NOTICE

(RFP # 2025-002)

Posted: 04/30/2025

The City of Mercedes is requesting sealed Requests for Proposals (RFP) from qualified individuals/firms for the **DACOTA AVENUE ROAD IMPROVEMENT PROJECT.** Qualified applicants are invited to submit qualifications and proposals for the provision of these services. In order to be considered, proposals must address each of the requests for information included in this document.

A **pre-bid meeting** will be held on **WEDNESDAY, MAY 8, 2025,** at the Commission Chambers in City Hall located at 400 S. Ohio Ave., Mercedes, Texas 78570, to review the project scope and address any preliminary questions.

All addenda, notices, additional information, etc. will be posted on the City of Mercedes website at www.cityofmercedes.com.

One (1) original copy of the proposal and one (1) electronic copy must be sealed and returned to the City of Mercedes, City Hall, no later than **3:00 P.M. CST on WEDNESDAY, MAY 15, 2025**, to the attention of:

City Secretary
Mercedes City Hall
400 S. Ohio Ave.
Mercedes, TX 78570

All proposals must be clearly marked with **"RFP 2025-002 – DACOTA AVE**." Proposer is responsible for delivery of response by the date and time set for the closing of the proposal acceptance. Responses received after the date and time set for the closing will not be considered.

Proposals will be publicly opened and acknowledged after the submission deadline. The contract award is anticipated to be made on Tuesday, May 20, 2025, during the regular meeting of the Mercedes City Commission.

All bidders **must be bonded** in accordance with state and local requirements.

All questions regarding the specifications or scope of work must be submitted in writing to the Project Engineer at:

Supreme Engineering
Omar Cano, P.E., C.F.M.
135 Paseo Del Prado Ste. 7
Edinburg, TX 78539
Phone: (956) 403-1314
Omar.cano@supremeengineering.com

The City of Mercedes reserves the right to reject any and all proposals and waive informalities in proposals received.

Joselynn Castillo
City Secretary

QUANTITY BID SCHEDULE
DACOTA AVENUE - ROADWAY IMPROVEMENTS

ITEM No.	DESCRIPTION OF WORK	UNIT	CONTRACT QUANTITY	UNIT PRICE	SCHEDULED VALUE
	PAVING IMPROVEMENTS (DACOTA AVENUE)				
1	7" DEPTH OF STRUCTURAL CONCRETE SLAB (4,000 PSI) (INCLUDES DOWELS TO EXIST. (	SY	4782		
3	EXCAVATED/EXCESS MATERIAL TO BE HAULED OFF	LS	1		
				TOTAL COST FOR PAVING IMPROVEMENTS:	
	MISCELLANEOUS				
1	PROJECT SW3P (EROSION CONTROL,BMPs AND SW3P REPORT)	LS	1		
2	STOP BAR	LF	30		
				TOTAL COST FOR MISCELLANEOUS:	
				TOTAL COST FOR BASE BID:	
	ALTERNATE 1				
1	6" CALICHE BASE (COMPACTED CALICHE)	SY	4925		
	ALTERNATE 2				
1	18" MONOLITHIC CURB & GUTTER	LF	3263		

CONSTRUCTION SPECIFICATIONS

DACOTA AVENUE
ROADWAY IMPROVEMENTS

CITY OF MERCEDES

CITY OF MERCEDES OFFICIALS
OSCAR D. MONTOYA SR., MAYOR
DR. RUBEN J. SALDANA, MAYOR PRO-TEM
DR. JACOB C. HOWELL, COMMISSIONER PLACE 1
ARMANDO GARCIA, COMMISSIONER PLACE 2
JOE MARTINEZ, COMMISSIONER PLACE 3

PREPARED BY:

SUPREME ENGINEERING, PLLC
TEXAS ENGINEERING FIRM F-21135
135 PASEO DEL PRADO STE. 7
EDINBURG, TX 78539
(956) 403-1314

4/22/2025

STATE OF TEXAS
OMAR CANO
120081
LICENSED
PROFESSIONAL ENGINEER

P.E

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- 02320 Utility Backfill Materials
- 02330 Embankment
- 02331 Temporary Special Shoring

Subgrade and Roadbed

- 02336 Lime-Stabilized Subgrade

Erosion Control

- 02360 Temporary Erosion, Sedimentation, & Environmental Controls
- 02361 Silt Fences
- 02365 Stabilized Construction Access

Drainage and Containment

- 02490 Trench Safety System
- 02506 Polyvinyl Chloride Pipe
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Flexible Paving

- 02741 Asphalt Concrete Pavement.
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- 02758 Retro-reflectorized Pavement Markings

Curbs, Gutters and Sidewalks

- 02775 Concrete Sidewalks

Planting

- 02911 Topsoil
- 02922 Sod

- 02923 Seed
- 02925 Mulch and Tackifier
- 02936 Fertilizer
- 02938 Mowing
- 02940 Irrigation

Site Restoration and Rehabilitation

- 02951 Pavement Repair and Restoration
- 02960 Milling Pavement

Miscellaneous Construction

- 02970 Chain Link Fence

SECTION 01181
PRIVATE UTILITIES

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for areas of work involving private utility companies including, but not limited to the following:
   1. Telephone Companies.
   2. Gas Companies.
   3. Power (Electric) Companies.
   4. Cable Television Companies.
   5. Pipeline Companies.

1.2 NOTIFICATIONS

A. Notify private utilities of proposed work at least 48 hours prior to starting work at site.
B. The following organizations provide construction notification services for member companies:
   1. DIG-TESS
      1-800-DIG-TESS
      1-800-344-8377

1.3 UTILITY RELOCATIONS

A. Where relocation of utility work is necessary for construction purposes, coordinate the relocations with the Engineer prior to start of work.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION – Not used

END OF SECTION

SECTION 01270
MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for measurement and payment procedures, conditions for nonconformance assessment and nonpayment for rejected products.

1.2 MEASUREMENT

A. Measurement methods delineated in individual Sections are intended to complement the criteria of this Section. In the event of conflict, the requirements of the individual Section governs.
B. Take measurements and compute quantities accordingly.
C. Provide equipment, workers and survey personnel as necessary to perform the measurement.

1.3 UNIT QUANTITIES

A. Quantity and measurement estimates stated on the Unit Price Schedule are for contract purposes only.
B. If greater or lesser quantities are required than those quantities indicated in the Unit Price Schedule, provide the required quantities at the unit prices contracted.
C. Measurement by Volume: Measure by cubic dimension.
D. Measurement by Area: Measure by square dimension.
E. Linear Measurement: Measure by linear dimension, at the item centerline or mean chord.
F. Unit Price Measurement: Measure by unit designated on the Unit Price Schedule.

1.4 PAYMENT

A. Payment includes: Full compensation for required supervision, labor, products, tools, equipment, plant, transportation, services and appurtenances; erection, application or installation of an item of the work; and Contractor's overhead and profit.
B. Total compensation for required work shall be included in the unit price bid on the Unit Price Schedule. Claims for payment of work not specifically covered in the list of unit prices contained in the Unit Price Schedule will not be accepted.
C. Progress payments will be based on the Engineer's observations and evaluations of quantities incorporated in the work multiplied by the unit price.

D. Final payment for pay items governed by unit prices will be made on the basis of actual measurements and quantities determined by the Engineer, multiplied by the unit price for the pay item which is incorporated in or made necessary by the work.
E. Prepare and submit an Application for Payment for work completed and not previously paid. The application at a minimum shall include the following:
    1. Application for Payment: The application will be in a form acceptable to the Engineer. A sample form will be provided to the Contractor.
    2. Construction Schedule: See Section 01325 – Construction Schedules, General Form and Contents of Schedules.
    3. Contractor Payroll Certificate: See Prevailing Wage Rates. (If applicable).
    4. Pollution Prevention Plan (PPP) Reports: See Storm Water Pollution Prevention Plan. (if applicable)
    5. Quantity supporting documents include: plotted and tabulated cross-sections, quantity calculations or suppliers' invoices, etc.
    6. Application supporting documents and submittal items are provided to verify products, regulations and contract requirements are being met. Application supporting documents include: field obtained data, truck volume tickets, truck weight tickets, seed and fertilizer tags, pesticide use records, etc. and other supporting documents as they may be necessary or required by Contract Documents.
F. Incomplete Applications for Payment will not be processed and will be returned to the Contractor.

1.5 NONCONFORMANCE OF WORK

A. Remove and replace the work, or portions of the work, not conforming to the Contract Documents.
B. If, in the opinion of the Engineer, it is not practical to remove and replace the work, the Engineer will direct one of the following remedies:
    1. The nonconforming work will remain as is, but the unit price will be adjusted to a lower price at the discretion of the Engineer.
    2. The nonconforming work will be modified as authorized by the Engineer, and the unit price will be adjusted to a lower price at the discretion of the Engineer, if the modified work is deemed to be less suitable than originally specified.
C. Individual Sections may modify these options or may identify a specific formula or percentage price reduction.
D. The authority of the Engineer to assess the nonconforming work and identify payment adjustment is final.

1.6 NONPAYMENT

A. Payment will not be made for any of the following:
    1. Products wasted or disposed of in a manner that is not acceptable to

Engineer.

2. Products determined as nonconforming before or after placement.
3. Products placed beyond the lines and levels of the required work.
4. Products remaining on hand after completion of the work, unless specified to remain.
5. Loading, hauling and disposing of rejected products.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION – Not used

END OF SECTION

SECTION 01292
SCHEDULE OF VALUES

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes the requirements for the submittal of a Schedule of Values.
B. Prepare and submit a Schedule of Values for major pay items when partial payments are requested. Use the Schedule of Values only as a basis for Application for Payment.
C. Refer to Section 01270 – Measurement and Payment.

1.2 SUBMITTALS

A. Refer to Section 01330 – Submittal Procedures.
B. Submit the Schedule of Values to the Engineer for review and approval.
C. After review by the Engineer, revise and resubmit the Schedule of Values, if required. The initial Application for Payment will not be processed until the Schedule of Values is approved.
D. During review, the Engineer may request additional documentation to support the data on the Schedule of Values.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION – Not used

END OF SECTION

SECTION 01325
CONSTRUCTION SCHEDULES

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for preparation, submittal and associated revisions of a construction schedule and the monthly submittal of an updated progress schedule.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.
D. Payments for progress meetings are incidental to site preparation and restoration.

1.3 GENERAL FORM AND CONTENTS OF SCHEDULES

A. Provide progress schedule in the form of a horizontal bar chart (Gantt Chart). Provide a Critical Path Method (CPM) schedule where required for complex projects or where scheduling is critical.

1.4 SUBMITTALS

A. Submit the initial construction schedule prior to beginning work.
B. Submit a revised construction schedule showing current and estimated future progress with each Application for Payment request. Applications for Payment will not be processed without the revised construction schedule.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION

3.1 PROGRESS MEETINGS

A. Meet with the Engineer 1 week prior to each scheduled Application for Payment to discuss progress and corrective action. Meetings are required for contracts with 120 or more calendar days and are also required for contracts behind schedule as determined by the Engineer.

END OF SECTION

SECTION 01328
CONSTRUCTION SURVEYING

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for construction surveying, construction staking and the coordination of the control with the Engineer.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 STANDARDS

A. Utilize recognized survey practices as published by the Texas Board of Professional Land Surveying.

1.4 CONTROL

A. Horizontal and vertical control and right-of-way monuments, as shown on the Plans, will be marked in the field at the direction of the Engineer.
B. Preserve control and right-of-way points. Where control points are in areas of construction, offsets or set supplemental control points will be established by the Contractor at no cost to the District. Notify the Engineer prior to performing work that will disturb project control.
C. Provide construction surveying and construction staking necessary to establish the line and grade of the proposed work from the control points.

1.5 ACCEPTANCE OF CONTROL

A. Notify the Engineer of any discrepancies discovered in the locations of survey control points prior to starting work.

1.6 DAMAGED MONUMENTATION

A. Re-establish property corners and right-of-way monumentation damaged or destroyed by the Contractor at no cost to the District. Perform the survey work to the tolerances of a “Category 1A – Land Title Survey” as set forth in the TSPS Manual of Practice for Land Surveying in Texas. All survey work shall adhere to the current Act and Rules of the Texas Board of Professional Land Surveying.
B. Report promptly to the Engineer the loss or destruction of any reference points or boundary monumentation.
C. Reimburse the District for the cost to reestablish permanent reference points disturbed by Contractor’s operations.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION – Not used

END OF SECTION

SECTION 01330
SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes procedures for the submittals identified by the Contract Documents.

1.2 SUBMITTAL PROCEDURES

A. Deliver available submittals to the Engineer at the Pre-Construction meeting. Allow no less than 14 calendar days for initial review of submittals by the Engineer. The Engineer will review and return submittals as expeditiously as possible, but the amount of time required for review will vary depending on the complexity and quantity of data submitted. This time for review shall in no way be justification for delays or additional compensation to the Contractor. Allow time to make delivery of material or equipment after the submittal is approved.

B. Submit 2 copies of documents unless otherwise specified.

C. The Engineer's review of submittals covers only general conformity to the Contract Documents. Quantities will not be reviewed or verified by the Engineer. Contractor is responsible for errors, omissions or deviations from Contract Documents. Review of submittals in no way relieves the Contractor from obligation to furnish required items according to the Contract Documents.

D. Revise and resubmit submittals as required. Identify all changes made since previous submittal.

E. The Contractor shall assume the risk for material or equipment that is fabricated or delivered prior to approval. No material or equipment shall be incorporated into the work or included in periodic progress payments until approval has been obtained in the specified manner.

F. Submittal Numbering:
   1. Transmit each submittal to the Engineer.
   2. Identify each submittal by project I.D., submittal number, section number and pay item number.
   3. Sequentially number each submittal beginning with the number 1. Resubmittals shall use the original number followed with an alphabetic suffix (i.e., 2A for the first resubmittal of Submittal 2 or 15C for the third resubmittal of Submittal 15). Each submittal shall only contain one type of work, material or equipment. Mixed submittals will not be accepted.
   4. Identify variations from requirements of Contract Documents and identify product or system limitations.

G. Contractor's Stamp: Apply Contractor's stamp, certifying that the items have been reviewed in detail and are correct and in accordance with Contract Documents, except as noted by any requested variance.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION – Not used

END OF SECTION

SECTION 01422
REFERENCE TECHNICAL STANDARDS

PART 1 – GENERAL

1.1 SUMMARY

A. Reference to various technical standards as published by technical societies, national and state associations or other authorities is made in the Contract Documents. The abbreviations along with the titles are listed below.

1.2 ABBREVIATIONS

AALA	–	American Association of Laboratory Accreditation.
AASHTO	–	American Association of State Highway and Transportation Officials.
ACI	–	American Concrete Institute.
AISC	–	American Institute of Steel Construction.
ANSI	–	American National Standards Institute.
ASTM	–	American Society for Testing Materials International.
AWS	–	American Welding Society.
AWPA	–	American Wood-Preservers' Association.
CPMB	–	Concrete Plant Manufactures Bureau.
CRSI	–	Concrete Reinforcing Steel Institute.
OSHA	–	Occupational Safety and Health Administration.
TSPS	–	Texas Society of Professional Surveyors.
TxDOT	–	Texas Department of Transportation

1.3 GOVERNING VERSION – Not used

1.4 CONTRACTUAL OBLIGATIONS

A. The technical standards are referenced for technical specifications only. Certain technical standards contain or imply contractual obligations. These obligations are void if they conflict with the Contract Documents.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION – Not used

END OF SECTION

SECTION 01457
CONSTRUCTION TESTS AND INSPECTION

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for tests and inspection.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 ACCESS TO WORK

A. The District, the Engineer, engineer's consultants, other representatives and personnel of the District, independent testing laboratories and governmental agencies with jurisdictional interests shall have access to the work at reasonable times for their observation, inspection and testing. Provide proper and safe conditions for such access and advise of site safety procedures and programs.

1.4 TESTS AND INSPECTIONS

A. Testing and Inspection includes, but is not limited to, services of a construction materials engineering laboratory or other agent employed by the District, to perform laboratory testing, field testing or examinations required in the Contract Documents.
B. The District will employ and pay for testing as noted above. Exceptions include, but are not limited to, the following:
    1. Arrange, obtain and pay for inspections, tests and approvals required by laws and regulations of other public bodies having jurisdiction. Transmit to the Engineer the required certificates of inspection or approval.
    2. Arrange, obtain and pay for inspections, tests or approvals required for acceptance of materials or equipment. This includes expenses surrounding materials, mix designs or equipment submitted for approval for incorporation in the work.

3. Perform retest or inspection of the corrected defective work at no cost to the District.

C. Retests that are required to verify the adequacy of reworked areas or work performed for the Contractor's convenience will be deducted from the Contractor's final payment.
D. Provide Engineer 24 hour notice of readiness of the work for inspections, tests or approvals and cooperate with inspectors and testing personnel to facilitate required inspections or testing.
E. Inspections and tests performed for either Engineer or Contractor shall be performed by an independent testing laboratory listed and qualified to provide the service to Hidalgo County Drainage District No. 1.
F. Acceptance of tests or inspections in no way relieves the Contractor of obligation to furnish required work in accordance with the Plans and Specifications.

1.5 SUBMITTALS

A. Submit testing laboratory or examination reports, as specified or required, dated, signed and sealed by a Licensed Professional Engineer in the State of Texas accepting technical responsibility for the report. The work performed by the laboratory shall be covered by a report that accurately, clearly and unambiguously presents the test or examination results and other relevant information in accordance with the criteria for accreditation used by the American Association for Laboratory Accreditation (AALA).

1.6 LIMITS OF AUTHORITY

A. The testing laboratory is not authorized to:
   1. Release, revoke, alter or enlarge on requirements of the Contract Documents.
   2. Approve or reject any portion of the work.
   3. Perform any duties of the Contractor.
   4. Stop the work.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION – Not used

END OF SECTION

SECTION 01555
TRAFFIC CONTROL AND REGULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements for signs, signals, control devices, traffic barriers, flares, lights and traffic signals; construction parking control, designated haul routes, and bridging of trenches and excavations.
B. Qualifications and requirements for use of flagmen.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule, and the following schedule
   1. Traffic control and regulation. Payment for traffic control and regulation is on a lump sum basis. Include preparation and submittal of traffic control plan if different than shown on Drawings, and provision of traffic control devices, equipment, and personnel necessary to protect the Work and public. Payment will be based on Contractor's Schedule of Values for traffic control and regulation.
   2. Payment for traffic control for wastewater or water line projects will be authorized by the Engineer in three (3) parts. Partial payment will be made according to following schedule:
      a. Payment of 25 percent of traffic control amount will be authorized when permanent control devices and necessary temporary markings, sufficiently deployed along job site as required to maintain progress of work, are installed at job site and approved. This limiting percentage will be prorated based upon extent of Contractor's setup.
      b. A payment of 50 percent of traffic control amount will be authorized when pavement replacement commences. This limiting percentage will be prorated based upon linear footage, as measured along centerline axis of wastewater or water line, of pavement replaced.
      c. A payment of 25 percent of traffic control amount will be authorized when permanent pavement markings are restored

and all unnecessary permanent and temporary control devices removed. This limiting percentage will be prorated based upon the extent of restoration.

3. Flagmen: Measurement is on a lump sum basis for flagmen as required for the project. The amount invoiced shall be determined based on the schedule of value submitted for flagmen.
4. New Portable Concrete Low-Profile Traffic Barrier Provided. Payment is on a unit price basis for each linear foot of low-profile traffic barrier provided, installed with hardware assemblies and connected together in accordance with the approved traffic control plan.
5. Portable Concrete Low-Profile Traffic Barrier Installed. Payment is on a unit price basis for each linear foot of low-profile traffic barrier delivered to the project location, installed with hardware assemblies and connected together in accordance with the approved traffic control plan.
6. Portable Concrete Low-Profile Traffic Barrier Moved and Reset. Payment is on a unit price basis for each linear foot of low-profile traffic barrier disassembled, moved on the project, reset at the new locations and connected together. Include cost to repair roadway in the unit price.
7. Portable Concrete Low-Profile Traffic Barrier Removed. Payment is on a unit price basis for each linear foot of low-profile traffic barrier removed from the project, including hardware assemblies, and stockpiling at location. In general, the Contractor shall provide, install, move, replace, clean, and remove upon completion of work all barricades, signs, cones, lights, and/or traffic control devices as directed.

C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. Texas Manual on Uniform Traffic Control Devices (TMUTCD)
B. Article 4413 (29bb), commonly referred to as Private Investigators and Private Security Agencies Act, and Article 2.12, Texas Code of Criminal Procedure.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. Traffic control plan:
   1. If using traffic control plan contained in the Contract without modification, submit a letter confirming use of the plan.
   2. If using a different traffic control plan, submit the plan for approval. The plan must conform to TMUTCD requirements and be sealed by a Registered Texas Professional Engineer.
C. Submit copies of approved lane closure permits issued by Hidalgo County Planning Department.

D. Submit Schedules of Values for traffic control plan and flagmen within 30 days following Notice to Proceed.

PART 2 - PRODUCTS

2.1 SIGNS, SIGNALS, AND DEVICES

A. Comply with TMUTCD requirements.
B. Traffic cones and drums, flares and lights: Conform to local jurisdictions' requirements.

PART 3 - EXECUTION

3.1 PUBLIC ROADS

A. Submit requests forms for lane closure and sidewalk closure to the Hidalgo County Planning Department at least three working days prior to need for blocking vehicular lanes or sidewalks. Do not block lanes or sidewalks without approved permits. Obtain application from the Hidalgo County Planning Department at 1304 S. 25th St.
Edinburg, TX 78539 or at the following internet address:
https://www.hidalgocounty.us/261/Planning
B. Follow laws and regulations of governing jurisdictions when using public roads. Pay for and obtain permits from jurisdiction before impeding traffic or closing lanes. Coordinate activities with the Engineer.
C. Give the Engineer one-week notice before implementing approved traffic control phases. Inform local businesses of impending traffic control activities.
D. Notify police department, fire department, and local schools, churches, and businesses in writing a minimum of five business days prior to beginning work.
E. Maintain 10-foot wide all-weather lanes adjacent to the Work for emergency vehicle use. Keep all-weather lanes free of construction equipment and debris.
F. Do not to obstruct normal flow of traffic from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. on designated major arterials or as directed by the Engineer.
G. Maintain local driveway access to residential and commercial properties adjacent to work areas at all times. Use all-weather materials approved by the Engineer to maintain temporary driveway access to commercial and residential driveways.
H. Keep streets entering and leaving job site free of excavated material, debris, and foreign material resulting from construction operations in compliance with applicable ordinances.
I. Remove existing signage and striping that conflict with construction

activities or that may cause driver confusion.

J. Provide safe access for pedestrians along major cross streets.
K. Alternate closures of cross streets so that two adjacent cross streets are not closed simultaneously.
L. Do not close more than two consecutive esplanade openings at a time without prior approval from the Engineer.

3.2 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and the local City's, County's, or States's operations.
B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.3 FLARES AND LIGHTS

A. Provide flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.4 HAUL ROUTS

A. Utilize haul routes designated by authorities or shown on drawings for construction traffic.
B. Confine construction traffic to designated haul routes.
C. Provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

3.5 TRAFFIC SIGNS AND SIGNALS

A. Construct necessary traffic control devices for temporary signals required to complete the Work including loop detectors, traffic signal conduits, traffic signal wiring and crosswalk signals. Notify the Hidalgo County Planning Department and appropriate Precinct office a minimum of 60 days in advance of need for control boxes and switchgear. The appropriate Hidalgo County Precinct Office will perform necessary service, programming or adjustments, to signal boxes and switchgear if required during construction.
B. Install and operate traffic control signals to direct and maintain orderly traffic flow in areas under Contractor's control affected by Contractor's operations. Post notices, signs and traffic controls before moving into next phase of traffic control.
C. Relocate traffic signs and signals as the Work progresses to maintain effective traffic control.

D. Unless otherwise approved by the Engineer, provide driveway signs with name of business that can be accessed from each crossover. Use two signs for each crossover.
E. Replace existing traffic control devices in Project area.
F. The Engineer may direct Contractor to make minor adjustments to traffic control
G. signage to eliminate driver confusion and maintain orderly traffic flow during construction at no additional cost to the District.

3.6 BRIDGING TRENCHES AND EXCAVATIONS

A. When necessary, construct bridges over trenches and excavation to permit an unobstructed flow of traffic across construction areas and major drives. Use steel plates of sufficient thickness to support H-20 loading and install to operate with minimum noise.
B. Shore trench or excavation to support bridge and traffic.
C. Secure bridging against displacement with adjustable cleats, angles, bolts or other devices when:
    1. bridging is placed over existing bus routes,
    2. more than five percent of daily traffic is comprised of commercial or truck traffic,
    3. more than two separate plates are used for bridging, and
    4. when bridge is to be used for more than five consecutive days.
D. Extend steel plates used for bridging a minimum of 1 foot beyond edges of trench or excavation. Use temporary paving materials such as premix to feather edges of plates to minimize wheel impact on secured bridging.

3.7 REMOVAL

A. Remove equipment and devices when no longer required.
B. Repair damage caused by installation.
C. Remove post settings to a depth of 2 feet.

3.8 TRAFFIC CONTROL, REGULATION AND DIRECTION

A. Use Flagmen to control, regulate and direct an even flow and movement of vehicular and pedestrian traffic, for periods of time as may be required to provide for public safety and convenience, where:
    1. multi-lane vehicular traffic must be diverted into single lane vehicular traffic,
    2. vehicular traffic must change lanes abruptly,
    3. construction equipment must enter or cross vehicular traffic lanes and walks,
    4. construction equipment may intermittently encroach on vehicular traffic lanes and unprotected walks and crosswalk,
    5. traffic regulation is needed due to rerouting of vehicular traffic around

the Work site, and
6. where construction activities might affect public safety and convenience.

B. Use of Flagmen to assist in the regulation of traffic flow and movement does not relieve Contractor of responsibility to take other means necessary to protect the Work and public.

3.9 INSTALLATION STANDARDS

A. Place temporary pavement for single lane closures, in accordance with TMUTCD.
B. Reinstall temporary and permanent pavement markings as approved by the Engineer. When weather conditions do not allow application according to manufacturer's requirements, alternate markings may be considered. Submit proposed alternate to the Engineer for approval prior to installation. No additional payment will be made for use of alternate markings.

3.10 MAINTENANCE OF EQUIPMENT AND MATERIAL

A. Submit name, address and telephone number of individual designated to be responsible for maintenance of traffic handling at construction site to the Engineer. Individual must be accessible at all times to immediately correct deficiencies in equipment and materials used to handle traffic including missing, damaged, or obscured signs, drums, barricades, or pavement markings.
B. Inspect signs, barricades, drums, lamps and temporary pavement markings daily to verify that they are visible, in good working order, and conform with traffic handling plans as approved by the Engineer. Immediately repair, clean, relocate, realign, or replace equipment or materials that are not in compliance.
C. Keep equipment and materials, signs and pavement markings, clean and free of dust, dirt, grime, oil, mud, or debris.
D. Obtain approval of the Engineer to reuse damaged or vandalized signs, drums, and barricades.

END OF SECTION

SECTION 01562
CONSTRUCTION FENCE

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for furnishing, installing, maintaining and removing construction fence.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

PART 2 – PRODUCTS

2.1 FENCE PROPERTIES

A. Provide construction fence comprised of extruded, high-density polypropylene, 4 foot tall minimum and orange in color unless shown otherwise on the Plans. The mesh openings shall be no larger than 3.25 inches by 1.75 inches.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install the construction fence with posts of sufficient size and spacing to insure that the construction fence remains upright throughout its installed length and functions as an effective barrier for the areas designated for protection.
B. Maintain and repair the construction fence throughout the duration of the project, at no cost to the District, to insure that the barrier continuously performs its intended function.

3.2 REMOVAL AND DISPOSAL

A. Remove and dispose of the construction fence upon completion of the project. Refer to Section 02120 – Material Disposal.

END OF SECTION

SECTION 01565
GENERAL SOURCE CONTROLS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for best management practices and care of the work area.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 DEFINITION

A. State Waters: The water of the ordinary flow, underflow, and tides of every flowing river, natural stream, and lake, and of every bay or arm of the Gulf of Mexico, and the stormwater, floodwater, and rainwater of every river, natural stream, and watercourse in the state. State Waters do not include percolating groundwater, diffuse surface rainfall runoff, groundwater seepage, or springwater before it reaches the watercourse.

1.4 PROTECTION OF TREES

A. Heavy equipment, vehicular traffic and stockpiles of construction materials are not permitted within the dripline of any tree designated to remain. Contractor shall avoid all contact with trees to remain unless otherwise directed by the Engineer.
B. Trees to remain, as shown on the Plans or marked onsite, shall be boxed or fenced at the perimeter of the tree's dripline.
C. Tree trunks, exposed roots and limbs of the trees designated to remain which are damaged during construction operations will be cared for as prescribed by an urban forester or licensed tree expert at the expense of the Contractor.
D. Replace trees that were designated to remain which are damaged beyond repair or removed without authorization by the Contractor. Determination of trees damaged beyond repair and the tree's suitable replacement will be made by an urban forester or a licensed

tree expert and approved by the Engineer. Determination and replacement expenses shall be paid for by the Contractor at no additional cost to the District.

E. Provide warranty for survivability of replacement tree(s) for 1 year after planting.

1.5 DUST CONTROL

A. Control dust blowing and movement on construction sites and roads to prevent exposure of soil surfaces, to reduce on and offsite damage, to prevent health hazards and to improve traffic safety.

B. Control dust blowing by utilizing one or more of the following:
   1. Paper or wood mulches bound with natural or chemical binders.
   2. Temporary vegetative cover.
   3. Apply dust suppressants at manufacturer's recommended rate for duration required.
   4. Irrigation by water sprinkling.
   5. Spreading hay.

C. Implement dust controls immediately whenever dust can be observed blowing on the site or as directed by the Engineer.

D. Provide copy of Water Rights Permit from the Texas Commission on Environmental Quality (TCEQ) prior to using State Water.

1.6 EQUIPMENT MAINTENANCE AND REPAIR

A. Confine maintenance and repair of construction machinery and equipment to areas specifically designated for that purpose. Locate and design designated areas so that oils, gasoline, grease, solvents and other potential pollutants cannot be allowed into soils, receiving streams or stormwater conveyance systems. Provide adequate waste disposal receptacles for liquid, as well as, solid waste. Inspect and clean maintenance areas daily.

B. On a site where designated equipment maintenance areas are not feasible, care must be taken during each individual repair or maintenance operation to prevent potential pollutants from becoming available to be washed into streams or stormwater conveyance systems. Provide and use temporary waste disposal receptacles.

1.7 WASTE COLLECTION AND DISPOSAL

A. Refer to Section 02120 – Material Disposal.

B. Provide a plan for the collection and disposal of waste materials on the site. Designate locations for trash and waste receptacles and establish a collection schedule. Specify and carry out methods for ultimate disposal of waste in accordance with applicable local, State and Federal health and safety regulations. Make special provisions for the collection and disposal of liquid wastes and toxic or hazardous materials.

C. Keep receptacles and other waste collection areas neat and orderly. Do not allow waste to overflow its container or accumulate for excessively long periods of time. Locate trash collection points where they will least likely be affected by stormwater runoff.

1.8 PUBLIC ROAD MAINTENANCE

A. Remove soil spilled, dropped, washed or tracked on to public rights-of-way immediately.

1.9 WASHING AREAS

A. Wash vehicles such as concrete or dump trucks and other construction equipment in accordance with current local, State and Federal rules and regulations and, as a minimum, vehicles such as concrete or dump trucks and other construction equipment shall not be washed at locations where runoff will flow directly into a watercourse or stormwater conveyance system. Special areas shall be designated for washing vehicles. These areas should be located where the wash water will spread out and evaporate or infiltrate directly into the ground, or where runoff can be collected in a temporary holding or seepage basin. Construct wash areas with gravel or rock bases to minimize mud generation.

1.10 STORAGE OF CONSTRUCTION MATERIALS, CHEMICALS, ETC.

A. Isolate sites where chemicals, cements, solvents, paints or other potential water pollutants are to be stored, so that they will not cause runoff pollution.
B. Store toxic chemicals and materials, such as pesticides, paints and acids in accordance with manufacturer's guidelines. Protect groundwater resources from leaching by placing a plastic liner or other impervious materials, as approved by the Engineer, on any areas where toxic liquids are to be opened and stored.

1.11 SANITARY FACILITIES

A. Provide construction site with adequate sanitary facilities for workers in accordance with applicable local, State and Federal health regulations.

1.12 INSPECTION REPORTS

A. Best Management Practices (BMP's) must be implemented for sediment Control. Submit Inspection and Maintenance Reports as required.

1.13 PART 2 – PRODUCTS – Not used

1.14 PART 3 – EXECUTION – Not used

END OF SECTION

SECTION 01785
PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for preparing and maintaining record documents for the project to reflect the construction as built.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 MAINTENANCE OF RECORD DOCUMENTS

A. Maintain at the job site, one copy of:
   1. Contract Documents.
   2. Reviewed Shop Drawings.
   3. Change orders and field orders.
   4. Field test records.
   5. Correspondence.
   6. Notice of Intent (NOI).
   7. Construction Site Notice.
   8. TPDES Storm Water Permit.
   9. Storm Water Pollution Prevention Plan (SWPPP).
   10. Notice of Termination (NOT) as they are filed.
   11. Other Environmental Permits, as required.
B. Store record documents apart from documents used for construction. Do not use record documents for construction purposes. Provide files and racks for orderly storage. Maintain documents in clean, dry, legible and orderly condition. Make documents and samples available at all times for inspection by the Engineer.

1.4 RECORDING

A. Label each document “PROJECT RECORD” in neat, large, printed letters.
B. Mark changes legibly in red pencil or red ink.

C. Keep record documents current.
D. Do not conceal work until required information is recorded.
E. Legibly mark and date Plans to record:
    1. Alignment and profile of the project, location and elevation of appurtenances.
    2. Horizontal and vertical location of underground utilities and appurtenances.
    3. Location of internal utilities and appurtenances referenced to permanent surface improvements.
    4. Field changes of dimension and detail.
    5. Changes made by change order or field order.
    6. Details not on original Plans.
F. Legibly mark specifications and addenda to record:
    1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
    2. Changes made by change order or field order.
G. Legibly annotate, mark and date Shop Drawings to record changes made after approval.

1.5 SUBMITTALS

A. At project completion, deliver record documents to the Engineer. Place letter-sized material in a 3-ring binder, neatly indexed. Bind Plans and Shop Drawings in rolls of convenient size for ease of handling.
B. Accompany submittals with a transmittal letter containing:
    1. Date.
    2. Project title and number.
    3. Contractor's name and address.
    4. Title and number of each record document.
    5. Certification that each document as submitted is complete and accurate.
    6. Signature of Contractor.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION – Not used

END OF SECTION

SECTION 02086
ADJUSTING MANHOLES, INLETS, AND VALVE BOXES TO GRADE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Adjusting elevation of manholes, inlets, and valve boxes to new grades.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Provide concrete, conforming to requirements for Concrete for Utility Construction.
B. Provide precast concrete manhole sections and adjustment rings conforming to requirements of Section 02082 - Precast Concrete Manholes.
C. Provide mortar conforming to requirements for Mortar.

2.2 CAST-IRON MATERIALS

A. Provide cast-iron materials conforming to requirements of Section 02090 - Frames, Grates, Rings, and Covers.

2.3 MASONRY MATERIALS FOR STORM SEWER MANHOLES AND INLETS

A. Provide brick masonry units conforming to the requirements for Brick Masonry for Utility Construction.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine existing structure, valve box, frame and cover or inlet box, frame

and cover or inlet, piping and connections for damage or defects affecting adjustment to grade. Report damage or defects to the Engineer.

3.2 ESTABLISHING GRADE

A. Coordinate grade related items with existing grade and finished grade or paving, and relate to established bench mark or reference line.

3.3 ADJUSTING MANHOLES AND INLETS

A. Rebuild adjustment portion of manhole or inlet by adding or removing Adjustments. Follow procedures for the type of structure being adjusted detailed in the following Sections:
   1. Section 02081 - Cast-In-Place Concrete Manholes
   2. Section 02082 - Precast Concrete Manholes
   3. Section 02083 - Fiberglass Manholes
   4. Section 02087 - Brick Manholes for Storm Sewers
   5. Section 02632 - Cast-In-Place Inlets, Headwalls and Wingwalls
   6. Section 02633 - Precast Concrete, Inlets, Headwalls and Wingwalls
B. Salvage and reuse cast-iron frame and cover or grate.
C. Protect or block off manhole or inlet bottom using wood forms shaped to fit so that no debris or soil falls to bottom during adjustment.
D. Verify that manholes and inlets are free of visible leaks as result of reconstruction. Repair leaks in manner subject to the Engineer's approval.

3.4 ADJUSTING VALVE BOXES

A. Salvage and reuse valve box and surrounding concrete block as approved by the Engineer. No separate pay.
B. Remove and replace 6-inch ductile iron riser pipe with suitable length for depth of cover required to establish adjusted elevation to accommodate actual finish grade.
C. Reinstall valve box and riser piping plumbed in vertical position. Provide minimum 6 inches telescoping freeboard space between riser pipe top butt end and interior contact flange of valve box for vertical movement damping.
D. After valve box has been set, aligned, and adjusted so that top lid is level with final grade.

3.5 BACKFILL AND GRADING

A. Backfill area of excavation surrounding each adjusted manhole, inlet, and valve box and compact according to requirements of Section 02316 - Excavation and Backfill for Structures.
B. Grade ground surface to drain away from each manhole and valve box. Place earth fill around manholes to level of upper rim of manhole frame. Place earth fill around valve box concrete slab.
C. In unpaved areas, grade surface at uniform slope of 1 to 5 from manhole

frame to natural grade. Provide minimum of 4 inches of topsoil conforming to requirements of Section 02911 - Topsoil. Provide seeding in accordance with Section 02921 - Hydro-mulch Seeding, or if sodding in accordance with Section 02922 - Sodding.

END OF SECTION

SECTION 02087
BRICK MANHOLE FOR STORM SEWER

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Brick masonry Work in utility construction for permanent or temporary installation of storm water manholes or vaults.
B. Brick masonry in repair and rehabilitation of storm water lines and associated structures.

1.2 MEASUREMENT AND PAYMENT

A. Measurement and payment is as noted on the Unit Price Schedule.
B. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600kN-m/m3)).

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. Submit certifications required for Brick Masonry Utility Construction.

1.5 HANDLING AND STORAGE

A. Handle and store brick to prevent damage.
B. Store brick and mortar mix off ground and dry. Cover mortar mix to protect from weather.

PART 2 - PRODUCTS

2.1 BRICK MASONRY UNITS

A. Manhole bricks not exposed to flow.
   1. Clay and shale brick masonry units conforming to requirements for Brick Masonry for Utility Construction.
   2. Concrete brick masonry units conforming to requirements for Brick Masonry for Utility Construction.
B. Sewer brick. Clay and shale brick masonry units conforming to requirements of for Brick Masonry for Utility Construction.

2.2 MORTAR

A. Conform to requirements for Mortar.

2.3 CONCRETE AND REINFORCING STEEL

A. Conform to requirements for Concrete for Utility Construction.
B. Provide Class A concrete with minimum compressive strength of 4000 psi unless otherwise indicated on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify lines and grades are correct.
B. Determine if subgrade, when scarified and recompacted, can be compacted to be 95 percent of maximum Standard Proctor Density according to ASTM D 698 prior to placement of foundation material and base section. When it cannot be compacted to that density, moisture condition subgrade until that density is reached or treat as unstable subgrade.
C. Do not build manholes in ditches, swales, or drainage paths unless approved by the Engineer.

3.2 MANHOLES

A. Construct manholes to dimensions shown on Drawings. Commence construction as soon as possible after pipes are laid. On monolithic sewers, construct manholes at same time sewer is being constructed.
B. Unstable Subgrade Treatment: When unstable subgrade is encountered, notify the Engineer for examination of subgrade to determine if subgrade has heaved upwards after being excavated. When heaving has not occurred, over-excavate subgrade to allow for 24- inch-thick layer of crushed stone wrapped in filter fabric as foundation material under manhole base. When there is evidence of heaving, provide pile-supported concrete foundation, as detailed on Drawings, under manhole base.
C. Construct manhole on concrete slab in accordance with requirements for Brick Masonry for Utility Construction.

3.3 PIPE CONNECTIONS

A. Use non-shrink grout to seal pipe connections to manholes unless otherwise shown on Drawings.

3.4 FRAME AND COVER

A. Install frame and cover in accordance for Frame, Grates, Rings, and Covers.

3.5 BACKFILL

A. Place and compact backfill materials in area of excavation surrounding manholes in accordance with requirements of Section 02316 - Excavation and Backfill for Structures. Use embedment zone backfill material for adjacent utilities, as shown in the HCDD No. 1 Standard Details over each pipe connected to manhole. Provide trench zone backfill, as specified for adjacent utilities, above embedment zone backfill.
B. Backfill under existing sewer up to spring line of pipe with Class B concrete or flowable fill in accordance for Concrete for Utility Construction.
C. In unpaved areas, provide positive drainage away from manhole frame to natural grade. Provide minimum of 4 inches of topsoil conforming to requirements of Section 02911 - Topsoil. Seed in accordance with Section 02921 - Hydro mulch Seeding, or sod disturbed areas in accordance with Section 02922 – Sodding.

PART 4 - FIELD QUALITY CONTROL

A. Visually inspect manhole for leakage.

4.1 PROTECTION

A. Protect manholes from damage until subsequent work has been accepted. Repair or replace damaged elements of manholes at no additional cost to the District.

END OF SECTION

SECTION 02090
FRAMES, GRATES, RINGS, AND COVERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Iron castings for manhole frames and covers, inlet frames and grates, catch basin frames and grates, meter vault frames and covers, adjustment rings, and extensions.
B. Ring grates.
C. Trench Drainage
D. Tree Grates

1.2 MEASUREMENT AND PAYMENT

A. Measurement and payment is as noted on the Unit Price Schedule.
B. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. AASHTO - American Association of State Highway and Transportation Officials
   1. Standard Specification for Highway Bridges
   2. M306: Drainage, Sewer, Utility, and Related Castings
   3. M105: Gray Iron Castings
B. ASTM A 48 - Standard Specification for Gray Iron Castings
C. ASTM A 536 – Standard Specification for Ductile Iron Castings
D. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
E. E. AWS - D 12.1 Welding Reinforcing Steel.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. Submit copies of manufacturer's specifications, load tables, dimension diagrams, anchor details, and installation instructions.
C. Submit shop drawings for fabrication and installation of casting assemblies that are not included in Drawings or standard HCDD No. 1 details. Include plans, elevations, sections and connection details. Show anchorage and accessory items. Include setting drawings for location and installation of castings and anchorage devices.

PART 2 - PRODUCTS

2.1 CASTINGS

A. All castings shall be made from gray cast iron conforming to the requirements of AASHTO M105 class 35b or ductile iron conforming to the requirements ASTM A536 70-50-05.
B. Castings intended for traffic service shall be clean castings capable of withstanding an application of 40,000 pound proof load as described in Section 5 of AASHTO M306 (includes items such as frames, grates, rings, covers, trench drainage, etc.)
C. Fabricate castings to conform to shapes, dimensions, and with wording or logos shown on Drawings.
D. All castings shall be manufactured in accordance with the requirement of Section 4 of AASHTO M306.
E. Unless otherwise indicated, all gray iron castings shall be provided uncoated.
F. Each individual casting shall include all markings as shown on the specification drawings and shall be identified by the producing foundry showing the following: Name of producing foundry; country of manufacturer preceded by the words “Made in,” such as “Made in USA”; material designation, heat identification and cast date (MM/DD/YY), casting lettering as required by the purchaser. If a casting is melted and poured at one foundry and labeled with the name of another organization, manufacturer, or foundry the casting shall include the name of the producing foundry and the organization the casting is produced for. The name of the producing foundry and the organization the product is made for shall have lettering of equal size, be in close proximity to each other, and be easily identified from the same side of the casting. The casting shall also include any additional markings as required in Section 9 of AASHTO M306 and Section 17 of AASHTO M105.

2.2 TESTING REQUIREMENTS

A. Testing shall be performed in accordance with the following inspection criteria unless otherwise specified in the contract or purchase order. The manufacturer/supplier shall be responsible for carrying out all of the required tests and inspections. All testing shall be conducted in the United States using purchaser approved reliable facilities. The manufacturer/supplier shall maintain complete records of all such tests and inspections. All testing shall be paid for by the manufacturer/supplier.
B. The manufacturer shall report and certify material information obtained from separately cast test bars. If there are more than three test bar failures in a calendar year the manufacturer shall report this to the purchaser and shall discontinue supplying product. In order to resume supplying product, documentation that a new Quality System is in place to ensure material compliance must be submitted to and accepted by the purchaser.

2.3 SPECIAL FRAMES AND COVERS

A. Where indicated on Drawings, provide watertight manhole frames and covers with minimum of four bolts and gasket designed to seal cover to frame. Supply approved watertight manhole covers and frames.
B. Where shown on Drawing, provide manhole frames and covers with 48-inch diameter clear opening, with inner cover for 22 inch diameter clear opening. Provide approved inner cover with pattern shown on Drawings.
C. Where indicated on Drawings provide security enabled covers or grates, to be secured with the addition of Cam locks and lock lugs to inhibit opening and removal of cover or grate without proper authorized tool. Supply approved security feature Frames, Cover or Grates.

2.4 FABRICATED RING GRATES

A. Fabricate ring grates from reinforcing steel conforming to ASTM A 615.
B. Conform to welds connecting bars to AWS D 12.1.

2.5 ADJUSTMENT RINGS FOR ASPHALT OVERLAYS

A. Use castings conforming Section 2.01.
B. One-piece casting with dimensions to fit frame and cover.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install castings according to approved shop drawings, instructions in related specifications, and applicable directions from manufacturer's printed materials.
B. Set castings accurately at required locations to proper alignment and elevation. Keep castings plumb, level, true, and free of rack. Measure location accurately from established lines and grades. Brace or anchor frames temporarily in form work until permanently set.
C. Fabricate ring grates in accordance with the HCDD No. 1 standard detail, “Ring Grate for Open End of 18 Inch to 72 Inch Stubs to Ditch”. Set in mortar in mouth of pipe bell.
D. Install adjustment rings in existing frames with clean bearing surfaces that are free from rocking.

END OF SECTION

SECTION 02091
WATER LINES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Installation of water lines.
B. Specifications identify requirements for both small diameter water lines and large diameter water lines. When specifications for large diameter water lines differ from those for small diameter water lines, large diameter specifications will govern for large diameter pipe.

1.2 MEASUREMENT AND PAYMENT

A. Measurement and payment is as noted on the Unit Price Schedule.
B. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. ANSI A 21.11/AWWA C111 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
B. ANSI/NSF Standard 61 - Drinking Water System - Health Components.
C. ASTM A 36 - Standard Specification for Carbon Structural Steel.
D. ASTM A 536 - Standard Specification for Ductile Iron Castings.
E. ASTM A 126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
F. ASTM B 21 - Standard Specification for Naval Brass Rod, Bar, and Shapes.
G. ASTM B 98 - Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.
H. ASTM B 301 - Standard Specification for Free-Cutting Copper Rod and Bar.
I. ASTM B 584 - Standard Specification for Copper Alloy Sand Casting for General Application.
J. ASTM E 165 - Standard Test Method for Liquid Penetrant Examination.
K. ASTM E 709 - Standard Guide for Magnetic Particle Examination.
L. ASTM F 1674 - Standard Test Method for Joint Restraint Products for Use with PVC Pipe.
M. AWWA C 206 - Standard for Field Welding of Steel Water Pipe.
N. AWWA C 207 - Standard for Steel Pipe Flanges for Waterworks Service -

Sizes 4 Inches through 144 Inches.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. Conform to submittal requirements of applicable Section for type of pipe used.
C. Submit, a minimum of 15 days before beginning pipe laying operations, layout drawing identifying proposed sections for disinfecting, hydrostatic testing and site restoration for entire project for review and approval. Layout drawing to identify sequence of sections for:
   1. Disinfection; not to exceed 4,000 linear feet per section.
   2. Hydrostatic testing and transfer of services; to immediately follow sequence of disinfected section.
   3. Site restoration; not to exceed limits specified; sequence in order of disturbance.
D. For water lines to be field welded, submit proof of certification of field welders per AWWA C206. Indicate certified procedures and position each welder is qualified to perform. Provide documentation of the most recent weld qualification test date and continuity of use in each process for which the welder or welding operator is required.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

A. Install pipe materials which conform to the following:
   1. Section 02501 - Ductile Iron Pipe and Fittings.
   2. Section 02502 - Steel Pipe and Fittings.
   3. Section 02506 - Polyvinyl Chloride Pipe.
B. Conform to American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 61 and have certified by an organization accredited by ANSI.
C. Type of pipe materials used is Contractor's option unless specifically identified on Drawings.
D. Provide minimum of 3/8 inch inside joint recess between ends of pipe in straight pipe sections.

2.2 WELDED JOINT PROTECTION FITTING FOR SMALL DIAMETER STEEL PIPE

A. Cylindrical Corrosion Barrier: Provide approved cylindrical corrosion barrier.
B. O-rings: Conform to National Sanitary Foundation requirements.

2.3 RESTRAINED JOINTS

A. Ductile-Iron Pipe: See Section 02501 - Ductile Iron Pipe and Fittings.
B. PVC Pipe: See Section 02506 - Polyvinyl Chloride Pipe. Perform hydrostatic testing in accordance with ASTM F 1674.
C. Prestressed Concrete Cylinder Pipe, Bar-Wrapped Pipe and Steel Pipe: Welded joints (see Paragraph 3.6C).
D. Except for trenchless installation, restrained Joints where required on DIP and PVC pipe are allowed with the following requirements as an alternative to the pipe with an integral restrained joint system:
    1. Restraint Devices: Manufacture of high-strength ductile iron, ASTM A 536. Working pressure rating twice that of design test pressure.
    2. Bolts and Connecting Hardware: High-strength low-alloy material in accordance with ANSI A21.11/AWWA C111.
E. For ductile iron or PVC pipes in augered holes, provide restrained joints that are integral to both the bell and spigot ends, and do not extend beyond or increase the outside diameter of the bell.
F. For small diameter water lines crossing under sanitary sewer lines or laterals, provide ductile iron pipe with locking or bolted type restrained joints.

