm to Market Road 1788 into 35 lots in order to obtain addressing and septic permits.

Current Zoning:

ETJ, Extraterritorial Jurisdiction

This request has been routed to all respective departments for internal review. The comments are below.

BUILDING CODE: (Approved)

ETJ, no jurisdiction

ENGINEERING: (Approved with Conditions)

IMPACT FEES: There are no impact fees associated with this plat. Plat outside designated service areas. [For Applicant’s Information Only.]

ROW: Refer to transportation's comments, if any. [For Applicant’s Information Only.]

PAVING: FM 1788 Frontage road is TxDOT facility, built and maintained by TxDOT, no improvements required. [For Applicant’s Information Only.]

WATER: 48” water exists south of tract, okay as is. No public water improvements required. [For Applicant’s Information Only.]

FIRE HYDRANTS: Required as needed to meet NFPA, IFC & City Fire Code; and/or comply with directives of City Fire Marshal. After January 14, 2020 - Fire hydrants shall be spaced no more than 500' apart, Pressure Indicator Rings are to be installed and will require the developers/contractors to pay for the flow test. [For Applicant’s Information Only.]

PRO RATA: None. [For Applicant’s Information Only.] SEWER: Deferral request for sewer improvements were administratively approved on 8/9/2025. [For Applicant’s Information Only.]

DRAINAGE: Drainage report mark-ups/comments were sent back on 8/9/2025. [For Applicant’s Information Only.]

EASEMENTS: Show existing and proposed. [For Applicant’s Information Only.]

DIMENSION: * * *

OTHER: * * *

TRANSPORTATION: (Approved)

No additions or changes to site access are approved with plat or zoning review. Driveways or other access points are approved only with construction drawing review. [For the Applicant’s information only.] No objections to plat. [For the Applicant’s information only.]

FIRE: (Approved)

No comments or objections.

OIL AND GAS: (Approved with Conditions)

Not in the City limits- no oil or gas jurisdiction. Plugged and Abandoned (P&A) well ST NW #2501 API # 32936036 needs to be identified. Include language in plat notes- No structure shall be built over Plugged and Abandoned well. Plugged and Abandoned (P&A) well ST NW #2509 API # 32938079 shows to a P&A well via TRRC GIS. If so then no 135’ radius is required. Include language in plat notes- No structure shall be built over Plugged and

Abandoned well. If this well is actually active, leave it as is.

GIS: (Approved)

Access easements need County names. (Confirm with County) For donation deed, depict it's use. Label private access and utility as easement. Label Craddick Hwy. Depict easement for 2018-1638. (if being vacated, consult Planning)

ADDRESSING: (Approved)

County Plat - To be addressed by MECD

CRMWD: (Approved)

We do not have any comments on this plat.

HEALTH DEPARTMENT: (Approved)

Yes, the health department will review applications from the 35 proposed lots of Dahlia Warehouse District, PLAT OF A 131 ACRE TRACT OF LAND OUT OF SECTION 25 AND SECTION 36, BLOCK 41, T-1-S, T. & P. RR. CO. SURVEY each lot is 1 acres and above property owner must contact the pipeline company to get the setback to their pipeline before any excavation can occur to ensure the proposed plans on the application for the septic system will meet the setbacks from the water well on the property and the water wells on the adjacent properties.

PLANNING: (Approved)

Include the following note: "Approval of a site plan by the City of Midland may be required before these lot(s) may be developed and before a building permit may be obtained." [11-2-5(B)8(b)]

MCAD shows the owner as Cumberland & Western Resources LLC. Provide title document showing proof of ownership at final submittal. [Midland City Code 11-2-3(H)3(e)]

The plat is over 25 acres and will need to be approved City Council [Informational]

Remove the “R” numbers from the surrounding subdivisions [Informational]

Provide the owners phone number [Midland City Code 11-2-3(A)1(a)(2)]

Label the acknowledgement and the owner’s certificate [Informational]

Staff recommends approval of the Preliminary Plat of Dahlia Warehouse District, subject to the following conditions.

Conditions:

A. **All certificates must be written as detailed in Section 11-2-3 Platting Procedures by Final Plat submittal. [11-2-3(H)3(m)(1)]**

B. **Proof of ownership must be provided at final plat submittal. [11-2-3(H)3(m)(1)]**

C. **Approval by the City Council shall be required prior to consideration of a final plat by the Commission on which any preliminary plat is ten hectares (25 acres) or more in area and is located in any survey section (approximately one square mile) which does not contain a publicly owned site or sites intended for both a public school and park, or public site reservation therefor; [11-2-3(D)11(a)(6)].**

D. **Approval of this preliminary plat is subject to the Final plat including all plat comments, conditions, and requirements must be satisfied by all pertinent City departments before filing for recording with the County Clerk of Midland County, Texas. [11-2]**

Attachments:

Final Plat
Application
Location Map
Aerial Photo
PowerPoint Presentation

City Manager's Office

MIDLAND Planning Division

Preliminary Plat Application

Project Number: SUB-25-0832

Case Number:

Proposed Subdivision Plat Name: DAHLIA WAREHOUSE DISTRICT

Legal Description (attached sealed Metes and Bounds):
BEING A 131.00 ACRE TRACT OF LAND, OUT OF SECTION 25 AND 36, BLOCK 41, T-1-S, T&P RR CO SURVEY, MIDLAND COUNTY, TEXAS.

Property Owner Printed Name: DWD 1788, LLC		Phone (214) 704-6201 Email rod.redmann@dahlia.com	
Address PO BOX 50910	City Midland	State TX	Zip 79710

Developer *(if different than Owner)* Printed Name:		Phone ( ) Email	
Address	City	State	Zip

Representative *(if acting as Agent, see affidavit on page 2)* Firm: Magrym Consulting Printed Name: Ed Aleman		Phone (432) 254-0329 Email ed.aleman@magrym.com	
Address 110 W Louisiana	City Midland	State TX	Zip 79701

Current Zoning: NA

Reason for Platting: Subdivide and obtain septic permits and addresses

Plat Information	Total Acreage: 131
Type: ☐ Single-Family Residential ☐ Multi-Family Residential ■ Commercial ☐ Extraterritorial Jurisdiction (ETJ)	
Number of Lots: 35	Number of Multi-family Dwelling Units:

Submittal and Fees
Items to be submitted with this application form:
- 1 FOLDED Copy of Dimensioned Plat
- 1 Extra Copy (11x17)
- Digital Files (JPEG & PDF)
- Application Fee – Payable to the 'City of Midland'

Request for a Development Agreement
Do you expect to request a development agreement with the City? ☐ Yes ☐ No
If yes, contact the City Engineer at (432) 685-7286

Provisions
A plat application will not be considered filed pursuant to Section 212.009 of the Texas Local Government Code until all required documents and fees have been submitted and ***all of the terms and conditions of the Subdivision Ordinance, including all necessary studies, plans and supporting information are accepted and approved,*** or the applicant has filed a waiver request for sections from which the plat deviates. Once a plat meets the requirements to be considered filed with the City, the application will be placed on the Planning and Zoning Commission agenda for consideration under the time requirements set out in Section 212.009.

Signature *(by property owner only – authorized agent must sign affidavit below)*

Property Owner (signature):	Date: 8/6/25
Property Owner (printed) : Adam Cuevas	

The Preliminary Plat shall be considered officially received in the Planning office only when it has been submitted in full compliance with the provisions of Section 212 of the Texas Local Government Code and the Subdivision Code of Ordinances of the City of Midland and when such required items for the application are also received.

All materials, including exhibits, submitted in support of an application, or displayed during a public hearing, shall remain the property of the City of Midland.

STATE OF TEXAS
COUNTY OF MIDLAND

Before me, the undersigned authority, on this day personally appeared_____who, being by me duly sworn, upon oath says: That (s)he is the owner of _____or is authorized by_____ the owner of the above described property, to fully represent him/her in this application and that (s)he had the legal right, power and authority to sign said owner's name hereto as his/her attorney in fact.

Authorized Agent (*signature*)

Subscribed and sworn to before me, this 6th day of August, 20 25 to certify which witness my hand and seal of office.

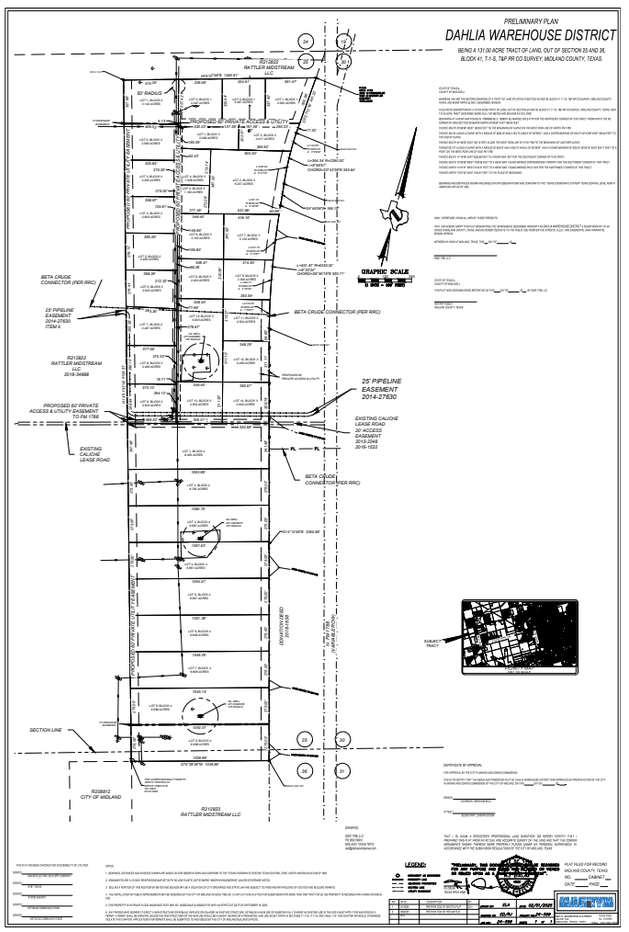
GENESIS MELODY GUEVARA
Notary ID #135161214
My Commission Expires
November 7, 2028

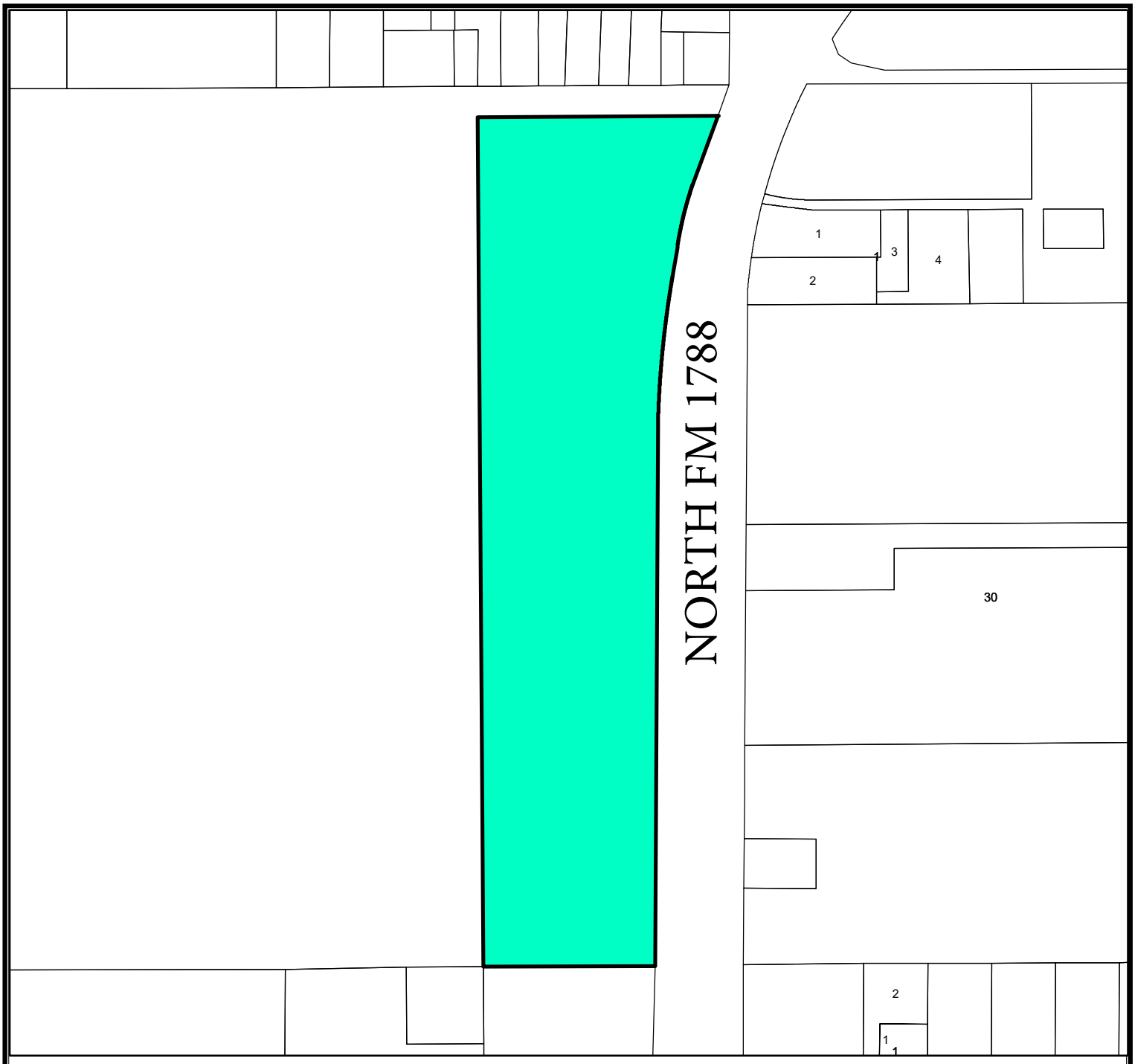
NOTARY PUBLIC, MIDLAND COUNTY, TEXAS

FOR OFFICE USE ONLY

☐ Property Owner Authorization	☐ 1 Copy of Dimensioned Plat	☐ Plat in Digital Format (PDF/JPEG)
☐ Application Fee	☑ 1 Copy of Plat (11x17)	RECEIVED
Check # 1568		AUG 06 2025
Received By:	Date:	Initial:

****Application will not be considered for scheduling until reviewed by a planner.****


PRELIMINARY PLAN
DAHLIA WAREHOUSE DISTRICT
BEING A 131.00 ACRE TRACT OF LAND, OUT OF SECTION 25 AND 36, BLOCK 41, T-1-S, T&P RR CO SURVEY, MIDLAND COUNTY, TEXAS.
R213922
RATTLER MIDSTREAM LLC
50' RADIUS
PROPOSED 60' PRIVATE ACCESS & UTILITY EASEMENT TO FM 1788
BETA CRUDE CONNECTOR (PER RRC)
25' PIPELINE EASEMENT 2004-27630 ITEM A
R213923
RATTLER MIDSTREAM LLC
2018-34568
EXISTING CALICHE LEASE ROAD
25' PIPELINE EASEMENT 2014-27630
EXISTING CALICHE LEASE ROAD 30' ACCESS EASEMENT 2015-2048 2016-1532
SECTION LINE
R59810
CITY OF MIDLAND
R210923
RATTLER MIDSTREAM LLC
GRAPHIC SCALE
LEGEND:
SURVEYOR'S CERTIFICATE
I, JOHN HUGH JACKSON, REGISTERED PROFESSIONAL LAND SURVEYOR, DO HEREBY CERTIFY THAT I HAVE CAUSED OR MADE A GROUND SURVEY OF THE PROPERTY SHOWN HEREON AND THAT THIS PLAT CORRECTLY REPRESENTS THAT SURVEY MADE BY ME OR UNDER MY SUPERVISION AND THAT ALL MONUMENTS SHOWN HEREON ACTUALLY EXIST AND THAT THEIR LOCATION, SIZE, AND MATERIAL ARE CORRECTLY SHOWN. THIS SURVEY WAS PERFORMED IN ACCORDANCE WITH THE SURVEYING RULES THAT ARE IN EFFECT ON THE DATE OF THIS SURVEY.
PLAT FILED FOR RECORD
MIDLAND COUNTY, TEXAS
NO. CABINET
DATE PAGE
CLARK & TEAM
SURVEYING & MAPPING
SHEET 1 OF 1



Location Map

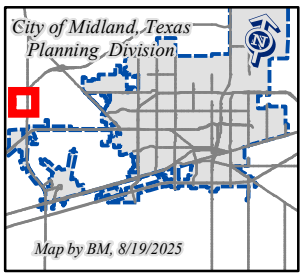
SUB-25-0832 **Scale: 1" = 864'**

Proposed plat of Dahlia Warehouse District, being a 131.00-acre tract of land out of Section 25 and Section 36, Block 41, T-1-S, T&P RR Co. Survey, Midland County, Texas.

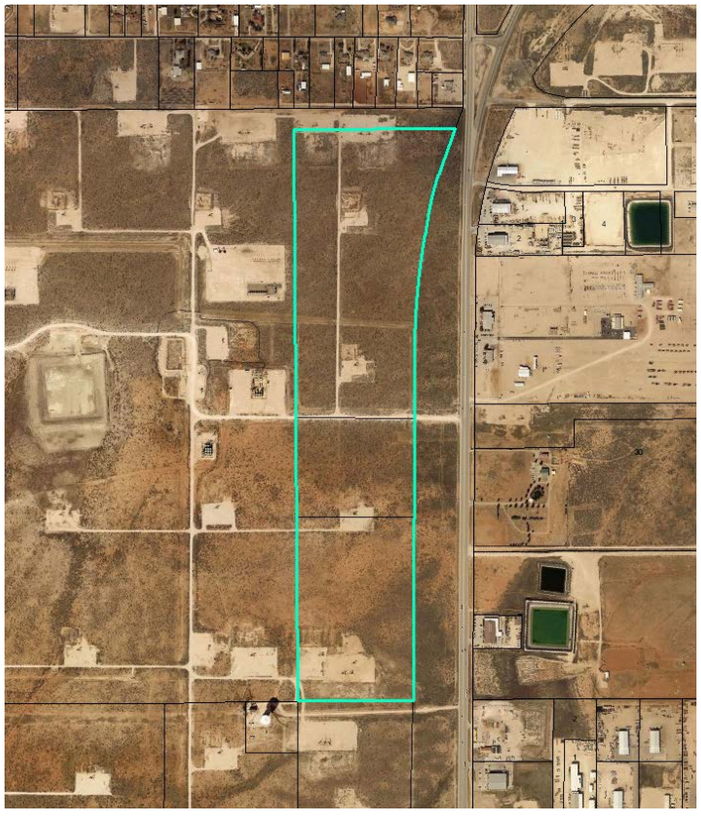
Generally located on the west side of North Farm to Market Road 1788, approximately 200 feet south of West County Road 60. (Extraterritorial Jurisdiction)

LEGEND

- CITY LIMITS
- PARCEL
- PRIVATE BLDGS



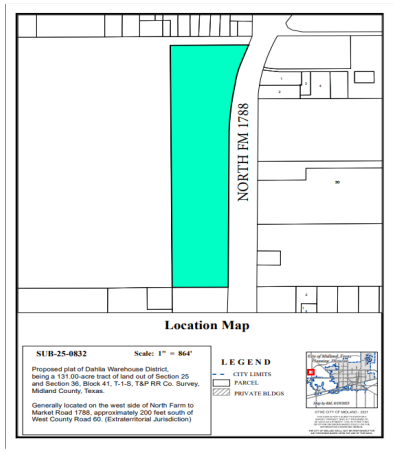
©THE CITY OF MIDLAND - 2021
THIS DATA IS NOT A SUBSTITUTION FOR A SURVEY PRODUCT OR IS INTENDED TO BE USED FOR PRECISE MEASUREMENTS, TO DETERMINE PROPERTY BOUNDARIES, FOR NAVIGATION, OR AS THE SOLE SOURCE FOR SITING OR OTHER DECISIONS BASED SOLELY ON THE INFORMATION CONTAINED HEREIN.
THE CITY OF MIDLAND SHALL NOT BE RESPONSIBLE FOR ANY DECISIONS BASED UPON THE USE OF THIS DATA.




MIDLAND
Be the Energy!
PRELIMINARY PLAT
DAHLIA WAREHOUSE DISTRICT
Visit Our Website
MIDLANDTEXAS.GOV

APPLICATION SUMMARY

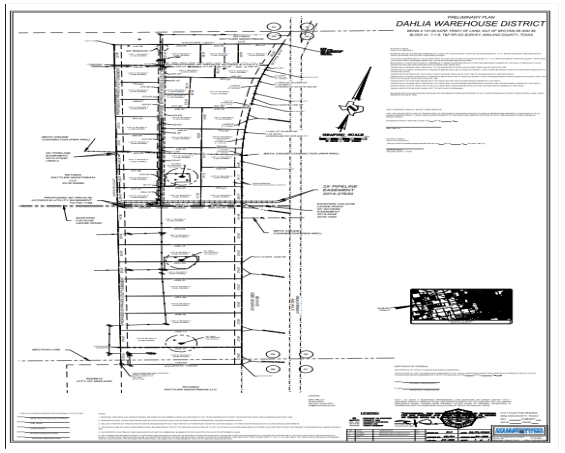
- **Property Owner/Developer:** DWD 1788, LLC
- **Representative:** Ed Aleman, with Magrym Consulting
- **Location:** Generally located on the west side of North Farm to Market Road 1788, approximately 200 feet south of West County Road 60. (Extraterritorial Jurisdiction)
- **Reason for Request:** Platting to obtain addresses and septic permits



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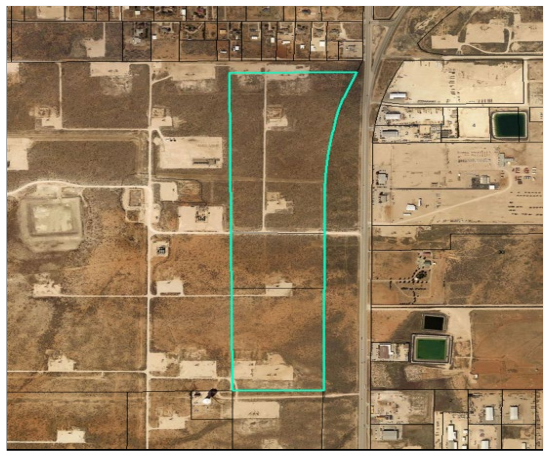
PLAT DETAILS

- **Acreage:** 131.00 acres
- **Number of Existing Lots:** 0
- **Number Proposed Lots:** 35



LAND USE

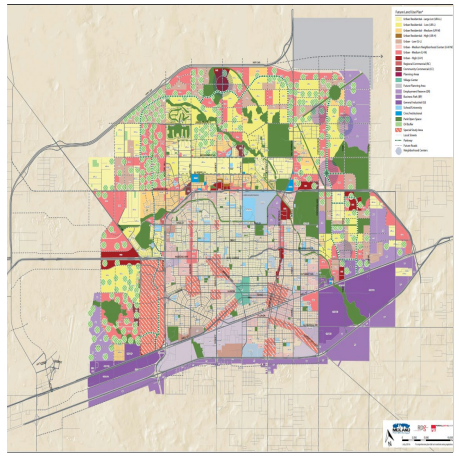
- **Current Use:** Vacant
- **Surrounding Uses:**
  - **North:** Residential
  - **South/West:** Vacant
  - **East:** Industrial Use
- **Proposed Use:** Industrial Use



4

COMPREHENSIVE PLAN

- **Land Use Designation:** Not designated



STAFF'S RECOMMENDATION

- Staff recommends approval of this request with the following conditions:
- The Planning and Zoning Commission recommended approval of this request on September 2, 2025.

A. All certificates must be written as detailed in Section 11-2-3 Platting Procedures by Final Plat submittal. [11-2-3(H)3(m)(1)]

B. Proof of ownership must be provided at final plat submittal. [11-2-3(H)3(m)(1)]



6

STAFF'S RECOMMENDATION

C. Approval by the City Council shall be required prior to consideration of a final plat by the Commission on which any preliminary plat is ten hectares (25 acres) or more in area and is located in any survey section (approximately one square mile) which does not contain a publicly owned site or sites intended for both a public school and park, or public site reservation therefor; [11-2-3(D)11(a)(6)].

D. Approval of this preliminary plat is subject to the Final plat including all plat comments, conditions, and requirements must be satisfied by all pertinent City departments before filing for recording with the County Clerk of Midland County, Texas. [11-2]




MISSION
Deliver exceptional services and promote a high quality of life and place for ALL our citizens.

City Council Meeting

Item Number: {{}}

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Lori Elliott, Planner

Subject: MOTION APPROVING, WITH STAFF'S RECOMMENDED CONDITIONS, A PRELIMINARY PLAT OF LIMESTONE ADDITION, SECTION 1, BEING A PLAT OF A 54.49-ACRE TRACT OF LAND OUT OF SECTIONS 11 AND 14, BLOCK 40, T-2-S, T&P RR CO. SURVEY, MIDLAND COUNTY, TEXAS. (GENERALLY LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF SOUTH COUNTY ROAD 1250 AND WEST INTERSTATE 20) (DISTRICT: EXTRATERRITORIAL JURISDICTION) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)

Purpose:

Maverick Engineering, on behalf of Marlin Muscat Properties, LLC, is requesting to plat a 54.49-acre tract of land located on the east side of South County Road 1250 into 10 lots for future industrial development.

Recommended City Council Action:

Approve

Fiscal Impact:

None

Strategic Priority:

Quality of Life and Place

Discussion:

BUILDING CODE: (Approved)

ETJ, no jurisdiction

ENGINEERING: (Approved with Conditions)

IMPACT FEES: There are no impact fees associated with this plat. Plat outside designated service areas. [For Applicant's Information Only.]

ROW: Refer to transportation's comments, if any. [For Applicant's Information Only.]

PAVING: Deferral request mark-ups were returned on August 4, 2025. Please ensure the updated materials are submitted before the final plat phase. [For Applicant's Information Only.] W I-20 Frontage road is TxDOT facility, built and maintained by TxDOT, no improvements required. [For Applicant's Information Only.]

WATER: Deferral request mark-ups were returned on August 4, 2025. Please ensure the updated materials are submitted before the final plat phase. [For Applicant's Information Only.]

FIRE HYDRANTS: Required as needed to meet NFPA, IFC & City Fire Code; and/or comply with directives of City Fire Marshal. After January 14, 2020 - Fire hydrants shall be spaced no more than 500' apart, Pressure Indicator Rings are to be installed and will require the developers/contractors to pay for the flow test. [For Applicant's Information Only.]

PRO RATA: None. [For Applicant's Information Only.]

SEWER: Deferral request mark-ups were returned on August 4, 2025. Please ensure the updated materials are submitted before the final plat phase. [For Applicant's Information Only.]

DRAINAGE: Drainage report has been approved for platting purposes. [For Applicant's Information Only.]

EASEMENTS: Show existing and proposed. [For Applicant's Information Only.]

SIDEWALKS: Required with building permit. [For Applicant's Information Only.]

DIMENSION: * * *

OTHER: * * *

TRANSPORTATION: (Approved with conditions)

Driveway permitting within city limits on I-20, LP 250, SH 191, and FM 1788 is under the jurisdiction of TxDOT. A copy of an approved TxDOT driveway permit must be provided to the City with the building permit application before a City building permit can be issued.

FIRE: (Approved)

No comments or objections

OIL AND GAS: (Approved)

No Oil & Gas Issues

Addressing: (Approved)

County Plat - To be addressed by MECD

GIS: (Approved)

Provide distances to the 60'x60' access easements. Also, provide calls for said easements.

CRMWD: (Approved)

We do not have any comments on this plat.

HEALTH DEPARTMENT: (Approved)

Yes, the health department will review applications from the 10 proposed lots of Limestone Addition, Section 1, PLAT OF A 54.49 ACRE TRACT OF LAND OUT OF SECTION II AND 14, BLOCK 40, T-2-S, T. & P. RR. CO. SURVEY each lots 1,2,4,5,10 is 6 acre lots 3,6,7,9 is 4 acres, lot 8 is 5 acres property owner must contact the pipeline company to get the setback to their pipeline before any excavation can occur to ensure the proposed plans on the application for the septic system will meet the setbacks from the water well on the property and the water wells on the adjacent properties.

PLANNING: (Approved)

MCAD shows the owners as Cumberland & Western Resources, LLC. Provide proof of ownership at the final phase. [Midland City Code 11-2-3(A)1(a)(2)]

Staff recommends approval of the Preliminary Plat of Limestone Addition, Section 1, subject to the following conditions.

Conditions:

A. **Proof of ownership must be provided at final plat submittal. [11-2-3(H)3(m)(1)]**

B. **Approval by the City Council shall be required prior to consideration of a final plat by the Commission on which any preliminary plat is ten hectares (25 acres) or more in area and is located in any survey section (approximately one square mile) which does not contain a publicly owned site or sites intended for both a public school and park, or public site reservation therefor; [11-2-3(D)11(a)(6)].**

C. **Approval of this preliminary plat is subject to the Final plat including all plat comments, conditions, and requirements must be satisfied by all pertinent City**

departments before filing for recording with the County Clerk of Midland County, Texas. [11-2]

City Manager's Office

MIDLAND Planning Division

Preliminary Plat Application

Project Number: SUB 25-0864

Case Number: _____

Proposed Subdivision Plat Name: LIMESTONE ADDITION SECTION 1

Legal Description (attached sealed Metes and Bounds): A PLAT OF A 54.49 ACRE TRACT OF L/ SECTIONS 11 AND 14, BLOCK 40, TOWNSHIP 2 SOUTH, TEXAS AND PACIFIC RAILWAY COMF

Property Owner Printed Name: MARLIN MUSCAT PROPERTIES, LLC		Phone (432)262-0999 Email john@limestoneeng.com	
Address PO BOX 1095	City DRIPPING SPRI	State TX	Zip 78620
Developer *(if different than Owner)* Printed Name:		Phone ( ) Email	
Address	City	State	Zip
Representative *(if acting as Agent, see affidavit on page 2)* Firm: MAVERICK ENGINEERING Printed Name: ANDREW MELLEN		Phone (432) 262-0999 Email amellen@maverick-eng.com	
Address 1909 W WALL STREET, SUITE K	City MIDLAND	State TX	Zip 79701

Current Zoning: ETJ

Reason for Platting: SITE HAS NEVER BEEN FORMALLY PLATTED. UTILITY IMPROVEMENTS.

Plat Information	Total Acreage:	54.49
Type: ☐ Single-Family Residential ☐ Commercial	☐ Multi-Family Residential ■ Extraterritorial Jurisdiction (ETJ)	
Number of Lots: 10	Number of Multi-family Dwelling Units:	

Submittal and Fees
Items to be submitted with this application form:
- 1 FOLDED Copy of Dimensioned Plat
- 1 Extra Copy (11x17)
- Digital Files (JPEG & PDF)
- Application Fee – Payable to the 'City of Midland'

Request for a Development Agreement
Do you expect to request a development agreement with the City? ☐ Yes ■ No
If yes, contact the City Engineer at (432) 685-7286

Provisions

A plat application will not be considered filed pursuant to Section 212.009 of the Texas Local Government Code until all required documents and fees have been submitted and ***all of the terms and conditions of the Subdivision Ordinance, including all necessary studies, plans and supporting information are accepted and approved,*** or the applicant has filed a waiver request for sections from which the plat deviates. Once a plat meets the requirements to be considered filed with the City, the application will be placed on the Planning and Zoning Commission agenda for consideration under the time requirements set out in Section 212.009.

Signature *(by property owner only – authorized agent must sign affidavit below)*

Property Owner (signature):	Date: 8/2/25
Property Owner (printed) : Sean Peters	

The Preliminary Plat shall be considered officially received in the Planning office only when it has been submitted in full compliance with the provisions of Section 212 of the Texas Local Government Code and the Subdivision Code of Ordinances of the City of Midland and when such required items for the application are also received.

All materials, including exhibits, submitted in support of an application, or displayed during a public hearing, shall remain the property of the City of Midland.

STATE OF TEXAS
COUNTY OF MIDLAND

Before me, the undersigned authority, on this day personally appeared Andrew Miller who, being by me duly sworn, upon oath says: That (s)he is the owner of _____ or is authorized by Marlin Muscat Properties, LLC the owner of the above described property, to fully represent him/her in this application and that (s)he had the legal right, power and authority to sign said owner's name hereto as his/her attorney in fact.

Andrew L Miller
Authorized Agent (*signature*)

Subscribed and sworn to before me, this 4th day of August, 2025, to certify which witness my hand and seal of office.

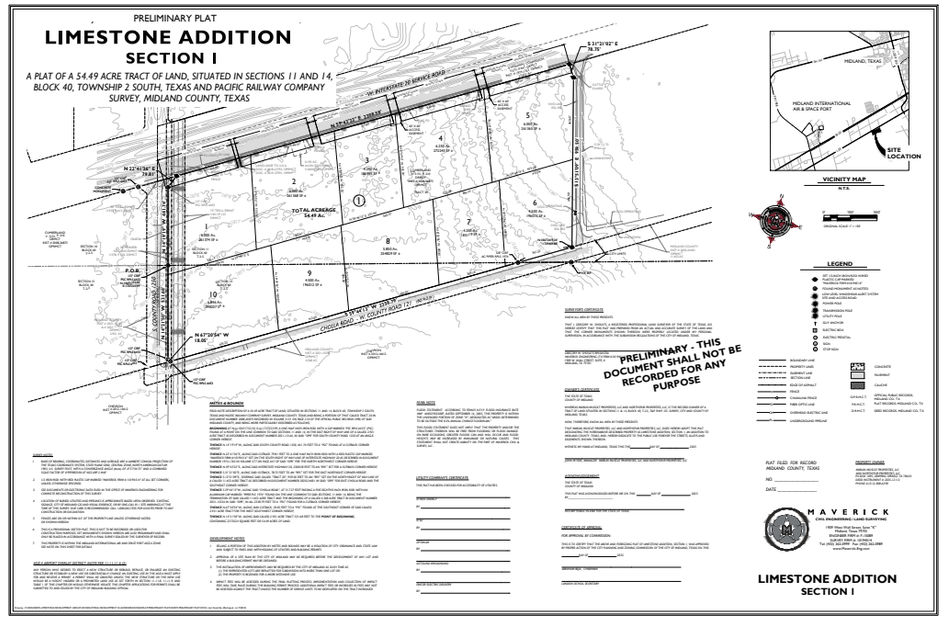
SAVANNAH DAVIS
Notary Public, State of Texas
Comm. Expires 05-20-2028
Notary ID 134907724

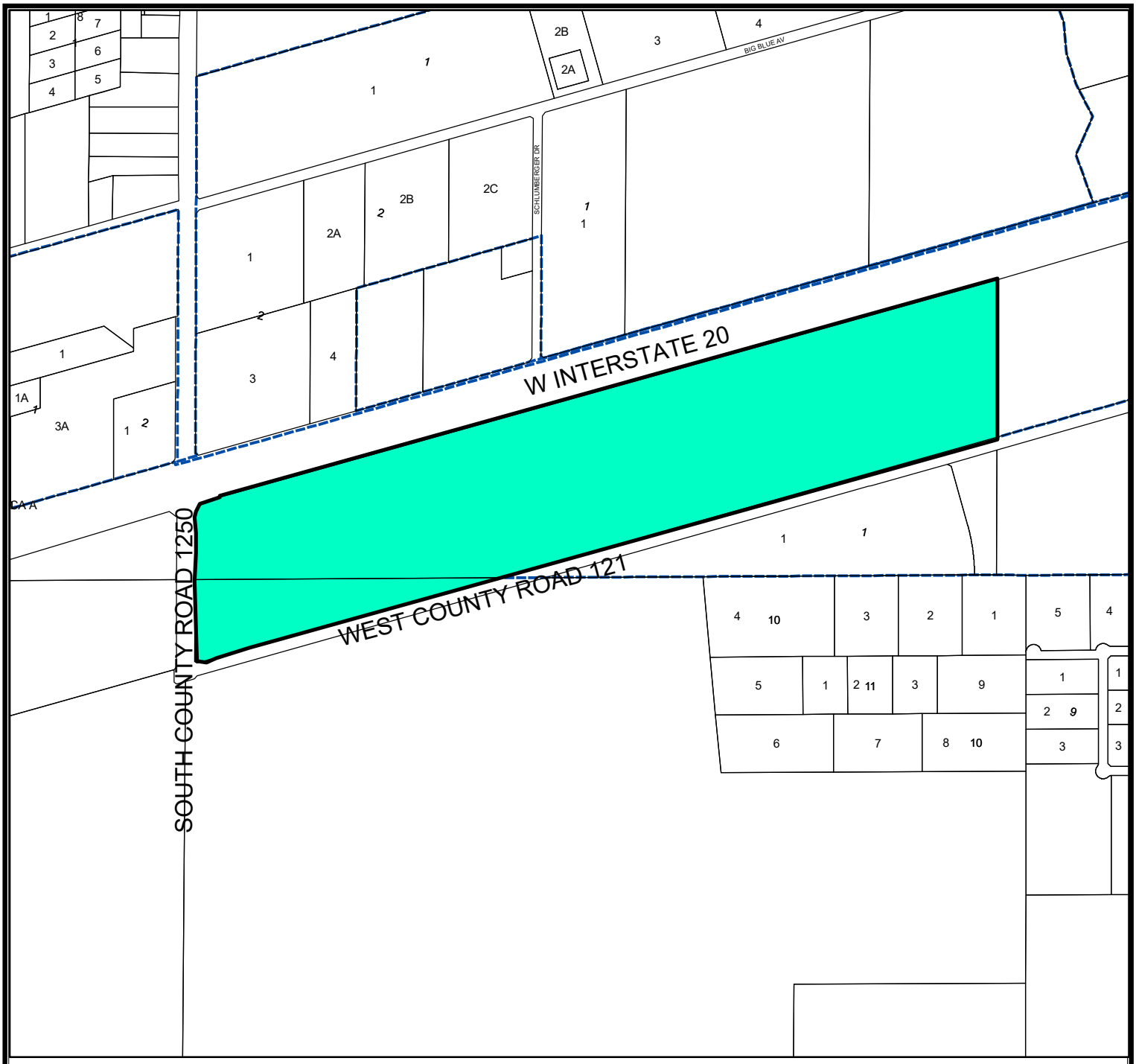
NOTARY PUBLIC, MIDLAND COUNTY, TEXAS

FOR OFFICE USE ONLY

☑ Property Owner Authorization	☑ 1 Copy of Dimensioned Plat	☑ Plat in Digital Format (PDF/JPEG)
☑ Application Fee	☑ 1 Copy of Plat (11x17)	
Check # 5488		RECEIVED
Received By:	Date:	AUG 04 2025
		Initial:

****Application will not be considered for scheduling until reviewed by a planner.****


PRELIMINARY PLAT
LIMESTONE ADDITION
SECTION I
A PLAT OF A 54.49 ACRE TRACT OF LAND, SITUATED IN SECTIONS 11 AND 14, BLOCK 40, TOWNSHIP 2 SOUTH, TEXAS AND PACIFIC RAILWAY COMPANY SURVEY, MIDLAND COUNTY, TEXAS
W. INTERSTATE 20 SERVICE ROAD
COUNTY ROAD 70 (CROOKED LAKE ROAD)
TOTAL ACREAGE 54.49 AC.
P.O.B.
MIDLAND, TEXAS
MIDLAND INTERNATIONAL AIR & SPACE PORT
SITE LOCATION
VICINITY MAP
N.T.S.
LEGEND
PRELIMINARY - THIS DOCUMENT SHALL NOT BE RECORDED FOR ANY PURPOSE
PLAT FILED FOR RECORD
MIDLAND COUNTY, TEXAS
NO.
DATE
MAVERICK
CIVIL ENGINEERING | LAND SURVEYING
LIMESTONE ADDITION
SECTION I



Location Map

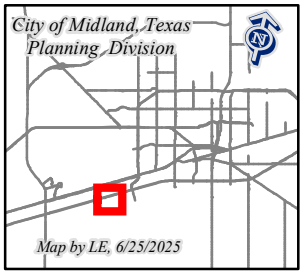
SUB-25-0864 **Scale: 1" = 6,000'**

Proposed plat of Limestone Addition, Section 1, being a plat of a 54.49-acre tract of land situated in Sections 11 and 14, Block 40, T-2-S, T&P RR Co. Survey, Midland County, Texas.

Generally located at the southeast corner of the intersection of South County Road 1250 and West Interstate 20 Service Road. (Extraterritorial Jurisdiction)

LEGEND

- CITY LIMITS
- PARCEL
- PRIVATE BLDGS



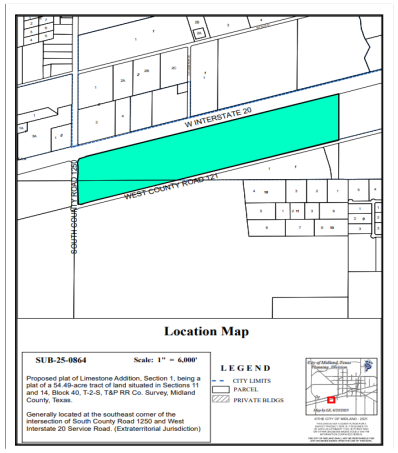
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THE CITY OF MIDLAND SHALL NOT BE RESPONSIBLE FOR ANY DECISIONS BASED UPON THE USE OF THIS DATA.




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PRELIMINARY PLAT
LIMESTONE ADDITION, SECTION 1
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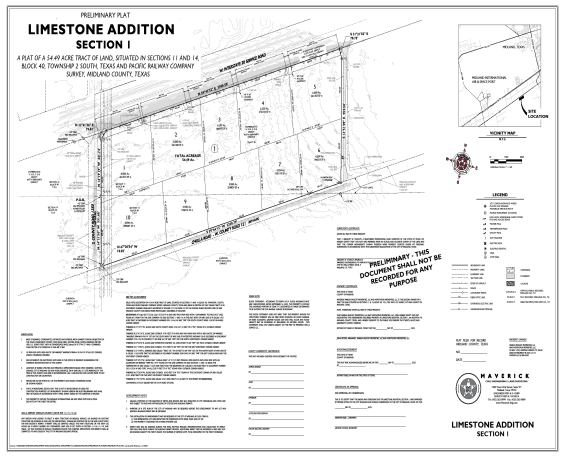
APPLICATION SUMMARY

- **Developer/Property Owner:** Marlin Muscat Properties, LLC
- **Representative:** Andrew Mellen, with Maverick Engineering
- **Location:** Generally located at the southeast corner of the intersection of South County Road 1250 and West Interstate 20 Service Road (Extraterritorial Jurisdiction)
- **Reason for Request:** For future industrial development



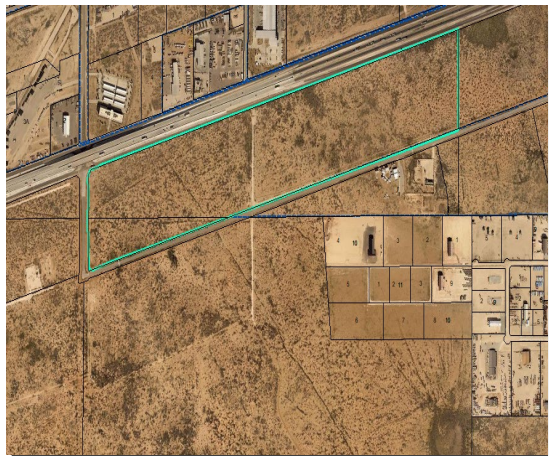
PLAT DETAILS

- **Acreage:** 54.49 acres
- **Number of Existing Lots:** 0
- **Number Proposed Lots:** 10



LAND USE

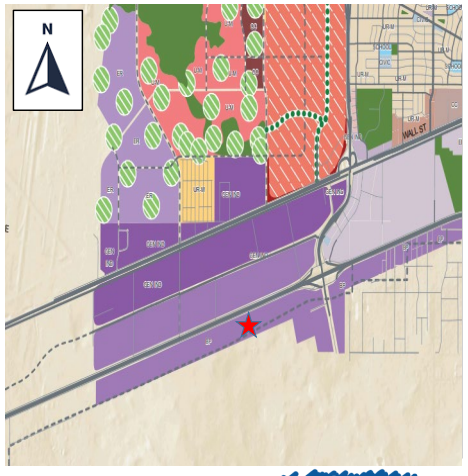
- **Current Use:** Vacant Land
- **Surrounding Uses:**
  - **North:** West Interstate 20
  - **South/East/West:** Vacant Land
- **Proposed Use:** Industrial Use



4

COMPREHENSIVE PLAN

- **Land Use Designation:** Business Park I-20 (BP)
- **Supported Uses:** Industrial uses such as warehousing and distribution
- The request is compatible with the *Tall City Tomorrow Comprehensive Plan.*



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RELATED ITEMS

- This preliminary plat was approved at the September 2, 2025, Planning and Zoning Commission Meeting.



6

STAFF'S RECOMMENDATION

- Staff recommends approval of this request with the following conditions:

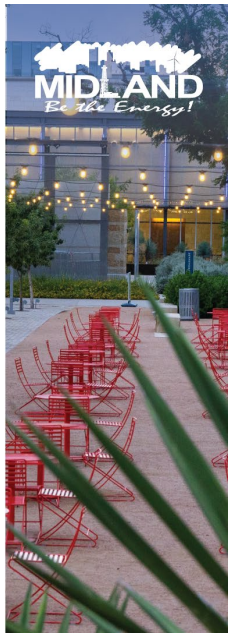
A. Proof of ownership must be provided at final plat submittal. [11-2-3(H)3(m)(1)]

B. Approval by the City Council shall be required prior to consideration of a final plat by the Commission on which any preliminary plat is ten hectares (25 acres) or more in area and is located in any survey section (approximately one square mile) which does not contain a publicly owned site or sites intended for both a public school and park, or public site reservation therefor; [11-2-3(D)11(a)(6)].



STAFF'S RECOMMENDATION

C. Approval of this preliminary plat is subject to the Final plat including all plat comments, conditions, and requirements must be satisfied by all pertinent City departments before filing for recording with the County Clerk of Midland County, Texas. [11-2]



8


MISSION
Deliver exceptional services and promote a high quality of life and place for ALL our citizens.

City Council Meeting

Item Number: 10

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Carl Craigo, Director

Subject: MOTION AUTHORIZING THE EXECUTION OF AN AMENDMENT TO THAT CERTAIN MAY 15, 1975, SURFACE LEASE AND RIGHT-OF-WAY AGREEMENT WITH MRC TORO, LLC, SUCCESSOR-IN-INTEREST TO ATLANTIC RICHFIELD COMPANY; SAID AMENDMENT PROVIDING FOR THE EXTENSION OF THE TERM FOR AN ADDITIONAL PERIOD OF FOUR (4) MONTHS (DISTRICT: NONE) (UTILITIES) (PROVIDE SOUND GOVERNANCE & FISCAL MANAGEMENT)

Purpose:

Motion authorizing the execution of an amendment to that certain May 15, 1975 surface lease and right-of-way agreement with MRC TORO, LLC, Successor-in-interest to Atlantic Richfield company; said amendment providing for the extension of the term for a period of four (4) months

Recommended City Council Action:

Approve

Fiscal Impact:

none

Strategic Priority:

(Provide Sound Governance & Fiscal Management)

Discussion:

Extension needed while a new surface use agreement is negotiated.



City Manager's Office

NOTICE OF CONFIDENTIALITY RIGHTS: IF YOU ARE A NATURAL PERSON, YOU MAY REMOVE OR STRIKE ANY OR ALL OF THE FOLLOWING INFORMATION FROM ANY INSTRUMENT THAT TRANSFERS AN INTEREST IN REAL PROPERTY BEFORE IT IS FILED FOR RECORD IN THE PUBLIC RECORDS: YOUR SOCIAL SECURITY NUMBER OR YOUR DRIVER'S LICENSE NUMBER.

AMENDMENT TO SURFACE USE AND RIGHT-OF-WAY AGREEMENT

State:	**Texas**
County:	**Winkler and Loving**
Lessor:	**City of Midland** **300 N. Loraine** **Midland, TX 79701**
Lessee:	**MRC TORO, LLC** **(successor-in-interest to Atlantic Richfield Company)** **5400 LBJ Fwy, Suite 1500** **Dallas, TX 75240**
Effective Date:	**May 15, 1975**

On May 15, 1975, Lessor, named above, a municipal corporation acting by and through its Mayor pursuant to appropriate resolutions of its City Council, executed a certain Surface Lease and Right-of-Way Agreement dated effective May 15, 1975 (the "Lease") in favor of Lessee's predecessor in interest, that covered certain lands the county and state named above, as more particularly described in the Lease:

Sections 7, 10, 11, 12, 13, 14, 17 through 27, Block C-23, PSL;
Sections 1 through 7, 12, 17 and 18, Block C-24, PSL;
Sections 8 through 11 and Section 27, Block 74, PSL; and
Section 1, Block 75, PSL

The Lease is recorded in Volume 280, page 475 of the Deed Records of Winkler County. Reference is made to the Lease for all purposes.

The Lease provides for a term of fifty (50) years from the Effective Date.

The Lease was previously amended to extend the primary term of the Lease for a period of four (4) months beyond the date of the primary term stated in the Lease.

Lessor desires to extend the primary term of the Lease for an additional period of four (4) months, for a total of eight (8) months beyond the date of the primary term stated in the Lease.

Lessor, for adequate consideration, grants, leases, and lets: (i) extends the Lease for an additional primary term of eight (8) months beginning at the expiration of the primary term stated in the Lease, on the same terms, conditions, and provisions as contained in the Lease. Paragraph 1 of the Lease is hereby amended and modified so that it will state the following:

"TO HAVE AND TO HOLD the leased premises, easements, rights and privileges to Lessee, its successors and assigns, for a term of fifty (50) years and eight (8) months from the date hereof (to and through January 15, 2026), subject to the further terms and provisions hereof."

The Lease, as amended, modified, and extended, is in all other respects confirmed, ratified, and acknowledged by Lessor to be in full force and effect.

This Amendment may be executed in multiple counterparts by each of the current parties to the Lease. Each of the counterparts, when executed and delivered shall be deemed an original and shall be binding and effective immediately upon execution.

This Amendment is signed by Lessor as of the date of acknowledgment of Lessor's signature, but is effective for all purposes as of the Effective Date stated above.

Lessor:

CITY OF MIDLAND

BY: _____
Name:
Title:

Lessee:

MRC TORO, LLC

BY: _____
Name:
Title:

[Acknowledgments follow on next page]

Acknowledgments

State of Texas §
County of Midland §

This instrument was acknowledged before me on the _____ day of _____, 2025, by _____, _____ of CITY OF MIDLAND, a municipal corporation, on behalf of said corporation.

_____
Notary Public, in and for the State of Texas
My Commission Expires: _____

State of Texas §
County of Dallas §

This instrument was acknowledged before me on the _____ day of _____, 2025, by _____, _____ of MRC TORO, LLC, a Texas corporation, on behalf of said corporation.

_____
Notary Public, in and for the State of Texas
My Commission Expires: _____

City Council Meeting

Item Number: 11

Meeting Date: August 26, 2025, September 9, 2025

To: City Council / City Manager

From: Alexis M. Martinez, Associate Planner

Subject: AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO GRANT A SPECIFIC USE DESIGNATION WITH TERM FOR LOT 2, BLOCK 6, CLAYDESTA PLAZA, SECTION 5, CITY AND COUNTY OF MIDLAND, TEXAS (GENERALLY LOCATED AT THE NORTHEAST CORNER OF THE INTERSECTION OF DESTA DRIVE AND WEST WADLEY AVENUE), WHICH IS PRESENTLY ZONED PD, PLANNED DEVELOPMENT DISTRICT FOR AN OFFICE AND RETAIL DEVELOPMENT, ALLOWING SAID PROPERTY TO BE USED FOR THE SALE OF ALL ALCOHOLIC BEVERAGES IN A RESTAURANT FOR ON-PREMISES CONSUMPTION; MAKING SAID DESIGNATION SUBJECT TO CERTAIN CONDITIONS AND RESTRICTIONS CONTAINED HEREIN; CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION (DISTRICT 3) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)

Purpose:

Jorge Ramos is requesting a Specific Use Designation with term, for the sale of all alcoholic beverages for on-premises consumption, on a property located at 418 West Wadley Avenue for Santomar.

Recommended City Council Action:

Approve

Fiscal Impact:

This proposal does not have a significant financial impact to the City.

Strategic Priority:

(Quality of Life & Place)

Current Zoning:

PD, Planned District (5837)

Surrounding Zoning and Land Use:

The properties to the north and west are zoned PD, Planned District, and are office spaces. The properties to the south are zoned PD, Planned District for a Shopping Center are the locations of cleaners and salon. The property to the west is zoned PD, Planned District for a Transitional District and is the location of a restaurant.

Analysis:

The subject property is located at 418 West Wadley Avenue is zoned PD, Planned Development District, which permits the sale of all alcoholic beverages for on-premises consumption. The total area of the restaurant, Santomar, is 7,633 square feet and the proposed alcohol serviceable Area is 3,960 square feet. The new business Santomar is attempting to obtain their TABC license but must first obtain their SUD.

The proposed days and hours of operation are:

Monday through Thursday from 11 a.m. to 10 p.m.
Friday through Sunday from 11 a.m. to 12 a.m. (midnight)

The applicant is requesting the following alcohol serviceable hours.

Monday through Thursday from 11 a.m. to 10 p.m.
Friday through Sundays from 11 a.m. to 12 a.m. (midnight)

Per Midland City Code, Section 5-4-4, Prohibited Places of Business:

The sale of any alcoholic beverage is hereby prohibited by any person, where the place of business of any such dealer is within 300 feet of any church, public-school, public-school ground, athletic stadium used by any public school or public hospital, the measurements to be along the property lines of the street fronts and from front door to front door and in a direct line across intersections where they occur.

There are no schools or churches within 300 feet of the property using the front door to door distance measurement.

This request has been circulated to and reviewed by respective City departments for internal review and their comments, conditions, and requirements are as follows:

Fire: (Approved)

No comments or objections.

Engineering: (Approved)

No objection. [For Applicant's Information Only.]

Transportation: (Approved)

No objection. [For Applicant's Information Only.]

Building Code: (Approved)

The SUD for Santomar is acceptable. The property must adhere to the maximum occupant load of 264 persons for the alcohol serviceable area. Occupancy loads must be posted in accordance with section 1004.3 of the 2015 International Fire Code.

Planning: (Approved with Conditions)

This request meets all requirements; therefore, staff recommends approval of the request of the Specific Use Designation with Term for the sale of all alcoholic beverages, for on-premises consumption, in a Restaurant, subject to Condition A through G.

Conditions:

A. That the serviceable area of the establishment shall be limited to approximately 3,960 square feet as shown in Exhibit "A", which is attached hereto and incorporated herein for all purposes.

B. That the sale and on-premises consumption of alcoholic beverages shall conform to applicable state and local laws.

C. That the days and hours of alcoholic beverages sales and consumption shall be limited to Monday through Thursday from 11 a.m. to 10 p.m.
Friday through Sundays from 11 a.m. to 12 a.m. (midnight)

D. That the establishment shall meet all requirements of the Fire Department and Code Administration

E. That the occupancy of the establishment shall not exceed the maximum occupancy determined by the Building Code and Fire Code.

F. That the operator of the establishment shall obtain a Certificate of Occupancy prior to commencement of the sale of alcohol beverages for on premises consumption to ensure that the conditions of this Specific Use Designation with Term are satisfied.

G. That in accordance with section 9.07.E.3 of the Zoning Ordinance, the establishment shall be in operation within 120 days from the final adoption date of this ordinance.

Letters of Objection:

As of August 15, 2025 staff has not received any letters of objections.

Attachments:

Application
Floor Plan (Exhibit A)
Maps
PowerPoint Presentation

City Manager's Office

ORDINANCE NO. _____

AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO GRANT A SPECIFIC USE DESIGNATION WITH TERM FOR LOT 2, BLOCK 6, CLAYDESTA PLAZA, SECTION 5, CITY AND COUNTY OF MIDLAND, TEXAS (GENERALLY LOCATED AT THE NORTHEAST CORNER OF THE INTERSECTION OF DESTA DRIVE AND WEST WADLEY AVENUE), WHICH IS PRESENTLY ZONED PD, PLANNED DEVELOPMENT DISTRICT FOR AN OFFICE AND RETAIL DEVELOPMENT, ALLOWING SAID PROPERTY TO BE USED FOR THE SALE OF ALL ALCOHOLIC BEVERAGES IN A RESTAURANT FOR ON-PREMISES CONSUMPTION; MAKING SAID DESIGNATION SUBJECT TO CERTAIN CONDITIONS AND RESTRICTIONS CONTAINED HEREIN; CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION

WHEREAS, the City Planning and Zoning Commission and the Governing Body of the City of Midland, Texas, in compliance with the City Charter, the City Code, and State law, have given the requisite notices by United States mail, publication and otherwise; and after holding due hearings affording a full and fair hearing to all of the property owners generally, and particularly to those interested persons situated in the affected area and in the vicinity thereof, the Governing Body of the City of Midland finds that the public convenience will be best served by granting a Specific Use Designation With Term for Lot 2, Block 6, Claydesta Plaza, Section 5, City and County of Midland, Texas (the "Property"), as set out hereinafter;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That the Zoning District Map of the City of Midland, Texas, is hereby amended to grant the Property a Specific Use Designation With Term for the sale of all alcoholic beverages in a restaurant (the "Establishment") for on-premises consumption, together with the uses permitted in the present PD, Planned Development District for an Office and Retail Development.

SECTION TWO. That the Property shall be subject to the following conditions and restrictions:

A. That the serviceable area of the Establishment shall be limited to approximately 3,960 square feet as shown in Exhibit A, which is attached hereto and incorporated herein for all purposes.

B. That the sale and on-premises consumption of alcoholic beverages shall conform to all applicable state and local laws.

C. That the days and hours of alcoholic beverage sales and consumption shall be limited to the following:

Monday through Thursday from 11:00 a.m. to 10:00 p.m.; and
Friday through Sunday from 11:00 a.m. to 12:00 a.m. (midnight).

D. That the occupancy of the Establishment shall not exceed the maximum occupancy determined by the Building Code and Fire Code.

E. That the Establishment shall meet the requirements of the Fire Department and the Code Administration Division.

F. That the operator of the Establishment shall obtain a Certificate of Occupancy prior to the commencement of the sale of alcoholic beverages for on-premises consumption to ensure that the conditions of this Specific Use Designation With Term are satisfied.

G. That in accordance with Section 11-1-9.07.E.3 of the City Code, the Establishment shall be in operation within 120 days from the final adoption date of this ordinance.

SECTION THREE. The provisions of this ordinance are to be cumulative of all other ordinances or parts of ordinances governing or regulating the same subject matter as that covered herein; provided, however, that all prior ordinances or parts of ordinances, inconsistent with or in conflict with any of the provisions of this ordinance are hereby expressly repealed to the extent of any such inconsistency or conflict.

SECTION FOUR. If any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional or invalid, such holding shall not affect the validity of the remaining portions of this ordinance. The Council of the City of Midland hereby declares that it would have passed this ordinance and each section, subsection, sentence, clause, or phrase hereof irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared unconstitutional or invalid.

SECTION FIVE. The penalty for violation of this ordinance shall be in accordance with the general penalty provisions contained in Section 1-3-1 of the City Code of Midland, Texas, which provides for a fine not exceeding two thousand dollars ($2,000.00).

SECTION SIX. The City Secretary is hereby authorized and directed to publish the descriptive caption of this ordinance in the manner and for the length of time prescribed by the law as an alternative method of publication.

The above and foregoing ordinance was duly proposed, read in full and adopted on first reading, the _____ day of _____, A.D., 2025; and passed to second reading on motion of Council member _____, seconded by Council member _____, by the following vote:

Council members voting "AYE":

Council members voting "NAY":

The above and foregoing ordinance was read in full and finally adopted by the following vote upon motion of Council member _____, seconded by Council member _____, on the _____ day of _____, A.D., 2025, at a regular meeting of the City Council:

Council members voting "AYE":

Council members voting "NAY":

PASSED AND APPROVED THIS _____ day of _____, A.D., 2025.

_____
Lori Merritt Blong, Mayor

ATTEST:

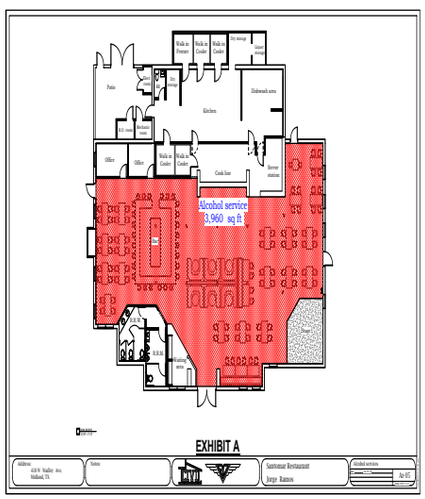
_____
Marcia Bentley-German, City Secretary

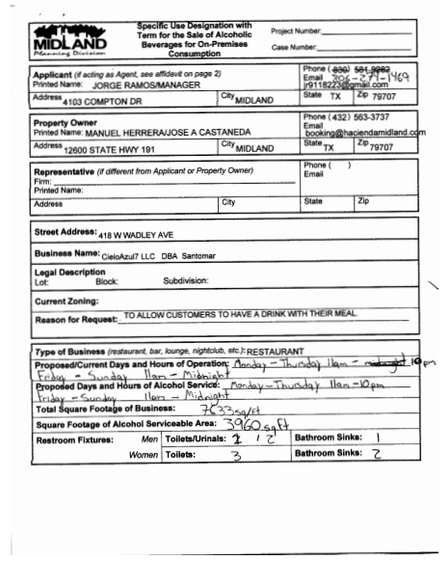
APPROVED AS TO CONTENT
AND COMPLETENESS:

_____
Elizabeth Triggs, Planning and Development Officer

APPROVED ONLY AS TO FORM:

_____
Nicholas Toulet, Interim City Attorney


Walk-in Freezer
Walk-in Cooler
Walk-in Cooler
Dry storage
Patio
Dishwash area
Kitchen
Office
Office
Walk-in Cooler
Walk-in Cooler
Cook line
Server station
Alcohol service
3,960 sq ft
Server station
EXHIBIT A
Restaurant
Jorge Ramos
Alcohol service
Ar-07



MIDLAND
Planning Division

Specific Use Designation with Term for the Sale of Alcoholic Beverages for On-Premises Consumption

Project Number: _____

Case Number: _____

Applicant *(if acting as Agent, see affidavit on page 2)*
Printed Name: JORGE RAMOS/MANAGER
Phone (~~830~~ ~~581-9282~~ 956) 371-1469
Email jr91182293@gmail.com
Address 4103 COMPTON DR | City MIDLAND | State TX | Zip 79707

Property Owner
Printed Name: MANUEL HERRERA/JOSE A CASTANEDA
Phone (432) 563-3737
Email booking@haciendamidland.com
Address 12600 STATE HWY 191 | City MIDLAND | State TX | Zip 79707

Representative *(if different from Applicant or Property Owner)*
Firm: _____
Printed Name: _____
Phone ( )
Email
Address | City | State | Zip

Street Address: 418 W WADLEY AVE

Business Name: CieloAzul7 LLC DBA Santomar

Legal Description
Lot: Block: Subdivision:

Current Zoning:

Reason for Request: TO ALLOW CUSTOMERS TO HAVE A DRINK WITH THEIR MEAL

Type of Business *(restaurant, bar, lounge, nightclub, etc.)*: RESTAURANT

Proposed/Current Days and Hours of Operation: Monday - Thursday 11am - ~~midnight~~ 10pm
Friday - Sunday 11am - Midnight

Proposed Days and Hours of Alcohol Service: Monday - Thursday 11am - 10pm
Friday - Sunday 11am - Midnight

Total Square Footage of Business: 7623sq/ft

Square Footage of Alcohol Serviceable Area: 3960 sq ft

Restroom Fixtures:	*Men*	**Toilets/Urinals:**	2 / 2	**Bathroom Sinks:**	1
	Women	**Toilets:**	3	**Bathroom Sinks:**	2

Submittal and Fees
Items to be submitted with this application form:

- Application Fee -- Payable to the 'City of Midland'
- Dimensioned Floor Plan showing:
  - Seating
  - Exits
  - Restrooms
  - Kitchen (if applicable)
  - Total Square Footage
  - Serviceable Square Footage
- Dimensioned Site Plan showing:
  - Parking
  - Business Footprint
- Digital Copies of Floor Plan & Site Plan (PDF/JPEG)

Signatures

Applicant (signature): X Date: 7/14/25

Applicant (printed): JORGE RAMOS

Property Owner (signature): X Date: 7/2/2025

Property Owner (printed): MANUEL HERRERA/JOSE A CASTANEDA

The Specific Use Designation with Term for the sale of all alcoholic beverages shall be considered officially received in the Planning office only when it has been submitted in full compliance with the provisions of Section 212 of the Texas Local Government Code and the Zoning Code of Ordinances of the City of Midland and when such required items for the application are also received.

All materials, including exhibits, submitted in support of an application, or displayed during a public hearing, shall remain the property of the City of Midland.

If an agent is authorized by the property owner to file and execute the application on behalf of the property owner, the agent must complete the affidavit below.

STATE OF TEXAS
COUNTY OF MIDLAND

Before me, the undersigned authority, on this day personally appeared Jorge Ramos who, being by me duly sworn, upon oath says: That (s)he is authorized by Manuel Herrera the owner of the above described property, to fully represent him/her in this application and that (s)he had the legal right, power and authority to sign said owner's name hereto as his/her attorney in fact.

X
Authorized Agent (signature)

Subscribed and sworn to before me, this 16th day of July, 2025, to certify which witness my hand and seal of office.

X
NOTARY PUBLIC, MIDLAND COUNTY, TEXAS

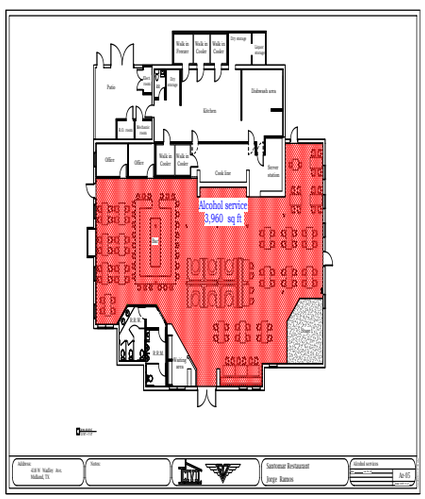
ALEXIS MARIE MARTINEZ
Notary Public, State of Texas
Comm. Expires 07-12-2027
Notary ID 134449507

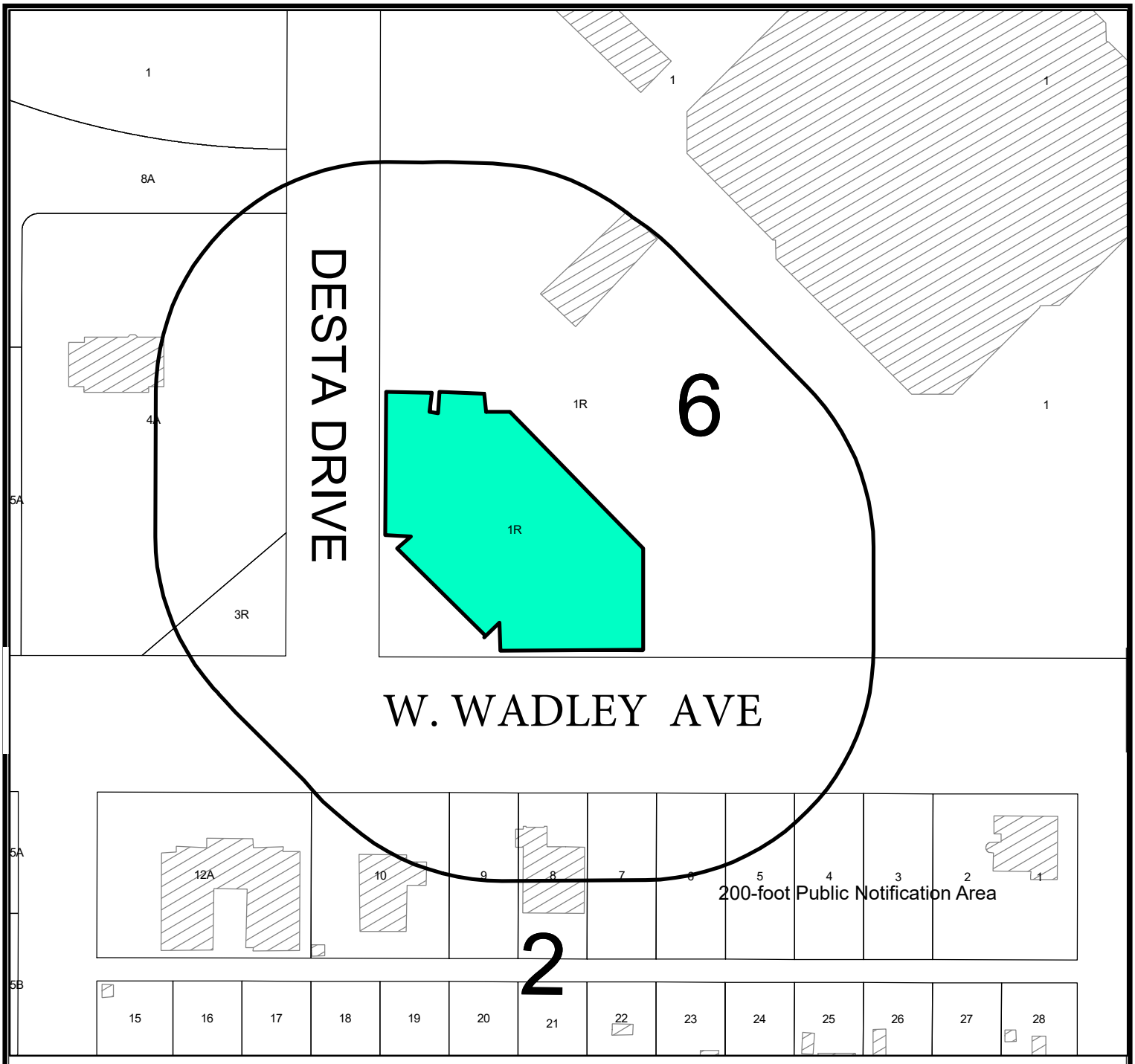
****Application will not be considered for scheduling until reviewed by a planner.****

FOR OFFICE USE ONLY	
☐ Property Owner Authorization	~~Dimensioned Floor Plan~~
☐ Application Fee	~~Site Plan~~
Check # 1064	~~Plans in Digital Format (PDF/JPEG)~~
Received By:	Date: RECEIVED JUL 16 2025

Initial:

****Application will not be considered for scheduling until reviewed by a planner.****


Walk-in Freezer
Walk-in Cooler
Walk-in Cooler
Dry storage
Patio
Dishwash area
Kitchen
Office
Office
Walk-in Cooler
Walk-in Cooler
Cook line
Server station
Alcohol service
3,960 sq ft
Server station
Address:
Notes:
Restaurant
Jorge Ramos
Alcohol services
As-05



Location Map

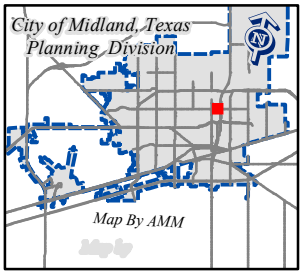
SUD-25-0206 **Scale: 1" = 800'**

Consider a request by Jorge Ramos for a Specific Use Designation with Term for the Sale of all Alcoholic Beverages for on premises consumption in a Restaurant on Lot 2, Block 6, Claydesta Plaza, Section 5, City and County of Midland, Texas.

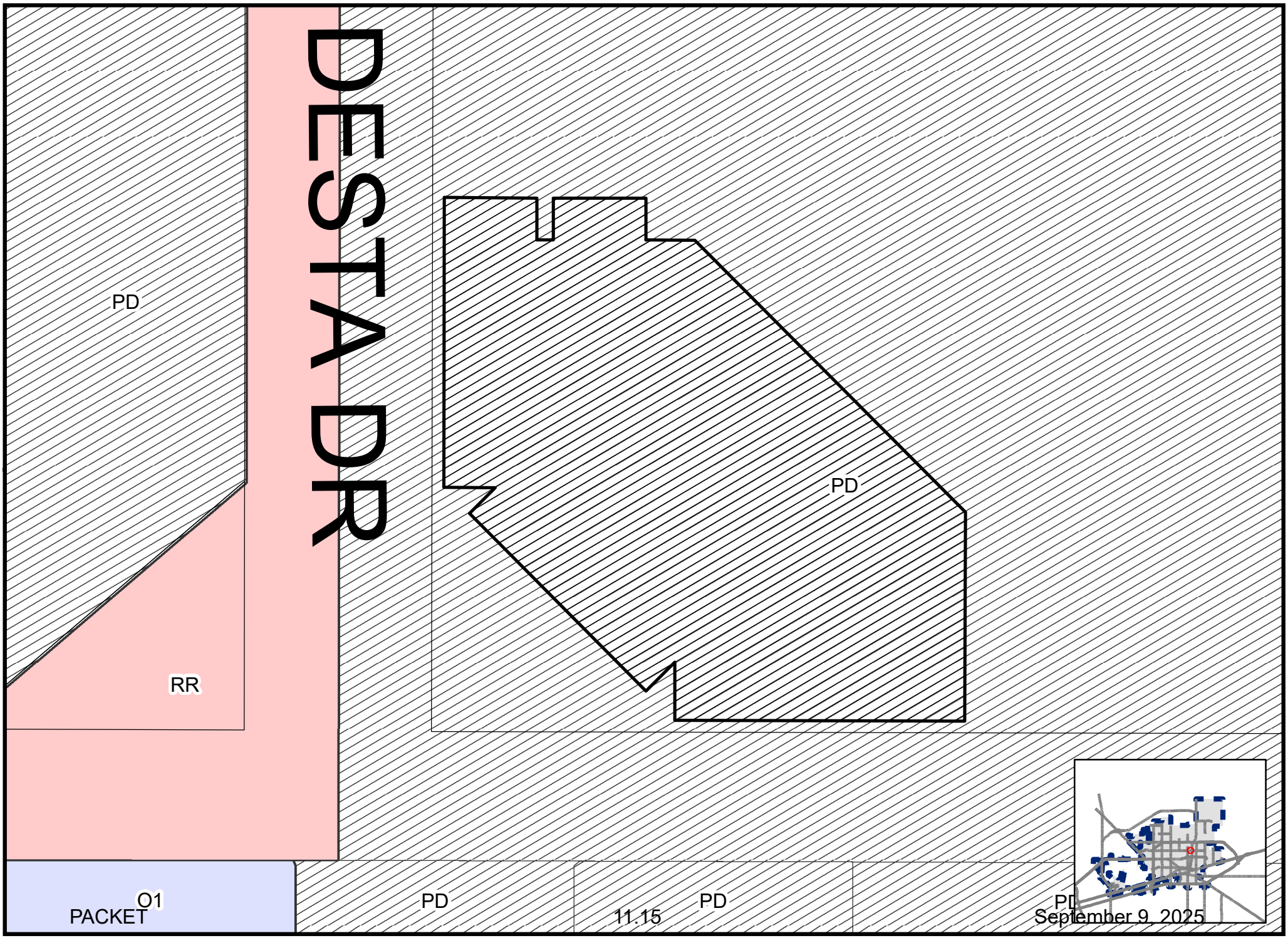
Generally located at the northeast corner of the intersection of Desta Drive and West Wadley Avenue (Council District

LEGEND

- CITY LIMITS
- PARCEL
- PRIVATE BLDGS



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THIS DATA IS NOT A SUBSTITUTION FOR A SURVEY PRODUCT OR IS INTENDED TO BE USED FOR PRECISE MEASUREMENTS OR OTHER DECISIONS BASED SOLELY ON THE INFORMATION CONTAINED HEREIN.
THE CITY OF MIDLAND SHALL NOT BE RESPONSIBLE FOR ANY DECISIONS BASED UPON THE USE OF THIS DATA.



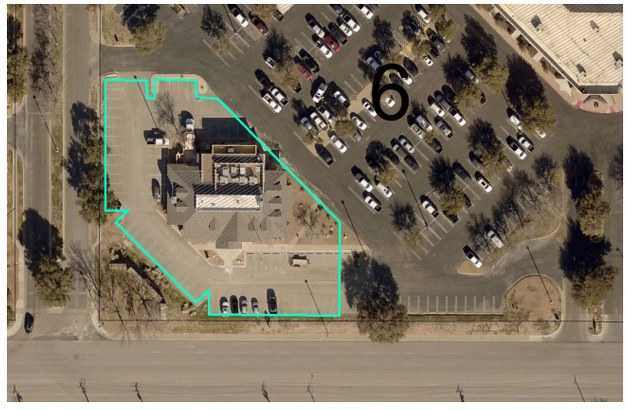
Map by

SUB-

Scale: 1" = 500'

ZONING MAP

© THE CITY OF MIDLAND - 2021: THIS DATA IS NOT A SUBSTITUTION FOR A SURVEY PRODUCT, NOR IS IT DESIGNED TO BE USED AS A PRIMARY TOOL IN PERMITTING OR OTHER DECISIONS BASED SOLELY ON THE INFORMATION CONTAINED HEREIN. THE CITY OF MIDLAND SHALL NOT BE RESPONSIBLE FOR ANY DECISIONS BASED UPON THE USE OF THIS DATA.

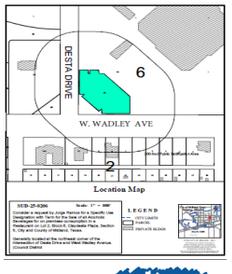

6




MIDLAND
Be the Energy!
SPECIFIC USE DESIGNATION
SANTOMAR
Visit Our Website
MIDLANDTEXAS.GOV

APPLICATION SUMMARY

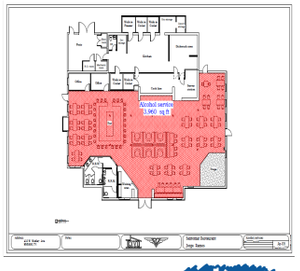
- **Applicant:** Jorge Ramos
- **Property Owner:** Manuel Herrera and Jose Castaneda
- **Location:** 418 West Wadley (Council District 3)
- **Reason for Request:** For the sale and on-premises consumption of alcohol



2

DETAILS OF REQUEST

- For an existing restaurant
- **Area of Business:** 7,633 SF
- **Serviceable Area:** 3,960 SF
- **Hours of Operation/Sales of Alcohol:**
  - Monday to Thursday 11 a.m. to 10 p.m.
  - Friday to Sunday 11 a.m. to 12 a.m.

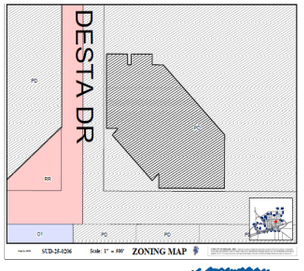


3

MIDLAND
Be the Energy!

ZONING

- **Current Zoning**: PD, Planned Development District for an Office and Retail Development
- **Surrounding Zoning:**
  - **North/East:** PD, Planned Development District for and Office and Retail Development
  - **West:** PD, Planned Development District for a Transitional District
  - **South:** PD, Planned Development District for a Shopping Center
- The use of an SUD for the sale and on-premises consumption is allowed in this zoning.



LAND USE

- **Current Use:** Vacant Building
- **Surrounding Uses:**
  - **North/East:** Office Use
  - **West:** Restaurant
  - **South:** Dry Cleaning Store and Spa



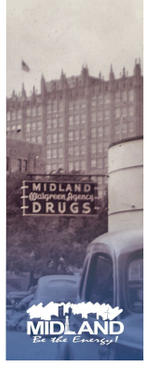
5



On West Wadley Avenue, Looking West

COMPREHENSIVE PLAN

This request is compatible with the *Tall City Tomorrow Comprehensive Plan* as it is consistent *Chapter 6-Character Plan, Goal 4*, which is to “Encourage the development of places where Midland residents can gather and socialize to build connections.”



7

PROHIBITED PLACES OF BUSINESS

There is no church, public school, public school ground, athletic stadium used by any public school, or public hospital within 300 feet of the building of the subject property as required by *Section 5-4-4 Prohibited Places of Business.*

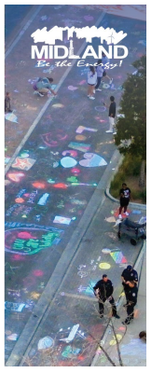


8

STAFF'S RECOMMENDATION

- No objections were received.
- Staff recommends approval of this request with the following conditions:

A. That the serviceable area of the Establishment shall be limited to approximately 3,960 square feet as shown in Exhibit A, which is attached hereto and incorporated herein for all purpose.

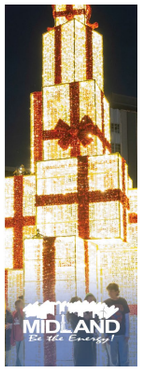


9

STAFF'S RECOMMENDATION

B. That the sale and on-premises consumption of alcoholic beverages shall conform to all applicable state and local laws.

C. That the days and hours of alcoholic beverage sales and consumption shall be limited to: Monday through Thursday from 11 a.m. to 10 p.m. and Friday through Sunday from 11 a.m. to 12 a.m. (midnight).



10

STAFF'S RECOMMENDATION

D. That the occupancy of the Establishment shall not exceed the maximum occupancy determined by the Building Code and Fire Code.

E. That the Establishment shall meet the requirements of the Fire Department and the Code Administration Division.



11

STAFF'S RECOMMENDATION

F. That the operator of the Establishment shall obtain a Certificate of Occupancy prior to the commencement of the sale of alcoholic beverages for on-premises consumption to ensure that the conditions of this Specific Use Designation With Term are satisfied.

G. That in accordance with Section 11-1-9.07.E.3 of the City Code, the Establishment shall be in operation within 120 days from the final adoption date of this ordinance.



12


MISSION
Deliver exceptional services and promote a high quality of life and place for ALL our citizens.

