HCDD No. 1
2021
Standard Specifications

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HIDALGO COUNTY DRAINAGE DISTRICT No. 1
STANDARD SPECIFICATIONS BOOK

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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 01554
EMERGENCY ACTION PLAN & STOP LOGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section includes requirements of an Emergency Action Plan (EAP) to address contingency plans in the event of damage to the floodway.
B. Section includes furnishing and installation of stop logs, guide frames and stop log lifters as shown on the plans and as specified herein.

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.
B. Additionally, provide the following information to confirm compliance with the specification of stop logs:
   1. Complete description of all materials including the material thickness of all structural components of the stop logs, guide frames, and stop log lifter.
   2. Installation drawings showing all details of construction, details required for installation, dimensions and anchor bolt locations.
   3. Maximum bending stress/deflection of the stop logs under the maximum design head.
   4. Name of the principle manufacturing facility.

1.4 EMERGENCY ACTION PLAN

A. The EAP document should include the following:
   1. Discussion of procedures for timely and reliable detection.
   2. Classification (level of emergency).
   3. Response procedure to a potential emergency condition.
   4. Contact personnel and agencies including primary and secondary telephone numbers.
   5. Contractor's hierarchy of responsible personnel.
   6. Traffic control measures.
   7. Identification of resources to be available on or near project site in event of damage to the floodway.
B. The EAP document should be:
   1. Approved by the IBWC and/or other agencies listed on the plans.

2. Dated, signed and sealed by a Licensed Professional Engineer.

1.5 QUALITY ASSURANCE OF STOP LOGS

A. All of the equipment specified under this Section shall be furnished by a single manufacturer with a minimum of 20 years' experience designing and manufacturing stop logs.
B. The specification is based on Aluminum Stop Logs as manufactured by Waterman Valve of Exeter, CA.

PART 2 - PRODUCTS

2.1 STOP LOGS GENERAL

A. Stop log assemblies shall be as specified herein and have the characteristics and dimensions shown on the Contract Drawings.
B. Leakage shall not exceed 0.05 gpm/ft of wetted seal perimeter.
C. The stop logs shall be provided with a continuous resilient seal along the bottom edge of each stop log. Vertical seals shall be mechanically fastened to the guide frame rails.
D. Stop logs shall be of the height as shown in the Contract Drawings and they shall be designed to function properly when stacked in any order.
E. Stop logs shall be designed to be self-draining, non-buoyant and to drop into place under their own weight without any downward pressure necessary.
F. All structural components of the stop logs shall be fabricated of aluminum and shall have adequate strength to prevent distortion during normal handling, during installation and while in service.
G. All structural components of the guide frames shall be fabricated of aluminum and/or stainless steel and shall have adequate strength to prevent distortion during normal handling, during installation and while in service.
H. All welds shall be performed by welders with AWS certification.
I. Finish: Mill finish on aluminum and stainless steel. All aluminum in contact with concrete shall be field coated by the contractor with a heavy coat of bitumastic paint. Welds on aluminum shall be cleaned to provide a uniform finish. Welds on stainless steel shall be passivated to remove weld burn and scale.
J. Materials:

Components	Materials
Frame Guides and Invert	Stainless Steel, Type 304L, Type 316L, ASTM A240, A276 Aluminum, Alloy 6061-T6, ASTM B 209, B308
Stop Logs	Aluminum, Alloy 6061-T6, ASTM B 209, B308
Lip Seal	Neoprene ASTM D-2000, EPDM
Anchor Studs, Fasteners and Nuts	Stainless Steel, Type 316, ASTM A276, F 593, F594

2.2 FRAME GUIDES

A. The frame guides or grooves and invert member shall be constructed of stainless steel or extruded aluminum with a minimum thickness of 1/4-inch.
   1. Frame design shall allow for embedded mounting or mounting directly to a wall with stainless steel anchor bolts and grout. Mounting style shall be as shown on the Contract Drawings.
   2. An invert member shall be provided across the bottom of the guides. The invert member shall be of the flush bottom type.