2.4 COUPLINGS AND APPURTENANCES FOR LARGE DIAMETER WATERLINE

A. Flexible (Dresser-type) Couplings:
    1. Install where shown on Drawings or where allowed by Project Manager for Contractor's convenience. Use galvanized flexible couplings when installed on galvanized pipe which is cement lined, or when underground. Provide gaskets manufactured from neoprene.
    2. For steel pipe, provide approved sleeve-type flexible couplings. Thickness of middle ring equal to or greater than thickness of pipe wall.
    3. Provide approved flanged adapter couplings for steel pipe.
    4. Use ASTM A193 Grade B7 high strength steel bolts and ASTM A194 heavy hex nuts where flexible couplings are installed underground. Provide cadmium plated hardware. Coat entire coupling with Denso or approved equal petrolatum-based tape.
B. Flap Valves: Provide approved flap valves on discharge of manhole drainline as shown on Drawings.
    1. Body and Flap: ASTM A 126-B cast iron.
    2. Seats: ASTM B 21-CA482 or ASTM B 301-CA145 bronze.
    3. Hinge Arms: ASTM B 584-CA865 high tensile bronze.
    4. Hinge Pins: ASTM B 98-CA655 silicon bronze.

2.5 COUPLINGS AND APPURTENANCES FOR LARGE DIAMETER WATERLINE

A. Install Flexible Expansion Joints at locations indicated on drawings, within limits of Fault Hazard Zone (FHZ), in accordance with the manufacturer's recommendations.

PART 3 - EXECUTION

3.1 PREPARATION

A. Conform to applicable installation specifications for types of pipe used.
B. Employ workmen who are skilled and experienced in laying pipe of type and joint configuration being furnished. Provide watertight pipe and pipe joints.
C. Lay pipe to lines and grades shown on Drawings.
D. Confirm 9 feet minimum separation from gravity sanitary sewers and manholes or separation of 4 feet minimum from force mains as specified in this Section in all directions unless special design is provided on Drawings.
E. Where above clearances cannot be attained, and special design has not been provided on Drawings, obtain direction from Project Manager before proceeding with construction.
F. Inform Project Manager if unmetered sprinkler or fire line connections exist which are not shown on Drawings. Make transfer only after approval by Project Manager.
G. For projects involving multiple subdivisions or locations, limit water line installation to maximum of two project site locations. Maximizing two pipe installation crews shall be permitted, unless otherwise approved by Project Manager.
H. If asbestos-cement (A.C.) pipe is encountered, follow safety practices outlined in OSHA 29 CFR 1926.1101 – Asbestos. Refer to Section 02221 – Removing Existing Pavements, Structures, Wood, and Demolition Debris for removing and disposing of A.C. Pipe.
I. For pipe diameters 36 inches and greater, clearly mark each section of pipe and fitting with unique designation on inside of pipe along with pressure class. Locate unique identifying mark minimum of 5 feet away from either end of each section of pipe. Provide one unique identifying mark in middle of each fitting. Place markings at consistent locations. Use permanent black paint and minimum letter height of 4 inches to mark designations.
J. Contractor is responsible for assuring chosen manufacturer fulfills requirements for extra fittings and, therefore, is responsible for costs due to downtime if requirements are not met.
K. Do not remove plugs or clamps during months of peak water demands; June, July and August, unless otherwise approved by Project Manager.

3.2 HANDLING, CLEANING AND INSPECTION

A. Handling
   1. Place pipe along project site where storm water or other water will not enter or pass through pipe.
   2. Load, transport, unload, and otherwise handle pipe and fittings to prevent damage of any kind. Handle and transport pipe with equipment designed, constructed and arranged to prevent damage to pipe, lining and coating. Do not permit bare chains, hooks, metal bars, or narrow skids or cradles to come in contact with coatings. Where required, provide pipe fittings with sufficient interior strutting or cross bracing to prevent deflection under their own weight.
   3. Hoist pipe from trench side into trench by means of sling of smooth steel cable, canvas, leather, nylon or similar material.
   4. For large diameter water lines, handle pipe only by means of sling of canvas, leather, nylon, or similar material. Slings shall be wide enough so as to not tear or wrinkle tape layers.
   5. Use precautions to prevent injury to pipe, protective linings and coatings.
      a. Package stacked pipe on timbers. Place protective pads under banding straps at time of packaging.
      b. Pad fork trucks with carpet or other suitable material. Use nylon straps around pipe for lift when relocating pipe with crane or backhoe.
      c. Do not lift pipe using hooks at each end of pipe.
      d. Do not place debris, tools, clothing, or other materials on pipe.
      e. Place pipe on timbers, tires or soil berms at the jobsite. Do not place pipe directly on ground.
   6. Repair damage to pipe or protective lining and coating before final acceptance.
   7. For cement mortar lined and coated steel pipe and PCCP, permit no visible cracks wider than 1/16”
      a. In surface laitance of centrifugally cast mortar.
      b. In sections of pipe with steel reinforcing collars or wrappers.
      c. Within 12 inches of pipe ends.
   8. Repair pipe with visible cracks that exceed project specifications. If cracks cannot be repaired to specification remove from project site.
B. Cleaning: Thoroughly clean and dry interior of pipe and fittings of foreign matter before installation, and keep interior clean until Work has been accepted. Keep joint contact surfaces clean until jointing is completed. Do not place debris, tools, clothing or other materials in pipe. After pipe laying and joining operations are completed, clean inside of pipe and remove debris.
C. Inspection: Before installation, inspect each pipe and fitting for defects. Reject defective, damaged or unsound pipe and fittings and remove them from site.

3.3 EARTHWORK

A. Conform to applicable provisions of Section 02317 - Excavation and Backfilling for Utilities.

3.4 PIPE CUTTING

A. Cut pipe 12 inches and smaller with standard wheel pipe cutters. Cut pipe larger than 12 inches in manner approved by Project Manager. Make cuts smooth and at right angles to axis of pipe. Bevel plain end with heavy file or grinder to remove sharp edges

3.5 PIPING INSTALLATION

A. General Requirements:
   1. When trench width below top of pipe becomes 4 feet wider than specified, install higher class of pipe or improved bedding, as determined by Project Manager. No additional payment will be made for higher class of pipe or improved bedding.
   2. Lay pipe in subgrade free of water.
   3. Properly form bedding to fully support bell without wedging or blocking up bell.
   4. Open Cut Construction: Cover or backfill laid pipe if pipe laying operations are interrupted and during non-working hours. Place backfill carefully and simultaneously on each side of pipe to avoid lateral displacement of pipe and damage to joints. If adjustment of pipe is required after it has been laid, remove and re-lay as new pipe. Lay not more than 50 feet of pipe in trench ahead of backfilling operations.
   5. Prevent damage to coating when placing backfill. Use backfill material free of large rocks or stones, or other material which could damage coatings.
B. Install pipe continuously and uninterrupted. Obtain approval of Project Manager prior to skipping any portion of Work.
   1. Before assembling couplings, lightly coat pipe ends and outside of gaskets with pipe lubricant, cup grease or liquid vegetable soap to facilitate installation.
   2. Prior to proceeding with critical tie-ins, submit sequence of work based on findings from "critical location" effort.
   3. Use adequate surveying methods and equipment; employ personnel competent in use of this equipment. Horizontal and vertical deviations from alignment as indicated on Drawings shall not exceed 0.10 feet. Measure and record "as- built" horizontal alignment and vertical grade at maximum of every 100 feet on record drawings.
C. Protection of Pipeline: Securely place stoppers or bulkheads in openings and in end of line when construction is stopped temporarily and at end of

each day's work.

D. Perform Critical Location as shown on Drawings. Refer to Section 02317 - Excavation and Backfill for Utilities for additional requirements at critical locations.
E. Assessment of deflection may be measured by Project Manager at location along pipe. Arithmetical averages of deflection or similar average measurements will not be deemed as meeting intent of standard. Refer to pipe material specifications for maximum allowable pipe deflection.
F. Perform following additional procedures when working on plant sites:
    1. Seventy-two hours prior to each plant shutdown or connection, schedule coordination meeting with Project Manager and Water Production personnel. At this meeting, present proposed sequencing of Work and verification of readiness to complete Work as required and within time permitted. Do not proceed with Work until Project Manager agrees key personnel, equipment and materials are on hand to complete Work.
    2. Prior to fully excavating around existing piping, excavate as minimal as possible to confirm type and condition of existing joints. Verify size, type, and condition of pipe prior to ordering materials or fully mobilizing for Work.
    3. Do not proceed with connections to existing piping and identified critical stages of work unless approved by Project Manager and City's Utility Maintenance Division operator is present to observe.
    4. Coordinate with City Drinking Water Operations to obtain reduction in operating pressures prior to performing connections to existing piping.
    5. Make connections to existing piping only when two valves are closed off between connection and source of water pressure. Do not make connection relying solely on one valve, unless otherwise approved by Project Manager.
    6. Excavation equipment used on plant sites to have smooth bucket; no teeth or side cutters.
    7. Before each "dig" with mechanical excavator, probe ground to determine potential obstructions. Repeat procedure until existing pipe is located or excavation reaches desired elevation. Perform excavations within one foot to existing piping by hand methods.
    8. Provide adequate notice to Project Manager and pipe manufacturer's representative when connecting or modifying existing prestressed or pretension concrete cylinder pipe.
G. For tie-ins to existing water lines, provide necessary material on hand to facilitate connection prior to shutting down existing water line. Provide City a minimum of two weeks’ notice prior to shutting down existing water line.

3.6 JOINTS AND JOINTING

A. Rubber Gasketed Bell-and-Spigot Joints for Concrete Cylinder Pipe, Bar Wrapped Pipe PVC, Steel, and DIP:

1. After rubber gasket is placed in spigot groove of pipe, equalize rubber gasket cross section by inserting tool or bar recommended by manufacturer under rubber gasket and moving it around periphery of pipe spigot.
2. Lubricate gaskets with nontoxic water-soluble lubricant before pipe units are joined.
3. Fit pipe units together in manner to avoid twisting or otherwise displacing or damaging rubber gasket.
4. After pipe sections are joined, check each gasket to ensure that no displacement of gasket has occurred. If displacement has occurred, remove pipe section and remake joint as for new pipe. Remove old gasket, and replace before remaking joint.
5. Provide means to prevent full engagement of spigot into bell in accordance with Paragraph 2.1D. For PVC pipe, means may consist of an approved bell insertion protection system.

B. Flanged Joints where required on Concrete Cylinder Pipe, Bar Wrapped Pipe, Ductile Iron Pipe, or Steel Pipe:
1. AWWA C 207. Prior to installation of bolts, accurately center and align flanged joints to prevent over stressing of flanges, pipe and equipment. Align bolt holes to straddle vertical, horizontal or north-south center line. Do not exceed 3/64 inch per foot inclination of flange face from true alignment.
2. Use ring type or full-face gaskets for flanged joints. Provide 1/8-inch-thick cloth inserted rubber gasket material in accordance with AWWA C207. Cut gaskets at factory to proper dimensions.
3. Provide ASTM A193 Grade B7 high strength steel stud bolts with ASTM A194 heavy hex nuts. Use cadmium-plated steel hardware underground. Tighten bolts progressively to prevent unbalanced stress. Maintain at all times approximately same distance between two flanges at points around flanges. Tighten bolts alternately (180˚ apart) until all are evenly tight. Draw bolts tight to ensure proper seating of gaskets. Provide Denso petrolatum-based tape or approved equal for all exposed portions of nuts, bolts and pipe hardware.
4. Isolation Joints:
    a. Provide full-face Type “E” gasket. For 30-inch diameter and greater, provide Pyrox G-10 material and EPDM sealing element. For 24-inch diameter and smaller, provide Phenolic material and EPDM sealing element. Provide full-length bolt isolating sleeves and washers. Provide matching steel washers on both sides of each insulating washer on every bolt.

C. Welded Joints (Concrete Cylinder Pipe, Bar Wrapped Pipe, Steel Pipe):
1. Prior to starting work, provide certification of qualification for welders employed on project for type of work procedures and positions involved.
2. Steel Pipe Joints: AWWA C 206. See Section 02502 – Steel Pipe and Fittings. Refer to Contract Drawings for joint details. For interior welded joints, complete backfilling before welding. For exterior field-welded

joints, provide adequate working room under and beside pipe. Use exterior welds for 30-inch and smaller.

3. Concrete Pipe Joints: Refer to Contract Drawings for joint details. Align piping and equipment so that no part is offset more than 1/8 inch. Set fittings and joints square and true, and preserve alignment during welding operation. For butt-welded joints, align abutting ends to minimize offset between surfaces. For pipe of same nominal wall thickness, do not exceed 1/16 inch offset. Use line-up clamps for this purpose; however, take care to avoid damage to linings and coatings.
4. Welding Rods: Compatible with metal to be welded to obtain strongest bond, E70XX.
5. Deposit metal in successive layers to provide 1 to 3 passes or beads as required to complete the structural weld or control heat in the weld after backfill joint.
6. Deposit no more than 1/4 inch of metal on each pass. Thoroughly clean each individual pass with wire brush or hammer to remove dirt, slag or flux.
7. Do not weld under weather condition that would impair strength of weld, such as wet surface, rain or snow, dust or high winds, unless work is properly protected.
8. Make tack weld of same material and by same procedure as completed weld. Otherwise, remove tack welds during welding operation.
9. Remove dirt, scale, and other foreign matter from inside piping before tying in sections, fittings, or valves.
10. Welded Joints for Large Diameter Water Lines:
    a. Use exterior welds for 30-inch and smaller.
    b. Employ an independent certified testing laboratory, approved by Project Manager, to perform weld acceptance tests on welded joints. Include cost of such testing and associated work to accommodate testing in contract unit price bid for water line. Furnish copies of test reports to Project Manager for review. Project Manager has final decision as to suitability of welds tested.
        - Weld Acceptance Criteria: Conduct in accordance with ASTM E165 - Standard Test Method for Liquid Penetrant Examination and ASTM E709 - Standard Guide for Magnetic Particle Examination. Use X-ray methods for butt welds, for 100 percent of joint welds.
        - Examine welded surfaces for the following defects: cracking, lack of fusion/penetration, slag which exceeds one third (t) where (t) equals material thickness, porosity/relevant rounded indications greater than 3/16 inch; rounded indication is one of circular or elliptical shape with length equal to or less than three times its width, relevant linear indications in which length of linear indication exceeds three times its width, four or more relevant 1/16 inch rounded indications in line separated by 1/16 inch or less edge to edge.

11. After pipe is joined and prior to start of welding procedure, make spigot and bell essentially concentric by jacking, shimming or tacking to obtain clearance tolerance around periphery of joint except for deflected joints.
12. Furnish each welder employed steel stencil for marking welds, so work of each welder can be identified. Mark pipe with assigned stencil adjacent to weld. When welder leaves job, stencil must be voided and not duplicated. Welder making defective welds must discontinue work and leave project site. Welder may return to project site only after recertification.
13. Scaffolding: Do not drag scaffolding or other items along interior of pipe.
14. Provide cylindrical corrosion barriers for polyurethane or epoxy-lined steel pipe 24-inch diameter and smaller, unless minimum wall thickness is 0.5 inch or greater.
    a. In addition to welding requirements contained here in Paragraph 3.6, conform to protection fitting manufacturer's installation recommendations.
    b. Provide services of technical representative of manufacturer available on site at beginning of pipe laying operations. Representative to train welders and advise regarding installation and general construction methods. Welders must have 12 months prior experience All steel pipe is to have cutback 3/4 inch to no greater than 1 inch of internal diameter coating from weld bevel.
    c. Furnish steel fittings with cylindrical corrosion barriers with shop welded extensions to end of fittings. Extension length to measure no less than diameter of pipe. Shop apply lining in accordance with AWWA C 210 or AWWA C 222.
    d. All steel pipe receiving field adjustments are to be cold cut using standard practices and equipment. No cutting using torch is to be allowed.

D. Harnessed Joints (Concrete Cylinder Pipe, Bar Wrapped Pipe or Steel Pipe):
1. Use of snap-ring type restrained joints on pipe is limited to 20-inch through 48- inch diameters.
2. Position snap-ring joint bolt on top (12 o'clock portion). Provide minimum 1/2- inch joint recess. Use joint "diapers" minimum of 12 inches wide.
3. For field adjustments with deflections or joint offsets beyond manufacturer's recommendations:
    a. Field trim spigot.
    b. Do not engage ring.
4. Harnessed joints are not permitted in areas defined on Drawings as potentially petroleum contaminated material, in tunnels, or at bend greater than 5 degrees.
5. Install harness type joints including snap rings at straight sections of pipe.

E. Restrained Joints:
   1. For existing water lines and water lines less than 16 inches in diameter, restrain pipe joints with concrete thrust blocks unless otherwise shown on Drawings.
   2. Thrust restraint lengths shown on Drawings are minimum anticipated lengths. These lengths are based on deflections or joint offsets indicated and on use of prestressed concrete cylinder pipe for large diameter lines and ductile iron pipe for small diameter lines. Adjustments in deflections or joint offsets or use of other pipe material may result in reduction or increase of thrust lengths.
   3. Pipe manufacturer or representative to perform thrust restraint calculations in accordance with latest revision of applicable standard for pipe material chosen. Submit calculations for all pipe materials sealed by a registered Professional Engineer in State of Texas for review by Project Manager. Make adjustments in thrust restraint lengths at no additional cost.
   4. Include buoyancy conditions for soil unit weight when computing thrust restraint calculations.
   5. Passive resistance of soil will not be permitted in calculation of thrust restraint for some pipe materials.
   6. For 16-inch lines and larger use minimum 16-foot length of pipe in and out of joints made up of beveled pipe where restraint joint lengths are not identified on Drawings. Otherwise, provide restraint joints for a minimum length of 16 feet on each side of beveled joints.
   7. Installation.
      a. Install restrained joints mechanism in accordance with manufacturer's recommendations.
      b. Examine and clean mechanism; remove dirt, debris and other foreign material.
      c. Apply gasket and joint NSF 61 FDA food grade approved lubricant.
      d. Verify gasket is evenly seated.
      e. Do not over stab pipe into mechanism.
   8. Prevent any lateral movement of thrust restraints throughout pressure testing and operation.
   9. Place 2500 psi concrete, for blocking at each change in direction of existing water lines, to brace pipe against undisturbed trench walls. Finish placement of concrete blocking, made from Type I cement, 4 days prior to hydrostatic testing of pipeline. Test may be made 2 days after completion of blocking if Type II cement is used.

F. Joint Grout (Concrete Cylinder Pipe, Bar Wrapped Pipe, Mortar Coated Steel Pipe):
   1. Mix cement grout mixture by machine except when less than 1/2 cubic yard is required. When less than 1/2 cubic yard is required, grout may be hand mixed. Mix grout only in quantities for immediate use. Place grout within 20 minutes after mixing. Discard grout that has set.

Retempering of grout by any means is not permitted.

2. Prepare grout in small batches to prevent stiffening before it is used. Do not use grout which has become so stiff that proper placement cannot be assured without retempering. Use grout for filling grooves of such consistency that it will adhere to ends of pipe.
3. Surface Preparation: Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces with wire brush or hammer to sound, clean surface. Remove rust and foreign materials from metal surfaces in contact with grout.
4. Follow established procedures for hot and cold weather concrete placement.
5. Complete joint grout operations and backfilling of pipe trenches as closely as practical to pipe laying operations. Allow grouted exterior joints to cure at least 1 hour before compacting backfill.
6. Grouting Exterior Joint Space: Hold wrapper in place on both sides of joint with minimum 5/8-inch-wide steel straps or bands. Place no additional bedding or backfill material on either side of pipe until after grout band is filled and grout has mechanically stiffened. Pull ends of wrapper together at top of pipe to form access hole. Pour grout down one side of pipe until it rises on other side. Rod or puddle grout to ensure complete filling of joint recess. Agitate for 15 minutes to allow excess water to seep through joint band. When necessary, add more grout to fill joint completely. Protect gap at top of joint band from backfill by allowing grout to stiffen or by covering with structurally protective material. Do not remove band from joint. Proceed with placement of additional bedding and backfill material.
7. Interior Joints for Pipe 24 Inches and Smaller: Circumferentially butter bell with grout prior to insertion of spigot, strike off flush surplus grout inside pipe by pulling filled burlap bag or inflated ball through pipe with rope. After joint is engaged, finish off joint grout smooth and clean. Use swab approved by Project Manager for 20-inch pipe and smaller.
8. Protect exposed interior surfaces of steel joint bands by pointing with grout. Remove and replace improperly cured or otherwise defective grout.
9. Strike off grout on interior joints and make smooth with inside diameter of pipe.
10. When installed in tunnel or encasement pipe and clearance within casing does not permit outside grout to be placed in normal manner, apply flexible sealer, such as Flex Protex or equal, to outside joint prior to joint engagement. Clean and prime surfaces receiving sealer in accordance with manufacturer's recommendations. Apply sufficient quantities of sealer to assure complete protection of steel in joint area. Fill interior of joint with grout in normal manner after joint closure.
11. Interior Joints for Water Lines 30 Inches and Larger: Clean joint space, wet joint surfaces, fill with stiff grout and trowel smooth and flush with inside surfaces of pipe using steel trowel so that surface is smooth.

Accomplish grouting at end of each work day. Obtain written acceptance from Project Manager of inside joints before proceeding with next day's pipe laying operation. During inspection, insure no delamination of joint mortar has occurred by striking joint mortar lining with rubber mallet. Remove and replace delaminated mortar lining.

12. Work which requires heavy equipment to be over water line must be completed before mortar is applied to interior joints.

G. Large Diameter Water Main Joint Testing: In addition to testing individual joints with feeler gauge approximately 1/2 inch wide and 0.015-inch thick, use other joint testing procedure approved or recommended by pipe manufacturer which will help ensure watertight installation prior to backfilling. Perform tests at no additional cost.

H. Make curves and bends by deflecting or offsetting joints or other method as recommended by manufacturer and approved by Project Manager. Submit details of other methods of providing curves and bends which exceed manufacturer's recommended deflection or joint offset prior to installation.
   1. Deflection of pipe joints shall not exceed maximum deflection recommended by pipe manufacturer, unless otherwise indicated on Drawings.
   2. If deflection exceeds that specified but is less than 5 percent, repair entire deflected pipe section such that maximum deflection allowed is not exceeded.
   3. If deflection is equal to or exceeds 5 percent from that specified, remove entire portion of deflected pipe section and install new pipe.
   4. Replace, repair, or reapply coatings and linings as required.
   5. Assessment of deflection may be measured by Project Manager at location along pipe. Arithmetical averages of deflection or similar average measurement methods will not be deemed as meeting intent of standard.
   6. When rubber gasketed pipe is laid on curve, join pipe in straight alignment and then deflect or offset to curved alignment.

I. Closures Sections and Approved Field Modifications to Steel, Concrete Cylinder Pipe, Bar Wrapped Pipe and Fittings:
   1. For large diameter water lines, provide minimum overlap of 4 inches on each side for butt-strap closures.
   2. For pipe diameters 36 inches and greater, perform field welds on interior and exterior of pipe.
   3. Apply welded-wire fabric reinforcement to interior and exterior of exposed interior and exterior surfaces greater than 6 inches in diameter. Welded-wire fabric: minimum W1; maximum spacing 2 inches by 4 inches; 3/8 inch from surface of steel plate or middle third of lining or coating thickness for mortar thickness less than 3/4 inch.
   4. Fill exposed interior and exterior surfaces with nonshrink grout.

3.7 CATHODIC PROTECTION APPURTENANCES

A. Where identified on Drawings, modify pipe for cathodic protection as detailed on Drawings and specified. Unless otherwise noted, provide insulation kits including test stations at connections to existing water system or at locations to isolate one type of cathodic system from another type, between water line, access manhole piping and other major openings in water line, or as shown on Drawings.
B. Bond joints for pipe installed in tunnel or open cut, except where insulating flanges are provided. Weld strap, wire or clip between bell and spigot of each joint or as shown on Drawings. No additional bonding required where joints are welded for thrust restraint. Repair coatings as specified by appropriate AWWA standard, as recommended by manufacturer, and as approved by Project Manager.
C. Bonding Strap or Clip: Free of foreign material that may increase contact resistance between wire and strap or clip.

3.8 SECURING, SUPPORTING AND ANCHORING

A. Support piping, as shown on Drawings and as specified in this Section, to maintain line and grade and prevent transfer of stress to adjacent structures.
B. Where shown on Drawings, anchor pipe fittings and bends installed on water line by welding consecutive joints of pipe together to distance each side of fitting. Restrained length, as shown on Drawings, assumes that installation of pipe and subsequent hydrostatic testing begin upstream and proceed downstream, with respect to normal flow of water in pipe. If installation and testing differs from this assumption, submit for approval revised method of restraining pipe joints upstream and downstream of device used to test against (block valve, blind flange or dished head plug).
C. Use adequate temporary blocking of fittings when making connections to distribution system and during hydrostatic tests. Use sufficient anchorage and blocking to resist stresses and forces encountered while tapping existing water line

3.9 CLEAN UP AND RESTORATION

A. Provide cleanup and restoration crews to work closely behind pipe laying crews and, where necessary, during disinfection and hydrostatic testing, service transfers, abandonment of old water lines, backfill and surface restoration.
B. Unless otherwise approved by Project Manager, comply with the following:
    1. Once water line is installed to limits approved in layout submitted, immediately begin preparatory work for disinfection effort.
    2. No later than three days after completing disinfection preparatory work, submit to City appropriate request for disinfection.
    3. Immediately after transfer of services, begin abandonment of old water lines and site restoration.

4. Do not exceed a total of 50% of total project linear feet of disturbed right-of- way and easement until site is restored in accordance with Section 02200 - Site Preparation and Restoration.

C. For large diameter water lines, do not install more than 2,000 linear feet of water line, without previous 2,000 linear feet being restored in accordance with Section 02200 – Site Preparation and Restoration. Schedule paving crews so repaving work will not lag behind pipe laying work by more than 1,000 linear feet. Failure to comply with this requirement shall be considered a material breach of the Contract and subject to termination in accordance with the General Conditions.

3.10 CLEANING PIPING SYSTEMS

A. Remove construction debris or foreign material and thoroughly broom clean and flush piping systems. Provide temporary connections, equipment and labor for cleaning.

END OF SECTION

SECTION 02094
WATER VALVES

PART 1 - GENERAL

1.01 GENERAL DESCRIPTION OF WORK:

A. This work shall consist of furnishing and installing valves as indicated on the plans or as directed by the ENGINEER in accordance with these specifications.

B. Unless otherwise noted, all valves 4-inches and larger shall be AWWA-type valves of suitable design and fully equipped for service buried in the earth, with our need for further modification and shall be wrapped with 8-mil polyethylene film with all edges and laps securely taped to provide a continuous wrap.

C. Valve ends on valves 4-inches and larger shall be flaned or mechanical joint. All mechanical joints shall conform to AWWA Specification C111. Flanges shall be dimensioned, faced, and drilled to the 125-pound "American Standard".

D. Valves shall be carefully installed in their respective positions, accessible for operation and repair. Unless shown on the plans otherwise, valves shall be of the same sizes as the pipelines in which they are installed. Stems shall be installed pointing straight upward. The operating nut of all valves or valve stem extensions shall be no deeper than 18-inches below the top of the valve box cover. Valves shall be left in satisfactory operating condition, free from all distortion and strain.

E. All valve operators shall turn in a counterclockwise direction to open the valve.

PART 2 - PRODUCTS

2.01 VALVE TYPES

A. Gate Valves

1. Gate valves shall only be used for pipe sizes of 12-inches and smaller, unless otherwise noted on the plans.

2. Resilient seat gate valve shall be used and shall conform to AWWA C 509. The gate valve shall be a non-rising stem type with inside screw and "O" ring seals. The valve shall have a

standard hub equipped with a square operating nut. The body-to-bonnet and bonnet-to-bonnet cover shall use "O" rings as seals.

3. The resilient seat shall be mechanically retained or bonded on the valve gate (wedge disc).

4. The gate valve shall have a protective coating inside and outside of fusion-bonded epoxy approved for potable water.

5. The valve stem shall comply with AWWA C 509. The material for the valve stem shall be brass or bronze, and shall have a minimum yield strength of 20,000 psi and minimum tensile strength of 60,000 psi. The valve stem shall be compatible and interchangeable with the equivalent sized double disc gate valve models.

6. Gate valves shall have a 2-inch square operating hub nut.

7. The number of turns to open the valve shall be the same or less than the equivalent sized double disc gate valve models. Maximum input torque to open and/or close the valve shall be 200 foot pounds for a 4-inch valve and 300 foot pounds for 6-inch under a working pressure of 200 psi.

8. Before the Work will be accepted, the CONTRACTOR shall provide the ENGINEER with a completed "Water Valve Data Card".

9. Gate valves shall be American Darling, Metroseal by U.S. Pipe, Mueller, or approved equal.

B. Rubber Seated Butterfly Valves

1. Butterfly valves will be used in lieu of gate valves for sizes of 14-inches and larger, the butterfly valve shall be of the rubber-seated tight closing type conforming to AWWA C504.

2. The valve body shall be cast iron having integral hubs for the housing shaft bearings and seals. The body ends shall be flanged per AWWA C504 with the flanges designed for installation between Class 125 cast iron flanges or mechanical joint meeting the requirements of AWWA C111.

3. The butterfly valve disc shall be cast iron.

4. The seat shall be buna-n rubber and shall be mechanically retained on the disc edge by means of 18-8 stainless steel bolts. Seat must also be capable of being replaced in the field without

chipping, grinding, or burning out of the old seat or retaining substance. The body seat mating surface shall be 18-8 stainless steel, type 304 mechanically retained.

5. Valve shafts shall be 18-8 stainless steel, type 304 and shall be securely attached to the disc by means of bolts, dowel pins, or taper pins.
   All butterfly valves shall be side operated. Valve actuator shall be integrally mounted on the valve mounting flange and shall be of the self locking traveling nut type in complete accordance with AWWA C504 requirements. Actuators shall be furnished with a standard 2" operating nut and must be designed to permit the adjustment of the valve disc seating without the removal of the housing cover.

6. All butterfly valves shall be tested per AWWA C504.

7. Before the work will be accepted, the CONTRACTOR shall provide the ENGINEER with a completed "Water Valve Data Card".

C. Valve Stem Extension

1. Extension stems shall be provided as necessary to situate the operating nut no greater than 18-inches below the valve cover.

2. Extension stems shall be equipped with stem guides affixed to the valve box at intervals not to exceed ten feet.

3. Stem guides shall be considered a part of the extension. Extension stems and stem guides shall be manufactured items or approved equal.

D. Air and Vacuum Valves

1. Air and vacuum valves shall be of the type that automatically exhaust large quantities of air during the filling of a pipeline and allow air to re-enter during draining or when a negative pressure occurs.

2. The inlet and outlet of the valve shall have the same cross-sectional area. The floats shall be guided by a stainless steel guide shaft and seat against a synthetic seat.

3. Valves shall have N.P.T. inlets and outlets.

4. All air and vacuum valves shall be constructed of cast iron with stainless steel trim and buna-n seating. Valve shall be as

manufactured by Val-Matic Valve & Mfg. Corp., Series 100.

E. Fire Hydrants

1. Fire hydrants and their extensions shall be in accordance with AWWA C 502, traffic type.

2. Fire hydrants shall have one 5 1/4 inch diameter valve opening; 6-inch mechanical joint of slip-on inlet connection; two 2 1/2 inch hose nozzle connections; and one 4 1/2 inch steamer nozzle with National Standard Fire Hose coupling Screw Threads or as specified by the OWNER.

3. Fire Hydrants shall have a bronze or cast iron, pentagon, operating nut, be designed for 150 psi., working pressure service, and have a normal bury of 4 to 4 1/2 feet unless field conditions require a deeper bury, in which case extensions will be used so as to bring the bottom of the break-off flange 2 to 8 inches above the top of finished grade.

4. The pipe fittings and fire hydrants starting at the street main and ending at the fire hydrant itself shall be lying in a line perpendicular to the street's centerline or radially on a curvilinear installation.

5. Fire hydrants shall be installed in as near a vertical position as possible and shall have no more than 1/2 inch variation from a vertical line between the breakway flange and the top of the fire hydrant.

6. Hydrants shall be dry barrel, post-type with compression main valve closing with pressure. They shall have a field lubrication capability. Hydrants shall have a bronze seat ring threaded into a bronze drain ring or bronze or cast iron bushing.

7. Hydrant interior and exterior below the ground line shall be coated with asphalt varnish, and the exterior painted from the top to a point one foot below the ground level flange, consisting of one coat rust inhibitive primer.

8. The bottom plate of the main valve shall be epoxy coated. The shoe of the fire hydrant shall have a 6-inch mechanical joint connection. The inside shall be epoxy coated to prevent corrosion.

9. The nozzle shall be threaded in-place and retained by stainless steel locks.

10. Hydrant body shall be threaded to receive the threaded nozzle. Nozzle shall be secured by a stainless steel locking device.

11. Fire hydrant shall contain two drain outlets. The drain outlets shall be constructed of bronze. Hydrant shall be provided with a pentagon operation nut to open counter clockwise and shall have an anti-friction washer between the hold-down nut and the operating nut.

12. Fire hydrants shall be installed at locations as shown on construction plans and in accordance with Standard Detail Drawings.

13. No project will be accepted by the OWNER until all hydrants are operational, accessible and have been tested by the McAllen Fire Department.

14. Before the work will be accepted, the CONTRACTOR shall provide the ENGINEER with a completed "Fire Hydrant Data Card".

15. Hydrants shall be limited the following unless prior written approval is provided by the ENGINEER:

    a) Mueller Centurion A-423

    b) American Darling B-84-B

    c) Kennedy Guardian K-81A

    d) U.S. Pipe Metropolitan

F. Valve Boxes

1. Valve boxes, rings and covers shall be the type, size and material as shown in Standard Detail Drawings.

2. No valve box shall be paved over without the permission of the ENGINEER. Paving material shall not remain on valve box covers overnight.

3. Valve boxes shall be fabricated using 6-inch cast-iron sliding type pipe shaft with cover and base casting.

4. Drop covers for valve boxes shall be marked "water" using lettering casted in the cover by the manufacturer.

5. Top of valve box shall be set at finished grade unless otherwise

noted.

2.02 WATER VALVE DATA CARD:

A. Water Valve Data Card, as shown on Figure 02558-1 and 02558-2, shall be prepared for all types of valves (Gate Valves, Butterfly Valves, Air Release Valves, etc) according to the following instructions:

1. The Valve Number will be assigned by the OWNER at a later date.

2. Valve Size is the nominal diameter of the valve, i.e., 6-inch, 14-inch or 48-inch. In the case of compound valves give size of main valve and by-pass valve, i.e., 24-inch and 4-inch, or 36-inch and 6-inch.

3. Valve Type is the general description of the valve, such as: Vertical Gate Valve, Horizontal Gate Valve, Vertical Gate Valve with by-pass, Horizontal Gate Valve with by-pass, Butterfly Valve, Globe Valve, Check Valve, etc.

4. Make and Model refers to the manufacturer, make and model number to identify the valve for replacement parts, such as Mueller No. A-2308-6. This information should be available from the shop drawings.

5. Number of Turns and Direction to Open is the number of revolutions of the operating nut to make the valve travel from fully closed to fully open, and the direction is either clockwise or counter-clockwise, i.e., 54 turns counter-clockwise. All standard valves shall open counter clockwise. Operation, turn count, and direction to open will be verified by the ENGINEER prior to installation.

6. Under Project Name is the assigned work order number or name shown on plans.

7. Date Warranty expires is the expiration date, under the contract, for requiring warranty repairs.

8. Street Location: Give both block number and street name. For valves in intersections give both streets.

9. The section on coordinate location shall be completed by the ENGINEER.

10. All applicable items on the "Water Valve Data Card" should be filled in. However, accuracy is more important than filling blank spaces. Therefore, if an item is unknown and cannot be

determined, leave the space blank.

11. Depth to "Operator" is vertical distance to the top of actual valve operating nut to top of valve box cover.

12. Extension length is self explanatory.

2.03 FIRE HYDRANT DATA CARD:

A. A fire hydrant data card, as shown on Figure 02558-3, shall be prepared for all installations of fire hydrants, in accordance with the following instructions:

1. Fire hydrant number will be assigned by the OWNER at a later date.

2. Fire hydrant type refers to the manufacturer's make and model. For example: Mueller Centurion, A 423 Model.

3. Location. Indicate both block number and street name. At intersections indicate both street names.

4. Date Installed. Indicate actual date the hydrant was installed.

5. Depth. Indicate the actual depth in feet of the lower barrel of the fire hydrant. This depth is measured from the shoe to the breakaway flanges of the hydrant.

6. On the reverse side of the card indicate the location of fire hydrant on the sketch.

PART 3 - EXECUTION

3.01 SETTING VALVES, DRAINS AND AIR RELEASES:

A. Unless otherwise indicated, main line valves, drain valves and piping, air and vacuum release assemblies and other miscellaneous accessories shall be set and jointed in the manner described for cleaning, laying, and jointing pipe.

B. Unless otherwise indicated, valves shall be set in line with the radius point and the corresponding point of curvature or point of tangency of adjacent curbs or right of way lines.

C. Valves shall be installed and the stems adjusted so that the top operating stems will be at the proper depth required for the piping at the location indicated above.

D. Valve boxes and valve stem casings shall be firmly supported and maintained, centered and aligned plumb over the valve or operating stem, with the top of the box or casing installed flush with the finished ground or pavement in existing streets and installed with the top of the box or casing approximately 6-inches below the standard street subgrade in streets which are excavated for paving construction or where such excavation is scheduled or elsewhere as directed by the ENGINEER.

E. Drainage branches or air blow-offs shall not be connected to any sanitary sewer or submerged in any stream or be installed in any other manner that will permit back siphonage into the distribution.

F. Every drain line and every air release line shall have a full sized independent gate valve flanged directly to the main.

G. Flap-valves, shear gates, etc., will not be accepted.

3.02 SETTING FIRE HYDRANTS:

A. Fire hydrants shall be located in a manner to provide accessibility and in such a manner the possibility of damage from vehicles or injury to pedestrians will be minimized.

B. Unless otherwise directed, the setting of a hydrant shall conform to the following:

1. When placed behind a curb, the hydrant barrel shall be set so that no portion of the pumper of hose nozzle cap will be less that 12 nor more than 24-inches from the gutter face of the curb or less than 20 feet from the curb line intersection of any street.
2. If set between streets, the hydrant shall be placed as directed by the ENGINEER.
3. When set in the lawn space between the curb and the sidewalk or between the sidewalk and property line, no portion of the hydrant or nozzle cap shall be within 6-inches of the sidewalk.

C. All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the curb with the pumper nozzle pointing normal to the curb. They shall conform to the finish grade with the hydrant bury mark approximately level with the ground or other finish grade, with the large pumper nozzle approximately 18-inches above grade as indicated without the use of hydrant extensions except where authorized by the ENGINEER.

D. Each hydrant shall be connected to the main pipe with the 6-inch Ductile Iron branch.

E. Below each hydrant, a drainage pit 2 feet in diameter and 2 feet deep shall be excavated and filled compactly with coarse gravel or broken stone mixed with coarse sand under and around the blow of the hydrant, except where thrust blocking is situated and to a level 6-inches above the hydrant drain opening.

F. No hydrant drainage pit shall be connected to a sanitary sewer.

G. The bowl of each hydrant shall be well braced against unexcavated earth at the end of the trench with concrete thrust blocking (taking care not to obstruct the hydrant drain holes) or it shall be tied to the pipe with approved metal harness rods and clamps.

H. Hydrants shall be thoroughly cleaned of dirt or foreign matter before setting.

3.03 PROTECTIVE COVERING:

A. Unless otherwise indicated, all flanges, nuts, bolts, threaded outlets and all other steel components buried and in contact with earth or backfill shall be wrapped with 8-mil (minimum) polyethylene film meeting ANSI/AWWA Specification C-105-current, with all edges and laps taped securely to provide a continuous and watertight wrap.

3.04 VALVE BOX REHABILITATION:

A. This item shall include replacement of the valve can and collar only where the work connects to an existing valve that is to be left in place.

B. This work shall be done only if the existing valve box does not have the required concrete collar around the can.

C. The work and materials shall include the following:

1. Replacement of the original can regardless of its condition, with the new 12-inch diameter corrugated metal culvert pipe.
2. Install concrete collar.
3. The existing ring and cover shall be reused if in good condition.
4. Removal and replacement of the pavement.
5. Excavation, backfill, and compaction.
6. All materials, labor, and equipment necessary to do the work.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

A. Measurement of accepted material, complete in place shall be made as follows:

1. Valves - Per each including valve stem casting and cover, excavation, setting and adjusting to grade and anchoring in place.

2. Air and Vacuum Valves - Per each including threaded valve and corporation cock, pipe, fittings, meter box and cover.

3. Fire Hydrants - Per each not including pipe, fittings and valves between main line and fire hydrant.

4. Fire Hydrant Extensions - Per vertical foot, in cases where the bury of the fire hydrant is greater than 4 feet, complete in place, including rod extensions, bolts and all other required accessories.

5. Valve Boxes - Per each when not incidental to another item, including cover, excavation, setting and adjusting to grade and anchoring in place, complete in place.

6. Valve Box Rehabilitation - Per each including all applicable materials.

4.02 PAYMENT

A. Payment for items measured above shall be made at the unit bid price as follows:

B. Compensation, whether by contract pay item or incidental work will be for furnishing all materials, labor, equipment, tools and incidentals required for the work, all in accordance with the plans and these specifications.

*** * * END OF SECTION * * ***

SECTION 02099
FIRE HYDRANT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fire Hydrants.
B. Adjustment of fire hydrants and gate valves.

1.2 MEASUREMENT AND PAYMENT

A. Measurement and payment is as noted on the Unit Price Schedule.
B. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. AWWA C 502 – Standard for Dry Barrel fire Hydrants (Latest Edition).
B. AWWA C 550 - Standard for Protective Epoxy Interior Coatings for Valves and Hydrants
C. SSPC SP2 - Hand Tool Cleaning
D. SSPC SP3 - Power Tool Cleaning
E. SSPC SP10 - Near-White Blast Cleaning
F. SSPC SP11 - Power Tool Cleaning to Bare Metal
G. SSPC 42 – Epoxy Polyamide/Polyamidoamine Primer, performance based
H. SSPC 36 – Two-Component Weatherable Aliphatic Polyurethane Topcoat, performance based

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. Submit name of hydrant manufacturer, type of bonnet paint, and engineering control drawing number for hydrant proposed for use.

PART 2 - PRODUCTS

2.1 HYDRANTS

A. Provide fire hydrants in conformance with AWWA C 502, Standard for Dry Barrel Fire Hydrants (Latest Edition).
B. The Project Manager may, at any time prior to or during installation of

hydrants, randomly select furnished hydrant for disassembly and laboratory inspection, at City expense, to verify compliance with Specifications. When hydrant is found to be noncompliant, replace, at Contractor's expense, hydrants, with hydrants that comply with Specifications.

C. Provide lower hydrant barrel fabricated from Ductile Iron Pipe as single piece, connected to upper hydrant barrel by means of joint coupling that will provide three hundred sixty degree (360) rotation of upper barrel.

2.2 LEADS

A. Branches (Leads): Conform to requirements of Section 02501 - Ductile Iron Pipe and Fittings, Section 02502 - Steel Pipe and Fittings, and Section 02506 - Polyvinyl Chloride Pipe.

2.3 HYDRANT PAINTING

A. New hydrants and refurbished hydrants shall be shop coated as specified herein.

B. Exterior Above Traffic Flange (Including Bolts & Nuts). Bolts and nuts (both above and below ground) shall conform to AWWA C-502 Section 4.11 and shall be stainless steel, cadmium plated, or zinc coated.
   1. Surface preparation to be in accordance with SSPC-SP 10 (NACE 2) near white blast cleaned surface.
   2. Coat with a liquid or powder epoxy primer and two part polyurethane or TGIC polyester top coat system with total dry film thickness (DFT) of not to exceed 20 mils as follows:
      a. Prime Coat - Liquid or powder epoxy primer with a total dry film thickness (DFT) of 4-6 mils, OR cathodic epoxy electro-coat (e-coat) with a (DFT) of 0.5-1.0 mils
      b. Intermediate Coat – Intermediate coat not required.
      c. Finish Coat - Two part polyurethane enamel to be in general conformance with SSPC Paint Specification No. 36 or TGIC polyester system, with a total dry film thickness (DFT) 1.5-3.0 mils. Install color coded finish coating of bonnet in field.
      d. Bonnet Paint - Field apply finish coat of Silicone Alkyd Resin Enamel to be in general conformance with SSPC Paint Specification No. 21. Dry film thickness of 2 - 3 mils. Bonnet colors are to be as specified in Paragraph 3.01 to designate the appropriate size of water supply line.
   3. Colors - Primer: Manufacturer’s standard color. Finish coat of hydrant body: Federal Standard Color #15187 (Blue) or equivalent. Bonnet and Connection caps: Finished coated white. Paint white band of finish coat two (2) inches in width on hydrant body approximately six inches (6") above and parallel to traffic flange.

C. Field Maintenance Painting (Exterior Above Traffic Flange)
   1. Surface Preparation to be in accordance with SSPC - SP2, Hand Tool

Cleaning, or SSPC - SP3, Power Tool Cleaning, depending on condition of existing paint and extent of corrosion. It is not necessary to remove tightly adhered mill scale, rust, and paint. Mill scale, rust and paint are considered tightly adherent when they cannot be removed with dull putty knife. In some severe cases where it is necessary to remove majority of existing paint, surface should be cleaned in accordance with SSPC -SP11, Power Tool Cleaning to Bare Metal.

2. When surface is cleaned to bare metal (SSPC - SP11), coat hydrant with three coat Alkyd/Silicone Alkyd system in accordance with Paragraph 2.03.B.2 as for new hydrants. When surface is cleaned to SSPC - SP2 or SSPC - SP3, coat hydrant with Silicone Alkyd Resin Enamel in general conformance with SSPC Paint Specification No. 21. Total dry film thickness of 3-6 mils.
3. Field coating should be conducted in accordance to the individual coatings manufacturer's recommendations.

D. Exterior Below Traffic Flange (including lower barrel extensions).
   1. Surface preparation in accordance with SSPC- SP10 (NACE 2) Near White Blast Cleaned Surface.
   2. Primer: One or two coats of modified or equal polyamide epoxy primer, to be in general conformance with SSPC Paint Specification No. 42 or approved equal with a total dry film thickness (DFT) of 20 mils. Exterior below traffic flange should be the same color as the above traffic flange, i.e., blue. (Federal Standard Color #15187 (Blue) or equivalent.)

E. Interior Surfaces Above and Below Water Line Valve (including lower barrel extensions).
   1. Material used for internal coating of hydrant interior ferrous surfaces must be NSF certified as suitable for contact with potable water as required by Chapter 290, Rules and Regulations for Public Water Systems, Texas Commission on Environmental Quality.
   2. Coating shall be liquid or powder epoxy system in accordance with AWWA Standard C - 550 (latest revision). Coating may be applied in two or three coats, according to manufacturer's recommendations, for total dry film thickness not to exceed 20 mils.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set fire hydrant plumb and brace at locations and grades as shown on Drawings. When barrel of hydrant passes through concrete slab, place 1-inch-thick piece of standard sidewalk expansion joint material around section of barrel passing through concrete.
B. Locate nozzle center line minimum 18 inches above finish grade.
C. Place 12-inch by 12-inch yellow indicators (plastic, sheet metal, plywood, or other material approved by Project Manager) on pumper nozzles of new or relocated fire hydrants installed on new water lines not in service.

Remove indicators after new water line is tested and approved by Project Manager.

D. Do not cover drain ports when placing concrete thrust block.
E. Obtain Project Manager's approval in writing prior to installation of hydrants which require changes in bury depth due to obstructions not shown on Drawings. Unit price adjustments will not be allowed for changes in water line flow line or fire hydrant barrel length caused by obstructions.
F. Plug branch lines to valves and fire hydrants shown on Drawings to be removed. Deliver fire hydrants designated for salvage to nearest Utility Maintenance Quadrant Facility.
G. Install branches (leads) in accordance with Section 02511 - Water Lines.
H. Coating Requirements:
    1. Apply coatings in strict accordance with manufacturer's recommendations. No requirements of this specification shall cancel or supersede written directions and recommendations of specific manufacturer so as to jeopardize integrity of applied system.
    2. Furnish affidavit of compliance that coatings furnished complies with requirements of this specification and referenced standards, as applicable.
I. Use following color code for field coating of hydrant bonnet to indicate size of water line supplying hydrant:

Supply Water Line Diameter (in)	Bonnet Color
6	Yellow
8	White
12 – 20	Green
24+	Orange

J. Remove and dispose of unsuitable materials and debris in accordance with requirements of Section 02120 – Material Disposal.

END OF SECTION

SECTION 02120
MATERIAL DISPOSAL

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for removal and proper disposal of unusable, objectionable or excess material.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 SUBMITTALS

A. Submittals shall be as indicated in Section 01330 – Submittal Procedures.
B. Submit prior to start of work.
    1. Disposal agreement(s) and fill permit(s).
    2. For material to be burned, submit burn permit and list of notified governmental agencies.
    3. One copy of a map (including map's scale) identifying the location and boundaries of the designated site. Provide physical address if available.
    4. One copy of the current Flood Insurance Rate Map (FIRM), map identifying the location of the designated site.
    5. Demonstration of compliance with any local jurisdictional requirements for material disposal.
C. During construction, for material disposed in a landfill, submit the following application support documents: One copy of the landfill operator's ticket or receipt clearly showing the truck load weight and/or cubic yards accepted by the landfill.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION

3.1 GENERAL

A. Remove unusable, objectionable or excess material from the construction work area and properly dispose of such material.
B. Disposal of material in wetlands or other environmentally sensitive areas without permits is prohibited.
C. Disposal of material in the 100-year flood plain without permits is prohibited.
D. Material disposed of without permits shall be removed and properly disposed of at no cost to the District. Restore the site at no cost to the District.
E. Cleared and grubbed material may be burned on the right-of-way, provided the following items are adhered to:
    1. Obtain permits required for burning including, but not limited to, permit(s) authorizing operation of the trench burner.
    2. Notify appropriate State and local governmental agencies and adhere to the requirements of these agencies.
    3. Obtain approval for location of the burn pit from the appropriate government agency and the Engineer.
    4. Perform burning with a permitted trench burner.
    5. Constantly supervise burning until extinguished.
    6. When burning is complete, remove ash, stumps and other objectionable material from the pit and dispose of in accordance with this Section.
    7. Backfill burn pit in accordance with Section 02315 – Excavating and Backfilling.
F. Cleared and grubbed material may be chipped on-site and chips disposed of in areas approved by the Engineer, provided the following items are adhered to:
    1. Scatter chips sufficiently to prevent killing turf grass or other desirable vegetation.
    2. Dispose of excess chips in accordance with this Section.