City Council Meeting

Item Number: 12

Meeting Date: August 26, 2025, September 9, 2025

To: City Council / City Manager

From: Britton Murry, Senior Planner

Subject: AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO REZONE A 302.39-ACRE TRACT OF LAND OUT OF SECTION 18, BLOCK 38, T-1-S, T&P RR CO. SURVEY, CITY AND COUNTY OF MIDLAND, TEXAS, FROM PD, PLANNED DEVELOPMENT DISTRICT FOR A HOUSING DEVELOPMENT TO AN AMENDED PD, PLANNED DEVELOPMENT DISTRICT FOR A HOUSING DEVELOPMENT (GENERALLY LOCATED AT THE NORTHEAST CORNER OF THE INTERSECTION OF NORTH FAIRGROUNDS ROAD AND FIREWHEEL ROAD); CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION (DISTRICT 1) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)

Purpose:

Maverick Engineering, on behalf of Betenbough Homes, LLC, is requesting to amend the current PD, Planned Development District for Housing Development (Ordinance No. 10564) to modify the lot sizes and lot configuration of the proposed housing development and revise the previously approved preliminary plat.

Recommended City Council Action:

Approve

Fiscal Impact:

None

Strategic Priority:

Quality of Life and Place

Discussion:

Current Zoning:

PD, Planned Development District for a Housing Development

Surrounding Zoning and Land Use:

The surrounding zoning to the north is SF-3, Single-Family Dwelling District and AE, Agricultural Estate District. The zoning to the east consists of LR, Local Retail District, MF-16, Multiple-Family Dwelling District, and 2F, Two-Family Dwelling (Duplex) District. The properties to the south are zoned PD, Planned Development District for Housing Development. The properties to the west are zoned PD, Planned Development District for Housing Development and SF-3, Single-Family Dwelling District. Surrounding land use consists of single-family housing, and vacant land.

Analysis:

Maverick Engineering, on behalf of Betenbough Homes LLC, is requesting a Zone Change for the development of multi-use site including single family housing, cottage housing, and greenspace uses. This proposed subdivision will have a total of one thousand two hundred and ninety-one (1,291) residential lots and approximately 60 acres of greenspace/detention pond that is composed of parks, trails, common areas, and drainage ponds.

The current zoning is PD, Planned Development District for a Housing Development and land use consists of single-family dwellings and vacant land.

The applicant is proposing the development to be executed in fifteen (12-26) phases. The lots width will vary anywhere from 45 to 75 feet and the minimum depth would be 83 feet. Below is a chart with the lot class tabulation, representing them by phases and percentage by lot widths.

Product Class		Smallest Lot Area SF	Smallest Lot Depth LF	Phase # 12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Percent of Total
Core	45'	4825	96'	46	30	50	22	25	45	27	38	31	30	46	26	29	20	35	38.7%
	50'	4851	90'	53	20	64	46	35	17	25	65	19	25	31	25	11	24	17	36.9%
Reserve	50'	5261	95'									5	7			10			1.7%
	60'	6095	95'									26	20			34			6.2%
	75'	11335	95'									1				1			0.2%
Cottages	50'	4120	83'	1	49	0	41	12	37	47	2	0	0	21	0	0	0	0	16.3%
PHASE TOTAL				100	99	114	109	72	99	99	105	82	82	98	51	85	44	52	100%
OVERALL TOTAL				1291															

These lots will have an underlying zoning of SF-3, Single Family Dwelling District but with the following amendments. The minimum dimensions are as follows:

For core dwellings:

1. The minimum lot Width shall be 45 feet.
2. The minimum lot Depth be 90 feet.
3. The minimum lot Area shall be 4,825 square feet.

For cottages:

1. A minimum lot Width shall be 50 feet.
2. A minimum lot Depth shall be 83 feet.
3. A minimum lot Area shall be 4,120 square feet.

For reserve dwellings:
1. The minimum lot Width shall be 50 feet.
2. The minimum lot depth shall be 95 feet.
3. The minimum lot Area shall be 5,261 feet.

The proposed uses consist of three product classes which are:

- 977 - Core (SF-3, Single-Family Dwelling District lots);
- 104 - Reserve (SF-3, Single-Family Dwelling District lots);
- 210 - Cottages (SF-3, Single-Family District lots);

The appropriate setbacks and maximum height of future development must meet the regulations described in Section 5.04 Residential Zoning District Dimensional Regulations chart. Not all the proposed lots meet the minimum lot depth, minimum lot width, and minimum lot area requirements of the SF-3 district. However, the new PD Ordinance will allow reduced depth, width, and areas as outlined above.

This proposed zone change has been circulated to the respective City departments for internal review and their comments, conditions, and requirements are as follows:

Fire: (Approved)

No comments or objections.

Oil and Gas: (Approved)

No Oil & Gas issues with Zoning.

Engineering: (Approved)

No objections to zone change. [For Applicant's Information Only.] Site drainage, utilities, driveway access, and traffic circulation may be adjusted during construction drawing review as necessary to receive building permit approval from Engineering and Traffic Operations. [For Applicant's Information Only.]

Code: (Approved)

No issues. All future structures must adhere to the 2018 International Building Codes, the 2015 International Energy Code, the 2023 NEC requirements, the 2015 International Fire Codes, local city ordinances, zoning requirements, established setbacks, oil and gas considerations, and floodplain requirements if necessary. Code versions are subject to change depending on the time of new code editions adopted in the City of Midland and date of permit application.

Transportation: (Approved)

Site drainage, utilities, driveway access, and traffic circulation may be adjusted during construction drawing review as necessary to receive building permit approval from Engineering and Traffic Operations. [For the Applicant's information only.] No objection to zone change. [For the Applicant's information only.]

Planning:

The area is classified as Urban Residential-Low, in part, which calls for restrictive land use, emphasizing single-family detached development. The area is also classified as Urban Medium which calls for a mix of complementary uses, including single-family housing, multi-family housing, schools, mid-sized parks and churches, commercial and mixed use. The plan also calls for a parkway that would run through the property which is identified on the amenity plan. All of these uses are compatible with the Low and Medium designations.

The Tall City Tomorrow Comprehensive Plan, Chapter 3 An Integrated Land Use Vision, "Development Policy Areas" labels this area as part of the "Current Development Area" which seeks to address the compatibility of uses, "specifically between different housing intensities," As shown in the proposed site plan, the applicant is planning to create a gradual transition from existing housing developments at the western edge of the property in question which is consistent with this statement.

Principle 4 of Chapter 3 of the Tall City Tomorrow Plan seeks to increase the diversity of the housing stock in Midland specifically including the need of smaller lot homes. This proposal works in compliance since the development will be introducing a neighborhood with a mix of housing intensities to include single-family sized lots of varying in size. Additionally, Principle 8 of the Chapter 3 requests that land use policies and regulations support the creation of more balanced neighborhoods, which include "a variety of housing options, access to open space, and contain activity centers such as parks…" The applicant is proposing to develop more specifically delineated park space and trails in the development which will help give the residents a diversity of recreation allowing for a more balance feel.

Principle 5 of Chapter 3 requests planning for community amenities such as parks and open space to support "community activity, personal interaction a sense of place, and ultimately a sense of ownership in the community." The applicant is proposing to include parks, green space, and trails, all of which will contribute to creating a sense of place for new residents.

Staff recommends approval of this request subject to conditions A through C.

Conditions:

A. **That the Property, including the minimum dimensions of each lot and the minimum area of each lot contained therein, shall significantly conform to the site plan attached hereto as Exhibit "B".**

B. **That the Property shall significantly conform to the amenity plan, which is attached hereto as Exhibit "C" and incorporated herein for all purposes.**

C. **That all signage shall conform to the regulations set forth in Title XI, Chapter 7a of the City Code.**

Letters of Objection:

As of August 15, 2025, staff has received no letters of objection for this request.

Attachments:

Application
Metes and Bounds (Exhibit A)
Site Plan (Exhibit B)
Amenity Plan (Exhibit C)
Maps
Aerial
Site Photo
PowerPoint Presentation

City Manager's Office

ORDINANCE NO. _____

AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO REZONE A 302.39-ACRE TRACT OF LAND OUT OF SECTION 18, BLOCK 38, T-1-S, T&P RR CO. SURVEY, CITY AND COUNTY OF MIDLAND, TEXAS, FROM PD, PLANNED DEVELOPMENT DISTRICT FOR A HOUSING DEVELOPMENT TO AN AMENDED PD, PLANNED DEVELOPMENT DISTRICT FOR A HOUSING DEVELOPMENT (GENERALLY LOCATED AT THE NORTHEAST CORNER OF THE INTERSECTION OF NORTH FAIRGROUNDS ROAD AND FIREWHEEL ROAD); CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION

WHEREAS, the City Planning and Zoning Commission and the Governing Body of the City of Midland, in compliance with the City Charter, the City Code, and State law, have given the requisite notices by United States mail, publication and otherwise; and after a full and fair hearing to all of the property owners generally and particularly to those interested persons situated in the affected area and in the vicinity thereof, the Governing Body finds that the public health, safety and general welfare will be best served by rezoning a 302.39-acre tract of land out of Section 18, Block 38, T-1-S, T&P RR Co. Survey, City and County of Midland, Texas, said tract being more specifically described by metes and bounds in Exhibit A, which is attached hereto and incorporated herein (the "Property") to an amended PD, Planned Development District for a Housing Development and adopting a site plan therefor, as set out hereinafter;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That the Zoning District Map of the City of Midland, Texas, is hereby amended to rezone the Property from PD, Planned Development District for a Housing Development to an amended PD, Planned Development District for a Housing Development.

SECTION TWO. That the base zoning district to which the use and development of the Property shall conform, except as modified by Section Three of this ordinance, is the SF-3, Single-Family Dwelling District.

SECTION THREE. That a site plan, which is attached hereto as Exhibit B and incorporated herein for all purposes, is hereby adopted, and the use and development of the Property shall be subject to the following conditions and restrictions:

A. That the Property, including the minimum dimensions of each lot and the minimum area of each lot contained therein, shall significantly conform to the site plan attached hereto as Exhibit B.

B. That the Property shall significantly conform to the amenity plan, which is attached hereto as Exhibit C and incorporated herein for all purposes.

C. That all signage shall conform to the regulations set forth in Title XI, Chapter 7a of the City Code.

SECTION FOUR. That the definitions given in the zoning regulations contained in the City Code of the City of Midland, Texas, shall be applicable to such of those terms as are used herein.

SECTION FIVE. The provisions of this ordinance are to be cumulative of all other ordinances or parts of ordinances governing or regulating the same subject matter as that covered herein; provided, however, that all prior ordinances or parts of ordinances inconsistent with or in conflict with any of the provisions of this ordinance are hereby expressly repealed to the extent of any such inconsistency or conflict.

SECTION SIX. If any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional or invalid, such holding shall not affect the validity of the remaining portions of this ordinance. The Council of the City of Midland hereby declares that it would have passed this ordinance and each section, subsection, sentence, clause, or phrase hereof irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared unconstitutional or invalid.

SECTION SEVEN. The penalty for violation of this ordinance shall be in accordance with the general penalty provisions contained in Section 1-3-1 of the City

Code of Midland, Texas, which provides for a fine not exceeding two thousand dollars ($2,000.00).

SECTION EIGHT. The City Secretary is hereby authorized and directed to publish the descriptive caption of this ordinance in the manner and for the length of time prescribed by the law as an alternative method of publication.

The above and foregoing ordinance was duly proposed, read in full and adopted on first reading, the _____ day of _____, A.D., 2025; and passed to second reading on motion of Council member _____, seconded by Council member _____, by the following vote:

Council members voting "AYE":

Council members voting "NAY":

The above and foregoing ordinance was read in full and finally adopted by the following vote upon motion of Council member _____, seconded by Council member _____, on the _____ day of _____, A.D., 2025, at a regular meeting of the City Council:

Council members voting "AYE":

Council members voting "NAY":

PASSED AND APPROVED THIS _____ day of _____, A.D., 2025.

_____
Lori Merritt Blong, Mayor

ATTEST:

_____
Marcia Bentley-German, City Secretary

APPROVED AS TO CONTENT
AND COMPLETENESS:

_____
Elizabeth Triggs, Planning and Development Officer

APPROVED ONLY AS TO FORM:

_____
Nicholas Toulet, Interim City Attorney

EXHIBIT A

MAVERICK
ENGINEERING · SURVEY · WATER RESOURCES
1909 West Wall Street, Suite A · Midland, TX 79701
Tel. 432.262.0999 · Fax · 432.262.0909 · maverick-eng.com
ENGINEER FIRM # F-11089 | SURVEY FIRM # 10194015

FIELD NOTE DESCRIPTION OF A 302.39 ACRE TRACT OF LAND, SITUATED IN SECTION 18, BLOCK 38, TOWNSHIP 1 SOUTH, ABSTRACT NUMBER 734, GLO FILE NUMBER 66103, TEXAS and PACIFIC RAILWAY COMPANY SURVEY, MIDLAND COUNTY, TEXAS, AND BEING A PORTION OF THAT SAME TRACT CALLED FOR IN DOCUMENT NUMBER 2018-20726 OF THE OFFICIAL PUBLIC RECORDS (OPR) OF SAID MIDLAND COUNTY, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS;

BEGINNING AT N.(y): 10723537.29, E.(x): 1758089.19, A ONE HALF INCH IRON ROD WITH A PLASTIC CAP MARKED "ASB 5689", FOUND ON THE NORTH LINE OF SAID SECTION 18, AT THE NORTHEAST CORNER OF A CALLED 22.96 ACRE TRACT DESCRIBED IN DOCUMENT NUMBER 2019-3532 OF SAID PUBLIC RECORDS, FROM WHICH A ONE HALF INCH IRON ROD FOUND AT A FENCE CORNER AND ACCEPTED AS BEING IN THE POSITION OF THE PATENTED IRON PIPE AT THE COMMON WEST CORNER OF SAID SECTION 18 AND SECTION 7 OF THE SAME BLOCK BEARS S.75°19'52"W., ALONG THE COMMON LINE OF SAID SECTIONS 7 AND 18, 156.42 FEET, AND BEING THE NORTHWEST CORNER HEREOF;

THENCE N.75°19'52"E., ALONG THE COMMON LINE OF SAID SECTIONS 7 AND 18, 4899.40 FEET TO A RED PLASTIC CAP MARKED "MAVERICK FIRM#10194014" (RPC) SET AT A POINT OF DEFLECTION RIGHT FOR A CURVE TO THE LEFT HAVING A RADIUS OF 1040.00 FEET AND A CHORD BEARING AND DISTANCE OF S.00°5'159"E., 431.04 FEET BEING ON THE EAST LINE OF PROPOSED "TODD DRIVE" FOR THE NORTHEAST CORNER HEREOF;

THENCE ALONG SAID TODD DRIVE AND THE ARC OF SAID CURVE BEING CONCAVE TO THIS TRACT 434.18 FEET TO THE POINT OF TANGENCY;

THENCE S.18°49'35"E., CONTINUING ALONG SAID TODD DRIVE, 1868.51 FEET TO A POINT OF CURVATURE FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 3560.00 FEET AND A CHORD BEARING AND DISTANCE OF S.16°37'01"E., 197.40 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT, 197.45 FEET TO A POINT OF DEFLECTION RIGHT FOR THE SOUTHEAST CORNER HEREOF;

THENCE THE FOLLOWING 9 COURSES AND DISTANCES ALL TO AN "RPC" FOUND, TO A POINT OF DEFLECTION LEFT FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 1305.00 FEET AND A CHORD BEARING AND DISTANCE OF S.43°21'40"W., 886.78 FEET;

1. S.75°20'52"W., 265.00 FEET;
2. S.80°51'01"W., 60.26 FEET;
3. S.75°20'52"W., 115.00 FEET;
4. S.14°25'02"E., 7.06 FEET;
5. S.75°20'52"W., 115.00 FEET;
6. S.81°18'37"W., 60.27 FEET;
7. S.69°08'15"W., 114.62 FEET;
8. S.14°39'08"E., 46.14 FEET;
9. S.77°16'15"W., 15.51 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 904.79 FEET TO A POINT OF DEFLECTION RIGHT;

THENCE N.26°46'36"W., 115.00 FEET TO AN "RPC" FOUND.

THENCE N.29°45'59"W., 80.11 FEET TO AN "RPC" FOUND;

THENCE N.26°33'48"W., 115.00 FEET TO AN "RPC" FOUND AT A POINT OF DEFLECTION LEFT FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 995.00 FEET AND A CHORD BEARING AND DISTANCE OF S.66°52'14"W., 119.20 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 119.27 FEET TO A POINT OF TANGENCY;

THENCE S.72°23'25"W., 72.42 FEET TO A POINT OF CURVATURE FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 995.00 FEET AND A CHORD BEARING AND DISTANCE OF S.78°25'37"W., 137.13 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 137.24 FEET TO A POINT OF DEFLECTION LEFT;

THENCE S.07°37'18"E., 115.00 FEET TO AN "RPC" FOUND AT A POINT OF DEFLECTION RIGHT FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 1110.00 FEET AND A CHORD BEARING AND DISTANCE OF N.88°33'08"W., 349.94 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 351.41 FEET TO A POINT OF REVERSE CURVATURE FOR A CURVE TO THE LEFT HAVING A RADIUS OF 1950.00 FEET AND A CHORD BEARING AND DISTANCE OF N.81°45'01"W., 154.30 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONCAVE TO THIS TRACT 154.34 FEET TO A POINT OF DEFLECTION RIGHT;

THENCE THE FOLLOWING 3 COURSES AND DISTANCES TO A POINT OF DEFLECTION RIGHT FOR A CURVE TO THE LEFT HAVING A RADIUS OF 1950.00 FEET AND A CHORD BEARING AND DISTANCE OF S.73°17'02"W., 1317.88 FEET;

1. N.42°57'36"W., 30.03 FEET;
2. N.85°29'51"W., 60.34 FEET;
3. S.45°51'35"W., 27.04 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONCAVE TO THIS TRACT 1344.34 FEET TO A POINT OF REVERSE CURVATURE FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 920.00 FEET AND A CHORD BEARING AND DISTANCE OF S.64°37'59"W., 354.22 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 356.44 FEET TO THE POINT OF TANGENCY;

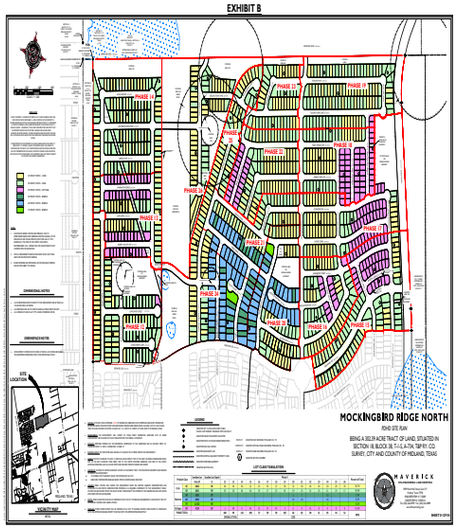
THENCE THE FOLLOWING 5 COURSES AND DISTANCES;

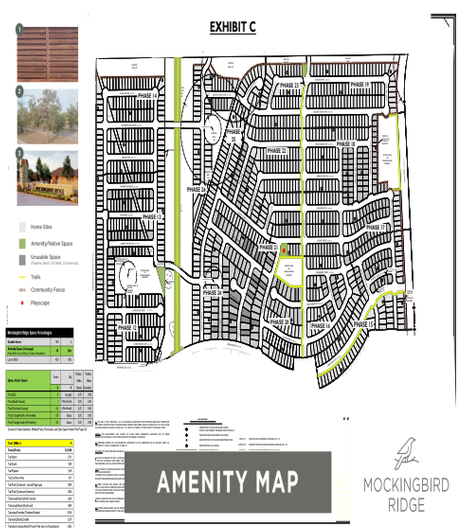
1. S.75°43'57"W., 651.20 FEET;
2. N.59°20'03"W., 28.32 FEET;
3. S.74°47'34"W., 79.96 FEET;
4. S.75°43'57"W., 95.07 FEET TO AN "RPC" FOUND FOR THE SOUTHWEST CORNER HEREOF;
5. N.14°24'01"W., 2733.97 FEET TO THE **POINT OF BEGINNING**, CONTAINING 302.39 ACRES OF LAND.

JULY 10, 2025

Gregory W. Shoults
www.maverick-eng.com
Texas RPLS - No. 5356
Maverick Engineering (TBPE – No. 10194514)

EXHIBIT B


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MOCKINGBIRD RIDGE NORTH
RDHS SITE PLAN
BEING A 363.91 ACRE TRACT OF LAND, SITUATED IN SECTION 16 BLOCK 38, T-1-N, ATN, T&P R. CO. SURVEY, CITY AND COUNTY OF MIDLAND, TEXAS
MAVERICK


EXHIBIT C
Home Sites
Amenity/Native Space
Unusable Space
Trails
Community Fence
Playscape
AMENITY MAP
MOCKINGBIRD RIDGE

Docusign Envelope ID: C173A87D-32E2-497C-BC94-E8FE889F536E

MIDLAND Planning Division

Zone Change/Planned District Amendment/Site Plan Approval

Project Number:_____

Case Number:_____

Applicant *(if acting as Agent, see affidavit on page 2)* Printed Name: Betenbough Homes LLC		Phone (432) 262-0999 Email brello@betenbough.com	
Address 6305 82nd St	City Lubbock	State TX	Zip 79424
Property Owner Printed Name: see applicant		Phone ( ) Email	
Address	City	State	Zip
Representative *(if different from Applicant or Property Owner)* Firm: Maverick Engineering Printed Name: Andrew Mellen		Phone (432) 262-0999 Email amellen@maverick-eng.com	
Address 1909 W Wall St Ste K	City Midland	State TX	Zip 79701

Street Address: NA

Legal Description Lot: Block 302.39 ACRE TRACT OF LAND, SITUATED IN SECTION 18, BLOCK 38, T-1-S, A-734, T&P RY. CO. SURVEY, CITY AND COUNTY OF MIDLAND, TEXAS

Current Zoning: LR, TH, MF16, SF3, SF2 SF1, 2F

Proposed Zone: PDHD *(List by tracts if more than one district is requested)*

Reason for Zone Change Request: To advance proposed housing development

Present Use of Property: vacant

Proposed Use of Property: Residential

How would this zone change affect the public health, safety and welfare? no adverse affect

Describe how conditions affecting the property have changed since present zoning designation: No Change since original zoning

Submittal and Fees
Items to be submitted with this application form:
- Application Fee – Payable to the 'City of Midland'
- Dimensioned Site Plan
- Digital Copies of Site Plan (PDF/JPEG)

Docusign Envelope ID: C173A87D-33E2-497C-BC94-EBFEB89F536E

Signature *(by property owner only – authorized agent must sign affidavit below)*

Applicant (signature): Abe Fuentez	Date: 7/14/2025
Applicant (printed): Abe Fuentez	
Property Owner (signature): see applicant	Date:
Property Owner (printed) : see applicant	

The Zone Change/Planned District Amendment/Site Plan Approval shall be considered officially received in the Planning office only when it has been submitted in full compliance with the provisions of Section 212 of the Texas Local Government Code and the Zoning Code of Ordinances of the City of Midland and when such required items for the application are also received.

All materials, including exhibits, submitted in support of an application, or displayed during a public hearing, shall remain the property of the City of Midland.

If an agent is authorized by the property owner to file and execute the application on behalf of the property owner, the agent must complete the affidavit below.

STATE OF TEXAS
COUNTY OF MIDLAND

Before me, the undersigned authority, on this day personally appeared Andrew Miller who, being by me duly sworn, upon oath says: That (s)he is authorized by Rattenbury Homes LLC the owner of the above described property, to fully represent him/her in this application and that (s)he had the legal right, power and authority to sign said owner's name hereto as his/her attorney in fact.

Andrew L. Miller
Authorized Agent (signature)

Subscribed and sworn to before me, this 21st day of July 20 25, to certify which witness my hand and seal of office.

SAVANNAH DAVIS
Notary Public, State of Texas
Comm. Expires 05-20-2028
Notary ID 134607724

NOTARY PUBLIC, MIDLAND COUNTY, TEXAS

FOR OFFICE USE ONLY

☑ Property Owner Authorization	☐ Dimensioned Site Plan
☐ Application Fee	☑ Plans in Digital Format (PDF/JPEG)
Check # 5449	RECEIVED
Received By:	Date: JUL 2 9 2025

****Application will not be considered for scheduling until reviewed by a planner.****

MAVERICK
ENGINEERING · SURVEY · WATER RESOURCES
1909 West Wall Street, Suite A · Midland, TX 79701
Tel. 432.262.0999 · Fax. 432.262.0909 · maverick-eng.com
ENGINEER FIRM # F-11089 | SURVEY FIRM # 10194513

FIELD NOTE DESCRIPTION OF A 302.39 ACRE TRACT OF LAND, SITUATED IN SECTION 18, BLOCK 38, TOWNSHIP 1 SOUTH, ABSTRACT NUMBER 734, GLO FILE NUMBER 66103, TEXAS and PACIFIC RAILWAY COMPANY SURVEY, MIDLAND COUNTY, TEXAS, AND BEING A PORTION OF THAT SAME TRACT CALLED FOR IN DOCUMENT NUMBER 2018-20726 OF THE OFFICIAL PUBLIC RECORDS (OPR) OF SAID MIDLAND COUNTY, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS;

BEGINNING AT N.(y). 10723537.29, E.(x). 1758089.19, A ONE HALF INCH IRON ROD WITH A PLASTIC CAP MARKED "ASB 5689", FOUND ON THE NORTH LINE OF SAID SECTION 18, AT THE NORTHEAST CORNER OF A CALLED 22.96 ACRE TRACT DESCRIBED IN DOCUMENT NUMBER 2019-3532 OF SAID PUBLIC RECORDS, FROM WHICH A ONE HALF INCH IRON ROD FOUND AT A FENCE CORNER AND ACCEPTED AS BEING IN THE POSITION OF THE PATENTED IRON PIPE AT THE COMMON WEST CORNER OF SAID SECTION 18 AND SECTION 7 OF THE SAME BLOCK BEARS S.75°19'52"W., ALONG THE COMMON LINE OF SAID SECTIONS 7 AND 18, 156.42 FEET, AND BEING THE NORTHWEST CORNER HEREOF;

THENCE N.75°19'52"E., ALONG THE COMMON LINE OF SAID SECTIONS 7 AND 18, 4894.40 FEET TO A RED PLASTIC CAP MARKED "MAVERICK FIRM#10194514" (RPC) SET AT A POINT OF DEFLECTION RIGHT FOR A CURVE TO THE LEFT HAVING A RADIUS OF 1040.00 FEET AND A CHORD BEARING AND DISTANCE OF S.06°5'19"E., 431.04 FEET BEING ON THE EAST LINE OF PROPOSED "TODD DRIVE" FOR THE NORTHEAST CORNER HEREOF;

THENCE ALONG SAID TODD DRIVE AND THE ARC OF SAID CURVE BEING CONCAVE TO THIS TRACT 434.18 FEET TO THE POINT OF TANGENCY;

THENCE S.18°49'35"E., CONTINUING ALONG SAID TODD DRIVE, 1868.51 FEET TO A POINT OF CURVATURE FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 3560.00 FEET AND A CHORD BEARING AND DISTANCE OF S.16°37'01"E., 197.40 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT, 197.45 FEET TO A POINT OF DEFLECTION RIGHT FOR THE SOUTHEAST CORNER HEREOF;

THENCE THE FOLLOWING 9 COURSES AND DISTANCES ALL TO AN "RPC" FOUND, TO A POINT OF DEFLECTION LEFT FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 1305.00 FEET AND A CHORD BEARING AND DISTANCE OF S.43°21'40"W., 886.78 FEET;

1. S.75°20'52"W., 265.00 FEET;
2. S.80°51'01"W., 60.26 FEET;
3. S.75°20'52"W., 115.00 FEET;
4. S.14°25'02"E., 7.06 FEET;
5. S.75°20'52"W., 115.00 FEET;
6. S.81°18'37"W., 60.27 FEET;
7. S.69°08'15"W., 114.62 FEET;
8. S.14°39'08"E., 46.14 FEET;
9. S.77°16'15"W., 15.51 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 904.79 FEET TO A POINT OF DEFLECTION RIGHT;

THENCE N.26°46'36"W., 115.00 FEET TO AN "RPC" FOUND.

THENCE N.29°45'59"W., 80.11 FEET TO AN "RPC" FOUND;

THENCE N.26°33'48"W., 115.00 FEET TO AN "RPC" FOUND AT A POINT OF DEFLECTION LEFT FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 995.00 FEET AND A CHORD BEARING AND DISTANCE OF S.66°52'14"W., 119.20 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 119.27 FEET TO A POINT OF TANGENCY;

THENCE S.72°23'25"W., 72.42 FEET TO A POINT OF CURVATURE FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 995.00 FEET AND A CHORD BEARING AND DISTANCE OF S.78°25'37"W., 137.13 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 137.24 FEET TO A POINT OF DEFLECTION LEFT;

THENCE S.07°37'18"E., 115.00 FEET TO AN "RPC" FOUND AT A POINT OF DEFLECTION RIGHT FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 1110.00 FEET AND A CHORD BEARING AND DISTANCE OF N.88°33'08"W., 349.94 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 351.41 FEET TO A POINT OF REVERSE CURVATURE FOR A CURVE TO THE LEFT HAVING A RADIUS OF 1950.00 FEET AND A CHORD BEARING AND DISTANCE OF N.81°45'01"W., 154.30 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONCAVE TO THIS TRACT 154.34 FEET TO A POINT OF DEFLECTION RIGHT;

THENCE THE FOLLOWING 3 COURSES AND DISTANCES TO A POINT OF DEFLECTION RIGHT FOR A CURVE TO THE LEFT HAVING A RADIUS OF 1950.00 FEET AND A CHORD BEARING AND DISTANCE OF S.73°17'02"W., 1317.88 FEET;

1. N.42°57'36"W., 30.03 FEET;
2. N.85°29'51"W., 60.34 FEET;
3. S.45°51'35"W., 27.04 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONCAVE TO THIS TRACT 1344.34 FEET TO A POINT OF REVERSE CURVATURE FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 920.00 FEET AND A CHORD BEARING AND DISTANCE OF S.64°37'59"W., 354.22 FEET;

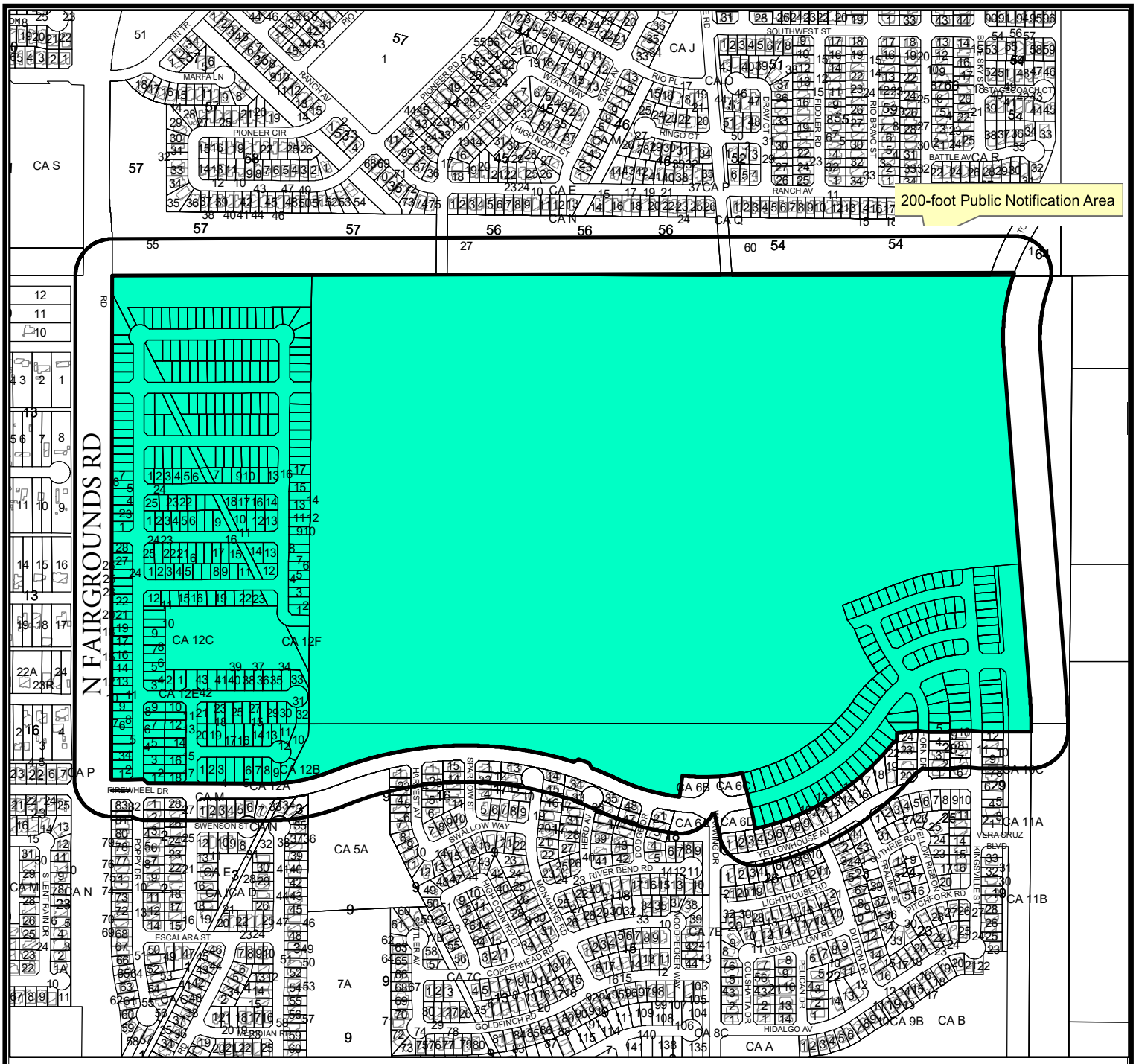
THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 356.44 FEET TO THE POINT OF TANGENCY;

THENCE THE FOLLOWING 5 COURSES AND DISTANCES;

1. S.75°43'57"W., 651.20 FEET;
2. N.59°20'03"W., 28.32 FEET;
3. S.74°47'34"W., 79.96 FEET;
4. S.75°43'57"W., 95.07 FEET TO AN "RPC" FOUND FOR THE SOUTHWEST CORNER HEREOF;
5. N.14°24'01"W., 2733.97 FEET TO THE **POINT OF BEGINNING**, CONTAINING 302.39 ACRES OF LAND.

JULY 10, 2025

Gregory W. Shoults
www.maverick-eng.com
Texas RPLS - No. 5356
Maverick Engineering (TBPLS – No. 10194514)



Location Map

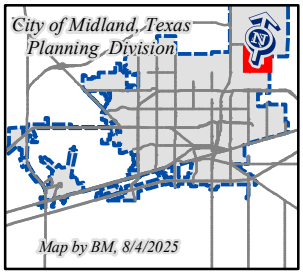
Z-25-0437 **Scale: 1" = 775'**

Consider a request by Betenbough Homes for a zone change from, PD, Planned Development District for Housing Development to PD, Planned Development District for Housing Development out of a 302.39-acre tract of land, in Section 18, Block 38, T-I-S, A-734, T&P RY. CO. Survey, City and County of Midland, Texas.

Generally located at the northeast corner of the intersection of North Fairgrounds Road and Firewheel Road. (Council District 1)

LEGEND

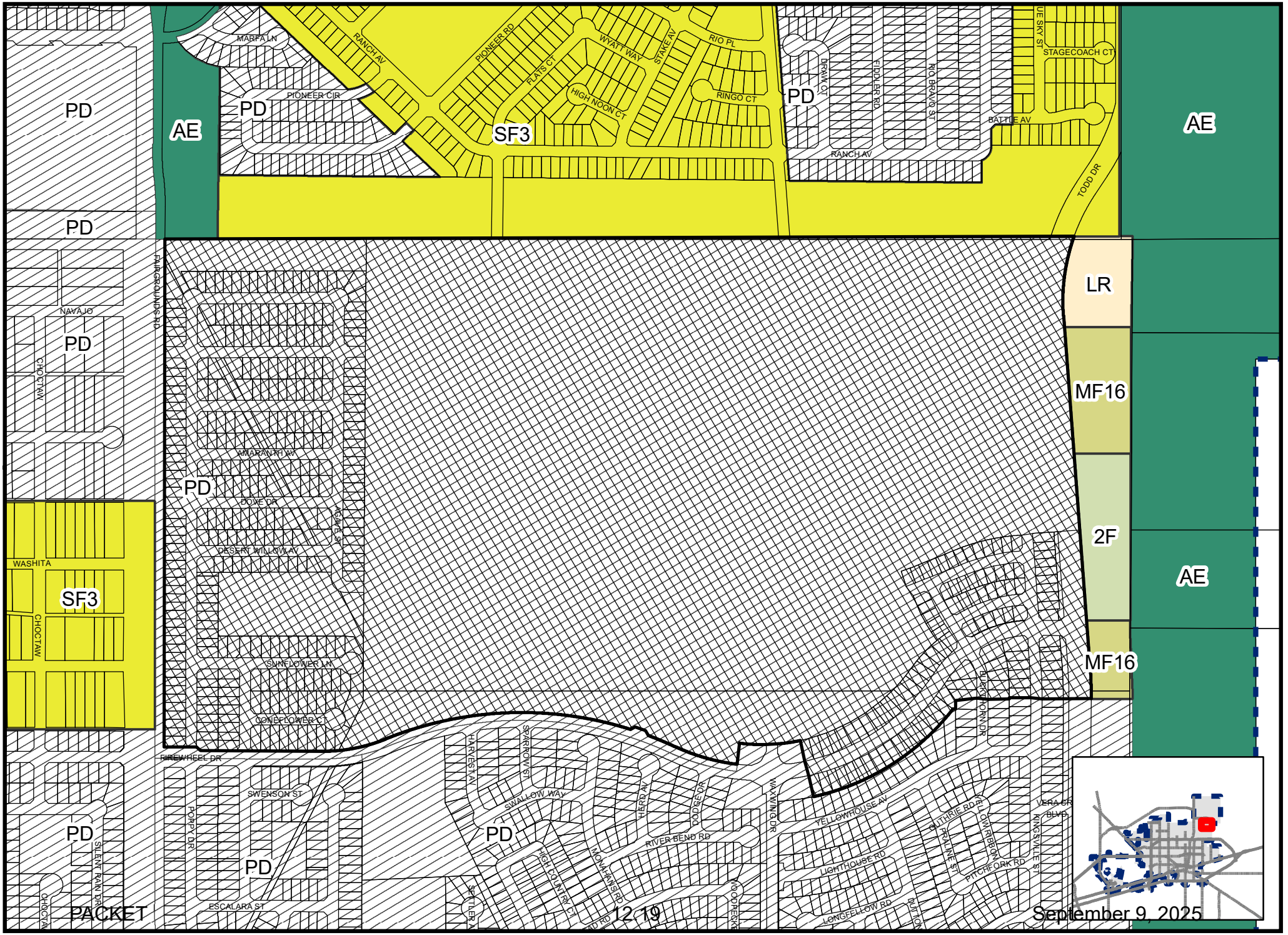
- CITY LIMITS
- PARCEL
- PRIVATE BLDGS



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THIS DATA IS NOT A SUBSTITUTION FOR A SURVEY PRODUCT NOR IS IT SUITABLE TO BE USED AS THE PRIMARY TOOL FOR ZONING OR OTHER DECISIONS BASED SOLELY ON THE INFORMATION CONTAINED HEREIN.

THE CITY OF MIDLAND SHALL NOT BE RESPONSIBLE FOR ANY DECISIONS BASED UPON THE USE OF THIS DATA.



Map by BM, 8/4/2025

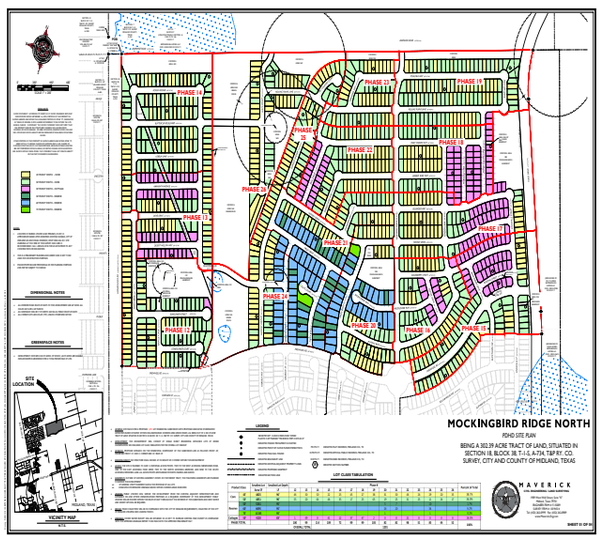
Z-25-0437

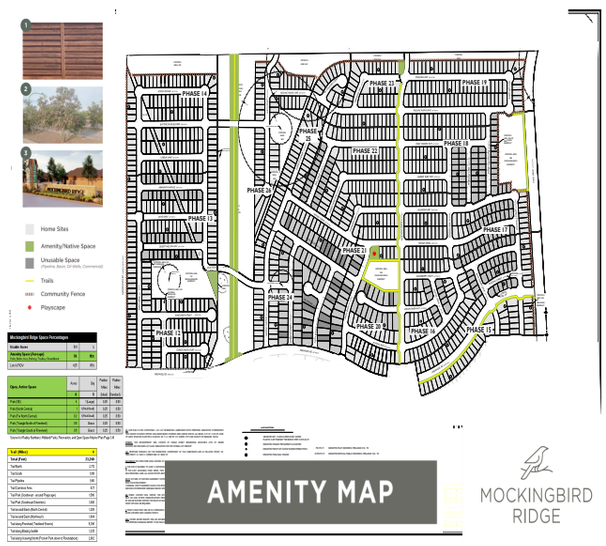
Scale: 1" = 646'

ZONING MAP

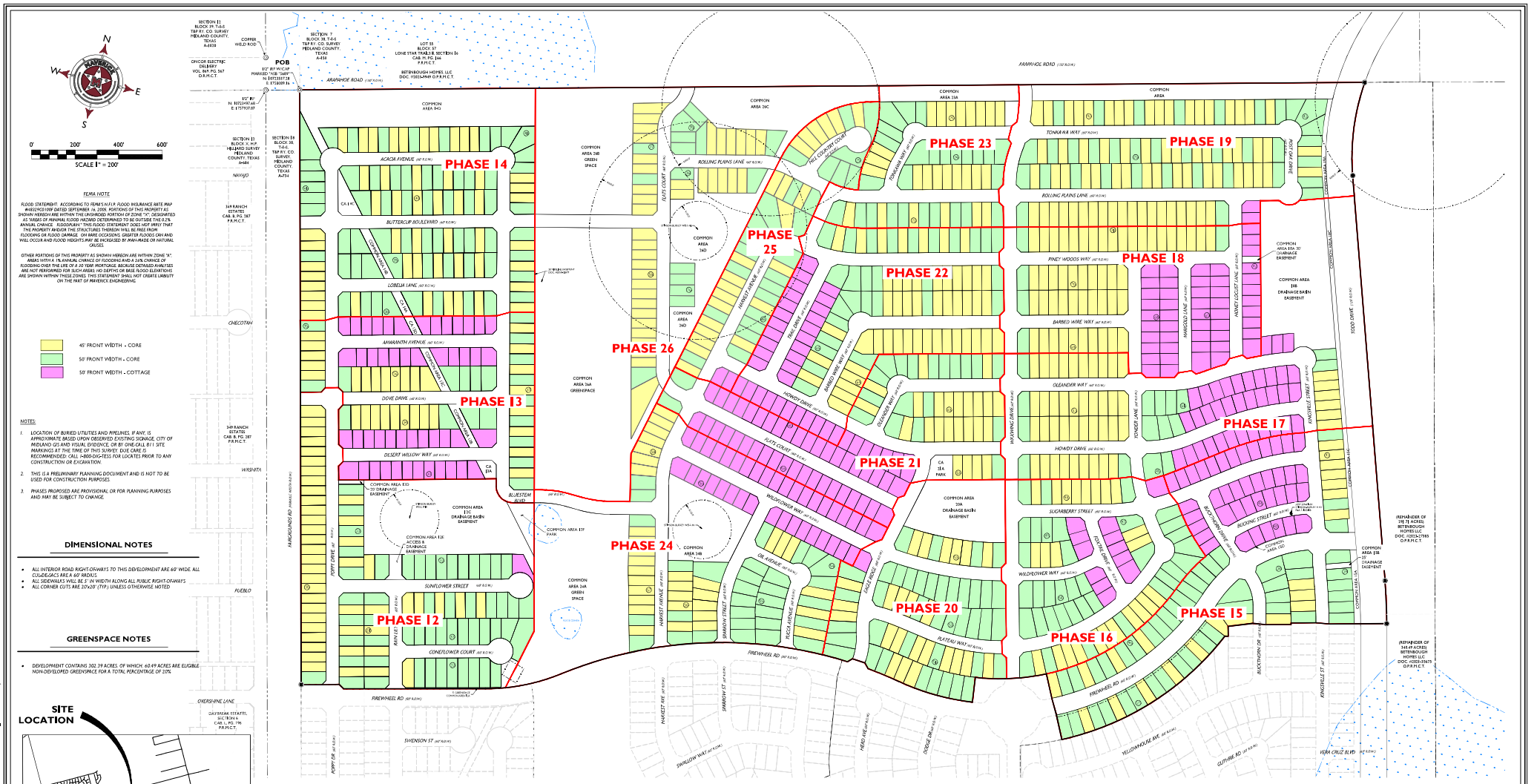
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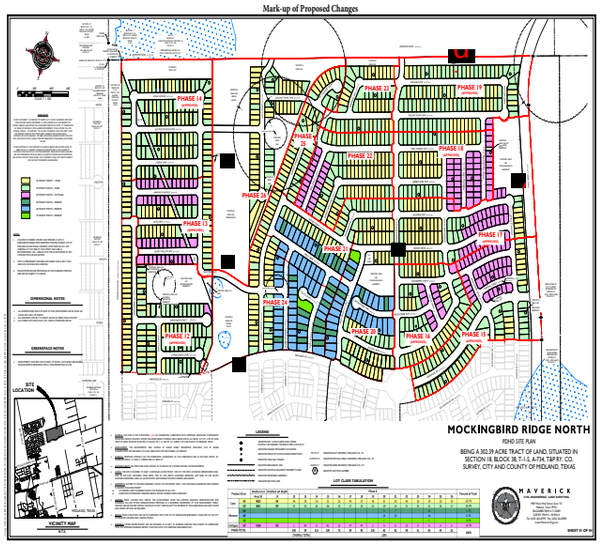

MOCKINGBIRD RIDGE NORTH
PDHD SITE PLAN
BEING A 302.29 ACRE TRACT OF LAND, SITUATED IN SECTION 18, BLOCK 38, T-1-S, A-774, T&P RY. CO. SURVEY, CITY AND COUNTY OF MIDLAND, TEXAS
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Home Sites
Amenity/Native Space
Unusable Space
Trails
Community Fence
Playscape
AMENITY MAP
MOCKINGBIRD RIDGE

Currently Approved Site Plan



Mark-up of Proposed Changes

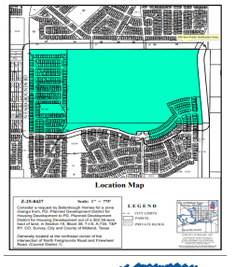





MIDLAND
Be the Energy!
ZONE CHANGE
MOCKINGBIRD RIDGE
Visit Our Website
MIDLANDTEXAS.GOV

APPLICATION SUMMARY

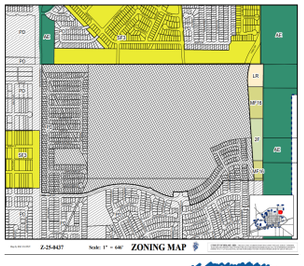
- **Applicant/Property Owner:** Betenbough Homes, LLC
- **Representative:** Andrew Mellen, with Maverick Engineering
- **Location:** Generally located at the northeast corner of the intersection of North Fairgrounds Road and Firewheel Road. (Council District 1)
- **Reason for Request:** To adjust the site plan associated with the current Planned Development District



MIDLAND
Be the Energy!

ZONING

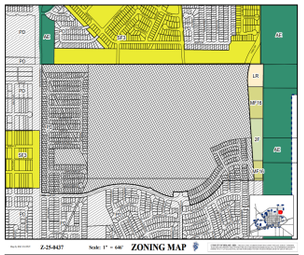
- **Current Zoning:** PD, Planned Development District for a Housing Development
- **Surrounding Zoning:**
  - **North:** SF-3, Single-Family Dwelling District and AE, Agricultural Estate District
  - **South:** PD, Planned Development District for a Housing Development



3

ZONING

- **Surrounding Zoning:**
  - **East:** LR, Local Retail District, MF-16, Multiple-Family Dwelling District, and 2F, Two-Family Dwelling (Duplex) District
  - **West:** PD, Planned Development District for a Housing Development and SF-3, Single-Family Dwelling District
- **Proposed Zoning:** An amended PD, Planned Development District for a Housing Development



4

LAND USE

- **Current Use:** Vacant Land
- **Surrounding Uses:**
  - **North/South/West/East:** Single-Family Housing and Vacant Land
- **Proposed Use:** Single-Family Housing



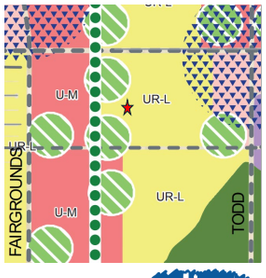
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On North Fairgrounds Road, Looking East

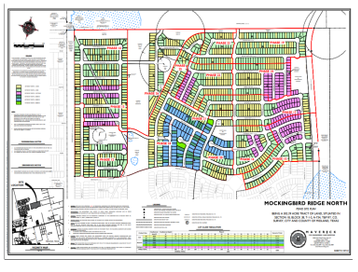
COMPREHENSIVE PLAN

- **Land Use Designation:** Urban-Medium (U-M) and Urban Residential-Low (UR-L)
- **Supported Uses:** Supporting uses include a mix of residential use, schools, churches, and low-dense commercial.
- The request is compatible with the *Tall City Tomorrow Comprehensive Plan*.



SITE PLAN

- **Base Zoning:** SF-3, Single-Family Dwelling District
- **Acreage:** 302.39
- **Proposed Lots:** 1,291
- **3 Classes:**
  - Core – 977 lots
  - Reserve – 104 lots
  - Cottages – 210 lots



8

LOT SIZES

Product Class		Smallest Lot Area SF	Smallest Lot Depth LF	Phase #														Percent of Total
				12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
Core	45'	4825	90'	46	30	50	72	25	45	27	36	33	30	46	26	29	20	35	38.7%
	50'	4851	90'	53	20	64	46	35	17	25	69	19	25	31	25	11	24	17	36.9%
Reserve	50'	5261	95'									3	7			10			2.3%
	60'	6095	95'									26	20			34			5.2%
	70'	11335	95'									0				1			0.2%
Cottages	50'	4120	83'	1	49	0	41	12	37	47	2	0	0	21	0	0	0	0	16.3%
PHASE TOTAL				100	99	114	109	72	99	99	105	82	82	98	51	85	44	52	100%
OVERALL TOTAL												1293							

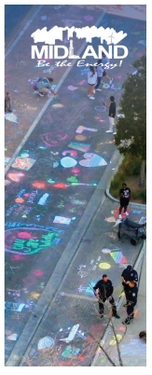
- **Core:**
  - Minimum lot width of 45 feet, minimum lot depth of 90 feet, and minimum lot area of 4,825 square feet.
- **Reserve:**
  - Minimum lot width of 50 feet, minimum lot depth of 95 feet, and minimum lot area of 5,261 square feet.
- **Cottage:**
  - Minimum lot width of 50 feet, minimum lot depth of 83 feet, and minimum lot area of 4,120 square feet.

STAFF'S RECOMMENDATION

- No objections were received.
- The Planning and Zoning Commission recommended approval of this request on August 18, 2025.
- Staff recommends approval of this request with the following conditions:

A. That the Property, including the minimum dimensions of each lot and the minimum area of each lot contained therein, shall significantly conform to the site plan attached hereto as Exhibit "B".

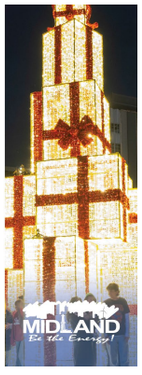
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STAFF'S RECOMMENDATION

B. That the Property shall significantly conform to the amenity plan, which is attached hereto as Exhibit "C" and incorporated herein for all purposes.

C. That all signage shall conform to the regulations set forth in Title XI, Chapter 7a of the City Code.




MISSION
Deliver exceptional services and promote a high quality of life and place for ALL our citizens.

ORDINANCE NO. 10564

AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO REZONE A 302.39-ACRE TRACT OF LAND OUT OF SECTION 18, BLOCK 38, T-1-S, T&P RR CO. SURVEY, CITY AND COUNTY OF MIDLAND, TEXAS, FROM SF-1, SINGLE-FAMILY DWELLING DISTRICT, IN PART, SF-2, SINGLE-FAMILY DWELLING DISTRICT, IN PART, SF-3, SINGLE-FAMILY DWELLING DISTRICT, IN PART, TH, TOWNHOUSE (ATTACHED) DWELLING DISTRICT, IN PART, 2F, TWO-FAMILY DWELLING (DUPLEX) DISTRICT, IN PART, MF-16, MULTIPLE-FAMILY DWELLING DISTRICT, IN PART, AND LR, LOCAL RETAIL DISTRICT, IN PART, TO PD, PLANNED DEVELOPMENT DISTRICT FOR A HOUSING DEVELOPMENT (GENERALLY LOCATED AT THE NORTHEAST CORNER OF THE INTERSECTION OF FAIRGROUNDS ROAD AND FIREWHEEL ROAD); CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION

WHEREAS, the City Planning and Zoning Commission and the Governing Body of the City of Midland, in compliance with the City Charter, the City Code, and State law, have given the requisite notices by United States mail, publication and otherwise; and after a full and fair hearing to all of the property owners generally and particularly to those interested persons situated in the affected area and in the vicinity thereof, the Governing Body finds that the public health, safety and general welfare will be best served by rezoning a 302.39-acre tract of land out of Section 18, Block 38, T-1-S, T&P RR Co. Survey, City and County of Midland, Texas, said tract being more specifically described by metes and bounds in Exhibit "A", which is attached hereto and incorporated herein (the "Property") to PD, Planned Development District for a Housing Development and adopting a site plan therefor, as set out hereinafter;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That the Zoning District Map of the City of Midland, Texas, is hereby amended to rezone the Property from SF-1, Single-Family Dwelling District, in part,

SF-2, Single-Family Dwelling District, in part, SF-3, Single-Family Dwelling District, in part, TH, Townhouse (Attached) Dwelling District, in part, 2F, Two-Family Dwelling (Duplex) District, in part, MF-16, Multiple-Family Dwelling District, in part, and LR, Local Retail District, in part, to PD, Planned Development District for a Housing Development.

SECTION TWO. That the base zoning district to which the use and development of the Property shall conform, except as modified by Section Three of this ordinance, is the SF-3, Single-Family Dwelling District.

SECTION THREE. That a site plan, which is attached hereto as Exhibit "B" and incorporated herein for all purposes, is hereby adopted, and the use and development of the Property shall be subject to the following conditions and restrictions:

A. That the Property, including the minimum dimensions of each lot and the minimum area of each lot contained therein, shall significantly conform to the site plan attached hereto as Exhibit "B".

B. That the Property shall significantly conform to the amenity plan, which is attached hereto as Exhibit "C" and incorporated herein for all purposes.

C. That all signage shall conform to the regulations set forth in Title XI, Chapter 7a of the City Code.

SECTION FOUR. That the definitions given in the zoning regulations contained in the City Code of the City of Midland, Texas, shall be applicable to such of those terms as are used herein.

SECTION FIVE. The provisions of this ordinance are to be cumulative of all other ordinances or parts of ordinances governing or regulating the same subject matter as that covered herein; provided, however, that all prior ordinances or parts of ordinances inconsistent with or in conflict with any of the provisions of this ordinance are hereby expressly repealed to the extent of any such inconsistency or conflict.

SECTION SIX. If any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional or invalid, such holding shall not affect the validity of the remaining portions of this ordinance. The Council of the City of

Midland hereby declares that it would have passed this ordinance and each section, subsection, sentence, clause, or phrase hereof irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared unconstitutional or invalid.

SECTION SEVEN. The penalty for violation of this ordinance shall be in accordance with the general penalty provisions contained in Section 1-3-1 of the City Code of Midland, Texas, which provides for a fine not exceeding two thousand dollars ($2,000.00).

SECTION EIGHT. The City Secretary is hereby authorized and directed to publish the descriptive caption of this ordinance in the manner and for the length of time prescribed by the law as an alternative method of publication.

The above and foregoing ordinance was duly proposed, read in full and adopted on first reading, the 10th day of September, A.D., 2024; and passed to second reading on motion of Council member Ladd, seconded by Council member Dufford, by the following vote:

Council members voting "AYE": Davidson, Stretcher Burkes, Poole, Blong, Dufford, Ladd, Norman

Council members voting "NAY": None

The above and foregoing ordinance was read in full and finally adopted by the following vote upon motion of Council member Ladd, seconded by Council member Norman, on the 24th day of September, A.D., 2024, at a regular meeting of the City Council:

Council members voting "AYE": Davidson, Stretcher Burkes, Poole, Blong, Dufford, Ladd, Norman

Council members voting "NAY": None

PASSED AND APPROVED THIS 24th day of September, A.D., 2024.

Lori Merritt Blong, Mayor

ATTEST:

Marcia Bentley-Gerrard, City Secretary

APPROVED AS TO CONTENT
AND COMPLETENESS:

Elizabeth Triggs, Planning and Development Officer

APPROVED ONLY AS TO FORM:

John Ohmemiller, City Attorney

S:\Ordinances\Planning\Zone Chng\2024\Z-24-0397.SF-1, SF-2, SF-3, TH, 2F, MF-6 & LR to PDHD.wpd

EXHIBIT "A"

MAVERICK
ENGINEERING · SURVEY · WATER RESOURCES
1909 West Wall Street, Suite K · Midland, TX 79701
Tel: 432.262.0999 · Fax: 432.262.0989 · maverick-eng.com
ENGINEER FIRM # F-15089 | SURVEY FIRM # 10194514

FIELD NOTE DESCRIPTION OF A 302.39 ACRE TRACT OF LAND, SITUATED IN SECTION 18, BLOCK 38, TOWNSHIP 1 SOUTH, ABSTRACT NUMBER 734, GLO FILE NUMBER 66103, TEXAS and PACIFIC RAILWAY COMPANY SURVEY, MIDLAND COUNTY, TEXAS, AND BEING A PORTION OF THAT SAME TRACT CALLED FOR IN DOCUMENT NUMBER 2018-20726 OF THE OFFICIAL PUBLIC RECORDS (OPR) OF SAID MIDLAND COUNTY, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS;

BEGINNING AT N (y): 10723537.29, E (x): 1758089.19, A ONE HALF INCH IRON ROD WITH A PLASTIC CAP MARKED "ASB 3689", FOUND ON THE NORTH LINE OF SAID SECTION 18, AT THE NORTHEAST CORNER OF A CALLED 22.96 ACRE TRACT DESCRIBED IN DOCUMENT NUMBER 2019-3532 OF SAID PUBLIC RECORDS, FROM WHICH A ONE HALF INCH IRON ROD FOUND AT A FENCE CORNER AND ACCEPTED AS BEING IN THE POSITION OF THE PATENTED IRON PIPE AT THE COMMON WEST CORNER OF SAID SECTION 18, AND SECTION 7 OF THE SAME BLOCK BEARS S.75°19'52"W., ALONG THE COMMON LINE OF SAID SECTIONS 7 AND 18, 156.42 FEET, AND BEING THE NORTHWEST CORNER HEREOF;

THENCE N.75°19'52"E., ALONG THE COMMON LINE OF SAID SECTIONS 7 AND 18, 4894.40 FEET TO A RED PLASTIC CAP MARKED "MAVERICK FIRM10194514" (RPC) SET AT A POINT OF DEFLECTION RIGHT FOR A CURVE TO THE LEFT HAVING A RADIUS OF 1040.00 FEET AND A CHORD BEARING AND DISTANCE OF S.06°51'59"E., 431.04 FEET BEING ON THE EAST LINE OF PROPOSED "TODD DRIVE" FOR THE NORTHEAST CORNER HEREOF;

THENCE ALONG SAID TODD DRIVE AND THE ARC OF SAID CURVE BEING CONCAVE TO THIS TRACT 434.18 FEET TO THE POINT OF TANGENCY;

THENCE S.18°49'35"E., CONTINUING ALONG SAID TODD DRIVE, 1868.51 FEET TO A POINT OF CURVATURE FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 2560.00 FEET AND A CHORD BEARING AND DISTANCE OF S.16°37'01"E, 197.40 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT, 197.45 FEET TO A POINT OF DEFLECTION RIGHT FOR THE SOUTHEAST CORNER HEREOF;

THENCE THE FOLLOWING 9 COURSES AND DISTANCES ALL TO AN "RPC" FOUND, TO A POINT OF DEFLECTION LEFT FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 1305.00 FEET AND A CHORD BEARING AND DISTANCE OF S.43°21'40"W., 886.78 FEET;

1. S.75°20'52"W., 265.00 FEET;
2. S.80°51'01"W., 60.26 FEET;
3. S.75°20'52"W., 115.00 FEET;
4. S.14°25'02"E., 7.06 FEET;
5. S.75°20'52"W., 115.00 FEET;
6. S.81°18'37"W., 60.27 FEET;
7. S.69°08'15"W., 114.62 FEET;
8. S.14°39'08"E., 46.14 FEET;
9. S.77°16'15"W., 15.51 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 904.79 FEET TO A POINT OF DEFLECTION RIGHT;

THENCE N.26°46'36"W., 115.00 FEET TO AN "RPC" FOUND;

THENCE N.29°43'59"W., 80.11 FEET TO AN "RPC" FOUND;

THENCE N.26°33'48"W., 115.00 FEET TO AN "RPC" FOUND AT A POINT OF DEFLECTION LEFT FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 995.00 FEET AND A CHORD BEARING AND DISTANCE OF S.66°52'14"W., 119.20 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 119.27 FEET TO A POINT OF TANGENCY;

THENCE S.72°23'25"W., 72.42 FEET TO A POINT OF CURVATURE FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 995.00 FEET AND A CHORD BEARING AND DISTANCE OF S.78°25'37"W., 137.13 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 137.24 FEET TO A POINT OF DEFLECTION LEFT;

THENCE S.07°37'18"E., 115.00 FEET TO AN "RPC" FOUND AT A POINT OF DEFLECTION RIGHT FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 1110.00 FEET AND A CHORD BEARING AND DISTANCE OF N.88°33'08"W., 349.94 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 351.41 FEET TO A POINT OF REVERSE CURVATURE FOR A CURVE TO THE LEFT HAVING A RADIUS OF 1950.00 FEET AND A CHORD BEARING AND DISTANCE OF N.81°45'01"W., 154.30 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONCAVE TO THIS TRACT 154.34 FEET TO A POINT OF DEFLECTION RIGHT;

THENCE THE FOLLOWING 3 COURSES AND DISTANCES TO A POINT OF DEFLECTION RIGHT FOR A CURVE TO THE LEFT HAVING A RADIUS OF 1950.00 FEET AND A CHORD BEARING AND DISTANCE OF S.73°17'02"W., 1317.88 FEET;

1. N.42°57'36"W., 30.03 FEET;
2. N.85°29'31"W., 60.34 FEET;
3. S.45°51'35"W., 27.04 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONCAVE TO THIS TRACT 1344.34 FEET TO A POINT OF REVERSE CURVATURE FOR A CURVE TO THE RIGHT HAVING A RADIUS OF 920.00 FEET AND A CHORD BEARING AND DISTANCE OF S.64°37'59"W., 354.22 FEET;

THENCE ALONG THE ARC OF SAID CURVE BEING CONVEX TO THIS TRACT 356.44 FEET TO THE POINT OF TANGENCY;

THENCE THE FOLLOWING 5 COURSES AND DISTANCES:

1. S.75°43'57"W., 651.20 FEET;
2. N.59°20'03"W., 28.32 FEET;
3. S.74°47'34"W., 79.96 FEET;
4. S.75°43'57"W., 95.07 FEET TO AN "RPC" FOUND FOR THE SOUTHWEST CORNER HEREOF;
5. N.14°16'01"W., 2733.97 FEET TO THE **POINT OF BEGINNING**, CONTAINING 302.39 ACRES OF LAND.

JULY 10, 2024

Gregory W. Shoults
www.maverick-eng.com
Texas RPLS – No. 5356
Maverick Engineering (FIRM – No. 10194514)



EXHIBIT "B"

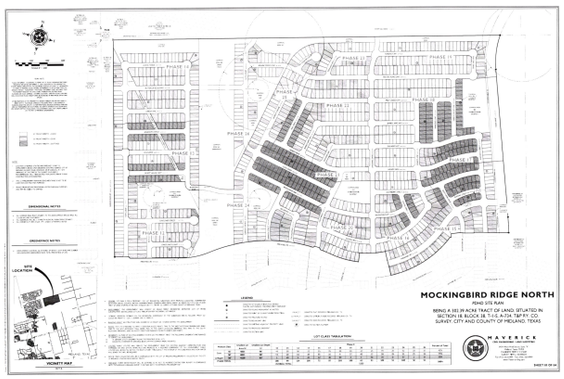

MOCKINGBIRD RIDGE NORTH
BEING A 161.91 ACRE TRACT OF LAND, SITUATED IN
SECTION 18, BLOCK 38, T-1-S, H.&T.C. TAP.Y CO.
SURVEY, CITY AND COUNTY OF MIDLAND, TEXAS
MAVERICK

EXHIBIT "C"

MOCKINGBIRD RIDGE

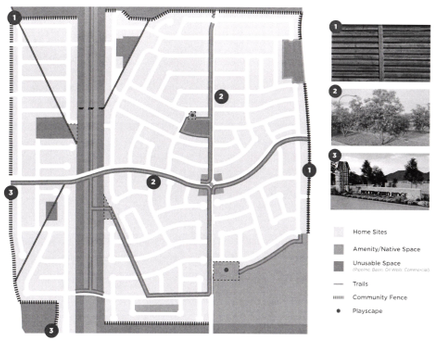
AMENITY MAP

Mockingbird Ridge Space Percentages		
Usable Acres	50	%
Amenity Space (Average) Parks, Trails, Entry Features, Pavilions, Playgrounds	26	49%
Lake & HOA	425	85%

Open, Active Space	Acres	Qty	Radius Miles (Axis)	Radius Miles (Vehicle)
	#	#		
Park (NE)	4	12 sqft	0.25	0.50
Park (North Central)	1.1	Unfurnished	0.25	0.50
Park (Far North Central)	0.2	Unfurnished	0.25	0.50
Park (Triangle North of Pinetree)	0.5	Grass	0.25	0.50
Park (Triangle South of Pinetree)	0.5	Grass	0.25	0.50

Source for Radius Numbers: Midland Parks, Recreation, and Open Space Master Plan Page 170

Trail (Miles)	#
Total (# Feet)	23,248
Trail North	2,770
Trail South	3,198
Trail Pavilion	1,069
Trail Commons Area	527
Trail Park (Southeast - around Playscape)	1,559
Trail Park (Southeast Entrance)	1,556
Trail around Open North Central	1,536
Trail around Open Northeast	1,554
Trail along Pinetree (Treeline) Streets	4,136
Trail along Roamy Tundra	1,178
Trail along Crossing North (Private Park down to Roundabout)	2,982



Home Sites
Amenity/Native Space
Unusable Space
Trails
Community Fence
Playscape

City Council Meeting

Item Number: 13

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Beatriz Quezada, Planner

Subject: AN ORDINANCE GRANTING A SPECIAL EXCEPTION FOR A 1.0-ACRE TRACT OF LAND OUT OF SECTION 23, BLOCK 40, T-1-S, T&P RR CO. SURVEY, CITY AND COUNTY OF MIDLAND, TEXAS (GENERALLY LOCATED ON THE NORTH SIDE OF GLADIOLA AVENUE, APPROXIMATELY 465 FEET EAST OF GOLDEN GATE DRIVE), BY PERMITTING A REDUCED MINIMUM LOT AREA; CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); ORDERING RECORDATION BY THE CITY SECRETARY IN THE DEED RECORDS OF MIDLAND COUNTY, TEXAS; AND ORDERING PUBLICATION (DISTRICT 4) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)

Purpose:

Maverick Engineering, on behalf of Brandon McMorries and Adrian Hernandez, is requesting a Special Exception from the City of Midland Zoning Ordinance, Section 5.04 – Residential Zoning District Dimensional Regulations Chart, to permit a reduced minimum lot area for the property located on 6500 Gladiola Avenue in order to develop two residential lots.

Recommended City Council Action:

Approve

Fiscal Impact:

None

Discussion:

The subject property, located at 6500 Gladiola Avenue, is currently the site of a single-family

residence. The applicant is requesting a special exception to reduce the minimum lot area to allow the property to be subdivided into two lots with both being 0.50 acres. The proposed parcel exceeds this requirement, comprising approximately 21,774 square feet.

Per the City of Midland Zoning Ordinance, Section 5.04 – Residential Zoning District Dimensional Regulations Chart, the minimum lot area required within the CE, Country Estate District, is 43,560 square feet (1.00 acre). The property located at 6500 Gladiola currently consists of a 1.00-acre parcel. In addition to the special exception request, the property is currently being replatted. The proposed subdivision would create two lots, each comprising approximately 21,774 square feet (0.50 acres), which does not meet the minimum lot size requirement for the district. In addition, pursuant to the Restrictive Covenants, Article IV – Building Restrictions, a minimum lot size of 10,000 square feet is required.

It is also noted that several properties located directly south of the subject parcel are existing nonconforming lots, each with a lot area below the minimum threshold established by the CE zoning district.

This request has been circulated to all pertinent City departments for review. Below are the departments' comments.

Fire: (Approved)

No comments or objections.

Building: (Approved)

No issues. All future structures must adhere to the 2018 International Building Codes, the 2015 International Energy Code, the 2023 NEC requirements, the 2015 International Fire Codes, local city ordinances, zoning requirements, established setbacks, oil and gas considerations, and floodplain requirements if necessary. Code versions are subject to change depending on the time of new code editions adopted in the City of Midland and date of permit application.

Oil & Gas Review (Approved)

No Oil & Gas issue for Zoning.

Engineering: (Approved)

No objection. [For Applicant's Information Only.]

Transportation: (Approved)

No objection. [For the Applicant's information only.]

Planning (Approved):

Staff recommends approval of this request, as it will not adversely impact the safety, comfort, or

well-being of the area's occupants, who currently benefit from the same allowances regarding the number of secondary structures.

Staff recommends approval of this request subject to condition A.

Condition:

A. That said special exception shall be of no force or effect unless the Property is subdivided into no more than two lots after the final adoption of this ordinance; provided, however, that each lot shall have an area of 0.5 acres.

Letters of Objection:

Staff has received three letters of objection as of September 5, 2025.

Attachments:
Meets and Bounds (Exhibit A)
Survey
Application
Maps

City Manager's Office

ORDINANCE NO. _____

AN ORDINANCE GRANTING A SPECIAL EXCEPTION FOR A 1.0-ACRE TRACT OF LAND OUT OF SECTION 23, BLOCK 40, T-1-S, T&P RR CO. SURVEY, CITY AND COUNTY OF MIDLAND, TEXAS (GENERALLY LOCATED ON THE NORTH SIDE OF GLADIOLA AVENUE, APPROXIMATELY 465 FEET EAST OF GOLDEN GATE DRIVE), BY PERMITTING A REDUCED MINIMUM LOT AREA; CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); ORDERING RECORDATION BY THE CITY SECRETARY IN THE DEED RECORDS OF MIDLAND COUNTY, TEXAS; AND ORDERING PUBLICATION

WHEREAS, the City Council modified the authority of the Board of Adjustment in Title XI, Chapter 1, Section 7 ("Section 11-1-7") of the Midland City Code; and

WHEREAS, Section 11-1-7 provides for the consideration of requests for special exceptions to the Midland Zoning Ordinance; and

WHEREAS, the Council finds that satisfactory evidence has been presented that the use to be authorized by the granting of the special exception will not be detrimental to the health, safety, comfort and welfare of the occupants of the land area near the tract on which the use to be allowed by special exception will be located; and

WHEREAS, the Council finds that it is clearly and specifically authorized by the terms of Section 11-1-7 to grant such a special exception, and said exception will be in harmony with the general purposes and intent of the zoning provisions of the Midland City Code; and

WHEREAS, after a full and fair public hearing at which all parties in interest were offered an opportunity to be heard, all pursuant to law, the Council finds it to be in the public interest to grant a special exception to the Zoning Ordinance, pursuant to Section 11-1-7, for the purposes herein stated, subject to special conditions;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That a special exception is hereby granted for the property described as a 1.0-acre tract of land out of Section 23, Block 40, T-1-S, T&P RR Co.

Survey, City and County of Midland, Texas (the "Property"), said Property being more fully described by metes and bounds in Exhibit A, which is attached hereto and incorporated herein for all purposes. Said special exception shall allow a reduced minimum lot area for all lots on the Property.

SECTION TWO. Said special exception is subject to the following special conditions:

> That said special exception shall be of no force or effect unless the Property is subdivided into no more than two lots after the final adoption of this ordinance; provided, however, that each lot shall have an area of 0.5 acres.

SECTION THREE. The provisions of this ordinance are to be cumulative of all other ordinances or parts of ordinances governing or regulating the same subject matter as that covered herein; provided, however, that all prior ordinances or parts of ordinances inconsistent with or in conflict with any of the provisions of this ordinance are hereby expressly repealed to the extent of any such inconsistency or conflict.

SECTION FOUR. If any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional or invalid, such holding shall not affect the validity of the remaining portions of this ordinance. The Council of the City of Midland hereby declares that it would have passed this ordinance and each section, subsection, sentence, clause, or phrase hereof irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared unconstitutional or invalid.

SECTION FIVE. The penalty for violation of this ordinance shall be in accordance with the general penalty provisions contained in Section 1-3-1 of the City Code of Midland, Texas, which provides for a fine not exceeding two thousand dollars ($2,000.00).

SECTION SIX. The City Secretary is hereby authorized and directed to file this ordinance with the Office of the County Clerk for purposes of recordation.

SECTION SEVEN. The City Secretary is hereby authorized and directed to publish the descriptive caption of this ordinance in the manner and for the length of time prescribed by the law as an alternative method of publication.

The above and foregoing ordinance was duly proposed, read in full and adopted on first reading, the _____ day of _____, A.D., 2025; and passed to second reading

on motion of Council member _____, seconded by Council member _____, by the following vote:

Council members voting “AYE”:

Council members voting “NAY”:

The above and foregoing ordinance was read in full and finally adopted by the following vote upon motion of Council member _____, seconded by Council member _____, on the _____ day of _____, A.D., 2025, at a regular meeting of the City Council:

Council members voting “AYE”:

Council members voting “NAY”:

PASSED AND APPROVED THIS _____ day of _____, A.D., 2025.

_____
Lori Merritt Blong, Mayor

ATTEST:

_____
Marcia Bentley-German, City Secretary

APPROVED AS TO CONTENT
AND COMPLETENESS:

_____
Elizabeth Triggs, Planning and Development Officer

APPROVED ONLY AS TO FORM:

_____
Nicholas Toulet, Interim City Attorney

EXHIBIT "A"

A description of a 1.0 acre tract of land out of the East half of the Southeast 1/4 of Section 23, Block 40, T-1-S, T&P RR. Co. Survey, Midland County, Texas, near F.M. Highway 868, and being otherwise known as Tract 123, Llano Estacado (First Part), said 1.0 acre tract being described more particularly described by metes and bounds as follows:

BEGINNING at a 1/2" iron rod with cap marked "BRADSHAW" found for the Northeast corner of this tract, also being the Northwest corner of Tract 122, from which the Southeast corner of said Section 23 bears S 15°19'30" E a distance of 2640 feet and N 74°22'00" E a distance of 584.50 feet;

THENCE S 15° 22' 23" E (record S 15°19'30" E) along the East line of said Tract 123 and the West line of said Tract 122 at a distance of 10.0 feet pass the South line of a 10' alley, at a distance of 129.92 feet pass a 1/2" iron rod with cap marked "BRADSHAW" found in the North right-of-way line of Gladiola Avenue, in all a total distance of 159.92 feet (record 160.00 feet) to a nail in the centerline of said Gladiola Avenue;

THENCE S 74° 22' 00" W along the centerline of said Gladiola Avenue a distance of 272.06 feet (record 272.00 feet) to a point in the centerline of said Gladiola Avenue for the Southeast corner of Tract 124 and the Southwest corner of this tract;

THENCE N 15° 20' 24" W (record N 15°19'30" W) along the east line of said Tract 124 and the West line of this tract at a distance of 30.00 feet pass a 1/2" iron rod with cap marked "RPLS 4170" found in the North right-of-way line of said Gladiola Avenue, at a distance of 149.91 feet pass a 1/2" iron rod with cap marked "RPLS 4170" found in the South line of a 10' alley, in all a total distance of 159.91 feet (record 160.00 feet) to a 1/2" iron rod with cap marked "RPLS 4170" set for the Northeast corner of said Tract 124 and the Northwest corner of this tract;

THENCE N 74° 21' 47" E (record N 74°22'00" E) a distance of 271.97 (record 272.00 feet) to the POINT OF BEGINNING.

MIDLAND Planning Division

Special Exception Application

Project Number: _____

Case Number: _____

Applicant *(if acting as Agent, see affidavit on page 2)* Printed Name: See Representative		Phone ( ) Email	
Address	City	State	Zip

Property Owner Printed Name: Brandon McMorries & Adrian Hernandez		Phone (432) 664-8264 Email ahernand202000@yahoo.com brandon@brandonmcmorries.com	
Address PO Box 11	City Stanton	State TX	Zip 79782

Representative *(if different from Applicant or Property Owner)* Firm: Maverick Engineering Printed Name:		Phone (432) 270-1645 Email adevine@maverick-eng.com	
Address 1909 W. Wall Street Suite K	City Midland	State TX	Zip 79701

Street Address: 6500 Gladiola Ave

Legal Description
Lot: 123 Block: Subdivision: Llano Estacado (see also attached proposed replat)

Current Zoning: CE

This property qualifies as an exception to the City Code because:

- ■ It is an expansion of a nonconforming use.
- ☐ There are existing nonconforming structures in the area.
- ☐ The addition of architectural or other projections of a minor extent.

Reason for Request: Applicant is seeking to replat Tract 123 of Llano Estacado (1.00-acre) into 2 lots less that are less than the 1-acre min required by existing zoning. Other areas directly south are also non conforming lots. Restrictive covenants allow for a min lot size of 10,000 sf

Submittal and Fees

Items to be submitted with this application form:

- Application Fee – Payable to the 'City of Midland'
- Dimensioned Site Plan showing:
  - Parking
  - Building Footprint
- Digital Copies of Site Plan (PDF/JPEG)

Signatures	
Applicant (signature): Ashlee Devine	Date: 4/23/25
Applicant (printed): Ashlee Devine	
Property Owner (signature): DocuSigned by: Brandon McMorries 5E8A4A656B28441...	Date: 6/17/2025
Property Owner (printed) : Brandon McMorries	

The Special Exception shall be considered officially received in the Planning office only when it has been submitted in full compliance with the provisions of Section 212 of the Texas Local Government Code and the Zoning Code of Ordinances of the City of Midland and when such required items for the application are also received.

All materials, including exhibits, submitted in support of an application, or displayed during a public hearing, shall remain the property of the City of Midland.

If an agent is authorized by the property owner to file and execute the application on behalf of the property owner, the agent must complete the affidavit below.

STATE OF TEXAS
COUNTY OF MIDLAND

Before me, the undersigned authority, on this day personally appeared Ashlee Devine who, being by me duly sworn, upon oath says: That (s)he is authorized by Brandon McMorries, the owner of the above described property, to fully represent him/her in this application and that (s)he had the legal right, power and authority to sign said owner's name hereto as his/her attorney in fact.

Ashlee Devine
Authorized Agent (*signature*)

Subscribed and sworn to before me, this 23rd day of June, 20 25, to certify which witness my hand and seal of office.

SAVANNAH DAVIS
Notary Public, State of Texas
Comm. Expires 05-20-2028
Notary ID 134907724

NOTARY PUBLIC, MIDLAND COUNTY, TEXAS

FOR OFFICE USE ONLY

☑ Property Owner Authorization	☑ Dimensioned Site Plan
☑ Application Fee	☑ Plans in Digital Format (PDF/JPEG)
Check # 5410	
Received By:	Date: 6/24/25

RECEIVED
JUN 24 2025
Initial:

****Application will not be considered for scheduling until reviewed by a planner.****

Signatures

Applicant (signature): Ashlee Devine	Date: 6/23/25
Applicant (printed): Ashlee Devine	
Property Owner (signature): DocuSigned by: ADRIAN HERNANDEZ 7C3EFDE9EB6A40C...	Date: 6/17/2025
Property Owner (printed) : ADRIAN HERNANDEZ	

The Special Exception shall be considered officially received in the Planning office only when it has been submitted in full compliance with the provisions of Section 212 of the Texas Local Government Code and the Zoning Code of Ordinances of the City of Midland and when such required items for the application are also received.

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STATE OF TEXAS
COUNTY OF MIDLAND

Before me, the undersigned authority, on this day personally appeared Ashlee Devine who, being by me duly sworn, upon oath says: That (s)he is authorized by Adrian Hernandez, the owner of the above described property, to fully represent him/her in this application and that (s)he had the legal right, power and authority to sign said owner's name hereto as his/her attorney in fact.

Ashlee Devine
Authorized Agent (signature)

Subscribed and sworn to before me, this 23rd day of June, 2025, to certify which witness my hand and seal of office.

