HCDD No. 1
2021
Standard Specifications

902 N. Doolittle
Edinburg, Texas 78542

(956) 292-7080
www.hcdd1.org

HIDALGO COUNTY DRAINAGE DISTRICT No. 1
STANDARD SPECIFICATIONS BOOK

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

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 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 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 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 02630
CONCRETE MANHOLES

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for storm sewer cast-in-place and precast concrete manholes.

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. Frames, grates, rings, covers, pipe connections, stubs and stub plugs and sealant materials are incidental to the structure and shall not be measured separately.

1.3 REFERENCES

A. AASHTO - Standard Specifications for Highway Bridges.
B. ASTM C 270 – Mortar for Unit Masonry.
C. ASTM C 443 – Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
D. ASTM C 478 – Precast Reinforced Concrete Manhole Sections.
E. ASTM C 1107 – Packaged Dry, Hydraulic - Cement Grout (Nonshrink).

1.4 SUBMITTALS

A. Refer to Section 01330 – Submittal Procedures.
B. Submit for approval, Shop Drawings and data on manhole sections, base units and construction details, including reinforcement, jointing methods, frames, grates, rings, and covers, materials and dimensions. Indicate conformance to appropriate reference standards using Certificate of Compliance.
C. Submit manufacturer's literature for product specifications including materials, dimensions and installation procedures.

PART 2 – PRODUCTS

1.5 PRECAST CONCRETE MANHOLES

A. Precast concrete manhole sections shall conform to ASTM C 478 in which design is based on AASHTO HS 20 vehicle loading unless otherwise indicated on the Plans.

B. Provide joints between sections with “o”-ring gaskets conforming to ASTM C 443.
C. When base is cast monolithic with portion of vertical section, extend reinforcing in vertical section into base.
D. Precast Concrete Base: Provide suitable cutouts or holes to receive pipe and connections.

2.1 CONCRETE

A. Refer to Section 03310 – Concrete.
B. Precast Manholes.
   1. Channel Inverts: Use structural concrete for inverts not integrally formed with manhole base.
   2. Cement Stabilized Sand Foundation: Provide cement stabilized sand foundation under base section. Refer to Section 02321 – Cement Stabilized Sand.
   3. Concrete Foundation: Provide structural concrete for concrete foundation slab under manhole base section where indicated on Plans.
C. Cast-in-Place and Concrete Brick Manholes.
   1. Use concrete conforming to the requirements of Section 03310 – Concrete unless otherwise shown on the Plans or approved by the Engineer.

2.2 REINFORCING STEEL

A. Refer to Section 03310 – Concrete.

2.3 MORTAR

A. Conform to requirements of ASTM C 270, Type S using Portland cement.

2.4 MISCELLANEOUS METALS

A. Provide cast-iron frames, grates, rings and covers as shown on the Plans.

2.5 PIPE CONNECTIONS TO MANHOLES

A. Storm sewer pipe connection is line pipe grouted in place with mortar.

2.6 SEALANT MATERIALS

A. Provide sealing materials between precast concrete adjustment ring and manhole cover frame, such as Adeka Ultraseal P201 or approved equal.
B. Provide butyl sealant, such as Press-Seal EZ Stick or approved equal, for HDPE rings.

C. Provide nonshrink cement based grout requiring only addition of water conforming to ASTM C 1107.

2.7 BACKFILL MATERIALS

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

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

SECTION 02972
METAL BEAM GUARD FENCE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnishing, installing, replacing or adjusting metal beam guard fences consisting of metal beam rail elements, hardware, blocks, and support posts.

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. Tex-708-I – TxDOT Test Procedure for Sampling Galvanized Metal Products for Coating Weight.
B. Tex-713-I – TxDOT Test Procedure for Sampling Metal Beam Guard Fence Rail Element.
C. DMS-7200 – TxDOT Departmental Materials Specification for Timber Posts and Blocks for Metal Bean Guard Fence.
D. DMS-7210 – TxDOT Departmental Materials Specification for Composite Materials Posts and Blocks for Metal Beam Guard Fence.