END OF SECTION

SECTION 02200
SITE PREPARATION AND RESTORATION

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for construction preparation and final site restoration.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule and the following schedule
   1. Payment of 70 percent of bid amount: When mobilization is complete, including move-in of major equipment, installation of project signs, and sanitary facilities.
   2. Payment of 30 percent of bid amount: When clean up of project site is complete, including removal of construction debris, temporary facilities, signs and related project appurtenances.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION

3.1 DESCRIPTION

D. The work covered by this Section consists of furnishing all labor, materials, equipment, supplies, supervision, tools, and performing all work necessary for clearing and protection of facilities during construction and top soiling, finish grading, seeding, fertilizing, watering, maintenance, and clean-up of disturbed areas within the individual water plant areas at the completion of work, in accordance with these specifications and as shown on drawings.
E. Fences shall be relocated or installed as shown on drawings. All damage to existing fencing occurring during construction activities shall be repaired or replaced at the Contractor's expense to a condition equal to or better than existing prior to such damage. Fencing relocated for the convenience of accommodating construction activities shall be returned to its original location at the completion of the work.

F. Silt fencing and four (4) foot safety fencing is to be installed as indicated on the plans.
G. All sites shall be restored to a condition equal to or better than that existing prior to construction activities. All holes and open excavations shall be filled and compacted to the density of the surrounding area. Level all washes, ruts, depressions, and mounds to provide a smooth finish with no large debris, dirt clods, or lumps of size that would interfere with the operation of a standard rotary lawnmower.

3.2 GENERAL

A. Protect items designated for preservation from abuse, marring or damage during construction operations.
B. Maintain access and drainage continuously for duration of the project.
C. Remove structures, abandoned utility lines and related obstructions to a depth of 2 feet below the finished grade.
D. Collect tires, batteries, paint cans, oil cans and related debris items on the right-of-way in a location approved by the Engineer, for disposal by others.
E. When Work is finished, remove existing construction signs and reinstall in an approved location when directed by the Engineer.
F. Remove structures, outfall pipes, drainage facilities and other items that may interfere with the construction work or as designated on the Plans.
G. Maintain all-weather access to adjacent facilities that have driveways.
H. Establish and maintain access to the site.
I. Clean up the site.
J. Install, remove, relocate, replace and reinstall fences, barricades or barriers required to secure the site.
K. Secure the site as necessary to perform the Work.

3.3 ABANDONED UTILITY LINES

A. Remove abandoned utility lines that may interfere with the construction work or as designated on the Plans.
B. Notify the utility owner prior to work on such abandoned lines.
C. Plug and abandon utility lines left in place as approved by the Engineer.

3.4 ENCROACHMENTS

A. Remove encroachments into the District's right-of-way that interfere with the construction work or as designated on the Plans.
B. Coordinate with property owners at least 24 hours prior to any work on such encroachments.
C. Place the removed encroachment neatly on the adjacent property.

3.5 PROJECT SIGNS

A. Refer to Section 01580 – Project Signs.

3.6 BACKFILLING

A. Refer to Section 02315 – Excavating and Backfilling.

3.7 DISPOSAL

A. Refer to Section 02120 – Material Disposal.

END OF SECTION

SECTION 02221
REMOVING EXISTING PAVEMENTS, STRUCTURES, WOOD, AND DEMOLITION DEBRIS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Removing concrete paving, asphaltic concrete pavement, brick pavement and base courses.
B. Removing concrete curbs, concrete curbs and gutters, sidewalks and driveways.
C. Removing pipe culverts, sewers, and sewer leads.
D. Removing waterlines and water services lines including asbestos cement pipe per OSHA guidelines.
E. Removing existing inlets and manholes.
F. Removing and disposing of pre-stressed concrete beams and drill shafts.
G. Removing miscellaneous structures of concrete or masonry.
H. Removing existing bridge.
I. Removing existing wood and demolition debris.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 PREPARATION

A. Obtain advance approval from Project Manager for dimensions and limits of removal work.
B. Identify known utilities below grade. Stake and flag locations.
C. For removal of asbestos-containing materials, or materials that could potentially contain asbestos, comply with the following:
   1. Crew members must be trained in accordance with OSHA 29 CFR 1926.1101 – Asbestos.

2. Conduct negative exposure assessment to demonstrate asbestos exposure below permissible exposure limit (PEL) in accordance with OSHA 29 CFR 1926.1101 – Asbestos and EPA 40 CFR 763 – Asbestos.
3. If negative exposure assessment not conducted, or if results are above PEL, provide respiratory protection in accordance with Paragraph 3.02 of this Section.

3.2 PROTECTION

A. Protect following from damage or displacement:
   1. Adjacent public and/or private property.
   2. Trees, plants, and other landscape features designated to remain.
   3. Utilities designated to remain.
   4. Pavement and utility structures designated to remain.
   5. Bench marks, monuments, and existing structures designated to remain.
B. When required, provide respiratory protection in accordance with OSHA 29 CFR 1910.134 – Respiratory Protection, and National Institute of Occupational Safety and Health (NIOSH).

3.3 REMOVALS

A. Remove pavements and structures by methods that will not damage underground utilities. Do not use drop hammer near existing underground utilities.
B. Minimize amount of earth loaded during removal operations.
C. Where existing pavement is to remain, make straight saw cuts in existing pavement to provide clean breaks prior to removal. Do not break concrete pavement or base with drop hammer unless concrete or base has been saw cut to minimum depth of 2 inches.
D. When street and driveway saw cut location is greater than one-half of pavement lane width, remove pavement for full lane width or to nearest longitudinal joint as directed by Project Manager.
E. Remove sidewalks and curbs to nearest existing dummy, expansion, or construction joint.
F. Where existing end of pipe culvert or end of sewer is to remain, install 8-inch-thick masonry plug in pipe end prior to backfill in accordance with requirements of Section 02316 – Structural Excavating and Backfilling.
G. Labeling of Asbestos Cement (AC) Pipe:
   1. Label leak-tight container with warning statement of hazardous asbestos content in accordance with OSHA 29 CFR 1926.1101 and as noted below.
   2. Label waste material with following warning:

DANGER
CONTAINS ABESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGES TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

3. Neatly print labels in letters of sufficient size and contrast so label is easily visible and legible

3.4 BACKFILL

A. Backfill of removal areas shall be in accordance with requirements of Section 02316 – Structural Excavating and Backfilling.

3.5 DISPOSAL

A. Inlet frames, grates, and plates; and manhole frames and covers, may remain City property. Disposal shall be in accordance with requirements of Section 02120 - Material Disposal.
B. Remove from site, debris resulting from work under this section in accordance with requirements of Section 02120 - Material Disposal.
C. For asbestos-containing materials:
   1. Comply with 40 CFR Part 61 and 30 TAC Sections 330.137(b) for Industrial Class 1 waste.
   2. Inspect load to ensure correct packaging and labeling.
   3. Line vehicles with two layers of 6-mil polyethylene sheeting.
   4. Remove asbestos-containing waste from site daily.

END OF SECTION

SECTION 02232
SELECTIVE CLEARING

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for selective clearing of trees, brush and other vegetation.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCE

A. ANSI A300 – Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance - Standard Practices (includes supplements).

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION

3.1 GENERAL

A. Remove selected vegetation, as shown on the Plans or designated by the Engineer, within the construction work limits from the work site. Engineer will designate and clearly mark trees to be removed.
B. Cut selected vegetation flush with or within 2 inches of the surrounding ground surface. Leave the stump and root system in place.
    1. Mulching or chipping cut material in place is preferred.
    2. Exercise care to avoid damage to adjacent vegetation.
    3. Chips larger than 6 inches are not permitted.
    4. Tree limb and root pruning shall comply with ANSI A300.
    5. Work limits shall not exceed 1,500 linear feet or as directed by the Engineer.

3.2 HERBICIDE APPLICATION

A. Apply herbicide to stumps as directed by Engineer. Refer to Section 02941 – Herbicide Application.

3.3 DISPOSAL

A. Dispose according to Section 02120 – Material Disposal or stack tree logs and brush when directed by Engineer.

END OF SECTION

SECTION 02233
CLEARING AND GRUBBING

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for clearing and grubbing of trees, brush, stumps, roots and buried logs.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION

3.2 CLEARING AND GRUBBING

A. Remove trees, brush and stumps within the construction work limits from the work site.
B. Clearing and grubbing beyond construction limits for the Contractor's convenience shall be at no cost to the District. Transmit written evidence to the Engineer that permission has been obtained from the property owner prior to beginning work.
C. For linear projects, clear and grub to no more than 1,500 linear feet ahead of the work.
D. Engineer will designate and clearly mark trees to be saved. Protect designated trees in accordance with Section 01565 – General Source Controls.
E. Trim tree limbs extending over the project site with a sharp saw or by-pass pruner to produce a smooth cut.
F. Cut roots extending into the project site with a sharp saw or by-pass pruner at the face of the excavated surface.
G. Remove stumps, roots and buried logs in areas of excavation or fill to a depth of 1 foot below design or existing ground surface.
H. Cut trees and brush at the ground surface, in areas where excavation or fill will not be performed, in a manner which permits

smooth grading.

3.3 HERBICIDE APPLICATION

A. Apply herbicide to stumps as directed by the Engineer. Refer to Section 02941 – Herbicide Application.

3.4 DISPOSAL

A. Refer to Section 02120 – Material Disposal.

END OF SECTION

SECTION 02241
CARE AND CONTROL OF WATER

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for the care and control of ground and surface water.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 SUBMITTALS

A. Submittals shall be as indicated in Section 01330 – Submittal Procedures.
B. Submit a plan to the Engineer prior to the start of construction or with bid when required where care and control of water is paid for separately.
C. Plan shall include drawings and descriptions of how to implement the care and control of ground and surface water. Plan shall cover the protection of existing facilities and new construction against normal flow, high flow and potential flooding conditions.
D. Submit a Schedule of Values for Engineer's approval when care and control of water is paid for separately or when requested by the Engineer.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION

3.1 GENERAL

A. Select the means, methods and techniques to control ground water and surface water.
B. Maintain the work reasonably free of water. Control shall be accomplished in a manner that will preserve the strength of the subgrade and backfill, not cause instability of slopes and not

result in damage to existing facilities or contamination of water.

C. Lower the groundwater in advance of excavation utilizing wells, wellpoints or similar methods, as necessary.
   1. Open pumping with sumps and ditches is not permitted if it results in boils, loss of fines, softening of the ground or instability of slopes.
   2. Install wells and wellpoints with suitable screens and filters so that continuous pumping of fines does not occur.
   3. Arrange the discharge to facilitate collection of samples by the Engineer and to prevent erosion at the outfall.
D. Remove care and control of water facilities in a manner as not to contaminate water and restore channel area to a condition satisfactory to the Engineer, after the work is complete.

3.2 REPAIR

A. Repair or replace damage caused by water at no cost to the District.
B. Remediate contamination of water resulting from construction activities on the Project at no cost to the District.

END OF SECTION

SECTION 02314
FILL MATERIAL

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for the acceptance and use of fill.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. ASTM D 1140 – Amount of Material in Soil Finer than the No. 200 (75 µm) Sieve.
B. ASTM D 2487 – Classification of Soils for Engineering Purposes Unified Soil Classification System.
C. ASTM D 4647 – Identification and Classification of Dispersive Clay Soils by the Pinhole Test.
D. ASTM D 4318 – Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.4 SUBMITTALS

A. Refer to Section 01330 – Submittal Procedures.
   1. Submit sample source identifying information including sample identification, one copy of map (including map's scale) identifying the location and boundaries of the designated site, source sketch, supplier and grab sample. Show the borrow site or pit and the proposed excavation location, sample location and approximate material depth(s) on the source sketch.
B. Submit test report based on:
   1. Laboratory determination of amount of material finer than the No. 200 (0.075 mm) sieve (ASTM D 1140).
   2. Liquid limit, plastic limit and plasticity index (ASTM D 4318).
   3. Pinhole test (ASTM D 4647, Method A).
   4. Classification shall be reported in accordance with ASTM D 2487 and include (as a minimum):

a. Group name.
b. Group symbol.
c. Soil color(s).
d. Results of the laboratory tests.

1.5 CONSTRUCTION TESTS AND INSPECTION

A. Refer to Section 01457 – Construction Tests and Inspection.

PART 2 – PRODUCTS

2.1 IMPORTED SELECT FILL MATERIAL

A. Use an approved material, free from roots, trash, organic matter and other objectionable material where imported select fill material is shown on the Plans or specified.
B. Where the imported select fill material is not specified elsewhere, the material shall be a fine-grained lean clay with sand (CL) or sandy lean clay (CL) soil material when classified in accordance with ASTM D 2487 and conforming to the following criteria:

TEST DESCRIPTION	ASTM TEST	UNIT	VALUE
Maximum Liquid Limit	D 4318	%	49
Plasticity Index Range	D 4318	%	15 – 30
Passing No. 200 Sieve	D 1140	%	60 – 85
Pinhole Test - Method A	D 4647	-	ND1 – ND2

2.2 FILL MATERIAL EXCAVATION FROM ON-SITE

A. Where no other fill material is specified or shown, use inorganic soils from the on-site excavation that are free from roots, trash, organic matter and other objectionable material and classified by their group name and symbol in accordance with ASTM D 2487 as follows:

GROUP NAME	GROUP SYMBOL
Lean Clay	CL
Lean Clay with Sand	CL
Sandy Lean Clay	CL

B. Do not use peat or other organic matter, muck, debris or similar materials. The inorganic soils listed below may be used only with the approval of the Engineer:

GROUP NAME	GROUP SYMBOL
Fat Clay	CH
Sand	SW, SP, SC or SM

PART 3 – EXECUTION

A. Refer to Section 02315 – Excavating and Backfilling.
B. Refer to Section 02316 – Structural Excavating and Backfilling.

END OF SECTION

SECTION 02315
EXCAVATING AND BACKFILLING

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for removing, stockpiling and replacing on-site vegetation and topsoil, excavating, repairing slopes, backfilling, grading the berms, backslope swales and related work. This Section does not include excavating and backfilling for structures.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.
D. Dirt Excavation and Hauling Measurement shall be based upon cross sections as required which are based on dirt in the ground. No additional payment will be given for over excavation. Further, payment shall not be based on the number of truck-loads.
E. Cross-sections obtained by Contractor shall be tied to the base line and, as a minimum, at the same locations and limits as the design cross-sections.
F. Cross-sections obtained by Contractor shall be plotted at the same scale as design cross-sections where available or to the same horizontal and vertical scale where design cross-sections are not available.
G. Plots of cross-section shall include pre-construction, intermediate, final and design cross-sections.
H. Cross-sections in areas of buried riprap or protective linings, such as riprap and concrete channel lining, shall be to the top of these materials. Excavation required for placement of such protective lining is considered structural excavation and incidental to the cost of related protective lining. See Section 02316 – Structural Excavating and Backfilling.
I. For small areas or other areas where limits can readily be determined visually, measurement may be by conventional taping and/or measuring techniques, as approved by the Engineer. Measurement shall be witnessed by the Engineer.

J. Where paid for separately, backslope swales shall be measured as noted on the Unit Price Schedule.
K. Contractor shall perform all quantity calculations for approval by Engineer.
L. No payment will be made for over-excavation or over-filling beyond the design cross-sections, except as directed by the Engineer.
M. Support partial pay request quantities with pre-construction and intermediate cross-sections, Plan quantity calculations to-date or quantity calculations determined from field measurement techniques previously approved by the Engineer.
N. Support final pay request quantities by using pre-construction, intermediate and final cross-sections or final field measured quantity calculations, as approved by the Engineer.

1.3 REFERENCES

A. ASTM D 698 – Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft-lbf/ft^3 (600kN-m/m^3)).

1.4 DEFINITIONS

A. Existing Cross-Sections: Obtained by design engineer to prepare Plans and bid documents.
B. Pre-Construction Cross-Sections: Obtained by Contractor prior to construction to establish pre-construction conditions. Contractor may accept existing cross-sections as pre-construction cross-sections.
C. Intermediate Cross-Sections: Obtained by Contractor to establish extent of work, such as to remove disturbed soil and to repair slope failures.
D. Final Cross-Sections: Obtained by Contractor at completion of excavation and/or fill.
E. Design Cross-Section: Proposed channel section shown on Plans showing final grades.

1.5 SUBMITTALS

A. Refer to Section 01330 – Submittal Procedures.
B. Submit plotted cross-sections and earthwork quantity calculations in tabular form.

1.6 CONSTRUCTION TESTS AND INSPECTION

A. Refer to Section 01457 – Construction Tests and Inspection.

PART 2 – PRODUCTS

2.1 FILL MATERIAL

A. Refer to Section 02314 – Fill Material.

PART 3 – EXECUTION

3.1 SITE PREPARATION

A. Prepare the site for construction in accordance with Section 02200 – Site Preparation and Restoration and Section 02233 – Clearing and Grubbing.
B. Remove grass and other vegetative cover from areas to be excavated or filled.
C. Remove material that may interfere with the proposed work, including unusable materials, disturbed soils and/or objectionable material as directed by Engineer.
D. Engineer will inspect and approve foundation soil prior to placement of fill.

3.2 TOPSOIL

A. Refer to Section 02911 – Topsoil.

3.3 CARE AND CONTROL OF WATER

A. Refer to Section 02241 – Care and Control of Water.

3.4 CONSTRUCTION

A. Construct to lines, grades and dimensions shown on the Plans.
B. Return over-excavation beyond the specified limits to grade at no cost to the District.
C. Do not cast or place material, either temporarily or permanently, on top of bank without approval of Engineer.
D. Do not cut temporary shelves into side slopes without approval of Engineer.
E. Correct grading that results in standing water at no cost to the District.
F. Grade side slopes as required by the Engineer to smoothly transition the lateral into the main channel at locations where lateral ditches enter the channel.

3.5 FILL

A. Level soil surface prior to placing first layer of fill.
B. Compaction of foundation soil surface shall be considered satisfactory when the Contractor is capable of achieving specified compaction for the first layer of fill.
C. Protect foundation soils and/or fill soils from detrimental drying.
D. Scarify surfaces to receive fill to ensure proper bonding. When the surface can be penetrated by tamping roller feet, additional scarification is usually not necessary.

E. Cut into existing (undisturbed) material in a “benching” or “stair step” fashion. Each bench shall form a horizontal surface and corresponding nearly vertical surface. The height difference between adjacent horizontal surfaces shall be a minimum of 3 feet.
F. Mechanically compact backfill provided under Section 02314 – Fill Material in 8-inch maximum layers, loose measure, to not less than 95 percent of maximum standard dry density (ASTM D 698) within plus or minus 3 percent of optimum moisture content. Where approved for use by the Engineer, fat clay (CH) soil shall be mechanically compacted to not less than 95 percent or more than 98 percent of maximum standard dry density (ASTM D 698) at or within plus 3 percent of optimum moisture content.
G. Refer to Section 02316 – Structural Excavating and Backfilling for backfilling behind retaining structures, unless shown otherwise on the Plans.

3.6 BACKSLOPE DRAINAGE SYSTEMS

A. Backslope swale and interceptor structure elevations and locations shown on the Plans are approximate. Final elevations and locations shall be field verified by the Engineer prior to installation. Minor changes in location and grade shall be considered incidental and no extra payment will be made for such adjustments.

3.7 MAINTENANCE OF DRAINAGE

A. Maintain constant flow and drainage in the main and lateral channels, backslope swales and off-site swales.

3.8 EROSION AND SEDIMENT CONTROL

A. Use means, methods, sequences and scheduling to minimize erosion and sedimentation and other damage to the project site and facilities, including the following:
    1. Limit work in this Section to no more than 1500 feet of channel at any time.
    2. Construct backslope drainage system, silt fences and vegetate each reach of the channel as soon as practical. Refer to Section 02361 – Silt Fences and Section 02921 – Turf Establishment.
    3. Failure to construct erosion control facilities in a timely manner, may result in a directive to do so. Engineer may stop construction on the project if, in the opinion of the Engineer, conditions warrant such action.
    4. Remove sediment and debris prior to final acceptance of the Work by the Engineer at no additional cost to the District. The removal of sediment includes reaches of channel downstream of the project where sedimentation occurred due to construction of this Project.
    5. Comply with terms and conditions of the Texas Pollutant Discharge

Elimination System (TPDES) permit, the Stormwater Pollution Prevention Plan (SWPPP) and Best Management Practices (BMPs) for this Project, if applicable.

3.9 MATERIAL DISPOSAL

A. Refer to Section 02120 – Material Disposal.

END OF SECTION

SECTION 02316
STRUCTURAL EXCAVATING AND BACKFILLING

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for excavating and backfilling under, above and adjacent to structures, including riprap and buried riprap.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. ASTM D 698 – Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft-lbf/ft^3 (600kN-m/m^3)).

1.4 CONSTRUCTION TESTS AND INSPECTION

A. Refer to Section 01457 – Construction Tests and Inspection.

PART 2 – PRODUCTS

2.2 FILL MATERIAL

A. Refer to Section 02314 – Fill Material.

2.3 CEMENT STABILIZED SAND

A. Refer to Section 02321 – Cement Stabilized Sand.

2.4 CONCRETE BACKFILL

A. Refer to Section 03310 – Concrete, Non-structural.

2.5 FLOWABLE FILL

A. Refer to Section 02322 – Flowable Fill.

2.6 SUBGRADE STABILIZATION

A. Provide stabilized subgrade or stabilized soil backfill as indicated in the Specifications, as noted on the Unit Price Schedule or as noted in the Plans.

2.7 SAND OR GRAVEL BACKFILL

A. Provide sand or gravel backfill in accordance with the material and gradation requirements as noted on the Plans.

2.8 GRANULAR FILL

A. Refer to Section 02378 – Riprap and Granular Fill.

2.9 TOPSOIL

A. Refer to Section 02911 – Topsoil.

PART 3 – EXECUTION

3.1 SITE PREPARATION, INCLUDING REMOVING VEGETATION

A. Refer to Section 02200 – Site Preparation and Restoration and Section 02233 – Clearing and Grubbing.
B. Remove grass and other vegetative cover from areas to be excavated or to receive fill.

3.2 EXCAVATION

A. Determine the size, shape and dimensions of the excavation necessary to accomplish the Work within the project site. This includes selecting the means, methods and techniques of excavation and other related matters. Extend the excavation a sufficient distance from walls and edges of the structure to allow for placing and removing of forms and trench safety systems, for inspection and installing ancillary items. Complete excavations within the following tolerances:
    1. Perform structural excavation to the grade necessary to provide the minimum design thickness as shown on the Plans and to allow the top to be no higher than the design grade.
    2. Cut vertical planes for footing excavations to neat lines with a tolerance of minus 1/2 inch to plus 3 inches.
    3. Excavate to the elevations shown on the Plans forming a relatively level undisturbed subgrade surface free of mud or other soft material. Excavation extending deeper than the Plan elevations is considered

unauthorized excavation unless it is as directed by the Engineer at no cost to the District.

B. Notify the Engineer when the bottom of the excavation, at the elevation shown, is not within the foundation bearing material shown on the Plans or is unsuitable for foundation bearing. Do not excavate to deeper levels without authorization from the Engineer. Remove pockets of soft or otherwise unstable soils and replace with satisfactory material as directed by the Engineer compacted to match adjacent stable soil or as directed by the Engineer.
C. Protect open excavation from rainfall, freezing or excessive drying to maintain the foundation subgrade or backfill in a satisfactory condition. Subgrade soils which become soft, loose or otherwise unsatisfactory for support of the foundation resulting from inadequate excavation protection, dewatering or other construction methods, shall be removed and replaced with satisfactory material, as directed by the Engineer, at no cost to the District.

3.3 SHEETING, SHORING AND BRACING

A. Perform sheeting, shoring and bracing of excavations as required to properly and safely complete the work as shown on the Plans. Install sheeting, shoring and bracing to prevent the excavation from extending beyond specified or indicated limits and to protect adjacent structures or improvements.
B. Protect workmen and the public with sheeting, shoring and bracing that is in strict conformity with Section 02269 – Trench Safety System.
C. Care shall be taken to prevent voids during the installation, use and removal of sheeting. Immediately fill voids with satisfactory material as directed by the Engineer and compact.
D. Remove sheeting, shoring and bracing after completion of the structure unless approval has been granted by the Engineer, in writing, to leave members in place.

3.4 CARE AND CONTROL OF WATER

A. Refer to Section 02241 – Care and Control of Water.

3.5 PLACING BACKFILL

A. Place backfill in 8 inch maximum layers (loose measure) to the elevation of surrounding natural ground or to the lines and grades shown on Plans.
B. Place backfill as promptly as practicable after completion of the structure or portion of a structure.
C. Placing operations shall be performed in such a manner as not to impair safety or serviceability of the structure. Do not place backfill against concrete walls or similar structures until all affected concrete has been in place at least 14 days and attained the minimum design compressive

strength, unless otherwise shown on the Plans.

D. Do not backfill where the top of walls are supported by slabs or intermediate walls until the slab or intermediate walls have been placed and cured. Do not backfill until the minimum curing requirement and minimum design compressive strength have been met unless otherwise shown on the Plans.
E. Prevent any wedging action of backfill against the structure. Step cut (bench) the slopes bounding the excavation, as required, to prevent wedging.
F. Use sand or gravel backfill for backfilling behind sheet pile walls, wingwalls, retaining walls, rectangular concrete channel walls or other retaining structures. Backfill in the zone for a distance of 3 feet from the wall to 1.5 foot below the top of the wall, unless shown otherwise on the Plans. Backfill the 1.5 foot zone with 1 foot of clay soil conforming to Part 2 of this Section and backfill the top 6 inches with topsoil conforming to Section 02911 – Topsoil.
G. Excavate 3 feet or less around abutment backwalls, inlets and manholes and fill with cement stabilized sand, unless shown otherwise on the Plans.

3.6 COMPACTING BACKFILL

A. Mechanically compact soil backfill as follows:
   1. Compact to not less than 95 percent of maximum standard dry density (ASTM D 698) within plus or minus 3 percent of the optimum moisture content.
   2. Where approved for use by the Engineer, fat clay (CH) soil shall be mechanically compacted to not less than 95 percent or more than 98 percent of maximum standard dry density (ASTM D 698) at or within plus 3 percent of the optimum moisture content.
   3. Compact sand and/or gravel backfill behind retaining walls including the top 1 foot of backfill material utilizing hand operated tamping or vibratory plate type of compaction equipment. Compact to no less than 90 percent of maximum standard dry density (ASTM D 698) within plus or minus 3 percent of the optimum moisture content.
   4. Compact cement stabilized sand to produce a minimum unconfined compressive strength of 200 psi in 48 hours when compacted to at least 95 percent maximum standard dry density (ASTM D 698) and in accordance with Section 02321 – Cement Stabilized Sand.
   5. Install flowable fill according to Section 02322 – Flowable Fill.
   6. Compact stabilized subgrade or stabilized soil backfill in accordance with the Plans and Specifications.
   7. Consolidate concrete backfill in accordance with Section 03310 – Concrete.
B. Prevent damage to structures caused by backfilling or other construction operations.

3.7 MATERIAL DISPOSAL

A. Refer to Section 02120 – Material Disposal.

END OF SECTION

SECTION 02317
EXCAVATION AND BACKFILL FOR UTILITIES

PART 1 – GENERAL

1.1 SUMMARY

A. Excavation, trenching, foundation, embedment, and backfill for installation of utilities, including manholes and other pipeline structures.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. ASTM D 558 - Standard Test Methods for Moisture-Density Relations of Soil Cement Mixtures.
B. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft).
C. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
D. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
E. ASTM D 2487 - Standard Classification of Soils for Engineering Purposes.
F. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
G. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
H. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
I. TxDOT Tex-101-E - Preparing Soil and Flexible Base Materials for Testing.
J. TxDOT Tex-110-E - Particle Size Analysis of Soils.
K. Federal Regulations, 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (OSHA).
L. ASTM C76- Standard Specification for Reinforced Concrete Culverts,

Storm Drain, and Sewer Pipe.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. Submit planned typical method of excavation, backfill placement and compaction including:
   1. Trench widths.
   2. Procedures for foundation and pipe zone bedding placement, and trench backfill compaction.
   3. Procedures for assuring compaction against undisturbed soil when pre-manufactured trench safety systems are proposed.
C. Submit backfill material sources and product quality

PART 2 – PRODUCTS

2.1 EQUIPMENT

A. Perform excavation with hydraulic excavator or other equipment suitable for achieving requirements of this Section.
B. Use only hand-operated tamping equipment until minimum cover of 12 inches is obtained over pipes, conduits, and ducts. Do not use heavy compacting equipment until adequate cover is attained to prevent damage to pipes, conduits, or ducts.
C. Use trench shields or other protective systems or shoring systems which are designed and operated to achieve placement and compaction of backfill directly against undisturbed native soil.
D. Use special shoring systems where required which may consist of braced sheeting, braced soldier piles and lagging, slide rail systems, or other systems .

2.2 FILL MATERIAL

A. Refer to Section 02314 – Fill Material.

2.3 CEMENT STABILIZED SAND

A. Refer to Section 02321 – Cement Stabilized Sand.

2.4 CONCRETE BACKFILL

A. Refer to Section 03310 – Concrete, Non-structural.

2.5 FLOWABLE FILL

A. Refer to Section 02322 – Flowable Fill.

2.6 SUBGRADE STABILIZATION

A. Provide stabilized subgrade or stabilized soil backfill as indicated in the Specifications, as noted on the Unit Price Schedule or as noted in the Plans.

2.7 SAND OR GRAVEL BACKFILL

A. Provide sand or gravel backfill in accordance with the material and gradation requirements as noted on the Plans.

2.8 GRANULAR FILL

A. Refer to Section 02378 – Riprap and Granular Fill.

2.9 TOPSOIL

A. Refer to Section 02911 – Topsoil.

PART 3 – EXECUTION

3.1 SITE PREPARATION, INCLUDING REMOVING VEGETATION

A. Refer to Section 02200 – Site Preparation and Restoration and Section 02233 – Clearing and Grubbing.
B. Remove grass and other vegetative cover from areas to be excavated or to receive fill.

3.2 PROTECTION

A. Protect trees, shrubs, lawns, existing structures, and other permanent objects outside of grading limits and within grading limits as designated on Drawings.
B. Protect and support above-grade and below-grade utilities which are to remain.
C. Restore damaged permanent facilities to pre-construction conditions unless replacement or abandonment of facilities is indicated on Drawings.
D. Take measures to minimize erosion of trenches. Do not allow water to pond in trenches. Where slides, washouts, settlements, or areas with loss of density or pavement failures or potholes occur, repair, re-compact, and pave those areas at no additional cost to the District.
E. Contingency plans for proposed work or utility installation adjacent to or across a LDWL:

    1. Conduct on-site emergency drill prior to commencing proposed utility installation, and at three-month intervals to assure Emergency Action Plan (EAP) is current.

2. In the event a LDWL shut down becomes necessary, secure site and provide assistance to the District personnel to access pipe and isolation valves as needed.

3.3 EXCAVATION

A. Except as otherwise specified or shown on Drawings, install underground utilities in open cut trenches with vertical sides.
B. Perform excavation work so that pipe, conduit, and ducts can be installed to depths and alignments shown on Drawings. Avoid disturbing surrounding ground and existing facilities and improvements.
C. Determine trench excavation widths using following schedule as related to pipe outside diameter (O.D.). Excavate trench so that pipe is centered in trench.

Nominal Pipe Size, Inches	Minimum Trench Width, Inches
Less than 18	O.D. + 18
18 to 30	O.D. + 24
36 to 42	O.D. + 36
Greater than 42	O.D. + 48

Do not obstruct sight distance for vehicles utilizing roadway or detours with stockpiled materials.

D. Use sufficient trench width or benches above embedment zone for installation of well point headers or manifolds and pumps where depth of trench makes it uneconomical or impractical to pump from surface elevation. Provide sufficient space between shoring cross braces to permit equipment operations and handling of forms, pipe, embedment and backfill, and other materials.
E. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions, discontinue work at that location. Notify the Engineer and obtain instructions before proceeding.

F. Shoring of Trench Walls.

1. Install Special Shoring in advance of trench excavation or simultaneously with trench excavation, so that soils within full height of trench excavation walls will remain laterally supported at all times.
2. For all types of shoring, support trench walls in pipe embedment zone throughout installation. Provide trench wall supports sufficiently tight to prevent washing trench wall soil out from behind trench wall support.
3. Leave sheeting driven into or below pipe embedment zone in place to preclude loss of support of foundation and embedment materials,

unless otherwise directed by the Engineer. Leave rangers, walers, and braces in place as long as required to support sheeting, which has been cut off, and trench wall in vicinity of pipe zone.

4. Employ special methods for maintaining integrity of embedment or foundation material. Before moving supports, place and compact embedment to sufficient depths to provide protection of pipe and stability of trench walls. As supports are moved, finish placing and compacting embedment.
5. If sheeting or other shoring is used below top of pipe embedment zone, do not disturb pipe foundation and embedment materials by subsequent removal. Maximum thickness of removable sheeting extending into embedment zone shall be equivalent of 1-inch-thick steel plate. As sheeting is removed, fill in voids left with grouting material.

G. Use of Trench Shields. When trench shield (trench box) is used as worker safety device, the following requirements apply:

1. Make trench excavations of sufficient width to allow shield to be lifted or pulled freely, without damage to trench sidewalls.
2. Move trench shields so that pipe, and backfill materials, after placement and compaction, are not damaged nor disturbed, nor degree of compaction reduced. Re-compact after shield is moved if soil is disturbed.
3. When required, place, spread, and compact pipe foundation and bedding materials beneath shield. For backfill above bedding, lift shield as each layer of backfill is placed and spread. Place and compact backfill materials against undisturbed trench walls and foundation.
4. Maintain trench shield in position to allow sampling and testing to be performed in safe manner.
5. Conform to applicable Government regulations.

H. Voids under paving area outside shield caused by Contractor's work will require removal of pavement, consolidation and replacement of pavement in accordance with Contract Documents. Repair damage resulting from failure to provide adequate supports.

I. Place sand or soil behind shoring or trench shield to prevent soil outside shoring from collapsing and causing voids under pavement. Immediately pack suitable material in outside voids following excavation to avoid caving of trench walls.

J. Coordinate excavation within 15 feet of pipeline with company's representative. Support pipeline with methods agreed to by pipeline company's representative. Use small, rubber-tired excavator, such as backhoe, to do exploratory excavation. Bucket that is used to dig in close proximity to pipelines shall not have teeth or shall have guard installed over teeth to approximate bucket without teeth. Excavate by hand within 1

foot of Pipeline Company's line. Do not use larger excavation equipment than normally used to dig trench in vicinity of pipeline until pipelines have been uncovered and fully exposed. Do not place large excavation and hauling equipment directly over pipelines unless approved by Pipeline Company's representative.

K. When, during excavation to uncover pipeline company's pipelines, screwed collar or an oxy- acetylene weld is exposed, immediately notify the Engineer. Provide supports for collar or welds. Discuss with Pipeline Company's representative and determine methods of supporting collar or weld during excavation and later backfilling operations. When collar is exposed, request Pipeline Company to provide welder in a timely manner to weld ends of collar prior to backfilling of excavation.

L. Excavation and shoring requirements for proposed work or utility installation adjacent to or across a Large Diameter Water Line (LDWL):

1. Identify LDWL area in field and barricade off from construction activities. Allow no construction related activities including, but not limited to, loading of dump trucks and material staging or storage, on top of LDWL.
2. Employ a groundwater control system when performing excavation activities within ten feet of LDWL to:
    a. Effectively reduce hydrostatic pressure affecting excavations,
    b. Develop substantially dry and stable subgrade for subsequent construction operations,
    c. Prevent loss of fines, seepage, boils, quick condition or softening of foundation strata, and
    d. Maintain stability of sides and bottom of excavations.

3. When edge of proposed trench or shoring is within a distance equal to one diameter of LDWL from outside of wall of LDWL, valve or appurtenance:

    a. Maintain minimum of four (4) feet horizontal clearance and minimum of two (2) feet vertical clearance between proposed utility and LDWL.
    b. Auger Construction
        i. Maintain minimum of four (4) feet horizontal clearance between proposed utility and LDWL.
        ii. Dry auger method required when auger hole is 12-inches and larger in diameter.

    c. Open Cut Construction and Auger pits
        i. Perform hand excavation when within four (4) feet of LDWL.
        ii. Employ hydraulic or pneumatic shoring system. Do not use vibratory or impact driven shoring or piling.

iii. Expose no more than 30-feet of trench prior to backfilling.
iv. A maximum of one (1) foot of vertical trench shall be un-braced at a time to maintain constant pressure on face of excavated soil.
v. Upon removal of shoring system, inject flowable fill into void space left behind by shoring system. Comply with Standard Specification 02322 - Flowable Fill.

d. When edge of utility excavation is greater than one diameter of LDWL from outside wall of LDWL, use a shielding system as required by the Engineer and proposed utility standards and practices.

3.4 TRENCH FOUNDATION

A. Excavate bottom of trench to uniform grade to achieve stable trench conditions and satisfactory compaction of foundation or bedding materials.

B. When wet soil is encountered on trench bottom and dewatering system is not required, over excavate an additional 6 inches with approval by the Engineer. Place non-woven geotextile fabric and then compact 12 inches of crushed stone in one lift on top of fabric. Compact crushed stone with four passes of vibratory-type compaction equipment.

C. Place trench dams in Class I foundations in line segments longer than 100 feet between manholes and not less than one in every 500 feet of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than 5 feet from manholes.

3.5 PIPE EMBEDMENT, PLACEMENT, AND COMPACTION

A. Remove loose, sloughing, caving, or otherwise unsuitable soil from bottoms and sidewalls of trenches immediately prior to placement of embedment materials.

B. Place embedment including bedding, haunching, and initial backfill as shown on Drawings.

C. For pipe installation, manually spread embedment materials around pipe to provide uniform bearing and side support when compacted. Protect flexible pipe from damage during placing of pipe zone bedding material. Perform placement and compaction directly against undisturbed soils in trench sidewalls, or against sheeting which is to remain in place.

D. Do not place trench shields or shoring within height of embedment zone unless means to maintain density of compacted embedment material are used. If moveable supports are used in embedment zone, lift supports

incrementally to allow placement and compaction of material against undisturbed soil.

E. Place geotextile to prevent particle migration from in-situ soil into open-graded (Class I) embedment materials or drainage layers.

F. Do not damage coatings or wrappings of pipes during backfilling and compacting operations. When embedding coated or wrapped pipes, do not use crushed stone or other sharp, angular aggregates.

G. Place haunching material manually around pipe and compact it to provide uniform bearing and side support. If necessary, hold small-diameter or lightweight pipe in place during compaction of haunch areas and placement beside pipe with sand bags or other suitable means.

H. Place electrical conduit, if used, directly on foundation without bedding.

I. Shovel in-place and compact embedment material using pneumatic tampers in restricted areas, and vibratory-plate compactors or engine-powered jumping jacks in unrestricted areas. Compact each lift before proceeding with placement of next lift. Water tamping is not allowed.

J. Place trench dams in Class I embedment in line segments longer than 100 feet between manholes, and not less than one in every 500 feet of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than 5 feet from manholes.

3.6 TRENCH ZONE BACKFILL PLACEMENT AND COMPACTION

A. Place backfill for pipe or conduits and restore surface as soon as practicable. Leave only minimum length of trench open as necessary for construction.

B. For sewer pipes (Storm and Sanitary), use backfill materials described by trench limits. For "trench zone backfill" under pavement and to within one foot back of curb, use cement stabilized sand for pipes of nominal sizes 36 inches in diameter and smaller to level 12 inches below the pavement. For

A. sewer pipes 42 inches in diameter and larger, under pavement or natural ground, backfill from 12 inches above top of pipe to 12 inches below pavement with suitable on-site material or select backfill. Use select backfill for rigid pavements or flexible base material for asphalt pavements for 12-inch backfill directly under pavement.

B. For Storm Sewers constructed of HDPE pipe and installed under pavement provide flowable fill as specified in Section 02322 Flowable Fill. For Storm Sewers constructed of HDPE pipe and not installed under pavement provide cement stabilized sand.

C. Where damage to completed pipe installation work is likely to result from withdrawal of sheeting, leave sheeting in place. Cut off sheeting 1.5 feet or more above crown of pipe. Remove trench supports within 5 feet from ground surface.

D. Unless otherwise shown on Drawings. Use one of the following trench zone backfills under pavement and to within one foot of edge of pavement. Place trench zone backfill in lifts and compact. Fully compact each lift before placement of next lift.

1. Class I, II, or III or combination thereof:

    a. Place in maximum 12-inch thick loose layers.
    b. Compact by vibratory equipment to minimum of 95 percent of maximum dry density determined according to ASTM D 698.
    c. Moisture content within zero percent to 5 percent above optimum determined according to ASTM D 698, unless otherwise approved by the Engineer.

2. Cement-Stabilized Sand:

    a. Maximum lift thickness determined by Contractor to achieve uniform placement and required compaction, but do not exceed 12 inches.
    b. Compact by vibratory equipment to minimum of 95 percent of maximum dry density determined according to ASTM D 558.
    c. Moisture content on dry side of optimum determined according to ASTM D 558 but sufficient for cement hydration.

3. Class IVA and IVB (Clay Soils):

    a. Place in maximum 8-inch thick loose lifts.
    b. Compaction by vibratory Sheepfoot roller to minimum of 95 percent of maximum dry density determined according to ASTM D 698.
    c. Moisture content within zero percent to 5 percent above optimum determined according to ASTM D 698, unless approved by the Engineer.

E. Unless otherwise shown on Drawings, for trench excavations not under pavement, random backfill of suitable material may be used in trench zone. This provision does not apply to HDPE storm sewers.

1. Fat clays (CH) may be used as trench zone backfill outside paved areas at Contractor's option. When required density is not achieved, at any additional cost to the HCDD No. 1, rework, dry out, use lime

stabilization or other approved methods to achieve compaction requirements, or use different suitable material.

2. Maximum 9-inch compacted lift thickness for clayey soils and maximum 12-inch lift thickness for granular soils.

3. Compact to minimum of 90 percent of maximum dry density determined according to ASTM D 698.

4. Moisture content as necessary to achieve density.

F. For electric conduits, remove form work used for construction of conduits before placing trench zone backfill.

3.7 MANHOLES, JUNCTION BOXES AND OTHER PIPELINE STRUCTURES

A. Below paved areas or where shown on Drawings, encapsulate manhole with cement stabilized sand; minimum of 2 foot below base, minimum 2 foot around walls, up to pavement subgrade or natural ground.

B. In unpaved areas, use select fill for backfill. Existing material that qualifies as select material may be used, unless indicated otherwise on Drawings. Deposit backfill in uniform layers and compact each layer as specified. Maintain backfill material at no less than 2 percent below nor more than 5 percent above optimum moisture content, unless otherwise approved by the Engineer. Place fill material in uniform 8-inch maximum loose layers. Compact fill to at least 95 percent of maximum Standard Proctor Density according to ASTM D 698.

C. For LDWL projects, encapsulate manhole with cement stabilized sand; minimum of 1 foot below base, minimum of 2 feet around walls, up to within 12 inches of pavement subgrade or natural ground. For manholes over water line, extend encapsulation to bottom of trench. Compact in accordance with this Section.

3.2 MATERIAL DISPOSAL

A. Refer to Section 02120 – Material Disposal.

END OF SECTION

SECTION 02320
UTILITY BACKFILL MATERIALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Material Classifications.
B. Utility Backfill Materials:
   1. Concrete sand
   2. Gem sand
   3. Pea gravel
   4. Crushed stone
   5. Crushed concrete
   6. Bank run sand
   7. Select backfill
   8. Random backfill
   9. Cement stabilized sand
C. Material Handling and Quality Control Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 DEFINITIONS

A. Unsuitable Material:
   1. Materials classified as ML, CL-ML, MH, PT, OH, and OL according to ASTM D 2487.
   2. Materials that cannot be compacted to required density due to gradation, plasticity, or moisture content.
   3. Materials containing large clods, aggregates, or stones greater than 4 inches in any dimension; debris, vegetation, or waste; or any other deleterious materials.
   4. Materials contaminated with hydrocarbons or other chemical contaminants.
B. Suitable Material:
   1. Materials meeting specification requirements.
   2. Unsuitable materials meeting specification requirements for suitable

soils after treatment with lime or cement.

C. Foundation Backfill Materials: Natural soil or manufactured aggregate meeting Class I requirements and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill where needed to provide stable support for structure foundation base. Foundation backfill materials may include concrete fill and seal slabs.
D. Foundation Base: Crushed stone aggregate with filter fabric as required, cement stabilized sand, or concrete seal slab. Foundation base provides smooth, level working surface for construction of concrete foundation.
E. Backfill Material: Classified soil material meeting specified quality requirements for designated application as embedment or trench zone backfill.
F. Embedment Material: Soil material placed under controlled conditions within embedment zone extending vertically upward from top of foundation to an elevation 12 inches above top of pipe, and including pipe bedding, haunching and initial backfill.
G. Trench Zone Backfill: Classified soil material meeting specified quality requirements and placed under controlled conditions in trench zone from top of embedment zone to base course in paved areas or to surface grading material in unpaved areas.
H. Foundation: Either suitable soil of trench bottom or material placed as backfill of over- excavation for removal and replacement of unsuitable or otherwise unstable soils.
I. Source: Source selected by Contractor for supply of embedment or trench zone backfill material. Selected source may be project excavation, off-site borrow pits, commercial borrow pits, or sand and aggregate production or manufacturing plants.
J. Refer to Section 02317 - Excavation and Backfill for Utilities for other definitions regarding utility installation by trench construction.

1.4 REFERENCES

A. ASTM C 33 - Standard Specification for Concrete Aggregate.
B. ASTM C 40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
C. ASTM C 123 - Standard Test Method for Lightweight Particles in Aggregate.
D. ASTM C 131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in Los Angeles Machine.
E. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
F. ASTM C 142 - Standard Test Method for Clay Lumps and Friable Particles in Aggregates.
G. ASTM D 1140 - Standard Test Method for Amount of Material in Soils Finer Than No. 200 Sieve.

H. ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
I. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
J. ASTM D 4643 - Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Method.
K. TxDOT Tex-110-E - Determining Particle Size Analysis of Soils.
L. TxDOT Tex-460-A - Material Finer Than 75 □m (No.200) Sieve In Mineral Aggregates (Decantation Test for Concrete Aggregates).

1.5 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. Submit description of source, material classification and product description, production method, and application of backfill materials.
C. Submit test results for samples of off-site backfill materials.
D. Before stockpiling materials, submit copy of approval from landowner for stockpiling backfill material on private property.
E. Provide delivery ticket which includes source location for each delivery of material that is obtained from off-site sources or is being paid as specific bid item.

PART 2 - PRODUCTS

2.1 MATERIAL CLASSIFICATIONS

A. Classify materials for backfill for purpose of quality control in accordance with Unified Soil Classification Symbols as defined in ASTM D 2487. Material use and application is defined in utility installation specifications and Drawings either by class or by product descriptions.
B. Class Designations Based on Laboratory Testing:
    1. Class I: Well-graded gravels and sands, gravel-sand mixtures, crushed well-graded rock, little or no fines (GW, SW):
        a. Plasticity index: non-plastic.
        b. Gradation: D60/D10 - greater than 4 percent; amount passing No. 200 sieve - less than or equal to 5 percent.
    2. Class II: Poorly graded gravels and sands, silty gravels and sands, little to moderate fines (GM, GP, SP, SM):
        a. Plasticity index: non-plastic to 4.
        b. Gradations:
            (1) Gradation (GP, SP): amount passing No. 200 sieve - less than 5 percent.
            (2) Gradation (GM, SM): amount passing No. 200 sieve - between 12 percent and 50 percent.
            (3) Borderline gradations with dual classifications (e.g., SP-SM): amount passing No. 200 sieve - between 5 percent and 12 percent.

3. Class III: Clayey gravels and sands, poorly graded mixtures of gravel, sand, silt, and clay (GC, SC, and dual classifications, e.g., SP-SC):
    a. Plasticity index: greater than 7.
    b. Gradation: amount passing No. 200 sieve - between 12 percent and 50 percent.
4. Class IVA: Lean clays (CL).
    a. Plasticity Indexes:
        (1) Plasticity index: greater than 7, and above A line.
        (2) Borderline plasticity with dual classifications (CL-ML): PI between 4 and 7.
    b. Liquid limit: less than 50.
    c. Gradation: amount passing No. 200 sieve - greater than 50 percent.
    d. Inorganic.
5. Class IVB: Fat clays (CH)
    a. Plasticity index: above A line.
    b. Liquid limit: 50 or greater.
    c. Gradation: amount passing No. 200 sieve - greater than 50 percent.
    d. Inorganic.
6. Use soils with dual class designation according to ASTM D 2487, and which are not defined above, according to more restrictive class.

2.2 PRODUCT DESCRIPTIONS

Soils classified as silt (ML) silty clay (CL-ML with PI of 4 to 7), elastic silt (MH), organic clay and organic silt (OL, OH), and organic matter (PT) are not acceptable as backfill

A. materials. These soils may be used for site grading and restoration in unimproved areas as approved by the Engineer. Soils in Class IVB, fat clay (CH) may be used as backfill materials where allowed by applicable backfill installation specification. Refer to Section 02316 - Excavation and Backfill for Structures and Section 02317 - Excavation and Backfill for Utilities.
B. Provide backfill material that is free of stones greater than 6 inches, free of roots, waste, debris, trash, organic material, unstable material, non-soil matter, hydrocarbon or other contamination, conforming to following limits for deleterious materials:
    1. Clay lumps: Less than 0.5 percent for Class I, and less than 2.0 percent for Class II, when tested in accordance with ASTM C 142.
    2. Lightweight pieces: Less than 5 percent when tested in accordance with ASTM C 123.
    3. Organic impurities: No color darker than standard color when tested in accordance with ASTM C 40.
C. Manufactured materials, such as crushed concrete, may be substituted for natural soil or rock products where indicated in product specification, and approved by the Engineer, provided that physical property criteria are

determined to be satisfactory by testing.

D. Bank Run Sand: Durable bank run sand classified as SP, SW, or SM by Unified Soil Classification System (ASTM D 2487) meeting following requirements:
   1. Less than 15 percent passing number 200 sieve when tested in accordance with ASTM D 1140. Amount of clay lumps or balls may not exceed 2 percent.
   2. Material passing number 40 sieve shall meet the following requirements when tested in accordance with ASTM D 4318: Plasticity index: not exceeding 7.