SAVANNAH DAVIS
Notary Public, State of Texas
Comm. Expires 05-20-2028
Notary ID 134907724

SL D

NOTARY PUBLIC, MIDLAND COUNTY, TEXAS

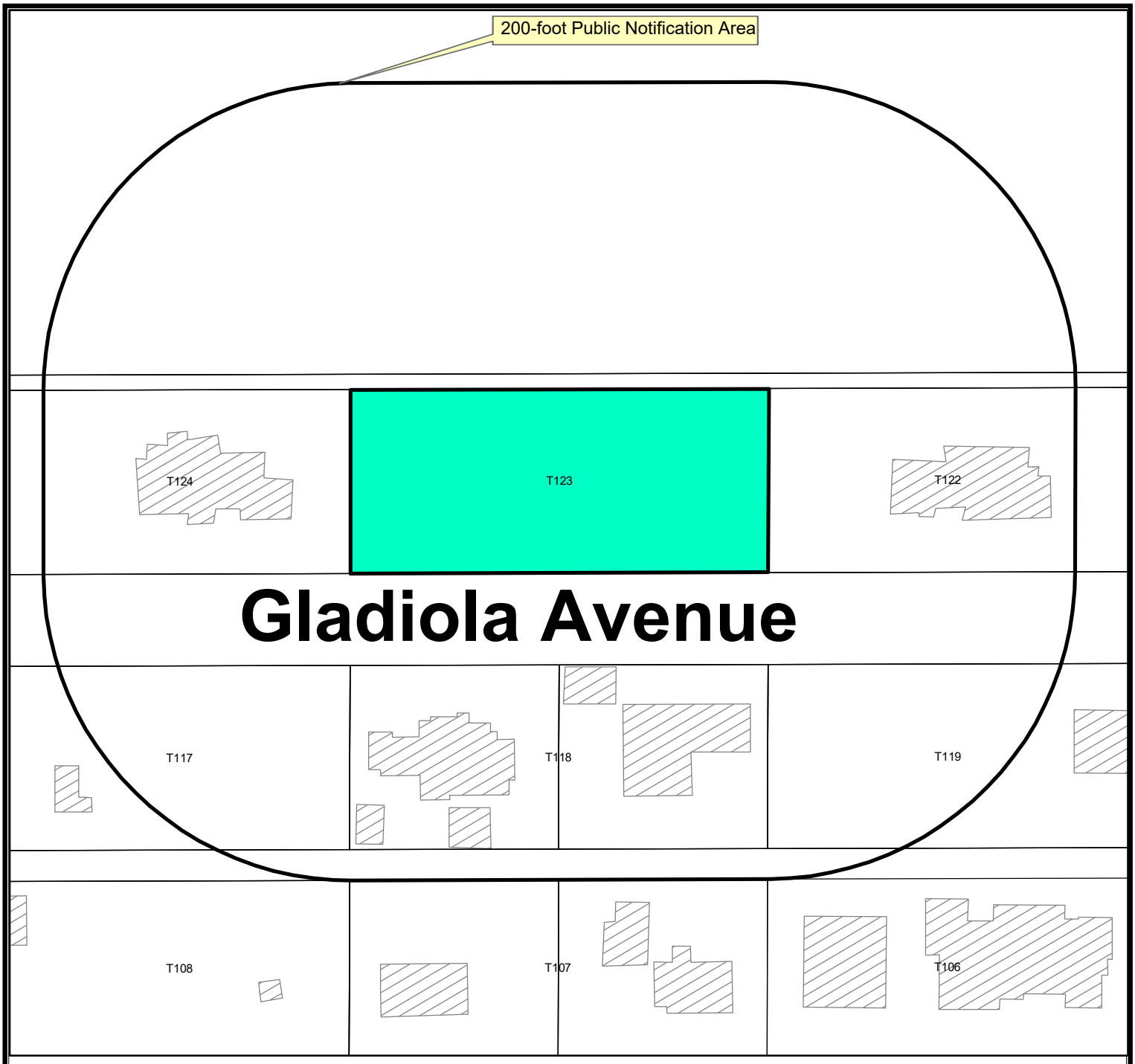
FOR OFFICE USE ONLY

☐ Property Owner Authorization	☐ Dimensioned Site Plan
☐ Application Fee	☐ Plans in Digital Format (PDF/JPEG)
Check #	
Received By:	Date: 6/24/25

RECEIVED
JUN 24 2025
Initial:

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Location Map

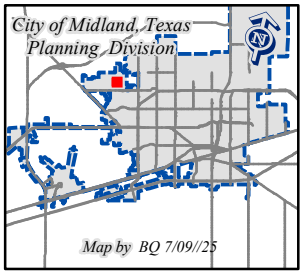
E-25-0141 **Scale: 1" = 600'**

Consider a request by Maverick Engineering, on behalf of Brandon McMorries and Adrian Hernandez, for a Special Exception from the City of Midland Zoning Ordinance, Section 5.04 – Residential Zoning District Dimensional Regulations Chart, to permit a reduced minimum lot area for a 1.0-acre tract of land out of Section 23, Block 40, T-1-S, T&P RR Co. Survey, City and County of Midland, Texas

Generally located on the north side of Gladiola Avenue, approximately 465 feet east of Golden Gate. (Council District 4)

L E G E N D

- CITY LIMITS
- PARCEL
- PRIVATE BLDGS



©THE CITY OF MIDLAND - 2021

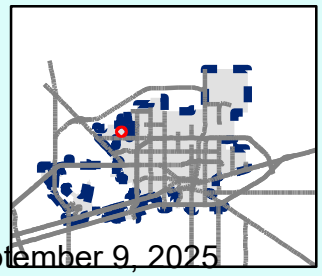
THIS DATA IS NOT A SUBSTITUTION FOR A SURVEY PRODUCT OR IS NOT TO BE USED TO DETERMINE, TO THE EXACT INCH, LOCATING OR OTHER DECISIONS BASED SOLELY ON THE INFORMATION CONTAINED HEREIN.

THE CITY OF MIDLAND SHALL NOT BE RESPONSIBLE FOR ANY DECISIONS BASED UPON THE USE OF THIS DATA.

SF1

CE

GLADIOLA AV



PACKET

13.13

September 9, 2025

Map by BQ, 7/10/25

E-25-0141

Scale: 1" = 400'

ZONING MAP

© THE CITY OF MIDLAND - 2021: THIS DATA IS NOT A SUBSTITUTION FOR A SURVEY PRODUCT, NOR IS IT DESIGNED TO BE USED AS A PRIMARY TOOL IN PERMITTING OR OTHER DECISIONS BASED SOLELY ON THE INFORMATION CONTAINED HEREIN. THE CITY OF MIDLAND SHALL NOT BE RESPONSIBLE FOR ANY DECISIONS BASED UPON THE USE OF THIS DATA.

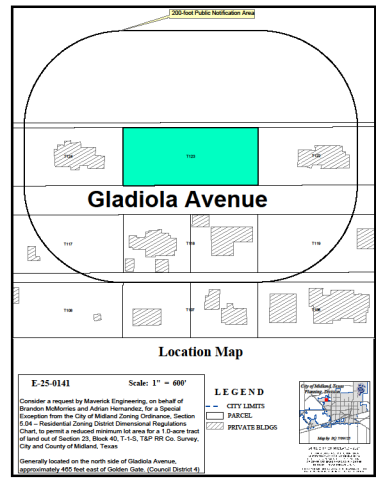

GLADIOLA AV




MIDLAND
Be the Energy!
SPECIAL EXCEPTION
6500 GLADIOLA AVE
Visit Our Website
MIDLANDTEXAS.GOV

APPLICATION SUMMARY

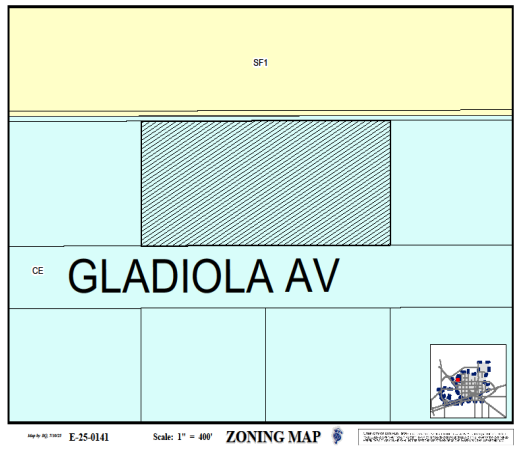
- **Property Owner:** Brandon McMorries & Adrian Hernandez
- **Representative:** Ashlee Devine, with Maverick Engineering
- **Location:** 6500 Gladiola Ave (District 4)
- **Reason for Request:** To be able to **subdivide the property into two lots, each approximately 0.5 acres**



MIDLAND
Be the Energy!

ZONING

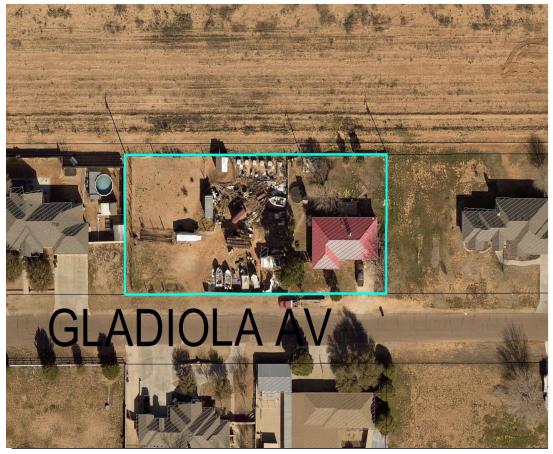
- **Current Zoning:** Country Estate District, CE
- **Surrounding Zoning:**
  - **North:** Single-Family Dwelling District, SF-1
  - **South/East/West:** Country Estate District, CE



MIDLAND
Be the Energy!

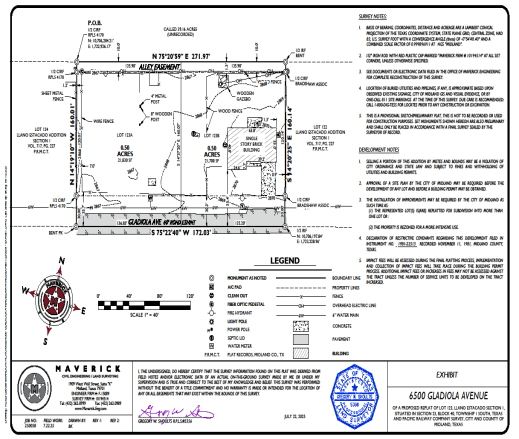
LAND USE

- **Current Use:** Residential
- **Surrounding Uses:**
  - **North:** Vacant
  - **South/East/West:** Residential



DETAILS OF REQUEST

- **Code Requirement:** Lot size must be at least 1 acre
- **Variance Requested:** Two lots measuring 0.5 acres
- Nearby properties do not meet the standard required by the zoning district

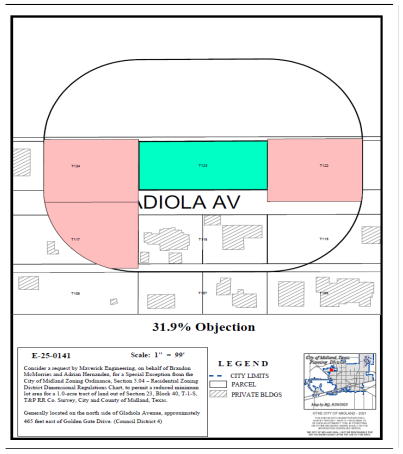




On Gladiola Avenue, Looking East

OBJECTIONS

- 3 objections have been received resulting in a 31.9% objection percentage. Supermajority vote is not required for approval.
- Protestors voiced concerns about the size of the proposed lots and an increase of traffic in the neighborhood.



STAFF'S RECOMMENDATION



- Three objections were received.
- Staff recommends approval of this request with the following condition:

A. That said special exception shall be of no force or effect unless the **Property is subdivided into no more than two lots** after the final adoption of this ordinance; provided, however, that **each lot shall have an area of 0.5 acres**.

8


MISSION
Deliver exceptional services and promote a high quality of life and place for ALL our citizens.

City Council Meeting

Item Number: 14

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Christy Weakland, Director

Subject: **GATHER PUBLIC INPUT ON THE PROPOSED 2025-2026 BUDGET; AND CONSIDER AN ORDINANCE OF THE CITY OF MIDLAND PROVIDING FUNDS FOR THE FISCAL YEAR BEGINNING OCTOBER 1, 2025, AND ENDING SEPTEMBER 30, 2026, BY APPROVING THE BUDGET FOR SAID PERIOD AND APPROPRIATING AND SETTING ASIDE THE NECESSARY FUNDS OUT OF THE GENERAL AND OTHER REVENUES AND UNAPPROPRIATED FUND BALANCE OF THE CITY OF MIDLAND FOR SAID FISCAL YEAR FOR THE MAINTENANCE AND OPERATION OF THE VARIOUS DEPARTMENTS AND FOR VARIOUS ACTIVITIES AND IMPROVEMENTS TO THE CITY; AND ORDERING PUBLICATION: (DISTRICT: ALL) (FINANCE) (PROVIDE SOUND GOVERNANCE & FISCAL MANAGEMENT)**

TAXPAYER IMPACT STATEMENT:

FOR THE FISCAL YEAR 2024-2025 MEDIAN-VALUED HOMESTEAD PROPERTY IN THE CITY OF MIDLAND, (1) THE CITY PROPERTY TAX BILL FOR THE CURRENT FISCAL YEAR ($0.348662 PER $100 OF TAXABLE VALUE) IS $907.49, (2) THE ESTIMATED CITY PROPERTY TAX BILL FOR THE UPCOMING FISCAL YEAR IF THE PROPOSED BUDGET IS ADOPTED ($0.347999 PER $100 OF TAXABLE VALUE) IS $909.22, AND (3) THE ESTIMATED CITY PROPERTY TAX BILL FOR THE UPCOMING FISCAL YEAR IF A BALANCED BUDGET FUNDED AT THE NO-NEW-REVENUE TAX RATE AS CALCULATED UNDER CHAPTER 26, TAX CODE, IS ADOPTED ($0.336458 PER $100 OF TAXABLE VALUE) IS $877.40.

FOR THE FISCAL YEAR 2025-2026 MEDIAN-VALUED HOMESTEAD PROPERTY IN THE CITY OF MIDLAND, (1) THE CITY PROPERTY TAX BILL FOR THE CURRENT FISCAL YEAR ($0.348662 PER $100 OF TAXABLE VALUE) IS $922.41, (2) THE ESTIMATED CITY PROPERTY TAX BILL FOR THE UPCOMING FISCAL YEAR IF THE PROPOSED BUDGET IS ADOPTED ($0.347999 PER $100 OF TAXABLE VALUE) IS $924.16, AND (3) THE ESTIMATED CITY PROPERTY TAX BILL FOR THE UPCOMING FISCAL YEAR IF A BALANCED BUDGET FUNDED AT THE NO-NEW-REVENUE TAX RATE AS CALCULATED UNDER CHAPTER 26, TAX CODE, IS ADOPTED ($0.336458 PER $100 OF TAXABLE VALUE) IS $891.82.

Purpose:

Compliance with the Texas Local Government Code requires a public hearing on the proposed budget more than 15 days after the proposed budget is filed with the city Secretary. The budget was filed with the City Secretary on August 15, 2025.

Recommended City Council Action:

Approve

Fiscal Impact:

The proposed budget is submitted as the City of Midland's general operating plan for the fiscal year beginning October 1, 2025, and ending September 30, 2026.

Strategic Priority:

(Provide Sound Governance & Fiscal Management)

Discussion:

The City Council established a Proposed Tax Rate of 0.347999 cents on August 13, 2025. At this tax rate the General Fund will have a budget appropriated of $187,458,359 for FY26.

The budgets of the other funds total $273,401,261.

Morris William Jr.

City Manager's Office

ORDINANCE NO. _____

AN ORDINANCE OF THE CITY OF MIDLAND PROVIDING FUNDS FOR THE FISCAL YEAR BEGINNING OCTOBER 1, 2025, AND ENDING SEPTEMBER 30, 2026, BY APPROVING THE BUDGET FOR SAID PERIOD AND APPROPRIATING AND SETTING ASIDE THE NECESSARY FUNDS OUT OF THE GENERAL AND OTHER REVENUES AND UNAPPROPRIATED FUND BALANCE OF THE CITY OF MIDLAND FOR SAID FISCAL YEAR FOR THE MAINTENANCE AND OPERATION OF THE VARIOUS DEPARTMENTS AND FOR VARIOUS ACTIVITIES AND IMPROVEMENTS TO THE CITY; AND ORDERING PUBLICATION

WHEREAS, as required by Article IV, Section 14, of the City Charter, the City Manager has prepared and submitted to the City Council a Budget Estimate of expenditures and revenues of all City departments, activities, and offices for the year beginning October 1, 2025, and ending September 30, 2026; and

WHEREAS, said Budget has been filed with the City Secretary of the City of Midland, Texas, as required; and

WHEREAS, notices of a public hearing upon said Budget have been duly and legally made; and

WHEREAS, said public hearing has been held and full and final consideration given said Budget;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That for the purpose of providing the funds necessary and proposed to be expended in the Budget of the City of Midland for the fiscal year beginning October 1, 2025, and ending September 30, 2026, the Budget prepared by the City Manager and submitted to the City Council for its consideration and approval is hereby approved, and the available resources and revenues of the City of Midland as set forth in said Budget for said fiscal year, are hereby appropriated and set aside for the maintenance and operation of the various departments of the Government of the City of Midland, together with the various

activities and improvements as set forth in said Budget; and the appropriations shall be strictly applied for the uses and purposes in the respective departments as provided for in said Budget.

SECTION TWO. That the said Budget for the fiscal year beginning October 1, 2025, and ending September 30, 2026, approved herein shall be attached to and made a part of this ordinance the same as if copied in full herein, said Budget being on file in the City Secretary's office referenced by the number and date of this Ordinance.

SECTION THREE. That expenditures during the fiscal year beginning October 1, 2025, and ending September 30, 2026, shall be made in accordance with the summary Budget approved by this ordinance unless otherwise authorized by a duly enacted resolution or ordinance of the City of Midland and subject to the following provisions and conditions, to wit:

1. That no expenditure may be made without Council approval which shall increase the total appropriation for any one Fund.
2. That the City Manager may make transfers to and between departments and divisions unless such transfers would increase the total appropriation within a Fund.
3. That department managers are hereby authorized to approve transfers of amounts between line items within their departments if such transfers do not significantly change the work program contemplated in the approved Budget.

SECTION FOUR. During each year while there is any liability by reason of the City's Personnel Policies or Employment Agreements, the City Council shall compute and ascertain the rate and amount of ad valorem tax, based on the latest approved tax rolls with full allowance being made for tax collection, which will be sufficient to raise the money required to pay any sums which may be or become due during any such year, in no instance to be less than two percent (2%) of such obligation, together with all interest thereon, because of the obligations assumed by the City's Personnel Policies or Employment

Agreements. Said rate and amount of ad valorem tax will be ordered to be levied against all taxable property in the City for each year while any liability exists by reason of the obligations undertaken by the City's Personnel Policies or Employment Agreements, and said ad valorem tax shall be assessed and collected each year until all of the obligations incurred in the City's Personnel Policies or Employment Agreements shall have been discharged and all liability discharged.

SECTION FIVE. For the purpose of this ordinance, certain words as used herein are defined as follows:

1. The term "agency" wherever used in the said Budget shall mean the same and be synonymous with the term "department" as used in the Charter, ordinances, resolutions, and other official documents and policies of the City of Midland, Texas.
2. The term "organization" wherever used in the said Budget shall mean the same and be synonymous with the term "division" as used in the Charter, ordinances, resolutions and other official documents and policies of the City of Midland, Texas.

SECTION SIX. All departments of the City required to be established by the City Charter, state law, or federal law are deemed to be created.

SECTION SEVEN. That all transfers from the Water and Sewer Fund and Sanitation Fund are made in compliance with Sections 1502.057, 1502.058 and 1502.059 of the Texas Government Code.

SECTION EIGHT. That the City Manager shall give notice of water rate increases to appropriate individuals and entities as required by state law.

SECTION NINE. That the City Manager is hereby authorized and directed to execute contracts for grants of Hotel/Motel Tax funds to the extent that said grants are included in the Budget.

The above and foregoing ordinance was duly proposed, read in full and adopted on first reading, the _____ day of _____, A.D., 2025; and passed to second reading on motion of Council member _____, seconded by Council member _____, by the following vote:

Council members voting “AYE”:

Council members voting “NAY”:

The above and foregoing ordinance was read in full and finally adopted by the following vote upon motion of Council member _____, seconded by Council member _____, on the _____ day of _____, A.D., 2025, at a regular meeting of the City Council:

Council members voting “AYE”:

Council members voting “NAY”:

PASSED AND APPROVED THIS _____ day of _____, A.D., 2025.

_____
Lori Merritt Blong, Mayor

ATTEST:

_____
Marcia Bentley-German, City Secretary

APPROVED AS TO CONTENT
AND COMPLETENESS:

_____
Christy Weakland, Director of Finance

APPROVED ONLY AS TO FORM:

_____
Nicholas Toulet, Interim City Attorney

NOTICE OF PUBLIC HEARING
2025-2026
CITY OF MIDLAND
ANNUAL OPERATING BUDGET

Notice is hereby given that the Mayor and City Council will conduct a Public Hearing at 10:00 A.M. on Tuesday, September 9, 2025, and Tuesday, September 16, 2025, in the City Hall Council Chamber located at 300 North Loraine, Midland, Texas.

THIS BUDGET WILL RAISE MORE REVENUE FROM PROPERTY TAXES THAN LAST YEAR'S BUDGET BY AN AMOUNT OF $3,664,292, WHICH IS A 4.80 PERCENT INCREASE FROM LAST YEAR'S BUDGET. THE PROPERTY TAX REVENUE TO BE RAISED FROM NEW PROPERTY ADDED TO THE TAX ROLL THIS YEAR IS $1,141,762.

The Public Hearing is for the purpose of allowing the public and other interested groups to make comments regarding the 2025-2026 City of Midland Budget.

(Publish August 26, 2025, or prior)

City of Midland
Fiscal Year 2025-2026
Budget Cover Page
September 16, 2025

This budget will raise more revenue from property taxes than last year's budget by an amount of $3,664,292, which is a 4.80 percent increase from last year's budget. The property tax revenue to be raised from new property added to the tax roll this year is $1,141,762.

The members of the governing body voted on the budget as follows:

FOR:

AGAINST:

PRESENT and not voting:

ABSENT:

Property Tax Rate Comparison

	2025-2026	2024-2025
Property Tax Rate:	$0.347999/100	$0.348662/100
No-New-Revenue Tax Rate:	$0.336458/100	$0.344045/100
No-New-Revenue Maintenance & Operations Tax Rate:	$0.280518/100	$0.284887/100
Voter-Approval Tax Rate:	$0.366479/100	$0.353201/100
Debt Rate:	$0.064451/100	$0.058342/100

Total debt obligation for City of Midland secured by property taxes: $14,491,138

Steps Required for Proposal and Adoption of Budget

Entity Name: City of Midland **Date: 08/19/2025 02:55 PM**

Steps for the Proposal of the Budget:

This year's property tax levy will raise more revenue from property taxes than in the preceding year. The governing body must hold a separate vote to ratify the property tax increase reflected in the budget. This vote must be in addition to and separate from the vote to adopt the budget or the vote to set the tax rate. Counties that maintain a website must post the proposed budget when it is filed with the county clerk. The adopted budget must also be posted on the website when it is filed with the county clerk.

The following statement must be included on the notices of public hearing on proposed budget. It must also be included on the cover page of the proposed budget, in 18-point type or larger.

THIS BUDGET WILL RAISE MORE TOTAL PROPERTY TAXES THAN LAST YEAR'S BUDGET BY $3,664,292 OR 4.80%, AND OF THAT AMOUNT, $1,141,762 IS TAX REVENUE TO BE RAISED FROM NEW PROPERTY ADDED TO THE TAX ROLL THIS YEAR.

Steps for the Adoption of the Budget:

-A vote to adopt the budget must be a record vote.
-An adopted budget must contain a cover page stating a record vote of each member of the governing body by name, the property tax rates for the current and preceding fiscal year, the total amount of debt obligations, and the following statement in 18 point font:
This budget will raise more revenue from property taxes than last year's budget by an amount of $3,664,292, which is a 4.80 percent increase from last year's budget. The property tax revenue to be raised from new property added to the tax roll this year is $1,141,762.
-The budget and cover page must be filed with the clerk and posted on the entity's website at least until the date of the first anniversary the budget is adopted.

City Council Meeting

Item Number: 15

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Christy Weakland, Director

Subject: TAX RATE INCREASE FOR FISCAL YEAR 2025-2026; AN ORDINANCE FIXING THE TAX LEVY FOR THE CITY OF MIDLAND, TEXAS, FOR THE FISCAL YEAR BEGINNING ON OCTOBER 1, 2025, AND ENDING ON SEPTEMBER 30, 2026 (DISTRICT: NONE) (FINANCE)

Purpose:

The purpose of this item is to provide notification to the public and to allow a public forum for citizen input on the tax increase.

Recommended City Council Action:

Approve

Fiscal Impact:

The proposed Ad Valorem Tax Rate of 0.347999 per $100 valuation for the fiscal year 2025-2026 operating budget will generate approximately $65,234,095 in revenue for the General Fund.

Discussion:

The proposed rate of 0.347999 is composed of a voter-approval maintenance and operations rate (0.283548 per $100 valuation) and a debt service levy (0.064451 per $100 valuation).

This budget will raise more total property taxes than last year’s budget by $3,664,292 or 4.8%, and of that amount, $1,141,762 is tax revenue to be raised from new property added to the tax roll this year.

Attached are the Chief Appraiser's 2025 Certified Estimates of Taxable Value for the City of Midland, the "Notice of Public Hearing on Tax Increase," and the "Notice of Tax Rates."

Morris Williams Jr.

City Manager’s Office

ORDINANCE NO. _____

AN ORDINANCE FIXING THE TAX LEVY FOR THE CITY OF MIDLAND, TEXAS, FOR THE FISCAL YEAR BEGINNING OCTOBER 1, 2025, AND ENDING SEPTEMBER 30, 2026

WHEREAS, the Midland City Council voted to propose a tax rate of $0.347999 for each one hundred dollar valuation of taxable property for the fiscal year beginning October 1, 2025, and ending September 30, 2026; and

WHEREAS, the Midland City Council finds and determines that the City of Midland has fully and timely complied with all notice, hearing and other legal requirements relative to the adoption of this ordinance; and

WHEREAS, THIS TAX RATE WILL RAISE MORE TAXES FOR MAINTENANCE AND OPERATIONS THAN LAST YEAR'S TAX RATE; AND

WHEREAS, THE TAX RATE WILL EFFECTIVELY BE RAISED BY 1.08 PERCENT AND WILL RAISE TAXES FOR MAINTENANCE AND OPERATIONS ON A $100,000.00 HOME BY APPROXIMATELY $-6.77.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That to pay interest and principal on outstanding bonds as they mature, a tax levy of $0.064451 on each $100.00 valuation of all taxable property in the City of Midland, Texas is hereby made and levied for the year 2025 to be credited to the Interest and Sinking Fund of the City.

SECTION TWO. That to raise funds to help defray current General expenses of the City, a levy of $0.283548 on each $100.00 valuation of all taxable property within the City is hereby made and levied for the year 2025. The collections from these levies are to be apportioned and deposited as follows:

Interest and Sinking Fund	$0.064451
General Fund	$0.283548
TOTAL TAX LEVY FOR ALL PURPOSES	$0.347999

The above and foregoing ordinance was duly proposed, read in full and adopted on first reading, the _____ day of _____, A.D., 2025; and passed to second reading on motion of Council member _____, seconded by Council member _____, with the motion being stated as "I move that the property tax rate be increased by the adoption of a tax rate of $0.347999, which is effectively a 3.43 percent increase in the tax rate", by the following vote:

Council members voting "AYE":

Council members voting "NAY":

The above and foregoing ordinance was read in full and finally adopted by the following vote upon motion of Council member _____, with the motion being stated as "I move that the property tax rate be increased by the adoption of a tax rate of $0.347999, which is effectively a 3.43 percent increase in the tax rate", seconded by Council member _____, on the _____ day of _____, A.D., 2025, at a regular meeting of the City Council:

Council members voting "AYE":

Council members voting "NAY":

PASSED AND APPROVED THIS _____ day of _____, A.D., 2025.

_____
Lori Merritt Blong, Mayor

ATTEST:

_____
Marcia Bentley-German, City Secretary

APPROVED AS TO CONTENT AND COMPLETENESS:

_____
Christy Weakland, Director of Finance

APPROVED AS TO FORM ONLY:

_____
Nicholas Toulet, Interim City Attorney

Texas Comptroller of Public Accounts Form 50-856

updated 7/9/25

2025 Tax Rate Calculation Worksheet

Taxing Units Other Than School Districts or Water Districts

CTM-CITY OF MIDLAND (2025) Phone (area code and number)

City of Midland, 300 N Loraine, Midland, TX 79701 Taxing Unit's Website Address

GENERAL INFORMATION: Tax Code Section 26.04(c) requires an officer or employee designated by the governing body to calculate the no-new-revenue (NNR) tax rate and voter-approval tax rate for the taxing unit. These tax rates are expressed in dollars per $100 of taxable value calculated. The calculation process starts after the chief appraiser delivers to the taxing unit the certified appraisal roll and the estimated values of properties under protest. The designated officer or employee shall certify that the officer or employee has accurately calculated the tax rates and used values shown for the certified appraisal roll or certified estimate. The officer or employee submits the rates to the governing body by Aug. 7 or as soon thereafter as practicable.

School districts do not use this form, but instead use Comptroller Form 50-859 Tax Rate Calculation Worksheet, School District without Chapter 313 Agreements or Comptroller Form 50-884 Tax Rate Calculation Worksheet, School District with Chapter 313 Agreements.

Water districts as defined under Water Code Section 49.001(1) do not use this form, but instead use Comptroller Form 50-858 Water District Voter-Approval Tax Rate Worksheet for Low Tax Rate and Developing Districts or Comptroller Form 50-860 Developed Water District Voter-Approval Tax Rate Worksheet.

The Comptroller's office provides this worksheet to assist taxing units in determining tax rates. The information provided in this worksheet is offered as technical assistance and not legal advice. Taxing units should consult legal counsel for interpretations of law regarding tax rate preparation and adoption

SECTION 1: No-New-Revenue Tax Rate

The NNR tax rate enables the public to evaluate the relationship between taxes for the prior year and for the current year based on a tax rate that would produce the same amount of taxes (no new taxes) if applied to the same properties that are taxed in both years. When appraisal values increase, the NNR tax rate should decrease.

The NNR tax rate for a county is the sum of the NNR tax rates calculated for each type of tax the county levies. While uncommon, it is possible for a taxing unit to provide an exemption for only maintenance and operations taxes. In this case, the taxing unit will need to calculate the NNR tax rate separately for the maintenance and operations tax and the debt tax, then add the two components together.

Line	No-New-Revenue Tax Rate Worksheet		Amount/Rate
1.	**Prior year total taxable value.** Enter the amount of the prior year taxable value on the prior year tax roll today. Include any adjustments since last year's certification; exclude Tax Code Section 25.25(d) one-fourth and one-third over-appraisal corrections from these adjustments. Exclude any property value subject to an appeal under Chapter 42 as of July 25 (will add undisputed value in Line 6). This total includes the taxable value of homesteads with tax ceilings (will deduct in Line 2) and the captured value for tax increment financing (adjustment is made by deducting TIF taxes, as reflected in Line 17).[1] Tex. Tax Code § 26.012(14)		**$21,767,992,608**
2.	**Prior year tax ceilings.** Counties, cities and junior college districts. Enter the prior year total taxable value of homesteads with tax ceilings. These include the homesteads of homeowners age 65 or older or disabled. Other taxing units enter 0. If your taxing unit adopted the tax ceiling provision last year or a prior year for homeowners age 65 or older or disabled, use this step.[2] Tex. Tax Code § 26.012(14)		**$0**
3.	**Preliminary prior year adjusted taxable value.** Subtract Line 2 from Line 1.		**$21,767,992,608**
4.	**Prior year total adopted tax rate.**		**0.34866200**
5.	**Prior year taxable value lost because court appeals of ARB decisions reduced the prior year's appraised value.**		
	A. Original prior year ARB values:	**$349,137,753**	
	B. Prior year values resulting from final court decisions:	**$312,115,066**	
	C. Prior year value loss. Subtract B from A.[3] Tex. Tax Code § 26.012(13)		**$37,022,687**
6.	**Prior year taxable value subject to an appeal under Chapter 42, as of July 25.**		
	A. Prior year ARB certified value:	**$333,550,191**	
	B. Prior year disputed value:	**$316,872,681**	
	C. Prior year undisputed value. Subtract B from A.[4] Tex. Tax Code § 26.012(13)		**$16,677,510**
7.	**Prior year Chapter 42 related adjusted values**. Add Line 5C and Line 6C.		**$53,700,197**

Line	No-New-Revenue Tax Rate Worksheet	Amount/Rate
8.	**Prior year taxable value, adjusted for actual and potential court-ordered adjustments.** Add Line 3 and Line 7.	**$21,821,692,805**
9.	**Prior year taxable value of property in territory the taxing unit deannexed after Jan. 1, 2025.** Enter the prior year value of property in deannexed territory.[5] Tex. Tax Code § 26.012(15)	**$0**

10.	**Prior year taxable value lost because property first qualified for an exemption in the current year.** If the taxing unit increased an original exemption, use the difference between the original exempted amount and the increased exempted amount. Do not include value lost due to freeport, goods-in-transit, temporary disaster exemptions. Note that lowering the amount or percentage of an existing exemption in the current year does not create a new exemption or reduce taxable value. A. Absolute exemptions. Use prior year market value: **B. Partial exemptions.** Current year exemption amount or current year percentage exemption times prior year value: **C. Value loss.** Add A and B.[6 Tex. Tax Code § 26.012(15)]	**$14,569,725** **$11,932,080**	**$26,501,805**
11.	**Prior year taxable value lost because property first qualified for agricultural appraisal (1-d or 1-d-1), timber appraisal, recreational/scenic appraisal or public access airport special appraisal in the current year.** Use only properties that qualified for the first time in the current year; do not use proper- ties that qualified in the prior year. **A. Prior year market value:** **B. Current year productivity or special appraised value::** **C. Value loss.** Subtract B from A.[7 Tex. Tax Code § 26.012(15)]	**$285,480** **$0**	**$285,480**
12.	Total adjustments for lost value. Add Lines 9, 10C and 11C		**$26,787,285**
13.	**Prior year captured value of property in a TIF.** Enter the total value of the prior year captured appraised value of property taxable by a taxing unit in a tax increment financing zone for which the prior year taxes were deposited into the tax increment fund. 8 If the taxing unit has no captured appraised value in line 18D, enter 0.		**$2,241,200**
14.	**Prior year total value.** Subtract Line 12 and Line 13 from Line 8.		**$21,792,664,320**
15.	**Adjusted prior year total levy.** Multiply Line 4 by Line 14 and divide by $100		**$75,982,739**
16.	**Taxes refunded for years preceding the prior tax year.** Enter the amount of taxes refunded by the taxing unit for tax years preceding the prior tax year. Types of refunds include court decisions, Tax Code Section 25.25(b) and (c) corrections and Tax Code Section 31.11 payment errors. Do not include refunds for the prior tax year. This line applies only to tax years preceding the prior tax year.[9 Tex. Tax Code § 26.012(13)]		**$280,542**
17.	**Adjusted prior year levy with refunds and TIF adjustment.** Add Lines 15 and 16.[10 Tex. Tax Code § 26.012(13)]		**$76,263,281**
18.	**Total current year taxable value on the current year certified appraisal roll today.** This value includes only certified values or certified estimate of values and includes the total taxable value of homesteads with tax ceilings (will deduct in Line 20). These homesteads include homeowners age 65 or older or disabled.[11 Tex. Tax Code § 26.012, 26.04(c-2)] **A. Certified values:** **B. Counties:** Include railroad rolling stock values certified by the Comptroller's office: **C. Pollution control and energy storage system exemption:** Deduct the value of property exempted for the current tax year for the first time as pollution control or energy storage system property: **D. Tax increment financing:** Deduct the current year captured appraised value of property taxable by a taxing unit in a tax increment financing zone for which the current year taxes will be deposited into the tax increment fund. Do not include any new property value that will be included in Line 23 below.[12 Tex. Tax Code § 26.03(c)] **E. Total current year value.** Add A and B, then subtract C and D.	**$23,113,530,950** **$0** **$0** **$160,248,334**	**$22,953,282,616**

2025 Tax Rate Calculation Worksheet – Taxing Units Other Than School Districts or Water Districts Form **50-856**

Line	No-New-Revenue Tax Rate Worksheet		Amount/Rate
19.	**Total value of properties under protest or not included on certified appraisal roll.** [13] Tex. Tax Code § 26.01(c) and (d)		
	A. Current year taxable value of properties under protest. The chief appraiser certifies a list of properties still under ARB protest. The list shows the appraisal district's value and the taxpayer's claimed value, if any, or an estimate of the value if the taxpayer wins. For each of the properties under protest, use the lowest of these values. Enter the total value under protest. [14] Tex. Tax Code § 26.01(c)	$41,315,028	* Please contact Chief Apprasier to obtain estimated Recognizable values of property under protest
	B. Current year value of properties not under protest or included on certified appraisal roll. The chief appraiser gives taxing units a list of those taxable properties that the chief appraiser knows about but are not included in the appraisal roll certification. These properties also are not on the list of properties that are still under protest. On this list of properties, the chief appraiser includes the market value, appraised value and exemptions for the preceding year and a reasonable estimate of the market value, appraised value and exemptions for the current year. Use the lower market, appraised or taxable value (as appropriate). Enter the total value of property not on the certified roll. [15] Tex. Tax Code § 26.01(d)	$0	
	C.Total value under protest or not certified. Add A and B.		$41,315,028
20.	**Current year tax ceilings.** Counties, cities and junior colleges enter current year total taxable value of homesteads with tax ceilings. These include the home- steads of homeowners age 65 or older or disabled. Other taxing units enter 0. If your taxing unit adopted the tax ceiling provision in the prior year or a previous year for homeowners age 65 or older or disabled, use this step.[16] Tex. Tax Code § 26.012(6)(B)		$0
21.	**Current year total taxable value.** Add Lines18Eand19C.Subtract Line 20[17] Tex. Tax Code § 26.012(6)		$22,994,597,644
22.	**Total current year taxable value of properties in territory annexed after Jan. 1, of the prior year.** Include both real and personal property. Enter the current year value of property in territory annexed. [18] Tex. Tax Code § 26.012(17)		$0
23.	**Total current year taxable value of new improvements and new personal property located in new improvements.** New means the item was not on the appraisal roll in the prior year. An improvement is a building, structure, fixture or fence erected on or affixed to land. New additions to existing improvements may be included if the appraised value can be determined. New personal property in a new improvement must have been brought into the taxing unit after Jan. 1, of the prior year and be located in a new improvement. New improvements **do** include property on which a tax abatement agreement has expired for the current year. [19] Tex. Tax Code § 26.012(17)		$328,093,308.00
24.	**Total adjustments to the current year taxable value.** Add Lines 22 and 23.		$328,093,308.00
25.	**Adjusted current year taxable value.** Subtract Line 24 from Line 21.		$22,666,504,336
26.	**Current year NNR tax rate.**Divide Line 17 by Line 25 and multiply by $100[20] Tex. Tax Code § 26.04(c)		0.3364581
27.	**COUNTIES ONLY.** Add together the NNR tax rates for each type of tax the county levies. The total is the current year county NNR tax rate. [21] Tex. Tax Code § 26.04(d)		0.00000000

Texas Comptroller of Public Accounts Form **50-856**

SECTION 2: Voter-Approval Tax Rate

The voter-approval tax rate is the highest tax rate that a taxing unit may adopt without holding an election to seek voter approval of the rate. The voter-approval tax rate is split into two separate rates:

1. Maintenance and Operations (M&O) Tax Rate: The M&O portion is the tax rate that is needed to raise the same amount of taxes that the taxing unit levied in the prior year plus the applicable percentage allowed by law. This rate accounts for such things as salaries, utilities and day-to-day operations.

2. Debt Rate: The debt rate includes the debt service necessary to pay the taxing unit's debt payments in the coming year. This rate accounts for principal and interest on bonds and other debt secured by property tax revenue.

The voter-approval tax rate for a county is the sum of the voter-approval tax rates calculated for each type of tax the county levies. In most cases the voter-approval tax rate exceeds the no-new-revenue tax rate, but occasionally decreases in a taxing unit's debt service will cause the NNR tax rate to be higher than the voter-approval tax rate.

Line	Voter-Approval Tax Rate Worksheet		Amount/Rate
28.	Prior year M&O tax rate. Enter the prior year M&O tax rate.		0.29032000
29.	**Prior year taxable value, adjusted for actual and potential court-ordered adjustments.** Enter the amount in Line 8 of the No-New-Revenue Tax Rate Worksheet.		$21,821,692,805
30.	**Total prior year M&O levy.** Multiply Line 28 by Line 29 and divide by $100		$63,352,739
31.	**Adjusted prior year levy for calculating NNR M&O rate.**		
	A. M&O taxes refunded for years preceding the prior tax year. Enter the amount of M&O taxes refunded in the preceding year for taxes before that year. Types of refunds include court decisions, Tax Code Section 25.25(b) and (c) corrections and Tax Code Section 31.11 payment errors. Do not include refunds for tax year 2024. This line applies only to tax years preceding the prior tax year.	$238,769	
	B. Prior year taxes in TIF. Enter the amount of taxes paid into the tax increment fund for a reinvestment zone as agreed by the taxing unit. If the taxing unit has no current year captured appraised value in Line 18D, enter 0.	$7,813	
	C. Prior year transferred function. If discontinuing all of a department, function or activity and transferring it to another taxing unit by written contract, enter the amount spent by the taxing unit discontinuing the function in the 12 months preceding the month of this calculation. If the taxing unit did not operate this function for this 12-month period, use the amount spent in the last full fiscal year in which the taxing unit operated the function. The taxing unit discontinuing the function will subtract this amount in D below. The taxing unit receiving the function will add this amount in D below. Other taxing units enter 0.	$0	
	SELECT TRANSFERRING FUNCTION STATE (NA, DISCONTINUED, RECEIVED)	NA	
	D. Prior year M&O levy adjustments. Subtract B from A. For taxing unit with C, subtract if discontinuing function and add if receiving function.	$230,956	
	E. Add Line 30 to 31D.		$63,583,695
32.	**Adjusted current year taxable value.** Enter the amount in Line 25 of the No-New-Revenue Tax Rate Worksheet		$22,666,504,336
33.	**Current year NNR M&O rate (unadjusted).** Divide Line 31E by Line 32 and multiply by $100.		0.28051831
34.	**Rate adjustment for state criminal justice mandate.** [23] Tex. Tax Code § 26.044		
	A. Current year state criminal justice mandate. Enter the amount spent by a county in the previous 12 months providing for the maintenance and operation cost of keeping inmates in county-paid facilities after they have been sentenced. Do not include any state reimbursement received by the county for the same purpose.	$0	
	B. Prior year state criminal justice mandate. Enter the amount spent by a county in the 12 months prior to the previous 12 months providing for the maintenance and operation cost of keeping inmates in county-paid facilities after they have been sentenced. Do not include any state reimbursement received by the county for the same purpose. Enter zero if this is the first time the mandate applies.	$0	
	C. Subtract B from A and divide by Line 32 and multiply by $100	0.00000000	
	D. Enter the rate calculated in C. If not applicable, enter 0.		0.00000000
35.	**Rate adjustment for indigent health care expenditures.** [24] Tex. Tax Code § 26.0442		
	A. Current year indigent health care expenditures. Enter the amount paid by a taxing unit providing for the maintenance and operation cost of providing indigent health care for the period beginning on July 1, of the prior tax year and ending on June 30, of the current tax year, less any state assistance received for the same purpose.	$0	
	B. Prior year indigent health care expenditures. Enter the amount paid by a taxing unit providing for the maintenance and operation cost of providing indigent health care for the period beginning on July 1, 2023 and ending on June 30, 2024, less any state assistance received for the same purpose.	$0	
	C. Subtract B from A and divide by Line 32 and multiply by $100	0.00000000	
	D. Enter the rate calculated in C. If not applicable, enter 0.		0.00000000

2025 Tax Rate Calculation Worksheet – Taxing Units Other Than School Districts or Water Districts Form **50-856**

Line	Voter-Approval Tax Rate Worksheet		Amount/Rate
36.	**Rate adjustment for county indigent defense compensation.** [25 Tex. Tax Code § 26.0442]		
	A. Current year indigent defense compensation expenditures. Enter the amount paid by a county to provide appointed counsel for indigent individuals and fund the operations of a public defender's office under Article 26.044, Code of Criminal Procedure for the period beginning on July 1, of the prior tax year and ending on June 30,of the current tax year, less any state grants received by the county for the same purpose.	**$0**	
	B. Prior year indigent defense compensation expenditures. Enter the amount paid by a county to provide appointed counsel for indigent individuals and fund the operations of a public defender's office under Article 26.044, Code of Criminal Procedure for the period beginning on July 1,2023 and ending on June 30,2024 less any state grants received by the county for the same purpose.	**$0**	
	C. Subtract B from A and divide by Line 32 and multiply by $100	**0.00000000**	
	D. Multiply B by 0.05 and divide by Line 32 and multiply by $100	**0**	
	E. Enter the lesser of C and D. If not applicable, enter 0.		**0.00000000**
37.	**Rate adjustment for county hospital expenditures.** [26 Tex. Tax Code § 26.0443]		
	A. Current year eligible county hospital expenditures. Enter the amount paid by the county or municipality to maintain and operate an eligible county hospital for the period beginning on July 1, of the prior tax year and ending on June 30, of the current tax year.	**$0**	
	B. Prior year eligible county hospital expenditures. Enter the amount paid by the county or municipality to maintain and operate an eligible county hospital for the period beginning on July 1, 2023 and ending on June 30, 2024.	**$0**	
	C. Subtract B from A and divide by Line 32 and multiply by $100	**0.00000000**	
	D. Multiply B by 0.08 and divide by Line 32 and multiply by $100	**0**	
	E. Enter the lesser of C and D, if applicable. If not applicable, enter 0.		**0.00000000**
38.	**Rate adjustment for defunding municipality.** This adjustment only applies to a municipality that is considered to be a defunding municipality for the current tax year under Chapter 109, Local Government Code. Chapter 109, Local Government Code only applies to municipalities with a population of more than 250,000 and includes a written determination by the Office of the Governor. See Tax Code Section 26.0444 for more information.		
	A. Amount appropriated for public safety in the prior year. Enter the amount of money appropriated for public safety in the budget adopted by the municipality for the preceding fiscal year	**$0**	
	B. Expenditures for public safety in the prior year. Enter the amount of money spent by the municipality for public safety during the preceding fiscal year	**$0**	
	C. Subtract B from A and divide by Line 32 and multiply by $100	**0.00000000**	
	D. Enter the lesser of C If not applicable, enter 0.	**0**	
			0.00000000
39.	**Adjusted current year NNR M&O rate.** Add Lines 33, 34D, 35D, 36E, and 37E. Subtract Line 38D.		**0.28051831**
40.	**Adjustment for prior year sales tax specifically to reduce property taxes.** Cities, counties and hospital districts that collected and spent additional sales tax on M&O expenses in the prior year should complete this line. These entities will deduct the sales tax gain rate for the current year in Section 3. Other taxing units, enter zero.		
	A. Enter the amount of additional sales tax collected and spent on M&O expenses in the prior year, if any. Counties must exclude any amount that was spent for economic development grants from the amount of sales tax spent	**$0**	
	B. Divide Line 40A by Line 32 and multiply by $100	**0.00000000**	
	C. Add Line 40B to Line 39.		**0.28051831**
41.	**Current year voter-approval M&O rate.** Enter the rate as calculated by the appropriate scenario below **Special Taxing Unit.** If the taxing unit qualifies as a special taxing unit, multiply Line 40C by 1.08. - or - **Other Taxing Unit.** If the taxing unit does not qualify as a special taxing unit, multiply Line 40C by 1.035.		**0.29033645**

D41.	**Disaster Line 41 (D41): Current year voter-approval M&O rate for taxing unit affected by disaster declaration.** If the taxing unit is located in an area declared a disaster area and at least one person is granted an exemption under Tax Code Section 11.35 for property located in the taxing unit, the governing body may direct the person calculating the voter-approval tax rate to calculate in the manner provided for a special taxing unit. The taxing unit shall continue to calculate the voter-approval tax rate in this manner until the earlier of 1) the first year in which total taxable value on the certified appraisal roll exceeds the total taxable value of the tax year in which the disaster occurred, or 2) the third tax year after the tax year in which the disaster occurred If the taxing unit qualifies under this scenario, multiply Line 40C by 1.08. [27] Tex. Tax Code § 26.042(a) If the taxing unit does not qualify, do not complete Disaster Line 41 (Line D41).	**0.00000000**
42.	**Total current year debt to be paid with property taxes and additional sales tax revenue**. Debt means the interest and principal that will be paid on debts that: (1) are paid by property taxes, (2) are secured by property taxes, (3) are scheduled for payment over a period longer than one year, and (4) are not classified in the taxing unit's budget as M&O expenses. **A. Debt** also includes contractual payments to other taxing units that have incurred debts on behalf of this taxing unit, if those debts meet the four conditions above. Include only amounts that will be paid from property tax revenue. Do not include appraisal district budget payments. If the governing body of a taxing unit authorized or agreed to authorize a bond, warrant, certificate of obligation, or other evidence of indebtedness on or after Sept. 1, 2021, verify if it meets the amended definition of debt before including it here. [28] Tex. Tax Code § 26.012(7)	
	Enter debt amount **$19,102,876**	
	B. Subtract **unencumbered fund amount** used to reduce total debt. **$0**	
	C. Subtract **certified amount spent from sales tax to reduce debt** (enter zero if none) **$0**	
	D. Subtract **amount paid** from other resources **$4,611,738**	
	E. Adjusted debt. Subtract B, C and D from A.	**$14,491,138**
43.	**Certified prior year excess debt collections.** Enter the amount certified by the collector. [29] Tex. Tax Code § 26.012(10) and 26.04(b)	**$0**

2025 Tax Rate Calculation Worksheet – Taxing Units Other Than School Districts or Water Districts Form **50-856**

Line	Voter-Approval Tax Rate Worksheet	Amount/Rate
44.	**Adjusted current year debt.** Subtract Line 43 from Line 42E.	**$14,491,138**
45.	**Current year anticipated collection rate.**	
	A. Enter the current year anticipated collection rate certified by the collector. [30] Tex. Tax Code § 26.04(b) **95.86%**	
	B. Enter the prior year actual collection rate. **97.78%**	
	C. Enter the 2023 actual collection rate **98.37%**	
	D. Enter the 2022 actual collection rate. **98.66%**	
	E. If the anticipated collection rate in A is lower than actual collection rates in B, C and D, enter the lowest collection rate from B, C and D. If the anticipated rate in A is higher than at least one of the rates in the prior three years, enter the rate from A. Note that the rate can be greater than 100%. [31] Tex. Tax Code § 26.04(h), (h-1) and (h-2)	**97.78%**
46.	**Current year debt adjusted for collections.** Divide Line 44 by Line 45E.	**14820145.22**
47.	**Current year total taxable value.** Enter the amount on Line 21 of the No-New-Revenue Tax Rate Worksheet	**22,994,597,644**
48.	**Current year debt rate.** Divide Line 46 by Line 47 and multiply by $100.	**0.06445055**
49.	**Current year voter-approval M&O rate plus current year debt rate.** Add Lines 41 and 48.	**0.35478700**
D49.	**Disaster Line 49 (D49): Current year voter-approval tax rate for taxing unit affected by disaster declaration.** Complete this line if the taxing unit calculated the voter-approval tax rate in the manner provided for a special taxing unit on Line D41. Add Line D41 and 48.	**0.06445055**
50.	**COUNTIES ONLY.** Add together the voter-approval tax rates for each type of tax the county levies. The total is the current year county voter-approval tax rate.	**0.00000000**

SECTION 3: NNR Tax Rate and Voter-Approval Tax Rate Adjustments for Additional Sales Tax to Reduce Property Taxes

Cities, counties and hospital districts may levy a sales tax specifically to reduce property taxes. Local voters by election must approve imposing or abolishing the additional sales tax. If approved, the taxing unit must reduce its NNR and voter-approval tax rates to offset the expected sales tax revenue.
This section should only be completed by a county, city or hospital district that is required to adjust its NNR tax rate and/or voter-approval tax rate because it adopted the additional sales tax.

Line	Additional Sales and Use Tax Worksheet	Amount/Rate
51.	**Taxable Sales.** For taxing units that adopted the sales tax in November of the prior tax year or May of the current tax year, enter the Comptroller's estimate of taxable sales for the previous four quarters.[32] Tex. Tax Code § 26.041(d) Estimates of taxable sales may be obtained through the Comptroller's Allocation Historical Summary webpage. Taxing units that adopted the sales tax before November of the prior year, enter 0.	$0
52.	**Estimated sales tax revenue.** Counties exclude any amount that is or will be spent for economic development grants from the amount of estimated sales tax revenue.[33] Tex. Tax Code § 26.041(i) **Taxing units that adopted the sales tax in November of the prior tax year or in May of the current tax year.** Multiply the amount on Line 51 by the sales tax rate (.01, .005 or .0025, as applicable) and multiply the result by .95.[34] Tex. Tax Code § 26.041(d) **- or -** **Taxing units that adopted the sales tax before November of the prior year.** Enter the sales tax revenue for the previous four quarters. Do not multiply by .95..	$0
53.	**Current year total taxable value.** Enter the amount from Line 21 of the No-New-Revenue Tax Rate Worksheet.	$22,994,597,644
54.	**Sales tax adjustment rate.** Divide Line 52 by Line 53 and multiply by $100.	0.00000000
55.	**Current year NNR tax rate, unadjusted for sales tax.**[35] Tex. Tax Code § 26.04(c) Enter the rate from Line 26 or 27, as applicable, on the No-New-Revenue Tax Rate Worksheet.	0.33645810
56.	**Current year NNR tax rate, adjusted for sales tax.** **Taxing units that adopted the sales tax in November the prior tax year or in May of the current tax year.** Subtract Line 54 from Line 55. Skip to Line 57 if you adopted the additional sales tax before November of the prior tax year.	$0
57.	**Current year voter-approval tax rate, unadjusted for sales tax.**[36] Enter the rate from Line 49, Line D49 (disaster) or Line 50 (counties) as applicable, of the Voter-Approval Tax Rate Worksheet.	0.35478700

Line	Additional Sales and Use Tax Worksheet	Amount/Rate
58.	**Current year voter-approval tax rate, adjusted for sales tax.** Subtract Line 54 from Line 57	0.35478700

SECTION 4: Voter-Approval Rate Adjustment for Pollution Control

A taxing unit may raise its rate for M&O funds used to pay for a facility, device or method for the control of air, water or land pollution. This includes any land, structure, building, installation, excavation, machinery, equipment or device that is used, constructed, acquired or installed wholly or partly to meet or exceed pollution control requirements. The taxing unit's expenses are those necessary to meet the requirements of a permit issued by the Texas Commission on Environmental Quality (TCEQ). The taxing unit must provide the tax assessor with a copy of the TCEQ letter of determination that states the portion of the cost of the installation for pollution control.
This section should only be completed by a taxing unit that uses M&O funds to pay for a facility, device or method for the control of air, water or land pollution.

Line	Voter-Approval Rate Adjustment for Pollution Control Requirements Worksheet	Amount/Rate
59.	**Certified expenses from the Texas Commission on Environmental Quality (TCEQ).** Enter the amount certified in the determination letter from TCEQ.[37] Tex. Tax Code § 26.045(d) The taxing unit shall provide its tax assessor-collector with a copy of the letter.[38] Tex. Tax Code § 26.045(i)	$0
60.	**Current year total taxable value.** Enter the amount from Line 21 of the No-New-Revenue Tax Rate Worksheet	$22,994,597,644
61.	**Additional rate for pollution control.** Divide Line 59 by Line 60 and multiply by $100.	0
62.	**Current year voter-approval tax rate, adjusted for pollution control.** Add Line 61 to one of the following lines (as applicable): Line 49, Line D49 (disaster), Line 50 (counties) or Line 58 (taxing units with the additional sales tax).	0.35478700

SECTION 5: Voter-Approval Tax Rate Adjustment for Unused Increment Rate

The unused increment rate is the rate equal to the sum of the prior 3 years Foregone Revenue Amounts divided by the current taxable value. [39] The Foregone Revenue Amount for each year is equal to that year's adopted tax rate subtracted from that year's voter-approval tax rate adjusted to remove the unused increment rate multiplied by that year's current total value. [40] The difference between the adopted tax rate and voter-approval tax rate is considered zero in the following scenarios:

- a tax year in which a taxing unit affected by a disaster declaration calculates the tax rate under Tax Code Section 26.042; [41]
- a tax year in which the municipality is a defunding municipality, as defined by Tax Code Section 26.0501(a); [42] or
- after Jan. 1, 2022, a tax year in which the comptroller determines that the county implemented a budget reduction or reallocation described by Local Government Code Section 120.002(a) without the required voter approval. [43]

This section should only be completed by a taxing unit that does not meet the definition of a special taxing unit. [44]

[39] Tex. Tax Code § 26.013(a)
[40] Tex. Tax Code § 26.013(c)
[41] Tex. Tax Code §§ 26.0501(a) and (c)
[42] Tex. Local Gov't Code § 120.007(d) or
[43] Tex. Tax Code § 26.063(a)(1)
[44] Tex. Tax Code § 26.012(8-a)

Line	Unused Increment Rate Worksheet	Amount/Rate
63.	**Year 3 Foregone Revenue Amount. Subtract the 2024 unused increment rate and 2024 actual tax rate from the 2024 voter-approval tax rate. Multiply the result by the 2024 current total value**	
	A. Voter-approval tax rate (Line 68)	**0.36105500**
	B. Unused increment rate (Line 67)	**0.00785400**
	C. Subtract B from A	**0.35320100**
	D. Adopted Tax Rate	**0.34866200**
	E. Subtract D from C	**0.00453900**
	F. 2024 Total Taxable Value (Line 60)	**21,701,456,134**
	G. Multiply E by F and divide the results by $100 If the number is less than zero, enter zero.	**985,029**
64.	**Year 2 Foregone Revenue Amount. Subtract the 2023 unused increment rate and 2023 actual tax rate from the 2023 voter-approval tax rate. Multiply the result by the 2023 current total value**	
	A. Voter-approval tax rate (Line 67)	**0.38040800**
	B. Unused increment rate (Line 66)	**0.02724600**
	C. Subtract B from A	**0.35316200**
	D. Adopted Tax Rate	**0.35066200**
	E. Subtract D from C	**0.00250000**
	F. 2023 Total Taxable Value (Line 60)	**20,599,905,042**
	G. Multiply E by F and divide the results by $100	**514,998**
65.	**Year 1 component. Subtract the 2022 actual tax rate and the 2022 unused increment rate from the 2022 voter-approval tax rate.**	
	A. Voter-approval tax rate (Line 67)	**0.37221000**
	B. Unused increment rate (Line 66)	**0.01047900**
	C. Subtract B from A	**0.36173100**
	D. Adopted Tax Rate	**0.35503900**
	E. Subtract D from C	**0.00669200**
	F. 2022 Total Taxable Value (Line 60)	**17,772,568,163**
	G. Multiply E by F and divide the results by $100	**1,189,340**
66.	**Total Foregone Revenue Amount.** Add Lines 63G, 64G and 65G.	**2,689,367.00000000**
67.	**2025 Unused Increment Rate.** Divide Line 66 by Line 21 of the No-New-Revenue Rate Worksheet. Multiply the result by 100	**0.01169564**
68.	**Total 2025 voter-approval tax rate, including the unused increment rate.** Add Line 67 to one of the following lines (as applicable): Line 49, Line 50 (counties), Line 58 (taxing units with additional sales tax) or Line 62 (taxing units with pollution)	**0.36648264**

SECTION 6: De Minimis Rate

The de minimis rate is the rate equal to the sum of the no-new-revenue maintenance and operations rate, the rate that will raise $500,000, and the current debt rate for a taxing unit. [46]
This section should only be completed by a taxing unit that is a municipality of less than 30,000 or a taxing unit that does not meet the definition of a special taxing unit. [47]

[46] Tex. Tax Code § 26.063(a)(1)
[47] Tex. Tax Code §26.042(b)

Line	De Minimis Rate Worksheet	Amount/Rate
69.	**Adjusted current year NNR M&O tax rate.** Enter the rate from Line 39 of the Voter-Approval Tax Rate Worksheet	**0.28051831**
70.	**Current year total taxable value.** Enter the amount on Line 21 of the No-New-Revenue Tax Rate Worksheet	**$22,994,597,644**
71.	**Rate necessary to impose $500,000 in taxes**. Divide $500,000 by Line 70 and multiply by $100	**0.002174424**
72.	**Current year debt rate.** Enter the rate from Line 48 of the Voter- Approval Tax Rate Worksheet	**0.06445055**
73.	**De minimis rate.** Add Lines 69, 71 and 72.	**0.34714328**

SECTION 7: Voter-Approval Tax Rate Adjustment for Emergency Revenue Rate

In the tax year after the end of the disaster calculation time period detailed in Tax Code Section 26.042(a), a taxing unit that calculated its voter-approval tax rate in the manner provided for a special taxing unit due to a disaster must calculate its emergency revenue rate and reduce its voter-approval tax rate for that year.[47] Tex. Tax Code §26.042(b)

Similarly, if a taxing unit adopted a tax rate that exceeded its voter-approval tax rate, calculated normally, without holding an election to respond to a disaster, as allowed by Tax Code Section 26.042(d), in the prior year, it must also reduce its voter-approval tax rate for the current tax year.[48] Tex. Tax Code §26.042(f)

This section will apply to a taxing unit other than a special taxing unit that:

• directed the designated officer or employee to calculate the voter-approval tax rate of the taxing unit in the manner provided for a special taxing unit in the prior year; and

• the current year is the first tax year in which the total taxable value of property taxable by the taxing unit as shown on the appraisal roll for the taxing unit submitted by the assessor for the taxing unit to the governing body exceeds the total taxable value of property taxable by the taxing unit on January 1 of the tax year in which the disaster occurred or the disaster occurred four years ago. This section will apply to a taxing unit in a disaster area that adopted a tax rate greater than its voter-approval tax rate without holding an election in the prior year.Note: This section does not apply if a taxing unit is continuing to calculate its voter-approval tax rate in the manner provided for a special taxing unit because it is still within the disaster calculation time period detailed in Tax Code Section 26.042(a) because it has not met the conditions in Tax Code Section 26.042(a)(1) or (2).

Line	Emergency Revenue Rate Worksheet	Amount/Rate
74.	**2024 adopted tax rate.** Enter the rate in Line 4 of the No-New-Revenue Tax Rate Worksheet.	**0.34866200**
75.	**Adjusted 2024 voter-approval tax rate.** Use the taxing unit's Tax Rate Calculation Worksheets from the prior year(s) to complete this line. [49 Tex. Tax Code §26.042(c)] If a disaster occurred in 2024 and the taxing unit calculated its 2024 voter-approval tax rate using a multiplier of 1.08 on Disaster Line 41 (D41) of the 2024 worksheet due to a disaster, complete the applicable sections or lines of Form 50-856-a, Adjusted Voter-Approval Tax Rate for Taxing Units in Disaster Area Calculation Worksheet. **- or -** If a disaster occurred prior to 2024 for which the taxing unit continued to calculate its voter-approval tax rate using a multiplier of 1.08 on Disaster Line 41 (D41) in 2024, complete form 50-856-a, Adjusted Voter-Approval Tax Rate for Taxing Units in Disaster Area Calculation Worksheet to recalculate the voter-approval tax rate the taxing unit would have calculated in 2024 if it had generated revenue based on an adopted tax rate using a multiplier of 1.035 in the years following the disaster. [50 Tex. Tax Code §26.042(b)] Enter the final adjusted 2024 voter-approval tax rate from the worksheet. - or - If the taxing unit adopted a tax rate above the 2024 voter-approval tax rate without calculating a disaster tax rate or holding an election due to a disaster, no recalculation is necessary. Enter the voter-approval tax rate from the prior year's worksheet.	**0.00000000**
76.	**Increase in 2024 tax rate due to disaster.** Subtract Line 75 from Line 74.	**-0.34866200**
77.	**Adjusted 2024 taxable value.** Enter the amount in Line 14 of the No-New-Revenue Tax Rate Worksheet.	**$21,792,664,320**
78.	**Emergency revenue.** Multiply Line 76 by Line 77 and divide by $100.	**-$75,982,739.27**
79.	**Adjusted 2024 taxable value.** Enter the amount in Line 25 of the No-New-Revenue Tax Rate Worksheet.	**$22,666,504,336**
80.	**Emergency revenue rate.** . Divide Line 78 by Line 79 and multiply by $100. [50 Tex. Tax Code §26.042(b)]	**-0.33522037**
81.	**Current year voter-approval tax rate, adjusted for emergency revenue.** Subtract Line 80 from one of the following lines (as applicable): Line 49, Line D49 (disaster), Line 50 (counties), Line 58 (taxing units with the additional sales tax), Line 62 (taxing units with pollution control) or Line 68 (taxing units with the unused increment rate).	**0.35478700**

SECTION 8: Total Tax Rate

Indicate the applicable total tax rates as calculated above.

No-new-revenue tax rate

As applicable, enter the current year NNR tax rate from: Line 26, Line 27 (counties), or Line 56 (adjusted for sales tax). **0.33645810**

Indicate the line number used: **26**

Voter-approval tax rate

As applicable, enter the current year voter-approval tax rate from: Line 49, Line D49 (disaster), Line 50 (counties), Line 58 (adjusted for sales tax), Line 62 (adjusted for pollution control), Line 68 (adjusted for unused increment), or Line 81 (adjusted for emergency revenue). **0.36648264**

Indicate the line number used: **68**

De minimis rate.

If applicable, enter the current year de minimis rate from Line 73. **n/a**

SECTION 9: Taxing Unit Representative Name and Signature

Enter the name of the person preparing the tax rate as authorized by the governing body of the taxing unit. By signing below, you certify that you are the designated officer or employee of the taxing unit and have accurately calculated the tax rates using values that are the same as the values shown in the taxing unit's certified appraisal roll or certified estimate of taxable value, in accordance with requirements in the Tax Code. [51 Tex. Tax Code §§ 26.04(c-2) and (d-2)]

print here: Michelle L Berdeaux, RPA, RTA, CTA, CCA

Printed Name of Taxing Unit Representative

sign here: Michelle L Berdeaux

Tax Unit Representative

Date: 8/5/2025

For additional copies, visit: comptroller.texas.gov/taxes/property-tax

50-856 3-25/12

NOTICE OF PUBLIC HEARING ON TAX INCREASE

A tax rate of $0.347999 per $100 valuation has been proposed by the governing body of City of Midland.

PROPOSED TAX RATE	$0.347999 per $100
NO-NEW-REVENUE TAX RATE	$0.336458 per $100
VOTER-APPROVAL TAX RATE	$0.366479 per $100

The no-new-revenue tax rate is the tax rate for the 2025 tax year that will raise the same amount of property tax revenue for City of Midland from the same properties in both the 2024 tax year and the 2025 tax year.

The voter-approval rate is the highest tax rate that City of Midland may adopt without holding an election to seek voter approval of the rate.

The proposed tax rate is greater than the no-new-revenue tax rate. This means that City of Midland is proposing to increase property taxes for the 2025 tax year.

A PUBLIC HEARING ON THE PROPOSED TAX RATE WILL BE HELD ON September 9, 2025 AT 10:00 AM AT City Hall Council Chambers, 300 N Loraine St. Midland TX 79701.

The proposed tax rate is not greater than the voter-approval tax rate. As a result, City of Midland is not required to hold an election at which voters may accept or reject the proposed tax rate. However, you may express your support for or opposition to the proposed tax rate by contacting the members of the of City of Midland at their offices or by attending the public hearing mentioned above.

YOUR TAXES OWED UNDER ANY OF THE RATES MENTIONED ABOVE CAN BE CALCULATED AS FOLLOWS:

Property tax amount= (tax rate) x (taxable value of your property)/100

FOR the proposal:

AGAINST the proposal:

PRESENT and not voting:

ABSENT:

DO NOT REPRODUCE

Visit Texas.gov/PropertyTaxes to find a link to your local property tax database on which you can easily access information regarding your property taxes, including information about proposed tax rates and scheduled public hearings of each entity that taxes your property.

The 86th Texas Legislature modified the manner in which the voter-approval tax rate is calculated to limit the rate of growth of property taxes in the state.

The following table compares the taxes imposed on the average residence homestead by City of Midland last year to the taxes proposed to be imposed on the average residence homestead by City of Midland this year.

	2024	2025	Change
Total tax rate (per $100 of value)	$0.348662	$0.347999	decrease of -0.000663 per $100, or -0.19%
Average homestead taxable value	$299,195	$302,016	increase of 0.94%
Tax on average homestead	$1,043.18	$1,051.01	increase of 7.83, or 0.75%
Total tax levy on all properties	$76,356,678	$80,020,970	increase of 3,664,292, or 4.80%

For assistance with tax calculations, please contact the tax assessor for City of Midland at or , or visit . for more information.

§26.05(b) of Property Tax Code

New Steps Required for Adoption of Tax Rate

Entity Name: City of Midland Date: 8/15/25

Language Required in the Motion Setting This Year's Tax Rate:

This year's proposed tax rate exceeds the effective tax rate. The vote on the ordinance, resolution, or order setting the tax rate must be a record vote. A motion to adopt the ordinance, resolution, or order must be made in the following form:

> *I move that the property tax rate be increased by the adoption of a tax rate of 0.347999 percent, which is effectively a 3.43% percent increase in the tax rate.*

Statement Required in the Ordinance, Resolution, or Order Setting:

This year's levy to fund maintenance and operations expenditures exceeds last year's maintenance and operations tax levy. Also, this year's M&O tax rate is higher than the effective maintenance and operations tax rate. The following statements must be included in the ordinance, resolution, or order setting this year's tax rate. The statements must be in larger type than the type used in any other portion of the document.

> *THIS TAX RATE WILL RAISE MORE TAXES FOR MAINTENANCE AND OPERATIONS THAN LAST YEAR'S TAX RATE.*
>
> *THE TAX RATE WILL EFFECTIVELY BE RAISED BY 1.08 PERCENT AND WILL RAISE TAXES FOR MAINTENANCE AND OPERATIONS ON A $100,000 HOME BY APPROXIMATELY $-6.77.*

Statement That Must be Posted on the Home Page of Any Internet Website Operated by the Taxing Unit:

This year's tax levy to fund maintenance and operations expenditures exceeds last year's maintenance and operations tax levy. Also, this year's M&O tax rate is higher than the effective maintenance and operations tax rate. The following statements must be included on the home page of any Internet website operated by City of Midland:

> *City of Midland ADOPTED A TAX RATE THAT WILL RAISE MORE TAXES FOR MAINTENANCE AND OPERATIONS THAN LAST YEAR'S TAX RATE.*
>
> *THE TAX RATE WILL EFFECTIVELY BE RAISED BY 1.08 PERCENT AND WILL RAISE TAXES FOR MAINTENANCE AND OPERATIONS ON A $100,000 HOME BY APPROXIMATELY $-6.77.*

City Council Meeting

Item Number: 16

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Garrick Clayton, Oil and Gas Officer

Subject: **THE PROPOSED GRANTING OF OIL AND GAS WELL PERMITS TO PIONEER NATURAL RESOURCES, USA, INC. (“OPERATOR”) FOR THE DRILLING OF THE FOLLOWING OIL AND GAS WELLS: NAIL-TILLMAN E1G 507H; NAIL-TILLMAN E1H 508H; NAIL-TILLMAN E1I 509H; NAILTILLMAN E1J 510H; AND NAIL-TILLMAN E1K 511H; SAID WELLS BEING GENERALLY LOCATED 7,122 FEET NORTH OF OCCIDENTAL PARKWAY AND BETWEEN 1,182 FEET AND 1,262 FEET EAST OF STATE HIGHWAY 349 (PUBLIC HEARING ONLY) (District 1) (Development Services) (Set the Standard for a Safe and Secure City)**

Purpose:

The proposed granting of oil and gas well permits to Pioneer Natural Resources, USA, Inc. (“Operator”) for the drilling of the following oil and gas wells: NAIL-TILLMAN E1G 507H; NAIL-TILLMAN E1H 508H; NAIL-TILLMAN E1I 509H; NAIL-TILLMAN E1J 510H; and NAIL-TILLMAN E1K 511H; said wells being generally located 7,122 feet north of occidental parkway and between 1,182 feet and 1,262 feet east of State Highway 349 (public hearing only). Council may consider these permits following a 30-day public comment period and at a regularly scheduled meeting. No notices of objection received.

Recommended City Council Action:

Direction/Informational

Fiscal Impact:

There is no cost to the City to process this application.

Discussion:

The Oil and Gas Advisory Committee has reviewed the well sites in detail and recommends

approval. Pioneer Natural Resources, USA Inc. will be using a 24’ sound barrier along the entire length of the south side of the pad with the remaining 3 sides facing undeveloped land and oil field which will remain for the duration of drilling and fracing. A quiet type frac system will be used to complete the wells. A closed loop system will be used during drilling operations so no reserve pits will be used and drill cuttings will be removed from the property. The use of compression is requested which will also be behind sound dampening enclosures. The Tank Battery for these wells will be located in the county. Pioneer Natural Resources, USA Inc. is requesting the following variances:

(1) No Road Repair Agreement be required because no City streets will be used to access the well site.

(2) No landscaping or irrigation be required due to no access to city water.

(3) Twenty-four hour hydraulic fracturing operations be permitted.

(4) Drill cuttings be allowed to be removed from the surface location.

(5) Allow for compressors to be used for gas lift during the production phase

Attachments: Applications; Location maps; Exhibit - Drill site maps, Exhibit – Overall Location

City Manager’s Office

MIDLAND Planning Division

APPLICATION FOR OIL AND GAS PERMIT

(Pursuant to Midland City Ordinance No. 8769)

I. General Information

Date	Operator Name (must match W-1)	Operator Address
7/1/2025	Pioneer Natural Resources, USA, Inc.	777 Hidden Ridge Lane Irving, Texas 75038

Representative Name	Representative Address (within Midland City Limits)	Rep. Tele.
BJ Laechelin, Operations Manager	3617 N Big Spring St. Midland, TX 79705	713-446-1628 (Mobile) Rep. Fax
Fee: $4,000.00 Rec'd Yes___ No___	NOTE: All attachments need to bound and put in a binder before submitting.	Pages 1-4

Permit Compliance Contact (Choose 1):

Option A: Laura Wallace, Regulatory Advisor
777 Hidden Ridge Lane Irving, Texas 75038

24/7 Answering Services - No. 1 (Tele.): 432-571-2666 **No. 2 (Tele.):**

Option B:

Company Compliance Representative (Name, Address, Local Telephone) ***(ATTACH STATEMENT AS EXHIBIT A):***

Emergency Contact Representative (Name, Address, 24-Hour Tele. No.):
Pioneer Remote Operations Hub
3617 N Big Spring St. Midland, Texas 79705
432-571-2666 (Available 24/7)

Other Permitted Wells in City ***(ATTACH EXHIBIT B*** **[see § J(26)]).** Attached as Exhibit B

II. Mineral Ownership

Name(s) and Address(es) of Mineral Estate Lessors (under applicable lease):

1. Attached as Exhibit C
2.
3.

ATTACHED AS EXHIBIT C **is (a** ***Title Opinion by*** Brashier, Crosby PLLC ***, a licensed Texas Attorney/Title Commitment by Abstract Company/a Take-off from , a Certified Petroleum Landman/an opinion letter from ,*** ***a licensed Texas Attorney)*** **indicating that [Operator] has a legal right to develop the mineral estate that is the subject of this Application. [See § J(5)].**

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General Description of Current Surface Use (within 860 feet of proposed surface location):

Located in Section 1, Block 39, T1S, T&P RR Co., Abstract 314, Martin County, Texas.

Pad location is owned by Jones Bros Dirt & Paving. Other properties within 860' are: City of Midland (See Exhibit D for details.)

Currently undeveloped.

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***ATTACHED AS EXHIBIT F* is a copy of the notification letter(s) sent to 100 percent of the surface owners, Certified Mail, Return Receipt Requested. [See § J(36)].**

IV. Well & Operations Information

Proposed Well Name: Nail-Tillman E1G 507H

Proposed Hole Size, Casing Program and Cementing Program (attach Exhibit as Necessary)[See § J(11) and § L(4)]:

A wellbore schematic with the applicable information is attached as Exhibit G

Legal Description of Proposed Well Site:

850' FNL, 1467' FEL, Section 1, Block 39, T1S, T&P RR Co., Abstract 314, Martin County, Texas

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Reserve pits will not be used. Freshwater pits will be used. Please see Exhibit O for closure details.

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***ATTACHED AS EXHIBIT U* is Applicant's Hazardous Materials Management Plan, a copy of which has been submitted and is on file with the Midland Fire Department. [See § J(23)].**

_____

[NAME OF COMPANY]

By _____

Its _____

State of _____)

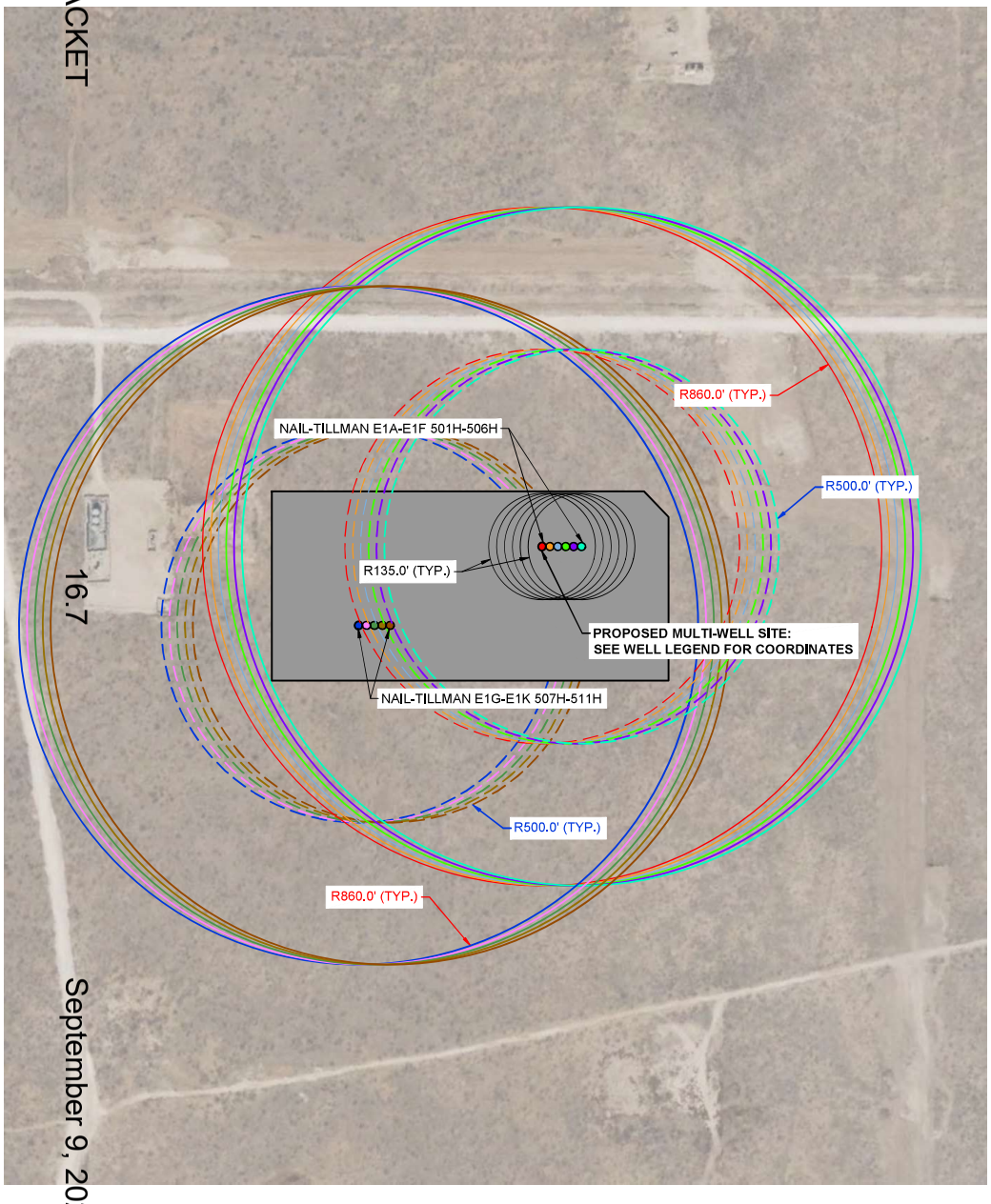
County of _____)

, personally appeared before me, and being first duly sworn declared he/she signed the application in the capacity designated, if any, and further states that he/she has read the above application and attached exhibits and the statements therein are true and correct to the best of their knowledge.