1.4 SUBMITTALS

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

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide samples of metal beam rail elements, terminal sections, bolts, and nuts for compliance testing according to Tex-708-I and Tex-713-I to verify physical and chemical properties meet AASHTO M 180 when directed.

2.2 METAL BEAM RAIL ELEMENTS

A. Furnish new metal beam rail elements, transitions, anchor sections, and terminals that meet the requirement of the table below.
B. Type I or II is required, unless otherwise shown on the plans. Base metal for metal bean rail elements must not contain more than 0.04% phosphorus or more than 0.05% sulfur.

C. Warped or deformed rail elements will be rejected.

Specification	AASHTO M 180
Class	A – Base metal nominal thickness 0.105 in. B – Base metal nominal thickness 0.135 in.
Type	I – Zinc-coated 1.80 oz. per square foot minimum single-spot. II – Zinc-coated 3.60 oz. per square foot minimum single-spot. IV – Weathering Steel (req. when shown on the plans).
Shape	W Beam Thrie Beam W Beam to Thrie Beam Transition
Markings	Permanently mark each metal beam rail element with the information required in AASHTO M 180. In addition, permanently mark all curved sections of metal beam rail element with the radius of the curved section in the format "R=XX ft." Markings must be on the back of the metal beam rail section away from traffic and visible after erection.

2.3 POSTS

A. Furnish new round timber, rectangular timber, or rolled steel section posts in accordance with details shown on the plans and the following requirements.
B. Timber Posts: meet the requirements of DMS-7200, "Timber Posts and Blocks for Metal Beam Guard Fence."
C. Steel Posts: provide rolled sections conforming to the material requirements of ASTM A36. Drill or punch posts for standard rail attachment as shown on the plans. Low-fill culvert posts may be fabricated as galvanized "blanks" with the rail hole and the final height field fabricated. Treat all exposed post surfaces caused by the field fabrication.

2.4 BLOCKS

A. Furnish new rectangular timber or composite blocks in accordance with details shown on the plans and the following requirements.
B. Timber: Meet the requirements of DMS-7200, "Timber Posts and Blocks for Metal Beam Guard Fence."
C. Composite: Meet the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence."

2.5 FITTINGS

A. Furnish new fittings (bolts, nuts, and washers) according to the details shown on the plans.

2.6 TERMINAL CONNECTORS

A. Furnish new terminal connectors, where required, meeting the material and galvanizing requirements specified for metal beam rail elements.

2.7 CONCRETE

A. Furnish concrete for terminal anchor posts meeting the requirements for Class A concrete.

2.8 CURB

A. If indicated in the details, furnish the curb shown with metal beam guard fence transition as required.

2.9 TERMINAL ANCHOR POSTS

A. Furnish new terminal anchor posts from steel conforming to the material requirements of ASTM A36.

2.10 DRIVEWAY TERMINAL ANCHOR POSTS

A. Furnish new terminal anchor posts from steel conforming to the material requirements of ASTM A36. Fabricate posts according to Section 02997 – Metal Fabrication.

2.11 DOWNSTREAM ANCHOR POSTS

A. Furnish new terminal anchor posts consisting of new rectangular timber and new steel foundation tubes according to details shown on the plans.

2.12 DOWNSTREAM ANCHOR HARDWARE

A. Furnish new hardware (brackets, plates, struts, cables, etc.) according to the details shown on the plans and galvanized.

2.13 CONTROLLED RELEASED TERMINAL (CRT) POSTS

A. Furnish new CRT posts according to the details shown on the plans and conforming to the requirements of DMS-7200, “Timber Posts and Blocks for Metal Beam Guard Fence.”