2.3 STOP LOGS

A. The stop logs shall be constructed of extruded aluminum shapes with a minimum thickness of 1/4-inch.
   1. Each stop log height shall be as indicated on the Contract Drawings.
   2. Maximum bending stress shall not exceed 7600 psi at the maximum operating head.
   3. Maximum deflection shall not exceed 1/360 of stop log span at the maximum operating head.
   4. Each stop log shall be provided with 2 alignment pins to ensure log stack alignment in service.
   5. Adequate drainage shall be provided for each stop log.
   6. Two slots shall be provided in the top of each stop log for removal and installation via the stop log lifter.
   7. Each stop log shall be outfitted with an identification tag indicating the manufacturer.

2.4 SEALS

A. Each stop log shall be outfitted with a continuous resilient lip seal along the bottom edge of each log.
   1. The continuous lip seal shall be constructed of rubber or EPDM and shall be mechanically retained to the stop log.
   2. The lip seal shall be activated by a combination of the weight of the stop log and the differential water pressure, which pushes the seal against the inside of the groove assembly.
   3. Stop logs that utilize rubber “J” seals or “P” seals are not acceptable.

2.5 LIFTER

A. One stop log lifter shall be provided for each different guide frame width.
   1. The lifter shall be constructed of (aluminum) (painted mild steel) (stainless steel) and shall be outfitted with UHMW guide bars and stainless-steel fasteners.

2. The lifter shall be provided with lifting hooks designed to automatically engage lifting pins through the slots in the top of the stop logs. A lanyard release will be incorporated into the design.
3. The lifter shall be capable of installing and removing all stop logs of the same width whether they are installed or at the operating floor level.

2.6 STORAGE RACKS

A. Storage racks, if shown on the Contract Drawings, shall be provided to house stop logs while they are not in use.
   1. Storage racks shall be constructed of aluminum, painted mild steel or stainless steel and shall be mounted, as shown on the Contract Drawings.

2.7 ANCHOR BOLTS

A. Anchor bolts shall be provided by the stop log manufacturer for mounting the guide frames and storage racks (if applicable).
   1. Quantity and location shall be determined by the stop log manufacturer.
   2. If epoxy type anchor bolts are provided, the stop log manufacturer shall provide the studs and nuts.
   3. For surface mount installations, anchor bolts shall have a minimum diameter of ½ inch. For embedded mount installations, anchor bolts shall have a minimum diameter of 3/8 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of the stop logs, guide frames and appurtenances shall be done in a workmanlike manner. It shall be the responsibility of the contractor to handle, store and install the equipment specified in this Section in strict accordance with the manufacturer's recommendations.
B. The contractor shall review the installation drawings and installation instruction prior to installing the guide frames.
C. The guide frames shall be installed in a true vertical plane, square and plumb.
D. The contractor shall fill the void in between the guide frames and the wall with non-shrink grout as shown on the installation drawing and in accordance with the manufacturer’s recommendations.

3.2 FIELD TESTING

A. After installation, all stop logs shall be field tested in the presence of the engineer and owner to ensure that all items of equipment are in full compliance with this Section. The stop logs shall be inserted into the guide

frames to confirm that they operate in accordance with the specification. Each stop log assembly shall be water tested by the contractor, at the discretion of the engineer and owner, to confirm that leakage does not exceed the specified allowable leakage.

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 HCDD No.1'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 01580
PROJECT SIGNS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for project identification sign installation and maintenance and for SWPPP/BMP (Storm Water Pollution Prevention Plan/Best Management Practices) sign and CSN (Construction Site Notice) holder construction, installation, maintenance and removal.

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

2.2 PROJECT SIGNS

A. Project identification sign(s) to be installed by the Contractor.
B. SWPPP/BMP Sign:
    1. Place laminated copies of Notice of Intents (NOIs) for Contractor and Owner on front of sign as required.
    2. Post both laminated Storm Water Permits upon receipt.
C. Construction Site Notice Holder(s):
    1. Place laminated Construction Site Notice on front of notice holder.

2.3 SUPPORTS

A. Project Identification Sign:
    1. When required, provide (0.4) pressure treated 12 feet long, 4 inch by 4 inch posts with appropriate hardware. Paint posts white.
B. SWPPP/BMP Sign:
    1. When required, provide (0.4) pressure treated 12 feet long, 4 inch by 4 inch posts. Paint posts white.
C. Construction Site Notice Holder(s):

1. When required, provide (0.4) pressure treated 4 feet long 2 inch by 4 inch lumber to secure notice holder. Paint posts white.