_____

Notary Public, State of_____

[S E A L]



WELL LEGEND

NAIL-TILLMAN E1A 501H 647' FNL, 1004' FEL (SEC. 1) SHL GROUND ELEVATION: 2835' (NAD83) X = 858905.7', Y = 6739308.2' LAT.: 32°06'10.45", LON.: -102°05'01.76" LAT.: 32.102903°, LON.: -102.083821°	NAIL-TILLMAN E1B 502H 647' FNL, 984' FEL (SEC. 1) SHL GROUND ELEVATION: 2835' (NAD83) X = 858925.1', Y = 6739312.9' LAT.: 32°06'10.50", LON.: -102°05'01.53" LAT.: 32.102918°, LON.: -102.083759°
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LEGEND

MULTI-COLOR — 860-FOOT BUFFER/ HALO
MULTI-COLOR — 500-FOOT BUFFER/ HALO
135-FOOT ORDINANCE DISTANCE
PROPOSED WELL PAD SITE

STATE OF TEXAS
REGISTERED
HUNTER WADE WILLS
5929
PROFESSIONAL
LAND SURVEYOR

Hunter Wade Wills
05/20/2025

N

0' 300' 600'

SCALE: 1" = 300'

NOTE: WELL LOCATIONS ARE APPROXIMATELY 7 MILES NORTH OF MIDLAND, TEXAS.

halff
3300 NORTH A STREET, BUILDING 2, SUITE 120
MIDLAND, TX 79705-5471
TEL (432) 253-3255
TBPELS SURVEYING FIRM #10193998
DATE: 2/24/2025
BY: J. ALVAREZ
REV.: 5/15/2025 J. ALVAREZ
AVO: 047474.872

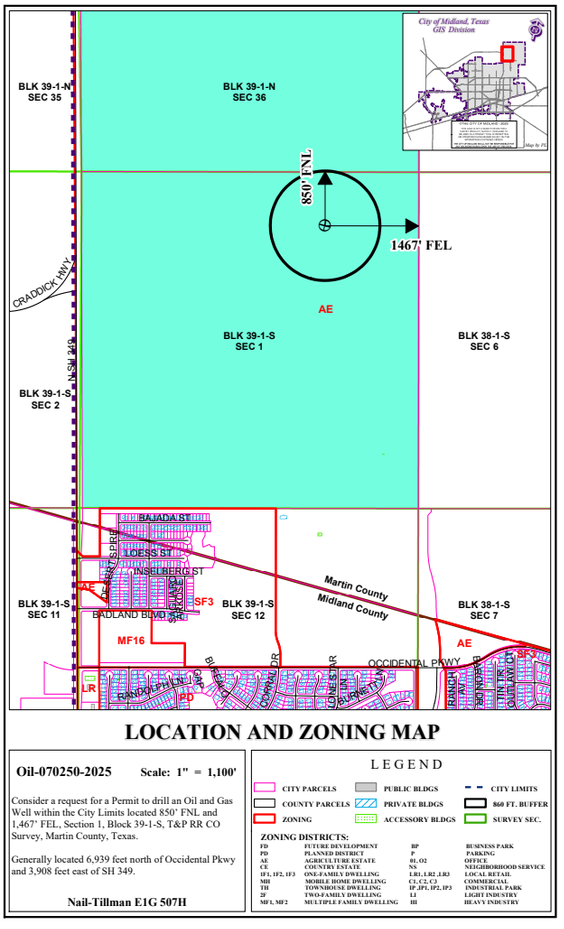
PIONEER NATURAL RESOURCES USA, INC.

EXHIBIT "E"
AERIAL SITE PLAN

NAIL-TILLMAN E1A-E1K 501H-511H

LOCATED IN:
SECTION 1, BLOCK 39, T-1-S,
T.&P. R.R. CO. SURVEY,
ABSTRACT NO. 314,
MARTIN COUNTY, TEXAS

A:\47000S\47474\87SURV\CADD\SHEETS\EXHIBIT\047474.872_AERIAL_SITE_PLAN_EXHIBIT_E.DWG



LOCATION AND ZONING MAP

Oil-070250-2025 **Scale: 1" = 1,100'**

Consider a request for a Permit to drill an Oil and Gas Well within the City Limits located 850' FNL and 1,467' FEL, Section 1, Block 39-1-S, T&P RR CO Survey, Martin County, Texas.

Generally located 6,939 feet north of Occidental Pkwy and 3,908 feet east of SH 349.

Nail-Tillman E1G 507H

LEGEND

CITY PARCELS | PUBLIC BLDGS | CITY LIMITS
COUNTY PARCELS | PRIVATE BLDGS | 860 FT. BUFFER
ZONING | ACCESSORY BLDGS | SURVEY SEC.

ZONING DISTRICTS:

FD	FUTURE DEVELOPMENT	BP	BUSINESS PARK
PD	PLANNED DISTRICT	P	PARKING
AE	AGRICULTURE ESTATE	01, O2	OFFICE
CE	COUNTRY ESTATE	NS	NEIGHBORHOOD SERVICE
1F1, 1F2, 1F3	ONE-FAMILY DWELLING	LR1, LR2 ,LR3	LOCAL RETAIL
MH	MOBILE HOME DWELLING	C1, C2, C3	COMMERCIAL
TH	TOWNHOUSE DWELLING	IP ,IP1, IP2, IP3	INDUSTRIAL PARK
2F	TWO-FAMILY DWELLING	LI	LIGHT INDUSTRY
MF1, MF2	MULTIPLE FAMILY DWELLING	HI	HEAVY INDUSTRY

MIDLAND
Planning Division

APPLICATION FOR OIL AND GAS PERMIT

(Pursuant to Midland City Ordinance No. 8769)

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Pioneer Natural Resources
[NAME OF COMPANY]

By Laura E Wallace Laura Wallace 4/21/25
Its Regulatory Advisor

State of Texas)

County of Dallas)

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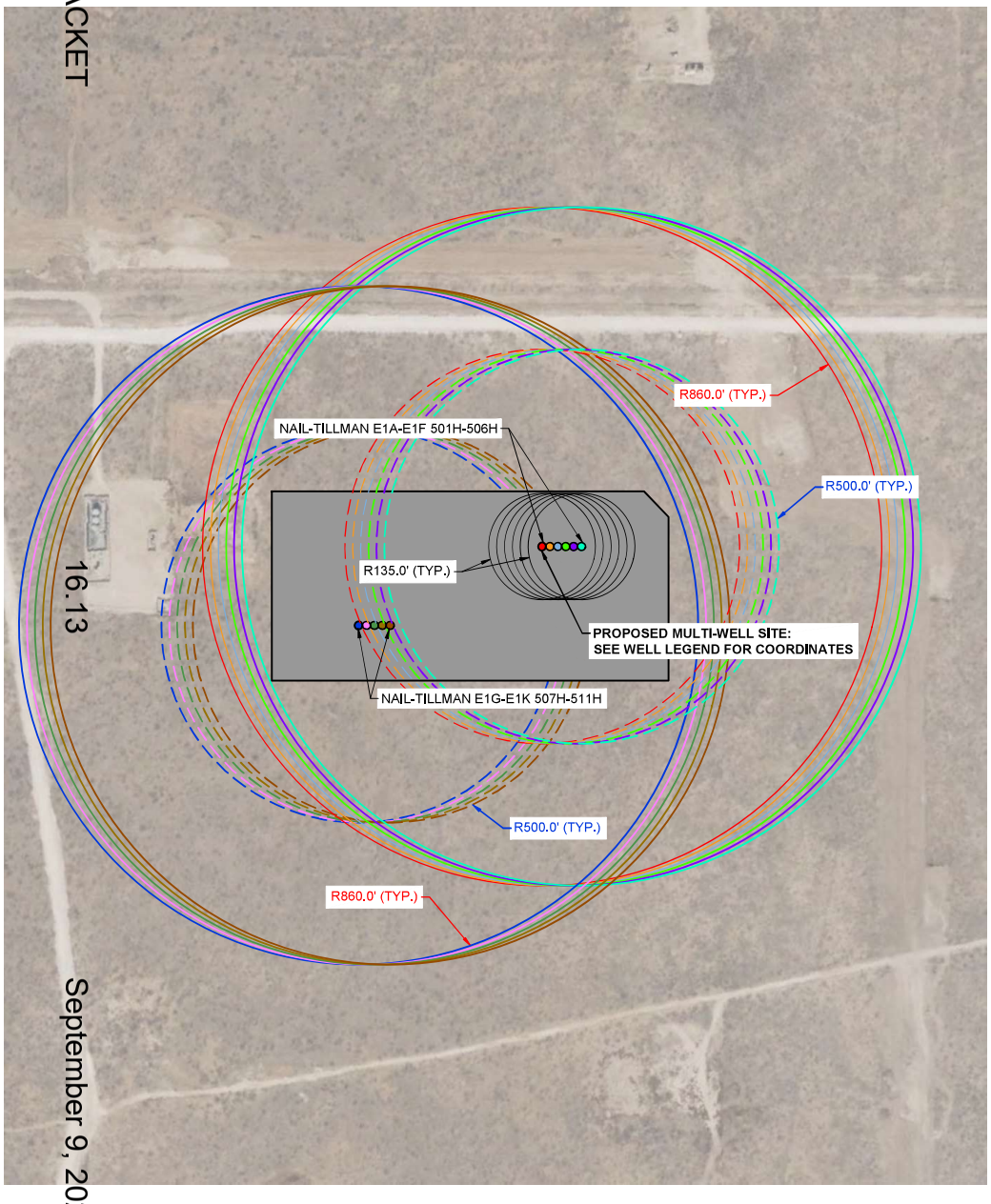
4/21/25

Notary Public, State of Texas

[S E A L]

BOBBY WHITEHEAD
Notary Public, State of Texas
Comm. Expires 08-30-2025
Notary ID 126336794

PACKET 16.13 September 9, 2025



WELL LEGEND

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LEGEND

MULTI-COLOR — 860-FOOT BUFFER/ HALO
MULTI-COLOR — 500-FOOT BUFFER/ HALO
135-FOOT ORDINANCE DISTANCE
PROPOSED WELL PAD SITE

STATE OF TEXAS
REGISTERED
HUNTER WADE WILLS
5929
PROFESSIONAL
LAND SURVEYOR

Hunter Wade Wills
05/20/2025

N

0' 300' 600'

SCALE: 1" = 300'

NOTE: WELL LOCATIONS ARE APPROXIMATELY 7 MILES NORTH OF MIDLAND, TEXAS.

halff
3300 NORTH A STREET, BUILDING 2, SUITE 120
MIDLAND, TX 79705-5471
TEL (432) 253-3255
TBPELS SURVEYING FIRM #10193998
DATE: 2/24/2025
BY: J. ALVAREZ
REV.: 5/15/2025 J. ALVAREZ
AVO: 047474.872

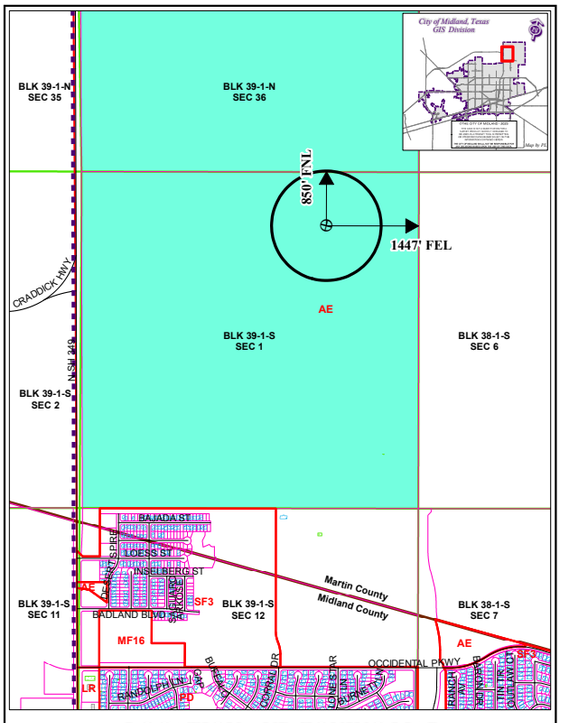
PIONEER NATURAL RESOURCES USA, INC.

EXHIBIT "E"
AERIAL SITE PLAN

NAIL-TILLMAN E1A-E1K 501H-511H

LOCATED IN:
SECTION 1, BLOCK 39, T-1-S,
T.&P. R.R. CO. SURVEY,
ABSTRACT NO. 314,
MARTIN COUNTY, TEXAS

A:\47000S\47474\872SURV\CADD\SHEETS\EXHIBIT\047474.872_AERIAL_SITE_PLAN_EXHIBIT_E.DWG



LOCATION AND ZONING MAP

Oil-070251-2025 **Scale: 1" = 1,100'**

Consider a request for a Permit to drill an Oil and Gas Well within the City Limits located 850' FNL and 1,447' FEL, Section 1, Block 39-1-S, T&P RR CO Survey, Martin County, Texas.

Generally located 6,939 feet north of Occidental Pkwy and 3,928 feet east of SH 349.

Nail-Tillman E1H 508H

LEGEND

CITY PARCELS	PUBLIC BLDGS	CITY LIMITS
COUNTY PARCELS	PRIVATE BLDGS	860 FT. BUFFER
ZONING	ACCESSORY BLDGS	SURVEY SEC.

ZONING DISTRICTS:

FD	FUTURE DEVELOPMENT	BP	BUSINESS PARK
PD	PLANNED DISTRICT	P	PARKING
AE	AGRICULTURE ESTATE	01, O2	OFFICE
CE	COUNTRY ESTATE	NS	NEIGHBORHOOD SERVICE
1F1, 1F2, 1F3	ONE-FAMILY DWELLING	LR1, LR2 ,LR3	LOCAL RETAIL
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2F	TWO-FAMILY DWELLING	LI	LIGHT INDUSTRY
MF1, MF2	MULTIPLE FAMILY DWELLING	HI	HEAVY INDUSTRY

APPLICATION FOR OIL AND GAS PERMIT

(Pursuant to Midland City Ordinance No. 8769)

I. General Information

Date	Operator Name (must match W-1)	Operator Address
7/21/2025	Pioneer Natural Resources, USA, Inc.	777 Hidden Ridge Lane Irving, Texas 75038

Representative Name	Representative Address (within Midland City Limits)	Rep. Tele.
BJ Laechelin, Operations Manager	3617 N Big Spring St. Midland, TX 79705	713-446-1628 (Mobile) Rep. Fax
Fee: $4,000.00 Rec'd Yes___ No___	NOTE: All attachments need to bound and put in a binder before submitting.	Pages 1-4

Permit Compliance Contact (Choose 1):

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24/7 Answering Services - No. 1 (Tele.): 432-571-2666 **No. 2 (Tele.):**

Option B:

Company Compliance Representative (Name, Address, Local Telephone) ***(ATTACH STATEMENT AS EXHIBIT A):***

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Other Permitted Wells in City ***(ATTACH EXHIBIT B*** **[see § J(26)]).** Attached as Exhibit B

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Name(s) and Address(es) of Mineral Estate Lessors (under applicable lease):

1. Attached as Exhibit C
2.
3.

ATTACHED AS EXHIBIT C **is (a** ***Title Opinion by*** Brashier, Crosby PLLC ***, a licensed Texas Attorney/Title Commitment by Abstract Company/a Take-off from , a Certified Petroleum Landman/an opinion letter from ,*** ***a licensed Texas Attorney)*** **indicating that [Operator] has a legal right to develop the mineral estate that is the subject of this Application. [See § J(5)].**

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General Description of Current Surface Use (within 860 feet of proposed surface location):

Located in Section 1, Block 39, T1S, T&P RR Co., Abstract 314, Martin County, Texas.

Pad location is owned by Jones Bros Dirt & Paving. Other properties within 860' are: City of Midland (See Exhibit D for details.)

Currently undeveloped.

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***ATTACHED AS EXHIBIT F* is a copy of the notification letter(s) sent to 100 percent of the surface owners, Certified Mail, Return Receipt Requested. [See § J(36)].**

IV. Well & Operations Information

Proposed Well Name: Nail-Tillman E1I 509H

Proposed Hole Size, Casing Program and Cementing Program (attach Exhibit as Necessary)[See § J(11) and § L(4)]:

A wellbore schematic with the applicable information is attached as Exhibit G

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849' FNL, 1427' FEL, Section 1, Block 39, T1S, T&P RR Co., Abstract 314, Martin County, Texas

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The water source used during drilling can be found on Exhibit N

Description of all electric lines to production facilities (reference exhibits as necessary) [See § L(10)]:

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Plan detailing construction, location, and closure of pits used for Drilling and Completion operations (attach exhibit if necessary) [See § J(35)]:

Reserve pits will not be used. Freshwater pits will be used. Please see Exhibit O for closure details.

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Pioneer Natural Resources
[NAME OF COMPANY]

By Laura E Wallace Laura Wallace 4/21/25
Its Regulatory Advisor

State of Texas)

County of Dallas)

, personally appeared before me, and being first duly sworn declared he/she signed the application in the capacity designated, if any, and further states that he/she has read the above application and attached exhibits and the statements therein are true and correct to the best of their knowledge.

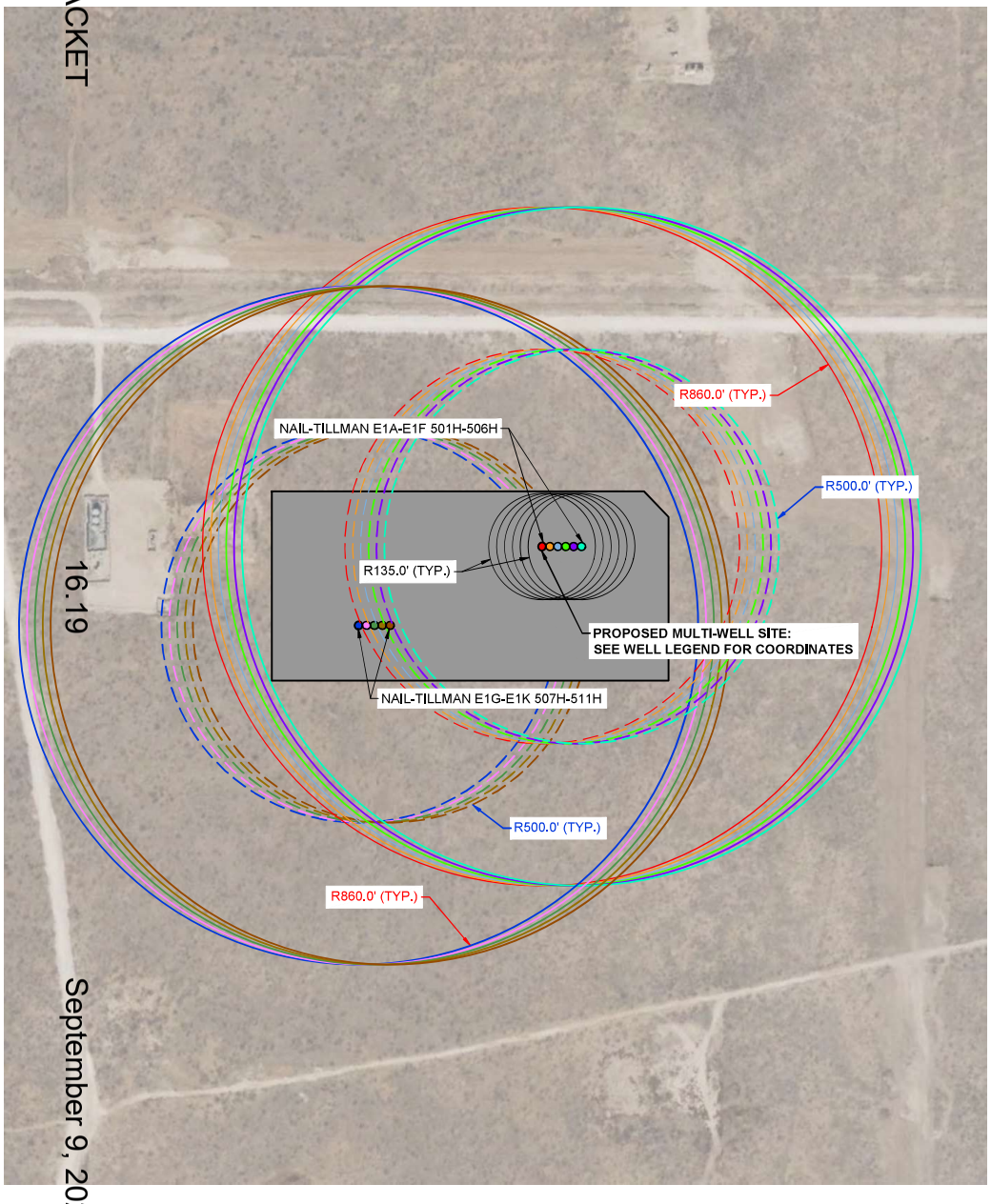
4/21/25

Notary Public, State of Texas

[S E A L]

BOBBY WHITEHEAD
Notary Public, State of Texas
Comm. Expires 08-30-2025
Notary ID 126336794

PACKET 16.19 September 9, 2025



WELL LEGEND

NAIL-TILLMAN E1A 501H 647' FNL, 1004' FEL (SEC. 1) SHL GROUND ELEVATION: 2835' (NAD83) X = 858905.7', Y = 6739308.2' LAT.: 32°06'10.45", LON.: -102°05'01.76" LAT.: 32.102903°, LON.: -102.083821°	NAIL-TILLMAN E1B 502H 647' FNL, 984' FEL (SEC. 1) SHL GROUND ELEVATION: 2835' (NAD83) X = 858925.1', Y = 6739312.9' LAT.: 32°06'10.50", LON.: -102°05'01.53" LAT.: 32.102918°, LON.: -102.083759°
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NAIL-TILLMAN E1K 511H 849' FNL, 1387' FEL (SEC. 1) SHL GROUND ELEVATION: 2836' (NAD83) X = 858579.1', Y = 6739022.5' LAT.: 32°06'07.52", LON.: -102°05'05.44" LAT.: 32.102088°, LON.: -102.084844°	

LEGEND

MULTI-COLOR — 860-FOOT BUFFER/ HALO
MULTI-COLOR — 500-FOOT BUFFER/ HALO
135-FOOT ORDINANCE DISTANCE
PROPOSED WELL PAD SITE

STATE OF TEXAS
REGISTERED
HUNTER WADE WILLS
5929
PROFESSIONAL
LAND SURVEYOR

Hunter Wade Wills
05/20/2025

N

0' 300' 600'

SCALE: 1" = 300'

NOTE: WELL LOCATIONS ARE APPROXIMATELY 7 MILES NORTH OF MIDLAND, TEXAS.

halff
3300 NORTH A STREET, BUILDING 2, SUITE 120
MIDLAND, TX 79705-5471
TEL (432) 253-3255
TBPELS SURVEYING FIRM #10193998
DATE: 2/24/2025
BY: J. ALVAREZ
REV.: 5/15/2025 J. ALVAREZ
AVO: 047474.872

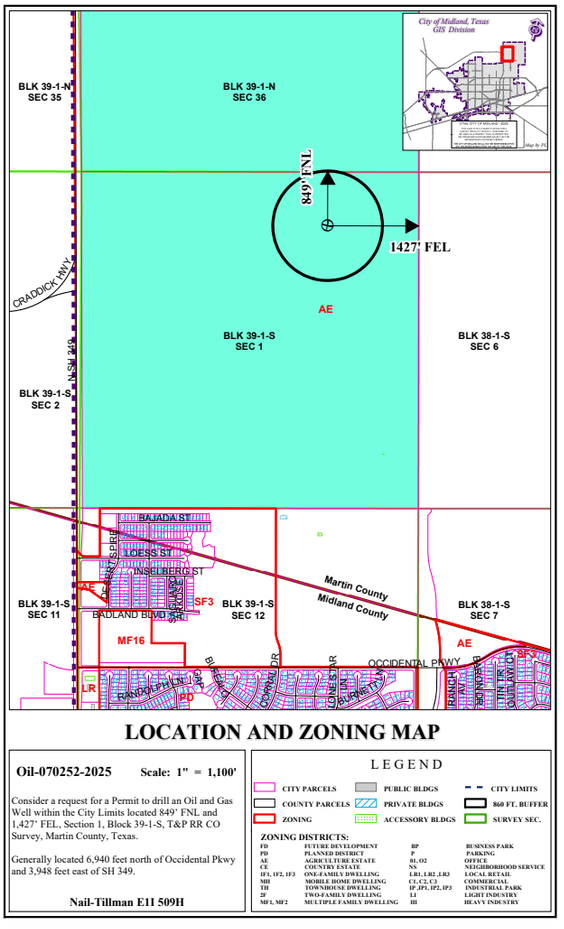
PIONEER NATURAL RESOURCES USA, INC.

EXHIBIT "E"
AERIAL SITE PLAN

NAIL-TILLMAN E1A-E1K 501H-511H

LOCATED IN:
SECTION 1, BLOCK 39, T-1-S,
T.&P. R.R. CO. SURVEY,
ABSTRACT NO. 314,
MARTIN COUNTY, TEXAS

A:\47000S\47474\872SURV\CADD\SHEETS\EXHIBIT\047474.872_AERIAL_SITE_PLAN_EXHIBIT_E.DWG



LOCATION AND ZONING MAP

Oil-070252-2025 **Scale: 1" = 1,100'**

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Generally located 6,940 feet north of Occidental Pkwy and 3,948 feet east of SH 349.

Nail-Tillman E1I 509H

LEGEND

CITY PARCELS	PUBLIC BLDGS	CITY LIMITS
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ZONING	ACCESSORY BLDGS	SURVEY SEC.

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CE	COUNTRY ESTATE	NS	NEIGHBORHOOD SERVICE
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MIDLAND
Planning Division

APPLICATION FOR OIL AND GAS PERMIT

(Pursuant to Midland City Ordinance No. 8769)

I. General Information

Date	Operator Name (must match W-1)	Operator Address
7/1/2025	Pioneer Natural Resources, USA, Inc.	777 Hidden Ridge Lane Irving, Texas 75038

Representative Name	Representative Address (within Midland City Limits)	Rep. Tele.
BJ Laechelin, Operations Manager	3617 N Big Spring St. Midland, TX 79705	713-446-1628 (Mobile) Rep. Fax
Fee: $4,000.00 Rec'd Yes___ No___	NOTE: All attachments need to bound and put in a binder before submitting.	Pages 1-4

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Proposed Well Name: Nail-Tillman E1J 510H

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Pioneer Natural Resources
[NAME OF COMPANY]

Laura E Wallace
By Laura Wallace 4/21/25
Its Regulatory Advisor

State of Texas)

County of Dallas)

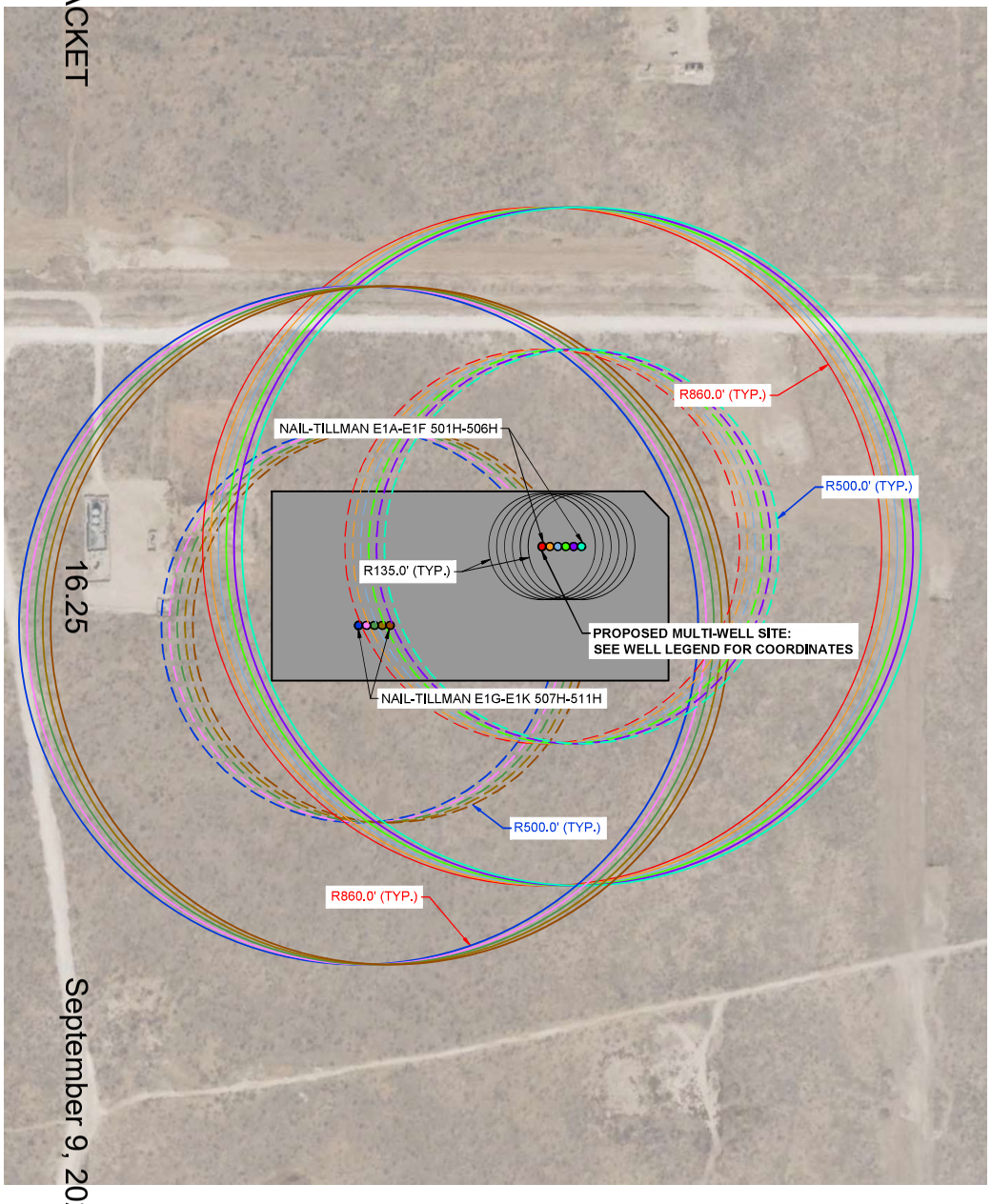
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4/21/25

Notary Public, State of Texas

[S E A L]

BOBBY WHITEHEAD
Notary Public, State of Texas
Comm. Expires 08-30-2025
Notary ID 126336794



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NAIL-TILLMAN E1K 511H 849' FNL, 1387' FEL (SEC. 1) SHL GROUND ELEVATION: 2836' (NAD83) X = 858579.1', Y = 6739022.5' LAT.: 32°06'07.52", LON.: -102°05'05.44" LAT.: 32.102088°, LON.: -102.084844°	

LEGEND

MULTI-COLOR — 860-FOOT BUFFER/ HALO
MULTI-COLOR — 500-FOOT BUFFER/ HALO
135-FOOT ORDINANCE DISTANCE
PROPOSED WELL PAD SITE

STATE OF TEXAS
REGISTERED
HUNTER WADE WILLS
5929
PROFESSIONAL
LAND SURVEYOR

Hunter Wade Wills
05/20/2025

N

0' 300' 600'

SCALE: 1" = 300'

NOTE: WELL LOCATIONS ARE APPROXIMATELY 7 MILES NORTH OF MIDLAND, TEXAS.

halff
3300 NORTH A STREET, BUILDING 2, SUITE 120
MIDLAND, TX 79705-5471
TEL (432) 253-3255
TBPELS SURVEYING FIRM #10193998
DATE: 2/24/2025
BY: J. ALVAREZ
REV.: 5/15/2025 J. ALVAREZ
AVO: 047474.872

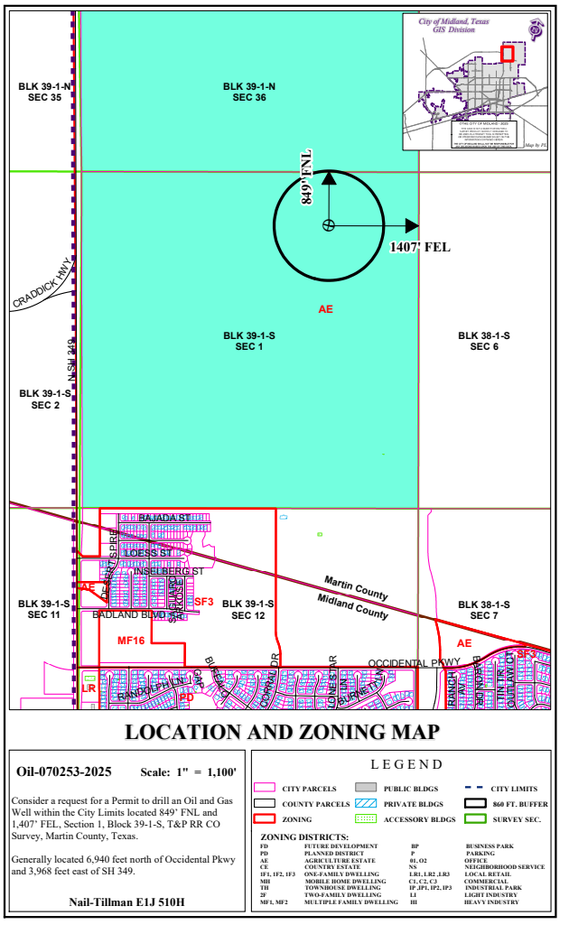
PIONEER NATURAL RESOURCES USA, INC.

EXHIBIT "E"
AERIAL SITE PLAN

NAIL-TILLMAN E1A-E1K 501H-511H

LOCATED IN:
SECTION 1, BLOCK 39, T-1-S,
T.&P. R.R. CO. SURVEY,
ABSTRACT NO. 314,
MARTIN COUNTY, TEXAS

A:\47000S\47474\872SURV\CADD\SHEETS\EXHIBIT\047474.872_AERIAL_SITE_PLAN_EXHIBIT_E.DWG



LOCATION AND ZONING MAP

Oil-070253-2025 **Scale: 1" = 1,100'**

Consider a request for a Permit to drill an Oil and Gas Well within the City Limits located 849' FNL and 1,407' FEL, Section 1, Block 39-1-S, T&P RR CO Survey, Martin County, Texas.

Generally located 6,940 feet north of Occidental Pkwy and 3,968 feet east of SH 349.

Nail-Tillman E1J 510H

LEGEND

CITY PARCELS | PUBLIC BLDGS | CITY LIMITS
COUNTY PARCELS | PRIVATE BLDGS | 860 FT. BUFFER
ZONING | ACCESSORY BLDGS | SURVEY SEC.

ZONING DISTRICTS:

FD	FUTURE DEVELOPMENT	BP	BUSINESS PARK
PD	PLANNED DISTRICT	P	PARKING
AE	AGRICULTURE ESTATE	01, O2	OFFICE
CE	COUNTRY ESTATE	NS	NEIGHBORHOOD SERVICE
1F1, 1F2, 1F3	ONE-FAMILY DWELLING	LR1, LR2 ,LR3	LOCAL RETAIL
MH	MOBILE HOME DWELLING	C1, C2, C3	COMMERCIAL
TH	TOWNHOUSE DWELLING	IP ,IP1, IP2, IP3	INDUSTRIAL PARK
2F	TWO-FAMILY DWELLING	LI	LIGHT INDUSTRY
MF1, MF2	MULTIPLE FAMILY DWELLING	HI	HEAVY INDUSTRY

APPLICATION FOR OIL AND GAS PERMIT

(Pursuant to Midland City Ordinance No. 8769)

I. General Information

Date	Operator Name (must match W-1)	Operator Address
7/1/2025	Pioneer Natural Resources, USA, Inc.	777 Hidden Ridge Lane Irving, Texas 75038

Representative Name	Representative Address (within Midland City Limits)	Rep. Tele.
BJ Laechelin, Operations Manager	3617 N Big Spring St. Midland, TX 79705	713-446-1628 (Mobile) Rep. Fax
Fee: $4,000.00 Rec'd Yes___ No___	NOTE: All attachments need to bound and put in a binder before submitting.	Pages 1-4

Permit Compliance Contact (Choose 1):

Option A: Laura Wallace, Regulatory Advisor
777 Hidden Ridge Lane Irving, Texas 75038

24/7 Answering Services - No. 1 (Tele.): 432-571-2666 **No. 2 (Tele.):**

Option B:

Company Compliance Representative (Name, Address, Local Telephone) ***(ATTACH STATEMENT AS EXHIBIT A):***

Emergency Contact Representative (Name, Address, 24-Hour Tele. No.):
Pioneer Remote Operations Hub
3617 N Big Spring St. Midland, Texas 79705
432-571-2666 (Available 24/7)

Other Permitted Wells in City ***(ATTACH EXHIBIT B*** **[see § J(26)]).** Attached as Exhibit B

II. Mineral Ownership

Name(s) and Address(es) of Mineral Estate Lessors (under applicable lease):

1. Attached as Exhibit C
2.
3.

ATTACHED AS EXHIBIT C **is (a** ***Title Opinion by*** Brashier, Crosby PLLC ***, a licensed Texas Attorney/Title Commitment by Abstract Company/a Take-off from , a Certified Petroleum Landman/an opinion letter from ,*** ***a licensed Texas Attorney)*** **indicating that [Operator] has a legal right to develop the mineral estate that is the subject of this Application. [See § J(5)].**

III. Surface Ownership & Use

General Description of Current Surface Use (within 860 feet of proposed surface location):

Located in Section 1, Block 39, T1S, T&P RR Co., Abstract 314, Martin County, Texas.

Pad location is owned by Jones Bros Dirt & Paving. Other properties within 860' are: City of Midland (See Exhibit D for details.)

Currently undeveloped.

ATTACHED AS EXHIBIT D **is (a** ***Title Opinion by , a licensed Texas Attorney/a Take-off from , a Certified Petroleum Landman/Current Tax Roll from Midland Central Appraisal District),*** **which lists the name(s) and address(es) of all surface owners within 860 feet of the surface well location. [See § J(7)].**

***ATTACHED AS EXHIBIT E* is a *(map/p lat/satellite/aerial photo)* depicting all Residences, commercial structures, public buildings, all publicly dedicated Streets and alleys, Rights of Way, and permanent accessory structures surrounding the proposed Drill Site. The *(map/p lat/satellite/aerial photo)* includes two circles, as required by the Ordinance—one depicting a 500 foot radius and one depicting an 860 foot radius from the proposed well's surface location. [See § J(10)].**

***ATTACHED AS EXHIBIT F* is a copy of the notification letter(s) sent to 100 percent of the surface owners, Certified Mail, Return Receipt Requested. [See § J(36)].**

IV. Well & Operations Information

Proposed Well Name: Nail-Tillman E1K 511H

Proposed Hole Size, Casing Program and Cementing Program (attach Exhibit as Necessary)[See § J(11) and § L(4)]:

A wellbore schematic with the applicable information is attached as Exhibit G

Legal Description of Proposed Well Site:

849' FNL, 1387' FEL, Section 1, Block 39, T1S, T&P RR Co., Abstract 314, Martin County, Texas

***ATTACHED AS EXHIBIT G* is the Location Site Plan [See § J(9)].**

***ATTACHED AS EXHIBIT H* is the Map with the proposed transportation route(s) and road(s) for equipment, chemicals, or refuse products used or produced in the proposed oil and gas operations. [See § J(12)].**

***ATTACHED AS EXHIBIT I* is a copy of the approved Texas Railroad Commission permit to drill (Form W-1), together with all attachments *(also file copy of W-1 with City Secretary before commencement of drilling operations).* [See § J(16) and (20)].**

***ATTACHED AS EXHIBIT J* is a copy of the required TCEQ report as to depth of usable quality ground water. [See § J(17)].**

***ATTACHED AS EXHIBIT K (if applicable)* is the list of alternative locations developed in consultation with the Oil & Gas Advisory Committee. [See § J(27)].**

***ATTACHED AS EXHIBIT L* is the Fencing and Irrigation Plan. [See § J(30)].**

***ATTACHED AS EXHIBIT M* is the Road Repair Agreement and *Letter of Credit/Certificate of Deposit/Surety Bond* in the amount of at least $25,000. *Option (if applicable): Applicant would further state that no City-owned streets or alleys will be used by the Operator in connection with its oil and gas operations and as a result, requests a waiver from the Council of this requirement. Option B (if applicable):* Because Applicant has three Road Repair Agreements in effect that have been approved by the Council, Applicant requests that the Council consolidate all agreements into one and is filing the necessary $75,000 *letter of credit/certificate of deposit/surety bond* in conjunction with this request. [See § J(31)].**

***ATTACHED AS EXHIBIT N* is the Concept Plan depicting the proposed Operations Site (which includes tanks, roads, power lines, and pipeline routes). [See § J(32)].**

Description of Public Utilities required during (1) drilling and (2) operations:

(1) Drilling: N/A

(2) Operations: Electric is required to support production operations for this well. Due to transmission constraints from Oncor, requesting a variance for on-site power generation until that time. See Exhibits N and V for details.

Description of water source to be used during Drilling:

The water source used during drilling can be found on Exhibit N

Description of all electric lines to production facilities (reference exhibits as necessary) [See § L(10)]:

The route for electric lines can be found on Exhibit N

Plan detailing construction, location, and closure of pits used for Drilling and Completion operations (attach exhibit if necessary) [See § J(35)]:

Reserve pits will not be used. Freshwater pits will be used. Please see Exhibit O for closure details.

V. Additional Required Exhibits

***ATTACHED AS EXHIBIT P* is the *Letter of Credit/Certificate of Deposit* in accordance with Subsection (K)(2). [See § J(18)].**

***ATTACHED AS EXHIBIT Q* are Tax certificates from Midland Central Appraisal District to be submitted indicating that all taxes on personal and real property, including minerals, owned by Applicant are current. [See § J(29)].**

***ATTACHED AS EXHIBIT R* is the required Insurance Certificate. [See § J(19) and § K(3)].**

***ATTACHED AS EXHIBIT S (if applicable)* is the Drainage Plan approved by the City Engineer relating to Applicant's proposed operations. [See § J(21)].**

***ATTACHED AS EXHIBIT T* is Applicant's Emergency Action Response Plan. [See § J(22)].**

***ATTACHED AS EXHIBIT U* is Applicant's Hazardous Materials Management Plan, a copy of which has been submitted and is on file with the Midland Fire Department. [See § J(23)].**

Pioneer Natural Resources
[NAME OF COMPANY]

By Laura E Wallace
Laura Wallace 4/21/25
Its Regulatory Advisor

State of Texas)

County of Dallas)

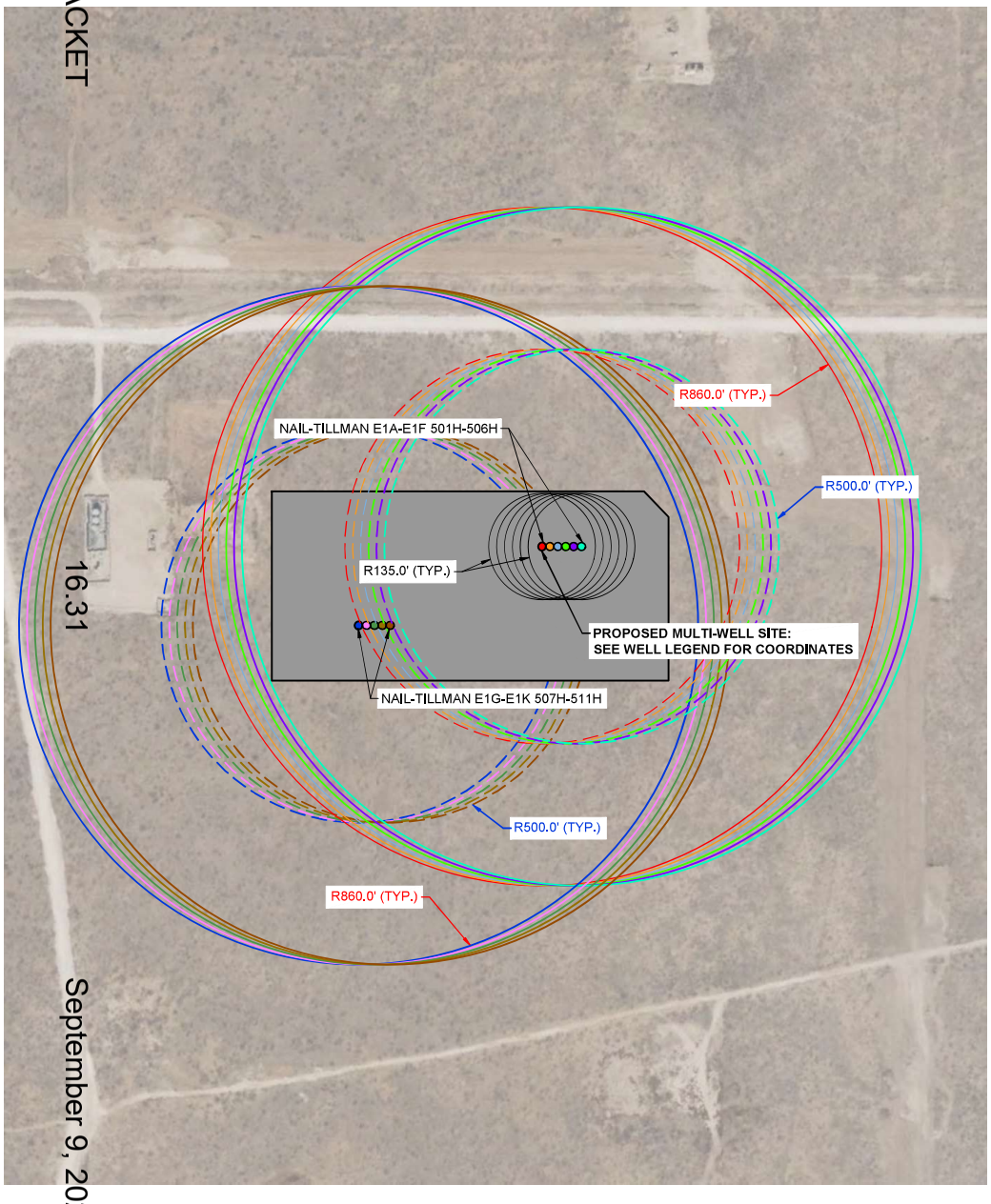
, personally appeared before me, and being first duly sworn declared he/she signed the application in the capacity designated, if any, and further states that he/she has read the above application and attached exhibits and the statements therein are true and correct to the best of their knowledge.

4/21/25

Notary Public, State of Texas

[S E A L]

BOBBY WHITEHEAD
Notary Public, State of Texas
Comm. Expires 08-30-2025
Notary ID 126336794



WELL LEGEND

NAIL-TILLMAN E1A 501H 647' FNL, 1004' FEL (SEC. 1) SHL GROUND ELEVATION: 2835' (NAD83) X = 858905.7', Y = 6739308.2' LAT.: 32°06'10.45", LON.: -102°05'01.76" LAT.: 32.102903°, LON.: -102.083821°	NAIL-TILLMAN E1B 502H 647' FNL, 984' FEL (SEC. 1) SHL GROUND ELEVATION: 2835' (NAD83) X = 858925.1', Y = 6739312.9' LAT.: 32°06'10.50", LON.: -102°05'01.53" LAT.: 32.102918°, LON.: -102.083759°
NAIL-TILLMAN E1C 503H 646' FNL, 964' FEL (SEC. 1) SHL GROUND ELEVATION: 2835' (NAD83) X = 858944.5', Y = 6739317.7' LAT.: 32°06'10.56", LON.: -102°05'01.31" LAT.: 32.102933°, LON.: -102.083697°	NAIL-TILLMAN E1D 504H 646' FNL, 944' FEL (SEC. 1) SHL GROUND ELEVATION: 2835' (NAD83) X = 858963.9', Y = 6739322.4' LAT.: 32°06'10.61", LON.: -102°05'01.08" LAT.: 32.102948°, LON.: -102.083635°
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LEGEND

MULTI-COLOR — 860-FOOT BUFFER/ HALO
MULTI-COLOR — 500-FOOT BUFFER/ HALO
135-FOOT ORDINANCE DISTANCE
PROPOSED WELL PAD SITE

STATE OF TEXAS
REGISTERED
HUNTER WADE WILLS
5929
PROFESSIONAL
LAND SURVEYOR

Hunter Wade Wills
05/20/2025

N

0' 300' 600'

SCALE: 1" = 300'

NOTE: WELL LOCATIONS ARE APPROXIMATELY 7 MILES NORTH OF MIDLAND, TEXAS.

halff
3300 NORTH A STREET, BUILDING 2, SUITE 120
MIDLAND, TX 79705-5471
TEL (432) 253-3255
TBPELS SURVEYING FIRM #10193998
DATE: 2/24/2025
BY: J. ALVAREZ
REV.: 5/15/2025 J. ALVAREZ
AVO: 047474.872

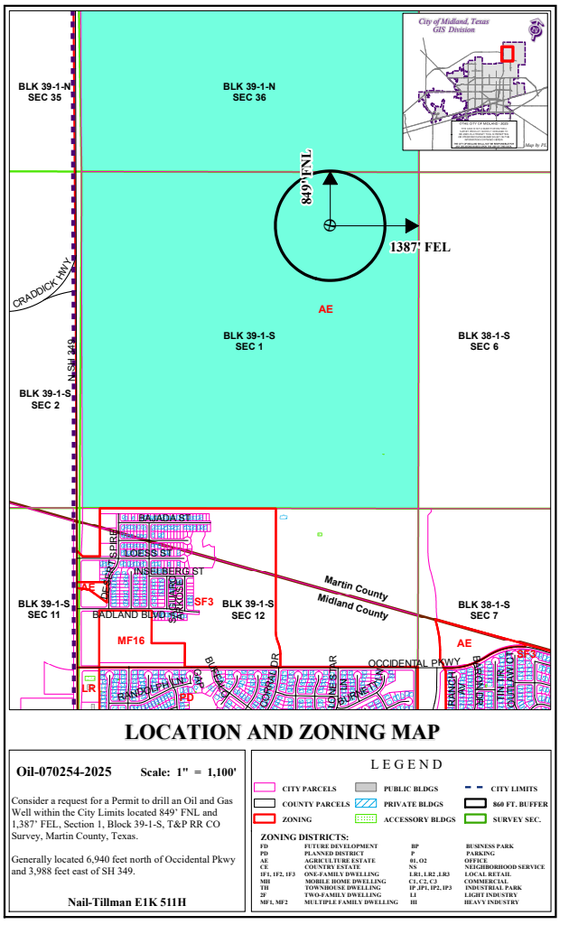
PIONEER NATURAL RESOURCES USA, INC.

EXHIBIT "E"
AERIAL SITE PLAN

NAIL-TILLMAN E1A-E1K 501H-511H

LOCATED IN:
SECTION 1, BLOCK 39, T-1-S,
T.&P. R.R. CO. SURVEY,
ABSTRACT NO. 314,
MARTIN COUNTY, TEXAS

A:\47000S\47474\87SURV\CADD\SHEETS\EXHIBIT\047474.872_AERIAL_SITE_PLAN_EXHIBIT_E.DWG



LOCATION AND ZONING MAP

Oil-070254-2025 **Scale: 1" = 1,100'**

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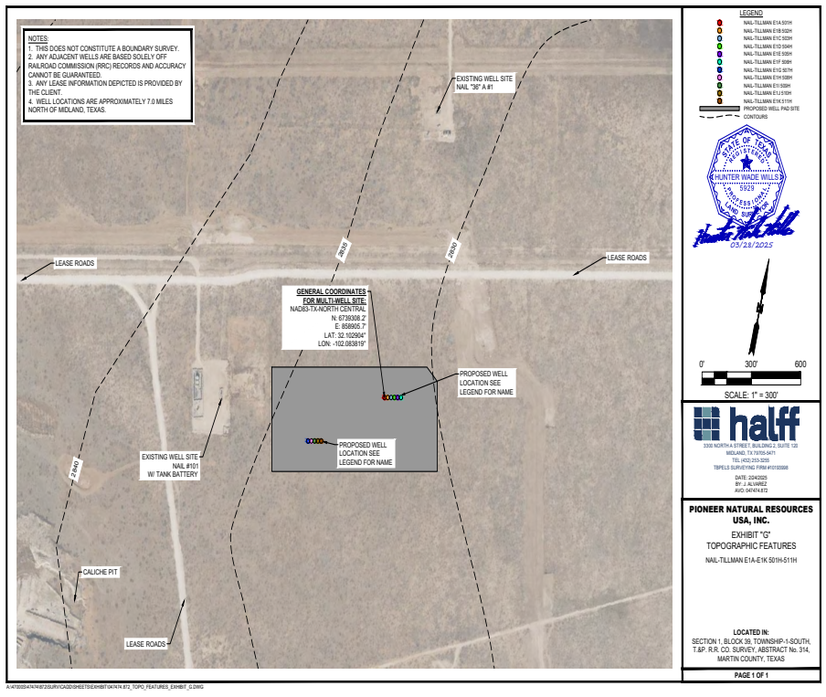
Nail-Tillman E1K 511H

LEGEND

CITY PARCELS	PUBLIC BLDGS	CITY LIMITS
COUNTY PARCELS	PRIVATE BLDGS	860 FT. BUFFER
ZONING	ACCESSORY BLDGS	SURVEY SEC.

ZONING DISTRICTS:

FD	FUTURE DEVELOPMENT	BP	BUSINESS PARK
PD	PLANNED DISTRICT	P	PARKING
AE	AGRICULTURE ESTATE	01, O2	OFFICE
CE	COUNTRY ESTATE	NS	NEIGHBORHOOD SERVICE
1F1, 1F2, 1F3	ONE-FAMILY DWELLING	LR1, LR2 ,LR3	LOCAL RETAIL
MH	MOBILE HOME DWELLING	C1, C2, C3	COMMERCIAL
TH	TOWNHOUSE DWELLING	IP ,IP1, IP2, IP3	INDUSTRIAL PARK
2F	TWO-FAMILY DWELLING	LI	LIGHT INDUSTRY
MF1, MF2	MULTIPLE FAMILY DWELLING	HI	HEAVY INDUSTRY


NOTES:
1. THIS DOES NOT CONSTITUTE A BOUNDARY SURVEY.
2. ANY ADJACENT WELLS ARE BASED SOLELY OFF RAILROAD COMMISSION (RRC) RECORDS AND ACCURACY CANNOT BE GUARANTEED.
3. ANY LEASE INFORMATION DEPICTED IS PROVIDED BY THE CLIENT.
4. WELL LOCATIONS ARE APPROXIMATELY 7.0 MILES NORTH OF MIDLAND, TEXAS.
EXISTING WELL SITE
NAIL "36" A #1
LEASE ROADS
LEASE ROADS
GENERAL COORDINATES
FOR MULTI-WELL SITE:
NAD83-TX-NORTH CENTRAL
N: 6736308.2'
E: 858905.7'
LAT: 32.102904°
LON: -102.083819°
PROPOSED WELL
LOCATION SEE
LEGEND FOR NAME
PROPOSED WELL
LOCATION SEE
LEGEND FOR NAME
EXISTING WELL SITE
NAIL #101
W/ TANK BATTERY
CALICHE PIT
LEASE ROADS
2NW
2NW
2NW
LEGEND
NAIL-TILLMAN E1A 501H
NAIL-TILLMAN E1B 502H
NAIL-TILLMAN E1C 503H
NAIL-TILLMAN E1D 504H
NAIL-TILLMAN E1E 505H
NAIL-TILLMAN E1F 506H
NAIL-TILLMAN E1G 507H
NAIL-TILLMAN E1H 508H
NAIL-TILLMAN E1J 509H
NAIL-TILLMAN E1J 510H
NAIL-TILLMAN E1K 511H
PROPOSED WELL PAD SITE
CONTOURS
STATE OF TEXAS
REGISTERED
PROFESSIONAL
LAND SURVEYOR
HUNTER WADE WILLS
5929
03/28/2025
0'
300'
600
SCALE: 1" = 300'
halff
3306 NORTH A STREET, BUILDING 2, SUITE 120
MIDLAND, TX 79705-5471
TEL (432) 253-3255
TBPELS SURVEYING FIRM #10100906
DATE: 2/24/2025
BY: J. ALVAREZ
AUD: NATALETZ
PIONEER NATURAL RESOURCES
USA, INC.
EXHIBIT "C"
TOPOGRAPHIC FEATURES
NAIL-TILLMAN E1A-E1K 501H-511H
LOCATED IN:
SECTION 1, BLOCK 39, TOWNSHIP-1-SOUTH,
T.&P. R.R. CO. SURVEY, ABSTRACT No. 314,
MARTIN COUNTY, TEXAS
PAGE 1 OF 1

City Council Meeting

Item Number: 17

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Garrick Clayton, Oil and Gas Officer

Subject: **THE PROPOSED GRANTING OF OIL AND GAS WELL PERMITS TO PIONEER NATURAL RESOURCES, USA, INC. (“OPERATOR”) FOR THE DRILLING OF THE FOLLOWING OIL AND GAS WELLS: NAIL-BURLEY 6L 712H; NAIL-BURLEY 6M 713H; NAIL-BURLEY 6N 714H; NAILBURLEY 6O 715H; NAIL-BURLEY 6P 716H; AND NAIL-BURLEY 6Q 717H; SAID WELLS BEING GENERALLY LOCATED BETWEEN 6,660 FEET AND 6,669 FEET NORTH OF OCCIDENTAL PARKWAY AND BETWEEN 6,627 FEET AND 6,727 FEET EAST OF STATE HIGHWAY 349 (PUBLIC HEARING ONLY) (District 1) (Development Services) (Set the Standard for a Safe and Secure City)**

Purpose:

The proposed granting of oil and gas well permits to Pioneer Natural Resources, USA, Inc. (“Operator”) for the drilling of the following oil and gas wells: NAIL-BURLEY 6L 712H; NAIL-BURLEY 6M 713H; NAIL-BURLEY 6N 714H; NAIL-BURLEY 6O 715H; NAIL-BURLEY 6P 716H; and NAIL-BURLEY 6Q 717H; said wells being generally located between 6,660 feet & 6,669 feet north of occidental parkway and between 6,627 feet and 6,727 feet east of State Highway 349 (public hearing only). Council may consider these permits following a 30-day public comment period and at a regularly scheduled meeting. No notices of objection received.

Recommended City Council Action:

Direction/Informational

Fiscal Impact:

There is no cost to the City to process this application.

Discussion:

The Oil and Gas Advisory Committee has reviewed the well sites in detail and recommends approval. Pioneer Natural Resources, USA Inc. will be using a 24' sound barrier along the entire length of the south side of the pad with the remaining 3 sides facing undeveloped land and oil field which will remain for the duration of drilling and fracing. A quiet type frac system will be used to complete the wells. A closed loop system will be used during drilling operations so no reserve pits will be used and drill cuttings will be removed from the property. The use of compression is requested which will also be behind sound dampening enclosures. The Tank Battery for these wells will be located in the county. Pioneer Natural Resources, USA Inc. is requesting the following variances:

(1) No Road Repair Agreement be required because no City streets will be used to access the well site.

(2) No landscaping or irrigation be required due to no access to city water.

(3) Twenty-four hour hydraulic fracturing operations be permitted.

(4) Drill cuttings be allowed to be removed from the surface location.

(5) Allow for compressors to be used for gas lift during the production phase

Attachments: Applications; Location maps; Exhibit - Drill site maps, Exhibit – Overall Location

City Manager's Office

MIDLAND Planning Division

APPLICATION FOR OIL AND GAS PERMIT

(Pursuant to Midland City Ordinance No. 8769)

I. General Information

Date	Operator Name (must match W-1)	Operator Address
7/1/2025	Pioneer Natural Resources, USA, Inc.	777 Hidden Ridge Lane Irving, Texas 75038

Representative Name	Representative Address (within Midland City Limits)	Rep. Tele.
BJ Laechelin, Operations Manager	3617 N Big Spring St. Midland, TX 79705	713-446-1628 (Mobile) Rep. Fax
Fee: $4,000.00 Rec'd Yes___ No___	NOTE: All attachments need to bound and put in a binder before submitting.	Pages 1-4

Permit Compliance Contact (Choose 1):

Option A: Laura Wallace, Regulatory Advisor
777 Hidden Ridge Lane Irving, Texas 75038

24/7 Answering Services - No. 1 (Tele.): 432-571-2666 **No. 2 (Tele.):**

Option B:

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Emergency Contact Representative (Name, Address, 24-Hour Tele. No.):
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432-571-2666 (Available 24/7)

Other Permitted Wells in City ***(ATTACH EXHIBIT B*** **[see § J(26)]).** Attached as Exhibit B

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IV. Well & Operations Information

Proposed Well Name: Nail-Burley 6L 712H

Proposed Hole Size, Casing Program and Cementing Program (attach Exhibit as Necessary)[See § J(11) and § L(4)]:

A wellbore schematic with the applicable information is attached as Exhibit G

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674' FNL, 1901' FEL, Section 6, Block 38, T1S, T&P RR Co., Abstract 671, Martin County, Texas

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Description of water source to be used during Drilling:

The water source used during drilling can be found on Exhibit N

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***ATTACHED AS EXHIBIT R* is the required Insurance Certificate. [See § J(19) and § K(3)].**

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***ATTACHED AS EXHIBIT T* is Applicant's Emergency Action Response Plan. [See § J(22)].**

***ATTACHED AS EXHIBIT U* is Applicant's Hazardous Materials Management Plan, a copy of which has been submitted and is on file with the Midland Fire Department. [See § J(23)].**

Pioneer Natural Resources
[NAME OF COMPANY]

Laura E Wallace
By Laura Wallace 4/21/25
Its Regulatory Advisor

State of Texas)

County of Dallas)

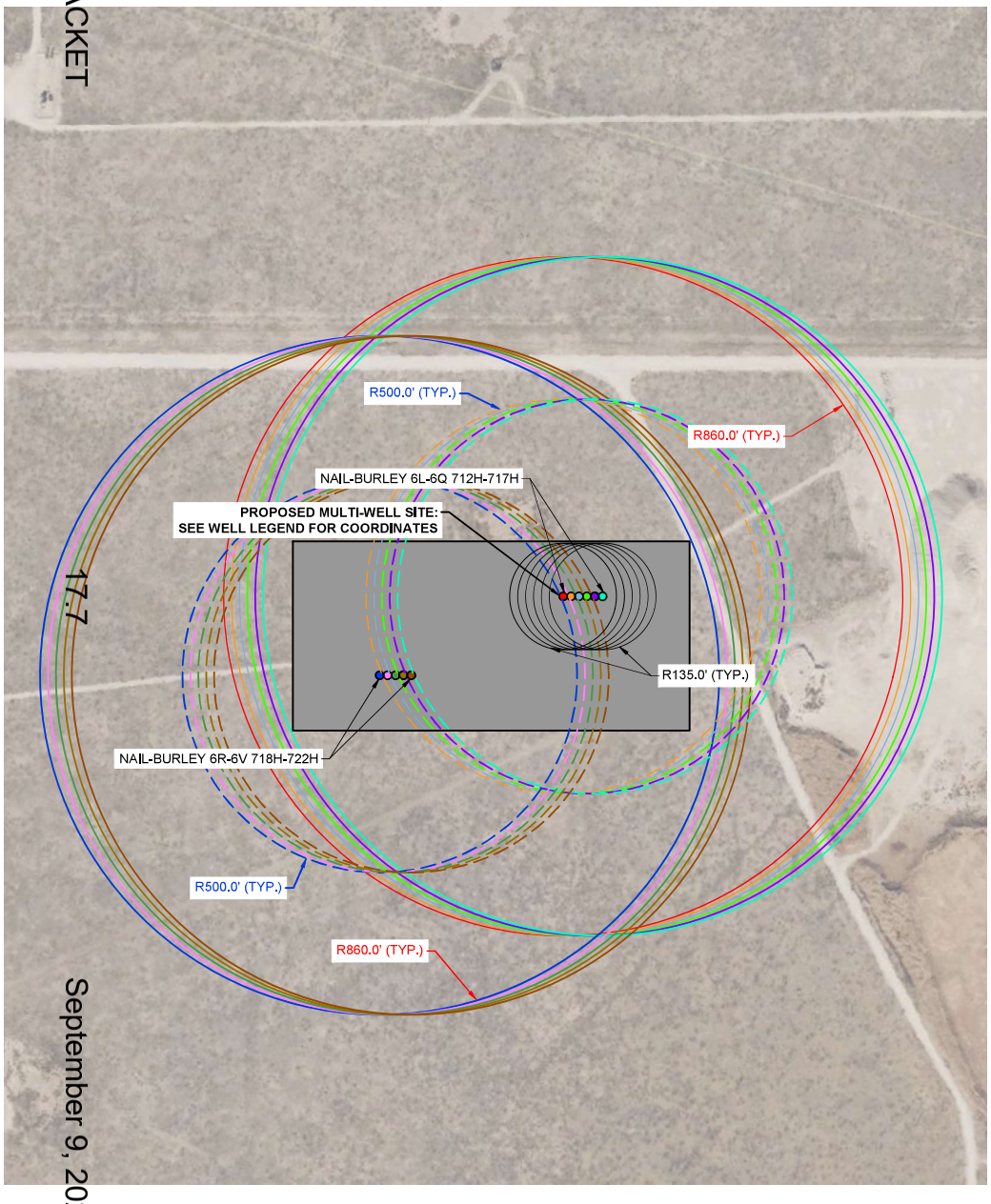
, personally appeared before me, and being first duly sworn declared he/she signed the application in the capacity designated, if any, and further states that he/she has read the above application and attached exhibits and the statements therein are true and correct to the best of their knowledge.

4/21/25

Notary Public, State of Texas

[S E A L]

BOBBY WHITEHEAD
Notary Public, State of Texas
Comm. Expires 08-30-2025
Notary ID 126336794



WELL LEGEND

NAIL-BURLEY 6L 712H 674' FNL, 1901' FEL (SEC. 6) SHL GROUND ELEVATION: 2831' (NAD83) X = 863256.4', Y = 6740319.4' LAT.: 32°06'21.92", LON.: -102°04'11.61" LAT.: 32.106088°, LON.: -102.069890°	NAIL-BURLEY 6M 713H 674' FNL, 1881' FEL (SEC. 6) SHL GROUND ELEVATION: 2831' (NAD83) X = 863275.9', Y = 6740324.2' LAT.: 32°06'21.97", LON.: -102°04'11.38" LAT.: 32.106103°, LON.: -102.069828°
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LEGEND

MULTI-COLOR — 860-FOOT BUFFER/ HALO
MULTI-COLOR — 500-FOOT BUFFER/ HALO
135-FOOT ORDINANCE DISTANCE
PROPOSED WELL PAD SITE

STATE OF TEXAS
REGISTERED
HUNTER WADE WILLS
5929
PROFESSIONAL
LAND SURVEYOR

05/20/2025

N

0' 300' 600'

SCALE: 1" = 300'

NOTE: WELL LOCATIONS ARE APPROXIMATELY 7 MILES NORTH OF MIDLAND, TEXAS.

halff
3300 NORTH A STREET, BUILDING 2, SUITE 120
MIDLAND, TX 79705-5471
TEL (432) 253-3255
TBPELS SURVEYING FIRM #10193998
DATE: 2/25/2025
BY: J. ALVAREZ
REV.: 05/16/2025 J. ALVAREZ
AVO: 047474.884

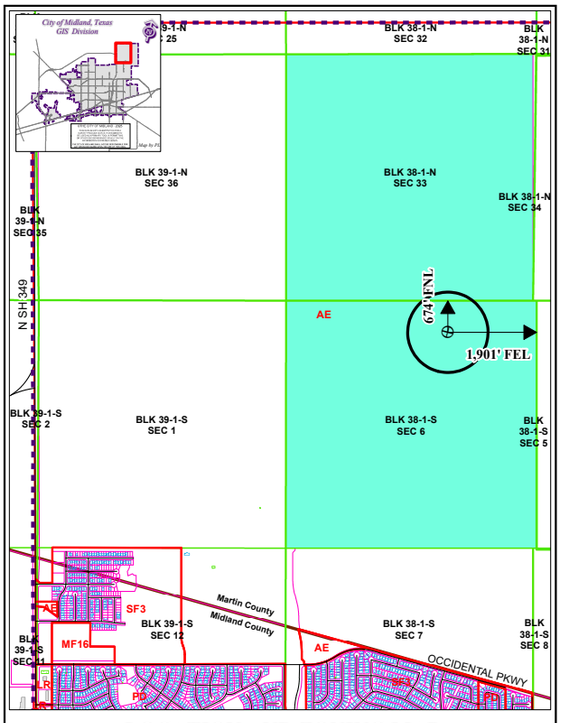
PIONEER NATURAL RESOURCES USA, INC.

EXHIBIT "E"
AERIAL SITE PLAN

NAIL-BURLEY 6L-6V 712H-722H

LOCATED IN:
SECTION 6, BLOCK 38, T-1-S,
T.&P. R.R. CO. SURVEY,
ABSTRACT NO. 671,
MARTIN COUNTY, TEXAS

A:\47000S\47474\884\SURV\CADD\SHEETS\EXHIBIT\047474.884_AERIAL_SITE_PLAN_EXHIBIT_E.DWG



LOCATION AND ZONING MAP

Oil-070255-2025 **Scale: 1" = 1500'**

Consider a request for a Permit to drill an Oil and Gas Well within the City Limits located 674' FNL and 1,901' FEL, Section 6, Block 38-1-S, T&P RR CO Survey, Martin County, Texas.

Generally located 7,272 feet north of Occidental Pkwy and 8,840 feet east of SH 349.

Nail-Burley 6L 712H

LEGEND

CITY PARCELS	PUBLIC BLDGS	CITY LIMITS
COUNTY PARCELS	PRIVATE BLDGS	860 FT. BUFFER
ZONING	ACCESSORY BLDGS	SURVEY SEC.

ZONING DISTRICTS:

FD	FUTURE DEVELOPMENT	BP	BUSINESS PARK
PD	PLANNED DISTRICT	P	PARKING
AE	AGRICULTURE ESTATE	01, O2	OFFICE
CE	COUNTRY ESTATE	NS	NEIGHBORHOOD SERVICE
1F1, 1F2, 1F3	ONE-FAMILY DWELLING	LR1, LR2 ,LR3	LOCAL RETAIL
MH	MOBILE HOME DWELLING	C1, C2, C3	COMMERCIAL
TH	TOWNHOUSE DWELLING	IP ,IP1, IP2, IP3	INDUSTRIAL PARK
2F	TWO-FAMILY DWELLING	LI	LIGHT INDUSTRY
MF1, MF2	MULTIPLE FAMILY DWELLING	HI	HEAVY INDUSTRY

MIDLAND
Planning Division

APPLICATION FOR OIL AND GAS PERMIT

(Pursuant to Midland City Ordinance No. 8769)

I. General Information

Date	Operator Name (must match W-1)	Operator Address
7/1/2025	Pioneer Natural Resources, USA, Inc.	777 Hidden Ridge Lane Irving, Texas 75038

Representative Name	Representative Address (within Midland City Limits)	Rep. Tele.
BJ Laechelin, Operations Manager	3617 N Big Spring St. Midland, TX 79705	713-446-1628 (Mobile) Rep. Fax
Fee: $4,000.00 Rec'd Yes___ No___	NOTE: All attachments need to bound and put in a binder before submitting.	Pages 1-4

Permit Compliance Contact (Choose 1):

Option A: Laura Wallace, Regulatory Advisor
777 Hidden Ridge Lane Irving, Texas 75038

24/7 Answering Services - No. 1 (Tele.): 432-571-2666 **No. 2 (Tele.):**

Option B:

Company Compliance Representative (Name, Address, Local Telephone) ***(ATTACH STATEMENT AS EXHIBIT A):***

Emergency Contact Representative (Name, Address, 24-Hour Tele. No.):
Pioneer Remote Operations Hub
3617 N Big Spring St. Midland, Texas 79705
432-571-2666 (Available 24/7)

Other Permitted Wells in City ***(ATTACH EXHIBIT B*** **[see § J(26)]).** Attached as Exhibit B

II. Mineral Ownership

Name(s) and Address(es) of Mineral Estate Lessors (under applicable lease):

1. Attached as Exhibit C
2.
3.

ATTACHED AS EXHIBIT C **is (a** ***Title Opinion by*** Brashier, Crosby PLLC ***, a licensed Texas Attorney/Title Commitment by Abstract Company/a Take-off from , a Certified Petroleum Landman/an opinion letter from ,*** ***a licensed Texas Attorney)*** **indicating that [Operator] has a legal right to develop the mineral estate that is the subject of this Application. [See § J(5)].**

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Pioneer Natural Resources
[NAME OF COMPANY]

By Laura E Wallace Laura Wallace 4/21/25
Its Regulatory Advisor

State of Texas)

County of Dallas)

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4/21/25

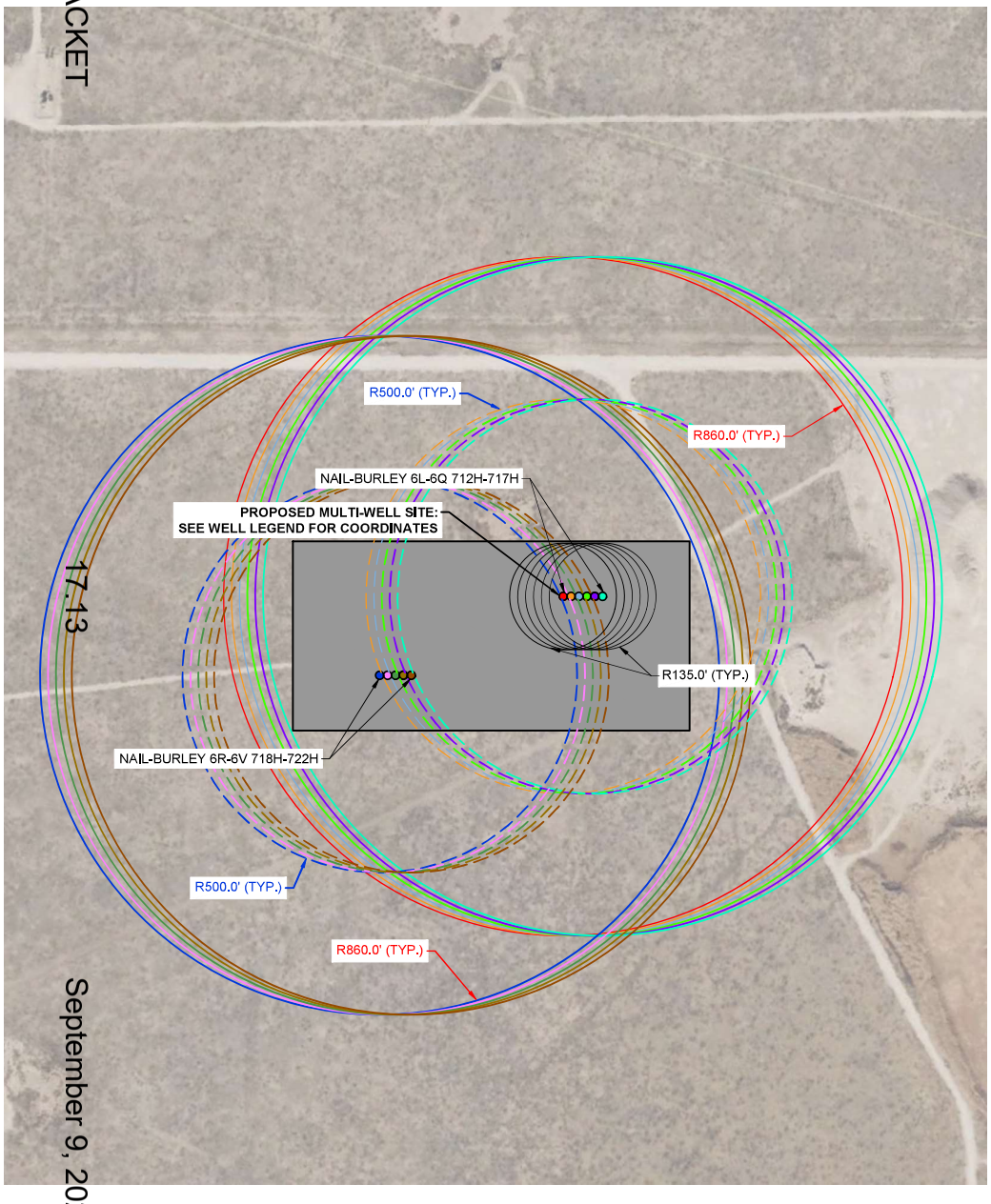
Notary Public, State of Texas

[S E A L]

BOBBY WHITEHEAD
Notary Public, State of Texas
Comm. Expires 08-30-2025
Notary ID 126336794

PACKET

17.13



September 9, 2025

WELL LEGEND

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LEGEND

MULTI-COLOR — 860-FOOT BUFFER/ HALO
MULTI-COLOR — 500-FOOT BUFFER/ HALO
135-FOOT ORDINANCE DISTANCE
PROPOSED WELL PAD SITE

STATE OF TEXAS
REGISTERED
HUNTER WADE WILLS
5929
PROFESSIONAL
LAND SURVEYOR

Hunter Wade Wills
05/20/2025

N

0' 300' 600'

SCALE: 1" = 300'

NOTE: WELL LOCATIONS ARE APPROXIMATELY 7 MILES NORTH OF MIDLAND, TEXAS.

halff
3300 NORTH A STREET, BUILDING 2, SUITE 120
MIDLAND, TX 79705-5471
TEL (432) 253-3255
TBPELS SURVEYING FIRM #10193998

DATE: 2/25/2025
BY: J. ALVAREZ
REV.: 05/16/2025 J. ALVAREZ
AVO: 047474.884

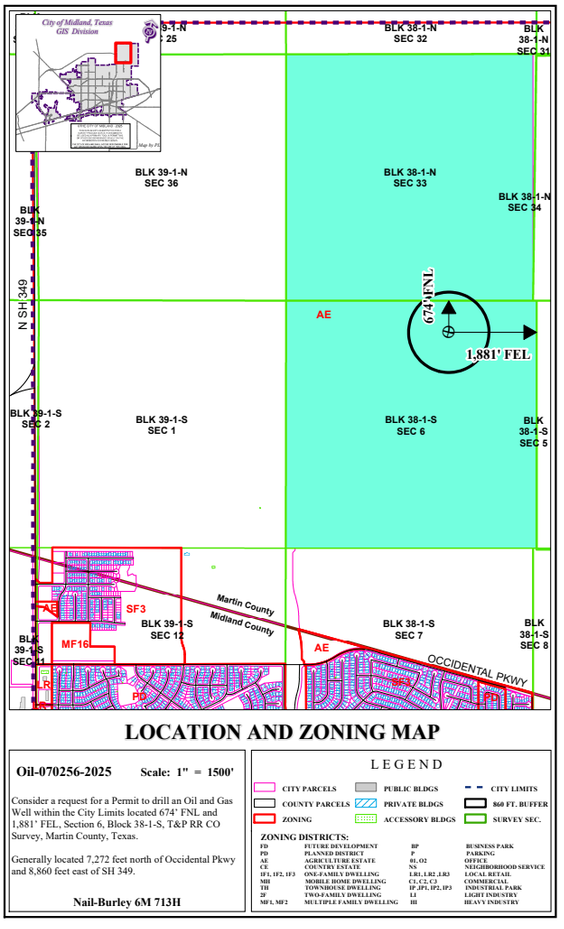
PIONEER NATURAL RESOURCES USA, INC.

EXHIBIT "E"
AERIAL SITE PLAN

NAIL-BURLEY 6L-6V 712H-722H

LOCATED IN:
SECTION 6, BLOCK 38, T-1-S,
T.&P. R.R. CO. SURVEY,
ABSTRACT NO. 671,
MARTIN COUNTY, TEXAS

A:\47000S\47474\884\SURV\CADD\SHEETS\EXHIBIT\047474.884_AERIAL_SITE_PLAN_EXHIBIT_E.DWG



LOCATION AND ZONING MAP

Oil-070256-2025 **Scale: 1" = 1500'**

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Nail-Burley 6M 713H

LEGEND

CITY PARCELS | PUBLIC BLDGS | CITY LIMITS
COUNTY PARCELS | PRIVATE BLDGS | 860 FT. BUFFER
ZONING | ACCESSORY BLDGS | SURVEY SEC.

ZONING DISTRICTS:

FD	FUTURE DEVELOPMENT	BP	BUSINESS PARK
PD	PLANNED DISTRICT	P	PARKING
AE	AGRICULTURE ESTATE	01, O2	OFFICE
CE	COUNTRY ESTATE	NS	NEIGHBORHOOD SERVICE
1F1, 1F2, 1F3	ONE-FAMILY DWELLING	LR1, LR2 ,LR3	LOCAL RETAIL
MH	MOBILE HOME DWELLING	C1, C2, C3	COMMERCIAL
TH	TOWNHOUSE DWELLING	IP ,IP1, IP2, IP3	INDUSTRIAL PARK
2F	TWO-FAMILY DWELLING	LI	LIGHT INDUSTRY
MF1, MF2	MULTIPLE FAMILY DWELLING	HI	HEAVY INDUSTRY

APPLICATION FOR OIL AND GAS PERMIT

(Pursuant to Midland City Ordinance No. 8769)

I. General Information

Date	Operator Name (must match W-1)	Operator Address
7/21/2025	Pioneer Natural Resources, USA, Inc.	777 Hidden Ridge Lane Irving, Texas 75038

Representative Name	Representative Address (within Midland City Limits)	Rep. Tele.
BJ Laechelin, Operations Manager	3617 N Big Spring St. Midland, TX 79705	713-446-1628 (Mobile) Rep. Fax
Fee: $4,000.00 Rec'd Yes___ No___	NOTE: All attachments need to bound and put in a binder before submitting.	Pages 1-4

Permit Compliance Contact (Choose 1):

Option A: Laura Wallace, Regulatory Advisor
777 Hidden Ridge Lane Irving, Texas 75038

24/7 Answering Services - No. 1 (Tele.): 432-571-2666 **No. 2 (Tele.):**

Option B:

Company Compliance Representative (Name, Address, Local Telephone) ***(ATTACH STATEMENT AS EXHIBIT A):***

Emergency Contact Representative (Name, Address, 24-Hour Tele. No.):
Pioneer Remote Operations Hub
3617 N Big Spring St. Midland, Texas 79705
432-571-2666 (Available 24/7)

Other Permitted Wells in City ***(ATTACH EXHIBIT B*** **[see § J(26)]).** Attached as Exhibit B

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Name(s) and Address(es) of Mineral Estate Lessors (under applicable lease):

1. Attached as Exhibit C
2.
3.

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Located in Section 6, Block 38, T1S, T&P RR Co., Abstract 671, Martin County, Texas.

Pad location is owned by Jones Bros Dirt & Paving. Other properties within 860' are: City of Midland (See Exhibit D for details.)

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Pioneer Natural Resources
[NAME OF COMPANY]

By Laura E Wallace 4/21/25
Its Laura Wallace Regulatory Advisor

State of Texas)

County of Dallas)

, personally appeared before me, and being first duly sworn declared he/she signed the application in the capacity designated, if any, and further states that he/she has read the above application and attached exhibits and the statements therein are true and correct to the best of their knowledge.