PART 3 - EXECUTION

3.1 GENERAL CONSTRUCTION

A. Install posts and rail elements according to details shown on the plans.

3.2 POSTS

A. Install posts by either drilling or driving.
   1. Drilling: Drill holes and set posts plumb and firm to the line and grade shown. Backfill posts by thoroughly compacting material to the density of adjacent undisturbed material.
   2. Driving: Drive posts plumb with approved power hammers (steam, compressed air, vibratory, or diesel) or gravity hammers to the line and grade shown while preventing damage to the post. Use pilot holes when required and approved. Determine the size and depth of pilot holes based on results of the first few posts driven. Thoroughly tamp loosened soil around the post, fill voids with suitable material, and thoroughly compact to the density of adjacent undisturbed material.

3.3 RAIL ELEMENTS

A. Erect metal beam rail elements to produce a smooth, continuous rail paralleling the line and grade of the roadway surface or as shown on the plans. Bolt rail elements end-to-end and lap splices in the direction of traffic. Field-drill or punch holes in rail elements for special details, only when approved.

3.4 SHORT RADIUS

A. Special rail fabrication with a required radius must be as shown on the plans.

3.5 TERMINAL ANCHOR POSTS

A. Embed terminal anchor posts in concrete, unless otherwise shown on the plans.

3.6 GALVANIZING REPAIR

A. Repair all parts of galvanized steel posts, washers, bolts, and rail elements after erection where galvanizing has become scratched, chipped, or otherwise damaged.

3.7 GUARDRAIL ADJUSTMENT

A. Work includes vertical adjustment, horizontal shift, and overlap of the rail

element to meet the detail shown on the plans.

3.8 CURB

A. If indicated in the details, construct the curb shown with metal beam guard fence transition as required.

3.9 DRIVEWAY TERMINAL ANCHOR POSTS

A. Embed terminal anchor posts in concrete, unless otherwise shown on the plans.

END OF SECTION

SECTION 03310
STRUCTURAL CONCRETE

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for cast-in-place concrete.

1.2 MEASUREMENT AND PAYMENT

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

1.3 REFERENCE

A. ACI 117 – Tolerances for Concrete Construction and Materials.
B. ACI 211.1 – Selecting Proportions for Normal, Heavyweight and Mass Concrete.
C. ACI 214.3R – Simplified Version of the Recommended Practice for Evaluation of Strength Test Results of Concrete.
D. ACI 302.1R – Concrete Floor and Slab Construction.
E. ACI 304R – Measuring, Mixing, Transporting, and Placing Concrete.
F. ACI 305R – Hot Weather Concreting.
G. ACI 308 – Curing Concrete.
H. ACI 309R – Consolidation of Concrete.
I. ACI 315 – Detailing Reinforced Concrete Structures.
J. ACI 318 – Building Code Requirements for Reinforced Concrete.
K. ASTM A 82 – Steel Wire, Plain, for Concrete Reinforcement.
L. ASTM A 185 – Steel Welded Wire Reinforcement, Plain, for Concrete.
M. ASTM A 615 – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
N. ASTM A 767 – Zinc-coated (Galvanized) Bars for Concrete Reinforcement.
O. ASTM A 775 – Epoxy-Coated Steel Reinforcing Bars.
P. ASTM A 884 – Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
Q. ASTM C 33 – Concrete Aggregates.
R. ASTM C 94 – Ready-Mixed Concrete.
S. ASTM C 138 – Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
T. ASTM C 143 – Slump of Hydraulic-Cement Concrete.

U. ASTM C 150 – Portland Cement.
V. ASTM C 172 – Sampling Freshly Mixed Concrete.
W. ASTM C 173 – Air Content of Freshly Mixed Concrete by Volumetric Method.
X. ASTM C 231 – Air Content of Freshly Mixed Concrete by Pressure Method.
Y. ASTM C 260 – Air-Entraining Admixtures for Concrete.
Z. ASTM C 309 – Liquid Membrane-Forming Compounds for Curing Concrete.
AA. ASTM C 494 – Chemical Admixtures for Concrete.
BB. ASTM C 595 – Blended Hydraulic Cements.
CC. ASTM C 685 – Concrete Made by Volumetric Batching and Continuous Mixing.
DD. ASTM C 1077 – Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
EE. CPMB-100 – Concrete Plant Standards, Part 2 – Plant Control Systems.
FF. CRSI – Placing Reinforcing Bars.
GG. CRSI MSP-1 – Manual of Standard Practice.