PART 3 – EXECUTION

3.1 CONSTRUCTION

A. SWPPP/BMP Sign:
   1. Construct sign roof from 3 pieces of 1 foot by 5 foot by ¾ inch thick exterior grade (EXT BC) plywood. Stack, fasten together and miter plywood for roof at 45 degree angle. Paint roof white.
   2. Construct sign from 4 foot by 4 foot by ¾ inch thick exterior grade (EXT BC) plywood. Paint sign white.
   3. Staple laminated NOIs to front of sign.
   4. Place 4 foot by 4 foot by ¼ inch clear plexiglass over notices on front of sign. Use ½ inch hot-dipped galvanized bolts, washers and nuts to secure plexiglass and sign to posts per drawing on Stormwater Pollution Prevention Detail Sheet. Use 3 bolts per post.
   5. Seal joint at top between plywood and plexiglass with white exterior grade waterproof caulk.

B. Construction Site Notice Holder(s):
   1. Construct notice holder from 1.5 foot by 1.5 foot by ¾ inch thick exterior grade (EXT BC) plywood. Paint white.
   2. Bolt notice holder to 2 by 4 inch posts with 2 hot-dipped galvanized screws per post. Paint posts white.
   3. Staple laminated Construction Site Notice to front of notice holder.
   4. Place Construction Site Notice holder at each entrance to the construction site.

3.2 INSTALLATION (WHEN REQUIRED)

A. Project Sign(s):
   1. Install Project Identification sign(s), SWPPP/BMP sign and Construction Site Notice holder(s) prior to construction start.
   2. Install, relocate, when required, and maintain all project signs for duration of Project.

B. Install sign(s) at location(s) designated by the Engineer or where shown on the Plans. Position the sign(s) in such a manner as to be fully visible and readable by the general public.

C. Install sign(s) level and plumb.

D. Project Identification Sign(s):
   1. Mount each Project Identification sign on two 12 feet long 4 inch by 4 inch posts; Install in the ground a minimum of 30 inches.

E. SWPPP/BMP Sign:
   1. Drive supports a minimum of 3 feet into ground**.**

F. Construction Site Notice Holder(s):
   1. Drive supports a minimum of 1 foot into ground.

3.3 MAINTENANCE

A. Maintain signs and supports.
B. Report deterioration or damage to the Project Identification sign(s) immediately. At the Engineer's discretion, the Engineer will provide new Project Identification sign(s). If required, install new sign(s) at no cost to the District.
C. Maintenance and replacement of the SWPP/BMP sign and Construction Site Notice holder(s) are the Contractor's responsibility at no additional cost to the District.

3.4 REMOVAL

A. Upon completion of project, remove Project Identification sign(s) and supports. Transport sign and supports to designated location, as directed by the Engineer. Restore the area prior to final payment.
B. Remove and dispose of non-reuseable foundation material. Refer to Section 02120 – Material Disposal.
C. SWPPP/BMP sign and Construction Site Notice holder(s) are to remain in place after final payment, unless directed otherwise by the Engineer.

3.5 SAMPLE SIGN

HIDALGO COUNTY
DRAINAGE DISTRICT NO.1
Raul E. Sesin, P.E., CFM – District General Manager

PROJECT NAME

Hidalgo County Drainage District No.1 Board of Directors

Judge Richard F. Cortez	-	Chairman of the Board
Commissioner David L. Fuentes	-	Board Member
Commissioner Eduardo "Eddie" Cantu	-	Board Member
Commissioner Joe M. Flores	-	Board Member
Commissioner Ellie Torres	-	Board Member

Contractor _____ Engineer: _____ Project Manager: _____

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 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 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 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 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. Measurement shall be based upon cross-sections, as required..
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 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 02378
RIPRAP AND GRANULAR FILL

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for furnishing and installing riprap and granular fill and filling and burying riprap, when required.

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.
C. Excavation for riprap and buried riprap will not be measured separately, but is incidental to riprap surface measurement.
D. Riprap and granular fill used in toe walls, grade beams or termination trenches are incidental to surface measurement.
E. Topsoil will not be measured and paid separately, but is incidental to riprap surface measurement.

1.3 DELIVERY, STORAGE AND HANDLING

A. Keep the storage area clean, firm, smooth and well drained in order that the product can be placed with a minimum of foreign matter.
B. Stockpile and handle riprap and granular fill to minimize segregation of particle sizes either in the stockpile or while loading, hauling and handling.