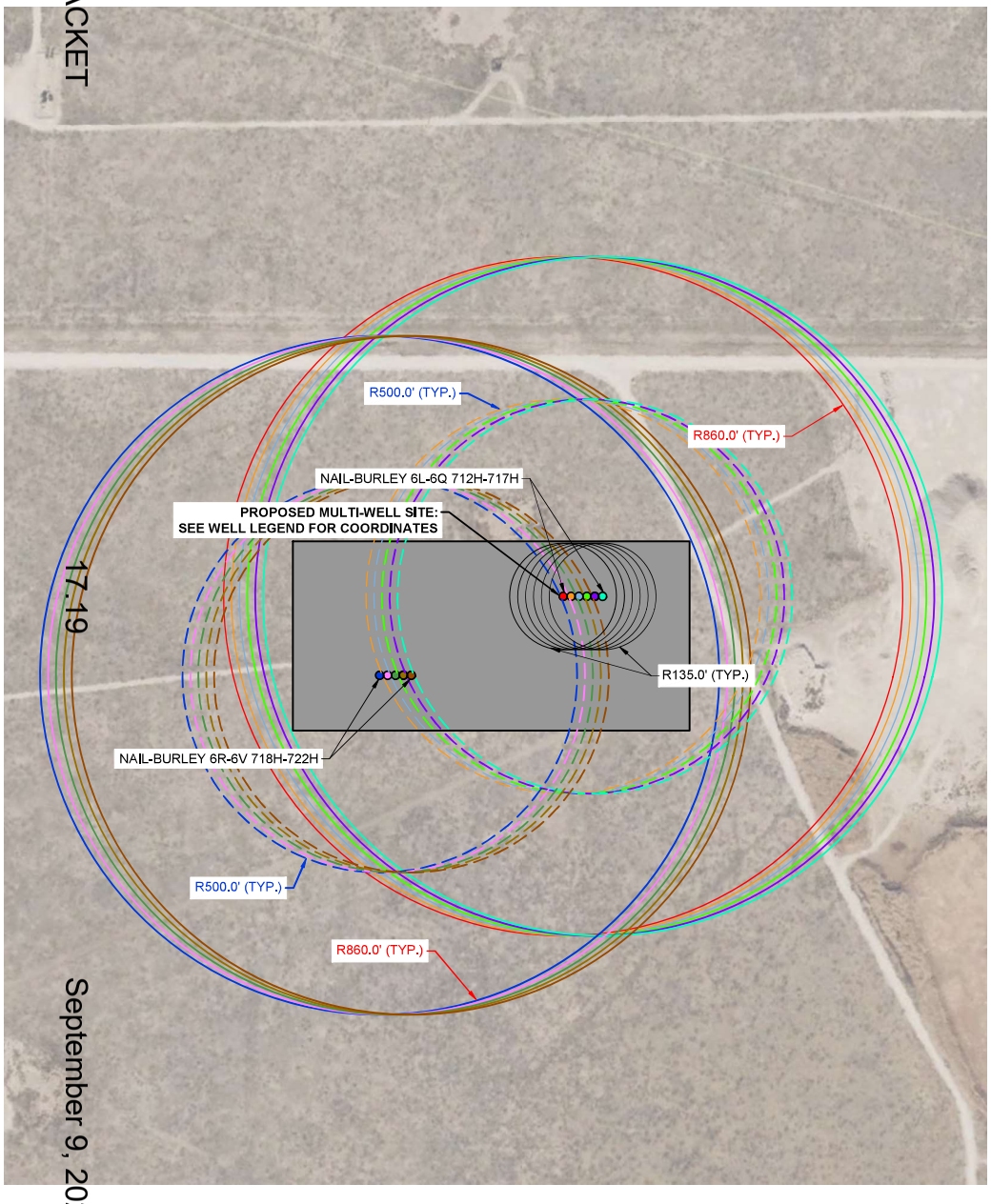
4/21/25

Notary Public, State of Texas

[S E A L]

BOBBY WHITEHEAD
Notary Public, State of Texas
Comm. Expires 08-30-2025
Notary ID 126336794

PACKET 17.19 September 9, 2025



WELL LEGEND

NAIL-BURLEY 6L 712H 674' FNL, 1901' FEL (SEC. 6) SHL GROUND ELEVATION: 2831' (NAD83) X = 863256.4', Y = 6740319.4' LAT.: 32°06'21.92", LON.: -102°04'11.61" LAT.: 32.106088°, LON.: -102.069890°	NAIL-BURLEY 6M 713H 674' FNL, 1881' FEL (SEC. 6) SHL GROUND ELEVATION: 2831' (NAD83) X = 863275.9', Y = 6740324.2' LAT.: 32°06'21.97", LON.: -102°04'11.38" LAT.: 32.106103°, LON.: -102.069828°
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LEGEND

MULTI-COLOR — 860-FOOT BUFFER/ HALO
MULTI-COLOR — 500-FOOT BUFFER/ HALO
135-FOOT ORDINANCE DISTANCE
PROPOSED WELL PAD SITE

STATE OF TEXAS
REGISTERED
HUNTER WADE WILLS
5929
PROFESSIONAL
LAND SURVEYOR

05/20/2025

N

0' 300' 600'

SCALE: 1" = 300'

NOTE: WELL LOCATIONS ARE APPROXIMATELY 7 MILES NORTH OF MIDLAND, TEXAS.

halff
3300 NORTH A STREET, BUILDING 2, SUITE 120
MIDLAND, TX 79705-5471
TEL (432) 253-3255
TBPELS SURVEYING FIRM #10193998
DATE: 2/25/2025
BY: J. ALVAREZ
REV.: 05/16/2025 J. ALVAREZ
AVO: 047474.884

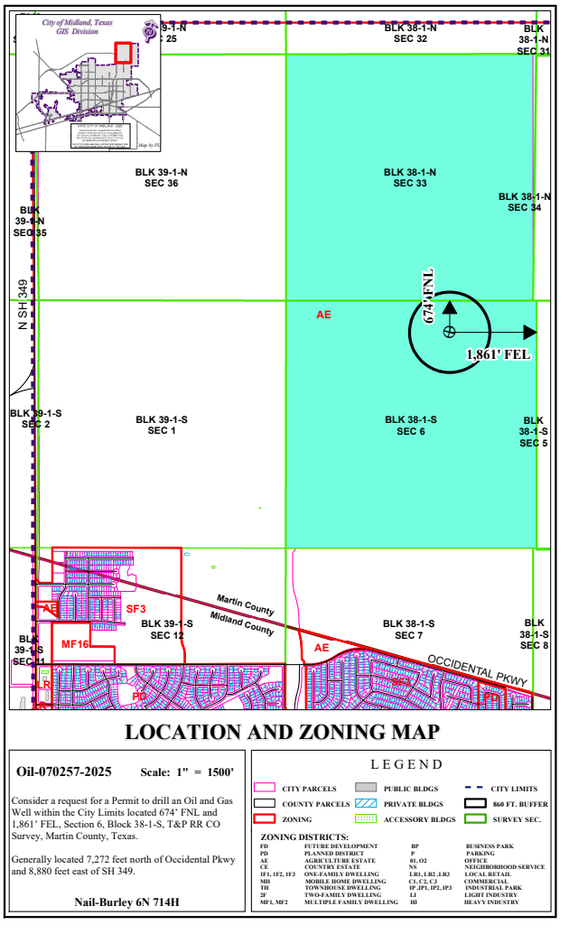
PIONEER NATURAL RESOURCES USA, INC.

EXHIBIT "E"
AERIAL SITE PLAN

NAIL-BURLEY 6L-6V 712H-722H

LOCATED IN:
SECTION 6, BLOCK 38, T-1-S,
T.&P. R.R. CO. SURVEY,
ABSTRACT NO. 671,
MARTIN COUNTY, TEXAS

A:\47000S\47474\884_SURV\CADD\SHEETS\EXHIBIT\047474.884_AERIAL_SITE_PLAN_EXHIBIT_E.DWG



LOCATION AND ZONING MAP

Oil-070257-2025 **Scale: 1" = 1500'**

Consider a request for a Permit to drill an Oil and Gas Well within the City Limits located 674' FNL and 1,861' FEL, Section 6, Block 38-1-S, T&P RR CO Survey, Martin County, Texas.

Generally located 7,272 feet north of Occidental Pkwy and 8,880 feet east of SH 349.

Nail-Burley 6N 714H

LEGEND

CITY PARCELS	PUBLIC BLDGS	CITY LIMITS
COUNTY PARCELS	PRIVATE BLDGS	860 FT. BUFFER
ZONING	ACCESSORY BLDGS	SURVEY SEC.

ZONING DISTRICTS:

FD	FUTURE DEVELOPMENT	BP	BUSINESS PARK
PD	PLANNED DISTRICT	P	PARKING
AE	AGRICULTURE ESTATE	01, O2	OFFICE
CE	COUNTRY ESTATE	NS	NEIGHBORHOOD SERVICE
1F1, 1F2, 1F3	ONE-FAMILY DWELLING	LR1, LR2, LR3	LOCAL RETAIL
MH	MOBILE HOME DWELLING	C1, C2, C3	COMMERCIAL
TH	TOWNHOUSE DWELLING	IP, IP1, IP2, IP3	INDUSTRIAL PARK
2F	TWO-FAMILY DWELLING	LI	LIGHT INDUSTRY
MF1, MF2	MULTIPLE FAMILY DWELLING	HI	HEAVY INDUSTRY

MIDLAND Planning Division

APPLICATION FOR OIL AND GAS PERMIT

(Pursuant to Midland City Ordinance No. 8769)

I. General Information

Date	Operator Name (must match W-1)	Operator Address
7/21/2025	Pioneer Natural Resources, USA, Inc.	777 Hidden Ridge Lane Irving, Texas 75038

Representative Name	Representative Address (within Midland City Limits)	Rep. Tele.
BJ Laechelin, Operations Manager	3617 N Big Spring St. Midland, TX 79705	713-446-1628 (Mobile) Rep. Fax
Fee: $4,000.00 Rec'd Yes___ No___	NOTE: All attachments need to bound and put in a binder before submitting.	Pages 1-4

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Pioneer Natural Resources
[NAME OF COMPANY]

Laura E Wallace
By Laura Wallace 4/21/25
Its Regulatory Advisor

State of Texas)

County of Dallas)

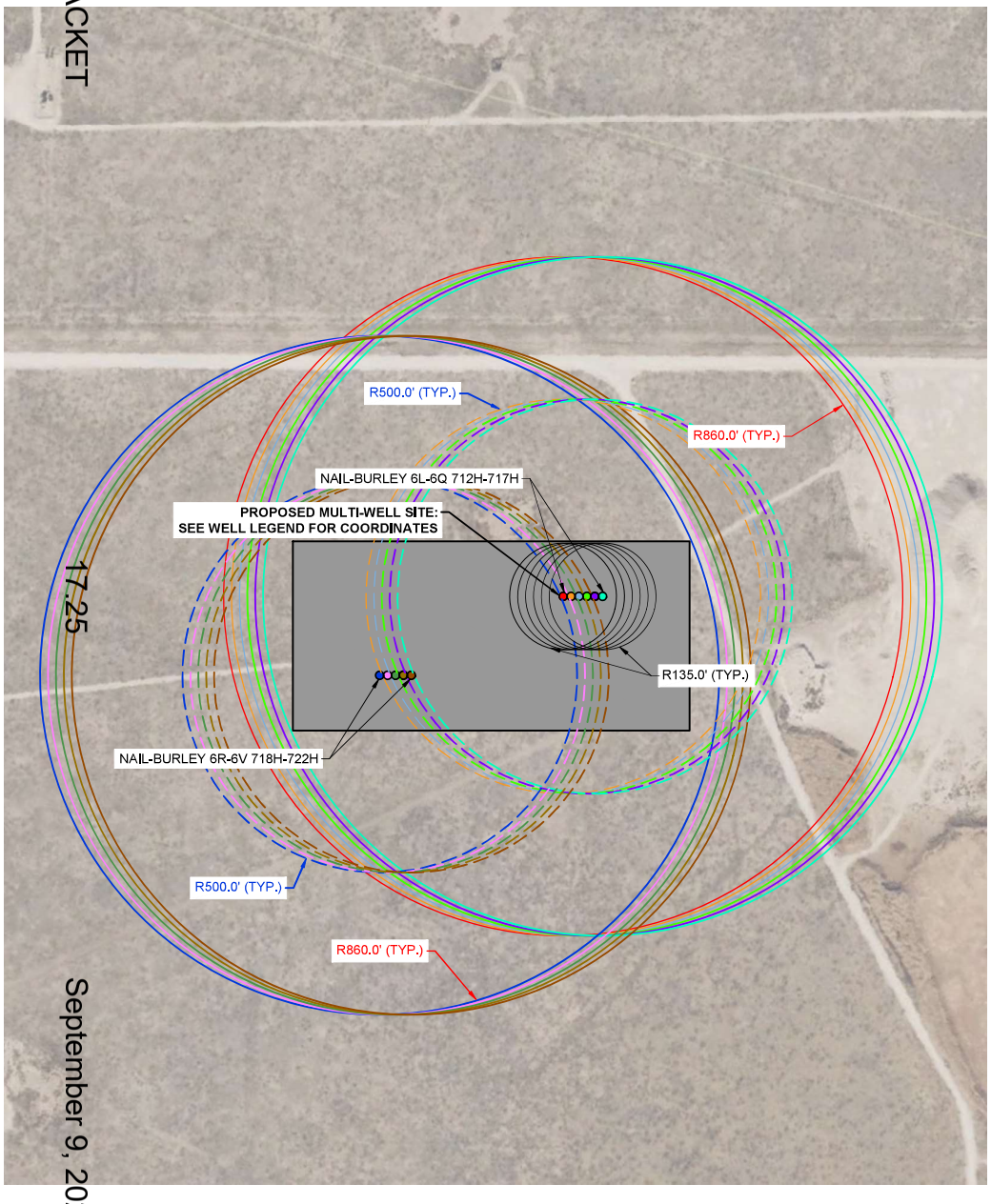
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4/21/25
Notary Public, State of Texas

[S E A L]

BOBBY WHITEHEAD
Notary Public, State of Texas
Comm. Expires 08-30-2025
Notary ID 126336794

PACKET 17.25 September 9, 2025



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LEGEND

MULTI-COLOR — 860-FOOT BUFFER/ HALO
MULTI-COLOR — 500-FOOT BUFFER/ HALO
135-FOOT ORDINANCE DISTANCE
PROPOSED WELL PAD SITE

STATE OF TEXAS
REGISTERED
HUNTER WADE WILLS
5929
PROFESSIONAL
LAND SURVEYOR

05/20/2025

N

0' 300' 600'

SCALE: 1" = 300'

NOTE: WELL LOCATIONS ARE APPROXIMATELY 7 MILES NORTH OF MIDLAND, TEXAS.

halff
3300 NORTH A STREET, BUILDING 2, SUITE 120
MIDLAND, TX 79705-5471
TEL (432) 253-3255
TBPELS SURVEYING FIRM #10193998
DATE: 2/25/2025
BY: J. ALVAREZ
REV.: 05/16/2025 J. ALVAREZ
AVO: 047474.884

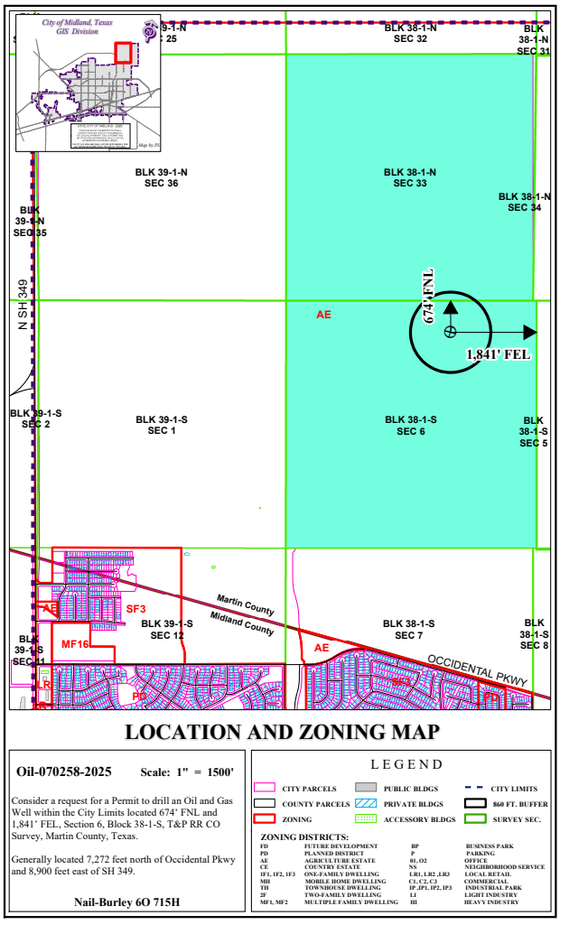
PIONEER NATURAL RESOURCES USA, INC.

EXHIBIT "E"
AERIAL SITE PLAN

NAIL-BURLEY 6L-6V 712H-722H

LOCATED IN:
SECTION 6, BLOCK 38, T-1-S,
T.&P. R.R. CO. SURVEY,
ABSTRACT NO. 671,
MARTIN COUNTY, TEXAS

A:\47000S\47474\884_SURV\CADD\SHEETS\EXHIBIT\047474.884_AERIAL_SITE_PLAN_EXHIBIT_E.DWG


City of Midland, Texas
GIS Division
BLK 38-1-N
SEC 32
BLK
38-1-N
SEC 31
BLK 39-1-N
SEC 36
BLK 38-1-N
SEC 33
BLK 38-1-N
SEC 34
BLK
39-1-N
SEC 35
N SH 349
AE
674' FNL
1,841' FEL
BLK 39-1-S
SEC 2
BLK 39-1-S
SEC 1
BLK 38-1-S
SEC 6
BLK
38-1-S
SEC 5
Martin County
Midland County
AE
SF3
BLK 39-1-S
SEC 12
BLK 38-1-S
SEC 7
BLK
38-1-S
SEC 8
MF16
AE
OCCIDENTAL PKWY
PD
LOCATION AND ZONING MAP
Oil-070258-2025
Scale: 1" = 1500'
Consider a request for a Permit to drill an Oil and Gas Well within the City Limits located 674' FNL and 1,841' FEL, Section 6, Block 38-1-S, T&P RR CO Survey, Martin County, Texas.
Generally located 7,272 feet north of Occidental Pkwy and 8,900 feet east of SH 349.
Nail-Burley 6O 715H
LEGEND
CITY PARCELS
COUNTY PARCELS
ZONING
PUBLIC BLDGS
PRIVATE BLDGS
ACCESSORY BLDGS
CITY LIMITS
860 FT. BUFFER
SURVEY SEC.
ZONING DISTRICTS:
FD FUTURE DEVELOPMENT
PD PLANNED DISTRICT
AE AGRICULTURE ESTATE
CE COUNTRY ESTATE
1F1, 1F2, 1F3 ONE-FAMILY DWELLING
MH MOBILE HOME DWELLING
TH TOWNHOUSE DWELLING
2F TWO-FAMILY DWELLING
MF1, MF2 MULTIPLE FAMILY DWELLING
BP BUSINESS PARK
P PARKING
01, O2 OFFICE
NS NEIGHBORHOOD SERVICE
LR1, LR2 ,LR3 LOCAL RETAIL
C1, C2, C3 COMMERCIAL
IP, IP1, IP2, IP3 INDUSTRIAL PARK
LI LIGHT INDUSTRY
HI HEAVY INDUSTRY

APPLICATION FOR OIL AND GAS PERMIT

(Pursuant to Midland City Ordinance No. 8769)

I. General Information

Date	Operator Name (must match W-1)	Operator Address
7/1/2025	Pioneer Natural Resources, USA, Inc.	777 Hidden Ridge Lane Irving, Texas 75038

Representative Name	Representative Address (within Midland City Limits)	Rep. Tele.
BJ Laechelin, Operations Manager	3617 N Big Spring St. Midland, TX 79705	713-446-1628 (Mobile) Rep. Fax
Fee: $4,000.00 Rec'd Yes___ No___	NOTE: All attachments need to bound and put in a binder before submitting.	Pages 1-4

Permit Compliance Contact (Choose 1):

Option A: Laura Wallace, Regulatory Advisor
777 Hidden Ridge Lane Irving, Texas 75038

24/7 Answering Services - No. 1 (Tele.): 432-571-2666 **No. 2 (Tele.):**

Option B:

Company Compliance Representative (Name, Address, Local Telephone) ***(ATTACH STATEMENT AS EXHIBIT A):***

Emergency Contact Representative (Name, Address, 24-Hour Tele. No.):
Pioneer Remote Operations Hub
3617 N Big Spring St. Midland, Texas 79705
432-571-2666 (Available 24/7)

Other Permitted Wells in City ***(ATTACH EXHIBIT B*** **[see § J(26)]).** Attached as Exhibit B

II. Mineral Ownership

Name(s) and Address(es) of Mineral Estate Lessors (under applicable lease):

1. Attached as Exhibit C
2.
3.

ATTACHED AS EXHIBIT C **is (a** ***Title Opinion by*** Brashier, Crosby PLLC ***, a licensed Texas Attorney/Title Commitment by Abstract Company/a Take-off from , a Certified Petroleum Landman/an opinion letter from ,*** ***a licensed Texas Attorney)*** **indicating that [Operator] has a legal right to develop the mineral estate that is the subject of this Application. [See § J(5)].**

III. Surface Ownership & Use

General Description of Current Surface Use (within 860 feet of proposed surface location):

Located in Section 6, Block 38, T1S, T&P RR Co., Abstract 671, Martin County, Texas.

Pad location is owned by Jones Bros Dirt & Paving. Other properties within 860' are: City of Midland (See Exhibit D for details.)

Currently undeveloped.

ATTACHED AS EXHIBIT D **is (a** ***Title Opinion by , a licensed Texas Attorney/a Take-off from , a Certified Petroleum Landman/Current Tax Roll from Midland Central Appraisal District),*** **which lists the name(s) and address(es) of all surface owners within 860 feet of the surface well location. [See § J(7)].**

***ATTACHED AS EXHIBIT E* is a *(map/p lat/satellite/aerial photo)* depicting all Residences, commercial structures, public buildings, all publicly dedicated Streets and alleys, Rights of Way, and permanent accessory structures surrounding the proposed Drill Site. The *(map/p lat/satellite/aerial photo)* includes two circles, as required by the Ordinance—one depicting a 500 foot radius and one depicting an 860 foot radius from the proposed well's surface location. [See § J(10)].**

***ATTACHED AS EXHIBIT F* is a copy of the notification letter(s) sent to 100 percent of the surface owners, Certified Mail, Return Receipt Requested. [See § J(36)].**

IV. Well & Operations Information

Proposed Well Name: Nail-Burley 6P 716H

Proposed Hole Size, Casing Program and Cementing Program (attach Exhibit as Necessary)[See § J(11) and § L(4)]:

A wellbore schematic with the applicable information is attached as Exhibit G

Legal Description of Proposed Well Site:

674' FNL, 1821' FEL, Section 6, Block 38, T1S, T&P RR Co., Abstract 671, Martin County, Texas

***ATTACHED AS EXHIBIT G* is the Location Site Plan [See § J(9)].**

***ATTACHED AS EXHIBIT H* is the Map with the proposed transportation route(s) and road(s) for equipment, chemicals, or refuse products used or produced in the proposed oil and gas operations. [See § J(12)].**

***ATTACHED AS EXHIBIT I* is a copy of the approved Texas Railroad Commission permit to drill (Form W-1), together with all attachments *(also file copy of W-1 with City Secretary before commencement of drilling operations).* [See § J(16) and (20)].**

***ATTACHED AS EXHIBIT J* is a copy of the required TCEQ report as to depth of usable quality ground water. [See § J(17)].**

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***ATTACHED AS EXHIBIT M* is the Road Repair Agreement and *Letter of Credit/Certificate of Deposit/Surety Bond* in the amount of at least $25,000. *Option (if applicable): Applicant would further state that no City-owned streets or alleys will be used by the Operator in connection with its oil and gas operations and as a result, requests a waiver from the Council of this requirement. Option B (if applicable):* Because Applicant has three Road Repair Agreements in effect that have been approved by the Council, Applicant requests that the Council consolidate all agreements into one and is filing the necessary $75,000 *letter of credit/certificate of deposit/surety bond* in conjunction with this request. [See § J(31)].**

***ATTACHED AS EXHIBIT N* is the Concept Plan depicting the proposed Operations Site (which includes tanks, roads, power lines, and pipeline routes). [See § J(32)].**

Description of Public Utilities required during (1) drilling and (2) operations:

(1) Drilling: N/A

(2) Operations: Electric is required to support production operations for this well. Due to transmission constraints from Oncor, requesting a variance for on-site power generation until that time. See Exhibits N and V for details.

Description of water source to be used during Drilling:

The water source used during drilling can be found on Exhibit N

Description of all electric lines to production facilities (reference exhibits as necessary) [See § L(10)]:

The route for electric lines can be found on Exhibit N

Plan detailing construction, location, and closure of pits used for Drilling and Completion operations (attach exhibit if necessary) [See § J(35)]:

Reserve pits will not be used. Freshwater pits will be used. Please see Exhibit O for closure details.

V. Additional Required Exhibits

***ATTACHED AS EXHIBIT P* is the *Letter of Credit/Certificate of Deposit* in accordance with Subsection (K)(2). [See § J(18)].**

***ATTACHED AS EXHIBIT Q* are Tax certificates from Midland Central Appraisal District to be submitted indicating that all taxes on personal and real property, including minerals, owned by Applicant are current. [See § J(29)].**

***ATTACHED AS EXHIBIT R* is the required Insurance Certificate. [See § J(19) and § K(3)].**

***ATTACHED AS EXHIBIT S (if applicable)* is the Drainage Plan approved by the City Engineer relating to Applicant's proposed operations. [See § J(21)].**

***ATTACHED AS EXHIBIT T* is Applicant's Emergency Action Response Plan. [See § J(22)].**

***ATTACHED AS EXHIBIT U* is Applicant's Hazardous Materials Management Plan, a copy of which has been submitted and is on file with the Midland Fire Department. [See § J(23)].**

Pioneer Natural Resources
[NAME OF COMPANY]

By Laura E Wallace Laura Wallace 4/21/25
Its Regulatory Advisor

State of Texas)

County of Dallas)

, personally appeared before me, and being first duly sworn declared he/she signed the application in the capacity designated, if any, and further states that he/she has read the above application and attached exhibits and the statements therein are true and correct to the best of their knowledge.

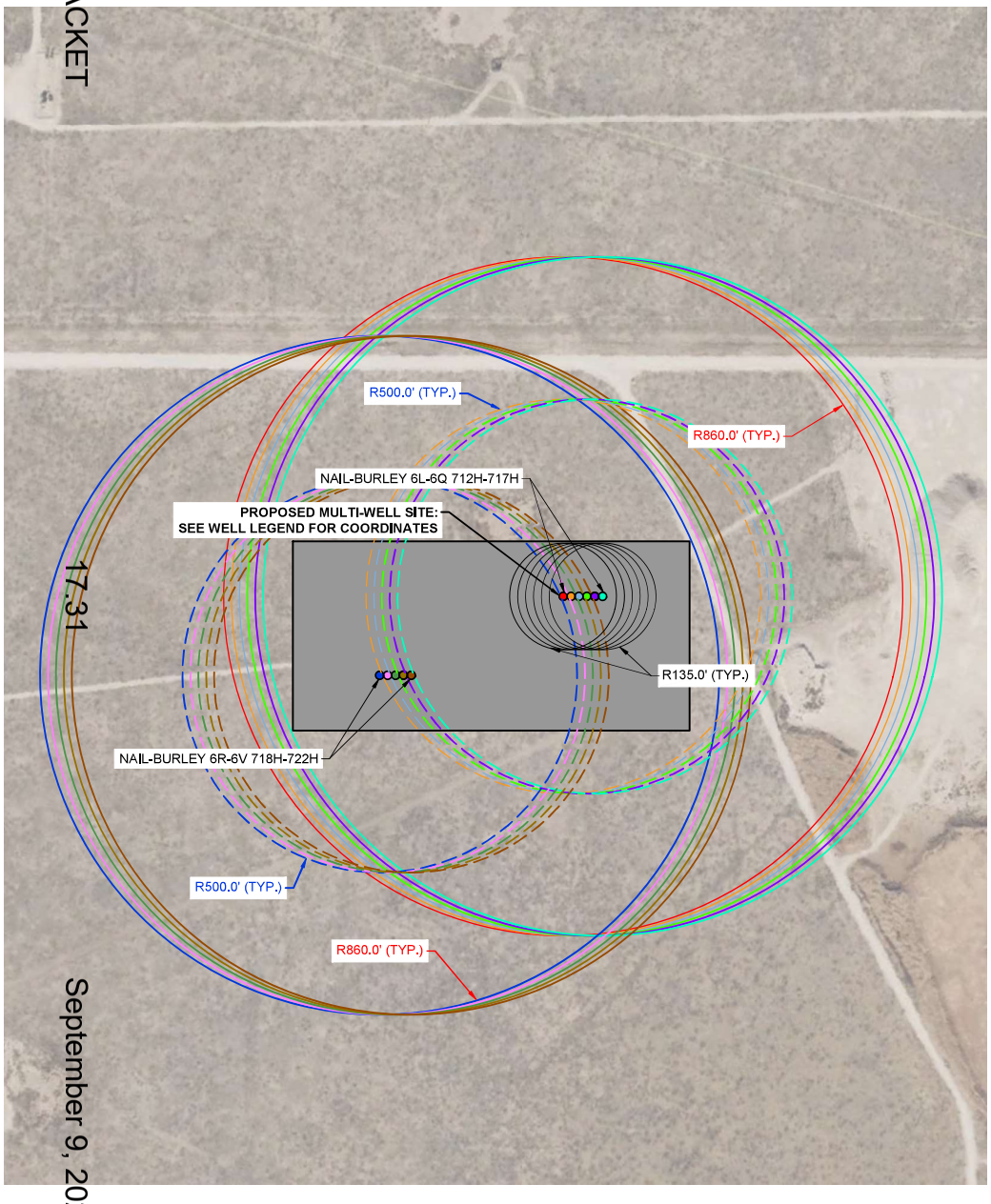
4/21/25

Notary Public, State of Texas

[S E A L]

BOBBY WHITEHEAD
Notary Public, State of Texas
Comm. Expires 08-30-2025
Notary ID 126336794

PACKET 17.31 September 9, 2025



WELL LEGEND

NAIL-BURLEY 6L 712H
674' FNL, 1901' FEL (SEC. 6)
SHL GROUND ELEVATION: 2831'
(NAD83)
X = 863256.4', Y = 6740319.4'
LAT.: 32°06'21.92", LON.: -102°04'11.61"
LAT.: 32.106088°, LON.: -102.069890°

NAIL-BURLEY 6M 713H
674' FNL, 1881' FEL (SEC. 6)
SHL GROUND ELEVATION: 2831'
(NAD83)
X = 863275.9', Y = 6740324.2'
LAT.: 32°06'21.97", LON.: -102°04'11.38"
LAT.: 32.106103°, LON.: -102.069828°

NAIL-BURLEY 6N 714H
674' FNL, 1861' FEL (SEC. 6)
SHL GROUND ELEVATION: 2830'
(NAD83)
X = 863295.3', Y = 6740329.0'
LAT.: 32°06'22.03", LON.: -102°04'11.16"
LAT.: 32.106118°, LON.: -102.069766°

NAIL-BURLEY 6O 715H
674' FNL, 1841' FEL (SEC. 6)
SHL GROUND ELEVATION: 2830'
(NAD83)
X = 863314.7', Y = 6740333.7'
LAT.: 32°06'22.08", LON.: -102°04'10.93"
LAT.: 32.106133°, LON.: -102.069704°

NAIL-BURLEY 6P 716H
674' FNL, 1821' FEL (SEC. 6)
SHL GROUND ELEVATION: 2830'
(NAD83)
X = 863334.2', Y = 6740338.5'
LAT.: 32°06'22.13", LON.: -102°04'10.71"
LAT.: 32.106148°, LON.: -102.069642°

NAIL-BURLEY 6Q 717H
674' FNL, 1801' FEL (SEC. 6)
SHL GROUND ELEVATION: 2830'
(NAD83)
X = 863353.6', Y = 6740343.2'
LAT.: 32°06'22.19", LON.: -102°04'10.49"
LAT.: 32.106163°, LON.: -102.069579°

NAIL-BURLEY 6R 718H
876' FNL, 2364' FEL (SEC. 6)
SHL GROUND ELEVATION: 2829'
(NAD83)
X = 862852.2', Y = 6740014.9'
LAT.: 32°06'18.77", LON.: -102°04'16.18"
LAT.: 32.105214°, LON.: -102.071162°

NAIL-BURLEY 6S 719H
876' FNL, 2344' FEL (SEC. 6)
SHL GROUND ELEVATION: 2829'
(NAD83)
X = 862871.6', Y = 6740019.6'
LAT.: 32°06'18.82", LON.: -102°04'15.96"
LAT.: 32.105229°, LON.: -102.071100°

NAIL-BURLEY 6T 720H
876' FNL, 2324' FEL (SEC. 6)
SHL GROUND ELEVATION: 2829'
(NAD83)
X = 862891.0', Y = 6740024.4'
LAT.: 32°06'18.88", LON.: -102°04'15.73"
LAT.: 32.105244°, LON.: -102.071037°

NAIL-BURLEY 6U 721H
876' FNL, 2304' FEL (SEC. 6)
SHL GROUND ELEVATION: 2829'
(NAD83)
X = 862910.5', Y = 6740029.1'
LAT.: 32°06'18.93", LON.: -102°04'15.51"
LAT.: 32.105258°, LON.: -102.070975°

NAIL-BURLEY 6V 722H
876' FNL, 2284' FEL (SEC. 6)
SHL GROUND ELEVATION: 2829'
(NAD83)
X = 862929.9', Y = 6740033.9'
LAT.: 32°06'18.98", LON.: -102°04'15.29"
LAT.: 32.105273°, LON.: -102.070913°

LEGEND

MULTI-COLOR — 860-FOOT BUFFER/ HALO
MULTI-COLOR — 500-FOOT BUFFER/ HALO
135-FOOT ORDINANCE DISTANCE
PROPOSED WELL PAD SITE

STATE OF TEXAS
REGISTERED
HUNTER WADE WILLS
5929
PROFESSIONAL
LAND SURVEYOR

05/20/2025

N

0' 300' 600'

SCALE: 1" = 300'

NOTE: WELL LOCATIONS ARE APPROXIMATELY 7 MILES NORTH OF MIDLAND, TEXAS.

halff
3300 NORTH A STREET, BUILDING 2, SUITE 120
MIDLAND, TX 79705-5471
TEL (432) 253-3255
TBPELS SURVEYING FIRM #10193998
DATE: 2/25/2025
BY: J. ALVAREZ
REV.: 05/16/2025 J. ALVAREZ
AVO: 047474.884

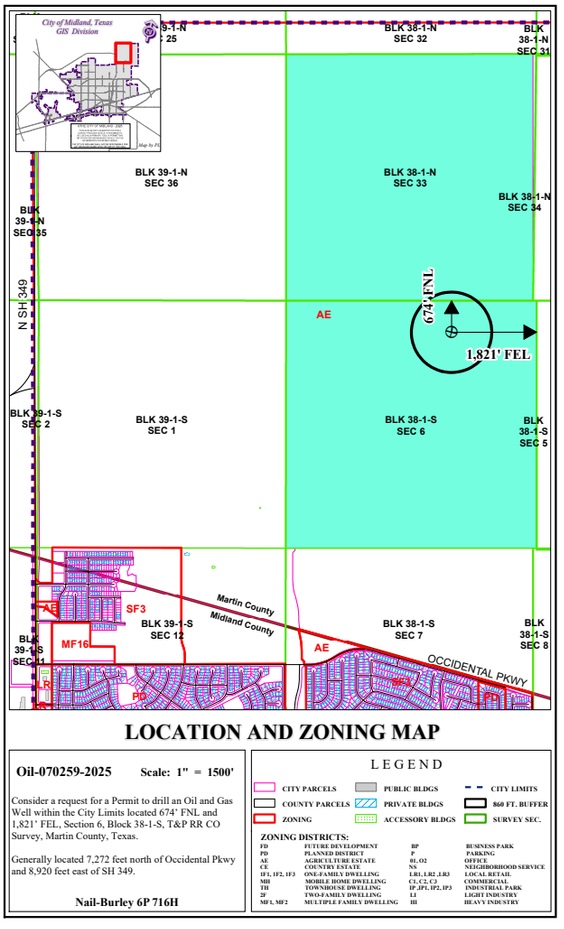
PIONEER NATURAL RESOURCES USA, INC.

EXHIBIT "E"
AERIAL SITE PLAN

NAIL-BURLEY 6L-6V 712H-722H

LOCATED IN:
SECTION 6, BLOCK 38, T-1-S,
T.&P. R.R. CO. SURVEY,
ABSTRACT NO. 671,
MARTIN COUNTY, TEXAS

A:\47000S\47474\884\SURV\CADD\SHEETS\EXHIBIT\047474.884_AERIAL_SITE_PLAN_EXHIBIT_E.DWG



LOCATION AND ZONING MAP

Oil-070259-2025 **Scale: 1" = 1500'**

Consider a request for a Permit to drill an Oil and Gas Well within the City Limits located 674' FNL and 1,821' FEL, Section 6, Block 38-1-S, T&P RR CO Survey, Martin County, Texas.

Generally located 7,272 feet north of Occidental Pkwy and 8,920 feet east of SH 349.

Nail-Burley 6P 716H

LEGEND

CITY PARCELS	PUBLIC BLDGS	CITY LIMITS
COUNTY PARCELS	PRIVATE BLDGS	860 FT. BUFFER
ZONING	ACCESSORY BLDGS	SURVEY SEC.

ZONING DISTRICTS:

FD	FUTURE DEVELOPMENT	BP	BUSINESS PARK
PD	PLANNED DISTRICT	P	PARKING
AE	AGRICULTURE ESTATE	01, O2	OFFICE
CE	COUNTRY ESTATE	NS	NEIGHBORHOOD SERVICE
1F1, 1F2, 1F3	ONE-FAMILY DWELLING	LR1, LR2 ,LR3	LOCAL RETAIL
MH	MOBILE HOME DWELLING	C1, C2, C3	COMMERCIAL
TH	TOWNHOUSE DWELLING	IP ,IP1, IP2, IP3	INDUSTRIAL PARK
2F	TWO-FAMILY DWELLING	LI	LIGHT INDUSTRY
MF1, MF2	MULTIPLE FAMILY DWELLING	HI	HEAVY INDUSTRY

MIDLAND Planning Division

APPLICATION FOR OIL AND GAS PERMIT

(Pursuant to Midland City Ordinance No. 8769)

I. General Information

Date	Operator Name (must match W-1)	Operator Address
7/1/2025	Pioneer Natural Resources, USA, Inc.	777 Hidden Ridge Lane Irving, Texas 75038

Representative Name	Representative Address (within Midland City Limits)	Rep. Tele.
BJ Laechelin, Operations Manager	3617 N Big Spring St. Midland, TX 79705	713-446-1628 (Mobile) Rep. Fax
Fee: $4,000.00 Rec'd Yes___ No___	NOTE: All attachments need to bound and put in a binder before submitting.	Pages 1-4

Permit Compliance Contact (Choose 1):

Option A: Laura Wallace, Regulatory Advisor
777 Hidden Ridge Lane Irving, Texas 75038

24/7 Answering Services - No. 1 (Tele.): 432-571-2666 **No. 2 (Tele.):**

Option B:

Company Compliance Representative (Name, Address, Local Telephone) ***(ATTACH STATEMENT AS EXHIBIT A):***

Emergency Contact Representative (Name, Address, 24-Hour Tele. No.):
Pioneer Remote Operations Hub
3617 N Big Spring St. Midland, Texas 79705
432-571-2666 (Available 24/7)

Other Permitted Wells in City ***(ATTACH EXHIBIT B*** **[see § J(26)]).** Attached as Exhibit B

II. Mineral Ownership

Name(s) and Address(es) of Mineral Estate Lessors (under applicable lease):

1. Attached as Exhibit C
2.
3.

ATTACHED AS EXHIBIT C **is (a** ***Title Opinion by*** Brashier, Crosby PLLC ***, a licensed Texas Attorney/Title Commitment by Abstract Company/a Take-off from , a Certified Petroleum Landman/an opinion letter from ,*** ***a licensed Texas Attorney)*** **indicating that [Operator] has a legal right to develop the mineral estate that is the subject of this Application. [See § J(5)].**

III. Surface Ownership & Use

General Description of Current Surface Use (within 860 feet of proposed surface location):

Located in Section 6, Block 38, T1S, T&P RR Co., Abstract 671, Martin County, Texas.

Pad location is owned by Jones Bros Dirt & Paving. Other properties within 860' are: City of Midland (See Exhibit D for details.)

Currently undeveloped.

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***ATTACHED AS EXHIBIT F* is a copy of the notification letter(s) sent to 100 percent of the surface owners, Certified Mail, Return Receipt Requested. [See § J(36)].**

IV. Well & Operations Information

Proposed Well Name: Nail-Burley 6Q 717H

Proposed Hole Size, Casing Program and Cementing Program (attach Exhibit as Necessary)[See § J(11) and § L(4)]:

A wellbore schematic with the applicable information is attached as Exhibit G

Legal Description of Proposed Well Site:

674' FNL, 1801' FEL, Section 6, Block 38, T1S, T&P RR Co., Abstract 671, Martin County, Texas

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***ATTACHED AS EXHIBIT L* is the Fencing and Irrigation Plan. [See § J(30)].**

***ATTACHED AS EXHIBIT M* is the Road Repair Agreement and *Letter of Credit/Certificate of Deposit/Surety Bond* in the amount of at least $25,000. *Option (if applicable): Applicant would further state that no City-owned streets or alleys will be used by the Operator in connection with its oil and gas operations and as a result, requests a waiver from the Council of this requirement. Option B (if applicable):* Because Applicant has three Road Repair Agreements in effect that have been approved by the Council, Applicant requests that the Council consolidate all agreements into one and is filing the necessary $75,000 *letter of credit/certificate of deposit/surety bond* in conjunction with this request. [See § J(31)].**

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Description of Public Utilities required during (1) drilling and (2) operations:

(1) Drilling: N/A

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The water source used during drilling can be found on Exhibit N

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Pioneer Natural Resources
[NAME OF COMPANY]

By Laura E Wallace Laura Wallace 4/21/25
Its Regulatory Advisor

State of Texas)

County of Dallas)

, personally appeared before me, and being first duly sworn declared he/she signed the application in the capacity designated, if any, and further states that he/she has read the above application and attached exhibits and the statements therein are true and correct to the best of their knowledge.

4/21/25

Notary Public, State of Texas

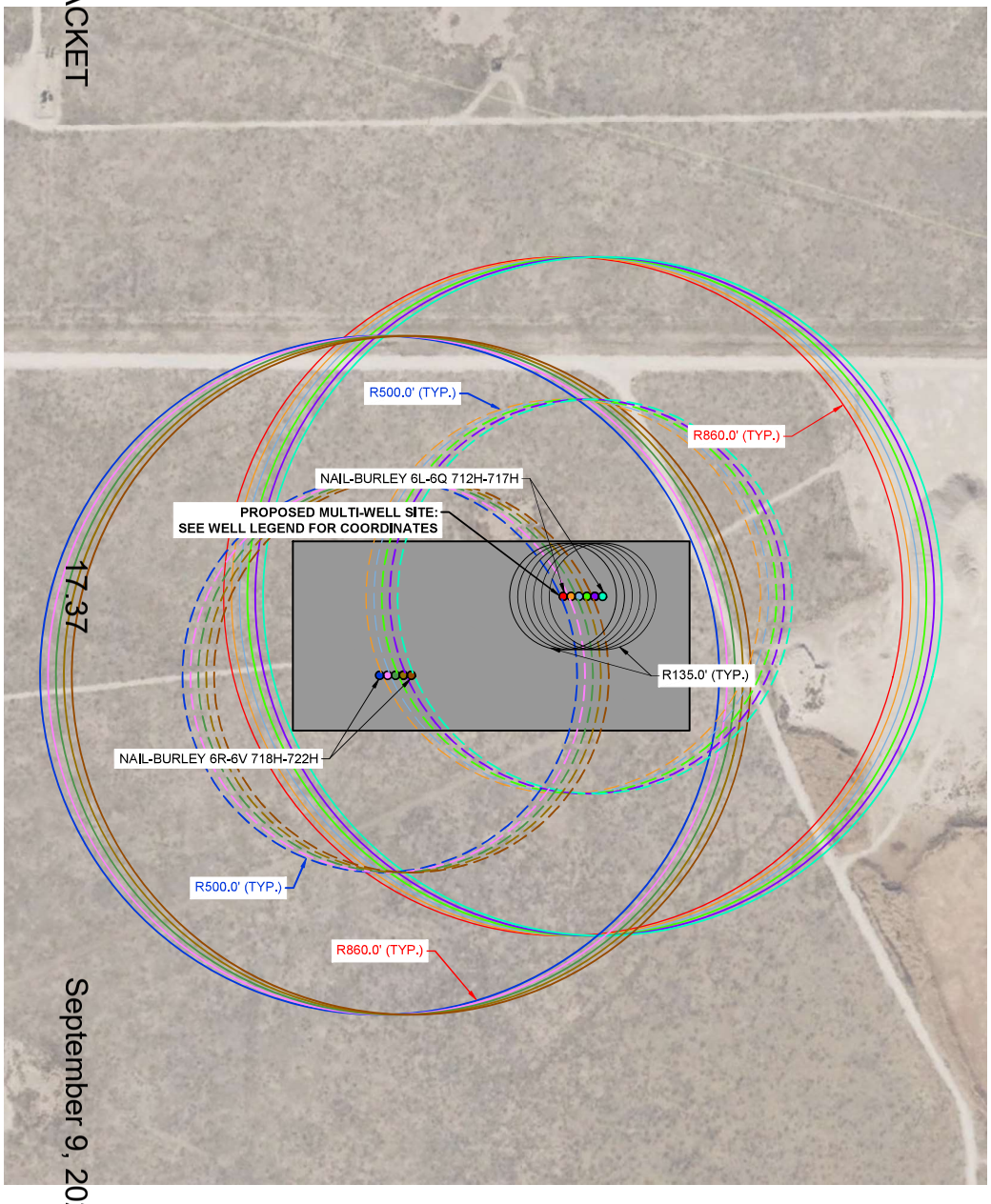
[S E A L]

BOBBY WHITEHEAD
Notary Public, State of Texas
Comm. Expires 08-30-2025
Notary ID 126336794

PACKET

17.37

September 9, 2025



WELL LEGEND

NAIL-BURLEY 6L 712H
674' FNL, 1901' FEL (SEC. 6)
SHL GROUND ELEVATION: 2831'
(NAD83)
X = 863256.4', Y = 6740319.4'
LAT.: 32°06'21.92", LON.: -102°04'11.61"
LAT.: 32.106088°, LON.: -102.069890°

NAIL-BURLEY 6M 713H
674' FNL, 1881' FEL (SEC. 6)
SHL GROUND ELEVATION: 2831'
(NAD83)
X = 863275.9', Y = 6740324.2'
LAT.: 32°06'21.97", LON.: -102°04'11.38"
LAT.: 32.106103°, LON.: -102.069828°

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674' FNL, 1861' FEL (SEC. 6)
SHL GROUND ELEVATION: 2830'
(NAD83)
X = 863295.3', Y = 6740329.0'
LAT.: 32°06'22.03", LON.: -102°04'11.16"
LAT.: 32.106118°, LON.: -102.069766°

NAIL-BURLEY 6O 715H
674' FNL, 1841' FEL (SEC. 6)
SHL GROUND ELEVATION: 2830'
(NAD83)
X = 863314.7', Y = 6740333.7'
LAT.: 32°06'22.08", LON.: -102°04'10.93"
LAT.: 32.106133°, LON.: -102.069704°

NAIL-BURLEY 6P 716H
674' FNL, 1821' FEL (SEC. 6)
SHL GROUND ELEVATION: 2830'
(NAD83)
X = 863334.2', Y = 6740338.5'
LAT.: 32°06'22.13", LON.: -102°04'10.71"
LAT.: 32.106148°, LON.: -102.069642°

NAIL-BURLEY 6Q 717H
674' FNL, 1801' FEL (SEC. 6)
SHL GROUND ELEVATION: 2830'
(NAD83)
X = 863353.6', Y = 6740343.2'
LAT.: 32°06'22.19", LON.: -102°04'10.49"
LAT.: 32.106163°, LON.: -102.069579°

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876' FNL, 2364' FEL (SEC. 6)
SHL GROUND ELEVATION: 2829'
(NAD83)
X = 862852.2', Y = 6740014.9'
LAT.: 32°06'18.77", LON.: -102°04'16.18"
LAT.: 32.105214°, LON.: -102.071162°

NAIL-BURLEY 6S 719H
876' FNL, 2344' FEL (SEC. 6)
SHL GROUND ELEVATION: 2829'
(NAD83)
X = 862871.6', Y = 6740019.6'
LAT.: 32°06'18.82", LON.: -102°04'15.96"
LAT.: 32.105229°, LON.: -102.071100°

NAIL-BURLEY 6T 720H
876' FNL, 2324' FEL (SEC. 6)
SHL GROUND ELEVATION: 2829'
(NAD83)
X = 862891.0', Y = 6740024.4'
LAT.: 32°06'18.88", LON.: -102°04'15.73"
LAT.: 32.105244°, LON.: -102.071037°

NAIL-BURLEY 6U 721H
876' FNL, 2304' FEL (SEC. 6)
SHL GROUND ELEVATION: 2829'
(NAD83)
X = 862910.5', Y = 6740029.1'
LAT.: 32°06'18.93", LON.: -102°04'15.51"
LAT.: 32.105258°, LON.: -102.070975°

NAIL-BURLEY 6V 722H
876' FNL, 2284' FEL (SEC. 6)
SHL GROUND ELEVATION: 2829'
(NAD83)
X = 862929.9', Y = 6740033.9'
LAT.: 32°06'18.98", LON.: -102°04'15.29"
LAT.: 32.105273°, LON.: -102.070913°

LEGEND

MULTI-COLOR — 860-FOOT BUFFER/ HALO
MULTI-COLOR — 500-FOOT BUFFER/ HALO
135-FOOT ORDINANCE DISTANCE
PROPOSED WELL PAD SITE

STATE OF TEXAS
REGISTERED
HUNTER WADE WILLS
5929
PROFESSIONAL
LAND SURVEYOR

Hunter Wade Wills
05/20/2025

N

0' 300' 600'

SCALE: 1" = 300'

NOTE: WELL LOCATIONS ARE APPROXIMATELY 7 MILES NORTH OF MIDLAND, TEXAS.

halff
3300 NORTH A STREET, BUILDING 2, SUITE 120
MIDLAND, TX 79705-5471
TEL (432) 253-3255
TBPELS SURVEYING FIRM #10193998

DATE: 2/25/2025
BY: J. ALVAREZ
REV.: 05/16/2025 J. ALVAREZ
AVO: 047474.884

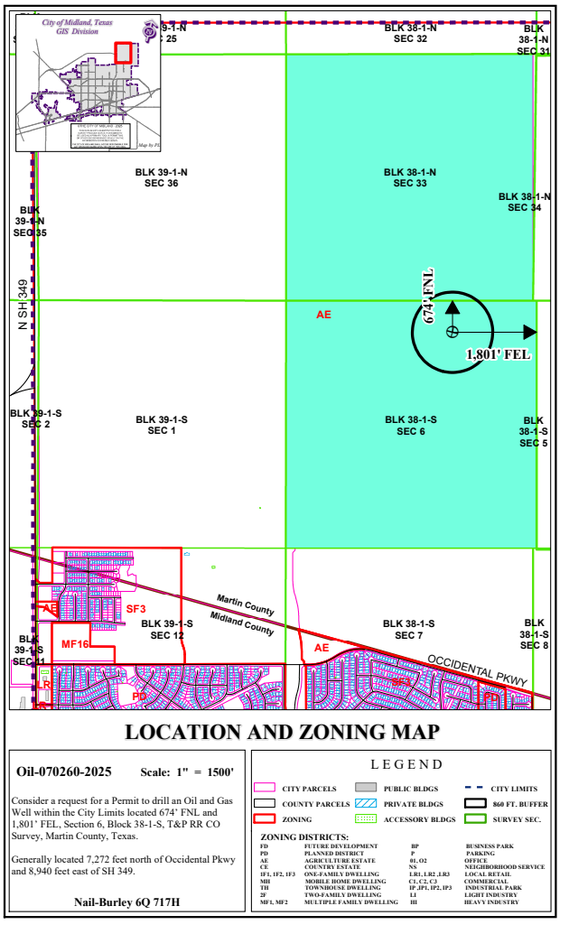
PIONEER NATURAL RESOURCES USA, INC.

EXHIBIT "E"
AERIAL SITE PLAN

NAIL-BURLEY 6L-6V 712H-722H

LOCATED IN:
SECTION 6, BLOCK 38, T-1-S,
T.&P. R.R. CO. SURVEY,
ABSTRACT NO. 671,
MARTIN COUNTY, TEXAS

A:\47000S\47474\884_SURV\CADD\SHEETS\EXHIBIT\047474.884_AERIAL_SITE_PLAN_EXHIBIT_E.DWG



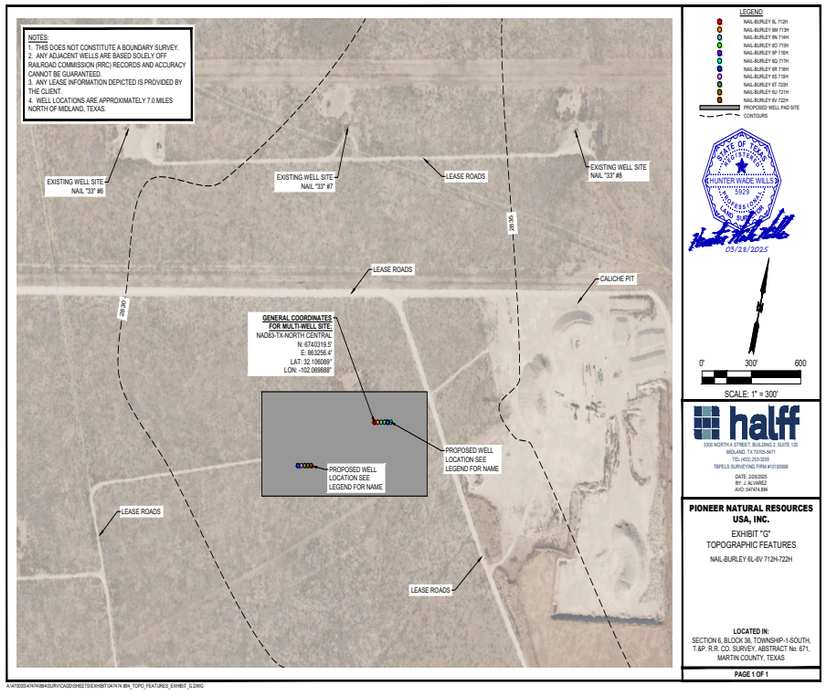
LOCATION AND ZONING MAP

Oil-070260-2025 **Scale: 1" = 1500'**

Consider a request for a Permit to drill an Oil and Gas Well within the City Limits located 674' FNL and 1,801' FEL, Section 6, Block 38-1-S, T&P RR CO Survey, Martin County, Texas.

Generally located 7,272 feet north of Occidental Pkwy and 8,940 feet east of SH 349.

Nail-Burley 6Q 717H


NOTES:
1. THIS DOES NOT CONSTITUTE A BOUNDARY SURVEY.
2. ANY ADJACENT WELLS ARE BASED SOLELY OFF RAILROAD COMMISSION (RRC) RECORDS AND ACCURACY CANNOT BE GUARANTEED.
3. ANY LEASE INFORMATION DEPICTED IS PROVIDED BY THE CLIENT.
4. WELL LOCATIONS ARE APPROXIMATELY 7.0 MILES NORTH OF MIDLAND, TEXAS.
EXISTING WELL SITE NAIL "33" #6
EXISTING WELL SITE NAIL "33" #7
LEASE ROADS
EXISTING WELL SITE NAIL "33" #8
LEASE ROADS
CALICHE PIT
GENERAL COORDINATES FOR MULTI-WELL SITE:
NAD83-TX NORTH CENTRAL
N: 6740319.5'
E: 863256.4'
LAT: 32.136089°
LON: -102.069888°
PROPOSED WELL LOCATION SEE LEGEND FOR NAME
PROPOSED WELL LOCATION SEE LEGEND FOR NAME
LEASE ROADS
LEASE ROADS
LEGEND
NAIL-BURLEY 6L 712H
NAIL-BURLEY 6M 713H
NAIL-BURLEY 6N 714H
NAIL-BURLEY 6O 715H
NAIL-BURLEY 6P 716H
NAIL-BURLEY 6Q 717H
NAIL-BURLEY 6R 718H
NAIL-BURLEY 6S 719H
NAIL-BURLEY 6T 720H
NAIL-BURLEY 6U 721H
NAIL-BURLEY 6V 722H
PROPOSED WELL PAD SITE
CONTOURS
HUNTER WADE WILLS
05/28/2025
0'
300'
600
SCALE: 1" = 300'
halff
3306 NORTH A STREET, BUILDING 2, SUITE 120
MIDLAND, TX 79705-5471
TEL (432) 253-3255
TBPELS SURVEYING FIRM #10193998
DATE: 2/25/2025
BY: J. ALVAREZ
AUC: NATALIEM
PIONEER NATURAL RESOURCES USA, INC.
EXHIBIT "C"
TOPOGRAPHIC FEATURES
NAIL-BURLEY 6L-6V 712H-722H
LOCATED IN:
SECTION 6, BLOCK 38, TOWNSHIP-1-SOUTH, T.&P. R.R. CO. SURVEY, ABSTRACT No. 671, MARTIN COUNTY, TEXAS
PAGE 1 OF 1

City Council Meeting

Item Number: 18

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Alexis M. Martinez, Associate Planner

Subject: **AN ORDINANCE AMENDING THE CONDITIONS AND RESTRICTIONS OF ORDINANCE NO. 10619, WHICH GRANTED A SPECIFIC USE DESIGNATION WITH TERM FOR THE EAST 50 FEET OF LOTS 10 THROUGH 12, BLOCK 61, ORIGINAL TOWN ADDITION, CITY AND COUNTY OF MIDLAND, TEXAS (GENERALLY LOCATED ON THE SOUTH SIDE OF WEST WALL STREET, APPROXIMATELY 110 FEET EAST OF SOUTH CARRIZO STREET), WHICH IS PRESENTLY ZONED CB, CENTRAL BUSINESS DISTRICT, ALLOWING SAID PROPERTY TO BE USED FOR THE SALE OF ALL ALCOHOLIC BEVERAGES IN A LOUNGE FOR ON-PREMISES CONSUMPTION; REQUIRING THE OPERATOR OF THE LOUNGE TO PROVIDE A MINIMUM OF TWO SECURITY GUARDS WHO ARE LEVEL II CERTIFIED ON THE PREMISES ON TUESDAY THROUGH SATURDAY FROM 9:00 P.M. TO 2:30 A.M. OF THE FOLLOWING DAY; CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; AND PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION (DISTRICT 3) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)**

Purpose:

This is to consider an ordinance amending Ordinance 10619 which granted an Specific Use Designation With Term for the sale of all alcoholic beverages for on-premises consumption in a lounge known as Hot Shots, located at 615 West Wall Street.

Recommended City Council Action:

Approve

Fiscal Impact:

This proposal does not have a significant financial impact to the City.

Strategic Priority:

Quality of Life & Place

Analysis:

The property is zoned CB, Central Business District. CB zoning allows Alcoholic Beverages Sales for On-Premises Consumption in a lounge with the approval of an SUD. The total area of the Lounge, Hot Shots, is 4,200 square feet and the proposed alcohol serviceable area is 4,000 square feet.

The proposed hours of operation:

Tuesday through Saturday from 6 p.m. to 1:45 a.m.

The proposed hours of alcohol service:

Tuesday through Saturday from 6 p.m. to 1:45 a.m.

Per Midland City Code, Section 5-4-4, Prohibited Places of Business:

The sale of any alcoholic beverage is hereby prohibited by any person, where the place of business of any such dealer is within 300 feet of any church, public-school, public-school ground, athletic stadium used by any public school or public hospital, the measurements to be along the property lines of the street fronts and from front door to front door and in a direct line across intersections where they occur.

There are no churches, private schools, public schools, public school grounds, athletic stadium, public hospital within 300 feet measurement along the property lines of the street fronts, and from the front door in a direct line across intersection where they occur within this site.

The request is in compliance with the Tall City Tomorrow Comprehensive Plan, Chapter 6-Character Plan Goal 4, which is to “Encourage the development of places where Midland residents can gather and socialize to build connections.” Hot Shots, is a destination where Midland residents will gather and socialize.

Hot Shots submitted an application for a Specific Use Designation (SUD) on March 11, 2025, following notification of non-compliance with the Midland City Code. The establishment has been in operation since 2005 but has not previously held a specific use designation authorizing the sale of alcohol. The application proceeded through the required meetings and received a recommendation for approval from the Planning and Zoning Commission. The request was then forwarded to City Council, which approved the SUD but imposed conditions not typically associated with standard SUD cases. These conditions can be seen in Ordinance No. 10619 which is attached.

On April 7, 2025, the Planning and Zoning Commission formally recommended approval of the SUD. Subsequently, City Council held a public hearing on April 22, 2025, where the request was approved with the following conditions: (1) the operator must provide two certified peace officers as security personnel on Fridays and Saturdays between 9:00 p.m. and 1:45 a.m., and (2) the SUD would be subject to review by City Council within 60 days, and again in seven months. A second reading of the item was held on June 10, 2025, during which Council amended the conditions to require two Level II certified security guards in place of peace officers and scheduled the matter for review in both 60 days and seven months.

During the 60-day review, which took place at the August 12, 2025 City Council meeting, staff presented data showing a summary of the incidents report from 2024 to present as well as a monthly average of the incidents during said time frame which can be seen in Figure 1 below. The most up to date table which includes the incidents for August so far can be seen in Figure 2.

Figure 1

	2024	2025 (through July)	Total
Double Bar	34	40	74
Hot Shots	41	36	77
The Bar	53	14	67
Total	**128**	**90**	**218**

Hot Shots incident summary:

- 11 incidents reported between May and July; or **3.7 average monthly incidents**.
- Prior to security, monthly incidents averaged 4.5 between August and April (excluding March).
- Monthly average of 3.7 incidents between May and July is slightly higher than the 3.3 monthly average during the same months last year.

Figure 2

	2024	2025 (Through August)	Total
Double Bar	34	40	74
Hot Shots	41	37	78
The Bar	53	18	71
Total	**128**	**95**	**223**

Based on the above data staff recommended that Condition D of Ordinance No. 10619 read as follows:

“The operator of the Establishment shall provide a minimum of two security guards who are Level II certified, as required by the State of Texas for a security officer commission or a license as a noncommissioned security officer, on the premises of the establishment during hours of

operation from Tuesday through Saturday, between 9:00 p.m. and 2:30 a.m. of the following day."

Based on staff's report and recommendation, City Council directed staff to begin the process of amending the ordinance as described above. The process for making the above amendment required that the proposed amendment be considered by the Planning & Zonin Commission by holding a public hearing and providing a recommendation to City Council. It must then be considered by Council in two readings with one being a public hearing.

Staff recommends approval of this proposed amendment.

Letters of Objection:

As of August 28, 2025, Staff has received one letter of objection.

Attachments:
Application
Floor Plan (Exhibit A)
Maps
Powerpoint Presentation
Ordinance No. 10619

City Manager's Office

ORDINANCE NO. 10619

AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO GRANT A SPECIFIC USE DESIGNATION WITH TERM FOR THE EAST 50 FEET OF LOTS 10 THROUGH 12, BLOCK 61, ORIGINAL TOWN ADDITION, CITY AND COUNTY OF MIDLAND, TEXAS (GENERALLY LOCATED ON THE SOUTH SIDE OF WEST WALL STREET, APPROXIMATELY 110 FEET EAST OF SOUTH CARRIZO STREET), WHICH IS PRESENTLY ZONED CB, CENTRAL BUSINESS DISTRICT, ALLOWING SAID PROPERTY TO BE USED FOR THE SALE OF ALL ALCOHOLIC BEVERAGES IN A LOUNGE FOR ON-PREMISES CONSUMPTION; MAKING SAID DESIGNATION SUBJECT TO CERTAIN CONDITIONS AND RESTRICTIONS CONTAINED HEREIN; CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION

WHEREAS, the City Planning and Zoning Commission and the Governing Body of the City of Midland, Texas, in compliance with the City Charter, the City Code, and State law, have given the requisite notices by United States mail, publication and otherwise; and after holding due hearings affording a full and fair hearing to all of the property owners generally, and particularly to those interested persons situated in the affected area and in the vicinity thereof, the Governing Body of the City of Midland finds that the public convenience will be best served by granting a Specific Use Designation With Term for the east 50 feet of Lots 10 through 12, Block 61, Original Town Addition, City and County of Midland, Texas (the "Property"), as set out hereinafter;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That the Zoning District Map of the City of Midland, Texas, is hereby amended to grant the Property a Specific Use Designation With Term for the sale of all alcoholic beverages in a lounge (the "Establishment") for on-premises consumption, together with the uses permitted in the present CB, Central Business District.

SECTION TWO. That the Property shall be subject to the following conditions and restrictions:

A. That the serviceable area of the Establishment shall be limited to approximately 4,000 square feet as shown in Exhibit A, which is attached hereto and incorporated herein for all purposes.

B. That the sale and on-premises consumption of alcoholic beverages shall conform to all applicable state and local laws.

C. That the days and hours of alcoholic beverage sales and consumption shall be limited to Tuesday through Saturday from 6:00 p.m. to 1:45 a.m. of the following day.

D. That the operator of the Establishment shall provide a minimum of two security guards who are Level II certified, as required by the State of Texas for a security officer commission or for a license as a noncommissioned security officer, on the premises of the Establishment during hours of operation on Friday and Saturday that occur between 9:00 p.m. and 1:45 a.m. of the following day.

E. That the occupancy of the Establishment shall not exceed the maximum occupancy determined by the Building Code and Fire Code.

F. That the Establishment shall meet the requirements of the Fire Department and the Code Administration Division.

G. That the operator of the Establishment shall obtain a Certificate of Occupancy prior to the commencement of the sale of alcoholic beverages for on-premises consumption to ensure that the conditions of this Specific Use Designation With Term are satisfied.

H. That in accordance with Section 11-1-9.07.E.3 of the City Code, the Establishment shall be in operation within 120 days from the final adoption date of this ordinance.

I. That the Specific Use Designation With Term granted herein will be reviewed by the City Council within 60 days. In conducting the review, the City Council may consider factors including, but not limited to, (1) whether the conditions and restrictions of this Specific Use Designation With Term have been satisfied and (2) the volume and types of incidents reported to have occurred on the premises of the Establishment. Based upon such review, the City Council may direct staff to begin the process to amend the conditions and restrictions of the Specific Use Designation With Term or to repeal this ordinance.

J. That in addition to the review specified in Subsection I, the Specific Use Designation With Term granted herein will be reviewed by the City Council within seven months. In conducting the review, the City Council may consider factors including, but not limited to, (1) whether the conditions and restrictions of this Specific Use Designation With Term have been satisfied and (2) the volume and types of incidents reported to have occurred on the premises of the Establishment. Based upon such review, the City Council may direct staff to begin the process to amend the conditions and restrictions of the Specific Use Designation With Term or to repeal this ordinance.

SECTION THREE. The provisions of this ordinance are to be cumulative of all other ordinances or parts of ordinances governing or regulating the same subject matter as that covered herein; provided, however, that all prior ordinances or parts of ordinances,

inconsistent with or in conflict with any of the provisions of this ordinance are hereby expressly repealed to the extent of any such inconsistency or conflict.

SECTION FOUR. If any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional or invalid, such holding shall not affect the validity of the remaining portions of this ordinance. The Council of the City of Midland hereby declares that it would have passed this ordinance and each section, subsection, sentence, clause, or phrase hereof irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared unconstitutional or invalid.

SECTION FIVE. The penalty for violation of this ordinance shall be in accordance with the general penalty provisions contained in Section 1-3-1 of the City Code of Midland, Texas, which provides for a fine not exceeding two thousand dollars ($2,000.00).

SECTION SIX. The City Secretary is hereby authorized and directed to publish the descriptive caption of this ordinance in the manner and for the length of time prescribed by the law as an alternative method of publication.

The above and foregoing ordinance was duly proposed, read in full and adopted on first reading, the 22nd day of April, A.D., 2025; and passed to second reading on motion of Council member Norman, seconded by Council member Ladd, by the following vote:

Council members voting "AYE": Burkholder, Stretcher Burkes, Poole, Blong, Stubbs, Ladd, Norman

Council members voting "NAY": None

The above and foregoing ordinance was read in full and finally adopted by the following vote upon motion of Council member Norman, seconded by Council member Stubbs, on the 10th day of June, A.D., 2025, at a regular meeting of the City Council:

Council members voting "AYE": Burkholder, Stretcher Burkes, Blong, Stubbs, Ladd, Norman

Council members voting "ABSTAIN": Poole

Council members voting "NAY": None

PASSED AND APPROVED THIS 10th day of June, A.D., 2025.

Lori Merritt Blong, Mayor

ATTEST:

Marcia Bentley-Germain, City Secretary

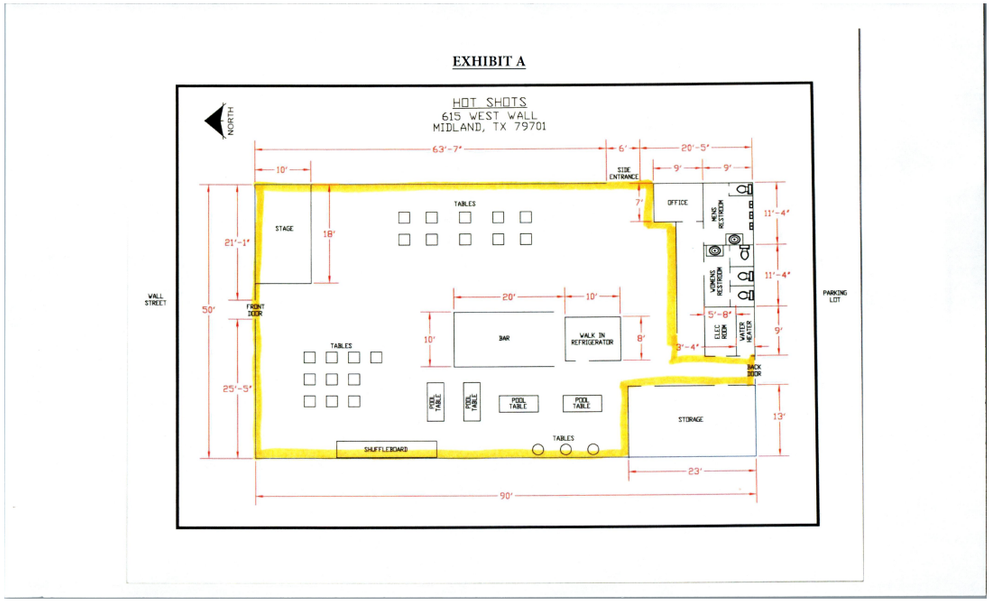
APPROVED AS TO CONTENT
AND COMPLETENESS:

Elizabeth Triggs, Planning and Development Officer

APPROVED ONLY AS TO FORM:

Nicholas Toulet, Interim City Attorney

EXHIBIT A


HOT SHOTS
615 WEST WALL
MIDLAND, TX 79701
NORTH
63'-7"
6'
20'-5"
10'
9'
9'
SIDE ENTRANCE
OFFICE
7'
MENS RESTROOM
WOMENS RESTROOM
11'-4"
11'-4"
STAGE
18'
21'-1"
TABLES
WALL STREET
50'
FRONT DOOR
20'
10'
5'-8"
ELEC ROOM
WATER HEATER
9'
9'-4"
BACK DOOR
TABLES
10'
BAR
WALK IN REFRIGERATOR
8'
25'-5"
POOL TABLE
POOL TABLE
POOL TABLE
POOL TABLE
STORAGE
13'
SHUFFLEBOARD
TABLES
PARKING LOT
23'
90'

MIDLAND
Planning Division

Specific Use Designation with Term for the Sale of Alcoholic Beverages for On-Premises Consumption

Project Number: _____

Case Number: _____

Applicant *(if acting as Agent, see affidavit on page 2)* Printed Name: DAVID CHIN		Phone (432) 352-7988 Email MANIX782@YAHOO.COM	
Address: 615 W. WALL STREET	City: MIDLAND	State: TX	Zip: 79701
Property Owner Printed Name: Same as above.		Phone ( ) Email	
Address	City	State	Zip
Representative *(if different from Applicant or Property Owner)* Firm: _____ Printed Name:		Phone ( ) Email	
Address	City	State	Zip

Street Address: 615 W. WALL STREET MIDLAND, TEXAS 79701

Business Name: HOT SHOTS

Legal Description
Lot: Block: Subdivision:

Current Zoning:

Reason for Request: _____

Type of Business *(restaurant, bar, lounge, nightclub, etc.)*: BAR

Proposed/Current Days and Hours of Operation: TUESDAYS THROUGH SATURDAY

Proposed Days and Hours of Alcohol Service: 6:00 PM - 1:45 AM

Total Square Footage of Business: 4,200

Square Footage of Alcohol Serviceable Area: 4,000

Restroom Fixtures: *Men*	**Toilets/Urinals:** 1 / 3	**Bathroom Sinks:** 1
Women	**Toilets:** 2	**Bathroom Sinks:** 1

Submittal and Fees
Items to be submitted with this application form:

- Application Fee – Payable to the 'City of Midland'
- Dimensioned Floor Plan showing:
  - Seating
  - Exits
  - Restrooms
  - Kitchen (if applicable)
  - Total Square Footage
  - Serviceable Square Footage
- Dimensioned Site Plan showing: *Parking *Business Footprint
- Digital Copies of Floor Plan & Site Plan (PDF/JPEG)

Signatures

Applicant (signature):	Date: 3/5/25
Applicant (printed): DAVID CHIN	
Property Owner (signature):	Date: 3/5/25
Property Owner (printed): DAVID CHIN	

The Specific Use Designation with Term for the sale of all alcoholic beverages shall be considered officially received in the Planning office only when it has been submitted in full compliance with the provisions of Section 212 of the Texas Local Government Code and the Zoning Code of Ordinances of the City of Midland and when such required items for the application are also received.

All materials, submitted in support of an application, or displayed during a public hearing, shall remain the property of the City of Midland.

If an agent is authorized by the property owner to file and execute application on behalf of property owner, agent must complete the affidavit below.

STATE OF TEXAS
COUNTY OF MIDLAND

Before me, the undersigned authority, on this day personally appeared David Chin who, being by me duly sworn, upon oath says: That (s)he is authorized by David Chin, the owner of the above described property, to fully represent him/her in this application and that (s)he had the legal right, power and authority to sign said owner's name hereto as his/her attorney in fact.

Subscribed and sworn to before me, this 6th day of March, 2025, to certify which witness my hand and seal of office.

CIARA GRAHAM
Notary ID #135088820
My Commission Expires
September 13, 2028

Notary Public

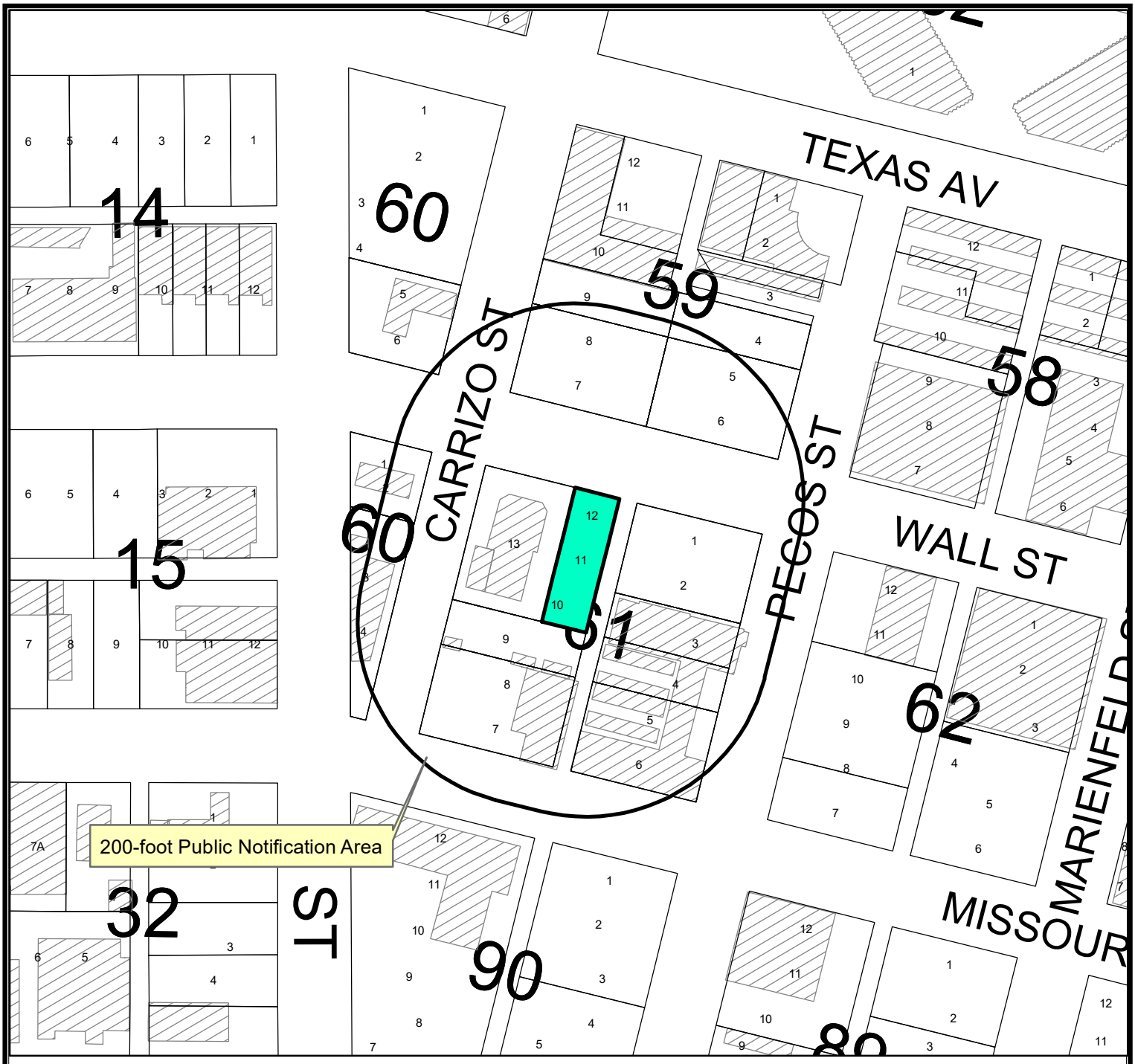
FOR OFFICE USE ONLY

☐ Property Owner Authorization	☑ Dimensioned Floor Plan
☑ Application Fee	☑ Site Plan
Check # 8975	☐ Plans in Digital Format (PDF/JPEG)
Received By:	Date: MAR 10 2025

Initial:

RECEIVED

****Application will not be considered for scheduling until reviewed by a planner.****



Location Map

SUD-25-0195 **Scale: 1" = 861'**

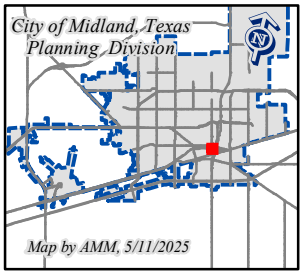
Consider a request by David Chin for a Specific Use Designation with Term for the Sale of all Alcoholic Beverages for on premises consumption in a bar on the east 50 feet of Lot 10 through and 12, Block 39, Original Town, City and County of Midland, Texas.