E. Concrete Sand: Natural sand, manufactured sand, or combination of natural and manufactured sand conforming to requirements of ASTM C 33 and graded within following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
3/8"	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

F. Gem Sand: Sand conforming to requirements of ASTM C 33 for course aggregates specified for number 8 size and graded within the following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
3/8”	95 to 100
No. 4	60 to 80
No. 8	15 to 40

G. Pea Gravel: Durable particles composed of small, smooth, rounded stones or pebbles and graded within the following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
1/2”	100
3/8”	85 to 100
No. 4	10 to 30
No. 8	0 to 10
No. 16	0 to 5

H. Crushed Aggregates: Crushed aggregates consist of durable particles obtained from an approved source and meeting the following requirements:
   1. Materials of one product delivered for same construction activity from single source, unless otherwise approved by the Engineer.
   2. Non-plastic fines.
   3. Los Angeles abrasion test wear not exceeding 45 percent when tested in accordance with ASTM C 131.
   4. Crushed aggregate shall have minimum of 90 percent of particles retained on No. 4 sieve with 2 or more crushed faces as determined by Tex-460-A, Part I.
   5. Crushed stone: Produced from oversize plant processed stone or gravel, sized by crushing to predominantly angular particles from naturally occurring single source. Uncrushed gravel is not acceptable materials for embedment where crushed stone is shown on applicable utility embedment drawing details.
   6. Crushed Concrete: Crushed concrete is an acceptable substitute for crushed stone as utility backfill. Gradation and quality control test requirements are same as crushed stone. Provide crushed concrete produced from normal weight concrete of uniform quality; containing particles of aggregate and cement material, free from other substances such as asphalt, reinforcing steel fragments, soil, waste gypsum (calcium sulfate), or debris.
   7. Gradations, as determined in accordance with Tex-110-E.

Sieve	Percent Passing by Weight for Pipe Embedment by Ranges of Nominal Pipes Sizes		
	>15"	15" - 8"	<8"
1"	95 - 100	100	-
3/4"	60 - 90	90 - 100	100
1/2"	25 - 60	-	90 - 100
3/8"	-	20 - 55	40 - 70
No. 4	0 - 5	0 - 10	0 - 15
No. 8	-	0 - 5	0 - 5

I. Select Backfill: Class III clayey gravel or sand or Class IV lean clay with plasticity index between 7 and 20 or clayey soils treated with lime in accordance with Section 02951 - Pavement Repair and Restoration to meet plasticity criteria.
J. Random Backfill: Any suitable soil or mixture of soils within Classes I, II, III and IV; or fat clay (CH) wh allowed by applicable backfill installation specification. Refer to Section 02316 - Excavation and Backfill for Structures and Section 02317 - Excavation and Backfill for Utilities.
K. Cement Stabilized Sand: Conform to requirements of Section 02321 - Cement Stabilized Sand.
L. Concrete Backfill: Conform to Class B.
M. Flexible Base Course Material: Conform to requirements of applicable

portions of Section 02711 - Hot Mix Asphaltic Base Course, Section 02712 - Cement Stabilized Base Course, and Section 02713 - Recycled Crushed Concrete Base Course.

2.3 MATERIAL TESTING

A. Source Qualification. Perform testing to obtain tests by suppliers for selection of material sources and products not from the project site. Test samples of processed materials from current production representing material to be delivered. Use tests to verify that materials meet specification requirements. Repeat qualification test procedures each time source characteristics change or there is planned change in source location or supplier. Include the following qualification tests, as applicable:
   1. Gradation. Report complete sieve analyses regardless of specified control sieves from largest particle through No. 200 sieve.
   2. Plasticity of material passing No. 40 sieve
   3. Los Angeles abrasion wear of material retained on No. 4 sieve
   4. Clay lumps
   5. Lightweight pieces
   6. Organic impurities

B. Production Testing. Provide reports to the Engineer from an independent testing laboratory that backfill materials to be placed in Work meet applicable specification requirements.

C. Assist the Engineer in obtaining material samples for verification testing at source or at production plant.

PART 3 - EXECUTION

3.1 SOURCES

A. Use of existing material in trench excavations is acceptable, provided applicable specification requirements are satisfied.

B. Identify off-site sources for backfill materials at least 14 days ahead of intended use so that the Engineer may obtain samples for verification testing.

C. Materials may be subjected to inspection or additional verification testing after delivery. Materials which do not meet requirements of specifications will be rejected. Do not use material which, after approval, has become unsuitable for use due to segregation, mixing with other materials, or by contamination. Once material is approved by the Engineer, expense for sampling and testing required to change to different material will be credited to the District through change order.

D. Bank run sand, select backfill, and random backfill, if available in project excavation, may be obtained by selective excavation and acceptance testing. Obtain additional quantities of these materials and other materials required to complete work from off-site sources. HCDD No. 1 does not represent or guarantee that any soil found in excavation work will be

suitable and acceptable as backfill material.

3.2 MATERIAL HANDLING

A. When backfill material is obtained from either commercial or non-commercial borrow pit, open pit to expose vertical faces of various strata for identification and selection of approved material to be used. Excavate selected material by vertical cuts extending through exposed strata to achieve uniformity in product.
B. Establish temporary stockpile locations for practical material handling, control, and verification testing by the Engineer in advance of final placement. Obtain approval from landowner for storage of backfill material on adjacent private property.
C. When stockpiling backfill material near project site, use appropriate covers to eliminate blowing of materials into adjacent areas and prevent runoff containing sediments from entering drainage system.
D. Place stockpiles in layers to avoid segregation of processed materials. Load material by making successive vertical cuts through entire depth of stockpile.

3.3 FIELD QUALITY CONTROL

A. Quality Control
    1. The Engineer may sample and test backfill at:
        a. Sources including borrow pits, production plants and Contractor's designated off-site stockpiles.
        b. On-site stockpiles.
        c. Materials placed in Work.
    2. The Engineer may re-sample material at any stage of work or location if changes in characteristics are apparent.
B. Testing laboratory will provide verification testing on backfill materials, as directed by the Engineer. Samples may be taken at source or at production plant, as applicable.

END OF SECTION

SECTION 02330
EMBANKMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Construction of embankments with excess excavated material and borrow.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
B. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
C. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

PART 2 - PRODUCTS

2.1 MATERIALS

A. Refer to Section 02315 - Roadway Excavation for acceptable excess materials from roadway excavation.
B. Refer to Section 02317 - Excavation and Backfill for Utilities for acceptable excess materials from utility excavation and trenching.
C. Refer to Section 02319 - Borrow for acceptable borrow materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify borrow and excess excavated materials to be reused are approved.
B. Verify removals and clearing and grubbing operations have been

completed.

3.2 PREPARATION

A. Backfill test pits, stump holes, small swales and other surface irregularities. Backfill and compact in designated lift depths to requirements for embankment compaction.
B. Record location and plug and fill inactive water and oil wells. Conform to Texas State Health Department, Texas Commission on Environmental Quality and Texas Railroad Commission requirements. Notify the Engineer prior to plugging wells.
C. Excavate and dispose of unsuitable soil and other unsuitable materials which will not consolidate. Backfill and compact to requirements for embankment. Unsuitable soil is defined in Section 02316 - Excavation and Backfill for Structures and Section 02320 - Utility Backfill Materials.
D. Backfill new utilities below future grade. Conform to requirements of Sections 02317 - Excavation and Backfill For Utilities, 02511 - Water Lines, 02531 - Gravity Sanitary Sewers, and 02532 - Sanitary Sewage Force Mains.

3.3 PROTECTION

A. Protect trees, shrubs, lawns, existing structures, and other features outside of embankment limits.
B. Protect utilities above and below grade, which are to remain.
C. Conform to protection requirements of Section 02315 - Roadway Excavation.

3.4 PLACING EMBANKMENT

A. Do not conduct placement operations during inclement weather or when existing ground or fill materials exceed 3 percent of optimum moisture content. Contractor may manipulate wet material to facilitate drying, by disking or windrowing.
B. Do not place embankment fill until density and moisture content of previously placed material comply with specified requirements.
    1. Scarify areas to be filled to minimum depth of 4 inches to bond existing and new materials. Mix with first fill layer.
    2. Spread fill material evenly, from dumped piles or windrows, into horizontal layers approximately parallel to finished grade. Place to meet specified compacted thickness. Break clods and lumps and mix materials by blading, harrowing, disking or other approved method. Extend each layer across full width of fill.
    3. Each layer shall be homogeneous and contain uniform moisture content before compaction. Mix dissimilar abutting materials to prevent abrupt changes in composition of fill.
    4. Layers shall not exceed the following compacted thickness:

a. Areas indicated to be under future paving or shoulders, to be constructed within 6 months: 6 inches when compacted with pneumatic rollers, or 8 inches when compacted with other rollers.
b. Other areas: 12 inches

5. For steep slopes, cut benches into slope and scarify before placing fill. Place increasingly wider horizontal layers of specified depth to level of each bench.
6. Build embankment layers on back slopes, adjacent to existing roadbeds, to level of old roadbed. Scarify top of old roadbed to minimum depth of 4 inches and recompact with next fill layer.
7. Construct to lines and grades shown on Drawings.
8. Remove unsuitable material and excess soil not being used for embankment from site in accordance with requirements of Section 02120 - Waste Material Disposal.
9. Maintain moisture content of embankment materials to attain required density.
10. Compact to following minimum densities at moisture content of optimum to 3 percent above optimum as determined by ASTM D 698, unless otherwise indicated on Drawings:
    a. Areas under future paving and shoulders: Minimum density of 95 percent of maximum dry density.
    b. Other areas: Minimum density of 90 percent of maximum dry density.

3.5 TOLERANCES

A. Top of compacted surface: Plus, or minus 1/2 inch in cross section or 16-foot length.

3.6 FIELD QUALITY CONTROL

A. Compaction Testing will be performed in accordance with ASTM D 698 or ASTM D 2922 and ASTM D 3017.
B. A minimum of three tests will be taken for each 1000 linear feet per lane of roadway or 500 square yards of embankment per lift.
C. If tests indicate work does not meet specified compaction requirements, recondition, recompact, and retest at no cost to the District.

END OF SECTION

SECTION 02331
TEMPORARY SPECIAL SHORING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish and install temporary shoring to hold the surrounding earth, water, or both out of the work area.

1.2 MEASUREMENT AND PAYMENT

A. Measurement and payment is as noted on the Unit Price Schedule.
B. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

PART 2 - PRODUCTS

2.1 MATERIAL

A. The Contractor shall furnish shoring that meets or exceeds the design requirements. Materials may be new or used. Materials shall not present a hazard to the public, shall be structurally adequate and shall fulfill the intended shoring purpose.

PART 3 - EXECUTION

3.1 CONSTRUCTION

A. The Contractor is responsible for the temporary special shoring design unless complete details are included on the plans. Submit details and design calculations bearing the seal of a licensed professional engineer before constructing the shoring. The Department reserves the right to reject designs. Design the shoring to comply with OSHA Standards and Interpretations, 29 CFR Part 1926, Subpart P, and “Excavations.” Design structural systems to comply with AASHTO Standard Specifications for Highway Bridges or AASHTO LRFD Bridge Design Specifications. Design shoring subject to railroad loading to comply with the AREMA Manual for Railway Engineering and any additional requirements of the railway being supported.
B. Provide vertical or sloped cuts, benches, shields, support systems, or other

systems to provide the necessary protection in accordance with the approved design. Construct temporary MSE walls, when used.

END OF SECTION

SECTION 02336
LIME-STABILIZED SUBGRADE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Foundation course of lime stabilized subgrade material.
   1. Application of lime slurry to subgrade.
   2. Mixing, compaction, and curing of lime slurry, water, and subgrade into a stabilized foundation.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 DEFINITION

A. Moist Cure: Curing soil and lime to obtain optimum hydration.
B. 1000-Foot Roadway Section: 1000 feet per lane width or approximately 500 square yards of compacted subgrade for other than full-lane-width roadway sections.

1.4 REFERENCES

A. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
B. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
C. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
D. TxDOT Tex-101-E (Part III) - Preparation of Soil and Flexible Base Material for Testing.
E. TxDOT Tex-140-E - Measuring Thickness of Pavement Layer.
F. TxDOT Tex-600-J - Sampling and Testing Hydrated Lime, Quicklime, and Commercial Lime Slurry.

1.5 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. Submit certification that hydrated lime, quicklime, or commercial lime slurry complies with specifications.
C. Submit weight tickets, certified by supplier, with each bulk delivery of lime to work site.

1.6 DELIVERY, STORAGE AND HANDLING

A. Bagged lime shall bear manufacturer's name, product identification, and certified weight. Bags varying more than 5 percent of certified weight may be rejected; average weight of 50 random bags in each shipment shall not be less than certified weight.
B. Store lime in weatherproof enclosures. Protect lime from ground dampness.

PART 2 - PRODUCTS

2.1 WATER

A. Use clean, clear water, free from oil, acids, alkali, or vegetation.

2.2 LIME

A. Type A - Hydrated Lime: Dry material consisting essentially of calcium hydroxide or mixture of calcium hydroxide and an allowable percentage of calcium oxide as listed in chemical composition chart.
B. Type B - Commercial Lime Slurry: Liquid mixture consisting essentially of lime solids and water in slurry form. Water or liquid portion shall not contain dissolved material in sufficient quantity to be injurious or objectionable for purpose intended.
C. Type C - Quicklime: Dry material consisting essentially of calcium oxide. Furnish quicklime in either of the following grades:
    1. Grade DS: Pebble quicklime of gradation suitable for use in preparation of slurry for wet placing.
    2. Grade S: Finely-graded quicklime for use in preparation of slurry for wet placing. Donor use grade S quicklime for dry placing.
D. Conform to the following requirements:

CHEMICAL COMPOSITION	TYPE		
	A	B	C
Active lime content, % by weight $Ca(OH)_2$+CaO	90.0 min[1]	87.0 min[2]	-
Unhydrated lime content, % by weight CaO	5.0 max	-	87.0 min
Free water content, % by weight H_2O:	5.0 max	-	-
SIZING			
Wet Sieve, as % by weight residue retained:			
No. 6	0.2 max	0.2 max[2]	8.0 max[3]
No. 30	4.0 max	4.0 max[2]	-
Dry sieve, as % by weight residue retained:			
1-inch	-	-	0.0
1/2-inch	-	-	10.0 max

Notes:
1. Maximum 5.0% by weight CaO shall be allowed in determining total active lime content.
2. Maximum solids content of slurry.
3. Total active lime content, as CaO, in material retained on No. 6 sieve shall not exceed 2.0% by weight of original Type C lime.

E. Deliver lime slurry to job site as commercial lime, or prepare at job site by using hydrated lime or quicklime. Provide slurry free of liquids other than water and of consistency that can be handled and uniformly applied without difficulty.
F. Lime containing magnesium hydroxide is prohibited.

2.3 SOIL

A. Soil to receive lime treatment may include borrow or existing subgrade material, existing pavement structure, or combination of all three. Where existing pavement or base material is encountered, pulverized or scarify material so that 100 percent of sampled material passes 2- inch sieve.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify compacted subgrade will support imposed loads.
B. Verify subgrade lines and grades.

3.2 PREPARATION

A. Complete backfill of utilities prior to stabilization.
B. Cut material to bottom of subgrade using an approved cutting and pulverizing machine meeting following requirements:
    1. Cutters accurately provide smooth surface over entire width of cut to plane of secondary grade.
    2. Provide cut to depth as specified or shown in the Drawings.
C. Alternatively, scarify or excavate to bottom of stabilized subgrade. Remove material or windrow to expose secondary grade. Obtain uniform stability.
D. Correct wet or unstable material below secondary grade by scarifying, adding lime, and compacting as directed by the Engineer.
E. Pulverize existing material so that 100 percent passes a 1-3/4-inch sieve.

3.3 LIME SLURRY APPLICATION

A. Apply slurry with distributor truck equipped with an agitator to keep lime and water in consistent mixture. Make successive passes over measured section of roadway to attain proper moisture and lime content. Limit spreading to an area where preliminary mixing operations can be completed on same working day.
B. Minimum lime content shall be 5 percent of dry unit weight of subgrade as determined by ASTM D 698

3.4 PRELIMINARY MIXING

A. Use approved single-pass or multiple-pass rotary speed mixers to mix soil, lime, and water to required depth. Obtain homogeneous friable mixture free of clods and lumps.
B. Shape mixed subgrade to final lines and grades.
C. Eliminate following operations and final mixing if pulverization requirements can be met during preliminary mixing:
    1. Seal subgrade as precaution against heavy rainfall by rolling lightly with light pneumatic rollers.
    2. Cure soil lime material for 24 to 72 hours or as required to obtain optimum hydration. Keep subgrade moist during cure.

3.5 FINAL MIXING

A. Use approved single-pass or multiple-pass rotary speed mixers to uniformly mix cured soil and lime to required depth.
B. Add water to bring moisture content of soil mixture to optimum or above.
C. Mix and pulverize until all material passes 13/4-inch sieve; minimum of 85 percent, excluding non-slacking fractions, passes 3/4-inch sieve; and minimum of 60 percent excluding non-slacking fractions passes No. 4 sieve. Test according to TxDOT Tex-101-E, Part III using dry method.
D. Shape mixed subgrade to final lines and grades.
E. Do not expose hydrated lime to open air for 6 hours or more during

interval between application and mixing. Avoid excessive hydrated lime loss due to washing or blowing.

3.6 COMPACTION

A. Aerate or sprinkle to attain optimum moisture content to 3 percent above optimum, as determined by ASTM D 698 on material sample from roadway after final mix with lime.
B. Start compaction immediately after final mixing.
C. Spread and compact in two or more equal layers where total compacted thickness is greater than equipment manufacturer's recommended range of mixing and compaction.
D. Compact with approved heavy pneumatic or vibrating rollers, or combination of tamping rollers and light pneumatic rollers. Begin compaction at bottom and continue until entire depth is uniformly compacted.
E. Do not allow stabilized subgrade to mix with underlying material. Correct irregularities or weak spots immediately by replacing material and recompacting.
F. Compact subgrade to minimum density of 95 percent of maximum dry density, according to ASTM D 698, at moisture content of optimum to 3 percent above optimum, unless otherwise indicated on Drawings:
G. Seal with approved light pneumatic tired rollers. Prevent surface hair line cracking. Rework and recompact at areas where hairline cracking develops.

3.7 CURING

A. Moist cure for minimum of 3 days before placing base or surface course, or opening to traffic. Subgrade may be opened to traffic after 2 days when adequate strength has been attained to prevent damage. Restrict traffic to light pneumatic rollers or vehicles weighing less than 10 tons.
B. Keep subgrade surface damp by sprinkling. Roll with light pneumatic roller to keep surface knit together.
C. Place base or surface within 14 days after final mixing and compaction. Restart compaction and moisture content of base material when time is exceeded.

3.8 TOLERANCES

A. Completed surface: smooth and conforming to typical section and established lines and grades.
B. Top of compacted surface: Plus or minus 1/4 inch in cross section or in 16-foot length.
C. Depth of lime stabilization shall be plus or minus one inch of specified depth for each 1000- foot roadway section.

3.9 FIELD QUALITY CONTROL

A. Testing will be performed.
B. Test soils, lime, and mixtures as follows:
    1. Tests and analysis of soil materials will be performed in accordance with ASTM D 4318, using the wet preparation method.
    2. Sampling and testing of lime slurry shall be in accordance with TxDOT Tex-600-J, except using a lime slurry cup.
    3. Sample mixtures of hydrated lime or quicklime in slurry form will be tested to establish compliance with specifications.
    4. Moisture-density relationship will be established on material sampled from roadway, after stabilization with lime and final mixing, in accordance with ASTM 698, Moist preparation Method.
C. In-place depth will be evaluated for each 1000-foot roadway section and determined in accordance with TxDOT Tex-140-E in hand excavated holes. For each 1000-foot section, 3 phenolphthalein tests will be performed. Average stabilization depth for 1000-foot section will be based on average depth for three tests.
D. Perform compaction testing in accordance with ASTM D 2922. Three tests will be performed for each 1000-foot roadway section.
E. Pulverization analysis will be performed as required on material sampled during mixing of each production area. Three tests will be performed per 1000-foot roadway section or a minimum of once daily.

3.10 REWORK OF FAILED SECTIONS

A. Rework sections that do not meet specified thickness.
B. Perform the following steps when more than 72 hours have lapsed since completion of compaction.
    1. Moist cure for minimum of 3 days after compaction to required density.
    2. Add lime at rate of 25 percent of specified rate at no additional cost to the District.
    3. Moisture density test of reworked material must be completed by laboratory before field compaction testing can be completed.

3.11 PROTECTION

A. Maintain stabilized subgrade to lines and grades and in good condition until placement of base or surface course. Protect asphalt membrane from being picked up by traffic.
B. Repair defects immediately by replacing material to full depth.

END OF SECTION

SECTION 02360
TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Install, maintain, and remove erosion, sedimentation, and environmental control measures to prevent or reduce the discharge of pollutants in accordance with the Storm Water Pollution Prevention Plan (SWP3) on the plans and the Texas Pollutant Discharge Elimination System (TPDES) General Permit TXR150000. Control measures are defined as Best Management Practices used to prevent or reduce the discharge of pollutants. Control measures include, but are not limited to, rock filter dams, temporary pipe slope drains, temporary paved flumes, construction exits, earthwork for erosion control, pipe, construction perimeter fence, sandbags, temporary sediment control fence, biodegradable erosion control logs, vertical tracking, temporary or permanent seeding, and other measures. Erosion and sediment control devices must be selected from the Erosion Control Approved Products or Sediment Control Approved Products lists. Perform work in a manner to prevent degradation of receiving waters, facilitate project construction, and comply with applicable federal, state, and local regulations. Ensure the installation and maintenance of control measures is performed in accordance with the manufacturer's or designer's specifications

B. Provide the Contractor Certification of Compliance before performing SWP3 or soil disturbing activities. By signing the Contractor Certification of Compliance, the Contractor certifies they have read and understand the requirements applicable to this project pertaining to the SWP3, the plans, and the TPDES General Permit TXR150000. The Contractor is responsible for any penalties associated with non-performance of installation or maintenance activities required for compliance. Ensure the most current version of the certificate is executed for this project.

1.2 MEASUREMENT AND PAYMENT

A. Measurement and payment is as noted on the Unit Price Schedule.
B. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Furnish materials in accordance with following sections:
   A. Section 02361 – Silt Fences
   B. Section 02364 – Filter Dams
   C. Section 02365 – Stabilized Construction Access
   D. Section 02374 – Articulating Concrete Block
   E. Section 02376 – Concrete Channel Lining and Concrete Interceptor Structures
   F. Section 02377 – Rectangular Concrete Channel
   G. Section 02378 – Rip Rap and Granular Fill
   H. Section 02379 – Geotextiles for Erosion Control Systems

2.2 ROCK FILTER DAMS

A. Aggregate: Furnish aggregate with approved hardness, durability, cleanliness, and resistance to crumbling, flaking, and eroding. Provide the following:
   A. Types 1,2, and 4 Rock Filter Dams. Use 3 to 6 inches aggregate.
   B. Type 3 Rock Filter Dams. Use 4 to 8 inches aggregate.
B. Wire: Provide minimum 20 gauge galvanized wire for the steel wire mesh and tie wires for Types 2 and 3 rock filter dams. Type 4 dams require:
   A. a double-twisted, hexagonal weave with a nominal mesh opening of 2-1/2 × 3-1/4 in.;
   B. minimum 0.0866 in. steel wire for netting;
   C. < minimum 0.1063 in. steel wire for selvages and corners;
   D. and < minimum 0.0866 in. for binding or tie wire.
C. Sandbag Material: any gradation of aggregate may be used to fill the sandbags.

2.3 CONSTRUCTION PERIMETER FENCE

A. Posts: Provide essentially straight wood or steel posts that are at least 60 in. long. Furnish soft wood posts with a minimum diameter of 3 in., or use nominal 2 × 4 in. boards. Furnish hardwood posts with a minimum cross-section of 1-1/2 × 1-1/5 in. Furnish T- or L-shaped steel posts with a minimum weight of 1.25 lb. per foot.
B. Fence: Provide orange construction fencing as approved.
C. Fence Wire. Provide 14 gauge or larger galvanized smooth or twisted wire. Provide 16 gauge or larger tie wire.

D. Provide brightly-colored flagging that is fade-resistant and at least 3/4 in. wide to provide maximum visibility both day and night.
E. Provide staples with a crown at least 1/2 in. wide and legs at least 1/2 in. long.

2.4 SANDBAGS

A. Provide sandbag material of polypropylene, polyethylene, or polyamide woven fabric with a minimum unit weight of 4 oz. per square yard, a Mullen burst-strength exceeding 300 psi, and an ultraviolet stability exceeding 70%.
B. Use natural coarse sand or manufactured sand meeting the gradation given in table below to fill sandbags. Filled sandbags must be 24 to 30 in. long, 16 to 18 in. wide, and 6 to 8 in. thick.
C. Aggregate may be used instead of sand for situations where sandbags are not adjacent to traffic. The aggregate size must not exceed 3/8 in.

Sieve Size	Retained (% by Weight)
No. 4	Maximum 3%
No. 100	Minimum 80%
No. 200	Minimum 95%

2.5 TEMPORARY SEDIMENT CONTROL FENCE

A. Provide a net-reinforced fence using woven geo-textile fabric. Logos visible to the traveling public will not be allowed.
B. Fabric: Provide fabric materials in accordance with DMS-6230, “Temporary Sediment Control Fence Fabric.”
C. Posts. Provide essentially straight wood or steel posts with a minimum length of 48 in., unless otherwise shown on the plans. Furnish soft wood posts at least 3 in. in diameter, or use nominal 2 × 4 in. boards. Furnish hardwood posts with a minimum cross-section of 1-1/2 × 1-1/2 in. Furnish T- or L-shaped steel posts with a minimum weight of 1.25 lb. per foot.
D. Net Reinforcement. Provide net reinforcement of at least 12.5 gauge (SWG) galvanized welded wire mesh, with a maximum opening size of 2 × 4 in., at least 24 in. wide, unless otherwise shown on the plans.
E. Staples. Provide staples with a crown at least 3/4 in. wide and legs 1/2 in. long.
F. Used Materials. Use recycled material meeting the applicable requirements if approved.

2.6 BIODEGRADABLE EROSION CONTROL LOGS

A. Core Material. Furnish core material that is biodegradable or recyclable. Use compost, mulch, aspen excelsior wood fibers, chipped site vegetation, agricultural rice or wheat straw, coconut fiber, 100% recyclable fibers, or any other acceptable material unless specifically called out on the plans. Permit no more than 5% of the material to escape from the containment mesh.
B. Containment Mesh. Furnish containment mesh that is 100% biodegradable, photodegradable, or recyclable such as burlap, twine, UV photodegradable plastic, polyester, or any other acceptable material.
C. Furnish biodegradable or photodegradable containment mesh when log will remain in place as part of a vegetative system.
D. Furnish recyclable containment mesh for temporary installations.
E. Size. Furnish biodegradable erosion control logs with diameters shown on the plans or as directed. Stuff containment mesh densely so logs do not deform.

PART 3 - EXECUTION

3.1 QUALIFICATIONS, TRAINING AND EMPLOYEE REQUIREMENTS

A. Contractor Responsible Person Environmental (CRPE) Qualifications and Responsibilities. Provide and designate in writing at the preconstruction conference a CRPE and alternate CRPE who have overall responsibility for the storm water management program. The CRPE will implement storm water and erosion control practices; will oversee and observe storm water control measure monitoring and management; will monitor the project site daily and produce daily monitoring reports as long as there are BMPs in place or soil disturbing activities are evident to ensure compliance with the SWP3 and TPDES General Permit TXR150000. During time suspensions when work is not occurring or on contract non-work days, daily inspections are not required unless a rain event has occurred.
B. Contractor Superintendent Qualifications and Responsibilities. Provide a superintendent that is competent, has experience with and knowledge of storm water management, and is knowledgeable of the requirements and the conditions of the TPDES General Permit TXR150000. The superintendent will manage and oversee the day to day operations and activities at the project site; work with the CRPE to provide effective storm water management at the project site; represent and act on behalf of the Contractor; and attend the Department’s preconstruction conference for the project.
C. Training. All Contractor and subcontractor employees involved in soil disturbing activities, small or large structures, storm water control measures, and seeding activities must complete training as prescribed.

3.2 INSTALLATION

A. Perform work in accordance with the SWP3, according to manufacturers' guidelines, and in accordance with the TPDES General Permit TXR150000. Install and maintain the integrity of temporary erosion and sedimentation control devices to accumulate silt and debris until soil disturbing activities are completed and permanent erosion control features are in place or the disturbed area has been adequately stabilized as approved.

B. The Department will inspect and document the condition of the control measures at the frequency shown on the plans and will provide the Construction SWP3 Field Inspection and Maintenance Reports to the Contractor. Make corrections as soon as possible before the next anticipated rain event or within 7 calendar days after being able to enter the worksite for each control measure. The only acceptable reason for not accomplishing the corrections with the time frame specified is when site conditions are "Too Wet to Work." Take immediate action if a correction is deemed critical as directed. When corrections are not made within the established time frame, all work will cease on the project and time charges will continue while the control measures are brought into compliance. Commence work once the Engineer reviews and documents the project is in compliance. Commencing work does not release the Contractor of the liability for noncompliance of the SWP3, plans, or TPDES General Permit TXR150000.

C. The Engineer may limit the disturbed area if the Contractor cannot control soil erosion and sedimentation resulting from the Contractor's operations. Implement additional controls as directed.

D. Remove devices upon approval or as directed. Finish-grade and dress the area upon removal. Stabilize disturbed areas in accordance with the permit, and as shown on the plans or directed. Materials removed are considered consumed by the project. Retain ownership of stockpiled material and remove it from the project when new installations or replacements are no longer required.

3.3 ROCK FILTER DAMS FOR EROSION CONTROL

A. Remove trees, brush, stumps, and other objectionable material that may interfere with the construction of rock filter dams. Place sandbags as a foundation when required or at the Contractor's option.

B. Place the aggregate to the lines, height, and slopes specified, without undue voids for Types 1, 2, 3, and 5. Place the aggregate on the mesh and then fold the mesh at the upstream side over the aggregate and secure it to itself on the downstream side with wire ties, or hog rings for Types 2 and 3, or as directed. Place rock filter dams perpendicular to the flow of the stream or channel unless otherwise directed. Construct filter dams according to the following criteria unless otherwise shown on the plans:

   A. Type 1 (Non-Reinforced).

      a. Height: At least 18 in. measured vertically from existing ground to

top of filter dam.
b. Top Width. At least 2 ft.
c. Slopes. No steeper than 2:1.

B. Type 2 (reinforced).
a. Height. At least 18 in. measured vertically from existing ground to top of filter dam.
b. Top Width. At least 2 ft.
c. Slopes. No steeper than 2:1.

C. Type 3 (Reinforced).
a. Height: At least 36 in. measured vertically from existing ground to top of filter dam.
b. Top Width. At least 2 ft.
c. Slopes. No steeper than 2:1.

D. Type 4 (Sack Gabions):
a. Unfold sack gabions and smooth out kinks and bends. Connect the sides by lacing in a single loop–double loop pattern on 4- to 5-in. spacing for vertical filling. Pull the end lacing rod at one end until tight, wrap around the end, and twist 4 times. Fill with stone at the filling end, pull the rod tight, cut the wire with approximately 6 in. remaining, and twist wires 4 times.
b. Place the sack flat in a filling trough, fill with stone, connect sides, and secure ends as described above for horizontal filling.
c. Lift and place without damaging the gabion. Shape sack gabions to existing contours.

E. Type 5: Provide rock filter dams as shown on the plans.

3.4 CONSTRUCTION PREIMETER FENCE

A. Construct, align, and locate fencing as shown on the plans or as directed.
B. Installation of Posts. Embed posts 18 in. deep or adequately anchor in rock, with a spacing of 8 to 10 ft.
C. Wire Attachment. Attach the top wire to the posts at least 3 ft. from the ground. Attach the lower wire midway between the ground and the top wire.
D. Flag Attachment. Attach flagging to both wire strands midway between each post. Use flagging at least 18 in. long. Tie flagging to the wire using a square knot.

3.5 SANDBAGS FOR EROSION CONTROL

A. Construct a berm or dam of sandbags that will intercept sediment-laden storm water runoff from disturbed areas, create a retention pond, detain sediment, and release water in sheet flow. Fill each bag with sand so that at least the top 6 in. of the bag is unfilled to allow for proper tying of the open end. Place the sandbags with their tied ends in the same direction. Offset subsequent rows of sandbags 1/2 the length of the preceding row. Place a single layer of sandbags downstream as a secondary debris trap. Place

additional sandbags as necessary or as directed for supplementary support to berms or dams of sandbags or earth.

3.6 TEMPORARY SEDIMENT CONTROL FENCE

A. Temporary Sediment-Control Fence. Provide temporary sediment-control fence near the downstream perimeter of a disturbed area to intercept sediment from sheet flow. Incorporate the fence into erosion-control measures used to control sediment in areas of higher flow. Install the fence as shown on the plans, as specified in this Section, or as directed.
B. Installation of Posts. Embed posts at least 18 in. deep, or adequately anchor, if in rock, with a spacing of 6 to 8 ft. and install on a slight angle toward the runoff source.
C. Fabric Anchoring. Dig trenches along the uphill side of the fence to anchor 6 to 8 in. of fabric. Provide a minimum trench cross-section of 6 × 6 in. Place the fabric against the side of the trench and align approximately 2 in. of fabric along the bottom in the upstream direction. Backfill the trench, then hand-tamp.
D. Fabric and Net Reinforcement Attachment. Attach the reinforcement to wooden posts with staples, or to steel posts with T-clips, in at least 4 places equally spaced unless otherwise shown on the plans. Sewn vertical pockets may be used to attach reinforcement to end posts. Fasten the fabric to the top strand of reinforcement by hog rings or cord every 15 in. or less.
E. Fabric and Net Splices. Locate splices at a fence post with a minimum lap of 6 in. attached in at least 6 places equally spaced unless otherwise shown on the plans. Do not locate splices in concentrated flow areas.
    A. Requirements for installation of used temporary sediment – control fence include the following:
        a. fabric with minimal or no visible signs of biodegradation (weak fibers),
        b. fabric without excessive patching (more than 1 patch every 15 to 20 ft.)
        c. posts without bends, and
        d. backing without holes.

3.7 BIODEGRADABLE EROSION CONTROL LOGS

A. Install biodegradable erosion control logs near the downstream perimeter of a disturbed area to intercept sediment from sheet flow. Incorporate the biodegradable erosion control logs into the erosion measures used to control sediment in areas of higher flow. Install, align, and locate the biodegradable erosion control logs as specified below, as shown on the plans, or as directed.
B. Secure biodegradable erosion control logs in a method adequate to prevent displacement as a result of normal rain events, prevent damage to the logs, and as approved, such that flow is not allowed under the logs. Temporarily

removing and replacing biodegradable erosion logs as to facilitate daily work is allowed at the Contractor's expense.

END OF SECTION

SECTION 02361
SILT FENCES

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for furnishing, installing, maintaining and removing temporary silt fences.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. AASHTO M 288 – Geotextile Specification for Highway Applications.
B. ASTM D 4355 – Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus.
C. ASTM D 4491 – Water Permeability of Geotextiles by Permittivity.
D. ASTM D 4632 – Grab Breaking Load and Elongation of Geotextiles.
E. ASTM D 4751 – Determining Apparent Opening Size of a Geotextile.

1.4 SUBMITTALS

A. Refer to Section 01330 – Submittal Procedures.
B. Submit catalog data and mill certificate for the silt fence geotextile and catalog data for welded wire fabric mesh or plastic grid mesh reinforcement to be used.

PART 2 – PRODUCTS

2.1 GEOTEXTILE FABRIC

A. Geotextile fabric shall consist of long-chain synthetic polymers composed of at least 95 percent by weight of polyolefins in a woven fabric.
B. Geotextile fabric shall contain stabilizers and/or inhibitors to make the fibers resistant to deterioration resulting from exposure to

sunlight or heat. The geotextile fabric shall be resistant to commonly encountered soil chemicals, mildew, rot and insects.

C. Geotextile fabric shall be free of defects or flaws that affect its physical properties.
D. Provide a geotextile fabric with a minimum grab strength of 100 lbs (ASTM D 4632).
E. Provide silt fence with properties in accordance with AASHTO M 288
Geotextile Specification for Highway Applications Table 6.

2.2 SUPPORTS

A. Provide wooden stakes or steel fence supports having a minimum length of 4 feet.
B. For reinforced fence, provide mesh reinforcement of galvanized 2 inch by 4 inch welded wire fabric mesh or plastic grid mesh reinforcement (refer to Section 01562 – Construction Fence).

PART 3 – EXECUTION

3.1 GENERAL

A. Install silt fences at locations shown on Plans or as approved by the Engineer.
B. Place silt fences in a continuous manner and transverse to the runoff. Place the silt fence to follow the contours of the site. Do not allow water to flow around the end of the fence.
C. Provide continuous rolls of the silt fence fabric and cut to length to minimize the use of fabric joints. When joints are necessary, the fabric shall be spliced together only at a support with a minimum 6 inch overlap.

3.2 MAINTENANCE

A. Inspect silt fences after each rainfall, daily during periods of daily rainfall, and, at a minimum, once every week. Repair and/or replace any component of the silt fence that becomes defective from intended use.
B. Remove sediment deposits when the deposit reaches 1/3 the height of the fence. Dispose of sediment properly.
C. Remove silt fences and dispose of any sediment accumulations promptly when directed by Engineer.

3.3 DAMAGED MATERIAL

A. Repair damage to silt fences and supports immediately.

3.4 DISPOSAL

A. Refer to Section 02120 – Material Disposal.

END OF SECTION

SECTION 02365
STABILIZED CONSTRUCTION ACCESS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for construction, maintenance and removal of stabilized construction access.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.
D. No separate measurement and payment will be made for maintenance or removal.

1.3 SUBMITTALS

A. Refer to Section 01330 – Submittals.
B. Refer to Section 02379 – Geotextiles for Erosion Control Systems.
C. Submit gradation for granular fill.

PART 2 – PRODUCTS

2.1 GEOTEXTILE SEPARATION FABRIC

A. Provide a geotextile of woven or spunbond nonwoven fibers consisting of long-chain synthetic polymers composed of at least 95 percent by weight of polyolefins. Provide geotextile fabric equal to the following average roll values or as directed by the Engineer:
    1. Minimum average roll value.
        a. Elongation **<** 50 percent.
        b. Grab Strength ≥ 200 pounds.
        c. Puncture Strength ≥ 75 pounds.
        d. UV Stability (retained strength) ≥ 50 percent after 500 hours of exposure.
    2. Maximum average roll value.
        a. Apparent Opening Size (AOS) – 0.212 to 0.6 mm (#70 to #30 US sieve).

2.2 GRANULAR FILL

A. Refer to Section 02378 – Riprap and Granular Fill.

PART 3 – EXECUTION

3.1 GENERAL

A. Provide stabilized access, washing areas and parking areas at locations shown on the Plans or as approved by the Engineer.
B. Furnish and place geotextile fabric as a permeable separator to prevent mixing of granular fill with underlying soil.
C. Place 3 inch to 5 inch granular fill to dimensions and depths shown on the Plans or as directed by the Engineer. The minimum thickness shall be 8 inches.
D. Roads and parking areas shall be graded to provide sufficient drainage away from stabilized areas. Use sandbags, gravel, boards or similar methods to prevent sediment from entering public rights-of-way, storm drains, ditches and watercourses.

3.2 MAINTENANCE

A. Inspect and maintain stabilized areas daily. Provide periodic top dressing with additional granular fill as necessary.
B. Repair or replace components of stabilized access areas that become defective from intended use.
C. Maintain stabilized access areas until acceptance of the Project or as directed by Engineer.
D. Remove stabilized access promptly when directed by Engineer. Restore areas where stabilized construction access was removed to final project grade in preparation of turf establishment by others.

3.3 DISPOSAL

A. Refer to Section 02120 – Material Disposal.

END OF SECTION

SECTION 02490
TRENCH SAFETY SYSTEM

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for the installation and maintenance of a trench safety system.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. Implement the Trench Safety System requirements of the Federal, State and local Safety and Health Regulations and the Occupational Safety and Health Administration (OSHA), 29 CFR, Part 1926 Subpart P – Excavation.
B. Texas Health and Safety Code Ann., Chapter 756. Miscellaneous Hazardous Conditions. Subchapter C. Trench Safety § 756.023. Trench Excavation for Political Subdivision.

1.4 SUBMITTALS

A. Refer to Section 01330 – Submittal Procedures.
B. Submit a safety plan specifically for the construction of trench excavation. Design the trench safety plan to be in accordance with OSHA regulations referenced above that govern the presence and activities of individuals working in and around trench excavations.
C. Construction and Shop Drawings containing deviations from OSHA regulations or special designs shall be sealed by a licensed Texas Professional Engineer retained and paid by the Contractor.
D. Review of the safety plan by the Engineer will only be in regard to compliance with this Section and will not constitute approval by the Engineer or relieve the Contractor of obligations under State and Federal trench safety laws.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION – Not used

END OF SECTION

SECTION 02506
POLYVINYL CHLORIDE PIPE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Polyvinyl chloride pressure pipe for water distribution, in nominal diameters 4 inches through 20 inches.
B. Polyvinyl chloride sewer pipe for gravity sewers in nominal diameters 4 inches through 60 inches.
C. Polyvinyl chloride pressure pipe for gravity sewers and force mains in nominal diameters 4 inches through 20 inches.

1.2 MEASUREMENT AND PAYMENT

A. Measurement and payment is as noted on the Unit Price Schedule.
B. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. ANSI A 21.16 (AWWA C 116) - Protective Fusion Bonded Epoxy Coating for the Interior and Exterior Surfaces of Ductile Iron and Grey Iron Fittings for Water Supply Service.
B. ASTM D 1248 - Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.
C. ASTM D 1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
D. ASTM D 2122 – Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.
E. ASTM D 2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
F. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
G. ASTM 2412 – Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel Plate Loading
H. ASTM D 2444 - Standard Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight).
I. ASTM D 2680 - Specification for Acrylonitrile-Butadiene-Styrene (ABS) and

Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.

J. ASTM D 3034 - Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
K. ASTM D 3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
L. ASTM D 3212 - Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
M. ASTM F 477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
N. ASTM F 679 - Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
O. ASTM F 794 - Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
P. ASTM F 949 - Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with Smooth Interior and Fittings.
Q. AWWA C 110 - American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 Inches Through 48 Inches for Water.
R. AWWA C 111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
S. AWWA C 900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 Inches Through 12 Inches for Water Distribution.
T. AWWA C 905 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In., for Water Transmission and Distribution.
U. AWWA C 909 - Standard for Molecularly-Oriented Polyvinyl Chloride (PVCO) Pressure Pipe, 4 Inches through 12 Inches (100mm through 300 mm), for Water Distribution.
V. AWWA M23 – PVC Pipe – Design and Installation
W. PPI TR3 - Policies and Procedures for Developing Recommended Hydrostatic Design Stresses for Thermoplastic Pipe Materials.
X. UNI-B-13 - Recommended Standard Performance Specification for Joint Restraint Devices for Use with Polyvinyl Chloride Pipe.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. Submit shop drawings showing design of new pipe and fittings indicating alignment and grade, laying dimensions, fabrication, fittings, flanges, and special details.
C. Contractor to review and submit PVC pipe manufacturers recommended installation procedures.
D. Calculations and limits of thrust restraint shall be based on AWWA M23, latest edition.

1.5 QUALITY CONTROL

A. Submit manufacturer's certifications that PVC pipe and fittings meet requirements of this Section and AWWA C 900, AWWA C 909 and AWWA C 905 for pressure pipe applications, or appropriate ASTM standard specified for gravity sewer pipe.
B. Submit manufacturer's certification that PVC pressure pipe for water lines and force mains has been hydrostatically tested at factory in accordance with AWWA C 900, AWWA C 909 and AWWA C 905, and this Section.
C. When foreign manufactured material is proposed for use, have material tested for conformance to applicable ASTM requirements by certified independent testing laboratory located in United States. Certification from another source is not acceptable. Furnish copies of test reports to the Engineer for review. Cost of testing paid by Contractor.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Use PVC compounds in manufacture of pipe that contain no ingredient in amount that has been demonstrated to migrate into water in quantities considered to be toxic.
B. Furnish PVC pressure pipe manufactured from Class 12454 virgin PVC compounds as defined in ASTM D 1784. Use compounds qualifying for rating of 4000 psi for water at 73.4 F per requirements of PPI TR3. Provide pipe which is homogeneous throughout, free of voids, cracks, inclusions, and other defects, uniform as commercially practical in color, density, and other physical properties. Deliver pipe with surfaces free from nicks and scratches with joining surfaces of spigots and joints free from gouges and imperfections which could cause leakage.
C. PVC Restrained Pipe:
    1. Pipe Material:
        a. DR 18: For restrained joints where shown on Drawings.
        b. DR 14: For alternate to offset pipe sections shown on Drawings. Do not use PVC for offset sections with depth of cover greater than 20 feet or less than 4 feet. Do not use PVC in potentially petroleum contaminated areas.
D. Water Service.
    1. Provide self-extinguishing PVC pipe that bears Underwriters' Laboratories mark of approval and is acceptable without penalty to Texas State Fire Insurance Committee for use in fire protection lines.
    2. Bear National Sanitation Foundation Seal of Approval (NSF-PW).
E. Gaskets:
    1. Gasket materials shall meet requirements of ASTM F 477. Use elastomeric factory- installed gaskets to make joints flexible and watertight.
    2. Flat Face Mating Flange: Full faces 1/8-inch-thick ethylene propylene

(EPR) rubber.

3. Raised Face Mating Flange: Flat ring 1/8-inch ethylene propylene (EDR) rubber, with filler gasket between OD of raised face and flange OD to protect flange from bolting moment.

F. Lubricant for rubber-gasketed joints: Water soluble, non-toxic, non-objectionable in taste and odor imparted to fluid, non-supporting of bacteria growth, having no deteriorating effect on PVC or rubber gaskets.
G. Do not use PVC in potentially or known contaminated areas.
H. Do not use PVC in areas exposed to direct sunlight.

2.2 WATER SERVICE PIPE

A. Pipe 4 inch through 12 inches: AWWA C 900, AWWA C 909, Class 150, DR 18; AWWA C 900, Class 200, DR 14 as alternate to offset pipe sections; nominal 20-foot lengths; cast-iron equivalent outside diameters.
B. Pipe 14 inch through 20 inches: AWWA C 905; DR 18; nominal 20-foot lengths; cast-iron equivalent outside diameter.
C. Provide Polyvinyl Chloride Pipe from approved manufacturers.
D. Make curves and bends by offsetting (i.e., deflecting joints). Do not exceed maximum offset recommended by pipe manufacturer.
E. Hydrostatic Test: AWWA C 900, AWWA C 905, AWWA C 909, ANSI A 21.10 (AWWA C 110); at point of manufacture; submit manufacturer's written certification.

2.3 GRAVITY SEWER PIPE

A. PVC gravity sanitary sewer pipe shall be in accordance with provisions in following table:

WALL CONSTRUCTION	ASTM DESIGNATION	SDR (MAX.)/ STIFFNESS (MIN.)	DIAMETER SIZE RANGE
Solid	D3034	SDR 26 / PS 115	6" to 10"
	D3034	SDR 35 / PS 46	12" & 15"
	F679	SDR 35 / PS 46	18" to 60"
	AWWA C900	DR 18 / N/A	4" to 12"
	AWWA C909	DR 18 / N/A	4" to 12"
	AWWA C905	DR 18 / N/A	14" to 20"

Note: Refer to Approved Products List for list of manufacturers.

B. PVC storm sewer pipe shall be in accordance with provisions in following table:

WALL CONSTRUCTION	MANUFACTURER	ASTM DESIGNATION	SDR (MAX.)/ STIFFNESS (MIN.)	DIAMETER SIZE RANGE

Solid	J-M Pipe CertainTeed Diamond Uponor ETI North American	D3034	SDR 26 / PS 115	6" to 10"
		D3034	SDR 35 / PS 46	12" & 15"
		F679	SDR 35 / PS 46	18" to 27"
		AWWA C900	DR 18 / N/A	4" to 12"
		AWWA C909	DR 18 / N/A	4" to 12"
		AWWA C905	DR 18 / N/A	14" to 16"
Truss (Gasketed)	Contech	D2680	N/A /200 psi	8" to 15"
Profile	Contech A-2000 Contech A-2026 ETI, Ultra-Rib ETI, Ultra-Corr	F949 F949 F794 F794	N/A / 46 psi N/A / 115 psi N/A / 46 psi N/A / 46 psi	12" to 36" 8" to 10" 8" to 30" 24" to 36"

C. When solid wall PVC pipe 18 inches to 27 inches in diameter is required in SDR 26, provide pipe conforming to ASTM F 679, except provide wall thickness as required for SDR 26 and pipe stiffness of 115 psi.

D. For sewers up to 12-inch diameter crossing over water lines, or crossing under water lines with less than 2-feet separation, provide minimum 150 psi pressure-rated pipe conforming to ASTM D 2241 with suitable PVC adapter couplings.

E. Joints: Spigot and integral wall section bell with solid cross section elastomeric or rubber ring gasket conforming to requirements of ASTM D 3212 and ASTM F 477, or ASTM D 3139 and ASTM F 477. Gaskets shall be factory-assembled and securely bonded or otherwise held in place to prevent displacement. Manufacturer shall test sample from each batch conforming to requirements ASTM D 2444.

F. Fittings: Provide PVC gravity sewer sanitary bends, tee, or wye fittings for new sanitary sewer construction. PVC pipe fittings shall be full-bodied, either injection molded or factory fabricated. Saddle-type tee or wye fittings are not acceptable.

G. Conditioning. Conditioning of samples prior to and during tests is subject to approval by the Engineer. When referee tests are required, condition specimens in accordance with Procedure A in ASTM D 618 at 73.4 degrees F plus or minus 3.6 degrees F and 50 percent relative humidity plus or minus 5 percent relative humidity for not less than 40 hours prior to test. Conduct tests under same conditions of temperature and humidity unless otherwise specified. This is a brief summary of the test method, and the full current edition of the standard must be followed.

H. Pipe Stiffness. Determine pipe stiffness at 5 percent deflection in accordance with Test Method D 2412. Minimum pipe stiffness shall be 46 psi. For diameters 4 inches through 18 inches, test three specimens, each

a minimum of 6 inches (152 mm) in length. For diameters 21 inch through 36 inch, test three specimens, each a minimum of 12 inch (305 mm) in length. This is a brief summary of the test method, and the full current edition of the standard must be followed.

I. Flattening. Flatten three specimens of pipe, in suitable press until internal diameter has been reduced to 60 percent of original inside diameter of pipe. Rate of loading shall be uniform. Test specimens, when examined under normal light and with unaided eye, shall show no evidence of splitting, cracking, breaking, or separation of pipe walls or bracing profiles. Perform the flattening test in conjunction with pipe stiffness test. This is a brief summary of the test method, and the full current edition of the standard must be followed.