PART 2 – PRODUCTS

2.1 RIPRAP

A. Provide riprap consisting of broken concrete or stone. Provide riprap that is dense, durable and hard material free from cracks, seams and other defects which would increase deterioration from handling and natural causes.
B. Shape and Dimensions.
   1. Provide riprap in cubic form, rather than elongated (flat) shapes.
   2. Provide riprap with a minimum thickness of 6 inches.
   3. No more than 25 percent shall have a length greater than 2-1/2 times the width or thickness. No length shall exceed 3 times the width or thickness.
C. Do not provide spalls, fragments and chips exceeding 5 percent by weight. The dimension and shape limitations do not apply to this portion

of the riprap.

D. Where broken concrete is used, cut exposed metal flush with the surface prior to placing the riprap.
E. Provide riprap conforming to the following tables:

TABLE 1

RIPRAP GRADATION NO. 1

Percent Lighter by Weight	Stone Weight Lbs.		Volume Cubic Ft (2)		Cubical Shape Ft (Each Side)		Spherical Shape Ft (Dia.)	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
100	180	265	1.20	1.77	1.06	1.21	1.31	1.50
50	80	110	0.53	0.73	0.81	0.90	1.01	1.12
15	40	60	0.27	0.40	0.64	0.74	0.80	0.91

Notes:

1. The theoretical cube and sphere size is presented for guidance only.
2. Volume is based on 150 pcf, unit weight.
3. Riprap Gradation No. 1 is to be used where an 18 inch thick riprap mat is noted on the Plans.

TABLE 2

RIPRAP GRADATION NO. 2

Percent Lighter by Weight	Stone Weight Lbs.		Volume Cubic Ft (2)		Cubical Shape Ft (Each Side)		Spherical Shape Ft (Dia.)	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
100	260	640	1.73	4.27	1.20	1.62	1.49	2.01
50	130	200	0.87	1.33	0.95	1.10	1.18	1.37
15	40	150	0.27	1.00	0.64	1.00	0.80	1.24

Notes:

1. The theoretical cube and sphere size is presented for guidance only.
2. Volume is based on 150 pcf, unit weight.
3. Riprap Gradation No. 2 is to be used where a 24 inch thick riprap mat is noted on the Plans.

2.2 GRANULAR FILL

A. Provide granular fill consisting of concrete or stone. Provide granular fill that is dense, durable and hard material.
B. Provide granular fill, as shown on the Plans or as directed by the Engineer, to the following dimensions:
   1. Provide 3 inch to 5 inch granular fill with no material diameter less than 3 inches and no material diameter greater than 5 inches.
   2. Provide 4 inch to 8 inch granular fill with no material diameter less than 4 inches and no material diameter greater than 8 inches.
   3. Provide riprap Gradation No. 1 and Gradation No. 2 as shown on the Plans or as directed by the Engineer.

C. Do not provide spalls, fragments and chips exceeding 5 percent by weight.
D. Where broken concrete is used, cut exposed metal flush with the surface prior to placing granular fill.

2.3 GEOTEXTILE

A. Refer to Section 02379 – Geotextiles for Erosion Control Systems.

PART 3 – EXECUTION

3.1 GRADE PREPARATION

A. Refer to Section 02241 – Care and Control of Water.
B. Trim and dress the channel bottom and side slopes to proper lines and grade prior to placing riprap or granular fill. Where shown on the Plans, place geotextile in accordance with Section 02379 – Geotextiles for Erosion Control Systems.
C. The Engineer will inspect prepared section prior to placing geotextile, riprap or granular fill.

3.2 EXCAVATION AND FILL

A. Excavate the channel. Refer to Section 02315 – Excavating and Backfilling.
B. Excavate for riprap. Refer to Section 02316 – Structural Excavating and Backfilling.

3.3 RIPRAP OR GRANULAR FILL PLACEMENT

A. Place the riprap or granular fill to the slopes, lines and grades as shown on the Plans.
B. To establish a well-graded mass of riprap with minimal voids, fill voids between larger riprap blocks with spalls and smaller blocks of the largest feasible size to form a compact mass. Do not place spalls and small blocks in place of larger size riprap or granular fill.
C. Install riprap and granular fill mat to the thickness as shown on the Plans. Riprap shall have minimum mat thickness as shown on the gradation tables.
D. Place the riprap and granular fill to avoid displacement or damage to the prepared surface or geotextile and in a manner to avoid segregation of particle sizes.
E. Fill riprap voids and bury riprap a minimum of 6 inches with topsoil on side slopes as directed by the Engineer.