1.4 SUBMITTALS

A. Refer to Section 01330 – Submittal Procedures.
B. Submit proposed mix design and strength test data for each type and strength of concrete used.
C. Submit laboratory reports prepared by an independent testing laboratory verifying that materials used comply with the requirements of this Section.
D. Provide manufacturer's mill certificates for reinforcing steel for inspection in the field. Steel not accompanied by manufacturer's mill certificates will not be approved. Provide specimens for testing when required by the Engineer.
E. Provide batch tickets showing mix design number and the information required by ASTM C 94 for ready-mixed concrete delivered to the site. Provide batch tickets showing the information required by ASTM C 685 for concrete produced by continuous mixing.
F. Submit certification from concrete supplier that materials and equipment used to produce and deliver concrete comply with this Section.
G. Submit Shop Drawings in accordance with ACI 315 and ACI 318, when required, showing reinforcement type, quantity, size, length, location, spacing, bending, splicing, support, fabrication details and other pertinent information.
H. For waterstops, submit product information, including manufacturer's description literature, installation instructions and specifications.
I. Submit curing procedures including materials and equipment to be used.

1.5 HANDLING AND STORAGE

A. Reinforcing Steel: Store reinforcing steel to protect it from damage and

formation of excessive rust. Protect epoxy-coated steel from damage to the coating.

PART 2 – PRODUCTS

2.1 CONCRETE MATERIALS

A. Cementitious Material:
   1. Portland Cement: ASTM C 150, TypeI/II or II, unless the use of Type III is authorized by the Engineer; or ASTM C 595, Type IP. For concrete in contact with sewage, use Type II cement.
   2. When aggregates are potentially reactive with alkalis in cement, use cement not exceeding 0.6 percent alkali content in the form of Na_2O + 0.658 K_2O.

B. Water: Clean, free from harmful amounts of oils, acids, alkalis or other deleterious substances and meeting requirements of ASTM C 94.

C. Aggregate:
   1. Coarse Aggregate: ASTM C 33. Unless otherwise indicated, use the following ASTM standard sizes: No. 357 or No. 467; No. 57 or No. 67, No. 7. Maximum size: Not larger than 1/5 of the minimum dimension between sides of forms, nor larger than 3/4 of minimum clear spacing between reinforcing bars.
   2. Fine Aggregate: ASTM C 33.
   3. Determine the potential reactivity of fine and coarse aggregate in accordance with the Appendix to ASTM C 33.

D. Air Entraining Admixtures: ASTM C 260.

E. Chemical Admixtures:
   1. Water Reducers: ASTM C 494, Type A.
   2. Water Reducer and Retarder: ASTM C 494, Type D.
   3. High Range Water Reducer (Superplasticizer): ASTM C 494, Types F and G.

F. Prohibited Admixtures: Admixtures containing calcium chloride, thiocyanate, or materials that contribute free chlorine ions in excess of 0.1 percent by weight of cement.

G. Reinforcing Steel:
   1. Use new billet steel bars conforming to ASTM A 615, ASTM A 767, or ASTM A 775, grade 40 unless otherwise shown on Plans. Use deformed bars except where smooth bars are specified. When placed in work, keep steel free of dirt, scale, loose or flaky rust, paint, oil or other harmful materials.
   2. Where shown, use welded wire fabric with wire conforming to ASTM A 185 or ASTM A 884. Supply the gauge and spacing shown, with longitudinal and transverse wires electrically welded together at points of intersection with welds strong enough not to be broken during handling or placing.
   3. Wire: ASTM A 82. Use 16-1/2 gauge minimum for tie wire unless otherwise shown on the Plans.

H. Curing Compounds: Liquid membrane-forming compounds conforming to ASTM C 309, with white or other heat reflecting pigment.