J. Joint Tightness. Test for joint tightness in accordance with ASTM D 3212, except that joint shall remain watertight at minimum deflection of 5 percent. Manufacturer will be required to provide independent third-party certification for joint testing each diameter of storm sewer pipe. This is a brief summary of the test method, and the full current edition of the standard must be followed

K. Purpose of Tests. Flattening and pipe stiffness tests are intended to be routine quality control tests. Joint tightness test is intended to qualify pipe to specified level of performance.

L. Saddle for pipe with 0.5-inch width and greater: Connect side sewer by drilling proper size round hole in wall of the main sewer pipe, inserting an approved pipe compression saddle. The Saddle shall meet requirements of ASTM C-923. Saddles will accept 4”, 6”, and 8” pipe. The lateral pipe shall be held in place by one stainless steel compression band with stainless steel nut and bolt (any AISI Series 300) type tightening device and meeting requirements of ASTM A240. A stainless-steel shear band shall wrap around the pipe a minimum of 380 degrees. Saddle may not protrude into mainline pipe.

2.4 SANITARY SEWER FORCE MAIN PIPE

A. Provide approved PVC pressure pipe conforming to requirements for water service pipe.

B. Acceptable pipe joints are integral bell-and-spigot, containing a bonded-in elastomeric sealing ring meeting requirements of ASTM F 477. In designated areas requiring restrained joint pipe and fittings, use approved joint restraint device conforming to UNI-B-13, for PVC pipe 12-inch diameter and less.

C. Fittings: Provide approved ductile iron fittings.
   1. Nominal 40 mils (35 mils minimum) virgin polyethylene complying with ASTM D 1248, heat fused to interior surface of fitting
   2. Nominal 40 mils (35 mils minimum) polyurethane
   3. Nominal 40 mils (35 mils minimum) ceramic epoxy
   4. Nominal 40 mils (35 mils minimum) fusion bonded epoxy

D. Exterior Protection: Provide polyethylene wrapping of ductile-iron fittings.
E. Hydrostatic Tests: Hydrostatically test pressure rated pipe.

2.5 BENDS AND FITTINGS FOR PVC PRESSURE PIPE

A. Bends and Fittings: ANSI A 21.10 or ANSI A 21.53, ductile iron; ANSI A 21.11 single rubber gasket push-on type joint; minimum 150 psi pressure rating. Approved restrained joints, 250 200 psi, may be provided for up to 12 inches in diameter (water or sanitary).
B. Provide approved restrained joint fittings: Integral restrained joint fittings and pipe do not require secondary restraint.

PART 3 - EXECUTION

3.1 PROTECTION

A. Store pipe under cover out of direct sunlight and protect from excessive heat or harmful chemicals in accordance with manufacturer’s recommendations.

3.2 INSTALLATION

A. Conform to requirements for Water Lines, Gravity Sanitary Sewers, and Sanitary Sewer Force Mains, as applicable.
B. Install PVC pipe in accordance with Section 02317 - Excavation and Backfill for Utilities, ASTM D 2321 for Sewer Pipe, and manufacturer's recommendations.
C. Install PVC water service pipe to clear utility lines with minimum 6-inch separation, unless otherwise shown on Drawings:
D. Avoid imposing strains that will overstress or buckle pipe when lowering pipe into trench.
E. Hand shovel pipe bedding under pipe haunches and along sides of pipe barrel and compact to eliminate voids and ensure side support. Ensure barrel is fully supported along entire length of pipe, prior to backfilling.
F. For PVC pipe installed by trenchless methods, provide integral restrained joints and pull pipe through hole or casing. For PVC pipe pushed through hole or casing, provide approved bell insertion protection system.
G. Store PVC pipe under cover out of direct sunlight. Protect pipe from excessive heat or harmful chemicals. Prevent damage by crushing or piercing.
H. Allow PVC pipe to cool to ground temperature before backfilling when assembled out of trench to prevent pullout due to thermal contraction.
I. Pipe Assembly Procedures
    1. Do not remove gasket from pipe.
    2. Lay pipe by inserting spigot end into bell flush with the insertion line or as recommended by pipe manufacturer.

3. Do not assemble joint by swinging or stabbing.
4. Do not assemble joint using machinery or equipment such as backhoe bucket.
5. At no time shall spigot go past insertion line or homing mark. Continuously observe and check each homing mark for proper length, and install pipe with home mark visible.

3.3 PVC RESTRAINED MECHANISM

A. For low-profile coupling with spline-type joints:
   1. Do not apply lubricant to spline or pipe or coupling spline grooves.
   2. Do not use excessive force while inserting the spline through coupling.
   3. Insert spline until it is fully seated around circumference of pipe.

B. Field Cutting of Pipe Ends:
   1. Perform by workers certified by manufacturer.
   2. Use a PVC pipe cutter and provide square ends.
   3. Follow manufacturer's recommendation to disassemble restrained joint after it has been locked in place.
   4. For low-profile coupling with spline-type joints, use manufacturer approved power routing and grooving tool to field fabricate required pipe groove.

END OF SECTION

SECTION 02631
STORM SEWERS AND OUTFALLS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes installation and testing requirements for storm sewers, manholes, outfalls and appurtenances.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCE

A. AASHTO Section 30 – Thermoplastic Pipe.

1.4 SUBMITTALS

A. Refer to Section 01330 – Submittal Procedures.
B. Submit manufacturer's literature for product specifications including materials, sizes, flow carrying capacity and installation procedures.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Comply with the manufacturer's recommendations.
B. Handle pipe, box, precast manholes, fittings and accessories carefully with approved handling devices. Materials cracked, gouged, chipped, dented or otherwise damaged will be considered nonconforming.
C. Store pipe, box, precast manholes and fittings on heavy timbers or platforms to avoid contact with the ground.
D. Unload pipe and box, precast manholes, fittings and accessories as close as practical to the location of installation to avoid unnecessary handling.
E. Keep interiors of pipe, box, precast manholes and fittings free of dirt and foreign matter.

PART 2 – PRODUCTS

2.1 PIPE AND BOX

A. Reinforced Concrete Pipe: Refer to Section 02611 – Reinforced Concrete Pipe.
B. Precast Reinforced Concrete Box Sewers: Refer to Section 02612 – Precast Reinforced Concrete Box.
C. Polypropylene Corrugated Wall Pipe: Refer to Section 02510 Polypropylene (HPP) Corrugated Wall Pipe
D. Concrete Manholes: Refer to Section 02630 – Concrete Manholes.
E. Fiberglass Manholes: Refer to Section 02083- Fiberglass Manholes.
F. Precast Polymer Concrete Manhole: Refer to Section 02088 - Precast Polymer Concrete Manhole

2.2 BEDDING, BACKFILL AND TOPSOIL

A. Bedding and Backfill Material: Refer to Section 02316 – Structural Excavating and Backfilling.
B. Cement Stabilized Sand: Refer to Section 02321 – Cement Stabilized Sand.
C. Topsoil: Refer to Section 02911 – Topsoil.

PART 3 – EXECUTION

3.1 EXCAVATING AND BACKFILLING

A. Earthwork: Refer to Section 02316 – Structural Excavating and Backfilling or as shown on Plans.
B. Lines and Grade: Establish proper line and grade in trenches.
C. When trench bottom is unstable, remove unstable soils and replace with satisfactory material as directed by the Engineer compacted to match adjacent stable soil or as directed by the Engineer.

3.2 PIPE AND BOX INSTALLATION AND BACKFILLING

A. Install in accordance with the manufacturer's recommendations and as specified in this Section.
B. Install pipe and box only after excavation is completed, the bottom of the trench is shaped, bedding material is installed and all are approved by the Engineer.
C. Install pipe and box to the line and grade indicated on the Plans. Place pipe and box so that they have continuous bearing of barrel-bottom on bedding material and the pipe is laid in the trench so the interior surfaces of the pipe follow the grades and alignments indicated.
D. Use Cement Stabilized Sand for backfill for storm sewers being constructed under roadway pavement construction as shown on the

Plans.

3.3 MANHOLE INSTALLATION AND BACKFILLING

A. Cast-in-place Concrete Manholes.
   1. Construct manholes to dimensions shown on the Plans. Commence construction as soon as possible after pipes are laid. On monolithic sewers, construct manholes at same time sewer is being constructed.
   2. Cast manhole foundations and walls monolithically. A cold joint with approved waterstop will be allowed when the manhole flow line depth exceeds 12 feet. No other joints will be allowed unless shown on the Plans or approved by Engineer.
   3. Refer to Section 03310 – Concrete to place, finish and cure concrete for manholes.
   4. The walls for brick manholes shall be a minimum of 8 inches thick.

B. Precast Concrete Manholes.
   1. Place precast base on 12 inch thick (minimum) foundation of cement stabilized sand. Refer to Section 02321 – Cement Stabilized Sand.
   2. Precast Manhole Sections.
      a. Install sections, joints and gaskets in accordance with manufacturer's instructions.
      b. Install precast adjustment rings above tops of cones or flat-top sections as required to adjust finished elevation and to support manhole frame.
      c. Seal any lifting holes with nonshrink grout.
      d. Place at least two precast concrete grade rings with thickness of 12 inches or less under casting.

C. Fiberglass Manholes
   1. General: The manhole installation should strictly follow the manufacturers recommended installation procedures.
      a. To Install the Fiberglass Manhole: Fiberglass manholes must be installed according to the latest edition of Containment Solution's Fiberglass Manhole Installation Instructions". In addition to these instructions, local codes may apply and should be consulted as applicable in manhole installation. Correct manhole installation requires proper concrete foundation, good backfill and proper handling to prevent manhole damage and insure long-term corrosion resistant service.
   2. B. General Installation Outline: Containment Solution's complete Manhole installation instructions must be consulted before actual installation is performed.
      a. Prepare Excavation/Make Manhole Pipe Cut-Outs for stubout connections: Prepare excavation in a normal manner. Excavation at manhole location should be at least wide enough to accommodate the slab specified and to provide working room around manhole. Insure the depth of manhole is sufficient to

allow at least one course of brick or one concrete ring for adjustment of ring and cover at top of final grade. Pipe cut-outs at the flowline are made in manhole prior to setting manhole in place over pipe in trench. Quarter marks have been provided on barrel to facilitate alignment of cut-outs.

b. Pour Concrete Base: Concrete slab base should be a minimum of 6” thick for up to 48” diameter manholes (8” for larger diameter manholes). Concrete slab should extend a minimum of 12” beyond manhole outside wall for manholes up to 20’ in depth (24” up to 35’ in depth).

c. Set Manhole: To lift manhole, insert an appropriately sized timber or steel beam, 8” longer than the cone top opening, crosswise inside the manhole to the underside of the collar with a rope or chain attached to backhoe or other lifting device. Lower manhole into wet concrete base to a minimum depth of 4”. Minimum 2” thick concrete bearing surface beneath bottom edge of the manhole is required. Plumb manhole using standard bubble level and by moving manhole with hands. Work concrete around manhole base and 6-inch minimum over incoming lines. Inverts and laterals are made following standard procedures.

d. Backfill: Backfilling is done just as soon as the concrete base has hardened enough to provide sufficient support for manhole and fill. Native soil (or sand, in unstable areas), free of large stones, debris, or concrete chunks may be used for backfill. Backfill should be place evenly around manhole in 12” maximum lifts and should thoroughly tamped to 90% standard proctor density before the next layer is installed. Backfill material shall be subject to approval by the engineer.

e. Bring to Grade: Construct chimney on flat shoulder of manhole using precast concrete rings.

D. Pipe Connections at Manholes.

1. Grout storm sewer connections to manhole unless otherwise shown on Plans. Grout pipe penetration in place on both inside and outside of manhole.

E. Inverts for Storm Sewers.

1. Construct invert channels to provide smooth flow transition waterway with no disruption of flow at pipe-manhole connections. Conform to the following criteria:

a. Slope of invert bench: 1 inch per foot minimum; 1.5 inches per foot maximum.

b. Depth of bench to invert:

(1) Pipes smaller than 15 inches: one-half of largest pipe diameter.

(2) Pipes 15 to 24 inches: three-fourths of largest pipe diameter.

(3) Pipes larger than 24 inches: equal to largest pipe diameter.

c. Invert slope through manhole: 0.10 foot drop across manhole with smooth transition of invert through manhole unless

otherwise shown on Plans.

2. Form invert channels with structural concrete if not integral with manhole base section. Provide curves for side inlets and smooth invert fillets for flow transition between pipe inverts. Refer to Section 03310 – Concrete.

F. Manhole Frame and Adjustment Rings.

1. Combine precast concrete or HDPE adjustment rings so elevation of installed casting cover matches pavement surface. Seal between concrete adjustment ring and precast top section with nonshrink grout; do not use mortar between adjustment rings. Apply latex-based bonding agent to precast concrete surfaces joined with nonshrink grout. Set cast iron frame on adjustment ring in bed of approved sealant material. Install sealant bed consisting of two beads of sealant, each bead at least 0.5 inch high and 0.5 inch wide.
2. For manholes in unpaved areas, set top ring of frame a minimum of 6 inches above existing ground unless shown otherwise on Plans. In unpaved areas, encase manhole frame in mortar or nonshrink grout placed flush with face of manhole ring and top edge of frame. Provide rounded corner around perimeter.

G. Where rigid joints are used for connecting existing sewers to the manhole, backfill under the existing sewer up to the springline of the pipe with non- structural concrete or flowable fill.

H. In unpaved areas, provide positive drainage away from manhole frame to natural grade.

3.4 APPURTENANCES INSTALLATION

A. Construct manholes and install frames, grates, rings and covers. Refer to Section 02630 – Concrete Manholes.

B. Plaster brick inlets with 1/2 inch mortar on the inside. The walls for brick inlets shall be a minimum of 8 inches thick.

C. Provide forms for both the outside and inside faces of concrete inlet walls. If the material excavated for the inlet can be hand trimmed to a smooth vertical face, the outside forms may be omitted with approval of Engineer.

D. Connect inlet leads to the inlet.

E. Cut off inlet leads neatly at the inside face of inlet wall. Point up with mortar.

F. When the box section of the inlet has been completed, shape the floor of the inlet to drain.

G. Finish concrete surfaces. Refer to Section 03310 – Concrete.

3.5 PROTECTION

A. Protect manholes, pipes and boxes from damage during construction. Repair or replace damaged materials at no cost to the District as directed by the Engineer.

3.6 DISPOSAL

A. Refer to Section 02120 – Material Disposal.

END OF SECTION

SECTION 02711
HOT MIX ASPHALT BASE COURSE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Foundation course of compacted mixture of coarse and fine aggregates, and asphalt binder.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. AASHTO T201 - Standard Specification for Kinematic Viscosity of Asphalts (Bitumens).
B. AASHTO T202 - Standard Specification for Viscosity of Asphalt by Vacuum Capillary Viscometer.
C. ASTM C 33 - Standard Specifications for Concrete Aggregate.
D. ASTM C 131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
E. ASTM C 136 - Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
F. ASTM D 4402 - Standard Test Method for Viscosity Determination of unfilled Asphalt Using the Broolfield Thermal Apparatus.
G. TxDOT Tex-106-E - Calculating the Plasticity Index of Soils.
H. TxDOT Tex-126-E - Molding, Testing, and Evaluating Bituminous Black Base Material.
I. TxDOT Tex-200-F- Sieve Analysis of Fine and Coarse Aggregates.
J. TxDOT Tex-203-F - Sand Equivalent Test.
K. TxDOT Tex-204-F - Design of Bituminous Mixtures.
L. TxDOT Tex-207-F - Determining Density of Compacted Bituminous Mixtures.
M. TxDOT Tex-208-F - Test for Stabilometer Value of Bituminous Mixtures.
N. TxDOT Tex-227-F - Theoretical Maximum Specific Gravity of Bituminous Mixtures.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. Submit certificates that asphalt materials and aggregates meet requirements.
C. Submit proposed mix and test data for each type of base course in Work.
D. Submit manufacturer's description and characteristics of mixing plant for approval.
E. Submit manufacturer's description and characteristics of spreading and finishing machine for approval.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Coarse Aggregate:
   1. Use crushed gravel or crushed stone, or combination retained on No. 10 sieve, uniform in quality throughout and free from dirt, organic, or other injurious material occurring either free or as coating on aggregate. Conform aggregate o ASTM C 33 except for gradation. Furnish rock or gravel with Los Angeles abrasion loss not to exceed 40 percent by weight when tested in accordance with ASTM C 131.
   2. Reclaimed asphalt pavement (RAP) or reclaimed Portland cement concrete pavement (RPCCP) are permitted as aggregates for hot mix asphalt base course if combined aggregate criteria, gradation, and mixture properties are met.
B. Fine Aggregate: Sand or stone screenings, or combination thereof, passing No. 10 sieve. Conform aggregate to ASTM C 33 except for gradation. Use sand composed of sound, durable stone particles free from loams or other deleterious foreign matter. Furnish screenings of same or similar material as specified for coarse aggregate. Plasticity index of that part of fine aggregate passing No. 40 sieve shall be not more than 6 when tested by TxDOT Tex-106-E. Sand equivalent shall have minimum value of 45 when tested by TxDOT Tex-203-F.
C. Composite Aggregate: Conform to following limits when graded in accordance with ASTM C 136. Provide either coarse or fine aggregate where designated on the Drawings.

GRADATION OF COMPOSITE AGGREGATE Percent Passing by Weight or Volume		
Sieve Size	**Type A Coarse**	**Type B Fine Base**
1 1/2"	98.0-100.0	-
1 1/4"	-	-
1"	78.0-94.0	98.0-100.0

3/4"	64.0-85.0	84.0-98.0
1/2”	50.0-70.0	-
3/8"	-	60.0 to 80.0
#4	30.0-50.0	40.0 to 60.0
#8	22.0-36.0	29.0-43.0
#30	8.0-23.0	13.0-28.0
# 50	3.0-19.0	6.0-20.0
#200	2.0-7.0	2.0-7.0
VMA % Minimum	12.0	13.0
*2 to 8 when Test Method Tex-200-F, Part II (Washed Sieve Analysis) is used.		

D. Asphalt Binder: Moisture-free homogeneous material meeting following requirements:

SPECIFICATION	PG 64 – 22
Average 7-day Maximum Pavement Design Temperature, degrees C[a]	<64
Minimum Pavement Design Temperature, degrees C[a]	>-22
Original Binder	
Flash Point Temperature, T48, Minimum degrees C	230
Viscosity, ASTM D 4402, [b] Maximum 3 Pa.s (3000cP), Test Temperature, degrees C	135
Dynamic Shear, TP5; [c]G*/sine[], Minimum, 1.00kPaTest Temperature @ 10rad/sec, degrees C	64
Rolling Thin Film Oven (T240) or Thin Film Oven (T179) Residue	
Mass Loss, Maximum, %	- 1.00
Dynamic Shear, TP5; G*/sine[], Minimum, 2.20 kPa Test Temperature @ 10rad/sec, degrees C	64
Pressure Aging Vessel Residue (PPI)	
PAV Aging Temperature, degrees C [d]	100
Dynamic Shear, TP5; G*/sine[], Maximum, 5000 kPa Test Temperature @ 10rad/sec, degrees C	25
Physical Hardening [e]	Report
Creep Stiffness, TP1; [f] S, Maximum, 300 Mpa; m-value, Minimum, 0.300 Test Temperature @ 60 sec, degrees C	-12
Direct Tension, TP3; [f] Failure Strain, Minimum, 1.0%; Test Temperature @ 1.0 mm/min, degrees C	-12

Notes:

a Pavement temperature can be estimated from air temperatures using algorithm contained in TxDOT testing procedures.

b The requirement may be waived at discretion of the Engineer if supplier warrants that asphalt binder can be adequately pumped and mixed at temperatures that meet applicable safety standards.

c For quality control of unmodified asphalt cement production, measurement of viscosity of original asphalt cement may be substituted for dynamic shear measurements of G*/sine [ ] at test temperature where asphalt is Newtonian fluid. Any suitable standard means of viscosity measurement may be used, including capillary of rotational viscometry (AASHTO T 201 or T202).

d The PAV aging temperature is based on simulated climatic conditions and is one of three temperatures: 90 C, 100 C, or 110 C. The PAV aging temperature is 100 C for PG64 and PG70.

e Physical Hardening - TP 1 is performed on a set of asphalt beams according to Section 13.1, except conditioning time is extended to 24 hours plus of minus 10 minutes at 10 C above minimum performance temperature. The 24-hour stiffness and m-value are reported for information purposes only.

f If creep stiffness is below 300 MPa, the direct tension test is not required. If creep stiffness is between 300 and 600 MPa the direct tension failure strain requirement can be used in lieu of creep stiffness requirement. The m-value requirement must be satisfied in both cases.

E. Reclaimed asphalt pavement (RAP) may be used at a rate no greater than 20 percent.

2.2 EQUIPMENT

A. Mixing Plant: Weight-batching or drum mix plant with capacity for producing continuous mixtures meeting specifications. With exception of a drum mix plant, the plant shall have satisfactory conveyors, power units, aggregate handling equipment, hot aggregate screens and bins, and dust collectors.
B. Provide equipment to supply materials adequately in accordance with rated capacity of plant and produce finished material within specified tolerances. Following equipment is essential:
   1. Cold aggregate bins and proportioning device
   2. Dryer
   3. Screens
   4. Aggregate weight box and batching scales
   5. Mixer
   6. Asphalt storage and heating devices
   7. Asphalt measuring devices
   8. Truck scales
C. Bins: Separate aggregate into minimum of four bins to produce consistently uniform grading and asphalt content in completed mix. One cold feet bin per stockpile is required.

2.3 MIXES

A. Employ certified testing laboratory to prepare design mixes.
   1. Test in accordance with TxDOT Tex-126-E, TxDOT Tex-204-F, TxDOT Tex-208-F, and TxDOT Tex-227-F.
   2. Verify mixture design properties for plant-produced mixture. Demonstrate that asphalt plant is capable of producing mixture meeting design volumetric and stability requirements before placement begins.

B. Density, Stability, and Air Voids Requirements. Select asphalt binder content for base courses to result in 3 to 5 percent air voids in laboratory molded specimens, while meeting minimum VMA requirement for selected mixture classification.

Percent Density		Percent	HVEEM Stability Percent	Percent Asphalt Content	
Min.	Max.	Optimum	Not Less Than	Min.	Max.
94.5	97.5	96	35	3.5	7

PART 3 - EXECUTION

3.1 PREPARATION

A. Complete backfill of new utilities below future grade.
B. Verify lines and grades are correct.
C. Prepare subgrade in accordance with requirements of Section 02330 - Embankment and Section 02315 - Roadway Excavation or Section 02336 - Lime Stabilized Subgrade and 02338 - Portland Cement Stabilized Subgrade. Subgrade preparation may also refer to Section 02321 - Cement Stabilized Sand or Section 02713 - Recycled Crushed Concrete Base Course.
D. Correct subgrade deviations in excess of plus or minus 1/4 inch in cross section, or in 16 foot length by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling.

3.2 PLACEMENT

A. Place base when surface temperature taken in shade and away from artificial heat is above 40 degrees F and rising. Do not place asphalt base when temperature of surface to receive base course is below 50 degrees F and falling.
B. Haul prepared and heated asphalt base mixture to project in tight vehicles previously cleaned of foreign material. Mixture shall be at temperature between 250 degrees F and 325 degrees F when laid.
C. Place hot mix asphalt base course in compacted lifts no greater than 4 inches thick, unless permitted in writing by Engineer.
D. Place courses as nearly continuously as possible. Place material with approved mechanical spreading and finishing machine of screeding or

tamping type. Spread lifts to attain smooth course of uniform density to section, line, and grades as indicated on Drawings.

E. In areas with limited space where use of paver or front-end loader is impractical, spread by hand and compact asphalt by mechanical means. Carefully place materials to avoid segregation of mix; do not broadcast material. Remove lumps that do not break down readily.

3.3 JOINTS

A. Transverse Joints. Pass roller over unprotected ends of freshly laid mixture only when mixture has cooled. When work is resumed, cut back placed material to produce slightly beveled edge for full thickness of course. Remove old material which has been cut away and lay new mix against fresh cut.

B. Existing pavement. When new asphalt is laid against existing asphalt pavement, saw cut existing asphalt to full depth creating vertical face. Clean joint and apply tack coat before placement.

3.4 COMPACTION

A. Construct test strip to identify correct type, number, and sequence of rollers necessary to obtain specified in-place density or air-voids. Prepare test strip at least 500 feet in length, comparable to placement and compaction conditions for Project.

B. Begin rolling while pavement is still hot and as soon as it will bear roller without undue displacement or hair line cracking. Keep wheels properly moistened with water to prevent adhesion of surface mixture. Do not use excessive water; do not use petroleum by-products.

C. Compact surface thoroughly and uniformly with power-driven equipment capable of obtaining required compaction. Obtain subsequent compression by starting at side and rolling longitudinally toward center of pavement, overlapping on successive trips by at least one-half width of rear wheels. Make alternate trips slightly different in length. Continue rolling until no further compression can be obtained and rolling marks are eliminated. Complete rolling before mat temperature drops below 175 degrees F.

D. Along walls, curbs, headers, similar structures, and in locations not accessible to rollers, compact mixture thoroughly with lightly oiled tamps.

E. Compact base course to a minimum density of 91 percent (TxDOT Tex-227-F).

3.5 TOLERANCES

A. Pavement Repairs.
   1. Furnish templates for checking surface of finished sections. Maximum deflection of templates, when supported at center, shall not exceed 1/4 inch.
   2. Completed surface, when tested with 10 foot straight edge laid

parallel to center line of pavement, shall show no deviation in excess of 1/4 inch in 10 feet. Correct surface not meeting this requirement.

3.6 FIELD QUALITY CONTROL

A. Perform testing.
B. For in-place depth and density, take minimum of one core at random locations for each 1000 feet of single lane pavement. On a 2-lane pavement, take samples at random every 500 feet from alternating lanes. Take cores for parking lots every 500 square yards of base to determine in-place depth and density. If cul-de sac or streets are less than 500 feet, minimum of 2 cores (one per lane) will be procured. On small projects, take a minimum of two cores for each day's placement. For first days placement and prior to coring, minimum of 5 nuclear gauge readings will be performed at each core location to establish correlation between nuclear gauge (wet density reading) and core (bulk density). This process will continue for each day's placement until engineer determines that a good bias has been established for that nuclear gauge.
C. Determine in-place density in accordance with TxDOT Tex-207-F and Tex-227-F from cores or sections of asphaltic base located near each core. Other methods of determining in-place density, which correlate satisfactorily with results obtained from roadway specimens, may be used when approved by the Engineer.
D. Request, at option, three additional cores within a 5-foot radius of core indicating nonconforming in-place depth at no additional cost to the District. In-place depth at these locations shall be average depth of four cores.
E. Fill cores and density test sections with new compacted asphalt base or cold patch material.

3.7 NONCONFORMING PAVEMENT

A. Re-compact and retest nonconforming street sections not meeting surface test requirements. Patch asphalt pavement sections in accordance with procedures established by Asphalt Institute. Retesting is at no cost to the District.
B. Remove and replace areas of asphalt base found deficient in thickness by more than 10 percent. Remove and replace areas of asphalt base found deficient in density. Use new asphalt base of thickness shown on Drawings.
C. Replace or correct nonconforming pavement sections at no additional cost to the District.

3.8 PROTECTION

A. Do not open base to traffic until 12 hours after completion of rolling, or as shown on Drawings.
B. Maintain asphalt base in good condition until completion of Work.

C. Repair defects immediately by replacing base to full depth.

END OF SECTION

SECTION 02714
FLEXIBLE BASE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Foundation course of crushed concrete or stone.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. ASTM D 1556 - Density of Soil in Place by the Sand-Cone Method.
B. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12.44 ft-lbf/ft3).
C. ASTM D 2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
D. ASTM D 361 - Test Method for Water Content of Soils and Rock in Place by Nuclear Methods (shallow depth).
E. ASTM D 3017 - Test Method for Water Content of Soils and Rock in Place by Nuclear Methods.
F. ASTM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
G. TxDOT Tex-101-E - Preparation of Soil and Flexible Base Materials for Testing.
H. TxDOT Tex-110-E - Determination of Particle Size Analysis of Soils.

1.4 SUBMITTALS

A. Submittals shall conform to requirements of Section 01330 - Submittals Procedures.
B. Submit samples of flexible base course and soil binder for testing.

1.5 TESTS

A. Tests and analysis of soil materials will be performed in accordance with

ASTM C 131, ASTM D 698, ASTM D 4318, Tex-101-E, and Tex-110-E.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Provide materials from stockpiles that are protected during storage from contaminates that would be detrimental to the flexible base course.
B. Load materials from same area of stockpile to maintain uniformity of each successive delivery to the project site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Crushed Stone or Concrete: Material retained on the No. 40 sieve meeting the following requirements:
   1. Durable particles of crusher-run broken limestone, crushed concrete, crushed sandstone, or granite obtained from an approved source.
B. Soil Binder: Material passing the No. 40 sieve meeting the following requirements when tested in accordance with ASTM D 4318:
   1. Maximum Liquid Limit: 40
   2. Maximum Plasticity Index: 12
   3. Maximum Lineal Shrinkage: 7 (when calculated from volumetric shrinkage at liquid limit).
C. Mixed Materials shall meet the following requirements:
   1. Minimum compressive strength of 35 psi at 0 psi lateral pressure and 175 psi at 15 psi lateral pressure using triaxial testing procedures.
   2. Grading in accordance with Tex-101-E and Tex-110-E within the following limits:

Property	Test Method	Grade 1–2	Grade 3	Grade 4[2]	Grade 5
Sampling	Tex-400-A				
Master gradation sieve size (cumulative % retained)	Tex-110-E			As shown on the plans	
2-1/2"		0	0		0
1-3/4"		0–10	0–10		0–5
7/8"		10–35	–		10–35
3/8"		30–65	–		35–65
#4		45–75	45–75		45–75
#40		65–90	50–85		70–90
Liquid Limit, % Max	Tex-104-E	40	40	As shown on the plans	35
Plasticity Index, Max[1]	Tex-106-E	10	12	As shown on the plans	10
Plasticity index, Min[1]		As shown on the plans	As shown on the plans	As shown on the plans	As shown on the plans
Wet ball mill, % Max	Tex-116-E	40	–	As shown on the plans	40
Wet ball mill, % Max increase passing the #40 sieve		20	–	As shown on the plans	20
Min compressive strength, psi	Tex-117-E			As shown on the plans	
lateral pressure 0 psi		35	–		–
lateral pressure 3 psi		–	–		90
lateral pressure 15 psi		175	–		175

1. Determine plastic index in accordance with Tex-107-E (linear shrinkage) when liquid limit is unattainable as defined in Tex-104-E.
2. Grade 4 may be further designated as Grade 4A, Grade 4B, etc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify compacted subgrade is ready to support imposed loads.
B. Verify lines and grades are correct.

3.2 PREPARATION

A. Complete backfill of new utilities below future grade.
B. Prepare subgrade in accordance with requirements of Section 02315 - Roadway Excavation or Sections 02336 - Lime Stabilized Subgrade and 02337 - Lime/Fly-ash Stabilized Subgrade.
C. Correct subgrade deviations in excess of plus or minus 1/2 inch in cross section, or in 16-foot length by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling.
D. Prepare sufficient subgrade in advance of base course operations.

3.3 PLACEMENT

A. Spread and shape in lifts to compacted thickness not to exceed 6 inches in depth. Complete spreading, shaping, and compacting on same day material is deposited.
B. Place base so that projecting reinforcing steel from curbs remain at approximate center of base. Secure a firm bond between reinforcement and base.
C. Start rolling operations as soon as possible after placement. Use sheep foot, steel, or pneumatic rollers as approved. Roll longitudinally with subgrade starting from sides. Overlap successive strips by one-half width of each rear wheel.
D. Maintain moisture between optimum and 3 percent above optimum moisture.
E. Compact to 95 percent of Proctor density in accordance with ASTM D 698, unless otherwise indicated on the Drawings.
F. Finish to grade and compact lift before placing successive lift.
G. Maintain shape by grading throughout operation.
H. Provide total thickness indicated on Drawings.

3.4 TOLERANCES

A. Completed surface shall be smooth and conform to typical section and established lines and grades.

3.5 FIELD QUALITY CONTROL

A. Testing will be performed.
B. Compaction Testing will be performed in accordance with ASTM D 698 or

ASTM D 2922 and ASTM 3017 at a random location near each depth determination core. Rework and recompact areas that do not conform to compaction requirements.

3.6 PROTECTION

A. Sprinkle to prevent excessive loss of moisture.
B. Restrict construction traffic on finished base to equipment required to complete the work.

END OF SECTION

SECTION 02741
ASPHALTIC CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Surface course of compacted mixture of coarse and fine aggregates and asphaltic binder.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. ASTM C 33 - Standard Specification for Concrete Aggregates.
B. ASTM C 131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
C. TxDOT Tex-106-E - Calculating the Plasticity Index of Soils
D. TxDOT Tex-126-E - Molding, Testing, and Evaluating Bituminous Black Base Material.
E. TxDOT Tex-200-F - Sieve Analysis of Fine and Coarse Aggregates.
F. TxDOT Tex-203-F - Sand Equivalent Test.
G. TxDOT Tex-204-F - Design of Bituminous Mixtures.
H. TxDOT Tex 206-F - Compacting Test Specimens of Bituminous Mixtures.
I. TxDOT Tex-207-F - Determining Density of Compacted Bituminous Mixtures.
J. J TxDOT Tex-208-F - Test for Stabilometer Value of Bituminous Mixtures.
K. TxDOT Tex-217-F - Determining Deleterious Material and Decantation Test for Coarse Aggregates.
L. TxDOT Tex-227-F - Theoretical Maximum Specific Gravity of Bituminous Mixtures.
M. TxDOT Tex-530-C - Effect of Water on Bituminous Paving Mixtures.
N. TxDOT Tex-531-C - Prediction of Moisture Induced Damage to Bituminous Paving Materials Using Molded Specimens.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. Submit certificates that asphalt materials and aggregates meet requirements.
C. Submit proposed design mix and test data for surface course.
D. Submit manufacturer's description and characteristics of spreading and finishing machine for approval.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Coarse Aggregate:
   1. Use gravel, crushed stone, or combination thereof, that is retained on No. 10 sieve, uniform in quality throughout and free from dirt, organic or other injurious matter occurring either free or as coating on aggregate. Use aggregate conforming to ASTM C 33 except for gradation. Furnish rock or gravel with Los Angeles abrasion loss not to exceed 40 percent by weight when tested in accordance with ASTM C 131.
   2. Aggregate by weight shall not contain more than 1.0 percent by weight of fine dust, clay- like particles, or silt when tested in accordance with Tex-217-F, Part II.

B. Fine Aggregate: Sand, stone screenings or combination of both passing No. 10 sieve. Use aggregate conforming to ASTM C 33 except for gradation. Use sand composed of sound, durable stone particles free from loams or other injurious foreign matter. Furnish screenings of same or similar material as specified for coarse aggregate. Plasticity index of that part of fine aggregate passing No. 40 sieve shall be not more than 6 when tested by TxDOT Tex- 106-E. Sand equivalent shall have minimum value of 45 when tested by TxDOT Tex-203-F.

C. Composite Aggregate: Conform to following limits when graded in accordance with TxDOT Tex-200-F. Use type specified on Drawings:

GRADATION OF COMPOSITE AGGREGATE		
SIEVE SIZE	PERCENT PASSING	
	Course Surface (TxDOT Type C)	Fine Surface (TxDOT Type D)
-	-	-
3/4 “	95 to 100	-
1/2"	-	98.0-100.0
3/8"	70.0-85.0	85.0-100.0
#4	43 to 63	50.0 to 70.0
#8	32.0-44.0	35.0-46.0

#30	14.0-28.0	15.0-29.0
# 50	7.0-21.0	7.0-20.0
#200	2.0-7.0	2.0-7.0
VMA % minimum	14.0	15.0
* 2 to 8 when Test Method Tex-200-F, Part II (Washed Sieve Analysis) is used.		

D. Asphalt Binder: Moisture-free homogeneous material which will not foam when heated to 347 F, meeting the following requirements.

PERFORMANCE GRADED BINDER	
CRITERIA / TEST	**PERFORMANCE GRADE (PG64-22)**
Average 7-day Maximum Pavement Design Temperature, C	< 64
Minimum Pavement Design Temperature, C	> -22
ORIGINAL BINDER	
Flash Point Temperature, T48; Minimum C	230
Viscosity, ASTM D 4402; Maximum, 3Pa*s (3000 cP) Test Temperature, C	135
Dynamic Shear, TP5; G*/sin[ ], Minimum, 1.00 kPa Test Temperature @ 10 rad/sec., C	64
ROLLING THIN FILM OVEN (T240) OR THIN FILM OVEN (T179) RESIDUE	
Mass Loss, Maximum , %	1.00
Dynamic Shear, TP5; G*/sin [ ], Minimum, 2.20 kPa Test Temperature @ 10 rad/sec., C	64
PRESSURE AGING VESSEL RESIDUE (PP1)	
PAV Aging Temperature, C	100
Dynamic Shear, TP5; G*/sin [ ], Minimum, 5000 kPa Test Temperature @ 10 rad/sec., C	25
Physical hardening	Report
Creep Stiffness, TP1; S, Maximum, 300 Mpa -value, Minimum, 0.300 Test Temperature @ 60 sec., C	-12
Direct Tension, TP3; Failure Strain, Minimum, 1.0% Test Temperature @ 1.0 mm/min, C	-12

E. Anti-stripping Agent:

1. Evaluate mixture of aggregate, asphalt, and additives proposed for use for moisture susceptibility and requirement for anti-stripping agents. To substantiate mix design, produce and test trial mixtures using proposed project materials and equipment prior to placement. Test for susceptibility to moisture and trial mixture may be waived by the

Engineer when similar designs using same material have previously proven satisfactory.

2. Liquid Anti-stripping Agent. Use anti-stripping agent with uniform liquid with no evidence of crystallization, settling, or separation of components. Submit sample of anti- stripping agent proposed for use and manufacturer's product data, including recommended dosage range, handling and storage, and application instructions.

2.2 EQUIPMENT

A. Mixing Plant: Weight-batching or drum mix plant with capacity for producing continuous mixtures meeting specifications. With exception of a drum mix plant, plant shall have satisfactory conveyors, power units, aggregate handling equipment, hot aggregate screens and bins, and dust collectors.
B. Provide equipment to supply materials adequately in accordance with rated capacity of plant and produce finished material within specified tolerances. Following equipment is essential:
   1. Cold aggregate bins and proportioning device
   2. Dryer
   3. Screens
   4. Aggregate weight box and batching scales
   5. Mixer
   6. Asphalt storage and heating devices
   7. Asphalt measuring devices
   8. Truck scales
C. Bins: Separate aggregate into minimum of four bins to produce consistently uniform grading and asphalt content in completed mix. Provide one cold feed bin per stockpile.

2.3 MIXES

A. Employ certified testing laboratory to prepare design mixes. Test in accordance with TxDOT Tex-126-E or Tex-204-F, Tex-206-F, Tex-208-F, Tex-530-C and Tex-531-C.
B. Density, Stability and Air Void Requirements:

Percent Density		Percent	HVEEM Stability Percent
Min	Max.	Optimum	Not Less Than
94.5	97.5	96	35

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify compacted base course is ready to support imposed loads.
B. Verify lines and grades are correct.

3.2 PREPARATION

A. Tack Coat: Conform to requirements of Section 02743 - Tack Coat. Where mixture will adhere to surface on which it is to be placed without use of tack coat, tack coat may be eliminated when approved by the Engineer.
B. Prepare subgrade in accordance with requirements of Section 02711 - Hot Mix Asphalt Base Course, Section 02712 - Cement Stabilized Base Course, or Section 02713 - Recycled Crushed Concrete Base Course.
C. Prepare subgrade in advance of asphalt concrete paving operation.
D. Perform pavement repair and resurfacing as indicated in Section 02951 - Pavement Repair and Resurfacing.
E. Do not use cutback asphalt.
F. Milling of pavement for speed humps: Mill pavement (concrete or asphalt) to depth of one inch and width between 18 and 24 inches around entire perimeter of proposed hump, as shown in detail for speed hump design.

3.3 PLACEMENT

A. Do not place asphalt pavement less than 2 inches thick when surface temperature taken in shade and away from artificial heat is below 50 F and falling. Asphalt may be placed when temperature is above 40 F and rising.
B. Haul prepared and heated asphaltic concrete mixture to project in tight vehicles previously cleaned of foreign material. Mixture temperature shall be between 250 F and 325 F when laid.
C. Spread material into place with approved mechanical spreading and finishing machine of screening or tamping type.
D. Surface Course Material: Surface course 2 inches or less in thickness may be spread in one lift. Spread lifts in such a manner that, when compacted, finished course will be smooth, of uniform density, and will be to section, line and grade as shown. Place construction joints on surface courses to coincide with lane lines or as directed by the Engineer.
E. Joints: Pass roller over unprotected ends of freshly laid mixture only when mixture has cooled. When work is resumed, cut back laid material to produce slightly beveled edge for full thickness of course. Remove old material which has been cut away and lay new mix against fresh cut.
F. When new asphalt is laid against existing or old asphalt, saw cut existing or old asphalt to full depth to provide straight smooth joint.
G. In smaller restricted areas where use of paver is impractical spread material by hand. Compact asphalt by mechanical means. Carefully place materials to avoid segregation of mix. Do not broadcast material. Remove lumps that do not break down readily.

3.4 COMPACTION

A. Construct test strip to identify correct type, number, and sequence of rollers necessary to obtain specified in-place density or air-voids when directed by the Engineer. Prepare test strip at least 1,000 feet in length, comparable to

placement and compaction conditions for Project.

B. Begin rolling while pavement is still hot and as soon as it will bear roller without shoving, displacement or hair cracking. Keep wheels properly moistened with water to prevent adhesion of surface mixture. Do not use excessive water or petroleum by-products.
C. Compact surface thoroughly and uniformly, first with power-driven, 3-wheel, or tandem rollers weighing a minimum of 8 tons. Obtain subsequent compression by starting at side and rolling longitudinally toward center of pavement, overlapping on successive trips by at least one-half width of rear wheels. Make alternate trips slightly different in length. Continue rolling until no further compression can be obtained and rolling marks are eliminated. Complete rolling before mat temperature drops below 185 F.
D. Use tandem roller for final rolling. Double coverage with approved pneumatic roller on asphaltic concrete surface is acceptable after flat wheel and tandem rolling has been completed.
E. Along walls, curbs, headers and similar structures, and in locations not accessible to rollers, compact mixture thoroughly with lightly oiled tamps.
F. Compact binder course and surface course to a minimum density of 91 percent of maximum possible density of voidless mixture composed of same materials in like proportions.

3.5 TOLERANCES

A. Furnish templates for checking surface in finished sections. Maximum deflection of templates, when supported at center, shall not exceed 1/8 inch.
B. Completed surface, when tested with 10-foot straightedge laid parallel to center line of pavement, shall show no deviation in excess of 1/8 inch in 10 feet. Correct surface not meeting this requirement.
C. Dimensions of speed humps shall conform to details for speed hump design and speed hump height tolerances.

3.6 QUALITY CONTROL

A. Testing will be performed.
B. For in-place depth and density, take minimum of one core at random locations for each 1000 feet of single lane pavement. On a 2-lane pavement, take samples at random every 500 feet from alternating lanes. Take cores for parking lots every 500 square yards of base to determine in-place depth and density. If cul-de sac or streets are less than 500 feet, minimum of 2 cores (one per lane) will be procured. On small projects, take a minimum of two cores for each day's placement. For first days placement and prior to coring, minimum of 5 nuclear gauge readings will be performed at each core location to establish correlation between nuclear gauge (wet density reading) and core (bulk density). This process will continue for each day's placement until engineer determines that a good bias has been established for that nuclear gauge.

C. Determine in-place density in accordance with TxDOT Tex-207-F and Tex-227-F from cores or sections. Other methods of determining in-place density, which correlate satisfactorily with results obtained from roadway specimens, may be used when approved by the Engineer. Average densities for each street placed in a single day to determine compliance.
D. Contractor may request three additional cores in vicinity of cores indicating nonconforming in-place depths or density at no additional cost to the District. In-place depth and density at these locations shall be average of four cores.
E. Fill cores and density test sections with new compacted asphaltic concrete.
F. Speed humps: Measure dimensions of completed speed hump, before applying pavement markings, at locations shown on Speed Hump Height Measurement Worksheet. Complete one worksheet for each speed hump, and send completed worksheets the Engineer.

3.7 NONCONFORMING PAVEMENT

A. Recompact and retest nonconforming street sections not meeting surface test requirements or having unacceptable surface texture. Patch asphalt pavement sections in accordance with procedures established by Asphalt Institute. Retesting is at no cost to the District.
B. Remove and replace areas of asphalt surface found deficient in thickness by more than 10 percent. Use new asphaltic surface of thickness shown on Drawings. Remove and replace areas of asphalt surface found deficient in average density.
C. Replace speed humps which do not conform to requirements of details, or which are rejected by the Engineer.

3.8 PROTECTION

A. Do not open pavement to traffic until completion of rolling and temperature has cooled to set asphaltic concrete surface, or as shown on Drawings.
B. Maintain asphalt pavement in good condition until completion of Work.
C. Repair defects immediately by replacing asphalt pavement to full depth.

3.9 PAVEMENT MARKINGS FOR SPEED HUMPS

A. Apply pavement markings to speed humps in conformance with dimensions shown on detail for speed hump design.

END OF SECTION

SECTION 02742
PRIME COAT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Prime coat for asphalt concrete paving

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. Submit product data for proposed prime coat.
C. Submit report of recent calibration of distributor.

PART 2 - PRODUCTS

2.1 CUTBACK ASPHALT

A. Provide moisture-free homogeneous material which will not foam when heated to 347 degrees F and which meets following requirements:
B. Asphalt material for prime coat shall be MC-30 or MC-70 and shall meet following requirements:

PROPERTIES	TYPE - GRADE			
	MC-30		MC-70	
	MIN.	MAX.	MIN.	MAX.
Water, Percent	---	0.2	---	0.2
Flash Point, T.O.C., □F	100	---	100	---
Kinematic Viscosity at 140□F, cst	30	60	70	140

1. Distillate shall be as follows, expressed as percent by volume of total distillate to 680 degrees F:

TEMPERATURE	TYPE-GRADE			
	MC-30		MC-70	
	MIN.	MAX.	MIN.	MAX.
to 437□F	---	25	---	20
to 500□F	40	70	20	60
to 600□F	75	93	65	90
Residue from 680□F Distillation, Volume, Percent	50	---	55	---

2. Tests on Distillation Residue:

TEST	TYPE-GRADE			
	MC-30		MC-70	
	MIN.	MAX.	MIN.	MAX.
Penetration at 77□F, 100g, 5 sec.	120	250	120	250
Ductility at 77□F, 5 cm/min. cms	100*	---	100*	---
Solubility in Trichloroethylene, %	99	---	99	---
Spot Test	All Negative			

* If penetration of residue is more than 200 and ductility at 77 degrees F is less than 100 cm, material will be acceptable when its ductility at 60 degrees F is more than 100.

2.2 EMULSIFIED PETROLEUM RESIN

A. EPR-1 Prime: Slow curing emulsion of petroleum resin and asphalt cement conforming to following requirements:

PROPERTIES	MIN.	MAX.
Fural Viscosity at 77□F, Sec	14	40
Residue by Evaporation, % by Weight	60	-
Sieve Test, %	-	0.1
Particle Charge Test	Positive	
Tests on Distillation Residue:		
Flash Point, COC (F)	400	-
Kinematic Viscosity @ 140 F (cst)	190	350

B. For use, EPR-1 may be diluted with water up to maximum three parts water to one-part EPR- 1 in order to achieve desired concentration of residual resin/asphalt to facilitate application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify base is ready to support imposed loads.
B. Verify lines and grades are correct.

3.2 PREPARATION

A. Thoroughly clean base course surface of loose material by brooming prior to application of tack coat.
B. Prepare sufficient base in advance of paving for efficient operations.

3.3 APPLICATION, BASIC

A. Apply prime coat with approved type of self-propelled pressure distributor. Distribute prime coat evenly and smoothly under pressure necessary for proper distribution.
B. Keep storage tanks, piping, retorts, booster tanks, and distributors used in handling asphalt materials clean and in good operating condition. Conduct operations so asphalt material does not become contaminated.
C. If yield of asphaltic material appears to be in error, recalibrate distributor prior to continuing Work.
D. Maintain surface until Work is accepted by the Engineer.

3.4 APPLICATION, CUTBACK ASPHALT

A. Do not use cutback asphalt during period of April 16 through September 15.
B. Do not place prime coat when air temperature is below 60 degrees F and falling. Materials may be placed when air temperature taken in shade and away from artificial heat is above 50 degrees F and rising.
C. Distribute at rate of 0.25 to 0.35 gallons per square yard.
D. Equipment shall accurately determine temperature of asphaltic material in heating equipment and in distributor, for determining rate of application, and for obtaining uniformity at junction of two distributor loads. Maintain in accurate working order, including recording thermometer at storage heating unit.
E. Base temperature of application on temperature-viscosity relationship that will permit application of asphalt with viscosity of 100 to 125 centistokes. Maintain asphalt within 15 degrees F of temperature required to meet viscosity. Selected temperature shall be within following range.

Prime Coat Type	Minimum (EF)	Maximum (EF)
MC-30	70	150
MC-70	125	175

F. Do not allow temperature of MC-30 to exceed 175 degrees F.
G. Do not allow temperature of MC-70 to exceed 200 degrees F.

3.5 APPLICATION, EMULSIFIED PETROLEUM RESIN

A. Do not place prime coat when air temperature is below 36 degrees F and falling.
B. Distribute at rate of 0.15 to 0.25 gallons per square yard.

3.6 PROTECTION

A. Prevent traffic or placement of subsequent courses over freshly applied prime coat until authorized by the Engineer.

END OF SECTION

SECTION 02743
TACK COAT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Tack coat for asphalt concrete paving.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. ASTM D 244 - Standard Test Methods for Emulsified Asphalts.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. Submit product data for proposed tack coat.
C. Submit report of recent calibration of distributor.