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 02510
POLYPROPYLENE (HPP) CORRUGATED WALL PIPE

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for Polypropylene (HPP) pipe for gravity sewers and drains, including fittings and appurtenances.

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 M330 Polypropylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter.
B. ASTM F 2881-Standard Specification for 12 to 60 in. [300 to 1500 mm] Polypropylene (HPP) Dual Wall Pipe a.11d Fittings for Non-Pressure Storm Sewer Applications.
C. ASTM F 2736- Standard Specification for 6 to 30 in. (152 to 762 mm) Polypropylene (HPP) Corrugated Single Wall Pipe and Double Wall Pipe.
D. ASTM F 2764 Standard Specification for 30 to 60 in. [750 to 1500 mm] Polypropylene (HPP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications.
E. ASTM D 2321 - Standard Recommended Practice for Underground Installation of Flexible Thermoplastic Pipe.
F. ASTM D 3212- Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
G. ASTM F 477- Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.4 SUBMITTALS

A. Refer to Section 01330 - Submittal Procedures.
B. Provide manufacturer's product specification and certification that pipe was manufactured in compliance with standards referenced in this Section.

PART 2 PRODUCTS

A. Install pipe in accordance with the manufacturers recommended

installation procedure and ASTM D 2321

2.1 GENERAL

A. Furnish corrugated-wall gravity sanitary sewer pipe with bell-and-spigot end construction conforming to ASTM D 3212. Joining will be accomplished with dual elastomeric gaskets in accordance with manufacturer's recommendations. Use integral bell-and-spigot gasketed joint designed so that when assembled, elastomeric gasket, contained in machined groove on pipe spigot, is compressed radially in pipe bell to form a positive seal. Design joint to avoid displacement of gasket when installed in accordance with manufacturer's recommendations.

B. Furnish corrugated-wall polypropylene (CPP) pipe for gravity storm sewer and storm sewer culvert pipe. Joints shall be installed such that connection of pipe sections will form continuous line free from irregularities in flow line. Suitable joints are:
   1. Integral Bell and Spigot with dual elastomeric gaskets. Bell shall overlap minimum of two corrugations of spigot end when fully engaged.

C. Jointing:
   1. Gaskets:
      a. Meet requirements of ASTM F 477. Use gasket molded into circular form or extruded to proper section and then spliced into circular form. When no contaminant is identified, use gaskets of properly cured, high-grade elastomeric compound. Basic polymer shall be natural rubber, synthetic elastomer, or blend of both.
      b. **PP** Pipes are Not allowed to be installed in potentially contaminated areas, unless approved by the Engineer.

CONTAMINANT	**GASKET MATERIAL REQUIRED**
Petroleum (diesel, gasoline)	Nitrile Rubber
Other Contaminants	As recommended by pipe manufacturer

   2. Lubricant. Use lubricant for assembly of gasketed joints which has no detrimental effect on gasket or on pipe, in accordance with manufacturer's recommendations.
   3. Diameters 12- through 60-inch shall have a reinforced bell with a polymer composite band installed by the manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install pipe in accordance with the manufacturer’s recommended

installation procedures and Section 02631 – Storm Sewers and Outfalls.

B. Install pipe in accordance with the manufacturers recommended installation procedure and ASTM D 2321
C. PP pipe is not approved in applications requiring augering of pipe.
D. Bedding and backfill: Conform to requirements of Section 02317 - Excavation and Backfill for Utilities.
E. Use only workmen trained in the installation of PP Pipe.
F. Cutting pipe: Comply with pipe manufacturer's recommendations. After cutting, leave end pipe in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 02636
REINFORCING STEEL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnishing and placing of reinforcing steel, deformed and smooth, in accordance with these specifications.