Generally located on the south side of West Wall Street approximately 110 feet east of South Carrizo Street (Council District 3)

PACKET 18.12

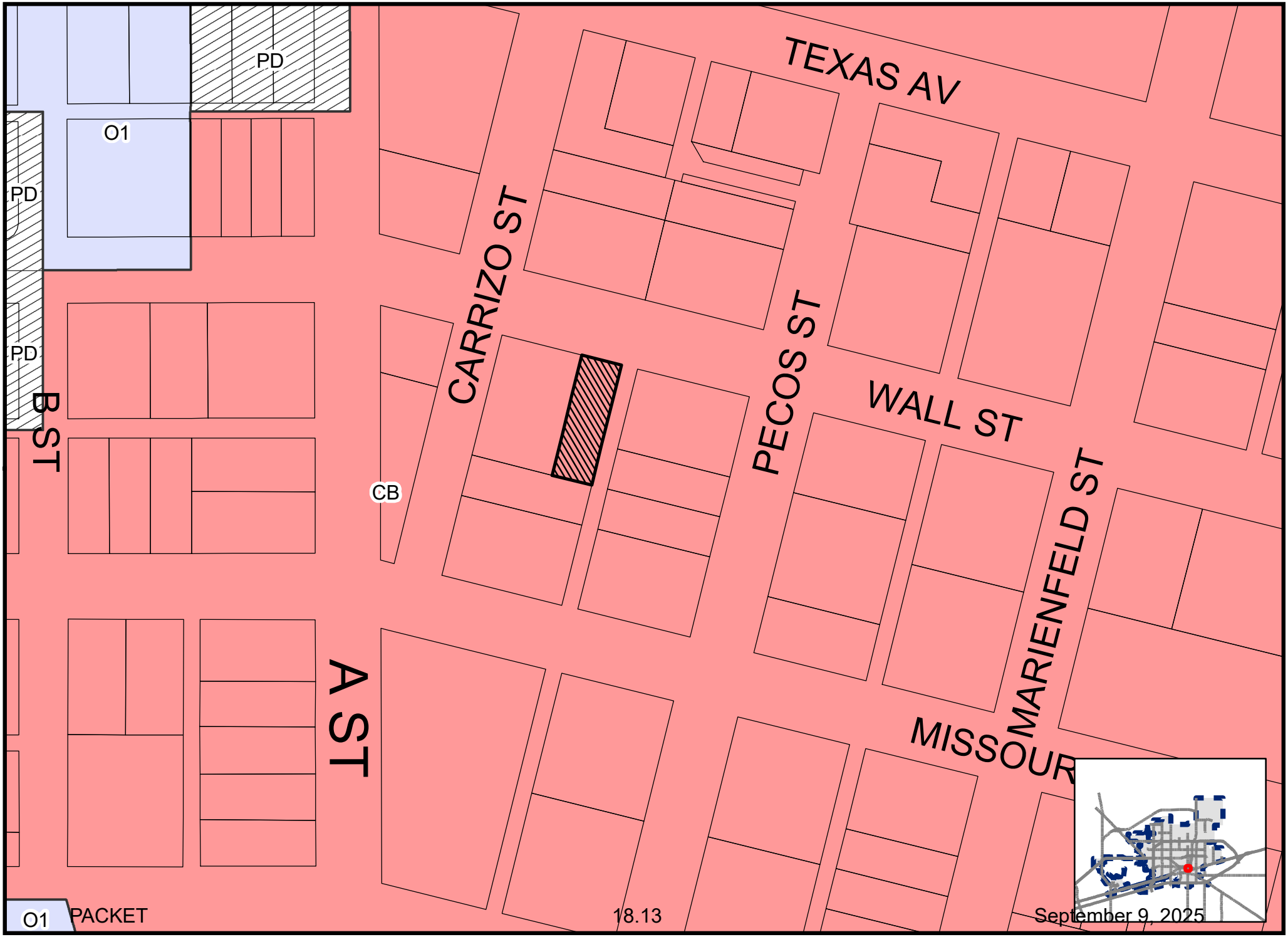
LEGEND

- CITY LIMITS
- PARCEL
- PRIVATE BLDGS



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THIS DATA IS NOT A SUBSTITUTION FOR A SURVEY PRODUCT OR IS INTENDED TO BE USED FOR PRECISE MEASUREMENTS, TO DETERMINE LOCATING OR OTHER DECISIONS BASED SOLELY ON THE INFORMATION CONTAINED HEREIN.
THE CITY OF MIDLAND SHALL NOT BE RESPONSIBLE FOR ANY DECISIONS BASED UPON THE USE OF THIS DATA.

September 9, 2025



Map by AMM, 5/11/2025

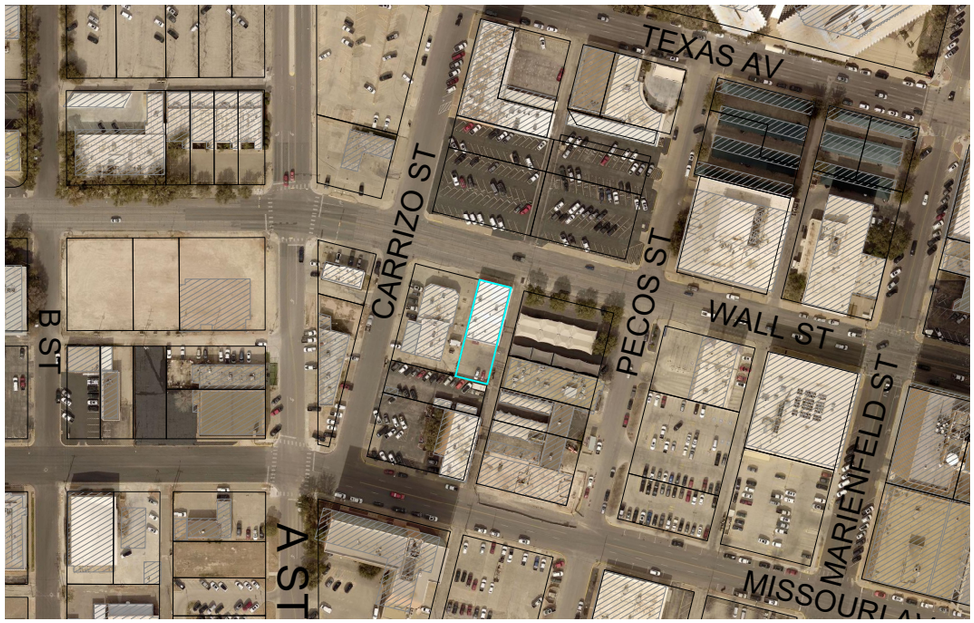
SUD-25-0195

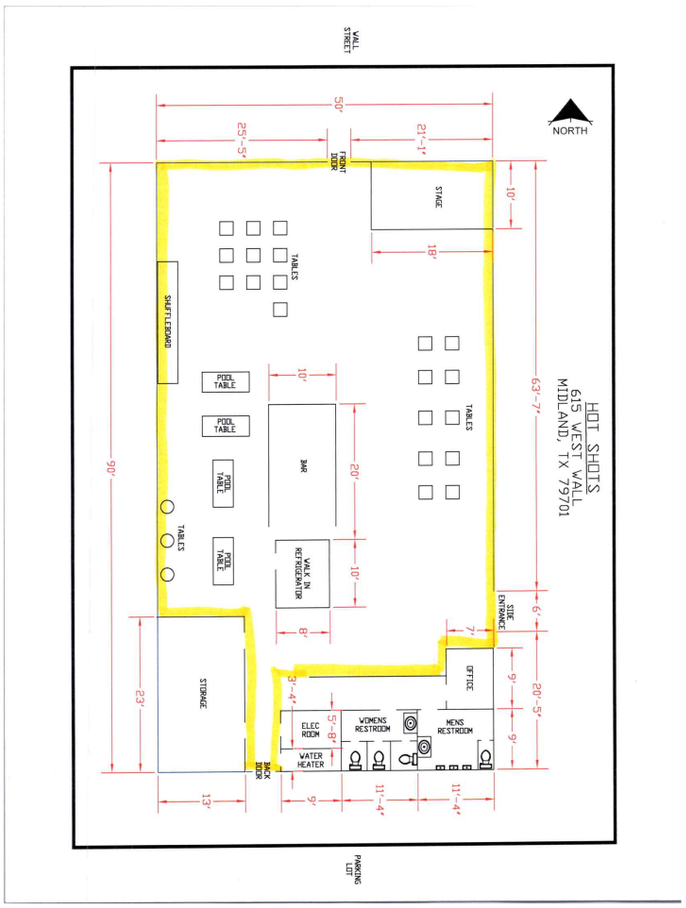
Scale: 1" = 753'

ZONING MAP

© THE CITY OF MIDLAND - 2021: THIS DATA IS NOT A SUBSTITUTION FOR A SURVEY PRODUCT, NOR IS IT DESIGNED TO BE USED AS A PRIMARY TOOL IN PERMITTING OR OTHER DECISIONS BASED SOLELY ON THE INFORMATION CONTAINED HEREIN. THE CITY OF MIDLAND SHALL NOT BE RESPONSIBLE FOR ANY DECISIONS BASED UPON THE USE OF THIS DATA.


Hot Shots
POOL TOURN MENT TUES-SAT
KARAOKE TUES THRU SAT
EST BLISHED 1999

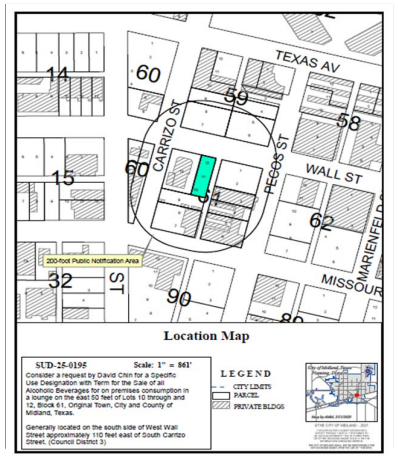

TEXAS AV
CARRIZO ST
PECOS ST
WALL ST
B ST
A ST
MARIENFELD ST


HOT SHOTS
615 WEST WALL
MIDLAND, TX 79701
NORTH
WALL STREET
PARKING LOT
FRONT DOOR
BACK DOOR
SIDE ENTRANCE
STAGE
TABLES
SHUFFLEBOARD
POOL TABLE
POOL TABLE
POOL TABLE
POOL TABLE
BAR
WALK IN REFRIGERATOR
TABLES
TABLES
STORAGE
OFFICE
ELEC ROOM
WATER HEATER
WOMENS RESTROOM
MENS RESTROOM
50'
25'-5'
21'-1'
10'
18'
63'-7"
90'
10'
20'
10'
8'
7'
6'
9'
20'-5"
9'
23'
3'-4"
5'-8"
13'
9'
11'-4"
11'-4"


MIDLAND
Be the Energy!
ITEM
SPECIFIC USE DESIGNATION
HOT SHOTS
Visit Our Website
MIDLANDTEXAS.GOV

APPLICATION SUMMARY

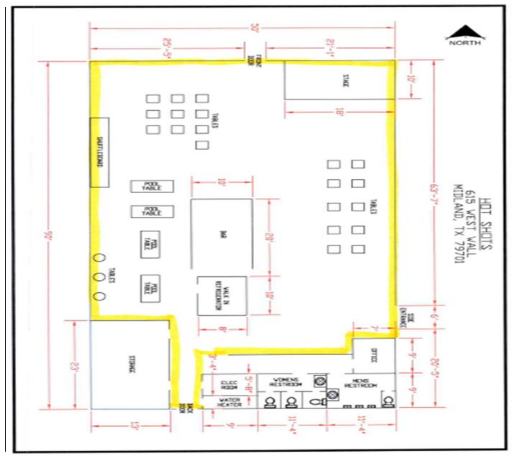
- **Property owner & applicant:** David Chin
- **Location**: 615 West Wall Street (Council District 3)
- **Type of Business:** Lounge/Bar
- SUD allowing for on-site sale and consumption of alcohol **approved June 10, 2025, with conditions**



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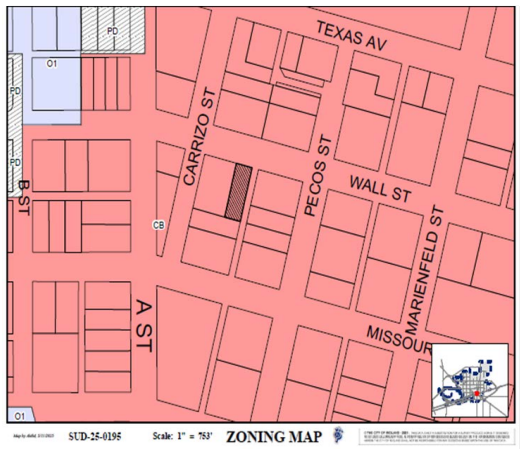
DETAILS OF SUD

- For existing lounge
- **Area of Business:** 4,200 SF
- **Serviceable Area:** 4,000 SF
- **Hours of Operation and Alcohol Sales:** Tuesday through Saturday from 6 p.m. to 1:45 a.m.



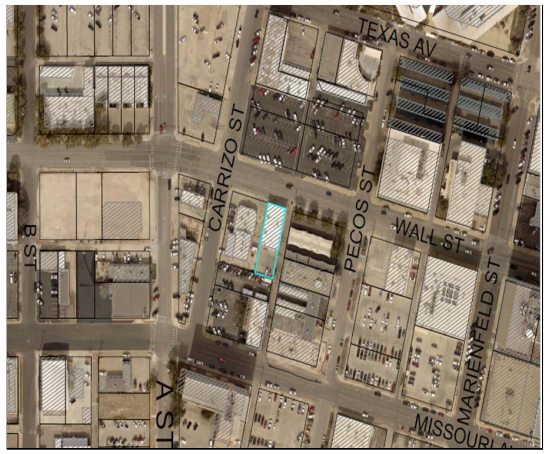
ZONING

- **Current Zoning:** CB, Central Business
- **Surrounding Zoning:**
  - **North/South/East/West:** CB, Central Business District
- The use of an SUD for the sale and on-premises consumption is allowed in this zoning.



LAND USE

- **Current Use:** Lounge
- **Surrounding Uses:**
  - **North:** Commercial Building
  - **South:** The Bar
  - **East:** BTA Oil Building
  - **West:** Double Bar Saloon

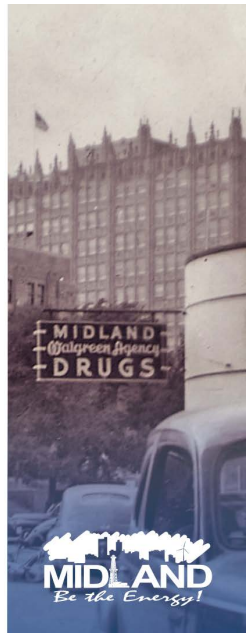




On West Wall Street, Looking South

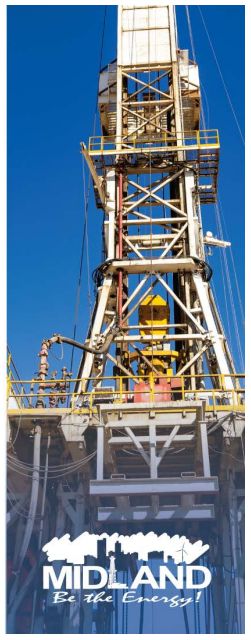
COMPREHENSIVE PLAN

This request is compatible with the *Tall City Tomorrow Comprehensive Plan* as it is consistent *Chapter 6-Character Plan, Goal 4*, which is to "Encourage the development of places where Midland residents can gather and socialize to build connections."



PROHIBITED PLACES OF BUSINESS

There is no church, public school, public school ground, athletic stadium used by any public school, or public hospital within 300 feet of the building of the subject property as required by *Section 5-4-4 Prohibited Places of Business.*



10

BALANCING IMPACT & COMPATIBILITY THROUGH SUDS (11-1-9.07)

- An SUD allows **case-by-case** review of certain land uses that may have greater impacts than typical uses in a zoning district
- It ensures these uses are only approved where appropriate, based on location and context
- **Council can require conditions** (e.g., screening, hours of operation) to reduce impacts on surrounding properties



MIDLAND
Be the Energy!

KEY CONSIDERATIONS FOR SUDS

- To protect public safety and surrounding properties, City council may evaluate:
  - Pedestrian and traffic safety
  - Access and circulation
  - Drainage and fire protection
  - Adequate parking and loading
  - Noise, lighting and visual impacts
  - Building height and compatibility with surroundings
- Council may also set conditions- such as time limits or screening- to reduce impacts on nearby properties and safeguard the public.

APPROVAL AND CONDITIONS



- The Planning & Zoning Commission recommended approval of this request on April 7, 2025.
- **City Council approved this SUD with term on June 10, 2025, with the below conditions:**

A. That the serviceable area of the Establishment shall be **limited to approximately 4,000 square feet** as shown in Exhibits A, which are attached hereto and incorporated herein for all purposes.

14

APPROVAL AND CONDITIONS

B. That the sale and on-premises consumption of alcoholic beverages shall **conform to all applicable state and local laws**.

C. That the days and hours of alcoholic beverage sales and consumption shall be limited to the following:

Tuesday through Saturday from 6 p.m. to 1:45 a.m. of the following day.



APPROVAL AND CONDITIONS

D. That the operator of the Establishment shall **provide a minimum of two certified security guards** on the premises of the establishment during hours of operation on **Tuesday through Saturday that occur between 9 p.m. and 2:30 a.m. of the following day**.

E. That the **occupancy of the Establishment shall not exceed the maximum occupancy** determined by the Building Code and Fire Code.



16

APPROVAL AND CONDITIONS

F. That the Establishment shall **meet the requirements of the Fire Department and the Code Administration Division**.

G. That the operator of the Establishment **shall obtain a Certificate of Occupancy prior to the commencement of the sale of alcoholic beverages** for on-premises consumption to ensure that the conditions of this Specific Use Designation With Term are satisfied.

17



APPROVAL AND CONDITIONS

H. That in accordance with Section 11-1-9.07.E.3 of the City Code, the **Establishment shall be in operation within 120 days from the final adoption date of this ordinance**.



18

APPROVAL AND CONDITIONS

I. That in addition to the review specified in subsection I, the Specific Use Designation With Term granted herein **will be reviewed by the City Council within seven months**. The City Council may consider factors including, but not limited to, (1) whether the conditions and restrictions of this Specific Use Designation With Term have been satisfied and (2) the volume and types of incidents reported to have occurred on the premises of the establishment. Based upon such review, the City Council may direct staff to begin the process to amend the conditions and restrictions of the Specific Use Designation With Term or to repeal this ordinance.

20



CONSIDERATIONS

Incident Report Summary

	2024	2025 (Through August)	Total
Double Bar	34	40	74
Hot Shots	41	37	78
The Bar	53	18	71
Total	**128**	**95**	**223**

Hot Shots incident summary:

- 11 incidents reported between May and July; or **3.7 average monthly incidents**.
- Prior to security, monthly incidents averaged 4.5 between August and April (excluding March).
- Monthly average of 3.7 incidents between May and July is slightly higher than the 3.3 monthly average during the same months last year.


MISSION
Deliver exceptional services and promote a high quality of life and place for ALL our citizens.

ORDINANCE NO. _____

AN ORDINANCE AMENDING THE CONDITIONS AND RESTRICTIONS OF ORDINANCE NO. 10619, WHICH GRANTED A SPECIFIC USE DESIGNATION WITH TERM FOR THE EAST 50 FEET OF LOTS 10 THROUGH 12, BLOCK 61, ORIGINAL TOWN ADDITION, CITY AND COUNTY OF MIDLAND, TEXAS (GENERALLY LOCATED ON THE SOUTH SIDE OF WEST WALL STREET, APPROXIMATELY 110 FEET EAST OF SOUTH CARRIZO STREET), WHICH IS PRESENTLY ZONED CB, CENTRAL BUSINESS DISTRICT, ALLOWING SAID PROPERTY TO BE USED FOR THE SALE OF ALL ALCOHOLIC BEVERAGES IN A LOUNGE FOR ON-PREMISES CONSUMPTION; REQUIRING THE OPERATOR OF THE LOUNGE TO PROVIDE A MINIMUM OF TWO SECURITY GUARDS WHO ARE LEVEL II CERTIFIED ON THE PREMISES ON TUESDAY THROUGH SATURDAY FROM 9:00 P.M. TO 2:30 A.M. OF THE FOLLOWING DAY; CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; AND PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION

WHEREAS, the City Planning and Zoning Commission and the Governing Body of the City of Midland, Texas, in compliance with the City Charter, the City Code, and State law, have given the requisite notices by United States mail, publication and otherwise; and after holding due hearings affording a full and fair hearing to all of the property owners generally, and particularly to those interested persons situated in the affected area and in the vicinity thereof, the Governing Body of the City of Midland finds that the public convenience will be best served by amending the conditions and restrictions of Ordinance No. 10619, which granted a Specific Use Designation With Term for the east 50 feet of Lots 10 through 12, Block 61, Original Town Addition, City and County of Midland, Texas (the "Property"), as set out hereinafter;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That Section Two D of Ordinance No. 10619, which granted the Property a Specific Use Designation With Term for the sale of all alcoholic beverages in a lounge (the "Establishment") for on-premises consumption, together with the uses

permitted in the present CB, Central Business District, is hereby amended to read in its entirety as follows:

D. That the operator of the Establishment shall provide a minimum of two security guards who are Level II certified, as required by the State of Texas for a security officer commission or for a license as a noncommissioned security officer, on the premises of the Establishment on Tuesday through Saturday from 9:00 p.m. to 2:30 a.m. of the following day.

SECTION TWO. That Ordinance No. 10619, as amended by Section One hereof, shall remain in full force and effect.

SECTION THREE. The provisions of this ordinance are to be cumulative of all other ordinances or parts of ordinances governing or regulating the same subject matter as that covered herein; provided, however, that all prior ordinances or parts of ordinances, inconsistent with or in conflict with any of the provisions of this ordinance are hereby expressly repealed to the extent of any such inconsistency or conflict.

SECTION FOUR. If any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional or invalid, such holding shall not affect the validity of the remaining portions of this ordinance. The Council of the City of Midland hereby declares that it would have passed this ordinance and each section, subsection, sentence, clause, or phrase hereof irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared unconstitutional or invalid.

SECTION FIVE. The penalty for violation of this ordinance shall be in accordance with the general penalty provisions contained in Section 1-3-1 of the City Code of Midland, Texas, which provides for a fine not exceeding two thousand dollars ($2,000.00).

SECTION SIX. The City Secretary is hereby authorized and directed to publish the descriptive caption of this ordinance in the manner and for the length of time prescribed by the law as an alternative method of publication.

The above and foregoing ordinance was duly proposed, read in full and adopted on first reading, the _____ day of _____, A.D., 2025; and passed to second reading on motion of Council member _____, seconded by Council member _____, by the following vote:

Council members voting “AYE”:

Council members voting “NAY”:

The above and foregoing ordinance was read in full and finally adopted by the following vote upon motion of Council member _____, seconded by Council member _____, on the _____ day of _____, A.D., 2025, at a regular meeting of the City Council:

Council members voting “AYE”:

Council members voting “NAY”:

PASSED AND APPROVED THIS _____ day of _____, A.D., 2025.

_____
Lori Merritt Blong, Mayor

ATTEST:

_____
Marcia Bentley-German, City Secretary

APPROVED AS TO CONTENT
AND COMPLETENESS:

_____
Elizabeth Triggs, Planning and Development Officer

APPROVED ONLY AS TO FORM:

_____
Nicholas Toulet, Interim City Attorney

City Council Meeting

Item Number: 19

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Alexis M. Martinez, Associate Planner

Subject: **AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO GRANT A SPECIFIC USE DESIGNATION WITH TERM FOR LOT 3, BLOCK 45, FAIRMONT PARK ADDITION, SECTION 13, CITY AND COUNTY OF MIDLAND, TEXAS (GENERALLY LOCATED ON THE EAST SIDE OF WEST LOOP 250 NORTH, APPROXIMATELY 450 FEET SOUTH OF HENRY KOONTZ BOULEVARD), WHICH IS PRESENTLY ZONED RR, REGIONAL RETAIL DISTRICT, ALLOWING SAID PROPERTY TO BE USED FOR THE SALE OF ALL ALCOHOLIC BEVERAGES IN A MOVIE THEATER FOR ON-PREMISES CONSUMPTION; MAKING SAID DESIGNATION SUBJECT TO CERTAIN CONDITIONS AND RESTRICTIONS CONTAINED HEREIN; CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION (DISTRICT 3) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)**

Purpose:

Cinergy 108, LLC is requesting a Specific Use Designation with term, for the sale of all alcoholic beverages for on-premises consumption, on a property located at 4915 West Loop 250 North for Cinergy Entertainment.

Recommended City Council Action:

Approve

Fiscal Impact:

This proposal does not have a significant financial impact to the City.

Strategic Priority:

(Quality of Life & Place)

Current Zoning:

RR, Regional Retail District

Surrounding Zoning and Land Use:

The properties to the north are zoned PD, Planned Development District for a Shopping Center, TH, Townhouse Dwelling District, with uses that include a car dealership and townhomes. The zoning to the east and west is PD, Planned Development District for a Shopping Center with a restaurant and a hotel as current uses. Zoning to the south includes PD, Planned Development District for a Shopping Center and SF-2, Single-Family Dwelling District, with storage units and single-family residential dwellings for current uses.

Analysis:

The subject property is located at 4915 West Loop 250 North is zoned RR, Regional Retail District, which permits the sale of all alcoholic beverages for on-premises consumption. The total area of the movie theatre is 96,397 square feet and the proposed alcohol serviceable Area is 50,567 square feet. The new business Cinergy Entertainment is attempting to obtain their TABC license but must first obtain their SUD.

The proposed days and hours of operation are:

Sunday through Thursday from 10 a.m. to 11 p.m.
Friday through Saturday from 10 a.m. to 12 a.m. (midnight)

The applicant is requesting the following alcohol serviceable hours.

Sunday through Thursday from 10 a.m. to 11 p.m.
Friday through Saturday from 10 a.m. to 12 a.m. (midnight)

Per Midland City Code, Section 5-4-4, Prohibited Places of Business:

The sale of any alcoholic beverage is hereby prohibited by any person, where the place of business of any such dealer is within 300 feet of any church, public-school, public-school ground, athletic stadium used by any public school or public hospital, the measurements to be along the property lines of the street fronts and from front door to front door and in a direct line across intersections where they occur.

There are no schools or churches within 300 feet of the property using the front door to door distance measurement.

This request has been circulated to and reviewed by respective City departments for internal review and their comments, conditions, and requirements are as follows:

Fire: (Approved)

No comments or objections.

Engineering: (Approved)

No objection. [For Applicant's Information Only.]

Transportation: (Approved)

No objection. [For Applicant's Information Only.]

Building Code: (Approved)

The SUD for Cinergy Entertainment is acceptable. The property must adhere to the maximum occupant load of 3,370 persons for the alcohol serviceable area. Occupancy loads must be posted in accordance with section 1004.3 of the 2015 International Fire Code.

Planning: (Approved with Conditions)

This request meets all requirements; therefore, staff recommends approval of the request of the Specific Use Designation with Term for the sale of all alcoholic beverages, for on-premises consumption, in a Movie Theatre, subject to Condition A through G.

Conditions:

A. That the serviceable area of the establishment shall be limited to approximately 50,567 square feet as shown in Exhibit "A", which is attached hereto and incorporated herein for all purposes.

B. That the sale and on-premises consumption of alcoholic beverages shall conform to applicable state and local laws.

C. That the days and hours of alcoholic beverages sales and consumption shall be limited to Sunday through Thursday from 10 a.m. to 11 p.m.
Friday through Saturday from 10 a.m. to 12 a.m. (midnight)

D. That the occupancy of the Establishment shall not exceed the maximum occupancy determined by the Building Code and Fire Code.

E. That the establishment shall meet all requirements of the Fire Department and Code Administration

F. That the operator of the establishment shall obtain a Certificate of Occupancy prior to commencement of the sale of alcohol beverages for on premises consumption to ensure that the conditions of this Specific Use Designation with Term are satisfied.

G. That in accordance with section 9.07.E.3 of the Zoning Ordinance, the establishment shall be in operation within 120 days from the final adoption date of this ordinance.

Letters of Objection:

As of August 28, 2025 staff has not received any letters of objection.

Attachments:

Application
Floor Plan (Exhibit A)
Maps
PowerPoint Presentation

City Manager's Office

ORDINANCE NO. _____

AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO GRANT A SPECIFIC USE DESIGNATION WITH TERM FOR LOT 3, BLOCK 45, FAIRMONT PARK ADDITION, SECTION 13, CITY AND COUNTY OF MIDLAND, TEXAS (GENERALLY LOCATED ON THE EAST SIDE OF WEST LOOP 250 NORTH, APPROXIMATELY 450 FEET SOUTH OF HENRY KOONTZ BOULEVARD), WHICH IS PRESENTLY ZONED RR, REGIONAL RETAIL DISTRICT, ALLOWING SAID PROPERTY TO BE USED FOR THE SALE OF ALL ALCOHOLIC BEVERAGES IN A MOVIE THEATER FOR ON-PREMISES CONSUMPTION; MAKING SAID DESIGNATION SUBJECT TO CERTAIN CONDITIONS AND RESTRICTIONS CONTAINED HEREIN; CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION

WHEREAS, the City Planning and Zoning Commission and the Governing Body of the City of Midland, Texas, in compliance with the City Charter, the City Code, and State law, have given the requisite notices by United States mail, publication and otherwise; and after holding due hearings affording a full and fair hearing to all of the property owners generally, and particularly to those interested persons situated in the affected area and in the vicinity thereof, the Governing Body of the City of Midland finds that the public convenience will be best served by granting a Specific Use Designation With Term for Lot 3, Block 45, Fairmont Park Addition, Section 13, City and County of Midland, Texas (the "Property"), as set out hereinafter;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That the Zoning District Map of the City of Midland, Texas, is hereby amended to grant the Property a Specific Use Designation With Term for the sale of all alcoholic beverages in a movie theater (the "Establishment") for on-premises consumption, together with the uses permitted in the present RR, Regional Retail District.

SECTION TWO. That the Property shall be subject to the following conditions and restrictions:

A. That the serviceable area of the Establishment shall be limited to approximately 50,567 square feet as shown in Exhibit A, which is attached hereto and incorporated herein for all purposes.

B. That the sale and on-premises consumption of alcoholic beverages shall conform to all applicable state and local laws.

C. That the days and hours of alcoholic beverage sales and consumption shall be limited to the following:

Sunday through Thursday from 10:00 a.m. to 11:00 p.m.; and
Friday and Saturday from 10:00 a.m. to 12:00 a.m. (midnight).

D. That the occupancy of the Establishment shall not exceed the maximum occupancy determined by the Building Code and Fire Code.

E. That the Establishment shall meet the requirements of the Fire Department and the Code Administration Division.

F. That the operator of the Establishment shall obtain a Certificate of Occupancy prior to the commencement of the sale of alcoholic beverages for on-premises consumption to ensure that the conditions of this Specific Use Designation With Term are satisfied.

G. That in accordance with Section 11-1-9.07.E.3 of the City Code, the Establishment shall be in operation within 120 days from the final adoption date of this ordinance.

SECTION THREE. The provisions of this ordinance are to be cumulative of all other ordinances or parts of ordinances governing or regulating the same subject matter as that covered herein; provided, however, that all prior ordinances or parts of ordinances, inconsistent with or in conflict with any of the provisions of this ordinance are hereby expressly repealed to the extent of any such inconsistency or conflict.

SECTION FOUR. If any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional or invalid, such holding shall not affect the validity of the remaining portions of this ordinance. The Council of the City of Midland hereby declares that it would have passed this ordinance and each section, subsection, sentence, clause, or phrase hereof irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared unconstitutional or invalid.

SECTION FIVE. The penalty for violation of this ordinance shall be in accordance with the general penalty provisions contained in Section 1-3-1 of the City Code of Midland, Texas, which provides for a fine not exceeding two thousand dollars ($2,000.00).

SECTION SIX. The City Secretary is hereby authorized and directed to publish the descriptive caption of this ordinance in the manner and for the length of time prescribed by the law as an alternative method of publication.

The above and foregoing ordinance was duly proposed, read in full and adopted on first reading, the _____ day of _____, A.D., 2025; and passed to second reading on motion of Council member _____, seconded by Council member _____, by the following vote:

Council members voting "AYE":

Council members voting "NAY":

The above and foregoing ordinance was read in full and finally adopted by the following vote upon motion of Council member _____, seconded by Council member _____, on the _____ day of _____, A.D., 2025, at a regular meeting of the City Council:

Council members voting "AYE":

Council members voting "NAY":

PASSED AND APPROVED THIS _____ day of _____, A.D., 2025.

_____
Lori Merritt Blong, Mayor

ATTEST:

_____
Marcia Bentley-German, City Secretary

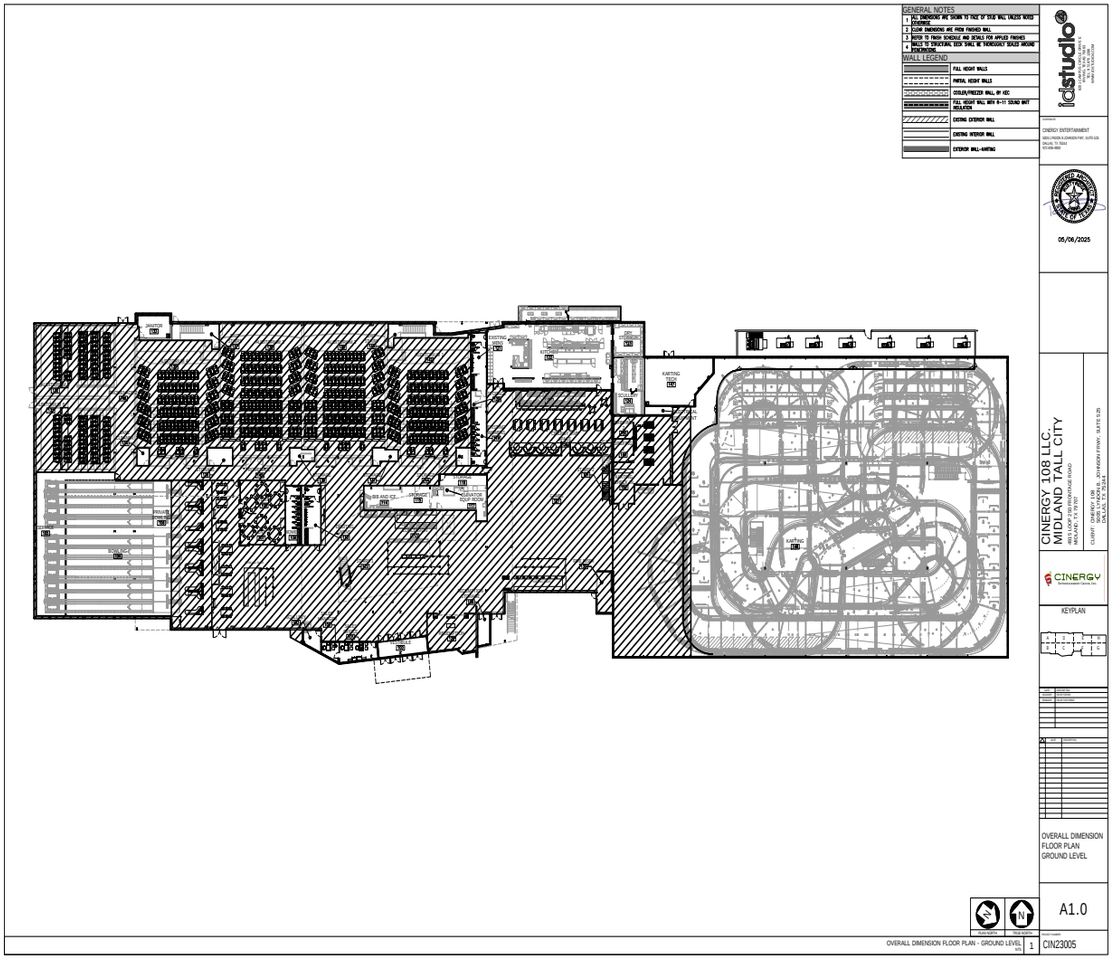
APPROVED AS TO CONTENT
AND COMPLETENESS:

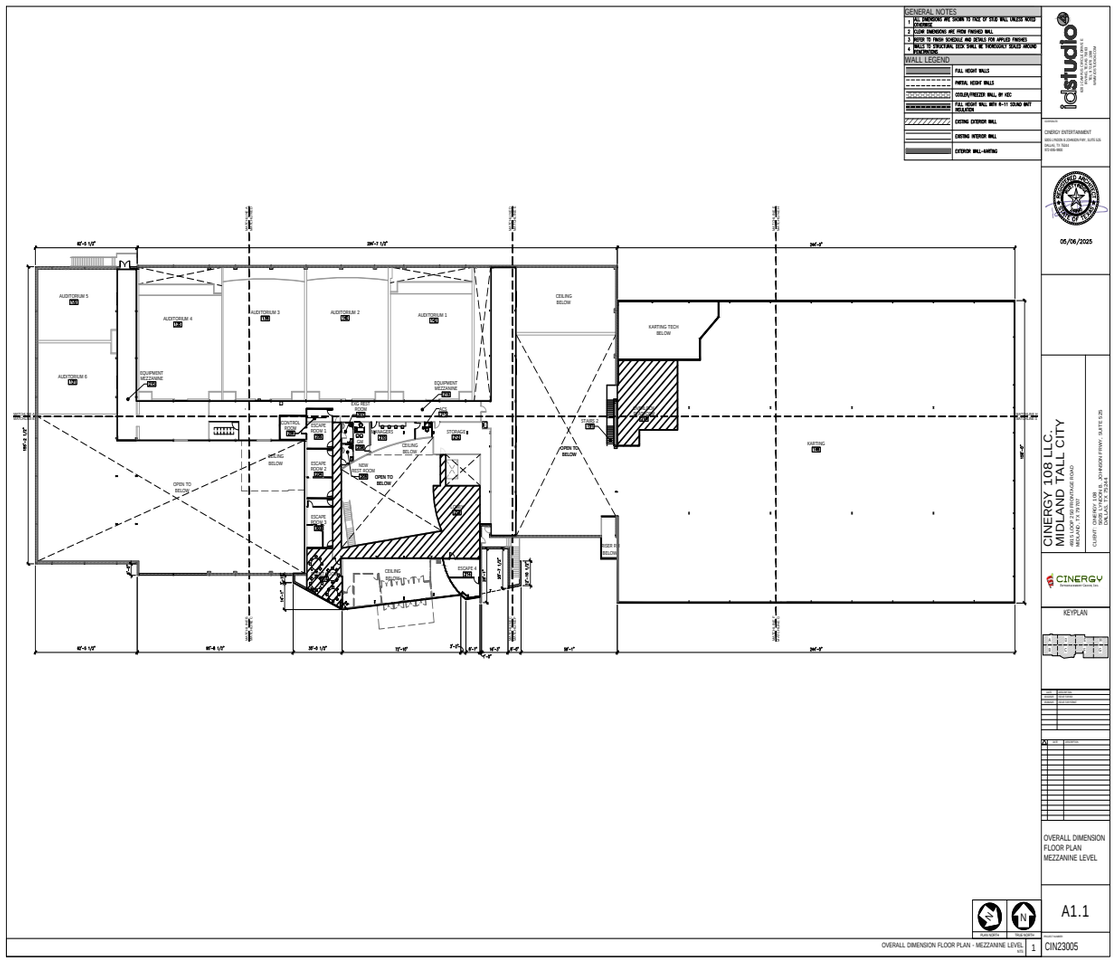
_____
Elizabeth Triggs, Planning and Development Officer

APPROVED ONLY AS TO FORM:

_____
Nicholas Toulet, Interim City Attorney

EXHIBIT A


GENERAL NOTES
1 ALL DIMENSIONS ARE GIVEN TO FACE OF FIELD WALL UNLESS NOTED OTHERWISE
2 FLOOR DIMENSIONS ARE FROM FINISHED WALL
3 REFER TO FINISH SCHEDULE AND DETAILS FOR APPLIED FINISHES
4 WALLS TO STRUCTURAL DECK SHALL BE "THOROUGHLY SEALED AROUND" PENETRATIONS
WALL LEGEND
FULL HEIGHT WALLS
PARTIAL HEIGHT WALLS
COOLER/FREEZER WALL, BY VDC
FULL HEIGHT WALL WITH R-11 SOUND MAT INSULATION
EXISTING EXTERIOR WALL
EXISTING INTERIOR WALL
EXTERIOR WALL-PAINTING
05/06/2025
CINERGY 108 LLC.
MIDLAND TALL CITY
4511 LOOP 250 MIDLAND, TX 79707
CLIENT: CINERGY - DFW
2001 BRYAN ST., SUITE 3, JOHNSON/FITWAY - SUITE 525
DALLAS, TX 75201
CINERGY
KEYPLAN
OVERALL DIMENSION
FLOOR PLAN
GROUND LEVEL
A1.0
CIN23005
OVERALL DIMENSION FLOOR PLAN - GROUND LEVEL
1


GENERAL NOTES
1 ALL DIMENSIONS ARE SHOWN TO FACE OF FINISH WALL UNLESS NOTED OTHERWISE
2 FLOOR DIMENSIONS ARE FROM FINISHED WALL
3 REFER TO FINISH SCHEDULE AND DETAILS FOR APPLIED FINISHES
4 WALLS TO STRUCTURAL DECK SHALL BE "THOROUGHLY SEALED AROUND PENETRATIONS"
WALL LEGEND
FULL HEIGHT WALLS
PARTIAL HEIGHT WALLS
COOLER/FREEZER WALL, BY VDC
FULL HEIGHT WALL WITH R-11 SOUND MAT INSULATION
EXISTING EXTERIOR WALL
EXISTING INTERIOR WALL
EXTERIOR WALL-PAINTING
AUDITORIUM 5
AUDITORIUM 4
AUDITORIUM 3
AUDITORIUM 2
AUDITORIUM 1
AUDITORIUM 6
CEILING BELOW
KARTING TECH BELOW
KARTING
EQUIPMENT MEZZANINE
OPEN TO BELOW
ESCAPE STAIR 1
ESCAPE STAIR 2
ESCAPE STAIR 3
ESCAPE STAIR 4
CLOSET
STORAGE
OFFICE
CONFERENCE
OVERALL DIMENSION FLOOR PLAN - MEZZANINE LEVEL
1/8" = 1'-0"
05/06/2025
CINERGY 108 LLC.
MIDLAND TALL CITY
4511 LOOP 250 MIDLAND, TX 79707
CLIENT: CINERGY 108
2711 N. HASKELL AVE., 2700 ENERGY PLAZA, SUITE 525
DALLAS, TX 75204
CINERGY
KEYPLAN
OVERALL DIMENSION FLOOR PLAN MEZZANINE LEVEL
A1.1
CIN23005

MIDLAND
Planning Division

Specific Use Designation with Term for the Sale of Alcoholic Beverages for On-Premises Consumption

Project Number: _____

Case Number: _____

Applicant *(if acting as Agent, see affidavit on page 2)* Printed Name: Cinergy 108, LLC		Phone (972) 895 9914 Email mtrammell@cinergy.com	
Address 5720 Lyndon B Johnson Fwy Ste 625	City Dallas	State TX	Zip 75240

Property Owner Printed Name: Cinergy 108, LLC		Phone (972)8959914 Email mtrammell@cinergy.com	
Address 5720 Lyndon B Johnson Fwy Ste 625	City Dallas	State TX	Zip 75240

Representative *(if different from Applicant or Property Owner)* Firm: Griffith & Hughes, PLLC Printed Name: Tana Kerss, Licensing Director		Phone (817)362-9648 Email tkerss@griffithhughes.com	
Address 2225 E Randol Mill Rd Ste 106	City Arlington	State TX	Zip 76011

Street Address: 4915 W Loop 250 N

Business Name: Cinergy Entertainment

Legal Description
Lot: 3 Block: 45 Subdivision: Fairmont Park Addition, Sec. 13

Current Zoning: RR

Reason for Request: Operation of family entertainment center, which will include movie theatre, arcade games, escape room, and food and beverage service

Type of Business *(restaurant, bar, lounge, nightclub, etc.)*: Theater, Restaurant, and Amusement

Proposed/Current Days and Hours of Operation: Sun-Thu: 10a-11p; Fri-Sat: 10a-12p

Proposed Days and Hours of Alcohol Service: Same

Total Square Footage of Business: 96397

Square Footage of Alcohol Serviceable Area: 50567

Restroom Fixtures:	*Men*	**Toilets/Urinals:** 6 / 14	**Bathroom Sinks:** 8
	Women	**Toilets:** 14	**Bathroom Sinks:** 8

Submittal and Fees

Items to be submitted with this application form:

- Application Fee – Payable to the 'City of Midland'
- Dimensioned Floor Plan showing:
  - Seating
  - Exits
  - Restrooms
  - Kitchen (if applicable)
  - Total Square Footage
  - Serviceable Square Footage
- Dimensioned Site Plan showing:
  - Parking
  - Business Footprint
- Digital Copies of Floor Plan & Site Plan (PDF/JPEG)

Signatures	
Applicant (signature):	Date:
Applicant (printed): Jeffrey P. Benson, Manager for Cinergy 108, LLC	
Property Owner (signature):	Date:
Property Owner (printed) : Jeffrey P. Benson, Manager for Cingery 108, LLC	

The Specific Use Designation with Term for the sale of all alcoholic beverages shall be considered officially received in the Planning office only when it has been submitted in full compliance with the provisions of Section 212 of the Texas Local Government Code and the Zoning Code of Ordinances of the City of Midland and when such required items for the application are also received.

All materials, including exhibits, submitted in support of an application, or displayed during a public hearing, shall remain the property of the City of Midland.

If an agent is authorized by the property owner to file and execute the application on behalf of the property owner, the agent must complete the affidavit below.

STATE OF TEXAS
COUNTY OF ~~MIDLAND~~ TARRANT

Before me, the undersigned authority, on this day personally appeared TANA KERSS who, being by me duly sworn, upon oath says: That (s)he is authorized by CINERGY 108 LLC, the owner of the above described property, to fully represent him/her in this application and that (s)he had the legal right, power and authority to sign said owner's name hereto as his/her attorney in fact.

Tana Kerss
Authorized Agent (*signature*)

Subscribed and sworn to before me, this 23rd day of July, 20 25, to certify which witness my hand and seal of office.

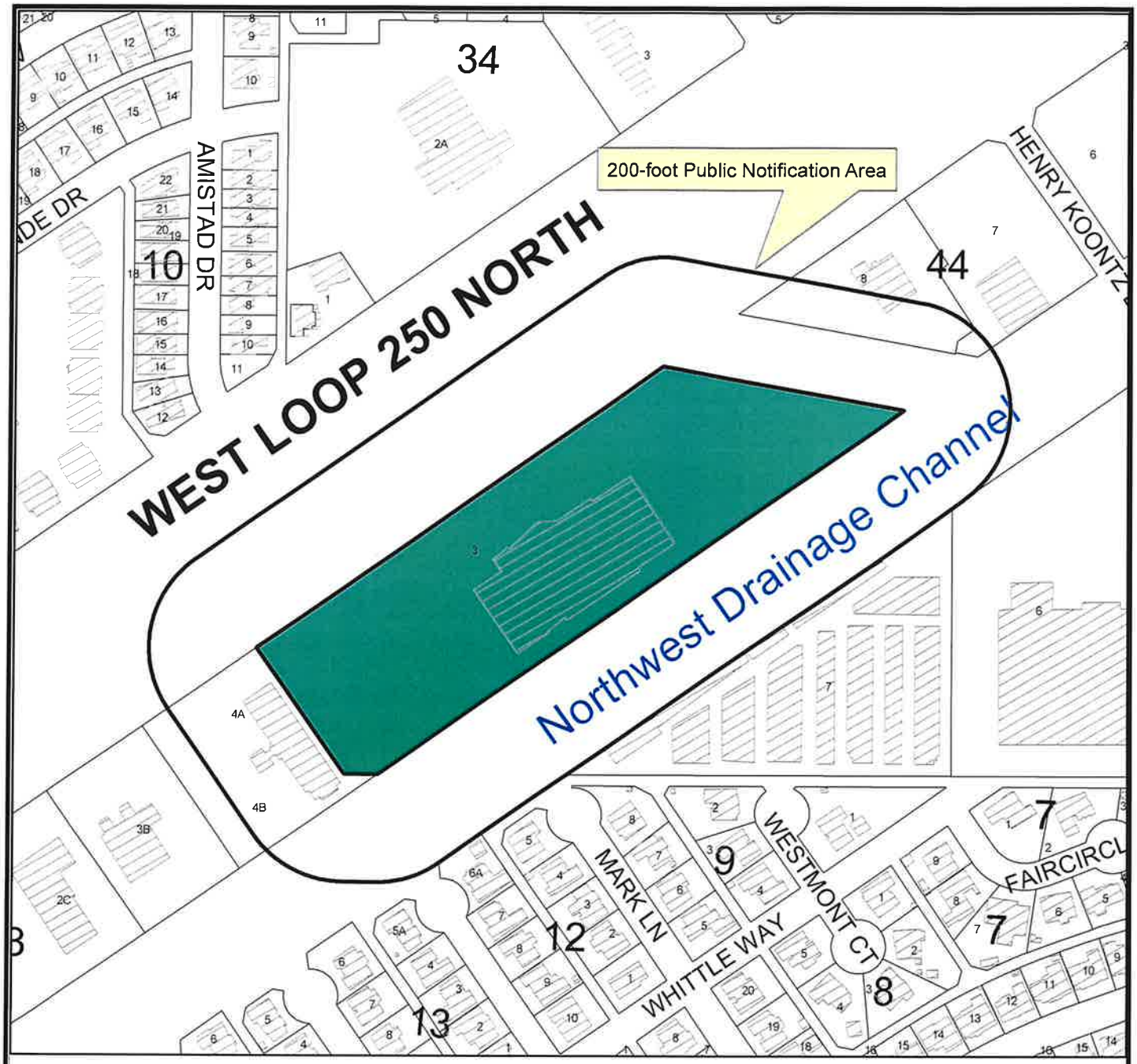
ED JENDRZEY
Notary Public, State of Texas
Comm. Expires 01-30-2029
Notary ID 135231964

NOTARY PUBLIC, ~~MIDLAND~~ XXXXXX COUNTY, TEXAS
TARRANT

****Application will not be considered for scheduling until reviewed by a planner.****

FOR OFFICE USE ONLY	
☐ Property Owner Authorization	☐ Dimensioned Floor Plan
☐ Application Fee	☐ Site Plan
Check #_____	☐ Plans in Digital Format (PDF/JPEG)
Received By:_____	Date:_____ RECEIVED JUL 29 2025

****Application will not be considered for scheduling until reviewed by a planner.****



Location Map

SUD-25-0207 **Scale: 1" = 263'**

Consider a request by Cinergy 108, LLC for a Specific Use Designation with Term for the Sale of all Alcoholic Beverages for on premises consumption in a movie theatre on Lot 3, Block 45, Fairmont Park Addition, Section 13, City and County of Midland, Texas.

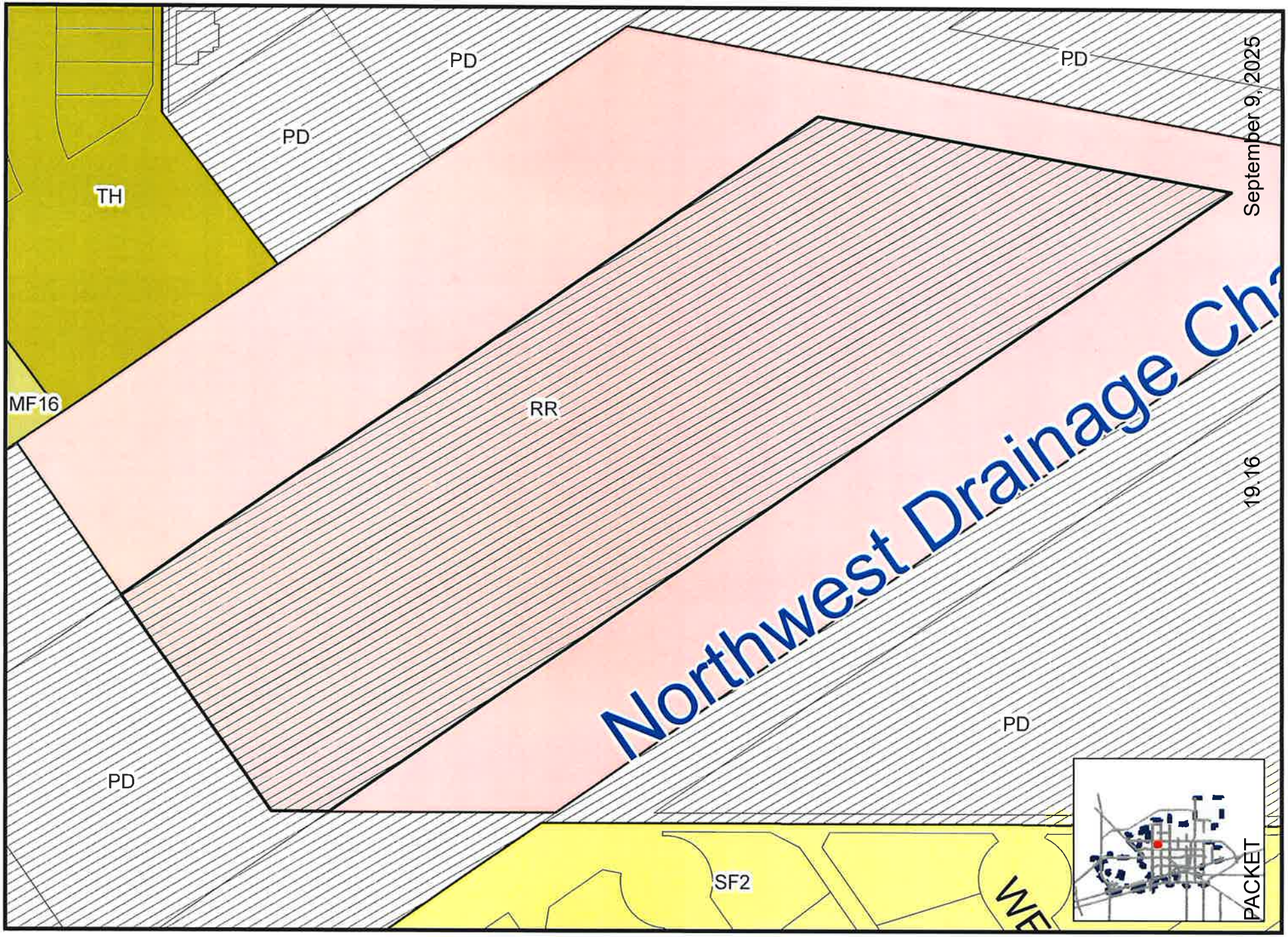
Generally located on the east side of West Loop 250 North, approximately 450 feet south of Henry Koontz Boulevard. (Council District 1)

LEGEND

- CITY LIMITS
- PARCEL
- PRIVATE BLDGS



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Map by

SUB-

Scale: 1" = 1,200'

ZONING MAP

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44
47

CINEMAS

GENERAL NOTES

WALL LEGEND

CINERGY 108 LLC.
MIDLAND TALL CITY

CLIENT CINERGY 108
9505 J YNDON B. JOHNSON FRWY, SUITE 525
DALLAS TX 75243

KEYPLAN

FLOOR PLAN
MEZZANINE LEVEL
OVERALL DIMENSION

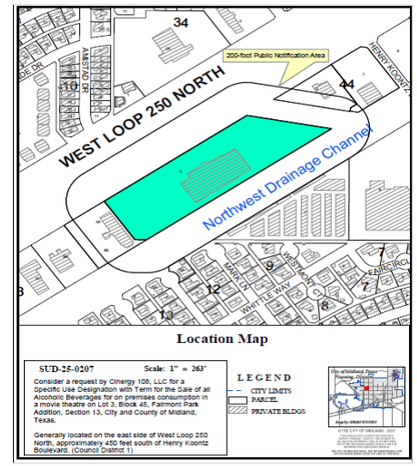
A1.1

idstudio


MIDLAND
Be the Energy!
ITEM
SPECIFIC USE DESIGNATION
CINERGY 108, LLC
Visit Our Website
MIDLANDTEXAS.GOV

APPLICATION SUMMARY

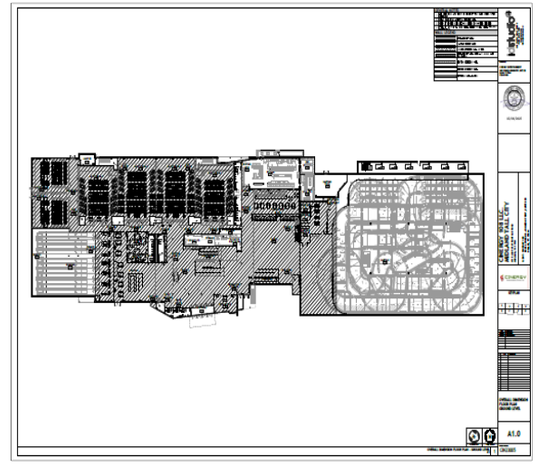
- **Applicant and Property Owner:** Cinergy 108, LLC
- **Location: 4915 West Loop 250 North** (Council District 2)
- **Reason for Request:** For the sale and on-premises consumption of alcohol



MIDLAND
Be the Energy!

DETAILS OF REQUEST

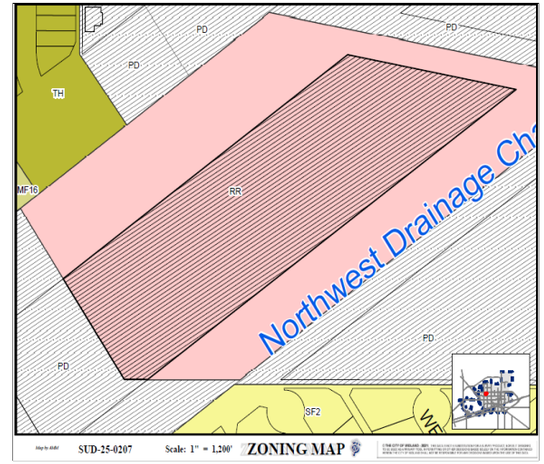
- For an existing movie theatre
- **Area of Business:** 96,397 SF
- **Serviceable Area:** 50,567 SF
- **Hours of Operation/Sales of Alcohol:**
  - Sunday to Thursday 10 a.m. to 11 p.m.
  - Friday to Saturday 10 a.m. to 12 a.m.



3

ZONING

- **Current Zoning**: PD, Planned Development District for a Shopping Center
- **Surrounding Zoning:**
  - **North:** PD, Planned Development District for a Shopping Center and TH, Townhouse Dwelling District
  - **East/West:** PD, Planned Development District for a Shopping Center
- The use of an SUD for the sale and on-premises consumption is allowed in this zoning.



MIDLAND
Be the Energy!

LAND USE

- **Current Use:** Vacant Building
- **Proposed Use:** Movie Theatre
- **Surrounding Uses:**
  - **North:** Retail and residential
  - **East/West:** Retail
  - **South:** Drainage easement, storage units, and residential



5

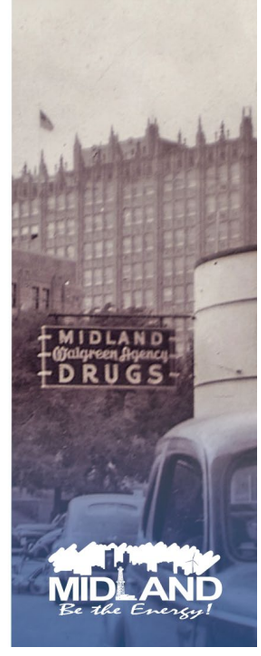


On West Loop 250 North, Looking South

6

COMPREHENSIVE PLAN

This request is compatible with the *Tall City Tomorrow Comprehensive Plan* as it is consistent *Chapter 6-Character Plan, Goal 4*, which is to “Encourage the development of places where Midland residents can gather and socialize to build connections.”



8

PROHIBITED PLACES OF BUSINESS

There is no church, public school, public school ground, athletic stadium used by any public school, or public hospital within 300 feet of the building of the subject property as required by *Section 5-4-4 Prohibited Places of Business.*



9

STAFF'S RECOMMENDATION

- No objections were received.
- The Planning & Zoning Commission recommended approval of this request on September 2, 2025.
- Staff recommends approval of this request with the following conditions:

A. That the serviceable area of the Establishment shall be limited to approximately 50,567 square feet as shown in Exhibit A, which is attached hereto and incorporated herein for all purpose.

11



STAFF'S RECOMMENDATION

B. That the sale and on-premises consumption of alcoholic beverages shall conform to all applicable state and local laws.

C. That the days and hours of alcoholic beverage sales and consumption shall be limited to the following: Sunday through Thursday from 10 a.m. to 11 p.m. Friday through Saturday from 10 a.m. to 12 a.m.

12



STAFF'S RECOMMENDATION

D. That the occupancy of the Establishment shall not exceed the maximum occupancy determined by the Building Code and Fire Code.

E. That the Establishment shall meet the requirements of the Fire Department and the Code Administration Division.

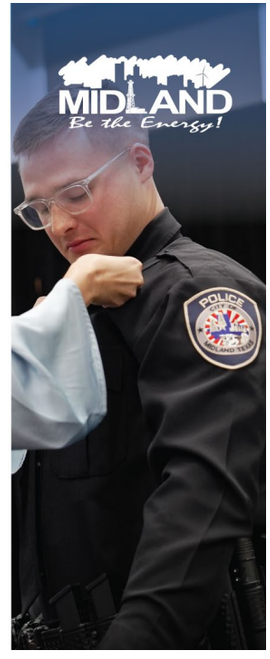


13

STAFF'S RECOMMENDATION

F. That the operator of the Establishment shall obtain a Certificate of Occupancy prior to the commencement of the sale of alcoholic beverages for on-premises consumption to ensure that the conditions of this Specific Use Designation With Term are satisfied.

G. That in accordance with Section 11-1-9.07.E.3 of the City Code, the Establishment shall be in operation within 120 days from the final adoption date of this ordinance



14


MISSION
Deliver exceptional services and promote a high quality of life and place for ALL our citizens.

City Council Meeting

Item Number: 20

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Angelina Bettanini, Planner

Subject: AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO REZONE LOT 8A, BLOCK 28, GREENWOOD ADDITION, SECTION 12, CITY AND COUNTY OF MIDLAND, TEXAS, FROM MF-22, MULTIPLE-FAMILY DWELLING DISTRICT TO SF-3, SINGLE-FAMILY DWELLING DISTRICT (GENERALLY LOCATED ON THE EAST SIDE OF SOUTH WEBSTER STREET, APPROXIMATELY 70 FEET SOUTH OF EAST NEW YORK AVENUE); CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION (DISTRICT 2) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)

Purpose:

Jorge Chavez is requesting a Zone Change from MF-22, Multiple-Family Dwelling District to SF-3, Single-Family Dwelling District for the construction of single-family housing on a property located at 603 South Webster Street.

Recommended City Council Action:

Approve

Fiscal Impact:

The request has no significant impact on the City’s budget.

Strategic Priority:

Quality of Life and Place

Discussion:

Current Zoning:

MF-22. Multiple-Family Dwelling District

Surrounding Zoning and Land Use:

The properties to the north, south, and west are all zoned MF-22, Multiple-Family Dwelling District, and consists of single-family housing. The properties to the east are zoned SF-3, Single-Family Dwelling District, and C, Commercial District, and consists of single-family housing and vacant lots.

Analysis:

The applicant is seeking this zone change in order to construct single-family housing, which is not allowed in the MF-22, Multiple-Family Dwelling District. This vacant lot is located in a residential neighborhood that is developed with single-family homes. Changing this zoning would help the future residential development of this area. This lot does meet the requirements for the SF-3, Single-Family Dwelling District. The property owner also has a plat in-process right now that will subdivide the property into two lots, both being 50 feet wide and approximately 140 feet deep which also meets the requirements of SF-3.

This request is consistent with the Tall City Tomorrow Comprehensive Plan, which designated this area as Urban Residential-Medium (UR-M). This designation calls for any single-family zoning district.

This proposed zone change has been circulated to the respective City departments for internal review and their comments, conditions, and requirements are as follows:

Fire: (Approved)

No comments or objections.

Oil and Gas: (Approved)

No Oil & Gas issues with Zoning.

Engineering: (Approved)

No objection to zone change. [For Applicant’s Information Only.]

Site drainage, utilities, driveway access, and traffic circulation may be adjusted during construction drawing review as necessary to receive building permit approval from Engineering and Traffic Operations. [For Applicant’s Information Only.]

Code: (Approved)

No issues. All future structures must adhere to the 2018 International Building Codes, the 2015 International Energy Code, the 2023 NEC requirements, the 2015 International Fire Codes, local city ordinances, zoning requirements, established setbacks, oil and gas considerations, and floodplain requirements if necessary. Code versions are subject to change depending on the time of new code editions adopted in the City of Midland and date of permit application.

Transportation: (Approved)

Site drainage, utilities, driveway access, and traffic circulation may be adjusted during construction drawing review as necessary to receive building permit approval from Engineering and Traffic Operations. [For the Applicant's information only.]

No objection to zone change. [For the Applicant's information only.]

Planning:

Therefore, staff recommends approval of this Zone Change from MF-22, Multiple-Family Dwelling District to SF-3, Single-Family Dwelling District.

Letters of Objection:

As of August 28, 2025, staff has received no letters of objection for this request.

Attachments:

Application
Maps
PowerPoint Presentation

City Manager's Office

ORDINANCE NO. _____

AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO REZONE LOT 8A, BLOCK 28, GREENWOOD ADDITION, SECTION 12, CITY AND COUNTY OF MIDLAND, TEXAS, FROM MF-22, MULTIPLE-FAMILY DWELLING DISTRICT TO SF-3, SINGLE-FAMILY DWELLING DISTRICT (GENERALLY LOCATED ON THE EAST SIDE OF SOUTH WEBSTER STREET, APPROXIMATELY 70 FEET SOUTH OF EAST NEW YORK AVENUE); CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION

WHEREAS, the City Planning and Zoning Commission and the Governing Body of the City of Midland, in compliance with the City Charter, the City Code, and State law, have given the requisite notices by United States mail, publication and otherwise; and after a full and fair hearing to all of the property owners generally and particularly to those interested persons situated in the affected area and in the vicinity thereof, the Governing Body finds that the public health, safety and general welfare will be best served by rezoning Lot 8A, Block 28, Greenwood Addition, Section 12, City and County of Midland, Texas (the "Property"), to SF-3, Single-Family Dwelling District, as set out hereinafter;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That the Zoning District Map of the City of Midland, Texas, is hereby amended to rezone the Property from MF-22, Multiple-Family Dwelling District to SF-3, Single-Family Dwelling District.

SECTION TWO. That the definitions given in the zoning regulations contained in the City Code of the City of Midland, Texas, shall be applicable to such of those terms as are used herein.

SECTION THREE. The provisions of this ordinance are to be cumulative of all other ordinances or parts of ordinances governing or regulating the same subject matter as that covered herein; provided, however, that all prior ordinances or parts of ordinances

inconsistent with or in conflict with any of the provisions of this ordinance are hereby expressly repealed to the extent of any such inconsistency or conflict.

SECTION FOUR. If any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional or invalid, such holding shall not affect the validity of the remaining portions of this ordinance. The Council of the City of Midland hereby declares that it would have passed this ordinance and each section, subsection, sentence, clause, or phrase hereof irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared unconstitutional or invalid.

SECTION FIVE. The penalty for violation of this ordinance shall be in accordance with the general penalty provisions contained in Section 1-3-1 of the City Code of Midland, Texas, which provides for a fine not exceeding two thousand dollars ($2,000.00).

SECTION SIX. The City Secretary is hereby authorized and directed to publish the descriptive caption of this ordinance in the manner and for the length of time prescribed by the law as an alternative method of publication.

The above and foregoing ordinance was duly proposed, read in full and adopted on first reading, the _____ day of _____, A.D., 2025; and passed to second reading on motion of Council member _____, seconded by Council member _____, by the following vote:

Council members voting "AYE":

Council members voting "NAY":

The above and foregoing ordinance was read in full and finally adopted by the following vote upon motion of Council member _____, seconded by Council member _____, on the _____ day of _____, A.D., 2025, at a regular meeting of the City Council:

Council members voting "AYE":

Council members voting "NAY":

PASSED AND APPROVED THIS _____ day of _____, A.D., 2025.

_____
Lori Merritt Blong, Mayor

ATTEST:

_____
Marcia Bentley-German, City Secretary

APPROVED AS TO CONTENT
AND COMPLETENESS:

_____
Elizabeth Triggs, Planning and Development Officer

APPROVED ONLY AS TO FORM:

_____
Nicholas Toulet, Interim City Attorney

MIDLAND
Planning Division

Zone Change/Planned District Amendment/Site Plan Approval

Project Number: _____

Case Number: _____

Applicant *(if acting as Agent, see affidavit on page 2)* Printed Name:		Phone ( ) Email	
Address	City	State	Zip

Property Owner Printed Name: Jorge Chavez		Phone (432) 889-7005 Email jjchavez26@gmail.com	
Address 704 S Loraine St	City Midland	State Tx	Zip 79701

Representative *(if different from Applicant or Property Owner)* Firm: _____ Printed Name:		Phone ( ) Email	
Address	City	State	Zip

Street Address: 603 S. Webster

Legal Description
Lot: 8A Block: 28 Subdivision: Greenwood addn Section 12

Current Zoning: MF 22

Proposed Zone: SF3
(List by tracts if more than one district is requested)

Reason for Zone Change Request: New House

Present Use of Property: Vacant

Proposed Use of Property: New House - Residential

How would this zone change affect the public health, safety and welfare? NA

Describe how conditions affecting the property have changed since present zoning designation: NA

Submittal and Fees
Items to be submitted with this application form:

- Application Fee – Payable to the 'City of Midland'
- Dimensioned Site Plan
- Digital Copies of Site Plan (PDF/JPEG)

Signature *(by property owner only – authorized agent must sign affidavit below)*	
Applicant (signature):	Date:
Applicant (printed):	
Property Owner (signature): x Jorge Chavez	Date: 7-24-25
Property Owner (printed) : Jorge Chavez	

The Zone Change/Planned District Amendment/Site Plan Approval shall be considered officially received in the Planning office only when it has been submitted in full compliance with the provisions of Section 212 of the Texas Local Government Code and the Zoning Code of Ordinances of the City of Midland and when such required items for the application are also received.

All materials, including exhibits, submitted in support of an application, or displayed during a public hearing, shall remain the property of the City of Midland.

STATE OF TEXAS
COUNTY OF MIDLAND

Before me, the undersigned authority, on this day personally appear Ed Alemán who, being by me duly sworn, upon oath says: That (s)he is the owner of _____ or authorized by Jorge Chavez, the owner of the above described property, to fully represent him/her in this application and that (s)he had the legal right, power and authority to sign said owner's name hereto as his/her attorney in fact.

GENESIS MELODY GUEVARA
Notary ID #135161214
My Commission Expires
November 7, 2028

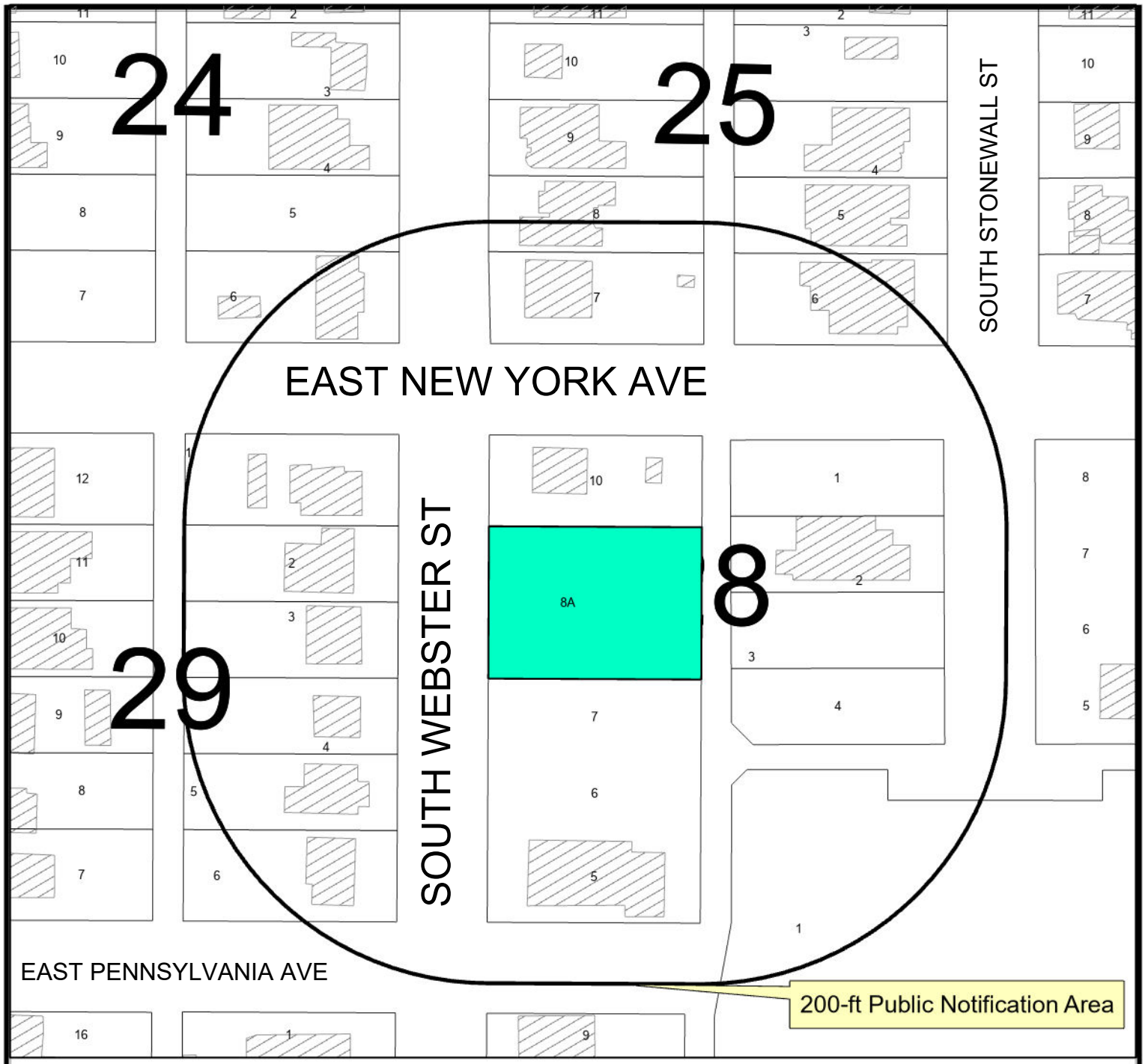
Eduardo Y Alemán
Authorized Agent (*signature*)

Subscribed and sworn to before me, this 24th day of July, 2025 to certify which witness my hand and seal of office.

NOTARY PUBLIC, MIDLAND COUNTY, TEXAS

FOR OFFICE USE ONLY	
☑ Property Owner Authorization	☑ Dimensioned Site Plan
☑ Application Fee	☑ Plans in Digital Format (PDF/JPEG)
Check # 2332	RECEIVED
Received By:	Date: JUL 29 2025
	Initial:

****Application will not be considered for scheduling until reviewed by a planner.****



Location Map

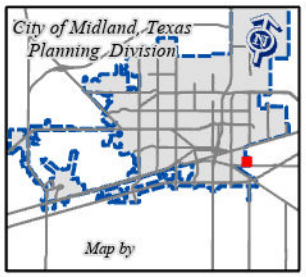
Z-25-0436 **1 in = 37'**

Consider a request by Jorge Chavez for a Zone Change from MF-22, Multiple-Family Dwelling District, to SF-3, Single-Family Dwelling District, on Lot 8A, Block 28, Greenwood Addition, Section 12, City and County of Midland, Texas.

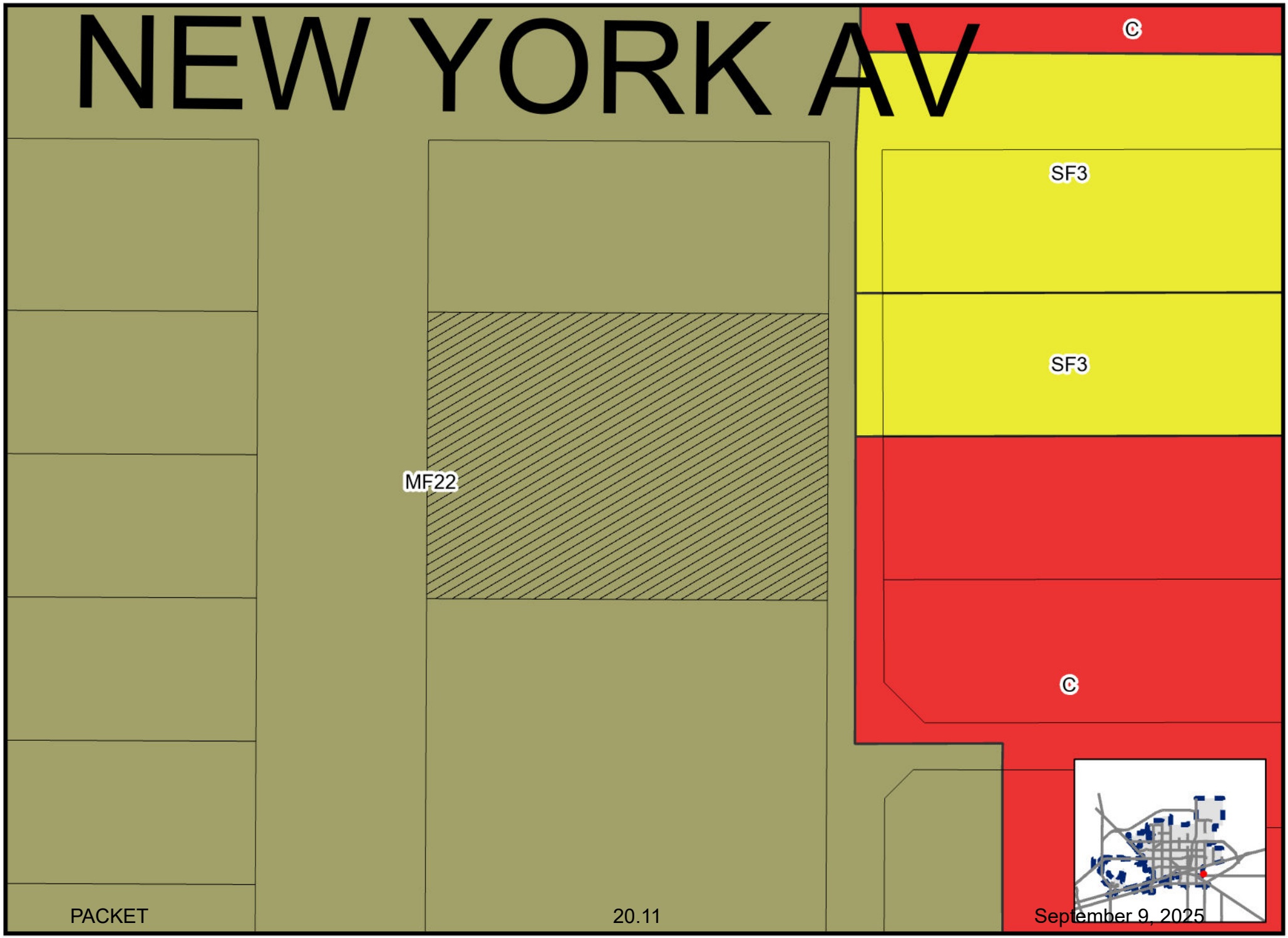
Generally located on the east side of South Webster Street, approximately 70 feet south of East New York Avenue (Council District 2)

LEGEND

- CITY LIMITS
- PARCEL
- PRIVATE BLDGS



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THE CITY OF MIDLAND SHALL NOT BE RESPONSIBLE FOR ANY DECISIONS BASED UPON THE USE OF THIS DATA.



PACKET 20.11 September 9, 2025

Map by Z-25-0436 1 in = 17'

ZONING MAP

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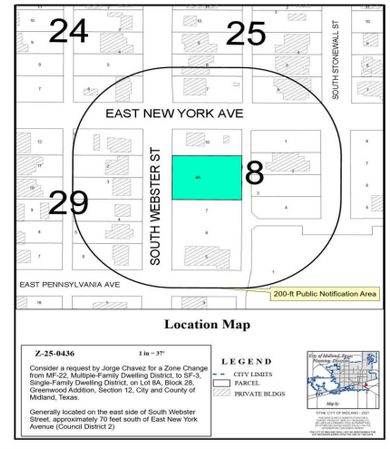

EAST NEW YORK AVENUE
SOUTH WEBSTER STREET




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ZONE CHANGE
603 SOUTH WEBSTER STREET
Visit Our Website
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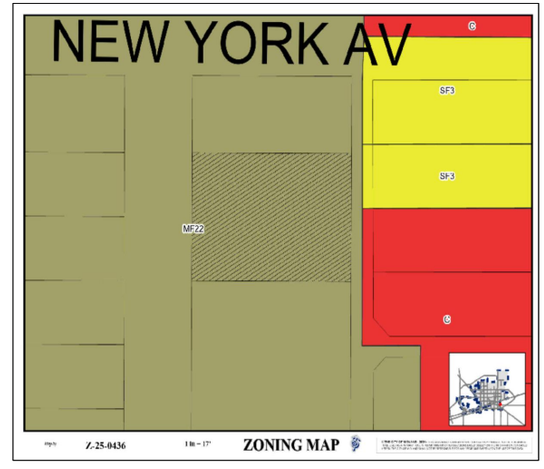
APPLICATION SUMMARY

- **Applicant/Property Owner:** Jorge Chavez
- **Location:** 603 South Webster Street (Council District 2)
- **Reason for Request:** To construct a single-family dwelling



ZONING

- **Current Zoning:** MF-22, Multiple-Family Dwelling District
- **Surrounding Zoning:**
  - **North/South/West:** MF-22, Multiple-Family Dwelling District
  - **East:** SF-3, Single-Family Dwelling District and C, Commercial District
- **Proposed Zoning:** SF-3, Single-Family Dwelling District



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LAND USE

- **Current Use:** Vacant
- **Surrounding Uses**
  - **North/South/West:** Single-Family Housing
  - **East:** Single-Family Housing and Vacant Lots
    Proposed Use: Single-Family Dwelling



4

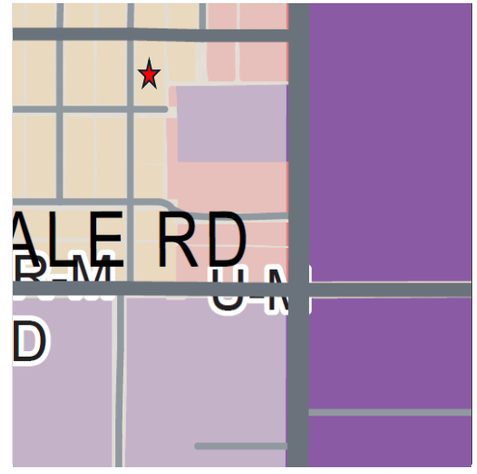


On South Webster Street, Looking East

5

COMPREHENSIVE PLAN

- **Land Use Designation:** Urban Residential-Medium (UR-M)
- **Supported Uses:** Restrictive land use, emphasizing a mix of housing styles including single-family detached, single-family attached, and townhouses.
- The request is compatible with the *Tall City Tomorrow Comprehensive Plan.*



6

RELATED ITEMS

- In addition to the zone change request, the property is currently being platted.



7

STAFF'S RECOMMENDATION

- No objections were received.
- The Planning and Zoning Commission recommended approval of this request on September 2, 2025.
- Staff recommends approval of this request.



8


MISSION
Deliver exceptional services and promote a high quality of life and place for ALL our citizens.