PART 2 - PRODUCTS

2.1 EMULSION

A. Provide homogeneous material which shows no separation of asphalt after mixing and meets viscosity requirements within 30 days after delivery.
B. Emulsion material for tack coat.
   1. Emulsified asphalt: SS-1 or SS-1h meeting following criteria:

PROPERTIES	SS-1		SS-1h	
	MIN.	MAX.	MIN.	MAX.
Furol Viscosity at 77□F, sec.	20	100	20	100
Residue by Distillation, %	60	--	60	--
Oil Portion of Distillate, %	--	1/2	--	1/2
Sieve Test, %	--	0.10	--	0.10

Miscibility (Standard Test)	Passing			
Cement Mixing, %	--	2.0	--	2.0
Storage Stability, 1 Day, %	--	1	--	1
Test on Residue: Penetration at 77□F, 100g, 5 sec. Solubility in Trichloroethylene, % Ductility at 77□F, 5 cm/min., cms	 120 97.5 100	 160 -- --	 70 97.5 80	 100 -- --

2. Polymer Modified Emulsion, SS-1P, for use where thin overlays (less than or equal 2 inches) are placed on collector or arterial streets and for speed humps, especially over existing Portland cement concrete pavement.

PROPERTIES	**SS-1P**	
	MIN.	**MAX.**
Furol Viscosity at 77 F, sec.	30	100
Residue by Distillation, %	60	--
Oil Portion of Distillate, %	--	1/2
Sieve Test, %	--	0.10
Miscibility (Standard Test)	Passing	
Cement Mixing, %	--	2.0
Storage Stability, 1 Day, %	--	1
Test on Residue: Penetration at 77□F, 100g, 5 sec.; Solubility in Trichloroethylene, %Ductility at 77□F, 5 cm/min., cms; Viscosity at 140 F, poises	 100 97 50 1300	 140 -- -- --

3. For emulsions used for tack coats during period of April 16 through September 15, volatile organic compound solvents (VOC) shall not exceed 12 percent by weight when tested in accordance with ASTM D 244.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify compacted base is ready to support imposed loads.
B. Verify lines and grades are correct.

3.2 PREPARATION

A. Thoroughly clean base course or concrete surface of loose material by brooming prior to tack coat application.

3.3 APPLICATION

A. Apply tack coat uniformly by use of approved distributor at rate not to exceed 0.05 gallons per square yard of surface depending on texture of underlying surface. Select an application rate that will provide appropriate asphalt residual.
B. Paint contact surfaces of curbs, structures, and joints with thin uniform coat of tack coat.

3.4 PROTECTION

A. Prevent traffic or placement of subsequent courses over freshly applied tack coat until authorized by the Engineer.

END OF SECTION

SECTION 02758
RETROREFLECTORIZED PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish and place retroreflectorized, non-retroreflectorized (shadow) and profile pavement markings

1.2 MEASUREMENT AND PAYMENT

A. Measurement and payment is as noted on the Unit Price Schedule.
B. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. TxDOT Departmental Materials Specification – 8200, “Traffic Paint”.
B. TxDOT Departmental Materials Specification – 8220, “Hot Applied Thermoplastic”.
C. TxDOT Departmental Materials Specification – 8290, “Glass Traffic Beads”.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

PART 2 - PRODUCTS

2.1 TYPE I MARKING MATERIALS

A. Furnish pavement markings material used for Type I profile markings and shadow markings that have been approved and in accordance with TxDOT DMS – 8220.

2.2 TYPE II MARKING MATERIALS

A. Furnish in accordance with TxDOT DMS – 8200.

2.3 GLASS TRAFFIC BEADS

A. Furnish drop-on glass beads in accordance with TxDOT DMS – 8290 or as approved. Furnish a double-drop of Type II and Type III drop-on glass beads where each type bead is applied separately in equal portions (by weight), unless otherwise approved. Apply the Type III beads before applying the Type II beads.

2.4 LABELING

A. Use clearly marked containers that indicate color, mass, material type, manufacturer, and batch number.

PART 3 - EXECUTION

3.1 EQUIPMENT

A. Use equipment that:
   1. Is maintained in satisfactory condition.
   2. Meets or exceeds the requirements of the National Board of Fire Underwriters and the Texas Railroad Commission for this application.
   3. Applies beads by an automatic bead dispenser attached to the pavement marking equipment in such a manner that the beads are dispensed uniformly and almost instantly upon the marking as the marking is being applied to the road surface. The bead dispenser must have an automatic cut-off control, synchronized with the cut-off of the pavement marking equipment.
   4. Has an automatic cut off device with manual operating capabilities to provide clean, square marking ends.
   5. Is capable of producing the types and shapes of profiles specified.
   6. Can provide continuous mixing and agitation of the pavement marking material. The use of pans, aprons, or similar appliances which the die overruns will not be permitted for longitudinal striping applications.

B. Provide a hand-held thermometer capable of measuring the temperature of the marking material when applying Type I material.

3.2 MATERIAL PLACEMENT REQUIREMENTS

A. Use equipment that can place:
   1. At least 40,000 ft. of 4 in. solid or broken non profile markings per working day at the specified thickness;
   2. at least 15,000 ft. of solid or broken profile pavement markings per working day at the specified thickness;
   3. linear non-profile markings up to 8 in. wide in a single pass;
   4. non-profile pavement markings other than solid or broken lines at an approved production rate;
   5. a centerline and no-passing barrier-line configuration consisting of 1 broken line and 2 solid lines at the same time to the alignment, spacing, and thickness for non-profile pavement markings shown on the plans;
   6. solid and broken lines simultaneously;
   7. white line from both sides;
   8. lines with clean edges, uniform cross section with a tolerance of ±1/8 in. per 4 in. width, uniform thickness, and reasonably square ends;
   9. skip lines between 10 and 10 1/2 ft., a stripe-to-gap ratio of 10 to 30, and a stripe-gap cycle between 39 1/2 ft. and 40 1/2 ft., automatically;

10. beads uniformly and almost instantly on the marking as the marking is being applied;
11. beads uniformly during the application of all lines (each line must have an equivalent bead yield rate and embedment); and
12. double-drop bead applications using both Type II and Type III beads from separate independent bead applicators, unless otherwise approved by the Engineer.

3.3 CONSTRUCTION

A. Place markings before opening to traffic unless short-term or work zone markings are allowed.
B. Obtain approval for the sequence of work and estimated daily production. Minimize interference to roadway operations when placing markings on roadways open to traffic. Use traffic control as shown on the plans or as approved. Protect all markings placed under open-traffic conditions from traffic damage and disfigurement.
C. Establish guides to mark the lateral location of pavement markings as shown on the plans or as directed, and have guide locations verified. Use material for guides that will not leave a permanent mark on the roadway.
D. Apply markings on pavement that is completely dry and passes the following tests:
    1. Type I Marking Application: Place a sample of Type I marking material on a piece of tarpaper placed on the pavement. Allow the material to cool to ambient temperature, and then inspect the underside of the tarpaper in contact with the pavement. Pavement will be considered dry if there is no condensation on the tarpaper.
    2. Type II Marking Application: Place a 1-sq. ft. piece of clear plastic on the pavement, and weight down the edges. The pavement is considered dry if, when inspected after 15 min., no condensation has occurred on the underside of the plastic.
E. Apply markings:
    1. That meet requirement of TEX-828-B,
    2. that meet minimum retroreflectivity requirements when specified on the plans (applies to Type I markings only),
    3. using widths and colors shown on the plans,
    4. at locations shown on the plans,
    5. in proper alignment with the guides without deviating from the alignment more than 1 in. per 200 ft. of roadway or more than 2 in. maximum,
    6. without abrupt deviations,
    7. free of blisters and with no more than 5% by area of holes or voids,
    8. with uniform cross section, density and thickness,
    9. with clean and reasonably square ends,
    10. that are retroreflectorized with drop-on glass beads, and
    11. using personnel skilled and experienced with installation of pavement markings.
F. Remove all applied markings that are not in alignment or sequence as

stated on the plans.

3.4 SURFACE PREPARATION

A. Prepare surfaces in accordance with this Section unless otherwise shown on the plans.
B. Cleaning for New Asphalt Surfaces and Retracing of All Surfaces. Air blast or broom the pavement surface for new asphalt surfaces (less than 3 years old) and for retracing of all surfaces to remove loose material, unless otherwise shown on the plans. A sealer for Type I markings is not required unless otherwise shown on the plans.
C. Cleaning for Old Asphalt and Concrete Surfaces (Excludes Retracing). Clean old asphalt surfaces (more than 3 years old) and all concrete surfaces in accordance with Item 678, “Pavement Surface Preparation for Markings,” to remove curing membrane, dirt, grease, loose and flaking existing construction markings, and other forms of contamination.
D. Sealer for Type I Markings. Apply a pavement sealer to old asphalt surfaces (more than 3 years old) and to all concrete surfaces before placing Type I markings on locations that do not have existing markings, unless otherwise approved. The pavement sealer may be either a Type II marking or an acrylic or epoxy sealer as recommended by the Type I marking manufacturer unless otherwise shown on the plans. Follow the manufacturer’s directions for application of acrylic or epoxy sealers. Clean sealer that becomes dirty after placement by washing. Place the sealer in the same configuration and color (unless clear) as the Type I markings unless otherwise shown on the plans.

3.5 APPLICATION

A. Apply markings during good weather unless otherwise directed. If markings are placed at Contractor option when inclement weather is impending and the markings are damaged by subsequent precipitation, the Contractor is responsible for all required replacement costs.
B. Place the Type I marking after the sealer cures. Apply within the temperature limits recommended by the material manufacturer. Flush the spray head if spray application operations cease for 5 min or longer by spraying marking material into a pan or similar container until the material being applied is at the recommended temperature.
C. Apply on clean, dry pavements passing the moisture test described and with a surface temperature above 50°F when measured in accordance with Tex-829-B.
D. Non Profile Pavement Markings. Apply Type I non-profile markings with a minimum thickness of:
    1. 0.100 inch for new markings and retracing water-based markings on surface treatments involving seal coats,
    2. 0.060 inch for retracing on thermoplastic pavement markings, or
    3. 0.090 inch for all other Type I markings.

E. Maximum thickness for Type I non profile markings is 0.180 inch. Measure thickness for markings in accordance with Tex-854-B using the tape method.
F. Profile pavement markings, apply Type I with a minimum thickness of:
   1. 0.060 inch for edgeline markings, or
   2. 0.090 inch for gore and centerline/no-passing barrier line markings.
G. In addition, at a longitudinal spacing indicated on the plans, the markings must be profiled in a vertical manner such that the profile is transverse to the longitudinal marking direction. The profile must not be less than 0.30 in. (300 mil) nor greater than 0.50 in. (500 mil) in height when measured above the normal top surface plane of the roadway. The transverse width of the profile must not be less than 3.25 in., and the longitudinal width not less than 1 in., when measured at the top surface plane of the profile bar. The profile may be either a 1 or 2 transverse bar profile. When the 2 transverse bar profile is used, the spacing between the bases of the profile bars must not exceed 0.50 in. The above transverse bar width is for each 4 in. of line width.
H. Type II Markings: Apply on surfaces with a minimum surface temperature of 50°F. Apply at least 20 gal. per mile on concrete and asphalt surfaces and at least 22 gal. per mile on surface treatments for a solid 4-in. line. Adjust application rates proportionally for other widths. When Type II markings are used as a sealer for Type I markings, apply at least 15 gal. per mile using Type II drop-on beads.
I. Bead Coverage, provide a uniform distribution of beads across the surface of the stripe for Type I and Type II markings, with 40% to 60% bead embedment.

3.6 RETROREFLECTIVITY REQUIREMENTS

A. When specified on the plans, Type I markings must meet the following minimum retroreflectivity values for edgeline markings, centerline or no passing barrier-line, and lane lines when measured any time after 3 days, but not later than 10 days after application:
   1. White markings: 250 millicandelas per square meter per lux (mcd/m2/lx)
   2. Yellow markings: 175 mcd/m2/lx

3.7 RETROREFLECTIVITY MEASUREMENTS

A. Use a mobile retroreflectometer for projects requiring minimum retroreflectivity requirements to measure retroreflectivity for Contracts totaling more than 200,000 ft. of pavement markings, unless otherwise shown on the plans. For Contracts with less than 200,000 ft. of pavement markings or Contracts with callout work, mobile or portable retroreflectometers may be used at the Contractor’s discretion.

3.8 MOBILE RETROREFLECTIVITY MEASUREMENTS

A. Provide mobile measurements averages for every 0.1 miles unless otherwise specified or approved. Take measurements on each section of roadway for each series of markings (i.e., edgeline, center skip line, each line of a double line, etc.) and for each direction of traffic flow. Measure each line in both directions for centerlines on two-way roadways (i.e., measure both double solid lines in both directions and measure all center skip lines in both directions). Furnish measurements in compliance with Special Specification, “Mobile Retroreflectivity Data Collection for Pavement Markings,” unless otherwise approved. The Engineer may require an occasional field comparison check with a portable retroreflectometer meeting the requirements listed above to ensure accuracy. Use all equipment in accordance with the manufacturer’s recommendations and directions. Inform the Engineer at least 24 hr. before taking any measurements.

B. A marking meets the retro reflectivity requirements if:
   1. the combined average retroreflectivity measurement for a one mile segment meets the minimum retroreflectivity values specified, and
   2. no more than 30% of the retroreflectivity measurement values are below the minimum retroreflectivity requirements value within the one mile segment.

C. The Engineer may accept failing one mile segments if no more than 20% of the retroreflectivity measurements within that mile segment are below the minimum retroreflectivity requirement value.

D. The one-mile segment will start from the beginning of the data collection and end after a mile worth of measurements have been taken; each subsequent mile of measurements will be a new segment. Centerlines with 2 stripes (either solid or broken) will result in 2 miles of data for each mile segment. Each centerline stripe must be tested for compliance as a stand-alone stripe.

E. Restripe at the Contractor's expense with a minimum of 0.060 in. (60 mils) of Type I marking if the marking fails retroreflectivity requirements. Take measurements every 0.1 miles a minimum of 10 days after this second application within that mile segment for that series of markings.

F. If the markings do not meet minimum retroreflectivity after 10 days of this second application, the Engineer may require removal of all existing markings, a new application as initially specified, and a repeat of the application process until minimum retroreflectivity requirements are met.

3.9 PORTABLE RETROREFLECTOMETER MEASUREMENTS

A. Take a minimum of 20 measurements for each 1-mi. section of roadway for each series of markings (i.e., edgeline, center skip line, each line of a double line, etc.) and direction of traffic flow when using a portable reflectometer. Measure each line in both directions for centerlines on two-way roadways (i.e., measure both double solid lines in both directions and

measure all center skip lines in both directions). The spacing between each measurement must be at least 100 ft. The Engineer may decrease the mileage frequency for measurements if the previous measurements provide satisfactory results. The Engineer may require the original number of measurements if concerns arise.

B. Restripe once at the Contractor's expense with a minimum of 0.060 in. (60 mils) of Type I marking material if the average of these measurements fails. Take a minimum of 10 more measurements after 10 days of this second application within that mile segment for that series of markings. Restripe again at the Contractor's expense with a minimum of 0.060 in. (60 mils) of Type I marking material if the average of these measurements fall below the minimum retroreflectivity requirements. If the markings do not meet minimum retroreflectivity after this third application, the Engineer may require removal of all existing markings, a new application as initially specified, and a repeat of the application process until minimum retroreflectivity requirements are met.

3.10 TRAFFIC CONTROL

A. Provide traffic control, as required, when taking retroreflectivity measurements after marking application. On low volume roadways (as defined on the plans), refer to the figure, “Temporary Road Closure” in Part 6 of the *Texas Manual on Uniform Traffic Control Devices* for the minimum traffic control requirements. For all other roadways, the minimum traffic control requirements will be as shown on the Traffic Control Plan (TCP) standard sheets TCP (3-1) and TCP (3-2). The lead vehicle will not be required on divided highways. The TCP and traffic control devices must meet the requirements for barricades, signs and traffic handling. Time restrictions that apply during striping application will also apply during the retroreflectivity inspections except when using the mobile retroreflectometer unless otherwise shown on the plans or approved.

3.11 PERFORMANCE PERIOD

A. All markings must meet the requirements of this specification for at least 30 calendar days after installation. Unless otherwise directed, remove pavement markings that fail to meet requirements, and replace at the Contractor’s expense. Replace failing markings within 30 days of notification. All replacement markings must also meet all requirements of this Item for a minimum of 30 calendar days after installation.

END OF SECTION

SECTION 02775
CONCRETE SIDEWALKS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Reinforced concrete sidewalks.
B. Wheelchair ramps.
C. Reinforced slope paving.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. ASTM C 31 - Standard Practice for Making and Curing Concrete Test Specimens in Field.
B. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
C. ASTM C 42 - Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
D. ASTM C 138 - Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
E. ASTM C 143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
F. ASTM C 172 - Standard Practice for Sampling Freshly Mixed Concrete.
G. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
H. Texas Accessibility Standards of Architectural Barriers Act, Article 9102, Texas Civil Statues.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. Submit certified testing results and certificates of compliance.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Forms: Use straight, unwarped wood or metal forms with nominal depth equal to or greater than proposed sidewalk thickness. The use of 2 inch by 4-inch lumber as forms will not be allowed.
B. Sand Bed: Conform to material requirements for bank run sand of Section 02320 - Utility Backfill Materials.
C. Sodding: Conform to material requirements for sodding of Section 02922 - Sodding.

PART 3 - EXECUTION

3.1 REPLACEMENT

A. Replace sidewalks and slope paving which are removed or damaged during construction with thickness and width equivalent to one removed or damaged, unless otherwise shown on Drawings. Finish surface (exposed aggregate, brick pavers, etc.) to match existing sidewalk.
B. Provide replaced and new sidewalks with wheelchair ramps when sidewalk intersects curb at street or driveway.

3.2 PREPARATION

A. Identify and protect utilities which are to remain.
B. Protect living trees, other plant growth, and features designated to remain.
C. Conduct clearing and grubbing operations in accordance with Section 02233 - Clearing and Grubbing.
D. Excavate subgrade 6 inches beyond outside lines of sidewalk. Shape to line, grade and cross section. For soils with plasticity index above 40 percent, stabilize soil with lime in accordance with Section 02336 – Lime-Stabilized Subgrade. Compact subgrade to minimum of 90 percent maximum dry density at optimum to 3 percent above optimum moisture content, as determined by ASTM D 698.
E. Immediately after subgrade is prepared, cover with compacted sand bed to depth as shown on Drawings. Lay concrete when sand is moist but not saturated.

3.3 PLACEMENT

A. Setting Forms: Straight, unwarped wood or metal forms with nominal depth equal to or greater than proposed sidewalk thickness. Use of 2 by 4's as forms will not be allowed. Securely stake forms to line and grade. Maintain position during concrete placement.
B. Reinforcement:

1. Install reinforcing bars.
2. Install reinforcing steel as shown on the drawings. Lay longitudinal bars in walk continuously, except through expansion joints.
3. Use sufficient number of chairs to support reinforcement in manner to maintain reinforcement in center of slab vertically during placement.
4. Drill dowels into existing paving, sidewalk and driveways, secure with epoxy, and provide headers as required.
5. Use sufficient number of chairs for steel reinforcement bars to maintain position of bars within allowable tolerances. Place reinforcement as shown on Drawings. In plane of steel parallel to nearest surface of concrete, bars shall not vary from plan placement by more than 1/12 of spacing between bars. In plane of steel perpendicular to nearest surface of concrete, bars shall not vary from plan placement by more than 1/4 inch.

C. Expansion Joints: Install expansion joints with load transfer.
D. Place concrete in forms to specified depth and tamp thoroughly with "jitterbug" tamp, or other acceptable method. Bring mortar to surface.
E. Strike off to smooth finish with wood strike board. Finish smoothly with wood hand float. Brush across sidewalk lightly with fine-haired brush.
F. Unless otherwise indicated on Drawings, mark off sidewalk joints 1/8-inch-deep, at spacing equal to width of walk. Use joint tool equal in width to edging tool.
G. Finish edges with tool having 1/4-inch radius.
H. After concrete has set sufficiently, refill space along sides of sidewalk to one-inch from top of walk with suitable material. Tamp until firm and solid, place sod as applicable. Dispose of excess material in accordance with Section 02120 - Waste Material Disposal. Repair driveways and parking lots damaged by sidewalk excavation.

3.4 CURING

A. Conform to requirements of Section 02753 - Concrete Pavement Curing.

3.5 FIELD QUALITY CONTROL

A. Testing will be performed
B. Compressive Strength Test Specimens: Four test specimens for compressive strength test will be made in accordance with ASTM C 31 for each 30 cubic yards or less of sidewalk that is placed in one day. Two specimens will be tested at 7 days. Remaining two specimens will be tested at 28 days. Specimens will be tested in accordance with ASTM C 39. Minimum compressive strength: 3000 psi at 7 days and 3500 psi at 28 days.
C. Yield test for cement content per cubic yard of concrete will be made in accordance with ASTM C 138. When cement content is found to be less than that specified per cubic yard, reduce batch weights until amount of cement per cubic yard of concrete conforms to requirements.

D. If the Contractor places concrete without notifying the laboratory, the Engineer will have the concrete tested by means of core test as specified in ASTM C 42. When concrete does not meet specification, cost of test will be deducted from payment.
E. Sampling of fresh concrete shall be in accordance with ASTM C 172.
F. Take slump tests when cylinders are made and when concrete slump appears excessive.
G. Concrete shall be acceptable when average of two 28-day compression tests is equal to or greater than minimum 28-day strength specified.
H. If either of two tests on field samples is less than average of two tests by more than 10 percent, that entire test shall be considered erratic and not indicative of concrete strength. Core samples will be required of in-place concrete in question.
I. If 28 day laboratory test indicates that concrete of low strength has been placed, test concrete in question by taking cores as directed by the Engineer. Take and test at least three representative cores as specified in ASTM C 42 and deduct cost from payment due.

3.6 NONCONFORMING CONCRETE

A. Remove and replace areas that fail compressive strength tests, with concrete of thickness shown on Drawings.
B. Replace nonconforming sections at no additional cost to the District.

3.7 PROTECTION

A. Maintain newly place concrete in good condition until completion of Work.
B. Replace damaged areas.

END OF SECTION

SECTION 02911
TOPSOIL

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for topsoil in support of turf establishment.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.
D. For on-site topsoil, no separate measurement and payment shall be made.

1.3 REFERENCES

A. AASHTO T 194 – Determination of Organic Matter in Soils by Wet Combustion.
B. ASTM D 422 – Particle-Size Analysis of Soils.
C. ASTM D 4972 – pH of Soils.

1.4 SUBMITTALS

A. Refer to Section 01330 – Submittal Procedures.
B. For imported topsoil, submit a topsoil analysis and fertilizer and/or amendment recommendations from a Texas certified agronomist for approval. Analysis shall include:
    1. Routine Analysis (Macronutrients) – NO_3, P, K, Ca, Mg, Na, pH and conductivity.
    2. Micronutrients – Zn, Fe, Cu and Mn.
    3. Organic matter.
    4. Textural analysis.
    5. Particle size analysis including hydrometer test.
    6. Indicate to the laboratory the type vegetation to be grown, e.g. Bermudagrass, whether to be irrigated and whether site was previously fertilized. Indicate to the laboratory that fertilizer recommendations are to be based on new establishment of forage using the minimum fertilizer requirement for establishment unless directed otherwise by the Engineer.

C. Imported topsoil samples.
   1. When requested by the Engineer, submit sufficient samples of topsoil for additional testing by the District.
   2. When additional samples are required, submit samples at least 60 days prior to delivery or placement of topsoil.
   3. Supply samples from the same source and stockpile as the topsoil for the project.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Import topsoil or provide from on-site material. Topsoil shall be easily cultivated, free from objectionable material including, gravel, large roots, stumps, wood, brush, debris, hard clods, clay balls, hardpan, refuse or other deleterious materials and be of reasonably uniform quality.
B. In the case of on-site or nearby source, topsoil is the surface layer of material containing decaying vegetable matter and fine hair-like roots.
C. Imported topsoil shall satisfy the following property values or as directed by the Engineer:

TEST DESCRIPTION	UNIT	VALUE	
1. Soil Reaction	pH	6-8	(a)
2. Passing No. 4 Sieve	%	95-100	
3. Sand Size, 2.0-0.05 mm	%	10-70	
4. Silt Size, 0.05-0.005 mm	%	0-40	
5. Clay Size, <0.005 mm	%	20-50	
6. Easily Oxidizable Organic Matter	%	2.5-10	(b)

Notes:
(a) Determine pH by Method A, pH meter. If the imported topsoil does not satisfy the specified pH range, achieve the desired pH by applying soil amendments as recommended by the certified agronomist's report of soil sample analysis.

PART 3 – EXECUTION

3.1 TOPSOIL DELIVERY, STORAGE AND HANDLING

A. Deliver, stockpile and handle topsoil in such a way as to not contaminate the material with other soils or objectionable materials.

3.2 TOPSOIL EXCAVATION (ON-SITE)

A. Strip topsoil including fine roots and herbaceous vegetation as specified on the Plans or as directed by the Engineer from areas to be excavated

or filled and stockpile it for use on the side slopes and berms.

3.3 TOPSOIL PLACEMENT

A. Prior to placing topsoil, disk or harrow the subgrade to a minimum depth of 4 inches until it is loose and uncompacted.
B. Place top elevation of topsoil at the design finish grade elevation shown on the Plans.
C. Do not spread topsoil when it is excessively wet or dry.

3.4 DISPOSAL

A. Refer to Section 02120 – Material Disposal.

END OF SECTION

SECTION 02922
SOD

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for Bermudagrass or St. Augustinegrass sod and staples.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 SUBMITTALS

A. Refer to Section 01330 – Submittals.
B. Submit letter from sod grower attesting that sod is Bermudagrass or “Raleigh” St. Augustinegrass.

PART 2 – PRODUCTS

2.1 SOD

A. Provide live, growing Bermudagrass or “Raleigh” St. Augustinegrass sod, as required by the Engineer.
B. Provide dark green sod with a healthy vigorous system of dense, thickly matted roots throughout the soil of the sod for a minimum depth of 1 inch (+/- 1/4 inch), excluding top growth and thatch.
C. Provide sod that contains no more than 5 percent noxious weeds and other crop and weed contaminants.
D. Provide sod free of diseases and harmful insects.
E. Cut sod in uniform panels or rolls. Broken panels or panels or rolls with torn or uneven ends will not be accepted.
F. Sod panels shall be strong enough to support their own weight and retain size and shape when suspended vertically from a firm grasp on the upper 10 percent of the panel.
G. Harvest, deliver and install sod within a 36-hour period. Sod not planted within this time period must be inspected and approved by

the Engineer prior to installation.

H. Sod that has been allowed to dry out by exposure to the sun and air is unacceptable and will be considered nonconforming.

2.2 STAPLES

A. Provide 6 inch x 1 inch x 6 inch, 11 gauge steel “u” staples.

PART 3 – EXECUTION – Not used

END OF SECTION

SECTION 02923
SEED

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for seed in support of turf establishment.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. Texas Seed and Plant Certification Act and Standards, Sections 21.9, 31.10 & 21.11.
B. U.S. Department of Agriculture Rules and Regulations – Federal Seed Act.

1.4 SUBMITTALS

A. Refer to Section 01330 – Submittal Procedures.
B. Submit seed certification (copy of seed bag tag(s)).
    1. Certification shall include common name; botanical name; percent by weight of each plant species; year of harvest; percent purity, germination and dormant seed; percent noxious weed content (maximum 1%); and date of certification.

PART 2 – PRODUCTS

2.1 MATERIAL

A. Provide seed that complies with the referenced standards in this Section.
B. Provide seed bags with tags affixed for inspection in the field. Bags without tags will be considered nonconforming.
C. Seed shall be tested and certified by a commercial or State laboratory not more than 9 months prior to the date of planting.
D. Provide seed in clean, unopened and undamaged bags.
E. Provide seeds containing no objectionable material, such as sticks,

stems and unthrashed seed heads, which will hinder proper distribution.

F. Seed that is wet, moldy, starting to germinate or otherwise damaged, will be considered nonconforming.

PART 3 – EXECUTION – Not used

END OF SECTION

SECTION 02925
MULCH AND TACKIFIER

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for mulch and tackifier or soil stabilizer in support of turf establishment.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 SUBMITTALS

A. Refer to Section 01330 – Submittal Procedures.
B. Submit product cut sheets for mulch and tackifier which clearly shows the amount of tackifier to be used per pound of mulch.
C. Submit product information for mulch.
D. Submit product information for tackifier.
E. Submit product information for soil stabilizer (if used) including application rate for required duration (months).

PART 2 – PRODUCTS

2.1 MULCH

A. Provide mulch products free of noxious weeds and foreign materials.
B. Provide mulch free of mold and rot.
C. Provide commercial quality paper mulch consisting of paper cellulose fiber mulch made from post-consumer recovered paper materials such as Pro-Mat® or approved equal.
D. Provide commercial quality wood fiber mulch consisting of wood cellulose fiber mulch made from recovered wood materials such as Silva-Fiber® or approved equal.
E. Provide straw mulch of oat, rice or wheat stem or other straw as approved by the Engineer.
F. Provide hay mulch of prairie grass, Bermudagrass or other hay as

approved by the Engineer.

G. Provide screened, mature compost or other organic materials as approved by the Engineer.

2.2 TACKIFIER

A. Provide organic biodegradable tackifier manufactured from muciloids or guar gum.

2.3 SOIL STABILIZER

A. Use a soil stabilizer in place of the guar gum tackifier when shown on the Plans or as directed by the Engineer. Soil stabilizers include products such as SoilMaster-WR®, Soil Sement®, UltraBond 2000® or approved equal.

PART 3 – EXECUTION – Not used

END OF SECTION

SECTION 02936
FERTILIZER

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for fertilizer in support of turf establishment.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. Texas Department of Agriculture – Fertilizer Laws.
B. Association of Official Analytical Chemists – Fertilizer Content Analytical Methods.
C. 40 *CFR* Part 503.

1.4 SUBMITTALS

A. Refer to Section 01330 – Submittal Procedures.
B. Submit results of agronomic soil testing of topsoil to Engineer for approval, if available.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver fertilizer in bags or containers clearly labeled with name and address of the manufacturer, weight and guaranteed analysis. Bulk fertilizer, if approved by the Engineer, must be accompanied by an invoice or label with the name and address of the manufacturer and guaranteed analysis and appropriate means to accurately measure and record weight of fertilizer used.
B. Deliver fertilizer in clean, unopened and undamaged bags.

PART 2 – PRODUCTS

2.1 FERTILIZER

A. Turf Establishment – Planting Methods: Dry Application, Overseeding, and Sodding:
   1. Provide pelleted or granulated fertilizer which has the specified analysis packaged in 40 pound bags.
   2. The guaranteed analysis represents the percent nitrogen (total N), percent water insoluble nitrogen (where applicable), percent phosphate (citrate soluble P as P_2O_5) and percent potash (water soluble K as K_2O) nutrients as determined by the methods of the Association of Official Analytical Chemists.
   3. Synthetic Fertilizer.
      a. Use a complete fertilizer with an analysis ratio of 1:2:2 (N:P:K), such as 10:20:20 with 50% of the nitrogen from sulfur coated urea (scu), or as directed by the Engineer.
   4. Organic Fertilizer.
      a. Use Ag-Org P/L® organic fertilizer or approved equal, when directed by the Engineer.
      b. Provide fertilizer containing a minimum N:P:K of 4:2:2 that is manufactured by organic processes applied to the base ingredient – uncomposted chicken litter.
      c. Fertilizer shall consist of approximately 89.5% insoluble and 10.5 soluble nitrogen.
      d. Provide fertilizer containing at least the following amounts per dry ton derived from its base material without supplemental inclusions or additions: phosphorus (P) 23,000 ppm; potassium (K) 108,000 ppm; sulfur (S) 6,200 ppm; chloride (Cl^-) 9,700 ppm; calcium (Ca) 28,000 ppm; sodium (Na) 6,400; iron (Fe) 2,000 ppm; copper (Cu) 470 ppm; magnesium (Mg) 7,600 ppm; manganese (Mn) 440 ppm; and zinc (Zn) 210 ppm.
      e. Do not exceed acceptable levels of metals listed in 40 *CFR* Part 503 for fertilizer. Fertilizer must be guaranteed by manufacturer as non-burning.

B. . Turf Establishment – Hydroseeding with Mulch:
   1. Use a completely soluble synthetic fertilizer or an organic fertilizer as directed by the Engineer.
   2. Use a complete synthetic fertilizer with an analysis ratio of 1:2:2 (N:P:K), such as 10:20:20 or an organic fertilizer with an analysis of 4:2:2 (N:P:K) as directed by the Engineer.

C. Reject fertilizer containing objectionable material that may hinder proper distribution.

D. Use dry and free-flowing fertilizer. Caked fertilizer will be considered nonconforming.

PART 3 – EXECUTION

3.1 APPLICATION

A. Refer to Section 02921 – Turf Establishment.
B. Apply synthetic fertilizer at a rate of 40 pounds Nitrogen/acre, which is 400 pounds fertilizer/acre of 10:20:20 or apply an organic fertilizer at a rate of 500 pounds fertilizer/acre of 4:2:2 as directed by the Engineer.

END OF SECTION

SECTION 02951
PAVEMENT REPAIR AND RESTORATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Repairing and replacing streets, highways, and other pavements that have been cut, broken, or damaged due to utility excavation.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Subgrade:
   1. Provide backfill material as required by applicable excavation and fill sections (Sections 02315 through 02319) and Section 02330 - Embankment.
   2. Provide material for stabilization as required by applicable portions of Section 02336 - Lime Stabilized Subgrade, and Section 02338 - Portland Cement Stabilized Subgrade.
B. Base: Provide base material as required by applicable portions of Section 02711 - Hot Mix Asphaltic Base Course, Section 02712 - Cement Stabilized Base Course, and Section 02713 - Crushed Concrete Base Course.
C. Pavement: Provide paving materials as required by applicable portions of Section 02741 - Asphaltic Concrete Pavement, and Section 02771 - Curb, Curb and Gutter, and Headers, and Section 02775 - Concrete Sidewalks.

PART 3 - EXECUTION

3.1 PREPARATION

A. Notify the Engineer prior to commencement of excavation in pavement for which an Excavation in Public Way permits has been obtained. Follow

directions contained in the permit.

B. Saw cut pavement 18 inches wider than width of trench needed to install utilities unless otherwise indicated on Drawings.
C. When removing pavement to existing deformed metal strip (i.e. dummy joint), saw cut pavement minimum 2 inches deep on opposite side of deformed metal strip. Place saw joint far enough behind deformed metal strip to obtain continuously straight joint. Remove damaged portion of deformed metal strip as required to provide proper joint. Saw cut and remove metal strip before placement of new concrete pavement.
D. Protect edges of existing pavement to remain from damage during removals, utility placement, backfill, and paving operations. For concrete pavement, protect undisturbed subgrade that is to remain to support replacement slab.
E. Dowel in existing pavement where no reinforcement is found or is broken due to construction activities. Unless otherwise directed by the Engineer, provide No. 6 bars 24 inches long, drilled and embedded 8 inches into center of existing slab with 'PO-ROC' epoxy grout or approved equal. Space dowels to match new pavement reinforcement spacing.
F. Provide transitional paving and earthwork as required to tie proposed pavement to existing pavement when unable to dowel new pavement into existing pavement.

3.2 INSTALLATION

A. Parking Areas, Service Drives, Driveways, and Sidewalks: Replace with material equal to or better than existing or as indicated on Drawings. Conform to applicable requirements for Materials.
B. Street Pavements and Curbs, Curbs and Gutters: Replace subgrade, base, and surface course with like materials or as indicated on Drawings and HCDD No. 1 Standard Detail. Curbs and curbs and gutters shall match existing. Conform to requirements for Materials.
    1. For concrete pavement, install size and length of reinforcing steel and pavement thickness indicated on Drawings and HCDD No. 1 Standard Detail. Place types and spacing of joints to match existing or as indicated on Drawings.
    2. Where existing pavement consists of concrete pavement with asphaltic surfacing, resurface with minimum 2-inch depth asphaltic pavement.
    3. Repair state highway and county crossings in accordance with TxDOT permit or county requirements as appropriate and within 1 week after utility work is installed.

3.3 WASTE MATERIAL DISPOSAL

A. Dispose of waste material in accordance with requirements of Section 02120 - Waste Material Disposal.

3.4 PROTECTION

A. Maintain pavement in good condition until completion of Work.
B. Replace pavement damaged by Contractor's operations at no cost to the District.

END OF SECTION

SECTION 02970
CHAIN LINK FENCE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnishing and erecting a chain link fence, in conformity with details, lines and grades as shown on the drawings.

1.2 MEASUREMENT AND PAYMENT

A. Measurement and payment is as noted on the Unit Price Schedule.
B. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. ASTM A120 – Pipe, steel, black and hot-dipped zinc-coated (galvanized) welded and seamless, for ordinary uses.
B. ASTM A121 – Zinc coated (galvanized) steel barbed wire.
C. ASTM A123 – Zinc (hot galvanized) coating on products fabricated from rolled, pressed and forged steel shapes, plates, bars and strip.
D. ASTM A153 – Zinc coated steel chain link fence fabric.
E. ASTM A392 – Zinc coated steel chain link fence fabric.
F. ASTM A491 – Aluminum coated steel chain link fence fabric.
G. ASTM A570 – Hot-rolled carbon steel sheet and strip structural quality.
H. ASTM A572 - High-strength low-alloy columbium-vanadium steels of structural quality.
I. ASTM A585 – Aluminum-coated steel barbed wire.
J. ASTM B211 – Aluminum-alloy bar, rod, and wire.
K. ASTM B221 – Aluminum-alloy extruded bars, rods, wire shapes and tubes.
L. RR-F-191/1 – Federal Specification Fencing, Wire, Post, and Metal.
M. RR-F-191/3 – Federal Specification Fencing, Wire, Post, and Metal.
N. RR-F-191/4 – Federal Specification Fencing, Wire, Post, and Metal.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

PART 2 - PRODUCTS

2.1 MATERIAL

A. The fabric shall be woven with a 9-gauge galvanized steel wire in a 2-inch mesh and shall meet the requirements of ASTM A392, Class II.
B. Barbed wire shall be 3-strand 12 1/2-gauge zinc-coated wire with 4-point barbs and shall conform to the requirements of ASTM A121, Class 3.
C. Posts, rails, and braces furnished for use in conjunction with zinc-coated steel fabric. Line posts, rails, and braces shall be galvanized steel pipe.
    1. Galvanized steel pipe shall conform to the requirements of ASTM A120, Schedule 40, except the hydrostatic testing requirement is waived. Galvanizing shall be in accordance with ASTM A123.
    2. The steel used in all structural shapes shall conform to the requirements of ASTM A 572, Grade 45, and shall be galvanized in accordance with the requirements of ASTM A123.
    3. Roll-formed sections shall be fabricated from material meeting the requirements of ASTM A570, grade 45, and shall be galvanized in accordance with the requirements of ASTM A123.
    4. The dimensions of the posts, rails, and braces shall be in accordance with the Standard Detail in the plans.
D. Gate frames shall consist of galvanized steel pipe and conform to the specifications for the same material under Section 2.03. The fabric shall be of the same type material as used in the fence.
E. Wire fabric ties, and tension wire for use in conjunction with a given type of fabric shall be of the same material identified with the fabric type. The tension wire shall be 7-gauge coiled spring wire coated similarly to the respective wire fabric being used.
F. Wire fabric ties shall be hog rings of galvanized steel wire not less than 9 gauge.
G. All material shall conform to Federal Specifications RR-F-191/4.
H. Miscellaneous steel fittings and hardware for use with zinc-coated or aluminum-coated steel fabric shall be of commercial grade steel or better quality, wrought of cast as appropriate to the article, and sufficient in strength to provide a balanced design when used in conjunction with fabric, posts, and wires of the quality specified herein. All steel fittings and hardware shall be protected with a zinc coating applied in conformance with ASTM A153. Miscellaneous aluminum fittings for use with aluminum alloy fabric shall be wrought or cast aluminum alloy. Barbed wire support arms shall withstand a load of 250 pounds (113 kg) applied vertically to the outermost end of the arm.
I. Concrete shall be of a commercial grade with a minimum 28-day compressive strength of 2,500 psi.
J. Each roll of fabric shall carry a tag showing the kind of base metal (steel, aluminum, or aluminum alloy number), kind of coating, the gauge of the wire, the length of fencing in the roll, and the name of the manufacturer. Posts,

wire, and other fittings shall be identified as to manufacturer, kind of base metal (steel, aluminum, or aluminum alloy number), and kind of coating.

PART 3 - EXECUTION

3.1 CLEARING FENCE LINE

A. All trees, brush, stumps, logs, and other debris which would interfere with the proper construction of the fence in the required location shall be removed a minimum width of 2 feet (0.6m) on each side of the fence centerline before starting fencing operations. The material removed and disposed of shall not constitute a pay item and shall be considered incidental to fence operations.

3.2 INSTALLING POSTS

A. All posts shall be set in concrete at the required dimension and depth and at the spacing shown on the plans.
B. The concrete shall be thoroughly compacted around the posts by tamping or vibrating and shall have a smooth finish slightly higher than the ground and sloped to drain away from the posts.
C. All posts shall be set plumb and to the required grade and alignment. No materials shall be installed on the posts, nor shall the posts be disturbed in any manner within 7 days after the individual post footing is completed.
D. Should rock be encountered at a depth less than the planned footing depth, a hole 2 inches (50mm) larger than the greatest dimension of the posts shall be drilled to a depth of 12 inches (300mm). After the posts are set, the remainder of the drilled hole shall be filled with grout, composed of one part Portland cement and two parts mortar sand. Any remaining space above the rock shall be filled with concrete in the manner described above.
E. In lieu of drilling, the rock may be excavated to the required footing depth. No extra compensation shall be made for rock excavation.

3.3 INSTALLING TOP RAILS

A. The top rail shall be continuous and shall pass through the post tops. The coupling used to join the top rail lengths shall allow for expansion.

3.4 INSTALLING BRACES

A. Horizontal brace rails, with diagonal truss roads and turnbuckles, shall be installed at all terminal posts.

3.5 INSTALLING FABRIC

A. The wire fabric shall be firmly attached to the posts and braced in the manner shown on the plans. All wire shall be stretched taut and shall be installed to the required elevations. The fence shall generally follow the contour of the ground, with the bottom of the fence fabric no less than 1 inch (25mm) or more than 4 inches (100mm) from the ground surface. Grading shall be performed where necessary to provide a neat appearance.
B. At locations of small natural swales or drainage ditches and where it is not practical to have the fence conform to the general contour of the ground surface, longer posts may be used and multiple strands of barbed wire stretched thereon to span the opening below the fence. The vertical clearance between strands of barbed wire shall be 6 inches (150mm) or less.

3.6 ELECTRICAL GROUNDS:

A. Electrical grounds shall be constructed where a power line passes over the fence or at 500-foot (150mm) intervals. The ground shall be accomplished with a copper clad rod 8 feet (2.4m) long and a minimum of 5/8 inch (15mm) in diameter driven vertically until the top is 6 inches (150mm) below the ground surface. A No. 6 solid copper conductor shall be clamped to the rod and to the fence in such a manner that each element of the fence is grounded. Installation of ground rods shall not constitute a pay item and shall be considered incidental to fence construction.

END OF SECTION

SECTION 03310
STRUCTURAL CONCRETE

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for cast-in-place concrete.

1.2 MEASUREMENT AND PAYMENT

A. Where there is not a separate item listed on the Unit Price Schedule for work in this Section, no separate measurement and payment are made. Include cost for work under this Section in the related item listed on the Unit Price Schedule.
B. Where an item is listed on the Unit Price Schedule, Measurement and Payment is as noted on the Unit Price Schedule.
C. Refer to Section 01270 – Measurement and Payment for unit price procedures.

1.3 REFERENCE

A. ACI 117 – Tolerances for Concrete Construction and Materials.
B. ACI 211.1 – Selecting Proportions for Normal, Heavyweight and Mass Concrete.
C. ACI 214.3R – Simplified Version of the Recommended Practice for Evaluation of Strength Test Results of Concrete.
D. ACI 302.1R – Concrete Floor and Slab Construction.
E. ACI 304R – Measuring, Mixing, Transporting, and Placing Concrete.
F. ACI 305R – Hot Weather Concreting.
G. ACI 308 – Curing Concrete.
H. ACI 309R – Consolidation of Concrete.
I. ACI 315 – Detailing Reinforced Concrete Structures.
J. ACI 318 – Building Code Requirements for Reinforced Concrete.
K. ASTM A 82 – Steel Wire, Plain, for Concrete Reinforcement.
L. ASTM A 185 – Steel Welded Wire Reinforcement, Plain, for Concrete.
M. ASTM A 615 – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
N. ASTM A 767 – Zinc-coated (Galvanized) Bars for Concrete Reinforcement.
O. ASTM A 775 – Epoxy-Coated Steel Reinforcing Bars.
P. ASTM A 884 – Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
Q. ASTM C 33 – Concrete Aggregates.
R. ASTM C 94 – Ready-Mixed Concrete.
S. ASTM C 138 – Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
T. ASTM C 143 – Slump of Hydraulic-Cement Concrete.

U. ASTM C 150 – Portland Cement.
V. ASTM C 172 – Sampling Freshly Mixed Concrete.
W. ASTM C 173 – Air Content of Freshly Mixed Concrete by Volumetric Method.
X. ASTM C 231 – Air Content of Freshly Mixed Concrete by Pressure Method.
Y. ASTM C 260 – Air-Entraining Admixtures for Concrete.
Z. ASTM C 309 – Liquid Membrane-Forming Compounds for Curing Concrete.
AA. ASTM C 494 – Chemical Admixtures for Concrete.
BB. ASTM C 595 – Blended Hydraulic Cements.
CC. ASTM C 685 – Concrete Made by Volumetric Batching and Continuous Mixing.
DD. ASTM C 1077 – Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
EE. CPMB-100 – Concrete Plant Standards, Part 2 – Plant Control Systems.
FF. CRSI – Placing Reinforcing Bars.
GG. CRSI MSP-1 – Manual of Standard Practice.

1.4 SUBMITTALS

A. Refer to Section 01330 – Submittal Procedures.
B. Submit proposed mix design and strength test data for each type and strength of concrete used.
C. Submit laboratory reports prepared by an independent testing laboratory verifying that materials used comply with the requirements of this Section.
D. Provide manufacturer's mill certificates for reinforcing steel for inspection in the field. Steel not accompanied by manufacturer's mill certificates will not be approved. Provide specimens for testing when required by the Engineer.
E. Provide batch tickets showing mix design number and the information required by ASTM C 94 for ready-mixed concrete delivered to the site. Provide batch tickets showing the information required by ASTM C 685 for concrete produced by continuous mixing.
F. Submit certification from concrete supplier that materials and equipment used to produce and deliver concrete comply with this Section.
G. Submit Shop Drawings in accordance with ACI 315 and ACI 318, when required, showing reinforcement type, quantity, size, length, location, spacing, bending, splicing, support, fabrication details and other pertinent information.
H. For waterstops, submit product information, including manufacturer's description literature, installation instructions and specifications.
I. Submit curing procedures including materials and equipment to be used.

1.5 HANDLING AND STORAGE

A. Reinforcing Steel: Store reinforcing steel to protect it from damage and

formation of excessive rust. Protect epoxy-coated steel from damage to the coating.

PART 2 – PRODUCTS

2.1 CONCRETE MATERIALS

A. Cementitious Material:
   1. Portland Cement: ASTM C 150, TypeI/II or II, unless the use of Type III is authorized by the Engineer; or ASTM C 595, Type IP. For concrete in contact with sewage, use Type II cement.
   2. When aggregates are potentially reactive with alkalis in cement, use cement not exceeding 0.6 percent alkali content in the form of Na_2O + 0.658 K_2O.

B. Water: Clean, free from harmful amounts of oils, acids, alkalis or other deleterious substances and meeting requirements of ASTM C 94.

C. Aggregate:
   1. Coarse Aggregate: ASTM C 33. Unless otherwise indicated, use the following ASTM standard sizes: No. 357 or No. 467; No. 57 or No. 67, No. 7. Maximum size: Not larger than 1/5 of the minimum dimension between sides of forms, nor larger than 3/4 of minimum clear spacing between reinforcing bars.
   2. Fine Aggregate: ASTM C 33.
   3. Determine the potential reactivity of fine and coarse aggregate in accordance with the Appendix to ASTM C 33.

D. Air Entraining Admixtures: ASTM C 260.

E. Chemical Admixtures:
   1. Water Reducers: ASTM C 494, Type A.
   2. Water Reducer and Retarder: ASTM C 494, Type D.
   3. High Range Water Reducer (Superplasticizer): ASTM C 494, Types F and G.

F. Prohibited Admixtures: Admixtures containing calcium chloride, thiocyanate, or materials that contribute free chlorine ions in excess of 0.1 percent by weight of cement.

G. Reinforcing Steel:
   1. Use new billet steel bars conforming to ASTM A 615, ASTM A 767, or ASTM A 775, grade 40 unless otherwise shown on Plans. Use deformed bars except where smooth bars are specified. When placed in work, keep steel free of dirt, scale, loose or flaky rust, paint, oil or other harmful materials.
   2. Where shown, use welded wire fabric with wire conforming to ASTM A 185 or ASTM A 884. Supply the gauge and spacing shown, with longitudinal and transverse wires electrically welded together at points of intersection with welds strong enough not to be broken during handling or placing.
   3. Wire: ASTM A 82. Use 16-1/2 gauge minimum for tie wire unless otherwise shown on the Plans.

H. Curing Compounds: Liquid membrane-forming compounds conforming to ASTM C 309, with white or other heat reflecting pigment.

2.2 FORMWORK MATERIALS

A. Lumber and Plywood: Seasoned and of good quality, free from loose or unsound knots, knot holes, twists, shakes, decay and other imperfections which would affect strength or impair the finished surface of concrete. Use S4S lumber for facing and sheathing.
B. Formwork: For exposed concrete indicated to receive rubbed finish, provide form or form-lining surfaces free of irregularities.
C. Form Ties: Metal or fiberglass of approved type with tie holes not larger than 7/8 inch in diameter.
D. Metal Forms: Clean and in good condition, free from dents and rust, grease or other foreign material that tend to mar or discolor concrete, in a gauge and condition capable of supporting concrete and construction loads without significant distortion. Countersink bolt and rivet heads on facing sides. Use only metal forms which present a smooth surface and which line up properly.

2.3 PRODUCTION METHODS

A. Use either ready-mixed concrete conforming to requirements of ASTM C 94 or concrete produced by volumetric batching and continuous mixing in accordance with ASTM C 685.

2.4 MEASUREMENT OF MATERIALS

A. Measure dry materials by weight, except volumetric proportioning may be used when concrete is batched and mixed in accordance with ASTM C 685.
B. Measure water and liquid admixtures by volume.