2.2 FORMWORK MATERIALS

A. Lumber and Plywood: Seasoned and of good quality, free from loose or unsound knots, knot holes, twists, shakes, decay and other imperfections which would affect strength or impair the finished surface of concrete. Use S4S lumber for facing and sheathing.
B. Formwork: For exposed concrete indicated to receive rubbed finish, provide form or form-lining surfaces free of irregularities.
C. Form Ties: Metal or fiberglass of approved type with tie holes not larger than 7/8 inch in diameter.
D. Metal Forms: Clean and in good condition, free from dents and rust, grease or other foreign material that tend to mar or discolor concrete, in a gauge and condition capable of supporting concrete and construction loads without significant distortion. Countersink bolt and rivet heads on facing sides. Use only metal forms which present a smooth surface and which line up properly.

2.3 PRODUCTION METHODS

A. Use either ready-mixed concrete conforming to requirements of ASTM C 94 or concrete produced by volumetric batching and continuous mixing in accordance with ASTM C 685.

2.4 MEASUREMENT OF MATERIALS

A. Measure dry materials by weight, except volumetric proportioning may be used when concrete is batched and mixed in accordance with ASTM C 685.
B. Measure water and liquid admixtures by volume.

2.5 DESIGN MIX

A. Use design mixes prepared by a certified testing laboratory in accordance with ASTM C 1077 and conforming to requirements of this Section.
B. Proportion concrete materials based on ACI 211.1 to comply with durability and strength requirements of ACI 318, Chapters 4 and 5, and this Section.
C. Proportioning on the basis of field experience or trial mixtures in accordance with the requirements of Section 5.3 of ACI 318 may be used, if approved by the Engineer.
D. Classification:

Type	Minimum 28-Day Compressive Strength (Lbs./sq.in.)	Maximum W/C Ratio	Air Content (Percent)	Consistency Range in Slump (Inches)	Cementitious Content (Lbs./cy)
Structural	3000	0.55	3-5	2 to 4	470
Non-Structural	1500	n/a	3-5	5 to 7	329

E. Determine air content in accordance with ASTM C 138, ASTM C 173 or ASTM C 231.

F. Use of Concrete Types: Use types of concrete as indicated on the Plans Unless indicated otherwise on the Plans or Specifications, use non-structural, unreinforced concrete for pipe plugs, seal slabs, thrust blocks, trench dams and concrete fill; use structural, reinforced concrete for all other applications.

PART 3 – EXECUTION

3.1 FORMS AND SHORING

A. Install forms in accordance with ACI 304R.

B. Provide mortar-tight forms sufficient in strength to prevent bulging between supports. Set and maintain forms to lines designated such that finished dimensions of structures are within the tolerances specified in ACI 117. Construct forms to permit removal without damage to concrete. Provide adequate cleanout openings. Before placing concrete, remove extraneous matter from within forms.

C. Unless otherwise indicated, form outside corners and edges with triangular 3/4-inch chamfer strips (measured on sides).

D. Remove metal form ties to depth of at least 3/4 inch from surface of concrete. Do not use pipe spreaders. Remove spreaders which are separate from forms as concrete is being placed.

E. Immediately before the concrete is placed, wet surface of forms which will come in contact with concrete.

3.2 PLACING REINFORCEMENT

A. Place reinforcing steel as shown on the Plans. Secure steel in position in forms to prevent misalignment. Welding of reinforcing steel is not permitted unless noted on the Plans. Maintain reinforcing steel in place using approved concrete, hot-dip galvanized metal or plastic chairs and spacers. Place reinforcing steel in accordance with CRSI Publication “Placing Reinforcing Bars.” Request inspection of reinforcing steel by the Engineer before concrete is placed.

B. Minimum spacing center-to-center of parallel bars: 2-1/2 times nominal bar diameter. Minimum cover measured from surface of concrete to face of reinforcing bar unless shown otherwise on the Plans: 2 inches.