City Council Meeting

Item Number: 21

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Angelina Bettanini, Planner

Subject: AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO REZONE LOTS 1 THROUGH 6, BLOCK 6, QUAIL RIDGE ADDITION, SECTION 5, CITY AND COUNTY OF MIDLAND, TEXAS, FROM PD, PLANNED DEVELOPMENT DISTRICT FOR A HOUSING DEVELOPMENT TO AN AMENDED PD, PLANNED DEVELOPMENT DISTRICT FOR A HOUSING DEVELOPMENT (GENERALLY LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF BEACHWOOD STREET AND CHAPARRAL STREET); CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION (DISTRICT 2) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)

Purpose:

Maverick Engineering is requesting a Zone Change from PD, Planned Development District for Housing Development to an amended PD, Planned Development District for a Housing Development to remove an easement from original site plan. One of the properties on which the easement is located is 914 Chaparral Street.

Recommended City Council Action:

Approve

Fiscal Impact:

None

Strategic Priority:

Quality of Life and Place

Discussion:

Current Zoning:

PD, Planned Development District for a Housing Development

Surrounding Zoning and Land Use:

All surrounding zoning is PD, Planned Development District for a Housing Development and surrounding uses consist of single-family housing.

Analysis:

The subject property is zoned PD, Planned Development District for a Housing Development. Maverick Engineering is seeking this zone change in order to amend the current Planned Development District by removing an easement. The applicant plans to build single-family housing. The current PD has an established site plan that the property must significantly conform to. In order to change the site plan, the PD has to be amended to no longer show the existing easement. This area has been developed into a residential neighborhood and the applicant plans to develop single family housing.

This request is consistent with the Tall City Tomorrow Comprehensive Plan, Chapter 3; which designated this area as Urban Medium (U-M). This designation calls for a mix of residential use, schools, churches, and low-dense commercial.

This proposed zone change has been circulated to the respective City departments for internal review and their comments, conditions, and requirements are as follows:

Fire: (Approved)

No comments or objections.

Oil and Gas: (Approved)

No Oil & Gas issues with Zoning.

Engineering: (Approved)

No objections to zone change. [For Applicant’s Information Only.]

Site drainage, utilities, driveway access, and traffic circulation may be adjusted during construction drawing review as necessary to receive building permit approval from Engineering and Traffic Operations. [For Applicant’s Information Only.]

Code: (Approved)

No issues. All future structures must adhere to the 2018 International Building Codes, the 2015 International Energy Code, the 2023 NEC requirements, the 2015 International Fire Codes, local city ordinances, zoning requirements, established setbacks, oil and gas considerations, and floodplain requirements if necessary. Code versions are subject to change depending on the time of new code editions adopted in the City of Midland and date of permit application.

Transportation: (Approved)

Site drainage, utilities, driveway access, and traffic circulation may be adjusted during construction drawing review as necessary to receive building permit approval from Engineering and Traffic Operations. [For the Applicant's information only.]

No objection to zone change. [For the Applicant's information only.]

Planning: (Approved with Conditions)

Therefore, staff recommends approval of this Zone Change from PD, Planned Development District for a Housing Development to amendment PD, Planned Development District for a Housing Development subject to the following conditions:

Conditions:

A. **That the Property shall significantly conform to the site plan attached hereto as Exhibit A; provided, however, that the building footprints shown on the site plan shall be considered illustrative.**

B. **That the minimum front yard setback shall be 15 feet.**

C. **That a minimum of two off-street parking spaces shall be provided on each lot.**

D. **That Ordinance No. 9732 shall remain in full force and effect except to the extent that it is superseded by this ordinance.**

Letters of Objection:

As of August 28, 2025, staff has received no letters of objection for this request.

Attachments:

Application
Site Plan (Exhibit A)
Maps
Aerial
Ordinance 9732

ORDINANCE NO. _____

AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO REZONE LOTS 1 THROUGH 6, BLOCK 6, QUAIL RIDGE ADDITION, SECTION 5, CITY AND COUNTY OF MIDLAND, TEXAS, FROM PD, PLANNED DEVELOPMENT DISTRICT FOR A HOUSING DEVELOPMENT TO AN AMENDED PD, PLANNED DEVELOPMENT DISTRICT FOR A HOUSING DEVELOPMENT (GENERALLY LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF BEACHWOOD STREET AND CHAPARRAL STREET); CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION

WHEREAS, the City Planning and Zoning Commission and the Governing Body of the City of Midland, in compliance with the City Charter, the City Code, and State law, have given the requisite notices by United States mail, publication and otherwise; and after a full and fair hearing to all of the property owners generally and particularly to those interested persons situated in the affected area and in the vicinity thereof, the Governing Body finds that the public health, safety and general welfare will be best served by rezoning Lots 1 through 6, Block 6, Quail Ridge Addition, Section 5, City and County of Midland, Texas (the "Property"), to an amended PD, Planned Development District for a Housing Development and adopting a site plan therefor, as set out hereinafter;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That the Zoning District Map of the City of Midland, Texas, is hereby amended to rezone the Property from PD, Planned Development District for a Housing Development to an amended PD, Planned Development District for a Housing Development.

SECTION TWO. That the base zoning district to which the use and development of the Property shall conform, except as modified by Section Three of this ordinance, is the SF-3, Single-Family Dwelling District.

SECTION THREE. That a site plan, which is attached hereto as Exhibit A and incorporated herein for all purposes, is hereby adopted, and the use and development of the Property shall be subject to the following conditions and restrictions:

A. That the Property shall significantly conform to the site plan attached hereto as Exhibit A; provided, however, that the building footprints shown on the site plan shall be considered illustrative.

B. That the minimum front yard setback shall be 15 feet.

C. That a minimum of two off-street parking spaces shall be provided on each lot.

D. That Ordinance No. 9732 shall remain in full force and effect except to the extent that it is superseded by this ordinance.

SECTION FOUR. That the definitions given in the zoning regulations contained in the City Code of the City of Midland, Texas, shall be applicable to such of those terms as are used herein.

SECTION FIVE. The provisions of this ordinance are to be cumulative of all other ordinances or parts of ordinances governing or regulating the same subject matter as that covered herein; provided, however, that all prior ordinances or parts of ordinances inconsistent with or in conflict with any of the provisions of this ordinance are hereby expressly repealed to the extent of any such inconsistency or conflict.

SECTION SIX. If any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional or invalid, such holding shall not affect the validity of the remaining portions of this ordinance. The Council of the City of Midland hereby declares that it would have passed this ordinance and each section, subsection, sentence, clause, or phrase hereof irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared unconstitutional or invalid.

SECTION SEVEN. The penalty for violation of this ordinance shall be in accordance with the general penalty provisions contained in Section 1-3-1 of the City Code of Midland, Texas, which provides for a fine not exceeding two thousand dollars ($2,000.00).

SECTION EIGHT. The City Secretary is hereby authorized and directed to publish the descriptive caption of this ordinance in the manner and for the length of time prescribed by the law as an alternative method of publication.

The above and foregoing ordinance was duly proposed, read in full and adopted on first reading, the _____ day of _____, A.D., 2025; and passed to second reading on motion of Council member _____, seconded by Council member _____, by the following vote:

Council members voting "AYE":

Council members voting "NAY":

The above and foregoing ordinance was read in full and finally adopted by the following vote upon motion of Council member _____, seconded by Council member _____, on the _____ day of _____, A.D., 2025, at a regular meeting of the City Council:

Council members voting "AYE":

Council members voting "NAY":

PASSED AND APPROVED THIS _____ day of _____, A.D., 2025.

_____
Lori Merritt Blong, Mayor

ATTEST:

_____
Marcia Bentley-German, City Secretary

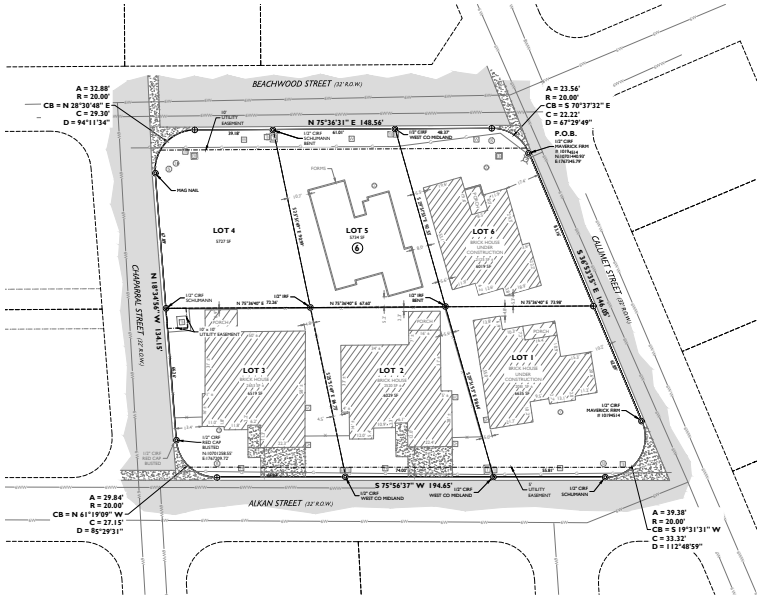
APPROVED AS TO CONTENT
AND COMPLETENESS:

_____
Elizabeth Triggs, Planning and Development Officer

APPROVED ONLY AS TO FORM:

_____
Nicholas Toulet, Interim City Attorney

EXHIBIT A



DEVELOPMENT NOTES:

1. SELLING A PORTION OF THIS ADDITION BY METES AND BOUNDS MAY BE A VIOLATION OF CITY ORDINANCE AND STATE LAW AND SUBJECT TO FINES AND WITHHOLDING OF UTILITIES AND BUILDING PERMITS.
2. APPROVAL OF A SITE PLAN BY THE CITY OF MIDLAND MAY BE REQUIRED BEFORE THE DEVELOPMENT OF ANY LOT AND BEFORE A BUILDING PERMIT MAY BE OBTAINED.

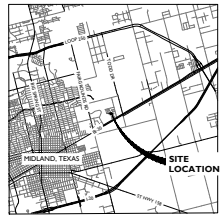
FEMA NOTE

FLOOD STATEMENT: ACCORDING TO FEMA'S NATUP FLOOD INSURANCE RATE MAP #48329C0615E DATED DECEMBER 18, 2012, THIS PROPERTY IS WITHIN THE UNSHADED AREA(S) OF ZONE "X" DESIGNATED AS "AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN."

THIS FLOOD STATEMENT DOES NOT IMPLY THAT THE PROPERTY AND/OR THE STRUCTURES THEREON WILL BE FREE FROM FLOODING OR FLOOD DAMAGE. ON RARE OCCASIONS, GREATER FLOODS CAN AND WILL OCCUR AND FLOOD HEIGHTS MAY BE INCREASED BY MAN-MADE OR NATURAL CAUSES. THIS STATEMENT SHALL NOT CREATE LIABILITY ON THE PART OF MAVERICK CIVIL & SURVEY, LLC.

SURVEY NOTES:

1. BASIS OF BEARING, COORDINATES, DISTANCE AND ACREAGE ARE A LAMBERT CONICAL PROJECTION OF THE TEXAS COORDINATE SYSTEM, STATE PLANE GRID, CENTRAL ZONE, NAD 83, U.S. SURVEY FOOT WITH A CONVERGENCE ANGLE (Gamma) OF -0°34'48.40" AND A COMBINED SCALE FACTOR OF 0.99988411 AT IVO "MIDLAND".
2. SEE DOCUMENTS OR ELECTRONIC DATA FILED IN THE OFFICE OF MAVERICK ENGINEERING FOR COMPLETE RECONSTRUCTION OF THIS SURVEY.
3. LOCATION OF BURIED UTILITIES AND PIPELINES, IF ANY, IS APPROXIMATE BASED UPON OBSERVED EXISTING SIGNAGE, CITY OF MIDLAND GIS AND VISUAL EVIDENCE, OR BY ONE-CALL 811 SITE MARKINGS AT THE TIME OF THIS SURVEY. DUE CARE IS RECOMMENDED. CALL 1-800-DIG-TESS FOR LOCATES PRIOR TO ANY CONSTRUCTION OR EXCAVATION.
4. THIS PLAT IS SOLELY FOR THE ABANDONMENT OF THE 20' UTILITY EASEMENT, VOL. 772, PG. 34, DIRECT ALONG EAST WEST LOT LINE BETWEEN LOTS 1, 2 & 3 AND 4, 5 & 6 AS SHOWN ON QUAIL RIDGE ADDITION, SECTION 3.



VICINITY MAP

N.T.S.



ORIGINAL SCALE: 1" = 20'

LEGEND

- FOUND MONUMENT AS NOTED
- "•" IN CONCRETE
- A/C PAD
- CLEAN OUT
- ELECTRIC BOX
- FIRE HYDRANT
- GAS METER
- TELECOM BOX
- TRANSFORMER PAD
- WATER METER
- SIGN
- STOP SIGN

- BOUNDARY LINE
- PROPERTY LINES
- EASEMENT LINE
- WOOD FENCE
- GAS LINE
- 4" WASTEWATER
- 8" WASTEWATER
- 6" WATER MAIN
- CONCRETE
- PAVEMENT
- BUILDING

O.P.R.M.C.T. OFFICIAL PUBLIC RECORDS, MIDLAND CO., TX
P.R.M.C.T. PLAT RECORDS, MIDLAND CO., TX
D.R.M.C.T. DEED RECORDS, MIDLAND CO., TX

MAVERICK
CIVIL ENGINEERING / LAND SURVEYING
1909 West Wall Street, Suite "K"
Midland, Texas 79701
ENGINEER FIRM #: F-15089
SURVEY FIRM #: 10194514
Tel: (432) 262-0999 Fax: (432) 262-0989
www.Maverick-Eng.com

MIDLAND
Planning Division

Zone Change/Planned District Amendment/Site Plan Approval

Project Number: _____

Case Number: _____

Applicant *(if acting as Agent, see affidavit on page 2)* Printed Name: SEE OWNER		Phone ( ) Email	
Address	City	State	Zip
Property Owner Printed Name: JOSE MANUEL JACQUEZ AND CRISTAL VANNESA JACQUEZ		Phone ( ) Email	
Address 2611 ALKAN STREET	City MIDLAND	State TX	Zip 79706
Representative *(if different from Applicant or Property Owner)* Firm: MAVERICK ENGINEERING Printed Name: ANDREW MELLEN		Phone (432) 262-0999 Email amellen@maverick-eng.com	
Address 1909 W WALL STREET SUITE K	City MIDLAND	State TX	Zip 79701

Street Address:

Legal Description
Lot: 1-6 Block: 6 Subdivision: QUAIL RIDGE ADDITION SECTION 5

Current Zoning:
PD

Proposed Zone: PD
(List by tracts if more than one district is requested)

Reason for Zone Change Request: UPDATING PD TO REMOVE EASEMENT

Present Use of Property: RESIDENTIAL

Proposed Use of Property: RESIDENTIAL

How would this zone change affect the public health, safety and welfare? NO AFFECT

Describe how conditions affecting the property have changed since present zoning designation: NO CHANGE

Submittal and Fees
Items to be submitted with this application form:

- Application Fee – Payable to the 'City of Midland'
- Dimensioned Site Plan
- Digital Copies of Site Plan (PDF/JPEG)

Signature *(by property owner only – authorized agent must sign affidavit below)*	
Applicant (signature):	Date: 7-31-25
Applicant (printed): Jose Jacquez	
Property Owner (signature):	Date: 7-31-25
Property Owner (printed): Jose Jacquez	

The Zone Change/Planned District Amendment/Site Plan Approval shall be considered officially received in the Planning office only when it has been submitted in full compliance with the provisions of Section 212 of the Texas Local Government Code and the Zoning Code of Ordinances of the City of Midland and when such required items for the application are also received.

All materials, including exhibits, submitted in support of an application, or displayed during a public hearing, shall remain the property of the City of Midland.

STATE OF TEXAS
COUNTY OF MIDLAND

Before me, the undersigned authority, on this day personally appear Andrew Melka who, being by me duly sworn, upon oath says: That (s)he is the owner of _____ or authorized by Jose and Cristal Jacquez, the owner of the above described property, to fully represent him/her in this application and that (s)he had the legal right, power and authority to sign said owner's name hereto as his/her attorney in fact.

Andrew L. Melka
Authorized Agent (*signature*)

Subscribed and sworn to before me, this 4th day of August, 2025, to certify which witness my hand and seal of office.

SAVANNAH DAVIS
Notary Public, State of Texas
Comm. Expires 05-20-2028
Notary ID 134907724

NOTARY PUBLIC, MIDLAND COUNTY, TEXAS

FOR OFFICE USE ONLY

☑ Property Owner Authorization	☑ Dimensioned Site Plan
☑ Application Fee	☑ Plans in Digital Format (PDF/JPEG)
Check # 5501	
Received By:	Date: RECEIVED AUG 06 2025
	Initial:

****Application will not be considered for scheduling until reviewed by a planner.****

MIDLAND Planning Division

Zone Change/Planned District Amendment/Site Plan Approval

Project Number: _____

Case Number: _____

Applicant *(if acting as Agent, see affidavit on page 2)* Printed Name: SEE OWNER		Phone ( ) Email	
Address	City	State	Zip

Property Owner Printed Name: CONSULTORA QUANTUM LLC		Phone ( ) Email	
Address 282 ED ENGLISH DR UNIT A	City SHENANDOAH	State TX	Zip 77385

Representative *(if different from Applicant or Property Owner)* Firm: MAVERICK ENGINEERING Printed Name: ANDREW MELLEN		Phone (432) 262-0999 Email amellen@maverick-eng.com	
Address 1909 W WALL STREET SUITE K	City MIDLAND	State TX	Zip 79701

Street Address:

Legal Description
Lot: 1-6 Block: 6 Subdivision: QUAIL RIDGE ADDITION SECTION 5

Current Zoning: PD	**Proposed Zone:** PD *(List by tracts if more than one district is requested)*

Reason for Zone Change Request: UPDATING PD TO REMOVE EASEMENT

Present Use of Property: RESIDENTIAL

Proposed Use of Property: RESIDENTIAL

How would this zone change affect the public health, safety and welfare? NO AFFECT

Describe how conditions affecting the property have changed since present zoning designation: NO CHANGE

Submittal and Fees
Items to be submitted with this application form:

- Application Fee – Payable to the 'City of Midland'
- Dimensioned Site Plan
- Digital Copies of Site Plan (PDF/JPEG)

Signature *(by property owner only – authorized agent must sign affidavit below)*	
Applicant (signature):	Date:
Applicant (printed):	
Property Owner (signature):	Date: 8/4/25
Property Owner (printed) : Cristian Uriel Natero	

The Zone Change/Planned District Amendment/Site Plan Approval shall be considered officially received in the Planning office only when it has been submitted in full compliance with the provisions of Section 212 of the Texas Local Government Code and the Zoning Code of Ordinances of the City of Midland and when such required items for the application are also received.

All materials, including exhibits, submitted in support of an application, or displayed during a public hearing, shall remain the property of the City of Midland.

STATE OF TEXAS
COUNTY OF MIDLAND

Before me, the undersigned authority, on this day personally appear Andrew Mellen who, being by me duly sworn, upon oath says: That (s)he is the owner of Consultora Quantum LLC or authorized by _____, the owner of the above described property, to fully represent him/her in this application and that (s)he had the legal right, power and authority to sign said owner's name hereto as his/her attorney in fact.

Andrew K. Mellen
Authorized Agent (*signature*)

Subscribed and sworn to before me, this 4th day of August, 2025, to certify which witness my hand and seal of office.

SAVANNAH DAVIS
Notary Public, State of Texas
Comm. Expires 05-20-2028
Notary ID 134907724

NOTARY PUBLIC, MIDLAND COUNTY, TEXAS

FOR OFFICE USE ONLY

☑ Property Owner Authorization	☑ Dimensioned Site Plan
☑ Application Fee	☑ Plans in Digital Format (PDF/JPEG)
Check # 5501	
Received By:	Date: RECEIVED AUG 06 2025
	Initial:

****Application will not be considered for scheduling until reviewed by a planner.****

MIDLAND Planning Division

Zone Change/Planned District Amendment/Site Plan Approval

Project Number: _____

Case Number: _____

Applicant *(if acting as Agent, see affidavit on page 2)* Printed Name: SEE OWNER		Phone ( ) Email	
Address	City	State	Zip
Property Owner Printed Name: SARA PIPKIN		Phone ( ) Email	
Address 2609 ALKAN STREET	City MIDLAND	State TX	Zip 79706
Representative *(if different from Applicant or Property Owner)* Firm: MAVERICK ENGINEERING Printed Name: ANDREW MELLEN		Phone (432) 262-0999 Email amellen@maverick-eng.com	
Address 1909 W WALL STREET SUITE K	City MIDLAND	State TX	Zip 79701

Street Address:

Legal Description
Lot: 1-6 Block: 6 Subdivision: QUAIL RIDGE ADDITION SECTION 5

Current Zoning: PD	**Proposed Zone:** PD *(List by tracts if more than one district is requested)*

Reason for Zone Change Request: UPDATING PD TO REMOVE EASEMENT

Present Use of Property: RESIDENTIAL

Proposed Use of Property: RESIDENTIAL

How would this zone change affect the public health, safety and welfare? NO AFFECT

Describe how conditions affecting the property have changed since present zoning designation: NO CHANGE

Submittal and Fees
Items to be submitted with this application form:

- Application Fee – Payable to the 'City of Midland'
- Dimensioned Site Plan
- Digital Copies of Site Plan (PDF/JPEG)

CamScanner

Signature *(by property owner only – authorized agent must sign affidavit below)*	
Applicant (signature):	Date: 8/6/25
Applicant (printed): Sara Pipkin	
Property Owner (signature):	Date: 8/6/25
Property Owner (printed) : Bryce Wynne	

The Zone Change/Planned District Amendment/Site Plan Approval shall be considered officially received in the Planning office only when it has been submitted in full compliance with the provisions of Section 212 of the Texas Local Government Code and the Zoning Code of Ordinances of the City of Midland and when such required items for the application are also received.

All materials, including exhibits, submitted in support of an application, or displayed during a public hearing, shall remain the property of the City of Midland.

STATE OF TEXAS
COUNTY OF MIDLAND

Before me, the undersigned authority, on this day personally appear Andrew Mellen who, being by me duly sworn, upon oath says: That (s)he is the owner of _____ or authorized by Sara Pipkin, the owner of the above described property, to fully represent him/her in this application and that (s)he had the legal right, power and authority to sign said owner's name hereto as his/her attorney in fact.

Andrew L Mellen
Authorized Agent (*signature*)

Subscribed and sworn to before me, this 6th day of August, 2025, to certify which witness my hand and seal of office.

SAVANNAH DAVIS
Notary Public, State of Texas
Comm. Expires 05-20-2028
Notary ID 134907724

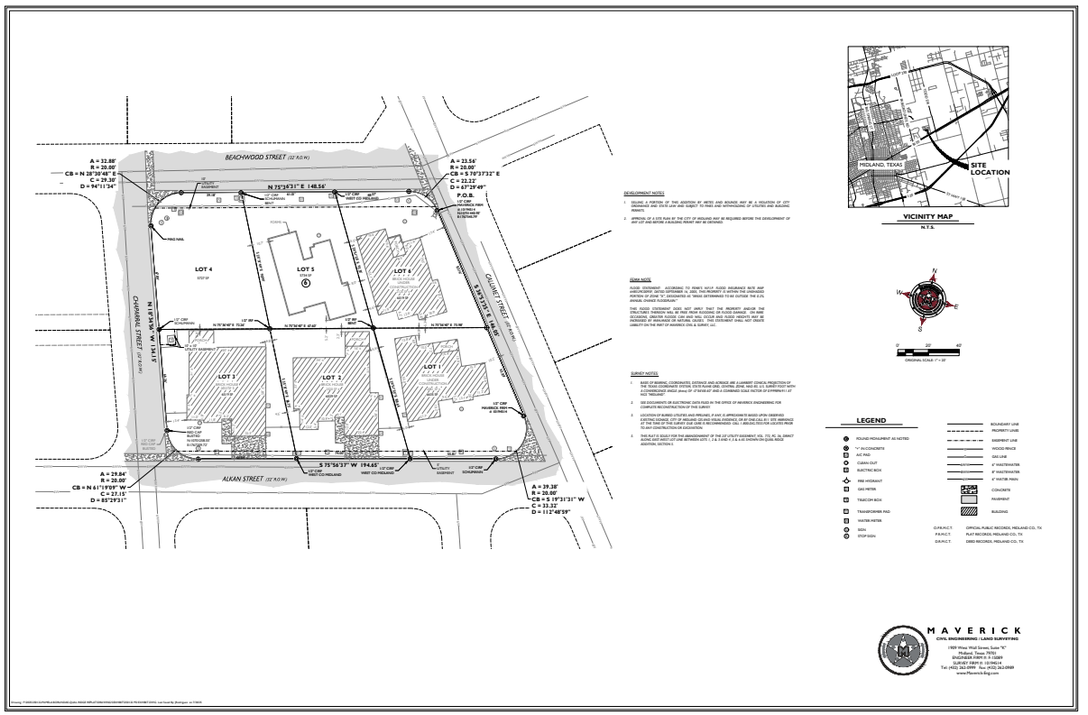
NOTARY PUBLIC, MIDLAND COUNTY, TEXAS

FOR OFFICE USE ONLY

☑ Property Owner Authorization	☑ Dimensioned Site Plan
☑ Application Fee	☑ Plans in Digital Format (PDF/JPEG)
Check # 5501	RECEIVED
Received By:	Date: AUG 06 2025
	Initial:

****Application will not be considered for scheduling until reviewed by a planner.****

CamScanner



DEVELOPMENT NOTES:

1. SQUARE 'A' PARTION OF THIS ADDITION IN", WITES AND BOUNDS, MAY BE A VIOLATION OF CITY ORDINANCE AND STATE LAW AND SUBJECT TO FINES AND WITHHOLDING OF UTILITIES AND BUILDING PERMITS
2. APPROVAL OF A SITE PLAN BY THE CITY OF MIDLAND MAY BE REQUIRED BEFORE THE DEVELOPMENT OF ANY LOT AND BEFORE A BUILDING PERMIT MAY BE OBTAINED.

FLOOD NOTES:

FLOOD STATEMENT – ACCORDING TO ZONE'X (X-S.H.) FLOOD INSURANCE RATE MAP #48329C0375F, DATED SEPTEMBER 26, 2008. THIS PROPERTY IS WITHIN THE UNSHADED ZONE "X" WHICH IS DEFINED AS AREAS OF 500-YEAR FLOOD; AREAS OF 100-YEAR FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 100-YEAR FLOOD.

THIS FLOOD STATEMENT DOES NOT IMPLY THAT THE PROPERTY AND/OR THE STRUCTURES THEREON WILL BE FREE FROM FLOODING OR FLOOD DAMAGE. ON RARE OCCASIONS, GREATER FLOODS CAN AND WILL OCCUR AND FLOOD HEIGHTS MAY BE INCREASED BY MAN-MADE OR NATURAL CAUSES. THIS STATEMENT SHALL NOT CREATE LIABILITY ON THE PART OF MAVERICK, LTD., OR SURVEY, LTD.

SURVEY NOTES:

1. BASIS OF BEARING, COORDINATES, DISTANCE AND ACREAGE ARE A GRANNET COMETA PROJECTION OF THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, (4204), NORTH AMERICAN DATUM OF 1983 (NAD83) BASED ON GPS OBSERVATIONS AT STATION 67 AND A COMBINED SCALE FACTOR OF 0.9999622173 AT GRID "MIDLAND"
2. SEE DOCUMENTS OR ELECTRONIC DATA FILES IN THE OFFICE OF MAVERICK ENGINEERING FOR COMPLETE RECONSTRUCTION OF THIS SURVEY.
3. LOCATION OF BURIED UTILITIES (AND PIPELINES, IF ANY) IS APPROXIMATE BASED UPON OBSERVED EVIDENCE AND/OR MAPS PROVIDED BY OTHERS. THE SURVEYOR MAKES NO GUARANTEE AS TO THE ACCURACY OF THE TYPE OF THESE SURVEY. EVE CURB IS RECOMMENDED. CALL 1-800-922-7555 FOR LOCATES PRIOR TO EXCAVATION.
4. THIS PLAT IS SOLELY FOR THE ABANDONMENT OF THE LOT LITILITY EASEMENT, VOL. 1172, PG. 45, DIRECT ALONG AND WEST LOT LINE BETWEEN LOTS 1, 2 & 3 AND LOT 4, 5 & 6 IN DIVISION (QUAL BLOCK ADDITION, SECTION 5

VICINITY MAP
N.T.S.

ORIGINAL SCALE: 1" = 20'

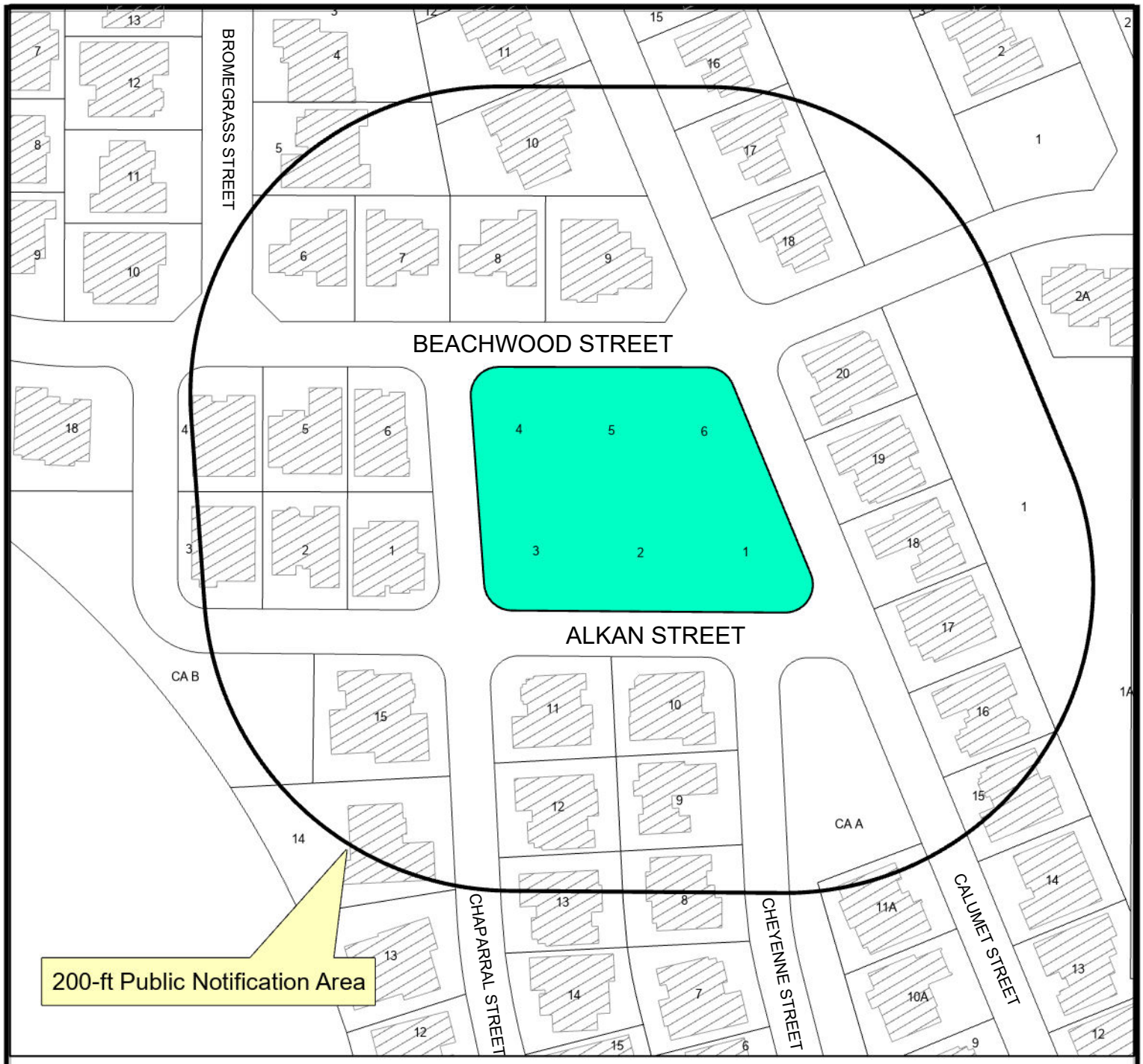
LEGEND

- FOUND MONUMENT AS NOTED
- "X" IN CONCRETE
- A/C PAD
- CLEAN OUT
- ELECTRIC BOX
- FIRE HYDRANT
- GAS METER
- TELECOM BOX
- TRANSFORMER PAD
- WATER METER
- SIGN
- STOP SIGN

- BOUNDARY LINE
- PROPERTY LINE
- EASEMENT LINE
- WOOD FENCE
- GAS LINE
- 4" WASTEWATER
- 8" WASTEWATER
- 4" WATER MAIN
- CONCRETE
- ASHPHALT
- BUILDING

O.P.R.M.C.T. OFFICIAL PUBLIC RECORDS, MIDLAND CO., TX
P.R.M.C.T. PLAT RECORDS, MIDLAND CO., TX
D.R.M.C.T. DEED RECORDS, MIDLAND CO., TX

MAVERICK
CIVIL ENGINEERING / LAND SURVEYING
1989 Wood Wind Street, Suite "A"
Midland, Texas 79705
TBPE Firm #: 18123
SURVEY FIRM #: 10194214
Tel: (432) 262-0999 Fax: (432) 262-0988
www.Maverick-Eng.com



Location Map

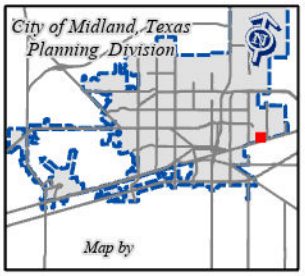
Z-25-0439 **1 in = 40'**

Consider a request by Maverick Engineering, for a zone change from, PD, Planned Development District for Housing Development to an amended PD, Planned Development District for a Housing Development for Lots 1 through 6, Block 6, Quail Ridge Addition, Section 5, City and County of Midland, Texas.

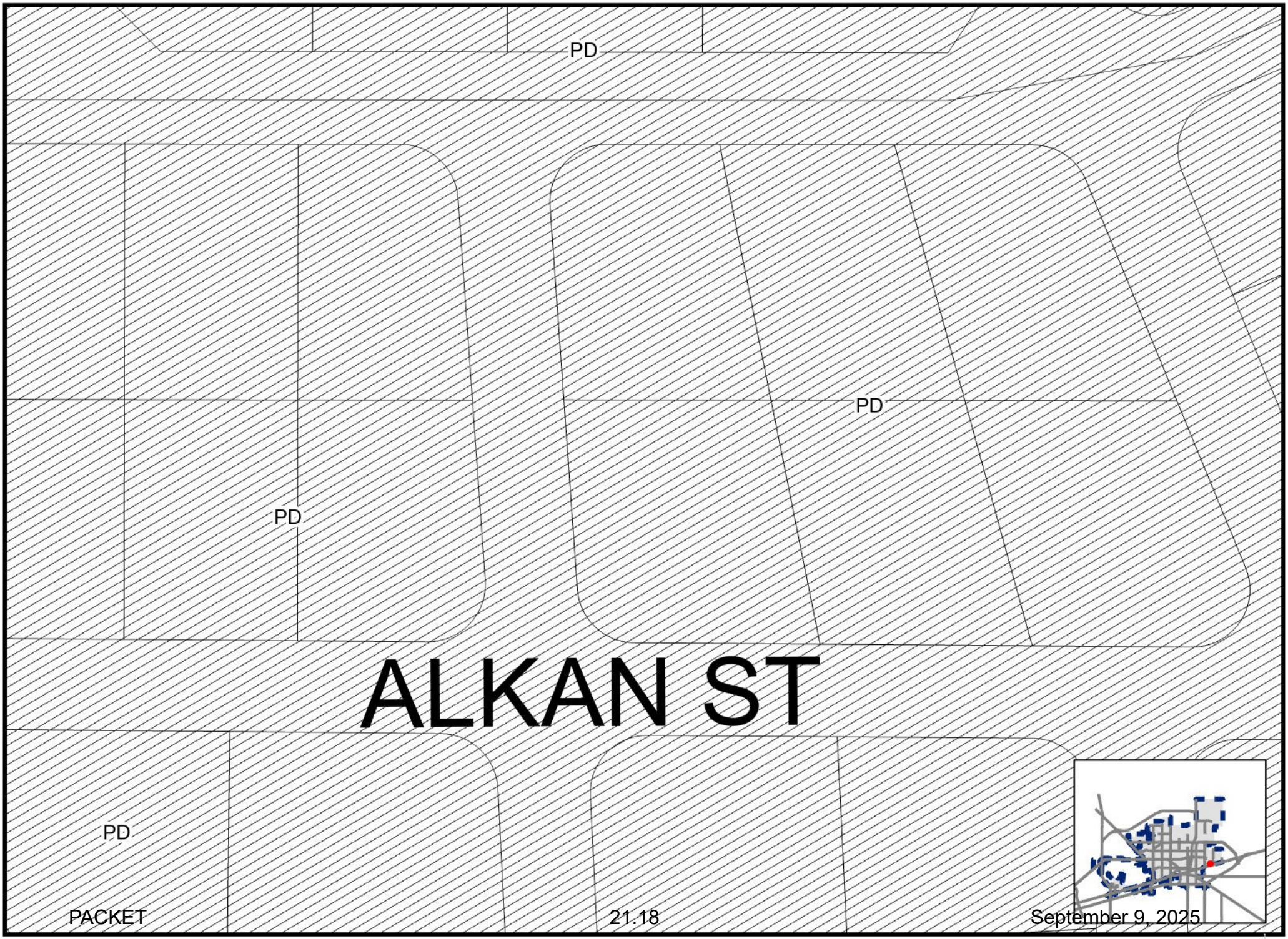
Generally located at the southeast corner of the intersection of Beachwood Street and Chaparral Street (Council District 2)

LEGEND

- CITY LIMITS
- PARCEL
- PRIVATE BLDGS



©THE CITY OF MIDLAND - 2021
THIS DATA IS NOT A SUBSTITUTION FOR A
OR OTHER DECISIONS BASED SOLELY ON THE
INFORMATION CONTAINED HEREIN.
THE CITY OF MIDLAND SHALL NOT BE RESPONSIBLE FOR
ANY DECISIONS BASED UPON THE USE OF THIS DATA.



Map by Z-25-0439 lin = 17'

ZONING MAP

QTHECITYOF MIOLANC-2021; THIS""TJLISMOTASV8STITV110NFOI(ASURVEYPROOUCTNOR rTDESIGPE.D TOBE USED"5A PRIMAAYTOOLIN PERMITTINO OROlt-ERDECISIONS MSEO5a.E)YONTHE Nf'OFU.IATJONCOWTAJUEO HERBNnE CITYOf MIoLANOSt-W.1.NOT8E RESPONSIBLE FORloHY DECISIONS8,1,SED|PONTHEUSEOf TiilSOAT.-_

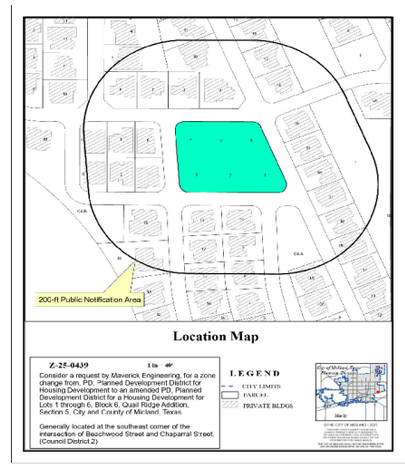

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MIDLAND
Be the Energy!
ZONE CHANGE
QUAIL RIDGE
Visit Our Website
MIDLANDTEXAS.GOV

APPLICATION SUMMARY

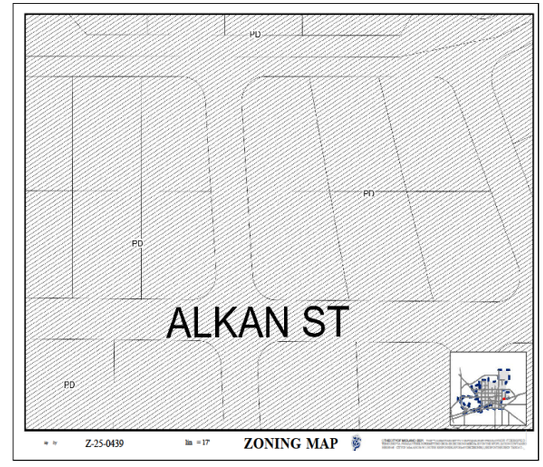
- **Representative:** Andrew Mellen, with Maverick Engineering
- **Location:** Generally located at the southeast corner of the intersection of Beachwood Street and Chaparral Street. (Council District 2)
- **Reason for Request:** To adjust the site plan associated with the current Planned Development District



2

ZONING

- **Current Zoning:** PD, Planned Development District for a Housing Development
- **Surrounding Zoning:**
  - **North, East, South, & West:** PD, Planned Development District for a Housing Development
- **Proposed Zoning:** An amended PD, Planned Development District for a Housing Development



3

LAND USE

- **Current Use:** Vacant Land and Single-Family Housing
- **Surrounding Uses:**
  - **North/South/West/East:** Single-Family Housing and Vacant Land
- **Proposed Use:** Single-Family Housing



4



On Beachwood Street, Looking South

5

COMPREHENSIVE PLAN

- **Land Use Designation:** Urban-Medium (U-M)
- **Supported Uses:** Supporting uses include a mix of residential use, schools, churches, and low-dense commercial.
- The request is compatible with the *Tall City Tomorrow Comprehensive Plan.*



MIDLAND
Be the Energy!

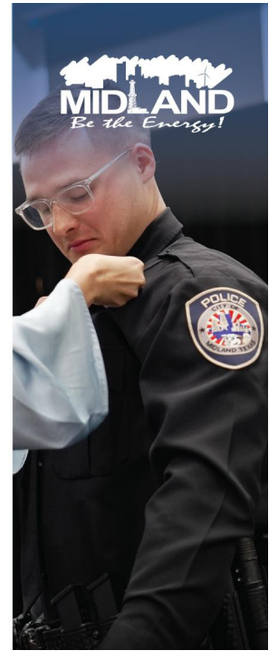
STAFF'S RECOMMENDATION

- No objections were received.
- The Planning & Zoning Commission approved of this request on September 2, 2025.
- Staff recommends approval of this request with the following conditions:

A. That the Property shall significantly conform to the site plan attached hereto as Exhibit A; provided, however, that the building footprints shown on the site plan shall be considered illustrative.

B. That the minimum front yard setback shall be 15 feet.

7



STAFF'S RECOMMENDATION

C. That a minimum of two off-street parking spaces shall be provided on each lot.

D. That Ordinance No. 9732 shall remain in full force and effect except to the extent that it is superseded by this ordinance.



8


MISSION
Deliver exceptional services and promote a high quality of life and place for ALL our citizens.

ORDINANCE NO. 9732

AN ORDINANCE CHANGING THE ZONING CLASSIFICATION BY AMENDING CHAPTER ONE, TITLE XI, OF THE CITY CODE OF MIDLAND, TEXAS, BY PERMITTING LOTS 10-13, BLOCK 3, COMMON AREA A, BLOCK 4, LOTS 16 AND 17, BLOCK 5, AND COMMON AREA B, BLOCK 6, QUAIL RIDGE ADDITION, SECTION 2, CITY AND COUNTY OF MIDLAND, TEXAS, WHICH IS PRESENTLY ZONED PD, PLANNED DISTRICT FOR A HOUSING DEVELOPMENT, TO BE USED AS AN AMENDED PLANNED DISTRICT (GENERALLY LOCATED ON THE NORTH SIDE OF EAST BUSINESS INTERSTATE 20, APPROXIMATELY 300 FEET WEST OF CHUKAR LANE); CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION

WHEREAS, the City Planning and Zoning Commission and the Governing Body of the City of Midland, in compliance with the City Charter and the State law with reference to the creation of "Planned Districts" under the zoning ordinance regulations and zoning map, have given the requisite notices by United States mail, publication and otherwise; and after a full and fair hearing to all of the property owners generally and particularly to those interested persons situated in the affected area and in the vicinity thereof, the Governing Body finds that the public health, safety and general welfare will be best served by the creation of an Amended Planned District, set out hereinafter and subject to the conditions and restrictions set out hereinafter;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That Chapter 1, Title XI, of the City Code of Midland, Texas, and the official zoning map of the City of Midland, Texas, are hereby amended insofar as the hereinafter described property is concerned, which is presently zoned PD, Planned District for a Housing Development, and it shall be used as an Amended Planned District, said property being described as follows:

Lots 10-13, Block 3, Common Area A, Block 4, Lots 16 and 17, Block 5, and

Common Area B, Block 6, Quail Ridge Addition, Section 2, City and County of Midland, Texas.

SECTION TWO. That said property shall be subject to the following special conditions and restrictions:

A. That the use and development of this property shall conform to the regulations of the 1F-3, One-Family Dwelling District, except as otherwise stated below.

B. That this property shall significantly conform to Exhibit "A", which is attached hereto and incorporated herein.

C. That the locations designated on Exhibit "A" as Common Area A and Common Area B shall be developed as recreational areas.

D. That the minimum front yard setback shall be 15 feet.

E. That a minimum of two off-street parking spaces shall be provided on each lot.

F. That the perimeter landscaping shall be irrigated with an underground sprinkler system and maintained in a healthy, growing condition by a homeowners' association.

SECTION THREE. That the definitions given in the zoning regulations contained in the City Code of the City of Midland, Texas, shall be applicable to such of those terms as are used herein.

SECTION FOUR. The provisions of this ordinance are to be cumulative of all other ordinances or parts of ordinances governing or regulating the same subject matter as that covered herein; provided, however, that all prior ordinances or parts of ordinances inconsistent with or in conflict with any of the provisions of this ordinance are hereby expressly repealed to the extent of any such inconsistency or conflict.

SECTION FIVE. If any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional or invalid, such holding shall not affect the validity of the remaining portions of this ordinance. The Council of the City of Midland hereby declares that it would have passed this ordinance and each section, subsection, sentence, clause, or phrase hereof irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared unconstitutional or invalid.

SECTION SIX. The penalty for violation of this ordinance shall be in accordance with the general penalty provisions contained in Section 1-3-1 of the City Code of Midland, Texas, which provides for a fine not exceeding two thousand dollars ($2,000.00).

SECTION SEVEN. The City Secretary is hereby authorized and directed to publish the descriptive caption of this ordinance in the manner and for the length of time prescribed by the law as an alternative method of publication.

The above and foregoing ordinance was duly proposed, read in full and adopted on first reading, the 23rd day of January, A.D., 2018; and passed to second reading on motion of Council member Love, seconded by Council member Hotchkiss, by the following vote:

Council members voting "AYE": Hotchkiss, Love, Sparks, Morales, Dufford, Lacy, Robnett

Council members voting "NAY": None

The above and foregoing ordinance was read in full and finally adopted by the following vote upon motion of Council member Lacy, seconded by Council member Hotchkiss, on the 13th day of February, A.D., 2018, at a regular meeting of the City Council:

Council members voting "AYE": Hotchkiss, Love, Sparks, Morales, Lacy

Council members voting "NAY": None

PASSED AND APPROVED THIS 13th day of February, A.D., 2018.

Jerry F. Morales, Mayor

ATTEST:

Amy M. Turner, City Secretary

APPROVED AS TO CONTENT
AND COMPLETENESS:

Frank Salvato, Assistant City Manager

Charles Harrington, Director of Development Services

APPROVED ONLY AS TO FORM:

John Ohnemiller, City Attorney

FINAL PLAT
QUAIL RIDGE ADDITION, SECTION 5
BEING A REPLAT OF COMMON AREAS "A" and "B" LOTS 10, 11, 12, 13, BLOCK 3, LOTS 16 and 17, BLOCK 5, QUAIL RIDGE ADDITION, SECTION 2, CITY and COUNTY OF MIDLAND, TEXAS
BEACHWOOD STREET
ALKAN STREET
CALUMET STREET
CHEROKEE STREET
MIDLAND DRIVE
Rockhill Trail NE
CHAPARRAL STREET
ADORA STREET
EAST WADLEY AVENUE
BUSINESS I-20 (250' ROW)
LEGEND
OWNER'S CERTIFICATE
UTILITY COMPANY'S CERTIFICATE
SURVEYOR'S CERTIFICATE
BOARD OF ADJUSTMENT CERTIFICATE
WEST COMPANY
QUAIL RIDGE ADDITION, SECTION 5
42.9

EXHIBIT A

City Council Meeting

Item Number: {{}}

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Lori Elliott, Planner

Subject: AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO REZONE LOT 4, BLOCK 62, PARK AVENUE HEIGHTS ADDITION, SECTION 2, CITY AND COUNTY OF MIDLAND, TEXAS, FROM MF-22, MULTIPLE-FAMILY DWELLING DISTRICT TO SF-3, SINGLE-FAMILY DWELLING DISTRICT (GENERALLY LOCATED ON THE WEST SIDE OF SOUTH MADISON STREET, APPROXIMATELY 190 FEET SOUTH OF EAST CALIFORNIA AVENUE); CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION (DISTRICT 2) (DEVELOPMENT SERVICES) (QUALITY OF LIFE AND PLACE)

Purpose:

Jorge Chavez is requesting a Zone Change from MF-22, Multiple-Family Dwelling District, to SF-3, Single-Family Dwelling District for the development of a single-family residential dwelling unit on a property located at 806 South Madison Street.

Recommended City Council Action:

Approve

Fiscal Impact:

None.

Strategic Priority:

Quality of Life and Place

Discussion:

Current Zoning:

MF-22, Multiple-Family Dwelling District

Surrounding Zoning and Land Use:

The properties to the north, east, and west are zoned as MF-22, Multiple-Family Dwelling District, and consist of single-family dwellings and vacant lots. The properties to the south are zoned MF-22, Multiple-Family Dwelling District, and SF-3, Single-Family Dwelling District, and consist of single-family dwellings and vacant lots.

Analysis:

The subject property is located at 806 South Madison Street. The property is currently zoned MF-22, Multiple-Family Dwelling District. This zoning district does not permit a single-family detached dwelling. The property is currently a vacant lot. The applicant has requested a zone change to SF-3, Single-Family Dwelling District, which would allow for the construction of a single-family residence. The property meets the minimum lot dimension requirements of the SF-3, Single-Family Dwelling District, zoning [Midland City Code 11-1-5.04]. Many nearby properties have transitioned to SF-3 zoning, aligning with the evolving character of the neighborhood and its single-family residential development.

This request is consistent with the Tall City Tomorrow Comprehensive Plan, Chapter 3, which designates this area as Urban-Medium (UR-M). Potential zoning for this designation calls for Single-Family Dwelling Districts, making this request compatible.

This proposed zone change has been circulated to the respective City departments for internal review and their comments, conditions, and requirements are as follows:

Departmental Review:

Fire: (Approved)

No comments or objections.

Oil and Gas: (Approved)

No Oil & Gas issues with Zoning.

Engineering: (Approved)

No objections to zone change. [For Applicant's Information Only.] Site drainage, utilities, driveway access, and traffic circulation may be adjusted during construction drawing review as necessary to receive building permit approval from Engineering and Traffic Operations. [For Applicant's Information Only.]

Building Code: (Approved)

No issues. All future structures must adhere to the 2018 International Building Codes, the 2015 International Energy Code, the 2023 NEC requirements, the 2015 International Fire Codes, local city ordinances, zoning requirements, established setbacks, oil and gas considerations, and floodplain requirements if necessary. Code versions are subject to change depending on the time of new code editions adopted in the City of Midland and date of permit application.

Transportation: (Approved)

Site drainage, utilities, driveway access, and traffic circulation may be adjusted during construction drawing review as necessary to receive building permit approval from Engineering and Traffic Operations. [For the Applicant's information only.] No objection to zone change. [For the Applicant's information only.]

Planning:

Therefore, staff recommends approval of this Zone Change from MF-22, Multiple-Family Dwelling District, to SF-3, Single-Family Dwelling District.

Letters of Objection:

As of August 28, 2025, staff has received no letters of objection for this request.

Attachments:

Application
Maps

City Manager's Office

ORDINANCE NO. _____

AN ORDINANCE AMENDING THE ZONING DISTRICT MAP OF THE CITY OF MIDLAND TO REZONE LOT 4, BLOCK 62, PARK AVENUE HEIGHTS ADDITION, SECTION 2, CITY AND COUNTY OF MIDLAND, TEXAS, FROM MF-22, MULTIPLE-FAMILY DWELLING DISTRICT TO SF-3, SINGLE-FAMILY DWELLING DISTRICT (GENERALLY LOCATED ON THE WEST SIDE OF SOUTH MADISON STREET, APPROXIMATELY 190 FEET SOUTH OF EAST CALIFORNIA AVENUE); CONTAINING A CUMULATIVE CLAUSE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING FOR A MAXIMUM PENALTY OR FINE OF TWO THOUSAND DOLLARS ($2,000.00); AND ORDERING PUBLICATION

WHEREAS, the City Planning and Zoning Commission and the Governing Body of the City of Midland, in compliance with the City Charter, the City Code, and State law, have given the requisite notices by United States mail, publication and otherwise; and after a full and fair hearing to all of the property owners generally and particularly to those interested persons situated in the affected area and in the vicinity thereof, the Governing Body finds that the public health, safety and general welfare will be best served by rezoning Lot 4, Block 62, Park Avenue Heights Addition, Section 2, City and County of Midland, Texas (the "Property"), to SF-3, Single-Family Dwelling District, as set out hereinafter;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That the Zoning District Map of the City of Midland, Texas, is hereby amended to rezone the Property from MF-22, Multiple-Family Dwelling District to SF-3, Single-Family Dwelling District.

SECTION TWO. That the definitions given in the zoning regulations contained in the City Code of the City of Midland, Texas, shall be applicable to such of those terms as are used herein.

SECTION THREE. The provisions of this ordinance are to be cumulative of all other ordinances or parts of ordinances governing or regulating the same subject matter as that covered herein; provided, however, that all prior ordinances or parts of ordinances

inconsistent with or in conflict with any of the provisions of this ordinance are hereby expressly repealed to the extent of any such inconsistency or conflict.

SECTION FOUR. If any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional or invalid, such holding shall not affect the validity of the remaining portions of this ordinance. The Council of the City of Midland hereby declares that it would have passed this ordinance and each section, subsection, sentence, clause, or phrase hereof irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared unconstitutional or invalid.

SECTION FIVE. The penalty for violation of this ordinance shall be in accordance with the general penalty provisions contained in Section 1-3-1 of the City Code of Midland, Texas, which provides for a fine not exceeding two thousand dollars ($2,000.00).

SECTION SIX. The City Secretary is hereby authorized and directed to publish the descriptive caption of this ordinance in the manner and for the length of time prescribed by the law as an alternative method of publication.

The above and foregoing ordinance was duly proposed, read in full and adopted on first reading, the _____ day of _____, A.D., 2025; and passed to second reading on motion of Council member _____, seconded by Council member _____, by the following vote:

Council members voting "AYE":

Council members voting "NAY":

The above and foregoing ordinance was read in full and finally adopted by the following vote upon motion of Council member _____, seconded by Council member _____, on the _____ day of _____, A.D., 2025, at a regular meeting of the City Council:

Council members voting "AYE":

Council members voting "NAY":

PASSED AND APPROVED THIS _____ day of _____, A.D., 2025.

_____
Lori Merritt Blong, Mayor

ATTEST:

_____
Marcia Bentley-German, City Secretary

APPROVED AS TO CONTENT
AND COMPLETENESS:

_____
Elizabeth Triggs, Planning and Development Officer

APPROVED ONLY AS TO FORM:

_____
Nicholas Toulet, Interim City Attorney

MIDLAND Planning Division

Zone Change/Planned District Amendment/Site Plan Approval

Project Number: _____

Case Number: _____

Applicant *(if acting as Agent, see affidavit on page 2)* Printed Name:		Phone ( ) Email	
Address	City	State	Zip

Property Owner Printed Name: Jorge Chavez		Phone (432) 889-7005 Email Jorgechavez22@gmail.com	
Address 704 S. Lorraine St	City Midland	State Tx	Zip 79701

Representative *(if different from Applicant or Property Owner)* Firm: _____ Printed Name:		Phone ( ) Email	
Address	City	State	Zip

Street Address: 804 S. Madison

Legal Description
Lot: 4 Block: 62 Subdivision: Park Avenue Heights Sec. 2

Current Zoning: MF 22

Proposed Zone: SF 3
(List by tracts if more than one district is requested)

Reason for Zone Change Request: Build House

Present Use of Property: Vacant

Proposed Use of Property: Residential

How would this zone change affect the public health, safety and welfare? NA

Describe how conditions affecting the property have changed since present zoning designation: NA

Submittal and Fees
Items to be submitted with this application form:

- Application Fee – Payable to the 'City of Midland'
- Dimensioned Site Plan
- Digital Copies of Site Plan (PDF/JPEG)

Signature *(by property owner only – authorized agent must sign affidavit below)*	
Applicant (signature):	Date:
Applicant (printed):	
Property Owner (signature): x Jorge Chavez	Date: 7-24-25
Property Owner (printed) : Jorge Chavez	

The Zone Change/Planned District Amendment/Site Plan Approval shall be considered officially received in the Planning office only when it has been submitted in full compliance with the provisions of Section 212 of the Texas Local Government Code and the Zoning Code of Ordinances of the City of Midland and when such required items for the application are also received.

All materials, including exhibits, submitted in support of an application, or displayed during a public hearing, shall remain the property of the City of Midland.

STATE OF TEXAS
COUNTY OF MIDLAND

Before me, the undersigned authority, on this day personally appear Ed Aleman who, being by me duly sworn, upon oath says: That (s)he is the owner of _____ or authorized by Jorge Chavez, the owner of the above described property, to fully represent him/her in this application and that (s)he had the legal right, power and authority to sign said owner's name hereto as his/her attorney in fact.

GENESIS MELODY GUEVARA
Notary ID #135161214
My Commission Expires
November 7, 2028

Eduardo J Aleman
Authorized Agent (*signature*)

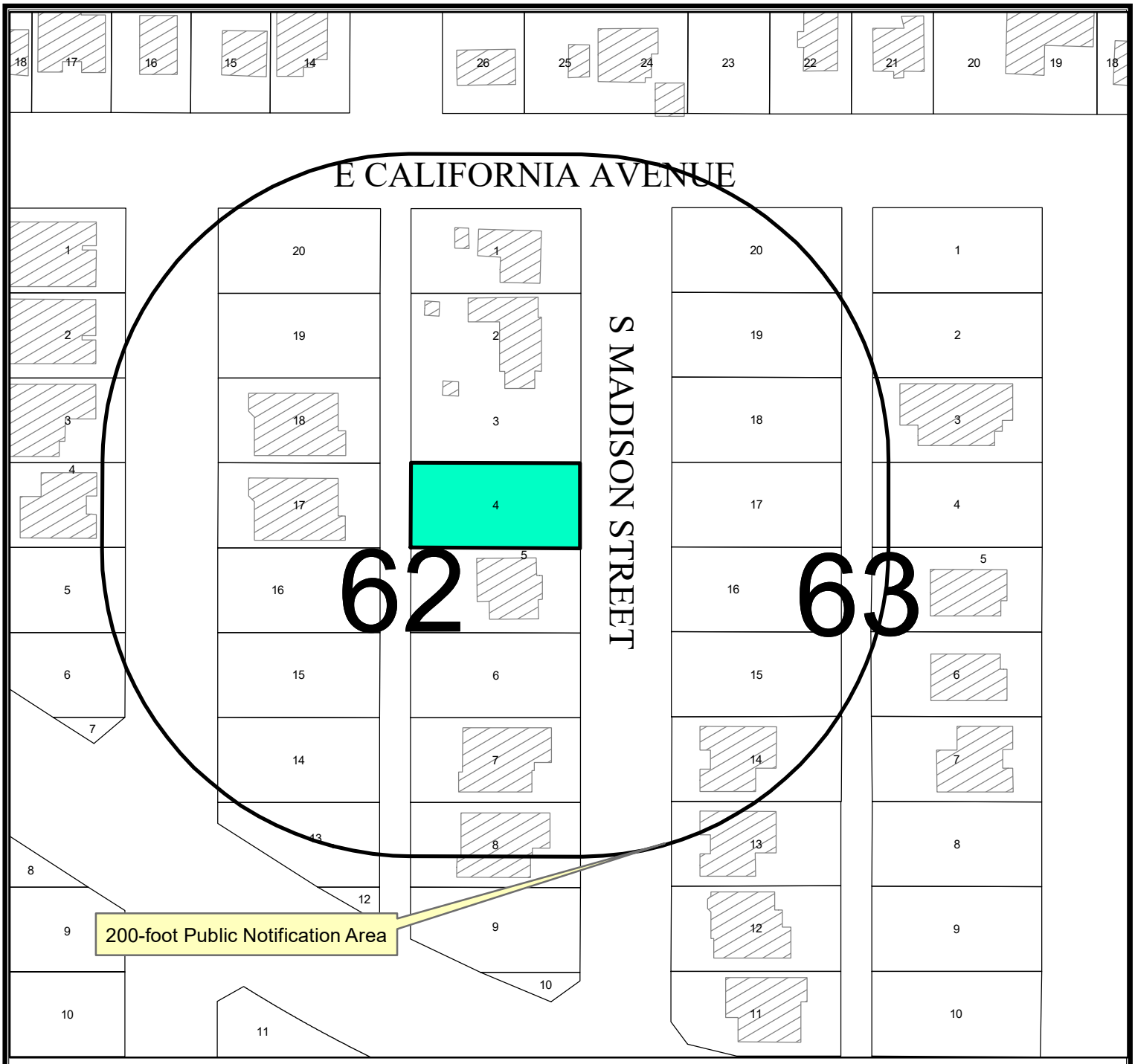
Subscribed and sworn to before me, this 24th day of July, 2025, to certify which witness my hand and seal of office.

NOTARY PUBLIC, MIDLAND COUNTY, TEXAS

FOR OFFICE USE ONLY

☑ Property Owner Authorization	☑ Dimensioned Site Plan
☐ Application Fee	☐ Plans in Digital Format (PDF/JPEG)
Check # 2382	RECEIVED
Received By:	Date: JUL 24 2025
	Initial:

****Application will not be considered for scheduling until reviewed by a planner.****



Location Map

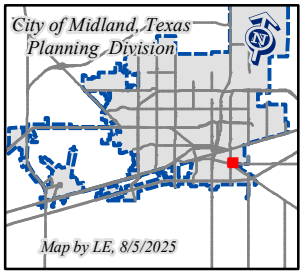
Z-25-0435 **Scale: 1" = 1,110'**

Consider a request by Jorge Chavez for a Zone Change from MF-22, Multiple-Family Dwelling District, to SF-3, Single-Family Dwelling District, on Lot 4, Block 62, Park Avenue Heights Addition, Section 2, City and County of Midland, Texas.

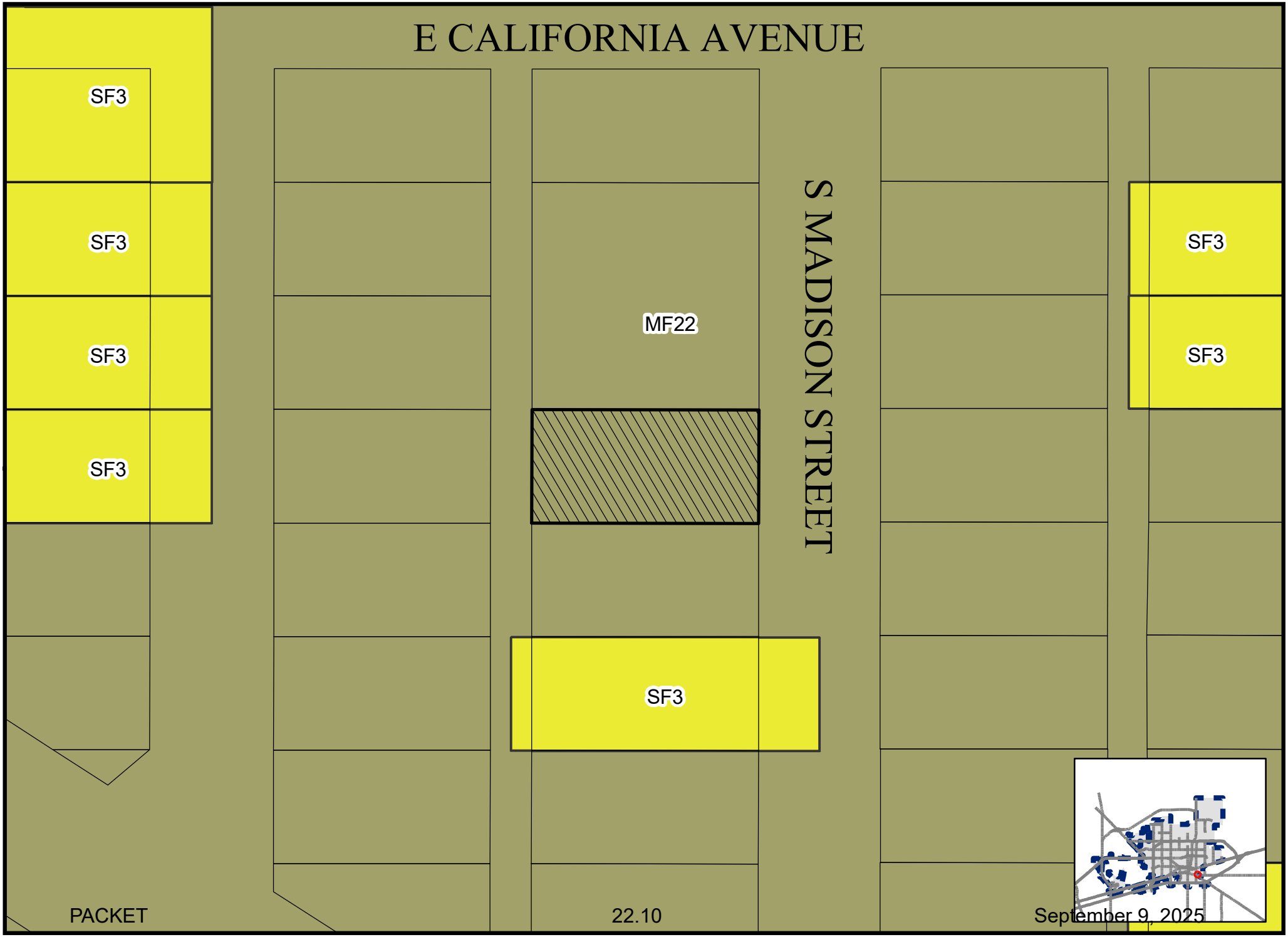
Generally located on the west side of South Madison Street approximately 190 feet south of East California Avenue. (Council District 2)

LEGEND

- CITY LIMITS
- PARCEL
- PRIVATE BLDGS



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THIS DATA IS NOT A SUBSTITUTION FOR A SURVEY PRODUCT OR IS INTENDED TO BE USED FOR PRIMARY TO DESIGNATING OR OTHER DECISIONS BASED SOLELY ON THE INFORMATION CONTAINED HEREIN.
THE CITY OF MIDLAND SHALL NOT BE RESPONSIBLE FOR ANY DECISIONS BASED UPON THE USE OF THIS DATA.



Map by LE, 8/6/2025

Z-25-0435

Scale: 1" = 699'

ZONING MAP

©THE CITY OF MIDLAND - 2021: THIS DATA IS NOT A SUBSTITUTION FOR A SURVEY PRODUCT, NOR IS IT DESIGNED TO BE USED AS A PRIMARY TOOL IN PERMITTING OR OTHER DECISIONS BASED SOLELY ON THE INFORMATION CONTAINED HEREIN. THE CITY OF MIDLAND SHALL NOT BE RESPONSIBLE FOR ANY DECISIONS BASED UPON THE USE OF THIS DATA.

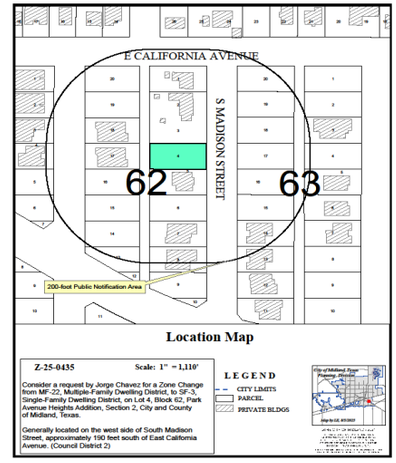

62
S MADISON STREET
63




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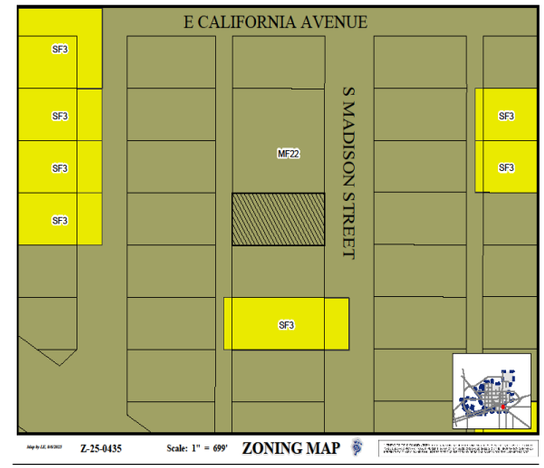
APPLICATION SUMMARY

- **Applicant/Property Owner:** Jorge Chavez
- **Location:** 806 South Madison Street (Council District 2)
- **Reason for Request:** to construct a single-family residence



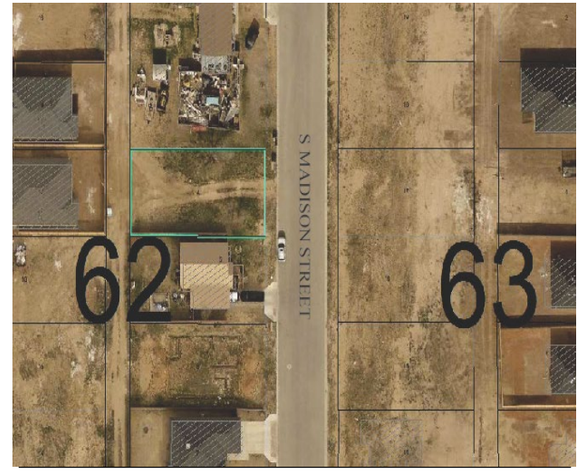
ZONING

- **Current Zoning:** MF-22, Multiple-Family Dwelling District
- **Surrounding Zoning:**
  - **North/East/West:** MF-22, Multiple-Family Dwelling District
  - **South:** MF-22, Multiple-Family Dwelling District and SF-3, Single-Family Dwelling District
- **Proposed Zoning:** SF-3, Single-Family Dwelling District



LAND USE

- **Current Use:** Vacant lot
- **Surrounding Uses:**
  - **North/South/West:** Single-Family Housing
  - **East:** Vacant lots
- **Proposed Use:** Single-Family Dwelling



4

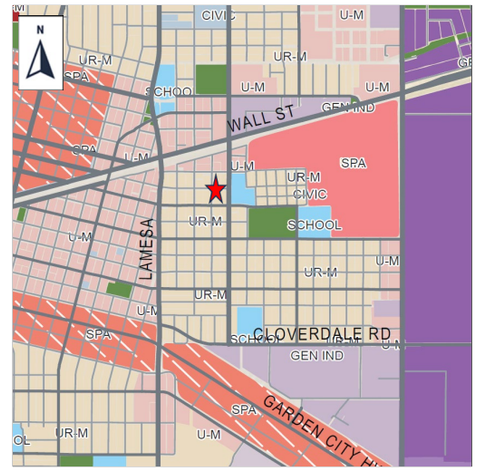


On South Madison Street, Looking West

5

COMPREHENSIVE PLAN

- **Land Use Designation:** Urban-Medium (U-M)
- **Supported Uses:** a mix of housing styles, including single-family detached
- The request is compatible with the *Tall City Tomorrow Comprehensive Plan.*



6

STAFF'S RECOMMENDATION

- No objections were received.

- Staff recommends approval of this Zone Change Request.



7


MISSION
Deliver exceptional services and promote a high quality of life and place for ALL our citizens.

City Council Meeting

Item Number: 23

Meeting Date: September 9, 2025

To: City Council / City Manager

From: Jamie Barton,

Subject: AN ORDINANCE ADOPTING A FEE SCHEDULE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING AN APPEAL PROCESS; ESTABLISHING AN EFFECTIVE DATE OF OCTOBER 1, 2025; AND ORDERING PUBLICATION (DISTRICT: ALL) (FINANCE) (DISTRICT: ALL) (FINANCE) (PROVIDE SOUND GOVERNANCE & FISCAL MANAGEMENT)

Purpose:

Revise an ordinance establishing regulatory and user fees collected by the City of Midland to adequately cover the costs and expenses incurred by the City in connection with providing the services associated with said fees.

Recommended City Council Action:

Approve

Fiscal Impact:

Regulatory and User Fees generate revenue designed to cover the cost of the service being provided by the City of Midland. No funding language necessary.

Strategic Priority:

(Provide Sound Governance & Fiscal Management)

Discussion:

Updates were made to 12 departments, as outlined below. Corresponding exhibits are attached.

1. City Secretary – In the Limo or Motorbus Operating Fee (each) line item, the term “Motorbus” was replaced with “Shuttle.” (Exhibit A)

2. Parks & Recreation – Parks (Exhibit B) Show Mobile Rental Fee was increased by $12.50, Artificial Turf Fields Rental Fee was increased by $10, and all Tournament Fees were slightly increased. Updates were made to the Recreation (Exhibit C) services and rates. The Cart Fee – Tournament Spectator Cart (full cart) in Golf Course (Exhibit F) was replaced with two new fees, Cart Fee - Spectator Cart (limited availability) and Cart Fee - Youth Tournament Spectator Cart (full cart). For Sports Complex (Exhibit N), two new fees were added, and others were increased.

3. Fire Department – New fees were added to the Environmental Section (Exhibit D) while new travel vaccines were also added to the Clinical Section (Exhibit D) and rate increases to the existing ones. HIV Testing was removed and combined with the STD Testing service and rate.

4. Development Services – The Oil and Gas section of Planning (Exhibit G) added a new Appeal Fee (takings).

5. Engineering – Street name and Traffic Control Sign Fee (Exhibit I) increased by $150 per intersection.

6. Water & Sewer – All fees were increased by 2.5% (Exhibit J and K).

7. Sanitation – Sanitation Fees for Inside and Outside City Limits (Exhibit L) were all increased. The Litter Abatement Fee was increased by $1. New fees were added and updates to existing ones were made.

8. Airport – Landing fees, Maximum per 24-hour Period and Annual Employee Parking Media (Exhibit M) was increased. Public Aircraft Parking was changed to being based on rates and charges.

9. Miscellaneous – New business regulation fees were added pertaining to door to door solicitors. A new section for fire regulations was created, with perspective fees transferred from police regulations. New fees were added while existing services and rates were updated. A new fee was added for police regulations for copy of collision report.

10. Credit Card Fee - The City of Midland will apply a 3.5% fee to all transactions paid by credit card, based on the total amount being paid.

Morris Williams Jr.

City Manager’s Office

ORDINANCE NO. _____

AN ORDINANCE ADOPTING A FEE SCHEDULE; CONTAINING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING AN APPEAL PROCESS; ESTABLISHING AN EFFECTIVE DATE OF OCTOBER 1, 2025; AND ORDERING PUBLICATION

WHEREAS, the City Council finds it to be in the public interest to establish fees collected by the City of Midland in order to adequately cover the costs and expenses incurred by the City in connection with providing the services associated with said fees; and

WHEREAS, the City Manager's designees have prepared Exhibits A through R, which are attached hereto and incorporated herein for all purposes, identifying said fees (collectively, the "Fee Schedule"); and

WHEREAS, the City Council of the City of Midland, Texas, finds it to be in the public interest to adopt the Fee Schedule and to establish the fees identified therein as the fees to be collected by the City of Midland, said fees being reasonably related to the costs and expenses incurred by the City in connection with providing the services associated with said fees;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MIDLAND, TEXAS:

SECTION ONE. That the facts and recitations contained in the preamble of this ordinance are hereby found and declared to be true and correct and are adopted as part of this ordinance for all purposes.

SECTION TWO. That the Fee Schedule is hereby approved and adopted. The fees identified in the Fee Schedule are hereby established as the fees to be collected by the City of Midland except for the following types of fees: a fee charged to a requestor who submits a request for information under the Texas Public Information Act; a fee assessed by the Municipal Court that is not identified in the Fee Schedule; a fee established by a contract, to the extent that the fee established by the contract conflicts with or is not identified in the Fee Schedule; a drainage charge; an impact fee; a fee prescribed by a state law, rule, or regulation; or a fee for which a state law, rule, or regulation, or the City Charter requires a

procedure to be followed to establish the fee other than the procedure that was followed to adopt the Fee Schedule.

To the extent that a fee identified in the Fee Schedule conflicts with a fee that was previously established by ordinance (including an ordinance that has been codified in the City Code), resolution, or other City of Midland instrument, this ordinance shall supersede such previous ordinance, resolution, or other instrument, and the fee identified in the Fee Schedule shall be the applicable fee.

To the extent that a fee identified in the Fee Schedule conflicts with a fee prescribed by a state law, rule, or regulation, the fee prescribed by the state law, rule, or regulation shall be the applicable fee.

To the extent that a fee identified in the Fee Schedule is a fee for which a state law, rule, or regulation, or the City Charter requires a procedure to be followed to establish the fee other than the procedure that was followed to adopt the Fee Schedule, such fee that was previously established by following the applicable procedure shall be the applicable fee.

SECTION THREE. That any person wishing to appeal the payment of a fee identified in the Fee Schedule may do so in accordance with the law, rule, regulation, or ordinance that established the procedure for appealing such fee. To the extent that no such appeal procedure has been established for a fee identified in the Fee Schedule that is not a fee assessed by the Municipal Court, the following appeal procedure shall apply:

A. Any person may appeal in writing to the City Manager, or the City Manager's designee, prior to paying the fee or after paying the fee. Any person may appeal in writing to the City Manager, or the City Manager's designee, if the person believes that he or she cannot afford the fee. The person may seek an exemption from all or part of the fee. The City Manager, or the City Manager's designee, shall make certain that the fee is not paid under duress. If a person wishes to appeal after payment of the fee, the person shall appeal in writing to the City Manager, or the City Manager's designee, within ten (10) calendar days of paying the fee.

B. During the pendency of the appeal, the City shall not file criminal charges against any person related to non-payment of the fee if the fee is not paid. Additionally, the City shall not file criminal charges against a person in an attempt to collect the fee.

C. The City Manager, or the City Manager's designee, shall provide a full and meaningful review process. The City Manager, or the City Manager's designee, shall provide a fair opportunity for a person to challenge the accuracy and legal validity of his or her fee obligation. The City Manager, or the City Manager's designee, shall also provide a clear and certain remedy for any erroneous or unlawful fee collection to ensure that the opportunity to contest the fee is a meaningful one. Options that the City Manager, or the City Manager's designee, shall consider in providing a clear and certain remedy are a refund of any excess fee paid, as well as other factors, such as ensuring that a person may continue the operation of his or her business.

D. The City Manager, or the City Manager's designee, shall make his or her decision within ten (10) days of receiving the written notice of appeal. The City Manager, or the City Manager's designee, shall ensure that a person has all rights under any applicable law. A person shall incur no financial hardship by exercising his or her right to appeal.

SECTION FOUR. That the provisions of this ordinance are to be cumulative of all other ordinances or parts of ordinances governing or regulating the same subject matter as that covered herein; provided, however, that all prior ordinances or parts of ordinances inconsistent with or in conflict with any of the provisions of this ordinance are hereby expressly repealed to the extent of any such inconsistency or conflict.

SECTION FIVE. That if any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional or invalid, such holding shall not affect the validity of the remaining portions of this ordinance. The Council of the City of Midland hereby declares that it would have passed this ordinance and each section,

subsection, sentence, clause, or phrase hereof irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared unconstitutional or invalid.

SECTION SIX. That this ordinance shall become effective on October 1, 2025.

SECTION SEVEN. That the City Secretary is hereby authorized and directed to publish the descriptive caption of this ordinance in the manner and for the length of time prescribed by the law as an alternative method of publication.

The above and foregoing ordinance was duly proposed, read in full and adopted on first reading, the _____ day of _____, A.D., 2025; and passed to second reading on motion of Council member _____, seconded by Council member _____, by the following vote:

Council members voting "AYE":

Council members voting "NAY":

The above and foregoing ordinance was read in full and finally adopted by the following vote upon motion of Council member _____, seconded by Council member _____, on the _____ day of _____, A.D., 2025, at a regular meeting of the City Council:

Council members voting "AYE":

Council members voting "NAY":

PASSED AND APPROVED THIS _____ day of _____, A.D., 2025.