2.5 DESIGN MIX

A. Use design mixes prepared by a certified testing laboratory in accordance with ASTM C 1077 and conforming to requirements of this Section.
B. Proportion concrete materials based on ACI 211.1 to comply with durability and strength requirements of ACI 318, Chapters 4 and 5, and this Section.
C. Proportioning on the basis of field experience or trial mixtures in accordance with the requirements of Section 5.3 of ACI 318 may be used, if approved by the Engineer.
D. Classification:

Type	Minimum 28-Day Compressive Strength (Lbs./sq.in.)	Maximum W/C Ratio	Air Content (Percent)	Consistency Range in Slump (Inches)	Cementitious Content (Lbs./cy)
Structural	4000	0.45			
Non-Structural	3000	0.60			

E. Determine air content in accordance with ASTM C 138, ASTM C 173 or ASTM C 231.

F. Use of Concrete Types: Use types of concrete as indicated on the Plans Unless indicated otherwise on the Plans or Specifications, use non-structural, unreinforced concrete for pipe plugs, seal slabs, thrust blocks, trench dams and concrete fill; use structural, reinforced concrete for all other applications.

PART 3 – EXECUTION

3.1 FORMS AND SHORING

A. Install forms in accordance with ACI 304R.

B. Provide mortar-tight forms sufficient in strength to prevent bulging between supports. Set and maintain forms to lines designated such that finished dimensions of structures are within the tolerances specified in ACI 117. Construct forms to permit removal without damage to concrete. Provide adequate cleanout openings. Before placing concrete, remove extraneous matter from within forms.

C. Unless otherwise indicated, form outside corners and edges with triangular 3/4-inch chamfer strips (measured on sides).

D. Remove metal form ties to depth of at least 3/4 inch from surface of concrete. Do not use pipe spreaders. Remove spreaders which are separate from forms as concrete is being placed.

E. Immediately before the concrete is placed, wet surface of forms which will come in contact with concrete.

3.2 PLACING REINFORCEMENT

A. Place reinforcing steel as shown on the Plans. Secure steel in position in forms to prevent misalignment. Welding of reinforcing steel is not permitted unless noted on the Plans. Maintain reinforcing steel in place using approved concrete, hot-dip galvanized metal or plastic chairs and spacers. Place reinforcing steel in accordance with CRSI Publication “Placing Reinforcing Bars.” Request inspection of reinforcing steel by the Engineer before concrete is placed.

B. Minimum spacing center-to-center of parallel bars: 2-1/2 times nominal bar diameter. Minimum cover measured from surface of concrete to face of reinforcing bar unless shown otherwise on the Plans: 2 inches.

C. Detail bars in accordance with ACI 315. Provide reinforcing steel fabricated in accordance with CRSI Publication MSP-1, “Manual of Standard Practice.” Bend reinforcing steel to required shape while steel is cold. Do not overbend steel.
D. Provide splice and development length of bars as shown on Plans. Stagger splices or locate at points of low tensile stress.

3.3 EMBEDDED ITEMS

A. Install conduit and piping as shown on the Plans. Locate and fasten conduit, piping and other embedded items in forms.

3.4 BATCHING, MIXING AND DELIVERY OF CONCRETE

A. Measure, batch, mix and deliver ready-mixed concrete in accordance with ASTM C 94 and ACI 304R. Produce ready-mixed concrete using an automatic batching system as described in CPMB-100 Concrete Plant Standards, Part 2 – Plant Control Systems.
B. Measure, mix and deliver concrete produced by volumetric batching and continuous mixing in accordance with ASTM C 685.
C. Maintain concrete workability without segregation of material and excessive bleeding. Obtain approval of the Engineer before adjustment and change of mix proportions.
D. Do not exceed the maximum water-cement ratio of the approved mix design. If all water allowed by the water-cement ratio has not been added at the start of mixing, the remaining water may be added no later than the time of delivery. Addition of water should be in accordance with ASTM C 94.
E. Do not mix concrete when the air temperature is at or below 40 degrees F and falling. Concrete may be mixed when temperature is 35 degrees F and rising. Take temperature readings in the shade, away from artificial heat. Protect concrete from temperatures below 32 degrees F until the concrete has cured for a minimum of 3 days at 70 degrees F or 5 days at 50 degrees F.
F. Conform to ACI 305R for batching concrete when air temperature is above 90 degrees F.
G. Clean, maintain and operate equipment so that it thoroughly mixes material.
H. Mixing methods other than as described above shall be used only when approved by the Engineer.

3.5 PLACING CONCRETE

A. Place and consolidate in accordance with ACI 304R and ACI 309R.
B. Give at least 24 hours advance notice to the Engineer to permit inspection of forms, reinforcing steel, embedded items and other preparations for placing concrete. Place no concrete prior to the Engineer’s inspection.

C. Schedule concrete placing to permit completion of finishing operations in daylight hours. However, if necessary to continue after daylight hours, light the site as required. If rainfall occurs after placing operations are started, provide covering to protect the work.
D. Use troughs, pipes and chutes lined with approved metal or synthetic material. Place concrete without allowing segregation. Keep chutes, troughs and pipes clean and free from coatings of hardened concrete. Do not allow aluminum material to be in contact with concrete.
E. Limit free fall of concrete to prevent segregation. Do not deposit large quantities of concrete at one location so that running or working concrete along forms is required. Do not jar forms after concrete has taken on initial set; do not place any strain on projecting reinforcement or anchor bolts.
F. Use tremies for placing concrete in walls and similar narrow or restricted locations. Use tremies made in sections, provide in several lengths, so that outlet may be adjusted to proper height during placement operations.
G. When the weather is hot enough to cause the concrete temperature to exceed 90 degrees F, employ means, such as pre-cooling aggregates and mixing water, using ice or placing at night, to maintain concrete temperature below 90 degrees F.
H. Consolidate each layer of concrete with concrete spading implements and mechanical vibrators of type and adequate number for the size of placement. Apply vibrators to concrete immediately after depositing. Do not use vibrators to aid lateral flow of concrete. Do not over-consolidate concrete.
I. Handling and Placing Concrete: Conform to ACI 302.1R, ACI 304R and ACI 309R.

3.6 CURING AND REMOVAL OF FORMS AND SHORING

A. Comply with ACI 308. Cure by preventing loss of moisture and rapid temperature change for a period of 7 days when Type I/II, II or IP cement has been used and for 3 curing days when Type III cement has been used.
B. Start curing as soon as free water has disappeared from the concrete surface after placing and finishing.
C. A curing day is any calendar day in which the temperature is above 50 degrees F for at least 19 hours. Colder days may be counted if air temperature adjacent to concrete is maintained above 50 degrees F. In continued cold weather, when artificial heat is not provided, removal of forms and shoring may be permitted at the end of calendar days equal to twice the required number of curing days.
D. Formed surfaces not requiring rubbed-finished surface:
    1. Cure by leaving forms in place for the full cure period or forms may be removed after 2 days and curing compound applied. Keep wood forms wet during the curing period. Add water as needed for other types of forms.

2. Soffit Forms: Leave soffit forms and shores in place until concrete has reached the specified design strength unless otherwise directed by the Engineer.

E. Rubbed Finish:
   1. At formed surfaces requiring rubbed finish, remove forms as soon as practicable without damaging the surface. Remove forms from surfaces requiring rubbing only as rapidly as rubbing operation progresses. Remove forms from vertical surfaces not requiring rubbed finish when concrete has aged for the required number of curing days.
   2. After rubbed-finish operations are complete, continue curing formed surfaces by using either approved curing/sealing compounds or moist cotton mats until normal curing period is complete.

F. Unformed Surfaces: Cure with approved membrane curing compound method in accordance with ASTM C 309.
   1. After concrete has received a final finish and surplus water sheen has disappeared, immediately seal surface with a uniform coating of approved curing compound, applied at the rate of coverage recommended by manufacturer or as directed by the Engineer. Provide uniform coverage at a minimum rate of 1 gallon per 180 square feet of area.
   2. Thoroughly agitate the compound during use and apply by means of approved mechanical power pressure sprayers equipped with atomizing nozzles. For application on small miscellaneous items, hand- powered spray equipment may be used. Prevent loss of compound between nozzle and concrete surface during spraying operations.
   3. Do not apply compound to a dry surface. If concrete surface has become dry, thoroughly moisten surface immediately prior to application. At locations where coating shows discontinuities, pinholes or other defects, or if rain falls on a newly coated surface before film has dried sufficiently to resist damage, apply an additional coat of compound at the specified rate of coverage.

3.7 FINISHING

A. Patch honeycomb, minor defects and form tie holes in concrete surfaces with cement mortar mixed 1 part cement to 2 parts fine aggregate. Repair defects by removing unsatisfactory material and replacing with new concrete, keyed and bonded to existing concrete. Finish to provide a uniform surface between patches and existing concrete.

B. Apply a broomed finish to all exposed surfaces of interceptor structure inlets and channel lining. Apply broomed finish in a single, continuous stroke perpendicular to flow to produce a uniform surface.

C. Apply a rubbed finish to all exposed surfaces unless directed otherwise on the Plans or by the Engineer. After pointing has set sufficiently, wet the surface and perform first surface rubbing with No. 16 carborundum

stone or approved equal. Do not add cement to form surface paste. Rub sufficiently to bring surface to paste; to remove form marks and projections; and to produce a smooth, dense surface. Spread or brush material, which has been ground to paste, uniformly over surface and allow to reset. In preparation for final acceptance, clean surfaces and perform final finish rubbing with No. 30 carborundum stone or approved equal. After rubbing, allow paste on the surface to re-set; then wash surface with clean water. Leave structure with a clean, neat and uniform finish.

3.8 DEFECTIVE WORK

A. Remove and repair defective work at no cost to the District.
B. If concrete surface is bulged, uneven, or shows honeycombing or form marks which cannot be repaired satisfactorily through patching, remove and replace the defective work as directed by the Engineer.
C. Replace or repair pitted or washed concrete as directed by the Engineer.

3.9 TESTING AND INSPECTION

A. Refer to Section 01457 – Construction Tests and Inspection.

3.10 PROTECTION

A. Refer to Section 02316 – Structural Excavating and Backfilling.
B. Provide for protection of freshly placed concrete against damage from precipitation by having sufficient material on-site to protect finished surface.

3.11 MATERIAL DISPOSAL

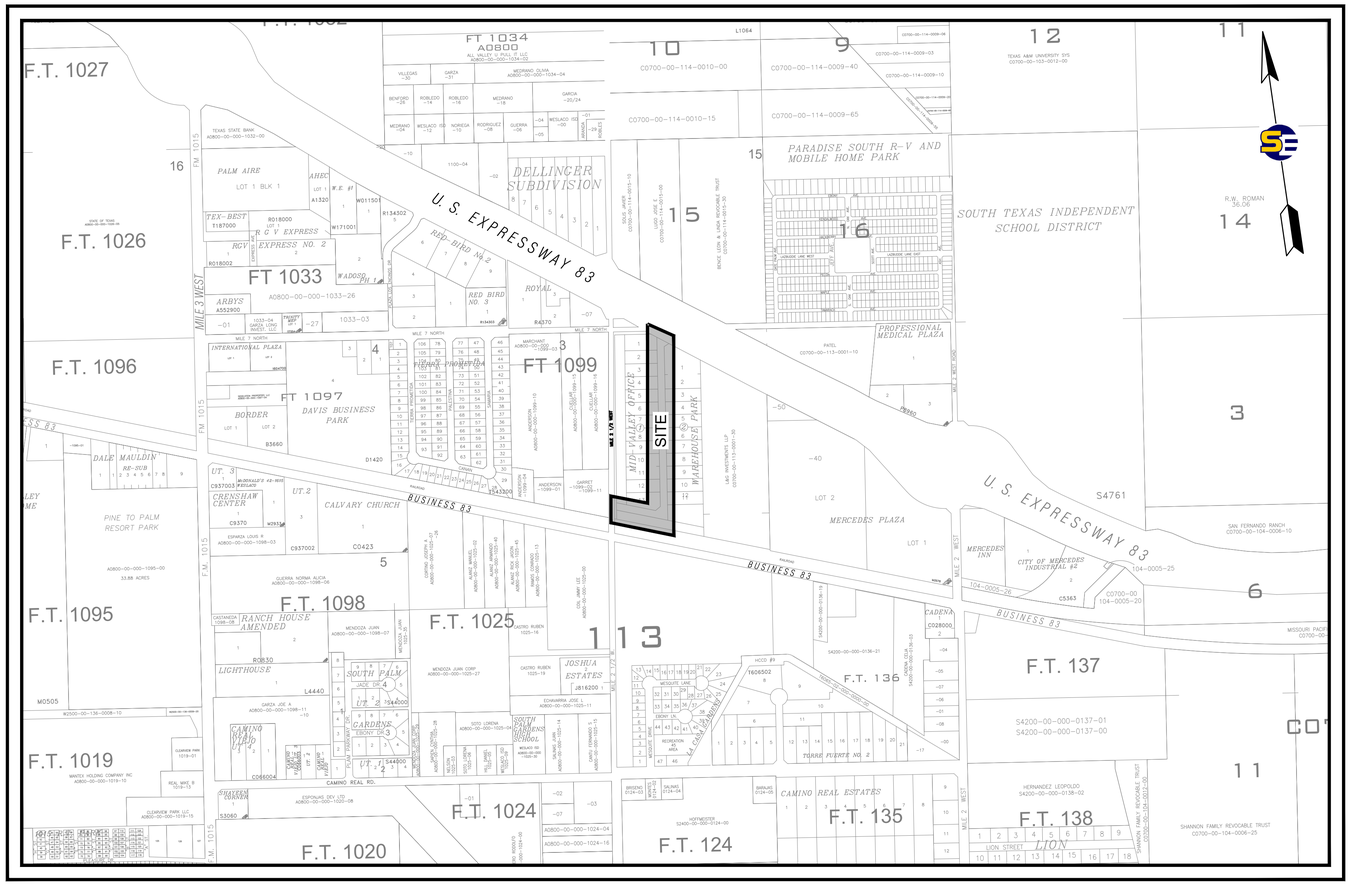
A. Refer to Section 02120 – Material Disposal.

END OF SECTION

CONSTRUCTION PLANS
FOR
DACOTA AVENUE
ROADWAY IMPROVEMENTS
MERCEDES, TEXAS

Texas 811
Know what's below.
Call before you dig.

city of mercedes
It Starts Here!



LOCATION MAP
SCALE 1" = 500'

INDEX OF PLANS

STATE OF TEXAS
OMAR CANO
120081
LICENSED
PROFESSIONAL ENGINEER

P.E
SIGNATURE

4/22/2025
DATE

SUPREME ENGINEERING

SUPREME ENGINEERING, PLLC
CONSULTING ENGINEERS
ENGINEERING FIRM F-21135
SURVEYING FIRM No. 10194901
135 PASEO DEL PRADO, STE. 7
EDINBURG, TX 78539
(956) 403-1314

DACOTA AVE.
ROADWAY IMPROVEMENTS

GENERAL NOTES

CONTRACTOR'S PRELIMINARY MATTER

1. THE INSTRUCTIONS GIVEN BY THE NOTES ON THIS SHEET DO NOT CONSTITUTE SEPARATE PAY ITEMS UNLESS SPECIFICALLY INCLUDED IN THE PROPOSAL FORM.
2. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS LISTED IN THE CONTRACT DOCUMENTS & THE STANDARD DETAILS INCLUDED OR REFERENCED IN THE PLANS.
3. ALL MATERIALS, WORKMANSHIP AND IMPROVEMENTS TO BE IN ACCORDANCE WITH ALL LOCAL CODES, INCLUDING THE STANDARD CONSTRUCTION DETAILS AND TECHNICAL SPECIFICATIONS FROM CITY OF MERCEDES, HIDALGO & CAMERON COUNTY IRRIGATION DISTRICT NO. 9 AND ALL OTHER GOVERNING AGENCIES.
4. ANY CHANGES OR REVISIONS TO THESE PLANS MUST BE SUBMITTED TO THE ENGINEER FOR REVIEW & APPROVAL PRIOR TO IMPLEMENTATION.
5. THE CONTRACTOR SHALL VERIFY ALL HORIZONTAL AND VERTICAL DIMENSIONS AND THE LOCATION OF EXISTING AND PROPOSED PROJECT ELEMENTS PRIOR TO CONSTRUCTION. ANY DISCREPANCIES BETWEEN PLAN DIMENSIONS AND ACTUAL FIELD CONDITIONS SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE ENGINEER. NO CONSTRUCTION ACTIVITY SHALL CONTINUE WITHOUT APPROVAL FROM THE ENGINEER.
6. THE LOCATIONS OF EXISTING UTILITIES SHOWN ON THESE PLANS ARE APPROXIMATE & WERE OBTAINED FROM EXISTING RECORDS & VISIBLE EVIDENCE ON THE GROUND. IT IS EXPECTED THAT THERE MAY BE SOME DISCREPANCIES & OMISSIONS IN THE LOCATIONS & QUANTITIES OF EXISTING UTILITIES & STRUCTURES SHOWN. THE CONTRACTOR SHALL VERIFY THE LOCATION & DEPTH OF ALL KNOWN EXISTING UTILITIES SUFFICIENTLY IN ADVANCE OF CONSTRUCTION SO THAT CONFLICTS CAN BE AVOIDED. WHEN AN EXISTING UTILITY OR UNDERGROUND PIPELINE IS ENCOUNTERED, THAT WAS PREVIOUSLY NOT LOCATED OR INCORRECTLY LOCATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER & THE APPROPRIATE UTILITY COMPANY TO OBTAIN PROCEDURAL INSTRUCTIONS. THE CONTRACTOR SHALL COOPERATE WITH THE APPROPRIATE UTILITY COMPANY IN MAINTAINING ACTIVE SERVICES IN OPERATION.
7. EXISTING PAVING, BUILDINGS & OTHER ITEMS SHOWN ON PLANS, BUT NOT SPECIFICALLY RELATED TO THE WORK OF THE CONTRACTOR, ARE FOR INFORMATIONAL PURPOSES ONLY & MAY BE SHOWN TO A LESSER ACCURACY OR TO A LESSER DEGREE OF DETAIL THAN THE REMAINDER OF THE PLANS.
8. ELEVATIONS SHOWN ON THE PLAN & FOLLOWED BY A "±" SYMBOL, INDICATE THAT THE ENGINEER'S INTENTION IS TO MATCH THE EXISTING GRADE OF THE TIE-IN PAVEMENT OR STRUCTURE. THE CONTRACTOR SHALL VERIFY THE ELEVATION AT THESE LOCATIONS & NOTIFY THE ENGINEER IMMEDIATELY, IF THE PLAN ELEVATION VARIES SIGNIFICANTLY.
9. WHERE ELEVATIONS ARE SHOWN ON THE PLAN AS "TBD", IT INDICATES THAT THE ELEVATIONS ARE TO BE DETERMINED IN THE FIELD BY THE CONTRACTOR. THIS NOTATION IS TYPICALLY USED FOR BURIED UTILITIES WHO'S ELEVATION COULD NOT BE DETERMINED BY AS-BUILT PLANS, OR PROBING DURING THE DESIGN PHASE OF THE PROJECT. THE CONTRACTOR SHALL EXCAVATE THE UTILITY, DETERMINE THE ELEVATION, AND NOTIFY THE ENGINEER IMMEDIATELY, SO THAT ADJUSTMENTS MAY BE MADE TO THE DESIGN PRIOR TO ORDERING MATERIALS OR SCHEDULING THE WORK.
10. THE OWNER/ENGINEER RESERVE THE RIGHT TO MAKE REASONABLE ADJUSTMENTS IN LINE AND/OR GRADE IN ORDER TO AVOID CONFLICTS WITH NON-RELOCATABLE STRUCTURES OR OTHER UTILITIES. THE CONTRACTOR AGREES TO MAKE SUCH REASONABLE ADJUSTMENTS AT NO COST TO OWNER OR ENGINEER.
11. EXISTING ELECTRICAL LINES ARE LOCATED CLOSE TO THE PROJECT. THE ATTENTION OF THE CONTRACTOR IS DIRECTED TO THE STATE LAW (VERNON'S ANNOTATED TEXAS STATUTES, ARTICLE 1436(C)) CONCERNING OPERATIONS IN THE VICINITY OF ELECTRICAL LINES & THE NEED FOR EFFECTIVE PRECAUTIONARY MEASURES.
12. THE MUNICIPALITY OR WATER CORPORATION SHALL PERFORM ALL OPERATION INVOLVING OPENING & CLOSING OF VALVES ON EXISTING PUBLIC WATER MAINS. THE CONTRACTOR SHALL VERIFY MAINS ARE DEAD BEFORE PERFORMING WORK ON EXISTING MAINS.

CONTRACTOR'S NOTIFICATION REQUIREMENTS

1. THE CONTRACTOR SHALL GIVE A MINIMUM OF 72 HOURS NOTICE TO THE OWNER, ENGINEER & PERSONS IN CHARGE OF PRIVATE & PUBLIC UTILITIES AFFECTED BY HIS OPERATIONS PRIOR TO COMMENCEMENT OF WORK.
2. AT LEAST 72 HOURS PRIOR TO COMMENCING ANY ACTIVITY FOR A TCEQ REGULATED SANITARY SEWER AND/OR WATER COLLECTION SYSTEM(S), THE CONTRACTOR SHALL NOTIFY THE LOCAL TCEQ'S REGIONAL OFFICE, IN WRITING, OF THE DATE ON WHICH CONSTRUCTION WILL BEGIN.
3. PRIOR TO BEGINNING CONSTRUCTION THE CONTRACTOR IS REQUIRED TO NOTIFY TEXAS 811 BEFORE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY.
4. THE CONTRACTOR SHALL NOTIFY LOCAL EMERGENCY SERVICES (I.E. FIRE, E.M.S. & POLICE) OF ANY CONSTRUCTION ACTIVITIES THAT WOULD AFFECT THE NORMAL FLOW OF TRAFFIC.
5. THE CONTRACTOR SHALL GIVE A MINIMUM OF 48 HOURS NOTICE TO THE ENGINEER & AUTHORIZED TESTING LABORATORY PRIOR TO REQUIRED TESTS.
6. THE CONTRACTOR SHALL GIVE A MINIMUM OF 48 HOURS NOTICE TO THE ENGINEER & THE OWNER PRIOR TO TESTING OF SANITARY SEWER & WATER LINES. INSPECTION BY THE MUNICIPALITY AND/OR WATER CORPORATION IS REQUIRED FOR ALL TESTING OF SANITARY SEWER & WATER LINES.

CONTRACTOR'S RESPONSIBILITIES

1. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER & THE ENGINEER OF ANY DISCREPANCIES, ERRORS, OR OMISSIONS, DISCOVERED IN THE FIELD OR ON THE PLANS.
2. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER & THE ENGINEER, VERBALLY & IN WRITING, OF ANY FUEL OR TOXIC MATERIAL SPILLS ONTO THE PROJECT/CONSTRUCTION AREA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSING OF FUELS, WASTE MATERIALS & CONTAMINATED EXCAVATIONS IN A LEGALLY APPROVED MANNER.
3. THE CONTRACTOR SHALL COORDINATE INTERRUPTIONS OF ALL UTILITIES & SERVICES WITH APPLICABLE UTILITY COMPANY, OWNER & TENANT. ALL WORK SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE APPLICABLE UTILITY COMPANY OR AGENCY INVOLVED.
4. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING INGRESS & EGRESS FOR ALL PUBLIC & PRIVATE FACILITIES AT ALL TIMES & FOR ALL WEATHER CONDITIONS, UNLESS OTHERWISE INDICATED ON THE PLANS OR APPROVED BY THE ENGINEER.
5. THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE & MAINTAIN ALL NECESSARY WARNING & SAFETY DEVICES (FLASHING LIGHTS, FLAG MEN, BARRICADES, SIGNS, ETC.) TO PROTECT THE PUBLIC SAFETY & HEALTH UNTIL THE WORK HAS BEEN COMPLETED & ACCEPTED BY THE ENGINEER & OWNER. ALL BARRICADING SHALL BE DONE IN COMPLIANCE WITH THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.
6. THE CONTRACTOR SHALL MAINTAIN ALL REGULATORY SIGNS DURING THE CONSTRUCTION PERIOD.
7. THE CONTRACTOR SHALL ASSURE HIMSELF THAT ALL CONSTRUCTION PERMITS HAVE BEEN OBTAINED PRIOR TO COMMENCEMENT OF WORK. REQUIRED PERMITS THAT CAN ONLY BE ISSUED TO CONTRACTOR ARE TO BE OBTAINED AT THE CONTRACTOR'S EXPENSE.
8. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING & MAINTAINING SANITARY FACILITIES ON THIS PROJECT FOR EMPLOYEES.
9. THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE FLOW IN DITCHES & STORM SEWERS AT ALL TIMES.
10. THE CONTRACTOR IS RESPONSIBLE FOR DISPOSING OF ALL EXCESS CONSTRUCTION & WASTE MATERIALS. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE LOCAL, STATE, & FEDERAL REQUIREMENTS REGARDING HANDLING & DISPOSAL OF EXCESS & WASTE MATERIAL. THE CONTRACTOR SHALL PAY PARTICULAR ATTENTION TO AREAS AROUND CONCRETE PAVEMENT & STRUCTURES TO ENSURE THAT CONSTRUCTION DEBRIS IS REMOVED & PROPERLY DISPOSED OF PRIOR TO BACKFILLING & THE APPLICATION OF TOPSOIL. EXCESS SOIL, ROCK OR SPOIL MATERIAL SHALL BE REMOVED FROM THE PROJECT SITE & DISPOSED OF BY THE CONTRACTOR AT HIS EXPENSE.
11. ALL CONSTRUCTION OPERATIONS SHALL BE ACCOMPLISHED IN ACCORDANCE WITH APPLICABLE REGULATIONS OF THE U.S. OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION. COPIES OF OSHA STANDARDS MAY BE PURCHASED FROM THE U.S. GOVERNMENT PRINTING OFFICE. INFORMATION & RELATED REFERENCE MATERIALS MAY BE OBTAINED FROM OSHA OFFICE.
12. DESIGN INSTALLATION, MAINTENANCE, & INSPECTION OF TRENCH SAFETY SYSTEMS SHALL BE IN ACCORDANCE WITH THE PROVISIONS OF EXCAVATIONS, TRENCHING & SHORING, FEDERAL OCCUPATION SAFETY & HEALTH ADMINISTRATION (OSHA) STANDARDS.
13. THE CONTRACTOR SHALL TAKE ALL DUE PRECAUTIONS TO PROTECT EXISTING FACILITIES (INCLUDING BUILDINGS, STRUCTURES, ROADWAYS, PARKING AREAS, DRIVEWAYS, UTILITIES, ETC.) FROM DAMAGE. ANY DAMAGE TO EXISTING FACILITIES INCURRED AS A RESULT OF THE CONSTRUCTION OPERATIONS ARE TO BE REPAIRED IMMEDIATELY BY THE CONTRACTOR TO A CONDITION SIMILAR OR EQUAL TO THAT EXISTING BEFORE THE DAMAGE WAS DONE. REPAIRS SHALL BE MADE TO THE SATISFACTION OF THE FACILITY OWNER & THE ENGINEER AT THE CONTRACTOR'S EXPENSE.
14. THE CONTRACTOR SHALL LOCATE, PROTECT & MAINTAIN BENCHMARKS, MONUMENTS & CONTROL POINTS. THE CONTRACTOR SHALL RE-ESTABLISH DISTURBED OR DESTROYED ITEMS AT HIS EXPENSE. THE RE-ESTABLISHMENT SHALL BE PERFORMED UNDER THE DIRECTION OF A TEXAS REGISTERED PROFESSIONAL LAND SURVEYOR.
15. WATER NECESSARY FOR CONSTRUCTION SHALL BE PROVIDED & PAID FOR BY THE CONTRACTOR. THE CONTRACTOR SHALL ARRANGE FOR A METERED CONNECTION(S) & SHALL PROVIDE THE PROPER EQUIPMENT TO PREVENT CROSS-CONNECTION.
16. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY CHARGES ASSOCIATED WITH TEMPORARILY SECURING OR TEMPORARILY RELOCATING POWER POLES THAT INTERFERE WITH THE CONSTRUCTION OPERATIONS. THIS DOES NOT APPLY TO THE PERMANENT RELOCATION OF POWER POLES THAT ARE PHYSICALLY IN CONFLICT WITH THE PROPOSED IMPROVEMENTS.
17. THE CONTRACTOR SHALL CLEAR STREETS, SIDEWALKS, DRIVEWAYS, & PARKING LOTS OF ALL CONSTRUCTION MATERIALS, EQUIPMENT, TRAFFIC CONTROL DEVICES, DIRT, & DEBRIS CAUSED BY CONSTRUCTION AT THE END OF EACH CONSTRUCTION PERIOD. ALL OPEN EXCAVATIONS & PITS MUST BE BARRICADED, FENCED, OR PLATED OVER WHEN NOT IN USE.
18. GRAVITY MAINS SHALL BE INSTALLED IN THE UPSTREAM DIRECTION, BEGINNING AT THE LOWEST POINT IN THE SYSTEM. THE CONTRACTOR IS REQUIRED TO VERIFY THE LOCATION, ELEVATION & CONDITION OF THE ALL CONNECTION POINTS (I.E. UPSTREAM AND DOWNSTREAM) & INVESTIGATE ALL POTENTIAL CONFLICTS WITH EXISTING UNDERGROUND UTILITIES, PRIOR TO BEGINNING THE NEW UTILITY INSTALLATION.
19. UTILITY MAINS MUST BE INSTALLED WITH ADEQUATE COVER TO PREVENT FLOATATION & TO SUPPORT CONSTRUCTION LOADS. THE CONTRACTOR SHALL ENSURE THAT ADEQUATE COVER IS MAINTAINED OVER THE UTILITY DURING CONSTRUCTION. IF ADEQUATE COVER CANNOT BE MAINTAINED, THE CONTRACTOR SHALL UTILIZE CEMENT STABILIZED BACKFILL AND/OR ADDITIONAL TEMPORARY OVERBURDEN TO ACHIEVE THE SAME GOALS.

CONTRACTOR'S RESPONSIBILITIES (CONTINUE)

20. THE CONTRACTOR SHALL PLACE & COMPACT BACKFILL AS PROMPTLY AS PRACTICAL AFTER COMPLETION OF EACH STRUCTURE OR PORTION OF A STRUCTURE. DO NOT, HOWEVER, PLACE BACKFILL AGAINST NEWLY CONSTRUCTED CONCRETE WALLS OR SIMILAR STRUCTURES UNTIL CONCRETE HAS CURED AT LEAST 7-DAYS.
21. UNLESS OTHERWISE NOTED ON PLANS OR IN SPECIFICATIONS, THE CONTRACTOR SHALL PLACE & COMPACT BACKFILL AROUND UTILITY STRUCTURES IN ACCORDANCE WITH APPLICABLE TRENCH ZONE BACKFILL FOR UTILITY LINE.
22. ALL DISTURBED AREAS SHALL BE RESTORED TO ORIGINAL OR BETTER CONDITION PRIOR TO ACCEPTANCE OF THE PROJECT.
23. THE CONTRACTOR SHALL PLAN AND SEQUENCE ALL CONSTRUCTION ACTIVITY IN SUCH A MANNER THAT WILL PERMIT SAFE PEDESTRIAN AND VEHICULAR MOVEMENT.
24. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION AND SAFETY OF THE WORK SITE, WORKERS, SUBCONTRACTORS, MATERIALS AND EQUIPMENT.
25. THE DRAWINGS AND SPECIFICATIONS REPRESENT THE COMPLETED STRUCTURES/DESIGN. THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE ALL MEASURES AND MEANS NECESSARY TO PROTECT PERSONS AND STRUCTURES DURING CONSTRUCTION. OBSERVATION BY THE ENGINEER OR THE DISTRICT DOES NOT INCLUDE REVIEW OF THESE MEASURES.
26. THESE PLANS, PREPARED BY SUPREME ENGINEERING, PLLC., DO NOT EXTEND TO OR INCLUDE DESIGN OF SYSTEMS PERTAINING TO THE SAFETY OF THE CONSTRUCTION CONTRACTOR OR ITS EMPLOYEES, AGENTS OR REPRESENTATIVES IN THE PERFORMANCE OF THE WORK. THE SEAL OF SUPREME ENGINEERING, PLLC., REGISTERED PROFESSIONAL ENGINEER(S) HEREON DOES NOT EXTEND TO ANY SUCH SAFETY SYSTEMS THAT MAY NOW OR HEREAFTER BE INCORPORATED IN THESE PLANS. THE CONSTRUCTION CONTRACTOR SHALL PREPARE OR OBTAIN THE APPROPRIATE SAFETY SYSTEMS, INCLUDING THE PLANS AND SPECIFICATIONS REQUIRED BY THE HOUSE BILLS 662 AND 665 ENACTED BY THE TEXAS LEGISLATURE IN THE 70TH LEGISLATURE REGULAR SESSION.
27. CONTRACTOR SHALL PROVIDE A SEQUENCE OF WORK AND PERFORM ASSOCIATED GRADING THAT PROVIDES POSITIVE OUTFALLS AT ALL TIMES.
28. CONSTRUCTION STAKING AND SURVEYING SHALL BE PROVIDED BY THE CONTRACTOR AND AT CONTRACTOR'S EXPENSE.
29. CONTRACTOR TO COORDINATE WITH THE OWNER AND ENGINEER ON WORK SCHEDULES, TESTING, GENERAL INSPECTION, AND OPERATION AND LOCATION OF EXISTING LINES.
30. THE CONTRACTOR IS RESPONSIBLE FOR SCHEDULING ALL CONSTRUCTION MATERIALS TESTING AND GENERAL INSPECTIONS. [THE CONTRACTOR SHALL COORDINATE THROUGH THE OWNER DESIGNATED FIELD REPRESENTATIVE A MINIMUM OF 24-HOURS PRIOR TO TESTING OR INSPECTION. FAILURE TO BE PREPARED FOR TESTING MAY RESULT IN TRAVEL CHARGES. RE-TESTING WILL BE BORNE BY THE CONTRACTOR.]
31. MATERIAL TESTING SHALL BE PROVIDED BY THE OWNER. FAIL TEST TO BE AT CONTRACTOR'S EXPENSE AND BILLED DIRECTLY FROM THE MATERIAL TESTING LABORATORY.
32. THE CONTRACTOR SHALL INSPECT ALL MATERIALS AT DELIVERY AND NOTIFY THE OWNER AND ENGINEER OF ANY DAMAGED OR QUESTIONABLE MATERIALS. ANY DAMAGED OR QUESTIONABLE MATERIAL INSTALLED WITHOUT PRIOR INSPECTION BY THE OWNER AND ENGINEER SHALL BE REMOVED AT THE CONTRACTOR'S EXPENSE.
33. WORK REQUIRED TO BE INSPECTED BY THE OWNER SHALL OCCUR DURING REGULAR WORKING HOURS, MONDAY THROUGH FRIDAY. NO WORK TO OCCUR DURING FEDERAL HOLIDAYS OR PREVIOUSLY APPROVED BY THE OWNER AND/OR ENGINEER.
34. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED. (NO SEPARATE PAY)
35. THE CONTRACTOR IS ENCOURAGED TO INSPECT AND DOCUMENT THE PRE-CONSTRUCTION CONDITION OF ALL PRIVATE DRIVEWAYS, MAILBOXES, PAVEMENT AREAS, SIDEWALKS, CURB AND GUTTER THAT IS TO BE AFFECTED BY PROPOSED CONSTRUCTION PRIOR TO COMMENCING.
36. ANY DAMAGE TO EXISTING PAVEMENT, DRAINAGE OR EXISTING STRUCTURES SHALL BE REPAIRED TO PRECONSTRUCTION CONDITION OR BETTER AT CONTRACTOR'S EXPENSE. EXISTING STRUCTURES MAY INCLUDE BUT ARE NOT LIMITED TO PAVEMENT, INLETS, MANHOLES, FENCES, SPRINKLER SYSTEMS, LAWNS, SIDEWALKS OR PRIVATE PROPERTY.
37. CONTRACTOR SHALL GIVE NOTICE TO ALL AUTHORIZED INSPECTORS, SUPERINTENDENTS, OR PERSONS IN CHARGE OF PRIVATE AND PUBLIC UTILITIES AFFECTED BY HIS OPERATIONS PRIOR TO COMMENCEMENT OF WORK. NOTIFY TEXAS 811, MUNICIPALITY AND ANY OTHER PRIVATE OR PUBLIC UTILITIES PRIOR TO ANY AND ALL EXCAVATIONS.
38. CONTRACTOR TO EXERCISE EXTREME CAUTION WHEN WORKING NEAR EXISTING FACILITIES AND/OR UTILITIES. ALL DAMAGE TO BE REPAIRED AT CONTRACTOR'S EXPENSE. ALL COSTS FOR INTERRUPTION OF GAS, ELECTRICAL, COMMUNICATIONS AND/OR WATER SERVICE DUE TO CONTRACTOR'S WORK SHALL BE BORNE BY THE CONTRACTOR.
39. INFORMATION ON EXISTING UTILITIES IS FROM BEST AVAILABLE INFORMATION OF RECORD AND SPOT FIELD LOCATIONS. AL THOUGH EVERY EFFORT HAS BEEN MADE TO ACCURATELY DEPICT ALL UTILITIES, NOT ALL (PUBLIC AND PRIVATE) MAY BE SHOWN. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION AND LOCATION OF THESE UNDERGROUND UTILITIES AS REQUIRED AT NO SEPARATE PAY. CONTRACTOR TO COORDINATE WITH ALL UTILITY COMPANIES
40. ALL WORK SHALL BE PERFORMED WITHIN THE PROPERTY, PUBLIC RIGHT-OF-WAY, EASEMENTS OR ON PUBLIC-OWNED PROPERTY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN PERMISSION TO USE PRIVATE PROPERTY, IF NECESSARY, FOR THE PURPOSES OF STAGING, STOCKPILE, STORAGE OR REFUSE AREAS. THE CONTRACTOR SHALL PROVIDE WRITTEN EVIDENCE TO THE DISTRICT PRIOR TO USE.
41. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED RESIDENTS OR BUSINESS OWNERS OF CONSTRUCTION ACTIVITY THROUGH THE USE OF BILINGUAL !ENGLISH AND SPANISH! DOOR TAGS, PAMPHLETS OR SIMILAR METHODS. ALL AFFECTED PARTIES MUST BE NOTIFIED A MINIMUM OF 72-HOURS PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE A SAMPLE OF THE NOTIFICATION TO THE OWNER AND ENGINEER PRIOR TO IMPLEMENTATION.
42. CONTRACTOR TO INSURE ACCESS AT ALL TIMES TO ALL RESIDENCES AND BUSINESSES ADJACENT TO CONSTRUCTION.
43. THE CONTRACTOR SHALL DO ALL NECESSARY CLEARING, EXCAVATION, TRENCHING, SHORING, DE-WATERING, DEMOLITION, GRADING, BACKFILLING, ETC. TO COMPLETE THE PROJECT. ASSOCIATED COSTS SHALL BE SUBSIDIARY TO THE RESPECTIVE BID ITEMS AS IDENTIFIED IN THE CONTRACT UNLESS NOTED OTHERWISE.
44. ALL COMPACTION SHALL BE ACHIEVED BY MECHANICAL METHODS. NO WATER JETTING ALLOWED.
45. ALL SPOIL MATERIAL AND DEBRIS SHALL BE DISPOSED OFFSITE BY THE CONTRACTOR IN A LEGAL MANNER. FURNISHING AND TRANSPORTATION OF ALL OFFSITE MATERIAL TO BE AT CONTRACTOR'S EXPENSE.
46. DEMOLITION, REMOVAL AND DISPOSAL OF ALL EXCESS CONCRETE, CURBS, RUBBLE, ETC. TO BE DONE IN A LEGAL MANNER AT CONTRACTOR'S EXPENSE.
47. THE CONTRACTOR SHALL KEEP THE CONSTRUCTION AREA AS CLEAN AS POSSIBLE. ALL ASSOCIATED DEBRIS SHALL BE COLLECTED AND PROPERLY DISPOSED OF AT THE END OF EACH WORKDAY.
48. UPON COMPLETION OF CONSTRUCTION, CONTRACTOR SHALL RETURN THE SITE TO ORIGINAL CONTOURS UNLESS DIFFERENT FINISHED ELEVATIONS ARE SHOWN ON PLANS. CONTRACTOR TO ENSURE NO AREAS OF PONDING ARE PRESENT.
49. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RECORDING ALL FIELD CHANGES AND FURNISHING A LEGIBLE SET OF 'AS-BUILT' DRAWINGS TO THE DISTRICT.

PAVING CONSTRUCTION NOTES

1. HOT MIX ASPHALT CONCRETE TO BE IN ACCORDANCE WITH SPECIFICATION, TYPE "D"
2. SUBGRADE EXCAVATION AND RECOMPACTION TO BE INCLUDED IN PRICE BID PER SQUARE YARD FOR 'PAVEMENT BID ITEMS.' UNLESS OTHERWISE NOTED IN THE BID SCHEDULE.
3. CONTRACTOR TO SHAPE, FILL, GRADE AND COMPACT TO ENSURE PROPER DRAINAGE.
4. ALL PAVEMENTS SHALL BE NEATLY SAW-CUT. DAMAGE TO PAVEMENT BEYOND THE EXTENTS OF TRENCH WIDTHS AS A RESULT OF FAILURE TO PROPERLY SAW-CUT SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
5. CONSTRUCTION JOINTS TO EXISTING PAVEMENT SHALL BE MADE BY EITHER CUTTING BACK EXISTING TO PRODUCE A SLIGHTLY BEVELED EDGE FOR THE FULL THICKNESS OF THE WEARING COURSE OR A SUITABLE LAP JOINT SHALL BE MADE. SAW CUTTING REQUIRED.
6. NO TRAFFIC SHALL BE ALLOWED ON THE FINISHED WEARING SURFACE UNTIL AT LEAST 12 HOURS AFTER COMPLETION OF ROLLING.
7. WHEN TYING INTO EXISTING CURB, EXPOSE REBAR AND FORM EXPANSION JOINT PER DETAIL.
8. ANY SETTLEMENT UNDER PAVEMENT DUE TO INADEQUATE COMPACTION OF UTILITY LINE BACKFILL SHALL BE CAUSE FOR RECOMPACTION OF TRENCH AND REPLACEMENT OF PAVEMENT SECTION AT CONTRACTOR'S EXPENSE.
9. HOT MIX ASPHALT CONCRETE TRANSPORT TRUCKS TO BE EQUIPPED WITH CANVAS COVERS TO BE UTILIZED DURING MATERIAL HAULING. MATERIAL DELIVERED TO SITE AT IMPROPER TEMPERATURE SHALL BE REJECTED. HOT MIX SHALL BE LAID AT A MINIMUM TEMPERATURE OF 225 DEGREES FAHRENHEIT.
10. CONTRACTOR TO REPLACE ALL PAVEMENT MARKINGS AND MARKERS THAT WERE REMOVED, DEMOLISHED, OR DAMAGED DURING CONSTRUCTION. (NO SEPARATE PAY)
11. CONTRACTOR SHALL "LAY DOWN" CURB SECTION AT DRIVEWAY LOCATIONS SHOWN ON DRAWINGS. CONTRACTOR SHALL BE REQUIRED TO GRADE FROM EXISTING DRIVES AND PARKING AREAS TO MATCH GRADES AND ALLOW SMOOTH TRANSITIONS AND PROPER DRAINAGE. (NO SEPARATE PAY)

STRIPING NOTES

1. ALL SIGNS AND MARKINGS SHALL BE PLACED BY THE CONTRACTOR IN ACCORDANCE WITH THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES LATEST EDITION, UNLESS OTHERWISE SHOWN OR DIRECTED.
2. THE PAVEMENT SURFACE SHALL BE MADE FREE OF DELETERIOUS MATERIAL PRIOR TO APPLICA TION OF PERMANENT MARKINGS.
3. ALL STRIPING SHALL BE A HI-PERFORMANCE ZONE MARKING PAINT AND SHALL BE PLACED PER MANUFACTURER RECOMMENDATIONS.
4. CONTRACTOR SHALL PROVIDE (RED PAINT THE CURB) A FIRE LANE 15 FEET WIDE OFF/CENTER ALL FIRE HYDRANTS.
5. CONTRACTOR SHALL INSTALLED A DOUBLE FACE STREET BLUE BUTTON MARKER AT THE CENTER OF THE ROAD IN FRONT OF ALL FIRE HYDRANTS.

UTILITIES GENERAL NOTES

4. THE TYPE, SIZE AND LOCATION OF ALL UNDERGROUND UTILITIES DEPICTED ON THE CONSTRUCTION PLANS WERE RESEARCHED WITH RESPECT TO THE BEST AVAILABLE DATA AND THEREFORE SHOWN APPROXIMATE. ALTHOUGH EVERY EFFORT HAS BEEN MADE TO ACCURATELY DEPICT ALL UTILITIES, NOT ALL (PUBLIC AND PRIVATE) MAY BE SHOWN. NEITHER THE ENGINEER NOR CITY IS RESPONSIBLE FOR THE ACCURACY OF THE LOCATION OF THE UTILITIES SHOWN ON THE CONSTRUCT!ON PLANS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CONTACT ALL UTILITY COMPANIES WITH JURISDICTION WITHIN THE LIMITS OF CONSTRUCTION FOR FIELD VERIFICATION AT NO ADDITIONAL EXPENSE TO THE DISTRICT.
5. CONTRACTOR TO EXPOSE ANY EXISTING UTILITY THAT MAY BE IN CONFLICT PRIOR TO COMMENCING CONSTRUCTION AND EXCAVATION.
6. ALL EXISTING UTILITIES SHOWN ARE FROM BEST INFORMATION AVAILABLE. NEITHER THE ENGINEER NOR THE CITY TAKE RESPONSIBILITY FOR ACCURACY OF LOCATION
7. THE CONTRACTOR SHALL NOTIFY ALL AUTHORIZED INSPECTORS, SUPERINTENDENTS, OR PERSONS RESPONSIBLE FOR PUBLIC AND PRIVATE UTILITIES AFFECTED BY HIS/HER OPERATIONS PRIOR TO COMMENCING CONSTRUCTION.
8. CONTRACTOR SHALL AT ALL TIMES ALLOW ACCESS TO EXISTING DRIVEWAY OR PROVIDE/MAINTAIN ALTERNATIVE ALL-WEATHER ROUTES.
9. ALL TRAFFIC CONTROL DEVICES SHALL BE IN CONFORMANCE WITH TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES LATEST EDITION.
10. ANY DAMAGES TO FENCES, WALKS, OR PRIVATE PROPERTY SHALL BE REPAIRED BY THE CONTRACTOR AT HIS EXPENSE.
11. ALL CONSTRUCTION MATERIALS TESTING WILL BE COORDINATED THROUGH THE OWNER.
12. USE CLASS 'B' EMBEDMENT FOR UTILITY TRENCHES UNDER PAVEMENT.
13. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REMOVE ALL EXCAVATED MATERIAL, EXCESS CONCRETE, AND DEBRIS FROM THE CONSTRUCTION SITE AT NO ADDITIONAL EXPENSE TO THE OWNER.
14. IN ACCORDANCE WITH HOUSE BILLS 662 AND 665 ENACTED BY THE TEXAS LEGISLATURE 170• REGULAR LEGISLATIVE SESSION!, THE CONTRACTOR SHALL MEET THE REQUIREMENTS FOR TRENCH SAFETY AS OUTLINED IN THE CURRENT VERSION OF THE UNITED STATES DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS, 29 CFR, PART 1926, SUBPART P-EXCAVATIONS.
15. PRIOR TO COMMENCING ANY EXCAVATION, THE CONTRACTOR SHALL PROVIDE A TRENCH SAFETY PLAN. ALL PLANS SHALL BE PREPARED BY A PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE STATE OF TEXAS. THE PLAN SHALL BE SUBMITTED TO THE OWNER FOR APPROVAL.
16. IN THE EVENT CONDITIONS ENCOUNTERED IN THE FIELD REQUIRE TRENCH SAFETY SYSTEMS OUTSIDE OF THE EXTENTS SUGGESTED TRENCH PROTECTION SHOWN ON THE CONSTRUCTION PLANS, ALL EXCAVATION SHALL CEASE AND THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER AND ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTING A REVISED TRENCH SAFETY PLAN. NO EXCAVATION SHALL RESUME UNTIL THE REVISED TRENCH SAFETY PLAN HAS BEEN APPROVED.
17. THE CONTRACTOR SHALL ENSURE APPROVED TRENCH SAFETY PLANS ARE IMPLEMENTED. FAILURE TO ADHERE TO THE TRENCH SAFETY PLAN WILL RESULT IN A STOP WORK ORDER. NON-COMPLIANCE INCIDENTS MAY BE REPORTED TO OHSA.
18. TRENCHES OR EXCAVATIONS MAY NOT BE LEFT UNATTENDED OR OPEN OVERNIGHT UNLESS AUTHORIZED IN WRITING BY THE OWNER AND THE ENGINEER. IN CASES WHERE TRENCHES ARE LEFT OPEN, THE CONTRACTOR MUST PROVIDE TRAFFIC-RATED, ANCHORED STEEL PLATE COVERS APPROVED BY THE CITY AND ENGINEER.