C. Detail bars in accordance with ACI 315. Provide reinforcing steel fabricated in accordance with CRSI Publication MSP-1, “Manual of Standard Practice.” Bend reinforcing steel to required shape while steel is cold. Do not overbend steel.
D. Provide splice and development length of bars as shown on Plans. Stagger splices or locate at points of low tensile stress.

3.3 EMBEDDED ITEMS

A. Install conduit and piping as shown on the Plans. Locate and fasten conduit, piping and other embedded items in forms.

3.4 BATCHING, MIXING AND DELIVERY OF CONCRETE

A. Measure, batch, mix and deliver ready-mixed concrete in accordance with ASTM C 94 and ACI 304R. Produce ready-mixed concrete using an automatic batching system as described in CPMB-100 Concrete Plant Standards, Part 2 – Plant Control Systems.
B. Measure, mix and deliver concrete produced by volumetric batching and continuous mixing in accordance with ASTM C 685.
C. Maintain concrete workability without segregation of material and excessive bleeding. Obtain approval of the Engineer before adjustment and change of mix proportions.
D. Do not exceed the maximum water-cement ratio of the approved mix design. If all water allowed by the water-cement ratio has not been added at the start of mixing, the remaining water may be added no later than the time of delivery. Addition of water should be in accordance with ASTM C 94.
E. Do not mix concrete when the air temperature is at or below 40 degrees F and falling. Concrete may be mixed when temperature is 35 degrees F and rising. Take temperature readings in the shade, away from artificial heat. Protect concrete from temperatures below 32 degrees F until the concrete has cured for a minimum of 3 days at 70 degrees F or 5 days at 50 degrees F.
F. Conform to ACI 305R for batching concrete when air temperature is above 90 degrees F.
G. Clean, maintain and operate equipment so that it thoroughly mixes material.
H. Mixing methods other than as described above shall be used only when approved by the Engineer.

3.5 PLACING CONCRETE

A. Place and consolidate in accordance with ACI 304R and ACI 309R.
B. Give at least 24 hours advance notice to the Engineer to permit inspection of forms, reinforcing steel, embedded items and other preparations for placing concrete. Place no concrete prior to the Engineer’s inspection.

C. Schedule concrete placing to permit completion of finishing operations in daylight hours. However, if necessary to continue after daylight hours, light the site as required. If rainfall occurs after placing operations are started, provide covering to protect the work.
D. Use troughs, pipes and chutes lined with approved metal or synthetic material. Place concrete without allowing segregation. Keep chutes, troughs and pipes clean and free from coatings of hardened concrete. Do not allow aluminum material to be in contact with concrete.
E. Limit free fall of concrete to prevent segregation. Do not deposit large quantities of concrete at one location so that running or working concrete along forms is required. Do not jar forms after concrete has taken on initial set; do not place any strain on projecting reinforcement or anchor bolts.
F. Use tremies for placing concrete in walls and similar narrow or restricted locations. Use tremies made in sections, provide in several lengths, so that outlet may be adjusted to proper height during placement operations.
G. When the weather is hot enough to cause the concrete temperature to exceed 90 degrees F, employ means, such as pre-cooling aggregates and mixing water, using ice or placing at night, to maintain concrete temperature below 90 degrees F.
H. Consolidate each layer of concrete with concrete spading implements and mechanical vibrators of type and adequate number for the size of placement. Apply vibrators to concrete immediately after depositing. Do not use vibrators to aid lateral flow of concrete. Do not over-consolidate concrete.
I. Handling and Placing Concrete: Conform to ACI 302.1R, ACI 304R and ACI 309R.