_____
Lori Merritt Blong, Mayor

ATTEST:

_____
Marcia Bentley-German, City Secretary

APPROVED AS TO CONTENT
AND COMPLETENESS:

_____
Tommy Gonzalez, City Manager

APPROVED ONLY AS TO FORM:

_____
Nicholas Toulet, Interim City Attorney

Exhibit A

City Secretary

	Fee
BUSINESS REGULATIONS	
Junk and Secondhand Goods License (original)	$25.00
Renewal of Junk and Secondhand Goods	$10.00
Alcoholic Beverage License Fee	1/2 of State Fee
Taxicab Annual Operating Fee (each)	$200.00
Limo or Shuttle Operating Fee (each)	$100.00

Exhibit B

Parks

	Fee
SHOWMOBILE	
Deposit	$1,000.00
Rental Fee (minimum of 4 hours)	$75.00/hr
Extensions	$100.00
Show Lights	$200.00
Deposit for Show Lights	$500.00
PORTABLE BLEACHERS	
Deposit	$100.00
Rental Fee (per day)	$100.00
PORTABLE STAGE	
Deposit	$100.00
Rental Fee	$250.00
TRASH CANS	
Deposit	$100.00
Rental Fee (minimum of 10 cans)	$5.00/can/day
PARK PAVILION RENTAL	
Deposit	$100.00
Rental Fee 9am-10pm	$60.00
Rental Fee 9am-3pm	$30.00
Rental Fee 4pm-10pm	$40.00
BEAL RANCH HOUSE	
Deposit w/o Alcohol	$300.00
Deposit w/Alcohol	$500.00
Rental Fee (per hour)	$50.00
GAZEBO RENTALS - WADLEY AND BEAL	
Deposit	$100.00
Rental Fee 9am-3pm	$50.00
Rental Fee 4pm-10pm	$50.00
Rental Fee 9am-10pm	$100.00
BASEBALL/SOFTBALL FIELD RENTALS	
Artificial Turf Fields Rental Fee	$75.00/hr
Deposit for Artificial Turf Field Rental	$100.00
Natural Turf Field Rental Fee	$25.00/hr
Lights	$25.00/hr
Tournament Fee	$35.00/team
Tournament Cleaning Fee	$150/field
Tournament Deposit	$100/field
Temporary Fence Set Up On Artificial Turf Field	$200/field
Game Cleaning Fee	$75/Field
FOOTBALL/SOCCER FIELD RENTALS	
Artificial Turf Fields Rental Fee	$65.00/hr
Deposit for Artificial Turf Field Rental	$100.00
Natural Turf Field Rental Fee	$25.00/hr
Lights	$25.00/hr
Tournament Fee	$35/Team with min. of $500/field

Exhibit B

Parks

	Fee
Tournament Cleaning Fee	$150/field
Tournament Deposit	$100/field
Game Cleaning Fee	$75/Field
CONCESSION RENTALS	
Concession Stand Deposit	$100.00
Concession Stand Rental	$25.00/hr
ULMER SAND VOLLEYBALL COURT	
Deposit	$25.00
Rental Fee	$25.00/day
WHITEHOUSE RENTAL	
Deposit	$200.00
Rental Fee 10am-4pm	$200.00
Rental Fee 6pm-12am	$200.00
Rental Fee All Day	$400.00

Exhibit C

Recreation

	Fee
CITY POOL RATES	
Entry Fee	$5.00
Children Under 2	Free
10 Punch Card	$30.00
25 Punch Card	$62.50
50 Punch Card	$100.00
Personal Cooler Admission	$10.00
Soda	$3.00
Water	$2.00
Snacks	$2.00
Ice Cream	$4.00
Swim Lesson (1 week)	$25.00
Life Jacket Rental	Free
PRIVATE RENTALS	
Deposit	$150.00
Rental Fee (2 hours)	$900.00
POOL PAVILION RENTALS (Doug Russell Only)	
Deposit	$150.00
Rental Fee	$100/session
MARTIN LUTHER KING RECREATION CENTER	
Activity Room	per hour
During Operation	$25.00
After Hours	$50.00
Deposit	$100.00
Activity Room w/ Game Room	per hour
During Operation	$50.00
After Hours	$70.00
Deposit	$300.00
Auditorium	per hour
During Operation	$50.00
After Hours	$75.00
Deposit No Alcohol	$500.00
Deposit Alcohol	$750.00
Gymnasium	per hour
During Operation	$40.00
After Hours	$60.00
Deposit	$200.00
MLK Volleyball Net Setup Fee	$15.00

Exhibit C

Recreation

	Fee
Training Room	per hour
Sporting Events ONLY	
During Operation	$50.00
After Hours	$75.00
Deposit	$1,000.00
Daily Entrance Fee	$1.00
Monthly Membership	$15.00
MOVIE SCREEN	
Deposit	$1,000.00
Fee (maximum 4 hours)	$500.00

Exhibit D

Health and Senior Services

	Fee
ENVIRONMENTAL SECTION	
Mobile Food Vendor	
Mobile Food Vendor	$175.00
Mobile Food (Seasonal)	$105.00
Temporary Permit	$70.00
Late Fee (When Not Paid By Specified Date)	25% of Permit Fee
Food Services Establishments	
1 thru 5 Employees	$150.00
6 thru 10 Employees	$200.00
11 or More Employees	$250.00
Deli/Meat Market/Bakery	$75.00
Farmers Market	$50.00
Late Fee (When Not Paid By Specified Date)	25% of Permit Fee
Retail Food Store	
1 thru 5 Employees	$150.00
6 thru 10 Employees	$200.00
11 or More Employees	$250.00
Temporary Permit	$70.00
Late Fee (When Not Paid By Specified Date)	25% of Permit Fee
Child Care Programs	
Day Care	$100.00
Foster Care	$50.00
Child Care Program for After School	$50.00
Late Fee (When Not Paid By Specified Date)	25% of Permit Fee
Swimming Pool, Spa, or Water Feature Permit	
Swimming Pool or Spa Permit	$100.00
Water Feature Permit	$100.00
Non-Profit Yearly	$30.00
Non-Profit Temporary	$30.00
Re-inspection (When Establishment is Shut Down)	$75.00
Late Fee (When Not Paid By Specified Date)	25% of Permit Fee
Septic System Inspections	
Septic System Residential	$150.00
Septic System Commercial	$210.00
Septic re-inspection (When Fails Initial Inspection)	$75.00
Late Fee (When Not Paid By Specified Date)	25% of Permit Fee

Exhibit D

Health and Senior Services

	Fee
Permits and Inspections	
Re-Inspection (All Services)	$75.00
CLINICAL SECTION	
Health Department Services	
Infanrix/Daptacel (DTaP)	$45.00
Kinrix (DTaP & Polio)	$65.00
Pentacel (DTaP & Polio & Flu Type B)	$120.00
Pediarix (DTAP, Hep B, & IPV)	$100.00
IPOL IPV (Polio)	$45.00
Haverix Pedi HEP A	$40.00
Engerix Pedi HEP B	$35.00
Acthib/Hiberix - HIB (Flu Type B)	$20.00
Vaxelis (DTaP, HIB, Polio & HEB B)	$155.00
Rototeq/Rotarix (Rotavirus)	$145.00
Proquad (MMR & Varicella)	$280.00
Prevnar20/Vaxneuvance 15 (Pneumococcal Conjugate)	$270.00
Pneumovax 23 (PPSV23-Pneumococcal Conjugate)	$125.00
MMR II	$95.00
Varivax (Varicella)	$185.00
Tenivac (TD-Tetanus & Diptheria)	$45.00
Boostrix/Adacel - TDAP (Tetanus Diptheria and Pertussis)	$50.00
Gardasil (HPV 9)	$315.00
Menqaudfi/Menveo (Meningitis)	$200.00
Trumenba (Meningococcal Group B)	$190.00
Bexsero (Meningococcal Group B)	$220.00
Penbraya (MCV A, C, W, Y & B)	$230.00
Havrix (Adult Hep A)	$80.00
Energix (3-dose Adult Hep B)	$65.00
Heplisav (2-dose Adult Hep B)	$145.00
Abrysvo/Arexvy (Adult RSV)	$300.00
Beyfortus (Infant RSV)	$515.00
RabAvert (Rabies)	$590.00
Imovax (Rabies)	$420.00
Pfizer- Infant (COVID-19)	$65.00
Pfizer- Adolescent (COVID-19)	$90.00
Pfizer- Adult (COVID-19)	$140.00
Moderna- Adult (COVID-19)	$145.00
Shingrix (Shingles)	$220.00
Infant flu	$25.00
Flu	$30.00
High Dose Flu	$70.00
Flublok	$70.00

Exhibit D

Health and Senior Services

	Fee
Yellow Fever	$225.00
Dengue	$70.00
Typhoid (Typhim Vi)	$150.00
Mpox	$275.00
TB Test	$15.00
TB Clinic	$15.00
Pregnancy Test-Urine	$15.00
Pregnancy Test - Blood	$15.00
STD Testing	$30.00
STD Clinic Treatment	$15.00
STD Clinic Retreatment	$15.00
Prep Panel	$70.00
Prep Office Visit	$15.00
Rapid GC/CT	$50.00
Rapid Trichomoniasis	$10.00
Rapid Syphilis	$20.00
Rapid HIV	$25.00
Renal Panel	$4.00
Lipid Panel	$4.00
Comprehensive Metabolic Panel	$4.00
(CMP) Complete Blood Count (CBC)	$3.00
Hemoglobin A1c	$6.00
PSA Total Screen	$8.00
Hepatitis B Surface Ab	$8.00
Hepatitis B Surface Ag	$8.00
Hepatitis C Ag	$9.00
Hepatitis C Ab	$9.00
MMR/Varicella Panel	$36.00
Administration Fees	
Insured	$60.00
TVFC 1=$10, 2=$20, >or= 3 = $30	
Refugee	$0.00
Medicaid/CHIP	$13.75
Medicare Flu or Pneumonia	$60.00

Exhibit E

Animal Services

	Fee
ADOPTION FEES	
Adoption Fees (Includes Micro Chipping)	$50 for Cats; $75 for Dogs
Ducks, Rabbits, Other	$5.00
Surgery Deposit	$100.00
VACCINES AND MEDICAL FEES	
Rabies ($10 Special Event and $20 Regular)	$10.00 or $20.00
IMPOUNDEMENT FEES	
Impoundment - 1st Offense (altered)	$25.00
Impoundment - 1st Offense (unaltered)	$100.00
Impoundment - 2nd Offense (altered)	$50.00
Impoundment - 2nd Offense (unaltered)	$150.00
Impoundment - 3rd Offense (altered)	$75.00
Impoundment - 3rd Offense (unaltered)	$200.00
Livestock Impoundment	$150.00
BOARDING & QUARINTINE	
Boarding (per day)	$10.00
Quarantine Fees (minimum of 10 days)	$10.00/day
PICK-UP FEES	
Pickup Fee - Owner Release	$15.00
Pickup Fee -Owner Release (additional animals)	$5.00/each
Pickup Fee -Owner release (litter)	$100.00
Pickup Fee - Deceased	$10.00
Pickup Fee - Dead Small Livestock	$50.00
Pickup Fee- Deceased Livestock	$150.00
MISCELLANEOUS FEES	
Drop off Fee - Owner Release	$25.00
Rabies Specimen Shipping	$100.00
Dangerous Dog Yearly Registration	$50.00
Off Leash Training Permit	$5.00
MICROCHIPPING	
Microchips	$10.00
PET LICENSES	
Pet License (yearly)	$10.00
Pet License (replacement)	$1.00

Exhibit F

Golf Course

	Fee
Green Fee - Weekday	$31.00
Green Fee - Weekend	$36.00
Green Fee - After 4:00PM	$21.00
Green Fee - Weekend AM - 9 Holes	$18.00
Green Fee - Weekday Senior	$20.00
Green Fee - Weekday Senior - 9 Holes	$13.00
Green Fee - Junior/High School/College	$9.50
Green Fee - Senior Annual Pass (Monday- Thursday)	$500.00
Green Fee - Senior w/Annual Pass (per round)	$5.00
Cart Fee - 18 holes per rider (w/tax)	$18.00
Cart Fee - 9 holes per rider (w/tax)	$9.00
Cart Fee - Spectator Cart (limited availability)	$75.00
Cart Fee - Youth Tournament Spectator Cart (full cart)	$36.00
Tournament Fee - Weekday (per player)	$55.00
Tournament Fee - Weekend (per player)	$65.00
Tournament Cooker Fee (per player) - Revenue to Concessionaire	$5.00
Range Balls - Small Bucket (w/tax)	$9.00
Range Balls - Medium Bucket (w/tax)	$11.00
Range Balls - Large Bucket (w/tax)	$16.00
Range Balls - Tournament Bucket (w/tax)	$5.00
No Show Fee (per reservation)	$50.00
Club Rental	$40.00
Pull Cart Rental	$5.00

Exhibit G

Planning

	Fee
PRELIMINARY PLAT APPLICATION	
Sketch Plan Application (1st review)	$225.00
Sketch Plan Application (2nd review)	$100.00
Preliminary Plat Application (up to 50 acres)	$350.00
Preliminary Plat Application (over 50 acres)	$500.00
Preliminary Plat Reinstatement	$50.00
FINAL PLAT APPLICATION	
Standard Plat or Residential Up to 50 acres (plus $1 per page)	$355.00
Standard Plat or Residential Over 50 acres (plus $1 per page)	$505.00
Administrative Plat	$250.00
Digital File Conversion Fee	$50.00
Recording Fees- Plats Up to 18"x24"	$60.00
Recording Fees- Plats Over 18"x24"	$80.00
Related Documents	$26.00
30-day Extension for Plat	$50.00
REPLAT	
Replat with Public Hearing	$250.00
Replat without Public Hearing	$250.00
ANNEXATION/ZONE CHANGE APPLICATION	
Standard Zone Change	$500.00
Planned District Zone Change	$650.00
Multiple PD Proposal Basic	$550.00
Multiple PD Proposal Per Additional District	$100.00
Additional PD Regulations	$75.00
Site Plan in PDF Format for City Council	$50.00
Application Fee	$500.00
Zoning Board of Appeal Fee	$600.00
Special Exception Application Fee	$500.00
Zone Change in Council District 2 from MF-22, Multiple-Family Dwelling District or C, Commercial District to SF-1, Single-Family Dwelling District, SF-2, Single-Family Dwelling District, or SF-3, Single-Family Dwelling District	$0.00
Zoning Verification Letter	$25.00
OIL AND GAS	
Amendment Fee	$1,000.00
Certification Fee & Inspection	$300.00
Oil & Gas Application Fee	$4,000.00
Well Transfer Fee	$500.00
Appeal Fee (takings)	$250.00

***TX State HB-40 recognizes Ordinance 8769 including fees and may not be amended**

Exhibit G

Planning

	Fee
CREDIT ACCESS BUSINESS	
Application Fee	$50.00
SPECIFIC USE PERMIT (SUP) / SPECIFICATION USE DESIGNATION (SUD)	
Application for SUP/SUD with Term for Alcoholic Beverage	$300.00
Application for General SUP/SUD	$400.00
Renewal SUP/SUD	$75.00
TEMPORARY MOBILE HOME	
Special Temporary Permit for Manufactured Home App (Based on Genuine Hardship Condition)	$50.00
Special Temporary Permit for Manufactured Home App (For Occupancy by a Caretaker, Manager, or Guard)	$100.00
RESTRICTED MASSAGE ESTABLISHMENT	
Restricted Massage Establishment License (2 year term)	$540.00
Request Exemption from Restricted Massage Establishment Licens	$120.00
DEDICATIONS	
Review Fee	$400.00
VACATION	
Application Fee	$400.00
CREATION OF A BUILDING SITE	
Application Fee	$400.00
MASTER SIGN PLAN	
Application Fee	$300.00
TRAFFIC IMPACT	
Traffic Impact (Staff Study)	$350.00
Traffic Impact (Review of Submittal)	$600.00
PORTABLE STORAGE CONTAINERS	
Freight or Portable storage cont.- permit fee	$125.00
Each add'l on same property	$25.00
90- day permit fee for storage container	$150.00
Each add'l container	$25.00
45- day permit fee for storage container	$125.00
Each add'l container	$25.00
30 day permit fee for storage container	$75.00
CERTIFICATE OF OCCUPANCY AND COMPLIANCE	
Certificate of occupancy and compliance	$10.00

Exhibit H

Code Enforcement

	Fee
BUILDING PERMITS	
COMMERCIAL	
Commercial Construction Permit Fee Based Upon Valuation:	
$0-$20,000	$100.00
$20,001 and Up	$100 for first $20k+ $3.5k for each add'l $1k or part thereof
RESIDENTIAL	
Construction Permit Fee	31.5 cents per sq.ft.
Sidewalk/ROW Residential (no building permit)	$50.00
Sidewalk/ROW Commercial (no building permit)	$200.00
Fence Fee	$50.00
Manufactured Home	$200.00
Manufactured Home Skirting Deposit	$100.00
Moving Fee	$200.00
Non-Profit Residential	$150.00
Temporary Structure	$100.00
Detached Accessory (120 sq.ft. or less)	$50.00
Detached Accessory (120 sq.ft. to 200 sq.ft.) **DEMOLITION**	$100.00
PERMITS	
Commercial Demo Fee - Building	$500.00
Commercial Demo Fee - Interior	$100.00
Residential or Accessory Building	$50.00
TEMPORARY SIGN PERMITS	
Permanent Sign Permits	$50.00
Temporary Sign Annual Permit Fee	$50.00
Failure to Remove Sign (hauling fee)	$50.00
Failure to Remove Sign (daily storage fee)	$10.00
OIL & GAS DRILLING PERMITS	
Amendment Fee	$1,000.00
Certification Fee & Inspection	$300.00
Oil & Gas Application Fee	$4,000.00
Well Transfer Fee	$500.00
***TX State HB-40 recognizes Ordinance 8769 including fees and may not be amended**	
MOBILE HOME PARK LICENSES	
Mobile Home Park Licenses	$25.00 plus $1 ea./addl
CERITIDICATE OF OCCUPANCY	
Certificate of Occupancy	$50.00
LOT DEPOSITS	
Clearing Deposits (Floor & Foundation) Commercial	$2,000.00
Clearing Deposits (Floor & Foundation) Residential	$600.00
Clearing Deposits (Rubbish, Litter, Lot)	$200.00

Exhibit H

Code Enforcement

	Fee
Clearing Deposit (Accessory Bldg., Debris, Material)	$200.00
LOT CLEARING	
Administrative Fee (per cas)	$150.00
Mow Lot 12,000 Square Feet or Less (per lot)	$175.00
Mow Lot Larger Than 12,000 Square Feet (per lot)	$275.00
Mow Lot (larger than 1 acre, per acre)	$400.00
Mow Weeds in Alley or Right-of-Way (per lot frontage)	$50.00
Trash Removal (per ton)	$110.00
Auto or Pick-Up Tire Removal (per tire)	$8.00
Semi-Truck or Similar Large Tire Removal (per tire)	$12.00
Tree Trimming (per hour)	$50.00
Graffiti Removal (per lot)	$100.00
Notwithstanding the foregoing, if any of the aforementioned "Lot Clearing" services is performed by a City contractor, the fee for such service shall be the fee charged to the City by the contractor.	
ELECTRICAL FEES	
Minimum Fee	$50.00
Temporary Service	$50.00
Temporary Construction Pole	$50.00
Parking Lot Wiring	$50.00
Building Wiring	$0.05 per sq.ft
Service Change	$50.00
Sign Electrical Fee	$50.00
Electrical Fixture Fee (for first, $1.00 each after)	$15.00
Mobile Home Rewiring ($5 for each add'l)	$50.00
Clearance for Elec Connect/Disconnect Residential Reinspection (red tag)	$50.00
MECHANICAL FEES (when not part of building permit) Minimum Fee	$50.00
Inspection for Heating, AC, Venting, Ductwork, Fridge ($5 for each add'l inspection)	$50.00
Fire Extinguishing Permit	$50.00
Boiler Inspections (33K to 1165 BTU)	$50.00
Boiler Inspections (1165K to 3300 BTU)	$50.00
Boiler Inspections (over 3300 BTU)	$50.00
Reinspection (red tag)	

Exhibit H

Code Enforcement

	Fee
GAS FEES (when not part of building permit	
Minimum Fee	$50.00
Floor Furnace, Boiler	$50.00
Vented Recessed Heater	$50.00
Gas Line Service	$50.00
Vented Appliance ($10 each add'l)	$50.00
Temporary Connection	$50.00
Reinspection (red tag)	$50.00
PLUMBING FEES (when not part of building permit)	
Minimum Fee	$50.00
Furnace, Unit or Wall Heater ($10 each add'l) Water	$50.00
Heater ($10 each add'l)	$50.00
Water Softener	$50.00
Lawn Sprinkler	$50.00
Water Line Service	$50.00
Sewer Line Service	$50.00
Replumb Building	$0.05 Sq. Ft.
Fire Sprinkler	$0.05 Sq. Ft.
Backflow Assembly Device ($10 each add'l)	$50.00
Reinspection (red tag)	$30.00
VENDOR PERMIT	
Vendor Permit	$100.00
WATER WELL FEE	
Drill New Well	$50.00
REINSPECTION FEE	
Reinspection (all permits)	$100.00
APPLICATION TO BOARD OF APPEALS	
Application	$200.00
PUBLIC WAYS AND PROPERTY	
House Moving Permit Fee	$25.00
Network Nodes-5 in Same Application	$500.00
Each Additional Node in Application	$250.00
Node Support Pole Application	$1,000.00
Fee to Attach Network Node to Public ROW Pole	$20.00

Exhibit I

Engineering

	Fee
TRAFFIC	
Street Name and Traffic Control Sign Fee	$650/intersection
Right of Way Use Permit Fee	$350.00

Exhibit J

Water & Sewer Fees

	Fee
WATER RATES INSIDE CITY	
Base Rate for All Except Apartments for First 2,000 Gallons	$23.26
Base Rate for Apartments per Unit for First 2,000 Gallons Per Unit	$18.94
Rate Per 1,000 gallons Over Base of 2,000 Up to 10,000	$6.58
Rate Per 1,000 Gallons From 10,001 Up to 25,000	$8.64
Rate Per 1,000 gallons From 25,001 Up to 50,000	$11.62
Rate for Over 50,001 (Residential and Non-Essential Water IE: Irrigation)	$14.53
SEWER RATES INSIDE CITY	
All Customers Base Rate (First 2,000 Gallons)	$23.45
All Customers Rate Per 1,000 After Base Rate	$0.94
WATER RATES OUTSIDE CITY	
Base Rate for All Except Apartments for First 2,000 Gallons	$34.89
Base Rate for Apartments Per Unit for First 2,000 Gallons Per Unit	$28.41
Rate Per 1,000 Gallons Over Base of 2,000 Up to 10,000	$9.87
Rate Per 1,000 Gallons from 10,001 Up to 25,000	$12.97
Rate Per 1,000 Gallons From 25,001 Up to 50,000	$17.44
Rate for Over 50,001 (Residential and Non-Essential Water IE: Irrigation)	$21.79
SEWER RATES OUTSIDE CITY	
Residential Base Rate (First 2,000 Gallons)	$35.18
Residential Rate Per 1,000 After Base Rate	$1.42
MISCELLANEOUS	
Septage Waste Hauler Discharges and Fees (per gallon)	$0.33

Exhibit K

Customer Service/Utility Billing

	Fee
ACCOUNT BILLING	
Residential Utility Deposit	$80.72
Re-read of Water Meter (2nd time)	$26.91
Test of Water Meter (2nd time)	$26.91
Non-sufficient Fund Check	$32.29
Reconnect-Disconnect Fee	$32.29
Application Fee	$21.53
Transfer Fee	$20.50
Tampering/Straight Fee (1st time)	$215.25
Tampering/Straight Fee (2nd time)	$322.88
WATER METERS & TAP FEES	
3/4" Water Meter (with existing meter box)	$43.05
1" Water Meter (with existing meter box)	$107.63
1" Water Meter Tap (no paving cut or meter installation)	$419.74
1" Service Charge for Tap and Meter (with meter box)	$457.41
2" Water Meter (with existing meter box)	$258.30
2" Water Meter Tap (no paving cut or meter installation)	$578.10
2" Service Charge for Tap and Meter (with meter box)	$764.14
3" Water Meter	$403.59
4" Water Meter	$384.38
4" Sewer Tap	$376.69
6" Sewer Tap	$410.00
Replacement Sewer Tap (per line)	$307.50
Fee to Abandon Line for Replacement	$153.75
Paving Cut/Boring & Casing Fee	$410.00
Fire Hydrant Meter Setting or Moving	$205.00
Fire Hydrant Meter Deposit Setting	$2,460.00
Drinking Water Testing - Total Coliform (presence or absence)	$18.45
Non-Potable H2O Testing - Total Coliform & E.coli (MPN)	$25.63
Non-Potable H2O Testing - Total Coliform & Fecal Coliform (MPN)	$25.63
Move a Service Line No More Than 5 feet	$153.75

Exhibit L

Sanitation Fees

Inside City Limits

# OF CONTAINERS	NUMBER OF PICKUPS PER WEEK			
	2X	3X	4X	5X
RESIDENTIAL				
0.25	$24.00			
0.5	$48.00			
0.75	$72.00			
1	$96.00			
COMMERCIAL				
0.25	$35.00	$52.50	$70.00	$87.50
0.5	$70.00	$105.00	$140.00	$175.00
0.75	$105.00	$157.50	$210.00	$262.50
1	$140.00	$210.00	$280.00	$350.00
2	$266.00	$399.00	$532.00	$665.00
3	$392.00	$588.00	$784.00	$980.00
4	$518.00	$777.00	$1,036.00	$1,295.00
5	$644.00	$966.00	$1,288.00	$1,610.00
6	$770.00	$1,155.00	$1,540.00	$1,925.00
7	$896.00	$1,344.00	$1,792.00	$2,240.00
8	$1,022.00	$1,533.00	$2,044.00	$2,555.00
9	$1,148.00	$1,722.00	$2,296.00	$2,870.00
10	$1,274.00	$1,911.00	$2,548.00	$3,185.00
11	$1,400.00	$2,100.00	$2,800.00	$3,500.00
12	$1,526.00	$2,289.00	$3,052.00	$3,815.00
13	$1,652.00	$2,478.00	$3,304.00	$4,130.00
14	$1,778.00	$2,667.00	$3,556.00	$4,445.00
15	$1,904.00	$2,856.00	$3,808.00	$4,760.00
16	$2,030.00	$3,045.00	$4,060.00	$5,075.00
17	$2,156.00	$3,234.00	$4,312.00	$5,390.00
18	$2,282.00	$3,423.00	$4,564.00	$5,705.00
19	$2,408.00	$3,612.00	$4,816.00	$6,020.00
20	$2,534.00	$3,801.00	$5,068.00	$6,335.00
21	$2,660.00	$3,990.00	$5,320.00	$6,650.00
22	$2,786.00	$4,179.00	$5,572.00	$6,965.00
23	$2,912.00	$4,368.00	$5,824.00	$7,280.00
24	$3,038.00	$4,557.00	$6,076.00	$7,595.00
25	$3,164.00	$4,746.00	$6,328.00	$7,910.00
26	$3,416.00	$5,124.00	$6,832.00	$8,540.00
27	$3,542.00	$5,313.00	$7,084.00	$8,855.00
28	$3,668.00	$5,502.00	$7,336.00	$9,170.00
29	$3,794.00	$5,691.00	$7,588.00	$9,485.00
30	$3,920.00	$5,880.00	$7,840.00	$9,800.00
PER MONTH				
Recycling Fee	$0.50			
Litter Abatement Fee	$2.00			

Exhibit L

Sanitation Fees

Outside City Limits

# OF CONTAINERS	NUMBER OF PICKUPS PER WEEK			
	2X	3X	4X	5X
RESIDENTIAL				
0.25	$37.00			
0.5	$74.00			
0.75	$111.00			
1	$148.00			
COMMERCIAL				
0.25	$52.50	$78.75	$105.00	$131.25
0.5	$105.00	$157.50	$210.00	$262.50
0.75	$157.50	$236.25	$315.00	$393.75
1	$210.00	$315.00	$420.00	$525.00
2	$399.00	$598.50	$798.00	$997.50
3	$588.00	$882.00	$1,176.00	$1,470.00
4	$777.00	$1,165.50	$1,554.00	$1,942.50
5	$966.00	$1,449.00	$1,932.00	$2,415.00
6	$1,155.00	$1,732.50	$2,310.00	$2,887.50
7	$1,344.00	$2,016.00	$2,688.00	$3,360.00
8	$1,533.00	$2,299.50	$3,066.00	$3,832.50
9	$1,722.00	$2,583.00	$3,444.00	$4,305.00
10	$1,911.00	$2,866.50	$3,822.00	$4,777.50
11	$2,100.00	$3,150.00	$4,200.00	$5,250.00
12	$2,289.00	$3,433.50	$4,578.00	$5,722.50
13	$2,478.00	$3,717.00	$4,956.00	$6,195.00
14	$2,667.00	$4,000.50	$5,334.00	$6,667.50
15	$2,856.00	$4,284.00	$5,712.00	$7,140.00
16	$3,045.00	$4,567.50	$6,090.00	$7,612.50
17	$3,234.00	$4,851.00	$6,468.00	$8,085.00
18	$3,423.00	$5,134.50	$6,846.00	$8,557.50
19	$3,612.00	$5,418.00	$7,224.00	$9,030.00
20	$3,801.00	$5,701.50	$7,602.00	$9,502.50
21	$3,990.00	$5,985.00	$7,980.00	$9,975.00
22	$4,179.00	$6,268.50	$8,358.00	$10,447.50
23	$4,368.00	$6,552.00	$8,736.00	$10,920.00
24	$4,557.00	$6,835.50	$9,114.00	$11,392.50
25	$4,746.00	$7,119.00	$9,492.00	$11,865.00

Exhibit L

Sanitation Fees

OPEN TOP/COMPACTOR FEES	
One-Time Set Up Fee (delivery fee)	$51.00 + tax
Daily Rental	$11.00 + tax
Haul Charge	$255.00 + tax
Per Ton Disposal Fee (landfill charge)	$48.80 per ton
ADDITIONAL CART FEE	
Monthly service Fee for Second Cart	$7.00
REMOVAL OF GARBAGE BY OTHER ENTITY	
Garbage Hauler's Permit	$500.00
LANDFILL (DUMPING AND UNLOADING CHARGES)	
Landfill Access Fee	$25.00
Unlimited Landfill Access Fee (year)	$500.00
Minimum Fee Under 1 Ton	$24.40
Per Ton Disposal Fee	$48.80
Materials Not Contained	$75.00
Pull off Fee	$77.00
SPECIAL WASTE/MINOR OF TDH PERMIT	
Special Waste Fee (per ton)	$97.60
Minimum Fee Under 1 Ton	$48.80

Exhibit M

Airport

	Fee
Landing Fees (per 1000 pounds of gross landing weight)	$2.40
Air Carrier Fees (per 1000 pounds of gross landing weight)	Based on Rates & Charges
Public Aircraft Parking – Locally Based Aircraft (month)	$25.00
Public Aircraft Parking – Transient Aircraft (day)	Based on Rates & Charges
Customer Facility Charge - Vehicle Rentals (per transaction day)	$3.00
PUBLIC PARKING – CI (COVERED)	
0-30 Minutes	Free
31-60 Minutes	$3.00
Every Additional Hour	$2.00
Maximum Per 24-Hour Period	$18.00
PUBLIC PARKING – P1 & P3 (CLOSE-IN)	
0-30 Minutes	Free
31-60 Minutes	$2.00
Every Additional Hour	$1.00
Maximum Per 24-Hour Period	$15.00
PUBLIC PARKING – P2 &P4 (ECONOMY)	
0-30 Minutes	Free
31-60 Minutes	$2.00
Every Additional Hour	$1.00
Maximum Per 24-Hour Period	$12.00
PUBLIC PARKING – C2 (REMOTE COVERED)	
0-30 Minutes	Free
31-60 Minutes	$2.00
Every Additional Hour	$1.00
Maximum Per 24-Hour Period	$14.00
PUBLIC PARKING – P5 (REMOT ECONOMY)	
0-30 Minutes	Free
31-60 Minutes	$2.00
Every Additional Hour	$1.00
Maximum Per 24-Hour Period	$10.00
GROUND TRANSPORTATION PERMITS (PER MONTH, PER	
Taxicab	$25.00
Buses	$25.00
Courtesy vehicles for Off-Airport Hotel	$25.00
Courtesy Vehicles for Off-Airport Car Rental (plus 10% airport revenue)	$25.00
Courtesy Vehicles for Off-Airport Parking Lot (plus 10% airport revenue)	$25.00

Exhibit M

Airport

	Fee
EMPLOYEE PARKING	
Annual Employee Parking Media (prorated monthly)	$50.00

SPECIAL ASSESSMENTS

1. Should any person upon driving a vehicle from the paid parking areas of the airport not be able to present an officially issued ticket indicating where that person's vehicle was parked and at what time, then the charge assessed for the parking of that vehicle shall be at least $12.00. In addition to that fee, there shall also be a fee assessed for the parking of that vehicle equal to the amount of the daily rate, times number of days, for the area in which that vehicle was parked as is indicated by the daily lot inventory taken by the airport administration.

2. Whenever a person or an entity shall pay for the parking fees assessed by this Section with a check or draft, and that check or draft is dishonored, then there shall be an additional $25.00 assessed against that person or entity.

Exhibit N

Sports Complex

	Fee
FOOTBALL/SOCCER STADIUM	
Sporting Events	
Half Stadium Rental	$1,500.00/day
Half Stadium Rental No Suites with Guarantee of Five Games	$750/day
Whole Stadium Rental	$3,000.00/day
All Inclusive Football Game Package	$10,000.00/game
This package includes a whole stadium rental, cleaning, lighting, game officials and staff, operators, security, EMS, and UIL fees, if necessary.	
Non-Sporting Events	
Non-Profit Deposit	$1,500.00
Non-Profit Rental	$1,500.00/day
Commercial Deposit	$2,500.00
Commercial Rental	$2,500.00/day
Cleaning Fees	
Less Than 2,000 People	$1,500/side
Less Than 2,000 People with Guarantee of Five Events No Suites	$750/side
More Than 2,000 People	$2,500/side
Lighting Fee	$75.00/hour
BASEBALL STADIUM	
Baseball Events	$750.00/day
Non-Baseball Events	
Non-Profit Deposit	$1,000.00
Non-Profit Rental	$1,000.00/day
Commercial Deposit	$1,500.00
Commercial Rental	$1,500/day
Cleaning Fees Assessed By Midland Rockhounds	
Lighting Fee	$75.00/hour
Groundskeeper and Grounds Material Fees Assessed By Midland Rockhounds	
Diamond Club Deposit	$100.00
Diamond Club Rental (minimum 2 hours)	$50.00/hour
Diamond Club Cleaning Fee (payable to Midland Rockhounds)	$150.00 hourly
OPERATOR FEES FOR BASEBALL AND FOOTBALL/SOCCER STADIUMS	
Video Board Operator	$50.00
Scoreboard Operator	$50.00
PA Announcer	$50.00
Camera Operator	$45.00
Replay Technician	$45.00
Sound Operator	$45.00

Temporary Fence Set Up on Artificial Turf Field **SSC**	$45.00
- COMMON AREA/PARKING LOT RENTALS Pavilion	
Non-Profit Deposit	
Non-Profit Rental	$1,500.00
Commercial Deposit	$1,500/day
Commercial Rental	$2,000.00
Parking Lot Only	$2,000/day
Parking Lot Deposit	
Set Up/Tear Down	$1,000.00
Rental Fee	$1,000/day
Cleaning Fees - Common Area/Parking Lot Rentals	$1,500/day
Less Than 1,000 People	
1,001 to 2,500 People	$1,000.00
More Than 2,500 People	$1,500.00
SSC - AUXILIARY FIELDS	$2,000.00
Non-Tournament Fees	
Deposit	
Field Rental	$100.00
Tournament Fees	$75.00/hour
Deposit	$100.00/field
Rental	$35/team with min. of $500/field
Cleaning Fee	$150.00/field/per day
Lighting Fee	$25.00/hour
Concession Stand Deposit	$100.00
Game Cleaning Fee	$75/field/per day
Concession Stand Rental	$25.00/hour

Exhibit O

Miscellaneous

	Fee
COURT FEES	
Municipal Court Building Security Fee	$3.00
Municipal Court Technology Fee	$4.00
Municipal Court Copy Fee	$1.00 per page
BUSINESS REGULATIONS	
Closing Out Sale License Fees - 30 Days	$100.00
Closing Out Sale License Fees - 60 Days	$125.00
Closing Out Sale License Fees - 90 Days	$150.00
Door to Door Solicitors (Peddler) License (valid for 6 months)	$125.00
Door to Door Solicitors (Peddler) License (renewal)	$125.00
Background Check for Door to Door Solicitor License (valid for 1 year)	$10.00
Mobile Home/Travel Trailer Park Application Fee	$10.00
Mobile Home/Travel Trailer Park License	$25 plus $1 each space
Mobile Home Mini Park Location Application	$10.00
Mobile Home Mini Park Revised Site plan	$10.00
City Chauffeur's License Application Fee	$25.00
Airport Cabstand Permit Fee (per month)	$25.00
Special Police Officer License Fee (individual)	$10.00
Special Police Officer License Fee (firm)	$50.00
Carnival Operator's License	$100.00
Carnival Employee's License	$6.00
Side Walk Sale Application Fee	$4.00
POLICE REGULATIONS	
Alarm Permit Application Fee (commercial)	$25.00
Alarm Permit Application Fee (residential)	$20.00
Alarm Permit Renewal Fee (commercial)	$20.00
Alarm Permit Renewal Fee (residential)	$15.00
Alarm Permit Service Fee	$50.00
FRANCHISES	
Telecomm Carrier on Public ROW Regular Fee	$25.00
Franchise Application and Review Fee	$500.00
Franchise Renewal Application and Review Fee	$500.00

Exhibit P

Right of Way

R*ight-of-Way License Fees and Rates for Crossing Property or Public Right-Of-Way Owned By the City of Midland.*

Fees (non-refundable)	
Application Fee	$ 1,500.00
Application Fee of Expired License	$ 1,500.00

The City of Midland's Rate and Damage Schedule is 200% of the Then-Current University Lands Rate and Damage Schedule for a 10-Year License

Fees and Rates Will Be Paid at the Commencement of the 10-Year License in One Payment

Exhibit Q

Fire and EMS

	Fee
EMS	
Ambulance Services - Basic Life Support (non emergency)	$700 + $15 per mile
Ambulance Services- Basic Life Support (emergency)	$1000 + $15 per mile
Ambulance Services- Advanced Life Support (non emergency)	$800 + $15 per mile
Ambulance Services- Advanced Life Support (emergency)	$1200 + $15 per mile
Ambulance Services- Advanced Life Support (level II)	$1400 + $15 per mile
Ambulance Services - Specialty Care Transport	$1600 + $15 per mile
Ambulance Waiting Charge	$200 per hour
Ambulance Service - Outside Midland County	$100.00
Advanced Life Support Disposables	$110.00
Basic Life Support Disposables	$80.00
Oxygen	$60.00
IV Supplies	$50.00
Defibrillation	$75.00
Intubation	$125.00
Fire Inspection	
Food Truck Fire Inspection	$50 per inspection annually
Motor Vehicle Incidents	
Motor Vehicle Incident (Level 1)	$500.00
Motor Vehicle Incident (Level 2)	$575.00
Motor Vehicle Incident (Level 3)	$700.00
Motor Vehicle Incident (Level 4)	$1,800.00
Motor Vehicle Incident (Level 5)	$2,200.00
Car Fire	$800.00
Add-On Services	
Extrication (Add-On)	$1,650.00
Landing Zone (Add-On)	$500.00
Hazardous Materials (HAZMAT) Incidents	
HAZMAT Level 1	$900.00
HAZMAT Level 2	$3,200.00
HAZMAT Level 3	$7,500.00
Equipment and Personnel (Hourly Rates)	
Fire Engine (per hour)	$400.00
Ladder Truck (per hour)	$500.00
Rescue Truck (per hour)	$500.00
Command Unit (per hour)	$100.00
Water Tender (per hour)	$150.00
Firefighter (per hour)	$50.00
Driver/Engineer (per hour)	$65.00

Exhibit Q

Fire and EMS

		Fee
Officer (per hour)		$80.00
Chief Officer (per hour)		$100.00
Paramedic (per hour)		$65.00
Inspector/Investigator (per hour)		$80.00
Misc. Equipment (per hour) $350		$350.00
Other Services		
False Fire Alarm		$200.00
Fire Investigation		$350/hr.
Water/Technical Rescue	$500/hr.	
Advanced Water Rescue		$2,000/hr.
Industrial Rescue		$500/hr.
Supplies (Used/Damaged)		Cost + 10%

Exhibit R

Credit Card Fees

The City of Midland will apply a 3.5% fee to all transactions paid by credit card, based on the total amount being paid.

MIDLAND
Be the Energy!

CITY OF MIDLAND
2026 FEE SCHEDULE



TABLE OF CONTENTS

City Secretary..... 3

Parks..... 3

Recreation..... 6

Health and Senior Services..... 8

Animal Services..... 13

Golf Course..... 15

Planning..... 16

Code Enforcement..... 19

Engineering..... 23

Water and Sewer..... 23

Drainage..... 24

Customer Service/Utility Billing..... 25

Sanitation..... 27

Airport..... 30

Sports Complex..... 32

Misc..... 35

Right of Way..... 37

Credit Card Fee..... 38

CITY SECRETARY

Business Regulations

Junk and Secondhand Goods License - Original	$25.00
Renewal of Junk and Secondhand Goods License	$10.00
Alcoholic Beverage License Fee	1/2 of State Fee
Taxicab Annual Operating Fee (each)	$200.00
Limo or Shuttle Operating Fee (each)	$100.00

PARKS

Showmobile

Deposit	$1,000.00
Rental Fee (minimum of 4 hours)	$75.00/hour
Extensions	$100.00
Show Lights	$200.00
Deposit for Show Lights	$500.00

Portable Bleachers

Deposit	$100.00
Rental Fee (per day)	$100.00

Portable Stage

Deposit	$100.00
Rental Fee	$250.00

Trash Cans

Deposit	$100.00
Rental Fee (minimum of 10 cans)	$5.00/can/day

Park Pavillion Rental

Deposit	$100.00
Rental Fee 9AM-10PM	$60.00
Rental Fee 9AM-3PM	$30.00
Rental Fee 4PM-10PM	$40.00

Beal Ranch House

Deposit w/o Alcohol	$300.00
Deposit w/ Alcohol	$500.00
Rental Fee per hour	$50.00

Gazebo Rentals - Wadley and Beal

Deposit	$100.00
Rental Fee 9AM-3PM	$50.00
Rental Fee 4PM-10PM	$50.00
Rental Fee 9AM-10PM	$100.00

Baseball/Softball Field Rentals

Artificial Turf Fields Rental Fee	$75.00/hour
Deposit for Artificial Turf Field Rental	$100.00
Natural Turf Field Rental Fee	$25.00/hour
Lights	$25.00/hour
Tournament Fee	$35.00/team
Tournament Cleaning Fee	$150.00/field
Tournament Deposit	$100.00/field
Temporary Fence Set Up on Artificial Turf Field	$200.00/field
Game Cleaning Fee	$75.00/Field

Football/Soccer Field Rentals

Artificial Turf Fields Rental Fee	$65.00/hour
Deposit for Artificial Turf Field Rental	$100.00
Natural Turf Field Rental Fee	$25.00/hour
Lights	$25.00/hour
Tournament Fee	$35.00/team with a min. of $500/field
Tournament Cleaning Fee	$150.00/field
Tournament Deposit	$100.00/field
Game Cleaning Fee	$75.00/Field

Concession Rentals

Concession Stand Deposit	$100.00
Concession Stand Rental	$25.00/hour

Ulmer Sand Volleyball Court

Deposit	$25.00
Rental Fee	$25.00/day

Whitehouse Rental

Deposit	$200.00
Rental Fee 10AM-4PM	$200.00
Rental Fee 6PM-12AM	$200.00
Rental Fee All Day	$400.00



RECREATION

City Pool Rates

Entry Fee	$5.00
Children Under 2	Free
10 Punch Card	$30.00
25 Punch Card	$62.50
50 Punch Card	$100.00
Personal Cooler Admission	$10.00
Soda	$3.00
Water	$2.00
Snacks	$2.00
Ice Cream	$4.00
Swim Lesson (1 week)	$25.00
Life Jacket Rental	Free

Private Rentals

Deposit	$150.00
Rental Fee (2 hours)	$900.00

Pool Pavilion Rentals

(Doug Russel Only)

Deposit	$150.00
Rental Fee	$100/session

Martin Luther King Recreation Center

Activity Room (per hour)

During Operation	$25.00
After Hours	$50.00
Deposit	$100.00

Activity Room w/ Game Room (per hour)

During Operation	$50.00
After Hours	$70.00
Deposit	$300.00

Auditorium (per hour)

During Operation	$50.00
After Hours	$75.00
Deposit w/o Alcohol	$500.00
Deposit w/ Alcohol	$750.00

Gymnasium (per hour)

During Operation	$40.00
After Hours	$60.00
Deposit	$200.00
MLK Volleyball Net Setup Fee	$15.00

Training Room (per hour)

Sporting Events ONLY

During Operation	$50.00
After Hours	$75.00
Deposit	$1,000.00
Daily Entrance Fee	$1.00
Monthly Membership	$15.00

Movie Screen

Deposit	$1,000.00
Fee (maximum 4 hours)	$500.00



HEALTH & SENIOR SERVICES

Environmental Section

Mobile Food Vendor

Mobile Food Vendor	$175.00
Mobile Food (seasonal)	$105.00
Temporary Permit	$70.00
Late Fee (when not paid by specified date)	25% of Permit Fee
Illegal Food Vendors (1st offense)	$50.00
Illegal Food Vendors (2nd offense) - Within a Rolling 12-Month Period After the 1st Offense	$100.00
Illegal Food Vendors (3rd offense and beyond) - Within a Rolling 12-Month Period After the 1st Offense	$200.00

Food Services Establishments

1 Thru 5 Employees	$150.00
6 Thru 10 Employees	$200.00
11 or More Employees	$250.00
Deli/Meat Market/Bakery	$75.00
Farmers Market	$50.00
Late Fee (when not paid by specified date)	25% of Permit Fee

Retail Food Store

1 Thru 5 Employees	$150.00
6 Thru 10 Employees	$200.00
11 Or More Employees	$250.00
Temporary Permit	$70.00
Late Fee (when not paid by specified date)	25% of Permit Fee

Child Care Programs

Day Care	$100.00
Foster Care	$50.00
Child Care Program for After School	$50.00
Late Fee (when not paid by specified date)	25% of Permit Fee

Swimming Pool, Spa, or Water Feature Permit

Swimming Pool or Spa Permit	$100.00
Water Feature Permit	$100.00
Non-Profit Yearly	$30.00
Non-Profit Temporary	$30.00
Re-Inspection (when establishment is shut down)	$75.00
Late Fee (when not paid by specified date)	25% of Permit Fee

Septic System Inspections

Septic System Residential	$150.00
Septic System Commercial	$210.00
Late Fee (when not paid by specified date)	25% of Permit Fee
Septic Re-Inspection (when fails initial inspection)	$75.00
Septic Systems Without an Inspection (1st offense)	$100.00
Septic Systems Without an Inspection (2nd offense) - Within a Rolling 12-Month Period After the 1st Offense	$200.00
Septic Systems Without an Inspection (3rd offense and beyond) - Within a Rolling 12-Month Period After the 1st Offense	$400.00

Permits and Inspections

Operating w/o a Valid Health Permit (1st offense)	$100.00
Operating w/o a Valid Health Permit (2nd Offense) - Within a Rolling 12-Month Period After the 1st Offense	$200.00
Operating w/o a Valid Health Permit (3rd offense and beyond) - Within a Rolling 12-Month Period After the 1st Offense	$400.00
Re-Inspection (all services)	$75.00



Clinical Section

Health Department Services

Infanrix/Daptacel (DTaP)	$45.00
Kinrix (DTaP & Polio)	$65.00
Pentacel (DTaP & Polio & Flu Type B)	$120.00
Pediarix (DTAP, Hep B, & IPV)	$100.00
IPOL IPV (Polio)	$45.00
Haverix Pedi HEP A	$40.00
Engerix Pedi HEP B	$35.00
Acthib/Hiberix - HIB (Flu ype B)	$20.00
Vaxelis (DTaP, HIB, Polio & HEB B)	$155.00
Rototeq/Rotarix (Rotavirus)	$145.00
Proquad (MMR & Varicella)	$280.00
Prevnar20/Vaxneuvance 15 (Pneumococcal Conjugate)	$270.00
Pneumovax 23 (PPSV23-Pneumococcal Conjugate)	$125.00
MMR II	$95.00
Varivax (Varicella)	$185.00
Tenivac (TD-Tetanus & Diptheria)	$45.00
Boostrix/Adacel - TDAP (Tetanus Diptheria and Pertussis)	$50.00
Gardasil (HPV 9)	$315.00
Menqaudfi/Menveo (Meningitis)	$200.00
Trumenba (Meningococcal Group B)	$190.00
Bexsero (Meningococcal Group B)	$220.00
Penbraya (MCV A, C, W, Y, & B)	$230.00
Havrix (Adult Hep A)	$80.00
Energix (3-dose Adult Hep B)	$65.00
Heplisav (2-dose Adult Hep B)	$145.00
Abrysvo/Arexvy (Adult RSV)	$300.00
Beyfortus (Infant RSV)	$515.00

RabAvert (Rabies)	$590.00
Imovax (Rabies)	$420.00
Pfizer- Infant (COVID-19)	$65.00
Pfizer- Adolescent (COVID-19)	$90.00
Pfizer- Adult (COVID-19)	$140.00
Moderna -Adult (COVID-19)	$145.00
Shingrix (Shingles)	$220.00
Infant flu	$25.00
Flu	$30.00
High Dose Flu	$70.00
Flublok	$70.00
Yellow Fever	$225.00
Dengue	$70.00
Typhoid(TyphimVi)	$150.00
Mpox	$275.00
TB Test	$15.00
TB Clinic	$15.00
Pregnancy Test - Urine	$15.00
Pregnancy Test - Blood	$15.00
STD Testing	$30.00
STD Clinic Treatment	$15.00
STD Clinic Retreatment	$15.00
Prep Panel	$70.00
Prep Office Visit	$15.00
Rapid GC/CT	$50.00
Rapid Trichomoniasis	$10.00
Rapid Syphilis	$20.00
Rapid HIV	$25.00
Renal Panel	$4.00
Lipid Panel	$4.00
Comprehensive Metobolic Panel (CMP)	$4.00

Complete Blood Count (CBC)	$3.00
Hemoglobin A1c	$6.00
PSA Total Screen	$8.00
Hepatitis B Surface Ab	$8.00
Hepatitis B Surface Ag	$8.00
Hepatitis C Ag	$9.00
Hepatisis C Ab	$9.00
MMR/Varicella Panel	$36.00
Administration Fees	
Insured	$60.00
TVFC 1=$10, 2=$20, >or= 3 = $30	
Refugee	$0.00
Medicaid/CHIP	$13.75
Medicare Flu or Pneumonia	$60.00



ANIMAL SERVICES

Adoption Fees

Adoption Fees (includes micro chipping) Ducks,	$50 for Cats; $75 for Dogs
Rabbits, Other	$5.00

Vaccines and Medical Fees

Rabies ($10 special event and $20 regular)	$10.00 or $20.00

Impoundment Fees

Impoundment - 1st Offense (altered)	$25.00
Impoundment - 1st Offense (unaltered)	$100.00
Impoundment - 2nd Offense (altered)	$50.00
Impoundment - 2nd Offense (unaltered)	$150.00
Impoundment - 3rd+ Offense (altered)	$75.00
Impoundment - 3rd+ Offense (unaltered)	$100.00
Livestock Impoundment	$150.00

Boarding and Quarantine

Boarding (per day)	$10.00
Quarantine Fees (minimum of 10 days)	$10.00/day

Pick-up Fees

Pickup Fee - Owner Release	$15.00
Pickup Fee - Owner Release (additional animals)	$5.00/each
Pickup Fee - Deceased	$10.00
Pickup Fee - Dead Small Livestock	$50.00
Pickup Fee- Deceased Livestock	$150.00



Miscellaneous Fees

Drop Off Fee - Owner Release	$10.00
Rabies Specimen Shipping	$100.00
Dangerous Dog Yearly Registration	$50.00
Off Leash Training Permit	$5.00

Microchipping

Microchips	$10.00

Pet Licenses

Pet License (yearly)	$10.00
Pet License (replacement)	$1.00



GOLF COURSE

Green Fee - Weekday	$31.00
Green Fee - Weekend	$36.00
Green Fee - After 4:00PM	$21.00
Green Fee - Weekend AM - 9 Holes	$18.00
Green Fee - Weekday Senior	$20.00
Green Fee - Weekday Senior - 9 Holes	$13.00
Green Fee - Junior/High School/College	$9.50
Green Fee - Senior Annual Pass (Monday- Thursday)	$500.00
Green Fee - Senior w/ Annual Pass (per round)	$5.00
Cart Fee - 18 holes per rider (w/tax)	$18.00
Cart Fee - 9 holes per rider (w/tax)	$9.00
Cart Fee - Spectator Cart (limited availability)	$75.00
Cart Fee - Youth Tournament Spectator Cart (full cart)	$36.00
Tournament Fee - Weekday (per player)	$55.00
Tournament Fee - Weekend (per player)	$65.00
Tournament Cooker Fee, Per Player (revenue to concessionaire)	$5.00
Range Balls - Small Bucket (w/tax)	$9.00
Range Balls - Medium Bucket (w/tax)	$11.00
Range Balls - Large Bucket (w/tax)	$16.00
Range Balls - Tournament Bucket (w/tax)	$5.00
No Show Fee (per reservation)	$50.00
Club Rental	$40.00
Pull Cart Rental	$5.00



PLANNING

Preliminary Plat Application

Sketch Plan Application (1st review)	$225.00
Sketch Plan Application (2nd review)	$100.00
Preliminary Plat Application (up to 50 acres)	$350.00
Preliminary Plat Application (over 50 acres)	$500.00
Preliminary Plat Reinstatement	$50.00

Final Plat Application

Standard Plat or Residential up to 50 acres (plus $1 per page)	$355.00
Standard Plat or Residential over 50 acres (plus $1 per page)	$505.00
Administrative Plat	$250.00
Digital File Conversion Fee	$50.00
Recording Fees - Plats Up to 18”x24”	$60.00
Recording Fees - Plats Over 18”x24”	$80.00
Related Documents	$26.00
30-day Extension for Plat	$50.00

Replat

Replat with Public Hearing	$250.00
Replat without Public Hearing	$250.00

Annexation/Zone Change Application

Standard Zone Change	$500.00
Planned District Zone Change	$650.00
Multiple PD Proposal Basic	$550.00
Multiple PD Proposal Per Additional District	$100.00
Additional PD Regulations	$75.00
Site Plan in PDF Format for City Council	$50.00
Application Fee	$500.00

Zoning Board of Appeal Fee	$600.00
Special Exception Application Fee	$500.00
Zone Change in Council District 2 from MF-22, Multiple-Family Dwelling District or C, Commercial District to SF-1, Single-Family Dwelling District, SF-2, Single-Family Dwelling District, or SF-3, Single-Family Dwelling District	$0.00
Zoning Verification Letter	$25.00

Oil and Gas

Application for Oil and Gas Permit	$4,000.00
Application for Oil and Gas Variance	$250.00

Credit Access Businesses

Application Fee	$50.00

Specific Use Permit (SUP) / Specific Use Designation (SUD)

Application for SUP/SUD with Term for Alcoholic Beverage	$300.00
Application for General SUP/SUD	$400.00
Renewal SUP/SUD	$75.00

Temporary Mobile Home

Special Temporary Permit for Manufactured Home App (Based on Genuine Hardship Condition)	$50.00
Special Temporary Permit for Manufactured Home App (For Occupancy by a Caretaker, Manager, or Guard)	$100.00

Restricted Massage Establishment

Restricted Massage Establishment License (2 year term)	$540.00
Request Exemption from Restricted Massage Establishment License	$120.00

Dedications

Review Fee	$400.00

Vacation

Application Fee	$400.00

Creation of a Building Site

Application Fee	$400.00

Master Sign Plan

Application Fee	$300.00

Traffic Impact

Traffic Impact (staff study)	$350.00
Traffic Impact (review of submittal)	$600.00

Portable Storage Containers

Freight or Portable Storage Cont.- Permit Fee	$125.00
Each Add'l on Same Property	$25.00
90- Day Permit Fee for Storage Container	$150.00
Each Add'l Container	$25.00
45- Day Permit Fee for Storage Container	$125.00
Each Add'l Container	$25.00
30 Day Permit Fee for Storage Container	$75.00

Certificate of Occupancy and Compliance

Certificate of Occupancy and Compliance	$10.00



CODE ENFORCEMENT

Building Permits

Construction Permit Fee	31.5 cents per sq foot
Sidewalk/ROW Residential (no building permit)	$50.00
Sidewalk/ROW Commercial (no building permit)	$200.00
Street Improvement Fee	23 cents per sq foot
Fence Fee	$50.00
Manufactured Home	$200.00
Manufactured Home Skirting Deposit	$100.00
Moving Fee	$200.00
Non-Profit Residential	$150.00
Temporary Structure	$100.00
Detached Accessory (120 sq.ft. or less)	$50.00
Detached Accessory (120 sq.ft to 200 sq.ft.)	$100.00

Demolition Permits

Commercial Demo Fee - Building	$500.00
Commercial Demo Fee - Interior	$100.00
Residential or Accessory Bldg	$50.00

Temporary Sign Permits

Permanent Sign Permits	$50.00
Temporary Sign Annual Permit Fee	$50.00
Failure to Remove Sign - Hauling Fee	$50.00
Failure to Remove Sign - Daily Storage Fee	$10.00

Oil and Gas Drilling Permits

Amendment Fee	$1,000.00
Certification Fee & Inspection	$300.00
Oil & Gas Application Fee	$4,000.00
Well Tranfer Fee	$500.00

***TX State HB-40 recognizes Ordinance 8769 including fees and may not be amended Mobile Home Park Licenses**

Mobile Home Park Licenses	$25.00 plus $1 ea/add

Certificate of Occupancy

Certificate of Occupancy	$50.00

Lot Deposits

Clearing Deposits (Floor & Foundation) Commercial	$2,000.00
Clearing Deposits (Floor & Foundation) Residential	$600.00
Clearing Deposits (Rubbish, Litter, Lot)	$200.00
Clearing Deposit (Accessory Bldg, Debris, Material)	$200.00

Lot Clearing

Administrative Fee (per cas)	$100.00
Mow Lot 12,000 Square Feet or Less (per lot)	$175.00
Mow Lot Larger Than 12,000 Square Feet (per lot)	$275.00
Mow Weeds in Alley or Right-of-Way (per lot frontage)	$50.00
Trash Removal (per ton)	$110.00
Auto or Pick-Up Tire Removal (per tire)	$5.00
Semi-Truck or Similar Large Tire Removal (per tire)	$12.00
Tree Removal and Trimming (per hour)	$75.00
Graffiti Removal (per lot)	$100.00

**Notwithstanding the foregoing, if any of the aforementioned "Lot Clearing" services is performed by a City contractor, the fee for such service shall be the fee charged to the City by the contractor.*



Electrical Fees

Minimum Fee	$50.00
Temporary Service	$50.00
Temporary Construction Pole	$50.00
Parking Lot Wiring	$50.00
Building Wiring	$0.05 per sq.ft
Service Change	$50.00
Sign Electrical Fee	$50.00
Electrical Fixture Fee (for first, $1.00 each after)	$15.00
Mobile Home Rewiring ($5 for each add'l)	$50.00
Clearance for Electrical Connect/Disconnect Residential	$50.00
Re-Inspection (red tag)	$50.00

Mechanical Fees (when not part of building permit)

Minimum Fee	$50.00
Inspection for Heating, AC,Venting,Ductwork,Fridge ($5 for each add'l inspection)	$50.00
Fire Extinguishing Permit	$50.00
Boiler Inspections (33K to 1165 BTU)	$50.00
Boiler Inspections (1165K to 3300 BTU)	$50.00
Boiler Inspections (over 3300 BTU)	$50.00
Re-Inspection (red tag)	$50.00

Gas Fees (when not part of building permit)

Minimum Fee	$50.00
Floor Furnace, Boiler	$50.00
Vented Recessed Heater	$50.00
Gas Line Service	$50.00
Vented Appliance ($10 each add'l)	$50.00
Temporary Connection	$50.00
Re-Inspection (red tag)	$50.00

Plumbing Fees (when not part of building permit)

Minimum Fee	$50.00
Furnace, Unit or Wall Heater ($10 each add'l)	$50.00
Water Heater ($10 each add'l)	$50.00
Water Softener	$50.00
Lawn Sprinkler	$50.00
Water Line Service	$50.00
Sewer Line Service	$50.00
Replumb Bldg	$0.05 Sq Feet
Fire Sprinkler	$0.05 Sq Feet
Backflow Assembly Device ($10 each add'l)	$50.00
Re-Inspection (red tag)	$30.00

Vendor Permit

Vendor Permit	$100.00

Water Well Fee

Drill New Well	$50.00

Re-Inspection Fee

Re-Inspection (all permits)	$100.00

Application to Board of Appeals

Application	$200.00

Public Ways of Property

House Moving Permit Fee	$25.00
Network Nodes-5 in Same Application	$500.00
Each Additional Node in Application	$250.00
Node Support Pole Application	$1,000.00
Fee to Attach Network Node to Public ROW Pole	$20.00

ENGINEERING

Traffic

Street Name and Traffic Control Sign Fee	$650.00/intersection
Right of Way Use Permit Fee	$350.00

WATER & SEWER

Water Rates Inside City

Base Rate for All Except Apartments for First 2,000 Gallons	$23.26
Base Rate for Apartments for First 2,000 gallons (per unit)	$18.94
Rate Per 1,000 Gallons Over Base of 2,000 Up to 10,000	$6.58
Rate Per 1,000 Gallons From 10,001 Up to 25,000	$8.64
Rate Per 1,000 Gallons From 25,001 Up to 50,000	$11.62
Rate For Over 50,001 (residential and non-essential water ie: irrigation)	$14.53

Sewer Rates Inside City

All Customers Base Rate (first 2,000 gallons)	$23.45
All Customers Rate After Base Rate (per 1,000)	$0.94

Water Rates Outside City:

Base Rate for All Except Apartments for First 2,000 gallons	$34.89
Base Rate for Apartments for First 2,000 gallons (per unit)	$28.41
Rate Per 1,000 Gallons Over Base of 2,000 Up to 10,000	$9.87
Rate Per 1,000 Gallons From 10,001 Up to 25,000	$12.97
Rate Per 1,000 Gallons From 25,001 Up to 50,000	$17.44
Rate For Over 50,001 (residential and non-essential water ie: irrigation)	$21.79

Sewer Rates Outside City:

Residential Base Rate (first 2,000 gallons)	$35.18
Residential Rate per 1,000 After Base Rate	$1.42

Miscellaneous

Septage Waste Hauler Discharges and Fees (per gallon)	$0.33

DRAINAGE

Rate Schedule	Residential	
Tier	**Square Footage of Rooftop**	**Monthly Rate**
Tier 1 (DRT 1)	up to 1,399 sq ft.	$1.20
Tier 2 (DRT 2)	1,400 to 2,424 sq ft.	$2.00
Tier 3 (DRT 3)	2,425 sq ft. or greater	$3.40

Rate Schedule	Residential	
Tier	**Square Footage of Impervious Area**	**Monthly Rate**
Tier 1 (DRT 1)	up to 8,339 sq ft.	$5.80
Tier 2 (DRT 2)	8,340 to 18,702 sq ft.	$13.00
Tier 3 (DRT 3)	18,703 to 47,853 sq ft.	$30.00
Tier 4 (DRT 4)	47,854 to 92,740 sq ft.	$68.40
Tier 5 (DRT 5)	92,741 to 261,475 sq ft.	$154.00
Tier 6 (DRT 6)	261,476 sq ft. or greater	$220.00

CUSTOMER SERVICE/UTILITY BILLING

Account Billing

Residential Utility Deposit	$80.72
Re-Read of Water Meter (2nd time)	$26.91
Test of Water Meter (2nd time)	$26.91
Non-Sufficient Fund Check	$32.29
Reconnect-Disconnect Fee	$32.29
Application Fee	$21.53
Transfer Fee	$20.50
Tampering/Straight Fee (1st time)	$215.25
Tampering/Straight Fee (2nd time)	$322.88



Water Meters & Tap Fees

3/4” Water Meter (with existing meter box)	$43.05
1” Water Meter (with existing meter box)	$107.63
1” Water Meter Tap (no paving cut or meter installation)	$419.74
1” Service Charge for Tap and Meter (with meter box)	$457.41
2” Water Meter (with existing meter box)	$258.30
2” Water Meter Tap (no paving cut or meter installation)	$578.10
2” Service Charge for Tap and Meter (with meter box)	$764.14
3” Water Meter	$403.59
4” Water Meter	$384.38
4” Sewer Tap	$376.69
6” Sewer Tap	$410.00
Replacement Sewer Tap (per line)	$307.50
Fee to Abandon Line for Replacement	$153.75
Paving Cut/Boring & Casing Fee	$410.00
Fire Hydrant Meter Setting or Moving	$205.00
Fire Hydrant Meter Deposit Setting	$2,460.00
Drinking Water Testing - Total Coliform (presence or absence)	$18.45
Non-Potable H2O Testing - Total Coliform & E.Coli (MPN)	$25.63
Non-Potable H2O Testing - Total Coliform & Fecal Coliform (MPN)	$25.63
Move a Service Line No More Than 5 feet	$153.75

SANITATION

Inside City Limits — **Number of Pickups (per week)**

# of Containers	2X	3X	4X	5X
RESIDENTIAL				
0.25	$24.00			
0.5	$48.00			
0.75	$72.00			
1	$96.00			
COMMERCIAL				
0.25	$35.00	$52.50	$70.00	$87.50
0.5	$70.00	$105.00	$140.00	$175.00
0.75	$105.00	$157.50	$210.00	$262.50
1	$140.00	$210.00	$280.00	$350.00
2	$266.00	$399.00	$532.00	$665.00
3	$392.00	$588.00	$784.00	$980.00
4	$518.00	$777.00	$1,036.00	$1,295.00
5	$644.00	$966.00	$1,288.00	$1,610.00
6	$770.00	$1,155.00	$1,540.00	$1,925.00
7	$896.00	$1,344.00	$1,792.00	$2,240.00
8	$1,022.00	$1,533.00	$2,044.00	$2,555.00
9	$1,148.00	$1,722.00	$2,296.00	$2,870.00
10	$1,274.00	$1,911.00	$2,548.00	$3,185.00
11	$1,400.00	$2,100.00	$2,800.00	$3,500.00
12	$1,526.00	$2,289.00	$3,052.00	$3,815.00
13	$1,652.00	$2,478.00	$3,304.00	$4,130.00
14	$1,778.00	$2,667.00	$3,556.00	$4,445.00
15	$1,904.00	$2,856.00	$3,808.00	$4,760.00
16	$2,030.00	$3,045.00	$4,060.00	$5,075.00
17	$2,156.00	$3,234.00	$4,312.00	$5,390.00
18	$2,282.00	$3,423.00	$4,564.00	$5,705.00
19	$2,408.00	$3,612.00	$4,816.00	$6,020.00
20	$2,534.00	$3,801.00	$5,068.00	$6,335.00
21	$2,660.00	$3,990.00	$5,320.00	$6,650.00
22	$2,786.00	$4,179.00	$5,572.00	$6,965.00
23	$2,912.00	$4,368.00	$5,824.00	$7,280.00
24	$3,038.00	$4,557.00	$6,076.00	$7,595.00
25	$3,164.00	$4,746.00	$6,328.00	$7,910.00
26	$3,416.00	$5,124.00	$6,832.00	$8,540.00
27	$3,542.00	$5,313.00	$7,084.00	$8,855.00
28	$3,668.00	$5,502.00	$7,336.00	$9,170.00
29	$3,794.00	$5,691.00	$7,588.00	$9,485.00
30	$3,920.00	$5,880.00	$7,840.00	$9,800.00

Per month

Recycling Fee	$0.50
Litter Abatement Fee	$2.00

Outside City Limits Sanitation Fees

# of Containers	Number of Pickups (per week)			
	2X	3X	4X	5X
RESIDENTIAL				
0.25	$37.00			
0.5	$74.00			
0.75	$111.00			
1	$148.00			
COMMERCIAL				
0.25	$52.50	$78.75	$105.00	$131.25
0.5	$105.00	$157.50	$210.00	$262.50
0.75	$157.50	$236.25	$315.00	$393.75
1	$210.00	$315.00	$420.00	$525.00
2	$399.00	$598.50	$798.00	$997.50
3	$588.00	$882.00	$1,176.00	$1,470.00
4	$777.00	$1,165.50	$1,554.00	$1,942.50
5	$966.00	$1,449.00	$1,932.00	$2,415.00
6	$1,155.00	$1,732.50	$2,310.00	$2,887.50
7	$1,344.00	$2,016.00	$2,688.00	$3,360.00
8	$1,533.00	$2,299.50	$3,066.00	$3,832.50
9	$1,722.00	$2,583.00	$3,444.00	$4,305.00
10	$1,911.00	$2,866.50	$3,822.00	$4,777.50
11	$2,100.00	$3,150.00	$4,200.00	$5,250.00
12	$2,289.00	$3,433.50	$4,578.00	$5,722.50
13	$2,478.00	$3,717.00	$4,956.00	$6,195.00
14	$2,667.00	$4,000.50	$5,334.00	$6,667.50
15	$2,856.00	$4,284.00	$5,712.00	$7,140.00
16	$3,045.00	$4,567.50	$6,090.00	$7,612.50
17	$3,234.00	$4,851.00	$6,468.00	$8,085.00
18	$3,423.00	$5,134.50	$6,846.00	$8,557.50
19	$3,612.00	$5,418.00	$7,224.00	$9,030.00
20	$3,801.00	$5,701.50	$7,602.00	$9,502.50
21	$3,990.00	$5,985.00	$7,980.00	$9,975.00
22	$4,179.00	$6,268.50	$8,358.00	$10,447.50
23	$4,368.00	$6,552.00	$8,736.00	$10,920.00
24	$4,557.00	$6,835.50	$9,114.00	$11,392.50
25	$4,746.00	$7,119.00	$9,492.00	$11,865.00

Open Top/Compactor Fees

One-time Set Up Fee (delivery fee)	$51.00 plus tax
Daily Rental	$11.00 plus tax
Haul Charge	$255.00 plus tax
Per Ton Disposal Fee (landfill charge)	$48.80 per ton

Additional Cart Fee

Monthly Service Fee for Second Cart	$7.00

Removal of Garbage by Other Entity

Garbage Hauler's Permit	$500.00

Landfill - Dumping and Unloading Charges

Landfill Access Fee	$25.00
Unlimited Landfill Access Fee (year)	$500.00
Minimum Fee (under 1 ton)	$24.40
Per Ton Disposal Fee	$48.80
Materials Not Contained	$75.00
Pull Off Fee	$77.00

Special Waste/Minor or TDH permit

Special Waste Fee (per ton)	$97.60
Minimum Fee (under 1 ton)	$48.80



AIRPORT

Landing Fees (per 1000 pounds of gross landing weight)	$2.40
Air Carrier Fees (per 1000 pounds of gross landing weight)	Based on Rates and Charges
Public Aircraft Parking – Locally Based Aircraft (month)	$25.00
Public Aircraft Parking – Transient Aircraft (day)	Based on Rates and Charges
Customer Facility Charge - Vehicle Rentals (per transaction day)	$3.00
Public Parking – CI (Covered)	
0-30 Minutes	Free
31-60 Minutes	$3.00
Every Additional Hour	$2.00
Maximum Per 24-Hour Period	$18.00
Public Parking – P1 & P3 (Close-In)	
0-30 Minutes	Free
31-60 Minutes	$2.00
Every Additional Hour	$1.00
Maximum Per 24-Hour Period	$15.00
Public Parking – P2 &P4 (Economy)	
0-30 Minutes	Free
31-60 Minutes	$2.00
Every Additional Hour	$1.00
Maximum Per 24-Hour Period	$12.00
Public Parking – C2 (Remote Covered)	
0-30 Minutes	Free
31-60 Minutes	$2.00
Every Additional Hour	$1.00
Maximum Per 24-Hour Period	$14.00

Public Parking – P5 (Remote Economy)

0-30 Minutes	Free
31-60 Minutes	$2.00
Every Additional Hour	$1.00
Maximum Per 24-Hour Period	$10.00

Ground Transportation Permits (per month, per vehicle)

Taxicab	$25.00
Buses	$25.00
Courtesy Vehicles for Off-Aiport Hotel	$25.00
Courtesy Vehicles for Off-Aiport Car Rental (plus 10% airport revenue)	$25.00
Courtesy Vehicles for Off-Aiport Parking Lot (plus 10% airport revenue)	$25.00

Employee Parking

Annual Employee Parking Media (prorated monthly)	$50.00

Special assessments

1. Should any person upon driving a vehicle from the paid parking areas of the airport not be able to present an officially issued ticket indicating where that person's vehicle was parked and at what time, then the charge assessed for the parking of that vehicle shall be at least $12.00. In addition to that fee, there shall also be a fee assessed for the parking of that vehicle equal to the amount of the daily rate, times number of days, for the area in which that vehicle was parked as is indicated by the daily lot inventory taken by the airport administration.

2. Whenever a person or an entity shall pay for the parking fees assessed by this Section with a check or draft, and that check or draft is dishonored, then there shall be an additional $25.00 assessed against that person or entity.



SPORTS COMPLEX

Football/Soccer Stadium

Sporting Events

Half Stadium Rental	$1,500.00/day
Half Stadium Rental (no suites with guarantee of five games)	$750.00/day
Whole Stadium Rental	$3,000.00/day
All Inclusive Football Game Package *This package includes a whole stadium rental, cleaning, lighting, game officials and staff, operators, security, EMS, and UIL fees, if necessary.*	$10,000.00/game

Non-Sporting Events

Non-Profit Deposit	$1,500.00
Non-Profit Rental	$1,500.00/day
Commercial Deposit	$2,500.00
Commercial Rental	$2,500.00/day

Cleaning Fees

Less Than 2,000 People	$1,500.00/side
Less Than 2,000 People (with guarentee of five events, no suites)	$750.00/side
More Than 2,000 People	$2,500.00/side
Lighting Fee	$75.00/hour

Baseball Stadium

Baseball Events	$750.00/day

Non-Baseball Events

Non-Profit Deposit	$1,000.00
Non-Profit Rental	$1,000.00/day
Commercial Deposit	$1,500.00
Commercial Rental	$1,500/day

Cleaning Fees Assessed by Midland Rockhounds	
Lighting Fee	$75.00/hour
Groundskeeper and Grounds Material Fees Assessed by Midland	
Diamond Club Deposit	$100.00
Diamond Club Rental (minimum 2 hours)	$50.00/hour
Diamond Club Cleaning Fee (payable to Midland Rockhounds)	$150.00
Operator Fees for Baseball and Football/Soccer Stadium	**Hourly**
Video Board Operator	$50.00
Scoreboard Operator	$50.00
PA Announcer	$50.00
Camera Operator	$45.00
Replay Technician	$45.00
Sound Operator	$45.00
Temporary Fence Set Up on Artificial Turf Field	$45.00
SSC- Common Area/Parking Lot Rentals	
Pavilion	
Non-Profit Deposit	$1,500.00
Non-Profit Rental	$1,500/day
Commercial Deposit	$2,000.00
Commercial Rental	$2,000.00/day
Parking Lot Only	
Parking Lot Deposit	$1,000.00
Set Up/Tear Down	$1,000.00/day
Rental Fee	$1,500.00/day
Cleaning Fees - Common Area/Parking Lot Rentals	
Less Than 1,000 People	$1,000
1,001 To 2,500 People	$1,500.00
More Than 2,500 People	$2,000

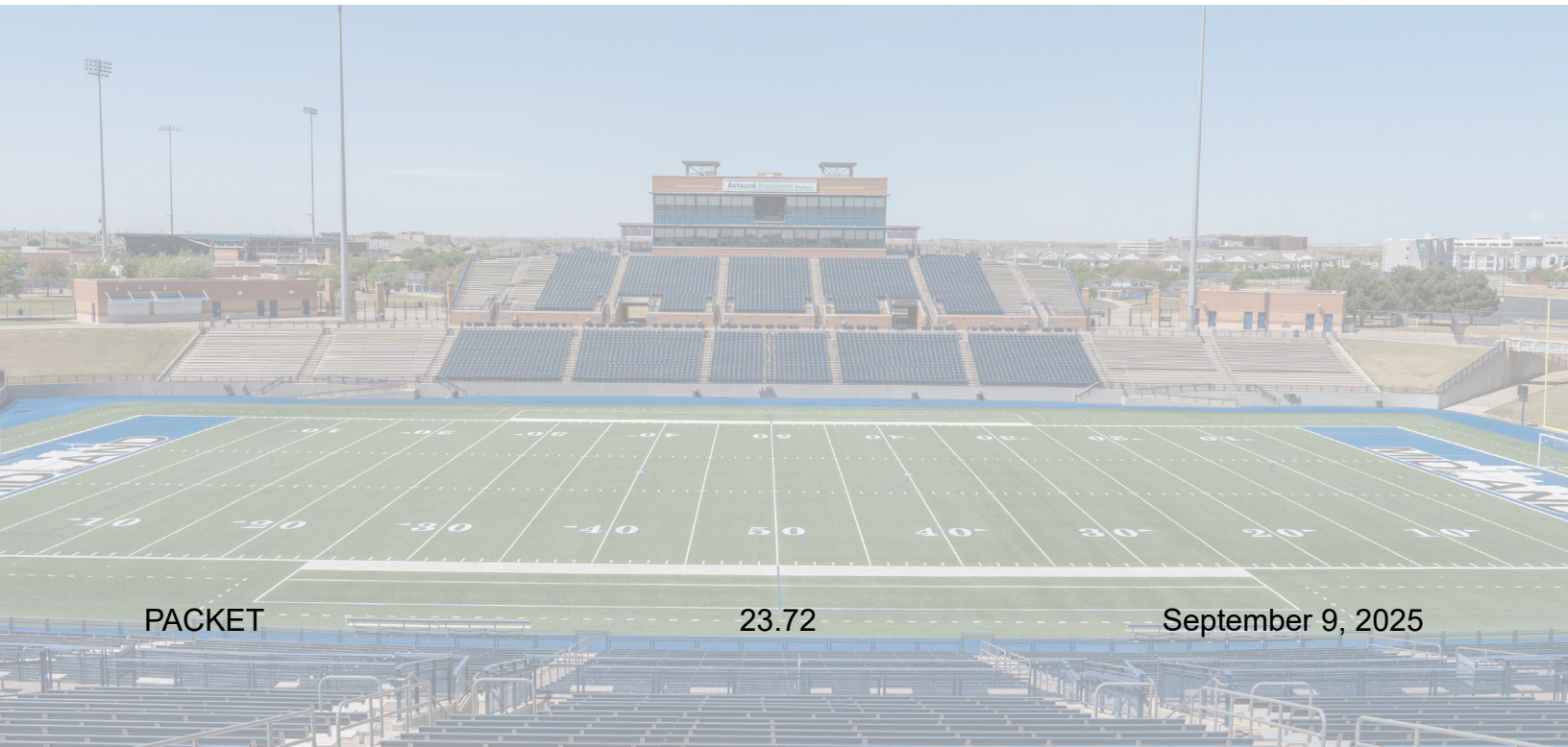
SSC - Auxiliary Fields

Non-Tournament Fees

Deposit	$100.00
Field Rental	$75.00/hour

Tournament Fees

Deposit	$100.00/field
Rental	$35.00/team w/ min. of $500/
Cleaning Fee	field$150.00/field/per day
Lighting Fee	$25.00/hour
Concession Stand Deposit	$100.00
Game Cleaning Fee	$75.00/field/per day
Concession Stand Rental	$25.00/hour



MISCELLANEOUS

Court Fees

Municipal Court Building Security Fee	$3.00
Municipal Court Technology Fee	$4.00
Municipal Court Copy Fee	$1.00 per page

Business Regulations

Closing Out Sale License Fees - 30 Days	$100.00
Closing Out Sale License Fees - 60 Days	$125.00
Closing Out Sale License Fees - 90 Days	$150.00
Mobile Home/Travel Trailer Park Application Fee	$10.00
Mobile Home/Travel Trailer Park License	$25 plus $1 ea.space
Mobile Home Mini Park Location Application	$10.00
Mobile Home Mini Park Revised Site Plan	$10.00
City Chauffeur's License Application Fee	$25.00
Airport Cabstand Permit Fee (per month)	$25.00
Special Police Officer License Fee (individual)	$10.00
Special Police Officer License Fee (firm)	$50.00
Carnival Operator's License	$100.00
Carnival Employee's License	$6.00
Side Walk Sale Application Fee	$4.00
Door to Door Solicitors (Peddler) License (valid for 6 months)	$125.00
Door to Door Solicitors (Peddler) License (renewal)	$125.00
Background Check for Door to Door Solicitors license (valid for 1 year)	$10.00



Police Regulations

Alarm Permit Application Fee (commercial)	$25.00
Alarm Permit Application Fee (residential)	$20.00
Alarm Permit Renewal Fee (commercial)	$20.00
Alarm Permit Renewal Fee (residential)	$15.00
Alarm Permit Service fee	$50.00
Copy of Traffic Collision Report	$10.00

Fire Regulations

Ambulance Services - Basic Life Support (non emergency)	$700.00 + $15 per mile
Ambulance Services- Basic Life Support (emergency)	$1000.00 + $15 per mile
Ambulance Services- Advanced Life Support (non emergency)	$800.00 + $15 per mile
Ambulance Services- Advanced Life Support (emergency)	$1200.00 + $15 per mile
Ambulance Services- Advanced Life Support (level II)	$1400.00 + $15 per mile
Ambulance Services - Specialty Care Transport	$1600.00 + $15 per mile
Ambulance Waiting Charge	$200.00 per hour
Ambulance Service - Outside Midland County	$100.00
Advanced Life Support Disposables	$110.00
Basic Life Support Disposables	$80.00
Oxygen	$60.00
IV Supplies	$50.00
De-fibrillation	$75.00
Intubation	$125.00
Food Truck Fire Inspection	$50 per inspection annually

Franchises

Telecom Carrier on Public ROW Regular Fee	$25.00
Franchise Application and Review Fee	$500.00
Franchise Renewal Application and Review Fee	$500.00

RIGHT OF WAY

Right-of-Way License Fees and Rates for Crossing Property or Public Right-of-Way Owned by the City of Midland.

Fees (non-refundable)

Application Fee	$1,500.00
Application Fee of Expired License	$1,500.00

The City of Midland's Rate and Damage Schedule is 200% of the then-current University Lands Rate and Damage Schedule for a 10-year license.

Fees and rates will be paid at the commencement of the 10-year license in one payment.

CREDIT CARD FEE

The City of Midland will apply a 3.5% fee to all transactions paid by credit card, based on the total amount being paid.

City Secretary's Office *– Council Memorandum*

August 27, 2025

To: City Council Members

From: Rachel Guentensberger, Deputy City Secretary

Subject: Applications for various Boards, Commissions and Committees

Attached to this memorandum are the applications received as part of the Boards, Commissions and Committee Annual Recruitment process. Also enclosed are the 2025 Vacancy Report, Main Board List, Attendance Records, and Staff Recommendations for your review. These materials are intended to support and guide your deliberations during the appointment process.