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 BARS

A. Bar reinforcement shall be deformed and shall conform to ASTM A 615, A 616, Grades 40, 60, or 75 and shall be open-hearth, basic oxygen or electric furnace new billet steel, unless otherwise indicated. Large diameter new billet steel (Nos. 14 and 18), Grade 75, and will be permitted for straight bars only.
B. Where bending of bar sizes No. 14 or No. 18 of Grades 40 or 60 is required, bend testing shall be performed on representative specimens as described for smaller bars in the applicable ASTM specification. The required bend shall be 90 degrees at a minimum temperature of 60oF around a pin having a diameter of 10 times the nominal diameter of the bar ad shall be free of cracking.
C. Spiral reinforcement shall be either smooth or deformed bars or wire of the minimum diameter indicated. Bars for spiral reinforcement shall comply with ASTM A 675, A 615 or A 617, Wire shall comply with ASTM A 82. The minimum yield strength for spiral reinforcement shall be 40,000 psi.
D. In cases where the provisions of this item are in conflict with the provisions of the ASTM Designation to which reference is made, the provisions of this item shall govern.
E. Report of chemical analysis showing the percentages of carbon, manganese, phosphorus and sulfur will be required for all reinforcing steel when it is to be welded, except for drill shafts. No tack welding will be allowed. All welding shall conform to the requirements of AWS D-1-72.

F. The nominal size and area and the theoretical weight (lbs.) of reinforcing steel bars covered by these specifications are as follows:

Bar Size Number (in.)	Diameter (in.)	Area (sq. in.)	Weight per Foot (lbs.)
3	0.375	0.11	0.376
4	0.500	0.20	0.668
5	0.625	0.31	1.043
6	0.750	0.44	1.502
7	0.875	0.60	2.044
8	1.000	0.79	2.670
9	1.128	1.00	3.400
10	1.270	1.27	4.303
11	1.410	1.56	5.313
14	1.693	2.25	7.650
18	2.257	4.00	13.60

G. Smooth bars, larger than No. 4, may be steel conforming to the above or may be furnished in any steel that meets the physical requirements of ASTM A36.
H. Smooth, round bars shall be designated by size number through No. 4. Smooth bars above No. 4 shall be designated by diameter in inches.

2.2 WELDED WIRE FABRIC

A. Wire for fabric reinforcement shall be cold-drawn from rods hot-rolled from open-hearth, basic oxygen or electric furnace billet. Wire shall conform to the requirements of the standard Specifications for Cold-Drawn Steel Wire for Concrete Reinforcement, ASTM A 82 or A496. Wire fabric, when used as reinforcement, shall conform to ASTM A 185 or A 497.
B. When wire is ordered by size numbers, the following relations between size number, diameter in inches and area shall apply unless otherwise indicated:

Size Number (in.)	Diameter (in.)	Area (sq. in.)
31	0.628	0.310
30	0.618	0.300
28	0.597	0.280
26	0.575	0.260
24	0.553	0.240
22	0.529	0.220
20	0.505	0.200
18	0.479	0.180
16	0.451	0.160
14	0.422	0.140
12	0.391	0.120
10	0.357	0.100
8	0.319	0.080
7	0.299	0.070
6	0.276	0.060
5.5	0.265	0.055
5	0.252	0.050
4.5	0.239	0.045
4	0.226	0.040
3.5	0.211	0.035
2.9	0.192	0.035
2.5	0.178	0.025
2	0.160	0.020
1.4	0.134	0.014
1.2	0.124	0.012
0.5	0.080	0.005

Note—Size numbers (in.) are the nominal cross-sectional area of the wire in hundredths of a square inch. Fractional sizes between the sizes listed above are also available and acceptable for use.

C. When deformed wire is required, the size number shall be preceded by D and for smooth wire the prefix W shall be shown.

2.3 CHAIRS AND SUPPORTS

A. Chairs and Supports shall be steel, precast mortar or concrete blocks cast in molds meeting the approval of the engineer of sufficient strength to position the reinforcement as indicated when supporting the dead load of the reinforcement, the weight of the workers placing concrete and the weight of the concrete bearing on the steel.
B. Chairs shall be plastic coated when indicated.
C. Chair types and uses shall be as follows:

Chair Types and Applicable Uses	
Structural or Architectural Elements (columns, beams, walls, slabs) exposed to weather, not subjected to sand blasting, water blasting or grinding.	Galvanized steel or steel chairs with plastic coated feet.
Structural or Architectural Elements exposed to weather and subject to sand blasting, water blasting or grinding.	Stainless steel chairs.
Structural or Architectural Elements not exposed to weather or corrosive conditions.	Uncoated steel chairs.
Slabs and grade beans cast on grade.	Steel chairs with a base with 9 inch^2 min area or sufficient area to prevent the chair from sinking into fill or subgrade. Precast mortar or concrete blocks meeting the requirements of this item may be used.