3.6 CURING AND REMOVAL OF FORMS AND SHORING

A. Comply with ACI 308. Cure by preventing loss of moisture and rapid temperature change for a period of 7 days when Type I/II, II or IP cement has been used and for 3 curing days when Type III cement has been used.
B. Start curing as soon as free water has disappeared from the concrete surface after placing and finishing.
C. A curing day is any calendar day in which the temperature is above 50 degrees F for at least 19 hours. Colder days may be counted if air temperature adjacent to concrete is maintained above 50 degrees F. In continued cold weather, when artificial heat is not provided, removal of forms and shoring may be permitted at the end of calendar days equal to twice the required number of curing days.
D. Formed surfaces not requiring rubbed-finished surface:
    1. Cure by leaving forms in place for the full cure period or forms may be removed after 2 days and curing compound applied. Keep wood forms wet during the curing period. Add water as needed for other types of forms.

2. Soffit Forms: Leave soffit forms and shores in place until concrete has reached the specified design strength unless otherwise directed by the Engineer.

E. Rubbed Finish:
   1. At formed surfaces requiring rubbed finish, remove forms as soon as practicable without damaging the surface. Remove forms from surfaces requiring rubbing only as rapidly as rubbing operation progresses. Remove forms from vertical surfaces not requiring rubbed finish when concrete has aged for the required number of curing days.
   2. After rubbed-finish operations are complete, continue curing formed surfaces by using either approved curing/sealing compounds or moist cotton mats until normal curing period is complete.

F. Unformed Surfaces: Cure with approved membrane curing compound method in accordance with ASTM C 309.
   1. After concrete has received a final finish and surplus water sheen has disappeared, immediately seal surface with a uniform coating of approved curing compound, applied at the rate of coverage recommended by manufacturer or as directed by the Engineer. Provide uniform coverage at a minimum rate of 1 gallon per 180 square feet of area.
   2. Thoroughly agitate the compound during use and apply by means of approved mechanical power pressure sprayers equipped with atomizing nozzles. For application on small miscellaneous items, hand- powered spray equipment may be used. Prevent loss of compound between nozzle and concrete surface during spraying operations.
   3. Do not apply compound to a dry surface. If concrete surface has become dry, thoroughly moisten surface immediately prior to application. At locations where coating shows discontinuities, pinholes or other defects, or if rain falls on a newly coated surface before film has dried sufficiently to resist damage, apply an additional coat of compound at the specified rate of coverage.

3.7 FINISHING

A. Patch honeycomb, minor defects and form tie holes in concrete surfaces with cement mortar mixed 1 part cement to 2 parts fine aggregate. Repair defects by removing unsatisfactory material and replacing with new concrete, keyed and bonded to existing concrete. Finish to provide a uniform surface between patches and existing concrete.

B. Apply a broomed finish to all exposed surfaces of interceptor structure inlets and channel lining. Apply broomed finish in a single, continuous stroke perpendicular to flow to produce a uniform surface.

C. Apply a rubbed finish to all exposed surfaces unless directed otherwise on the Plans or by the Engineer. After pointing has set sufficiently, wet the surface and perform first surface rubbing with No. 16 carborundum

stone or approved equal. Do not add cement to form surface paste. Rub sufficiently to bring surface to paste; to remove form marks and projections; and to produce a smooth, dense surface. Spread or brush material, which has been ground to paste, uniformly over surface and allow to reset. In preparation for final acceptance, clean surfaces and perform final finish rubbing with No. 30 carborundum stone or approved equal. After rubbing, allow paste on the surface to re-set; then wash surface with clean water. Leave structure with a clean, neat and uniform finish.

3.8 DEFECTIVE WORK

A. Remove and repair defective work at no cost to the District.
B. If concrete surface is bulged, uneven, or shows honeycombing or form marks which cannot be repaired satisfactorily through patching, remove and replace the defective work as directed by the Engineer.
C. Replace or repair pitted or washed concrete as directed by the Engineer.

3.9 TESTING AND INSPECTION

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

3.10 PROTECTION

A. Refer to Section 02316 – Structural Excavating and Backfilling.
B. Provide for protection of freshly placed concrete against damage from precipitation by having sufficient material on-site to protect finished surface.

3.11 MATERIAL DISPOSAL

A. Refer to Section 02120 – Material Disposal.

END OF SECTION