WASTEWATER COLLECTION LINE CONSTRUCTION NOTES

1. PROPOSED GRAVITY SEWER LINES SHALL MEET THE REQUIREMENTS OF SD26 ASTM D3034 OR EXCEED PIPE MATERIAL (UNLESS OTHERWISE NOTED).
2. PROPOSED FORCE MAINS SHALL MEET OR EXCEED THE REQUIREMENTS OF AWWA C-900/905. USE DUCTILE IRON (CLASS 52) FITTINGS.
3. CONTRACTOR TO PROVIDE DEFLECTION TEST IN ACCORDANCE WITH TCEQ CHAPTER 217.57 (b). IF MANDRAL IS USED. MANDRAL IS TO BE PULLED IN BOTH DIRECTIONS.
4. CONTRACTOR TO PROVIDE LOW PRESSURE AIR TEST IN ACCORDANCE WITH TCEQ CHAPTER 217.57 (a), (1). 30 DAYS AFTER INSTALLATION. NO WATER TEST ALLOWED.
5. CONTRACTOR TO FIELD VERIFY THE LOCATION OF EXISTING UTILITIES AND FACILITIES PRIOR TO CONSTRUCTION.
6. ALL CROSSING OF WASTEWATER COLLECTION LINES AND WATERLINES CONSTRUCTED IN ACCORDANCE WITH TCEQ REGULATIONS CHAPTER 290 AND 217. SEPARATION DISTANCES SHALL COMPLY WITH 30 TAC 217.53(d).
7. CONTRACTOR TO PROVIDE LEAKAGE TEST FOR MANHOLE IN ACCORDANCE WITH TCEQ CHAPTER 217.58 (a),(b OF THE STATE WASTEWATER CODE. NO WATER TEST ALLOWED.
8. NO WATER JETTING ALLOWED; MECHANICAL COMPACTION REQUIRED.
9. ALL STRUCTURES TO BE ADJUSTED BY THE CONTRACTOR TO MEET FINAL GRADES, A MAXIMUM OF 1 FOOT OF THROAT RINGS WILL BE ALLOWED OR AS CITY REQUIREMENTS.
10. CONTRACTOR TO PROVIDE BYPASS PUMPING AS REQUIRED TO COMPLETE THE WORK. (NO SEPARATE PAY)

STORM DRAINAGE LINE CONSTRUCTION NOTES

1. CONTRACTOR TO PROVIDE POSITIVE OUTFLOW FOR DRAINAGE BASIN AT ALL TIMES. IN THE CASE OF A STORM EVENT, CAPACITY FOR STORM WATER RUNOFF SHALL BE PROVIDED ON SITE AS A TEMPORARY DETENTION FACILITY TO MINIMIZE ADJACENT LOCAL FLOODING.
2. CONTRACTOR SHALL PROVIDE A SEQUENCE OF WORK FOR STORM DRAINAGE TIE INS THAT PROVIDES POSITIVE OUTFLOW AT ALL TIMES.
3. CONTRACTOR TO FIELD VERIFY THE LOCATION OF EXISTING UTILITIES AND FACILITIES PRIOR TO CONSTRUCTION.
4. ALL REINFORCED CONCRETE STORM PIPES SHALL BE ASTM C-76 CLASS 111 WITH RUBBER GASKET SEALED JOINTS, UNLESS OTHERWISE NOTED ON PLANS. ALL PIPE AND APPURTENANCES (INLETS, MANHOLES, JUNCTION BOXES, ETC) SHALL CONFORM TO THE TECHNICAL SPECIFICATIONS.
5. REINFORCED CONCRETE PIPES SHALL EXTEND TO THE INSIDE FACE OF ALL STRUCTURES. ALL JOINTS SHALL BE GROUTED TO ENSURE A WATER-TIGHT FIT. IN NO INSTANCE SHALL GROUT BE USED TO EXTEND AN INCOMPLETE SEGMENT OF PIPE TO THE INSIDE FACE OF A STRUCTURE.
6. PRECAST REINFORCED CONCRETE STORM BOXES SHALL BE IN ACCORDANCE WITH ASTM C1577. THE JOINTS SHALL BE SEALED WITH GROUT FROM INSIDE THE BOXES.
7. CAST-IN-PLACE REINFORCED CONCRETE STORM BOXES SHALL BE CONSTRUCTED WITH CLASS "C" CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 3,600 PSI AND GRADE 60 REINFORCED. WELDED WIRE REINFORCEMENT IS NOT ALLOWED.
8. SAND BACKFILL IN LIEU OF NATIVE MATERIAL IS ALLOWED AT THE CONTRACTOR"S DISCRETION; NO SEPARATE PAY. THE CONTRACTOR SHALL SUBMIT A SAMPLE OF THE BACKFILL MATERIAL TO THE ENGINEER FOR INSPECTION AND SHALL UTILIZE THE MATERIAL ONLY UPON APPROVAL BY THE ENGINEER.
9. EXPANSION JOINTS ARE REQUIRED BETWEEN ALL INLET STRUCTURES AND CURB AND GUTTER AND/OR SIDEWALK.
10. ALL MANHOLE COVERS WITHIN THE CITY OF MERCEDES SHALL DISPLAY THE CITY OF MERCEDES LOGO AND STORM SEWER DESIGNATION. MANHOLE COVERS IN TRAVELED WAYS SHALL BE H-20 RATED.
11. THE CONTRACTOR SHALL ENSURE THAT ALL EXISTING STORM SEWER INFRASTRUCTURE REMAINS FUNCTIONAL THROUGHOUT THE COURSE OF CONSTRUCTION. IN THE EVENT THAT ANY ASSOCIATED CONSTRUCTION ACTIVITY IMPEDES THE FUNCTION OF A SYSTEM, THE CONTRACTOR SHALL PROVIDE THE ENGINEER A PLAN TO ADDRESS THE ISSUE IN ANTICIPATION OF A STORM EVENT.
12. ALL NEWLY INSTALLED STORM SEWER PIPE AND APPURTENANCES ARE SUBJECT TO VIDEO INSPECTION.

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THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY OMAR CANO, P.E. ON 4/22/2025
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PROJECT No. ##	REVISIONS:			
PROJECT TEAM				
DESIGN BY: O.C.				
DRAWN BY: J.L.G.				
CHECKED BY: O.C.				
APPROVED BY: O.C.	REV	DESCRIPTION	DATE:	APPROVED BY:

PREPARED FOR:
CITY OF MERCEDES
400 S. OHIO AVE.
MERCEDES, TX 78570

DACOTA AVE. ROADWAY IMPROVEMENTS
GENERAL NOTES

C2.1

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---- PLOTTED 4/22/2025 C1_C2.2 - COVER SHEET_GENERAL NOTES_LEGEND.DWG

WATERLINE CONSTRUCTION NOTES

1. ALL WATERLINES TO BE C-900 CLASS 150 PVC UNLESS OTHERWISE NOTED.
2. DOUBLE CHECK VALVE WILL BE REQUIRED WHEN FILLING NEW WATERLINE FOR PRESSURE TESTING.
3. ALL WATER, REUSE (RECLAIMED), & WASTEWATER COLLECTION LINE CROSSINGS TO BE CONSTRUCTED IN ACCORDANCE WITH TCEQ REGULATION, CHAPTER 210, 290 & 217.
4. CONTRACTOR TO VERIFY THE LOCATION OF ALL EXISTING LINES TO BE TIED IN TO NEW MAIN PRIOR TO SETTING LOCATION OF TIE-IN TEE AND VALVE ON MAIN.
5. WATERLINE MAINS TO BE HYDROSTATICALLY AND BACTERIOLOGICAL TESTED PER OWNER'S REQUIREMENTS AND CITY REQUIREMENTS PRIOR TO TIE-INS. OWNER APPROVAL OF TESTING IS REQUIRED.
6. ALL CROSSINGS OF WASTEWATER COLLECTION LINES AND WATERLINES CONSTRUCTED IN ACCORDANCE WITH TCEQ REGULATIONS CHAPTER 290 AND 217. SEPARATION DISTANCES SHALL COMPLY WITH 30 TAC 217.53(D).
7. CONTRACTOR SHALL MAINTAIN AS MINIMUMS 10 FEET HORIZONTAL AND 2 FEET VERTICAL SEPARATION BETWEEN WATERLINES AND ANY OTHER SEWER.
8. NO WATER JETTING ALLOWED; MECHANICAL COMPACTION REQUIRED.
9. FIRE HYDRANTS SHALL BE PLACED 3.0 FEET BEHIND BACK OF CURB AND SHALL HAVE A 4-1/2 INCH OUTLET FACING THE STREET WITH 18" TO 24" CLEARANCE FROM BOTTOM OF OUTLET TO GRADE LEVEL FOR HYDRANT WRENCH. HYDRANT SHALL BE MARKED ON THE STREETS WITH A REFLECTIVE BLUE MARKER TO SHOW LOCATION OF HYDRANT. HYDRANT SHALL HAVE A 3' CLEARANCE FROM ANY FENCES, POLES, BRUSH ETC.
10. CONTRACTOR SHALL MAINTAIN A MINIMUM OF 4FT OF COVER OR AS REQUIRED BY THE CITY ON ALL WATERLINES, UNLESS OTHERWISE NOTED ON PLANS.
11. FITTINGS TO BE USED ON DEFLECTIONS AS NEEDED.
12. CONTRACTOR IS RESPONSIBLE FOR INSTALLING VALVES, FITTINGS AND ALL INCIDENTALS AS NEEDED FOR A COMPLETE IN PLACE SYSTEM AND SHALL BE SUBSIDIARY TO PIPE INSTALLATION.
13. WATERLINE VALVES SHALL ONLY BE OPERATED BY THE OWNER. CONTRACTOR TO COORDINATE WITH THE OWNER IF WATERLINE VALVE OPERATIONS ARE REQUIRED DURING CONSTRUCTION.
14. ALL PIPE TO BE STORED A MINIMUM OF 6 INCHES ABOVE GROUND.
15. FIRE APPARATUS ACCESS ROAD SHALL COMPLY WITH IFC 2015 EDITION, APPENDIX D. (CUL-DE-SAC, WYE, HAMMERHEAD).
16. ACCESS ROADS SHALL BE 36' MINIMUM WITH HYDRANT UNOBSTRUCTED, 20' WITHOUT HYDRANT UNOBSTRUCTED. ALL WEATHER SURFACE ROAD THAT SUPPORTS THE IMPOSED LOADS OF FIRE APPARATUS SHALL BE IN PLACE (CONCRETE OR ASPHALT).

IRRIGATION NOTES

(TO BE PROVIDED BY IRRIGATION DISTRICT)

EROSION CONTROL NOTES

1. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN PLACE PRIOR TO COMMENCING ANY EARTH DISTURBING ACTIVITY.
2. ALL EFFORTS SHALL BE MADE TO CONTAIN DISTURBED SOILS WITHIN THE EXTENTS OF PERIMETER EROSION AND SEDIMENT CONTROL MEASURES.
3. THE CONTRACTOR SHALL SEQUENCE ALL CONSTRUCTION IN SUCH A MANNER AS TO MINIMIZE THE AMOUNT AND EXTENTS OF DISTURBED EARTH.
4. A STABILIZED CONSTRUCTION EXIT IS REQUIRED AT ALL POINTS OF DESIGNATED EGRESS FROM THE LIMITS OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE LOCATION(S) UNLESS OTHERWISE NOTED ON THE PLANS. THE LOCATION(S) OF THE STABILIZED CONSTRUCTION EXIT(S) MAY BE MODIFIED WITH RESPECT TO THE SEQUENCE OF CONSTRUCTION WITH PRIOR APPROVAL BY THE ENGINEER.
5. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE PROPERLY MAINTAINED DURING THE COURSE OF THEIR INTENDED USE.
6. ALL STAGING. MATERIAL STORAGE. STOCKPILE AND REFUSE AREAS SHALL REQUIRE APPLICABLE EROSION AND SEDIMENT CONTROL MEASURES.
7. ALL CONSTRUCTION DEBRIS SHALL BE CONTAINED WITHIN APPROPRIATE RECEPTACLES (ROLL-OFF CONTAINERS, DUMPSTERS, TRASH CANS, WIRE-MESH CAGES, ETC.) AND CONFINED WITHIN PERIMETER EROSION AND SEDIMENT CONTROLS.
8. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL REMAIN IN PLACE DURING THE COURSE OF EARTH DISTURBING ACTIVITY AND UNTIL FINAL STABILIZATION IS ACHIEVED. STRUCTURAL MEASURES MAY BE REMOVED ONLY UPON FINAL PROJECT ACCEPTANCE BY THE CITY OR AS DIRECTED BY THE ENGINEER.
9. PERMANENT STABILIZATION SHALL BEGIN AS SOON AS PRACTICABLE OR AS DIRECTED BY THE ENGINEER.
10. THE CONTRACTOR MAY REFER TO THE TEXAS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS, AND BRIDGES (2004 EDITION) ITEM 164, "SEEDING FOR EROSION CONTROL" AND ITEM 168, "VEGETATIVE WATERING" FOR VEGETATIVE STABILIZATION SPECIFICATIONS.
11. DUST CONTROL SHALL BE IMPLEMENTED AS NECESSARY OR AS DIRECTED BY THE ENGINEER. DUST CONTROL MAY CONSIST OF WATERING OR OTHER METHODS APPROVED BY THE ENGINEER.
12. TRACKED DEBRIS SHALL BE SWEPT AT THE END OF EACH WORKDAY OR AS DIRECTED BY THE ENGINEER.
13. ALL DISCHARGES ASSOCIATED WITH DEWATERING OPERATIONS SHALL IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES. MEASURES MAY INCLUDE BUT ARE NOT LIMITED TO SEDIMENTATION BASINS OR FILTER SOCKS.
14. CONCRETE WASH-WATER SHALL NOT BE DISCHARGED DIRECTLY INTO A STORM SEWER SYSTEM OR RECEIVING STREAM. ALL WASH ACTIVITIES MUST BE PERFORMED WITHIN THE EXTENTS OF ESTABLISHED EROSION AND SEDIMENT CONTROL MEASURES OR DESIGNATED AREAS APPROVED BY THE ENGINEER.
15. SEDIMENT SHALL BE CLEARED FROM ALL STORM SEWER PIPES, CULVERTS AND APPURTENANCES WITHIN THE LIMITS OF CONSTRUCTION PRIOR TO FINAL PROJECT ACCEPTANCE. SEDIMENT SHALL BE PROPERLY DISPOSED.

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STATE OF TEXAS
OMAR CANO
120081
LICENSED
PROFESSIONAL ENGINEER

OMAR CANO, P.E

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PROJECT No. ##
PROJECT TEAM
DESIGN BY: O.C.
DRAWN BY: J.L.G.
CHECKED BY: O.C.
APPROVED BY: O.C.

PREPARED FOR:
CITY OF MERCEDES
400 S. OHIO AVE.
MERCEDES, TX 78570

DACOTA AVE. ROADWAY IMPROVEMENTS
GENERAL NOTES

C2.2

#####

---- PLOTTED 4/22/2025 C1_C2.2 - COVER SHEET_GENERAL NOTES_LEGEND.DWG

ABBREVIATIONS

A	ASPHALT	IGV	IRRIGATION GATE VALVE
ADR	ASPHALT DRIVE	IGW	IRRIGATION GATEWELL
APV	ASPHALT PAVEMENT	ISP	IRRIGATION STAND PIPE
AVE	AVENUE	INV	INVERT
BM	BENCHMARK	IV	IRRIGATION VENT
BOC	BACK OF CURB	LT	LEFT
CONC.	CONCRETE	LOT	LOT CORNER
CONST.	CONSTRUCT	MB	MAIL BOX
CL	CENTER LINE	MH	MANHOLE
CDR	CONCRETE DRIVE	MON	MONUMENT
CPV	CONCRETE PAVEMENT	N.T.S	NOT TO SCALE
CA	CALICHE	NAIL	NAIL
CADR	CALICHE DRIVE	NAWSC	NORTH ALAMO WATER SUPPLY CORPORATION
CARD	CALICHE ROAD	NG	NATURAL GROUND
CFN	CHAIN LINK FENCE	OHE	OVERHEAD ELECTRIC LINE
CI	CURB INLET	PFL	PIPE FLOW LINE
CLV	CULVERT	PGL	PROPOSED GRADE LINE
CP	CONTROL POINT	PL	PROPERTY LINE
CPV	CONCRETE PAVEMENT	PP	POWER POLE
CR	CENTER OF ROAD	PROP	PROPOSED
CRB	CURB	PV	PAVEMENT
CSM	CABLE SPOT MARKING	PVC	PVC PIPE
D	DIRT	RT	RIGHT
DR	DRIVE	RCP	REINFORCED CONCRETE PIPE
DDR	DIRT DRIVE	RIP	RIP-RAP
DT	DITCH	RD	ROAD
DTB	DITCH BOTTOM	RM	REFERENCE MARKER
DTBB	DITCH BOTTOM OF BERM	ROW	RIGHT-OF-WAY
DTE	DITCH EDGE	RR	RAIL ROAD
DTFL	DITCH FLOW LINE	RSD	ROAD SIDE DITCH
DTT	DITCH TOP	RW	RETAINING WALL
DTTB	DITCH TOP OF BERM	SBOT	SWALE BOTTOM
DTTOE	DITCH TOE	SDL	STORM DRAIN LINE
EXIST.	EXISTING	SEP	SEPTIC TANK COVER
ESMT.	EASEMENT	SET	SAFETY-END TREATMENT
EBX	ELECTRIC BOX	SP	SERVICE POLE
EOCA	EDGE OF CALICHE	SPOL	SIGNAL POLE TRAFFIC
EOP	EDGE OF PAVEMENT	STOP	SWALE TOP
EW	EDGE OF WATER	STA	STATION
EWL	END WALL	SW	SIDEWALK
FG	FINISHED GRADE	TELBX	TELEPHONE BOX
FH	FIRE HYDRANT	TBX	TRAFFIC CONTROL BOX
FL	FLOW LINE	TMKR	TELEPHONE MARKER
FM	FARM-TO-MARKET	TOA	TOP OF ASPHALT
FN	FENCE	TOC	TOP OF CURB
FOC	FIBER OPTIC CABLE	TOW	TOP OF WATER
FOCM	FIBER OPTIC CABLE MARKING	TR	TREE
G	GRAVEL	TRNS	TRANSFORMER
GDR	GRAVEL DRIVE	TSL	TRAFFIC SIGNAL LIGHT
GL	GAS LINE	TSM	TELEPHONE LINE SPOT MARKING
GLMKR	GAS LINE MARKER	VA	VALVE
GLSM	GAS LINE SPOT MARKING	WB	WATER BIBB
GM	GAS METER	WDFN	WOODEN FENCE
GV	GAS VALVE	WFN	WIRE FENCE
GW	GUY WIRE	WL	WATER LINE
HCDR	HIDALGO COUNTY DEED RECORDS	WLSM	WATER LINE SPOT MARKING
HCOR	HIDALGO COUNTY OFFICIAL RECORDS	WM	WATER METER
HCMR	HIDALGO COUNTY MAP RECORDS	WP	WOODEN POST
HCR	HANDICAP RAMP	WV	WATER VALVE
HDW	HEADWALL	WWSM	WASTE WATER LINE SPOT MARKING
HWM	HIGH WATER MARK	YD	YARD DRAIN
IR	IRON ROD		
IRS	IRON ROD SET		

LEGEND

—W—W—	WATER PIPE
—SS—SS—	SANITARY SEWER PIPE
—SD—SD—	STORM DRAIN PIPE
—IRR—IRR—	IRRIGATION PIPE
—TEL—TEL—	TELEPHONE LINE
—FO—FO—	FIBER OPTIC CABLE
—GAS—GAS—	GAS LINE
—OHE—OHE—	OVERHEAD ELECTRICAL LINE
—//—//—	WOOD FENCE
—XX—XX—	HOG-WIRE FENCE
—X—X—	CHAINLINK FENCE
— - - — - - —	RIGHT-OF-WAY LINE

Iron Pipe
Iron Rod
Tree
Sign
HL&P Tower
Mhel (Manhole electric)
Power pole
Pptrn (Power Pole w/transformer)
Guy (Down guy)
Gas meter (Gm)
Gv (Gas valve)
Mhsn (Sanitary sewer manhole)
Snco (Clean out)
Culv (Culvert pipe)
Grinl (Grate inlet)
Mhst (Storm sewer manhole)
Sgnstp (Stop sign)
Trjb (Traffic junction box)
Trlpl (Traffic light pole)
Fh (Fire hydrant)
Wm (Water meter)
Wv (Water valve)
Shrub
Acap (Aluminum cap)
Bdisk (Brass disk)
Fnd IP (Iron Pipe found)
Fnd IR (Iron Rod found)
Nail
Bm (Benchmark)
Rowmkr (R.O.W. marker)
Irr Box
Irr standpipe

Irr gate valve
Grdpst (Guardrail post)
Mailbox
Stsgn (Street sign)
Palm
Catvbox (Cable Tv box)
Ebox (Electrical box)
Eltrn (Electrical transformer)
Emkr (Electrical marker)
Lp (Light Pole)
Pplt (Power pole w/light)
Pipe
Gasreg (Gas regulator)
Mhgs (Mahole Gas)
Pipvnt (Pipe vent/stand pipe)
Wvmkr (Water valve marker)
Crbinl (Curb Inlet)
Trlt (Traffic light)
Trsgn (Traffic sign)
Tsbox (Traffic signal box)
Tsigpl (Traffic signal pole)
Mhtel (Manhole telephone)
Pbox (Telephone pedestal)
Phmkr (Telephone marker)
Tlbox (Telephone box)
Tljnc (Telephone junction box)
Tlpol (Telephone pole)
Spkhd (Sprinkler head)
Wtrwell (Water well)
Water Bibb
Cps (Cotton Picker Spindle)

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400 S. OHIO AVE.
MERCEDES, TX 78570

DACOTA AVE. ROADWAY IMPROVEMENTS
LEGEND & ABBREVIATIONS

C2.3

---- PLOTTED 4/22/2025 C1_C2.2 - COVER SHEET_GENERAL NOTES_LEGEND.DWG

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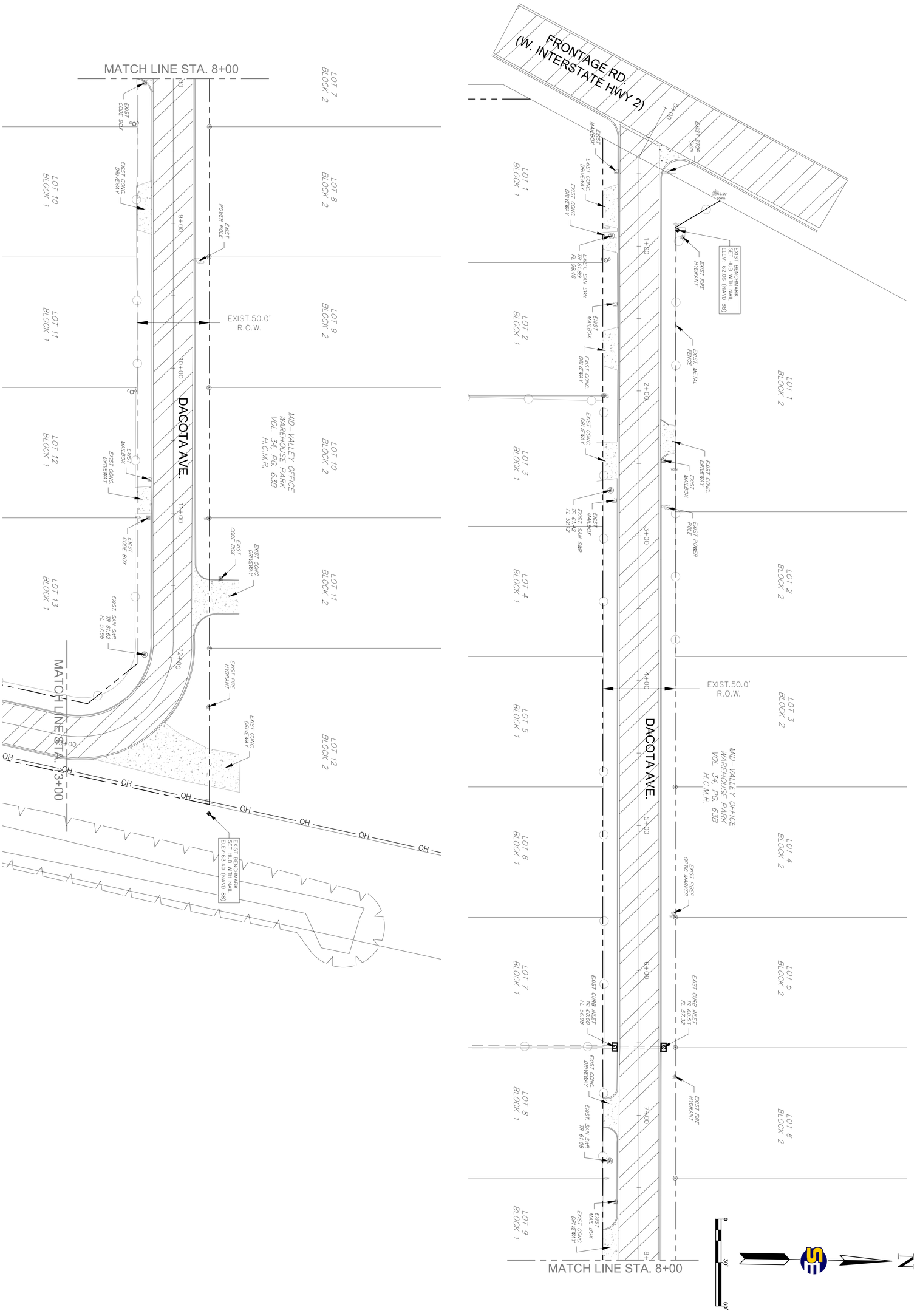

C3.1

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MERCEDES, TX 78570

DACOTA AVE. ROADWAY IMPROVEMENTS
EXISTING CONDITION

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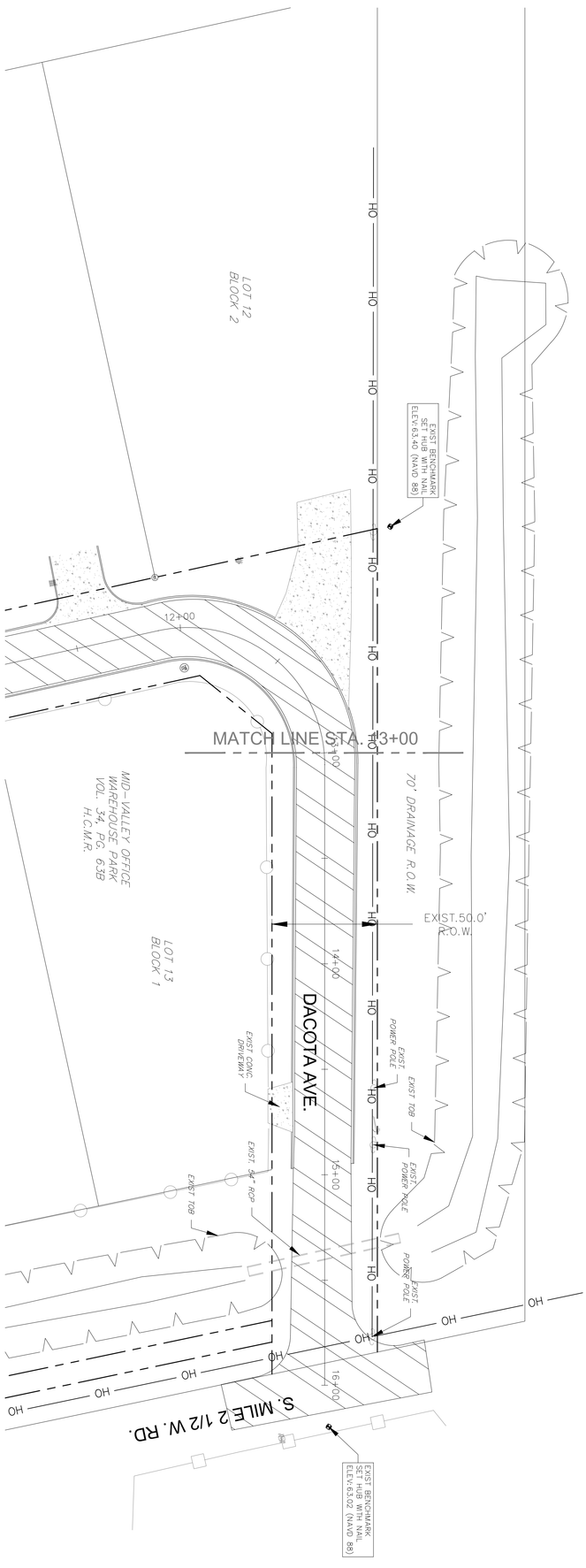

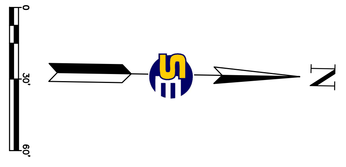

C3.2

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MERCEDES, TX 78570

DACOTA AVE. ROADWAY IMPROVEMENTS
EXISTING CONDITION

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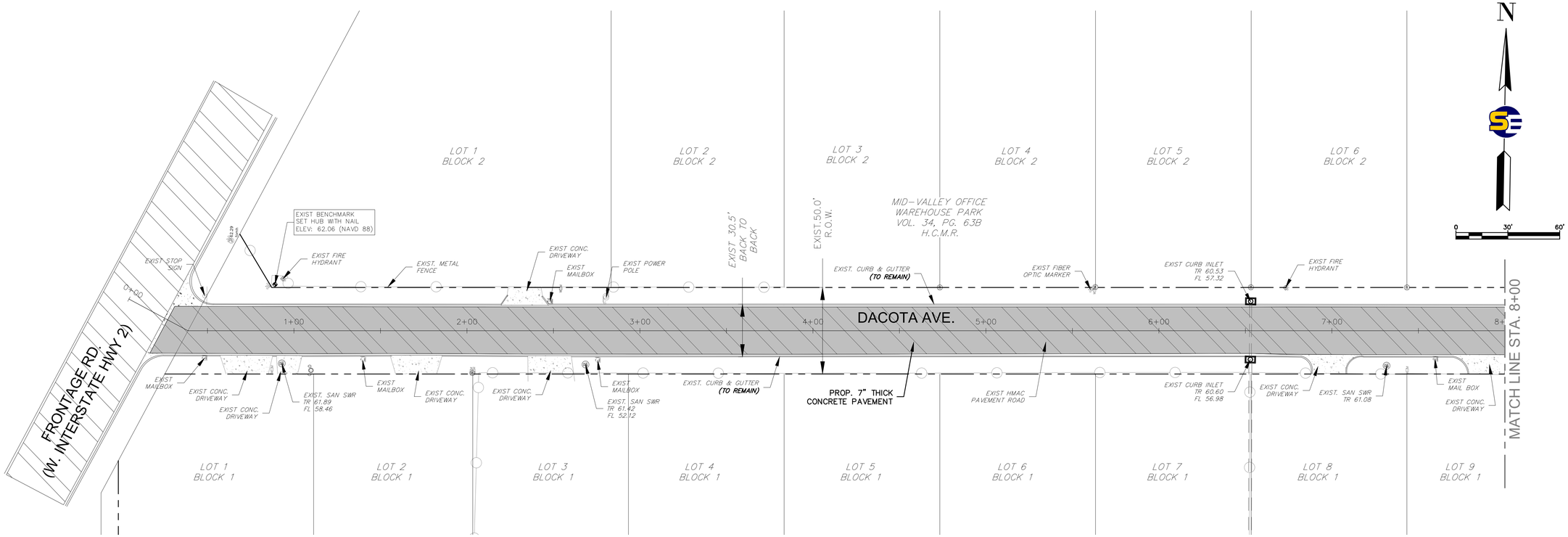
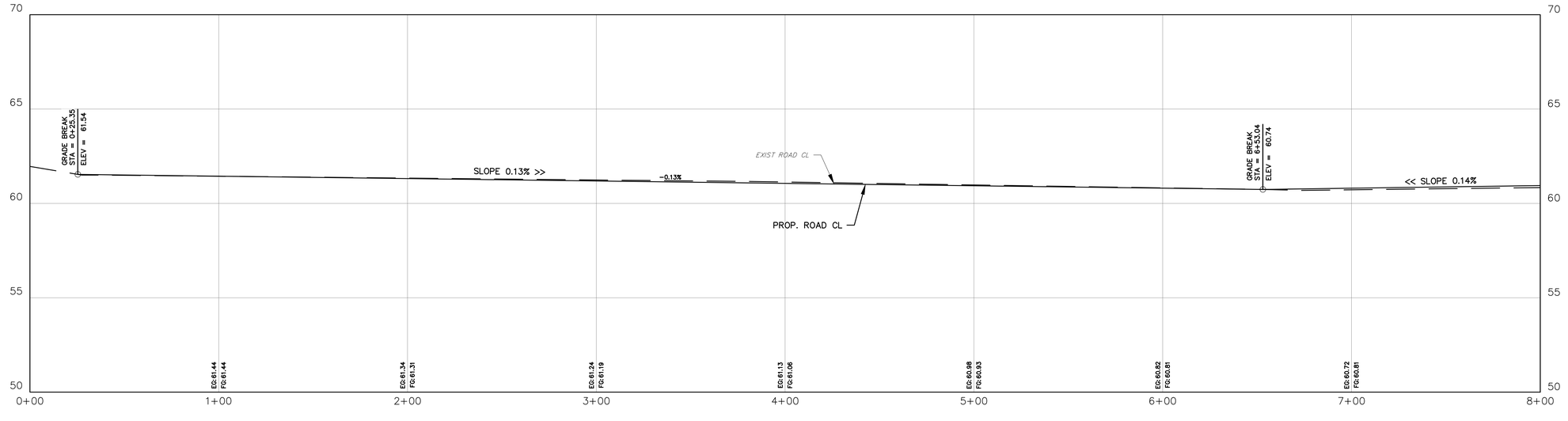


DACOTA AVE. - PLAN



DACOTA AVE. - PROFILE

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DACOTA AVE. ROADWAY IMPROVEMENTS

DACOTA AVE. – PLAN & PROFILE – STA. 0+00–8+00

C4.1

---- PLOTTED 4/22/2025 C4.1_C4.3 – DACOTA AVE.IMPROVEMENT PLAN & PROFILE.DWG

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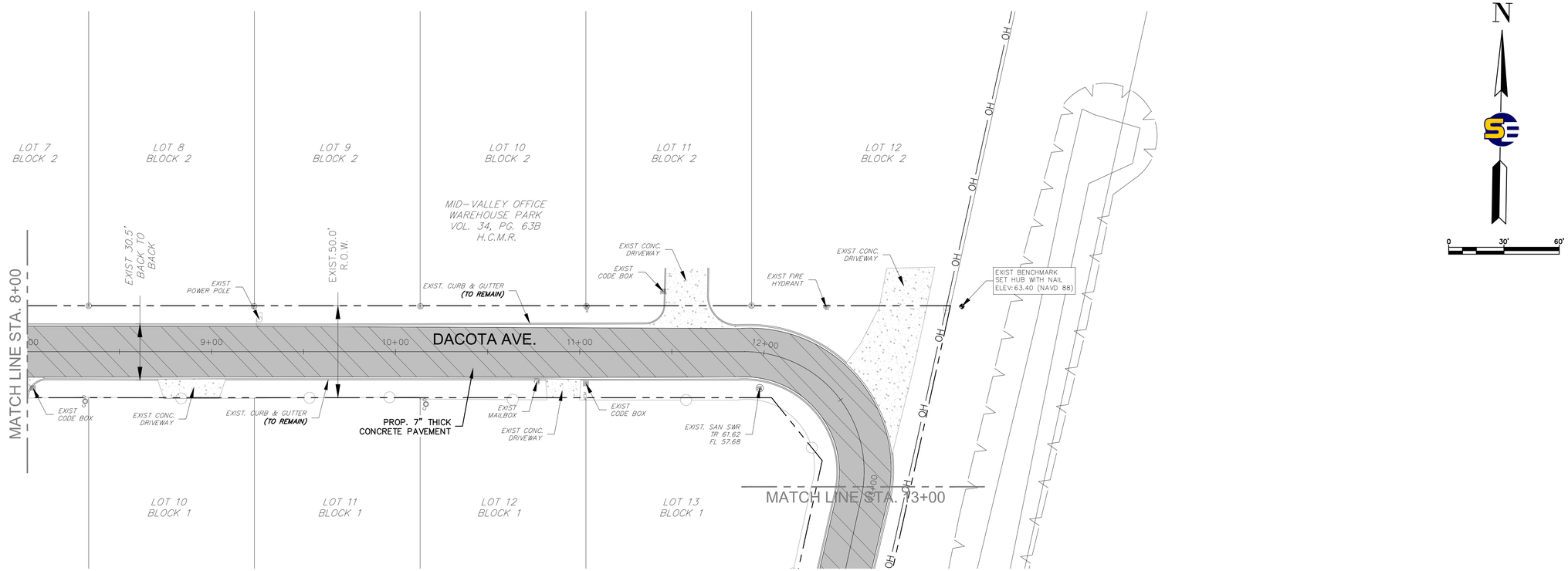
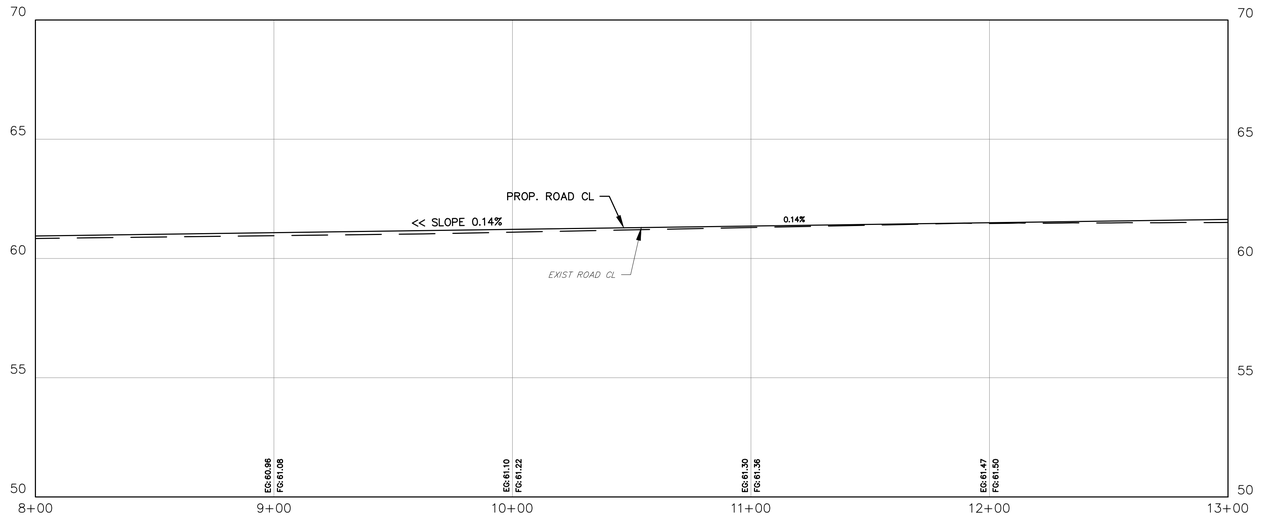


DACOTA AVE. - PLAN



DACOTA AVE. - PROFILE

N

0 30' 60'

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DACOTA AVE. ROADWAY IMPROVEMENTS

DACOTA AVE. – PLAN & PROFILE – STA. 8+00–13+00

C4.2

---- PLOTTED 4/22/2025 C4.1_C4.3 – DACOTA AVE.IMPROVEMENT PLAN & PROFILE.DWG

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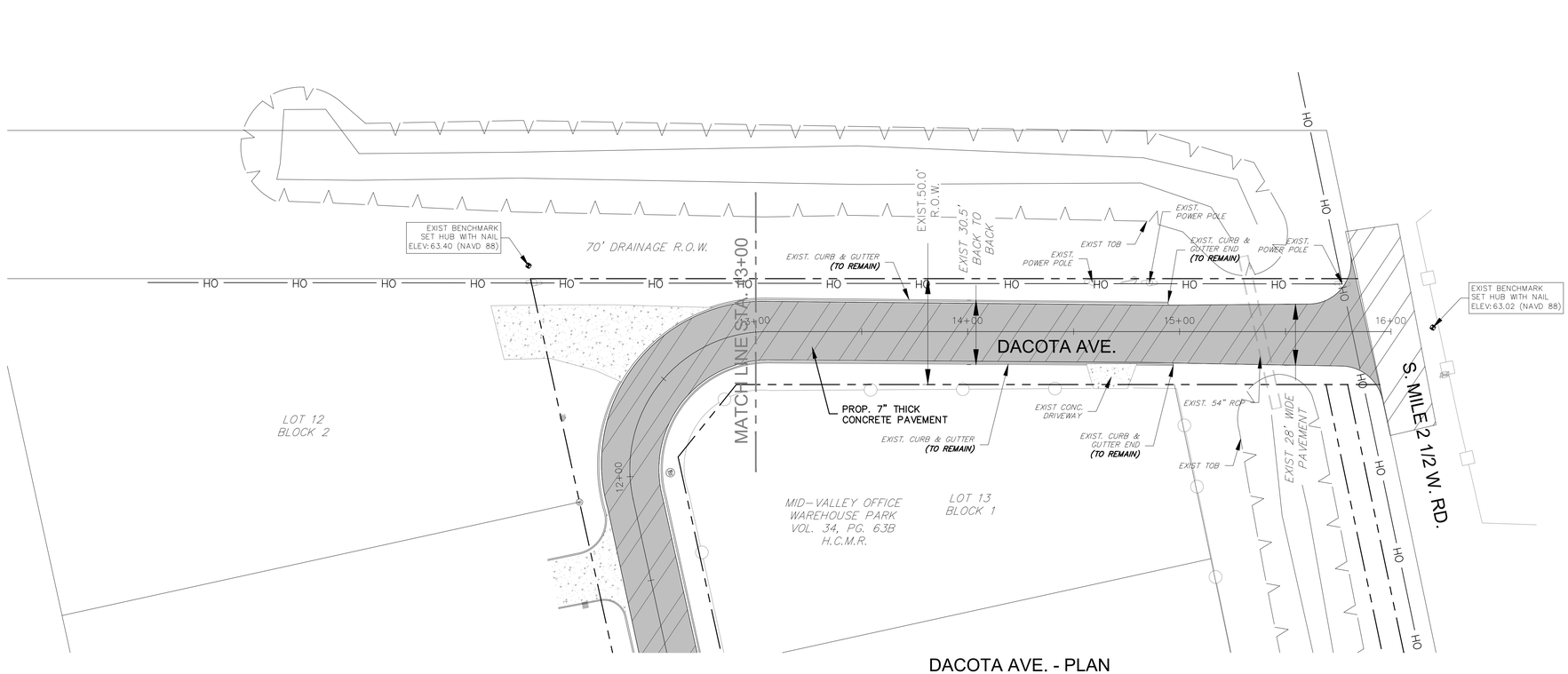
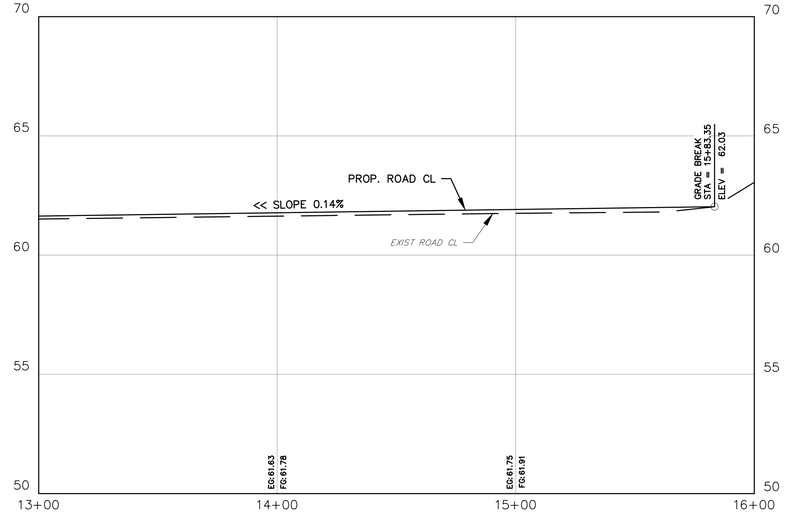


DACOTA AVE. - PLAN



DACOTA AVE. - PROFILE

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0 30' 60'

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DACOTA AVE. ROADWAY IMPROVEMENTS

DACOTA AVE. – PLAN & PROFILE – STA. 13+00–16+00

C4.3

---- PLOTTED 4/22/2025 C4.1_C4.3 – DACOTA AVE.IMPROVEMENT PLAN & PROFILE.DWG

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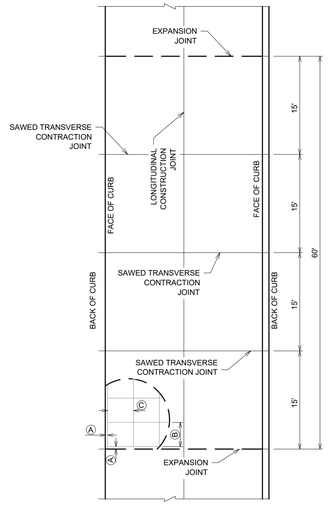
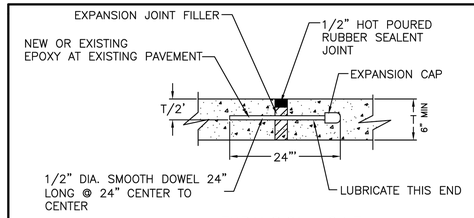
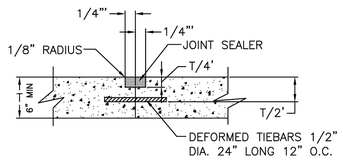


Ⓐ	Ⓑ	Ⓒ
3" - 4"	12" MAX	12" MAX

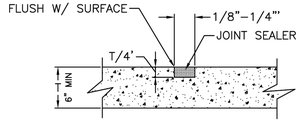
CONCRETE JOINT LAYOUT



EXPANSION JOINT



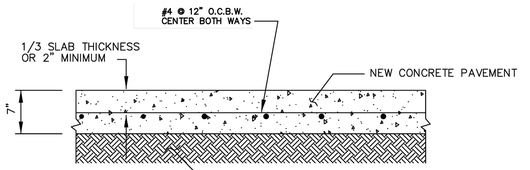
CONSTRUCTION JOINT



SAWED OR PREMOLDED STRIP LONGITUDINAL OR TRANSVERSE

SAWED CONTRACTION JOINT

city of mercedes 400 South Ohio, Mercedes, Texas 78570 (956) 565 – 3114	PAVEMENT & ROADWAY IMPROVEMENT DETAILS TYPICAL CONCRETE JOINT DETAILS	HCE PROJECT NO. P241-01	
	STANDARD DESIGN MANUAL CITY OF MERCEDES	SHEET NO. ST - 7	01/2021



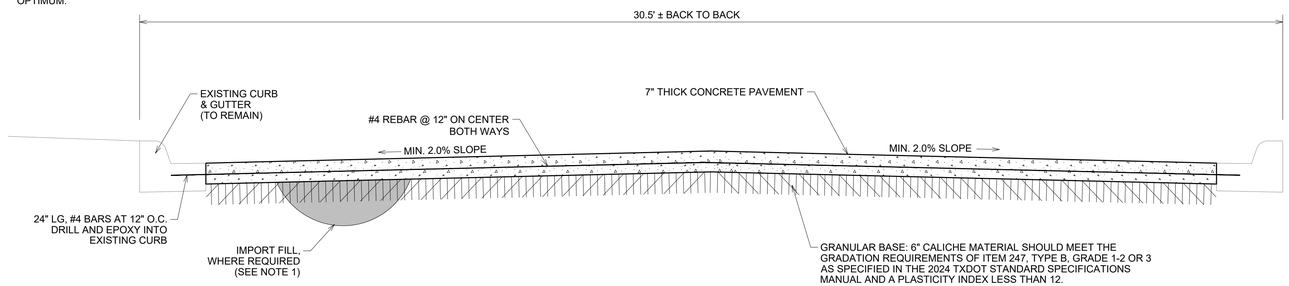
PAVEMENT SECTION: CONCRETE MIN. 4,000 PSI @28 DAYS
CONTRACTOR TO CUT 15' x 15' CONTROL JOINTS.
EXPANSION JOINTS NOT TO EXCEED 45 FT.

CONTRACTOR TO USE #4 DOWELS 24 " LONG @ 24" ON CENTER ON NEW CONSTRUCTION JOINTS WHERE NEW PAVEMENTS ARE POURED ON TWO SEPARATE DAYS. (12" OF DOWEL TO BE GREASED)

city of mercedes 400 South Ohio, Mercedes, Texas 78570 (956) 565 – 3114	PAVEMENT & ROADWAY IMPROVEMENT DETAILS TYPICAL CONCRETE PAVEMENT	HCE PROJECT NO. P241-01	
	STANDARD DESIGN MANUAL CITY OF MERCEDES	SHEET NO. ST - 27	01/2021

GENERAL NOTES

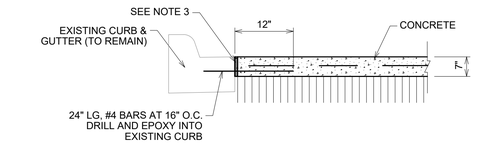
1. SUBGRADE FILL: IMPORTED FILL MATERIALS, WHEN REQUIRED TO ACHIEVE FINAL SUBGRADE ELEVATION, SHALL BE CHOSEN THAT EXHIBIT SIMILAR CLASSIFICATION AND PHYSICAL PROPERTIES AS THE ON SITE SOILS. SAMPLES OF THE FILL MATERIAL SHALL BE MADE AVAILABLE TO THE OWNER'S TESTING LABORATORY 7 DAYS PRIOR TO PLACEMENT. SUBGRADE FILL, WHETHER IMPORTED OR EXCAVATED ON-SITE, SHALL BE PLACED IN 6" LOOSE LIFTS AND COMPACTED TO 95% STANDARD PROCTOR DENSITY (ASTM D698) AT A MOISTURE CONTENT WITHIN BETWEEN -1% DRY & +3% WET OF OPTIMUM.



PROPOSED STREET CROSS SECTION

GENERAL NOTES

1. CONSTRUCTION JOINTS ARE REQUIRED AT ANY LOCATION WHERE NEW CONCRETE IS PLACED AGAINST EXISTING CONCRETE PAVEMENT OR STRUCTURES. THIS INCLUDES BUILDINGS, PARKING LOTS, SIDEWALKS, PATIOS, CURBS, INLETS, MANHOLES, HEADWALLS, LIGHT POLES, ETC, AND APPLIES TO CONCRETE THAT WAS PLACED EARLIER DURING THE PROJECT AND CONCRETE THAT WAS EXISTING PRIOR TO THE START OF THIS PROJECT.
2. CONSTRUCTION JOINTS WITHIN NEW PAVEMENT SHOULD BE PLANNED TO COINCIDE WITH EXPANSION JOINT LOCATIONS. WHEN THIS IS NOT FEASIBLE, THEN A KEYWAY STYLE CONSTRUCTION JOINT SHALL BE UTILIZED. THE LOCATION OF THE KEYWAY CONSTRUCTION JOINT SHALL COINCIDE WITH THE LOCATION OF A PLANNED CONTRACTION JOINT.
3. CONSTRUCTION JOINT SHALL BE SEALED WITH SONNEBORN BUILDING PRODUCT; SONOLASTIC SL-1; NON-PRIMING, ONE-PART, SELF LEVELING POLYURETHANE SEALANT OR APPROVED EQUAL. JOINT CLEANING AND PREPARATION SHALL BE IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.



CONCRETE ADJACENT TO EXISTING CONCRETE CURB

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LICENSED
PROFESSIONAL ENGINEER

OMAR CANO, P.E.

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REVISIONS:	REV	DESCRIPTION	DATE:	APPROVED BY:

PROJECT No. ##
PROJECT TEAM
DESIGN BY: O.C.
DRAWN BY: J.L.G.
CHECKED BY: O.C.
APPROVED BY: O.C.

PREPARED FOR:
CITY OF MERCEDES
400 S. OHIO AVE.
MERCEDES, TX 78570

DACOTA AVE. ROADWAY IMPROVEMENTS
STANDARD DETAILS

C5.0