2.4 BENDING

A. The reinforcement shall be bent cold, true to the shapes indicated. Bending shall preferably be done in the shop.
B. Irregularities in bending shall be cause for rejection.
C. Unless otherwise indicated, the inside diameter of bar bends, in terms of the nominal bar diameter (d), shall be as follows:

Bend	Bar Size Number (in.)	Pin Diameter
Bends of 90° and greater in stirrups, ties, and other secondary bars that enclose another bar in the bend	3, 4, 5	4d
	6, 7, 8	6d
Bends in main bars and in secondary bars not covered above	3 through 8	6d
	9, 10, 11	8d
	14, 18	10d

2.5 STORAGE

A. Steel reinforcement shall be stored above the surface of the ground upon platforms, skids or other supports and shall be protected as far as practicable from mechanical injury and surface deterioration caused by

exposure to conditions producing rust.

B. When placed in the work, reinforcement shall be free from dirt, paint, grease, oil or other foreign materials. Reinforcement shall be free from injurious defects such as cracks and laminations.
C. Rust, surface seams, surface irregularities or mill scale will not be cause for rejection, provided the minimum dimensions, cross sectional area ad tensile properties of a hand wire brushed specimen meets the physical requirements for the size and grade of steel indicated.

2.6 SPLICES

A. No splicing of bars, except when indicated or specified herein, will be permitted without written approval of the engineer.
B. No substitution of bars will be allowed without the approval of the engineer.
C. Splices not indicated will be permitted in slabs no more than 15 inches in thickness, columns, walls and parapets, but not included for measurement, subject to the following:
   1. Splices will not be permitted in bars 30 feet or less in plan length.
   2. For bars exceeding 30 feet in plan length, the distance center to center of splices shall not be less than 30 feet minus 1 splice length, with no more than 1 individual bar length less than 10 feet.
   3. Splices not indicated, but permitted hereby, shall conform to the table below. The specified concrete cover shall be maintained at such splices and the bars placed in contact and securely tied together.

Bar Size Number (in.)	Uncoated Lap Length	Coated Lap Length
3	1 ft. 4 in.	2 ft. 0 in.
4	1 ft. 9 in.	2 ft. 8 in.
5	2 ft. 2 in.	3 ft. 3 in.
6	2 ft. 7 in.	3 ft. 11 in.
7	3 ft. 5 in.	5 ft. 2 in.
8	4 ft. 6 in.	6 ft. 9 in.
9	5 ft. 8 in.	8 ft. 6 in.
10	7 ft. 3 in.	10 ft. 11 in.
11	8 ft. 11 in.	13 ft. 5 in.

Minimum Lap Requirements for Steel Bar Sizes through No. 11

D. Spiral steel shall be lapped a minimum of 1 turn. Bar No. 14 and No. 18 may not be lapped.
E. Welding of reinforcing bars may be used only when indicated or as permitted herein. All welding operations, processes equipment, materials,

workmanship and inspection shall conform to the requirements indicated. All splices shall be of such dimension and character as to develop the full strength of the bar being spliced.

F. End preparation for butt welding reinforcing bars shall be done in the field, except Bar No. 6 and larger shall be done in the shop. Delivered bars shall be of sufficient length to permit this practice.
G. For box culvert extensions with less than 1 foot of fill, the existing longitudinal bars shall have a lap with the new bars.
H. For box extensions with more than 1 foot of fill, a minimum lap of 6 inches will be required.
I. Unless otherwise indicated, dowel bars transferring tensile stress shall have a minimum embedment equal to the minimum lap requirements.
J. Shear transfer dowels shall have a minimum embedment of 12 inches.

PART 3 - EXECUTION

3.1 PLACING

A. Reinforcement shall be placed as near as possible in the position indicated. Unless otherwise indicated, dimensions shown for reinforcement are to the centers of the bars.
B. In the plane of the steel parallel to the nearest surface of concrete, bars shall not vary from plan placement by more than 1/12 of the spacing between bars. In the plane of the steel perpendicular to the nearest surface of the concrete, bars shall not vary from plan placement by more than 1/4 inch.
C. Cover of concrete to the nearest surface of steel shall be as follows:

Item	Minimum Cover (inches)
Concrete cast against and permanently exposed to earth	3
Concrete exposed to earth or weather Bar No. 6 through No. 18 bars Bar No. 5, W31 or D31 wire and smaller	 2 1 ½
Concrete not exposed to weather or in contact with ground (slabs, walls, joints) Bar No. 14 and No. 18 Bar No. 11 and smaller	 1 ½ 1
Beams, columns Primary reinforcement, ties, stirrups, spirals:	 1 ½
Shells, folded plate members Bar No. 6 and larger: Bar No. 5, W31 or D31 wire, and smaller:	 1 1

D. Vertical stirrups shall always pass around the main tension members and be attached securely thereto. The reinforcing steel shall be spaced its required distance from the form surface by means of approved galvanized

metal spacers, metal spacers with plastic coated tips, stainless steel spacers, plastic spacers or approved precast mortar or concrete blocks. For approval of plastic spacers on a project, representative samples of the plastic shall show no visible indications of deterioration after immersion in a 5 percent solution of sodium hydroxide for 120 hours.

E. All reinforcing steel shall be tied at all intersections, except that where spacing is less than 1 foot in each direction, alternate intersections only need by tied. For reinforcing steel cages for other structural members, the steel shall be tied at enough intersections to provide a rigid cage of steel. Mats of wire fabric shall overlap each other 1 full space as a minimum to maintain a uniform strength and shall be tied at the ends and edges.
F. Where prefabricated deformed wire mats are specified or if the contractor requests, welded wire fabric may be substituted for a comparable area of steel reinforcing bar plan, subject to the approval of the engineer.
G. A suitable tie wire shall be provided in each block, to be used for anchoring to the steel. Except in unusual cases and when specifically authorized by the engineer, the size of the surface to be placed adjacent to the forms shall not exceed 2 1/2 inches square or the equivalent thereof in cases where circular or rectangular areas are provided. Blocks shall be cast accurately the thickness required and the surface to be placed adjacent to the forms shall be a true plane, free of surface imperfections.
H. Reinforcement shall be supported and tied in such a manner that sufficiently rigid case of steel is provided. If the cage is not adequately supported to resist settlement or floating upward of the steel, overturning of truss bars or movement in any direction during concrete placement, permission to continue concrete placement will be withheld until corrective measures are taken. Sufficient measurements shall be made during concrete placement to insure compliance with the above.
I. No concrete shall be deposited until the engineer has reviewed the placement of the reinforcing steel and all mortar, mud, dirt, etc., shall be cleaned from the reinforcement, forms workers' boots and tools.

END OF SECTION

SECTION 02611
REINFORCED CONCRETE PIPE

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for reinforced concrete 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. ASTM A 506 – Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe.
B. ASTM A 507 – Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
C. ASTM C 76 – Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
D. ASTM C 443 – Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
E. ASTM C 655 – Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe.
F. ASTM C 877 – External Sealing Bands for Non-circular Concrete Sewer, Storm Drain, and Culvert Pipe.

1.4 SUBMITTALS

A. Refer to Section 01330 – Submittal Procedures.
B. Submit for approval, Shop Drawings and data on piping, fittings, gaskets and appurtenances. Indicate conformance to appropriate reference standards using Certificate of Compliance.
C. Submit manufacturer's literature for product specified including materials, sizes, flow carrying capacity and installation procedures.

PART 2 – PRODUCTS

2.1 REINFORCED CONCRETE PIPE

A. Provide circular reinforced concrete pipe in accordance with the requirements of ASTM C 76 for Class III wall thickness. Provide joints comprised of rubber gaskets conforming to ASTM C 443.

B. Provide reinforced concrete arch pipe in accordance with the requirements of ASTM C 506 for Class A-III. Provide joints comprised of rubber gaskets conforming to ASTM C 877.
C. Provide reinforced concrete elliptical pipe, either vertical or horizontal, in accordance with the requirements of ASTM C 507 for Class VE-III for vertical or Class HE-III for horizontal. Provide joints comprised of rubber gaskets conforming to ASTM C 877.
D. Provide reinforced concrete D-load pipe in accordance with the requirements of ASTM C 655.

PART 3 – EXECUTION

3.1 EXCAVATION AND INSTALLATION

A. Excavate in accordance with the requirements of Section 02316 – Structural Excavating and Backfilling.
B. Install as shown on the Plans or in accordance with the requirements of Section 02631 – Storm Sewers and Outfalls.

END OF SECTION