

## SECTION 33 42 13 – PIPE CULVERTS

### PART 1 - GENERAL

#### 1.01 UNIT PRICES

##### A. 36" HDPE Pipe

1. Payment: Payment for "36" HDPE Pipe" shall include the HPDE Pipe, transport of all materials to the project site, temporary storage and protection of materials at the project site, all excavation, handling, stockpiling, replacement and compaction of soil material, all piping connections, gaskets, flanges, connection hardware, and all material, labor, and equipment associated with safe handling and installation of the HDPE pipe.
2. Measurement: "36" HDPE Pipe" shall be measured on a Linear Foot basis.
3. Unit of Measure: Linear Foot (LF)

##### B. HDPE Flashboard Riser Fixtures

1. Payment: Payment for "HDPE Flashboard Riser Fixtures" shall include designing and providing HDPE Flashboard Riser Fixtures in accordance with the configuration and performance criteria specified in the Contract Documents. This cost includes the HPDE Flashboard Riser Structure, timber weir boards, transport of all materials to the project site, temporary storage and protection of materials at the project site, and all material, labor, and equipment associated with safe handling and installation of the HDPE Flashboard Riser Fixtures.
2. Measurement: "HDPE Flashboard Riser Fixtures" shall be measured on a per each basis.
3. Unit of Measure: Per Each (EA)

#### 1.02 SUMMARY

- A. Section Includes:
  1. Pipe culverts.
  2. Joints and accessories.
  3. Bedding.
- B. Related Sections:
  1. Section 31 00 00 - Earthwork.

#### 1.03 REFERENCES

- A. ASTM International (ASTM)

1. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
2. ASTM F2160 - Standard Specification for Solid Wall High Density Polyethylene (HDPE) Conduit Based on Controlled Outside Diameter (OD)
3. ASTM D 2657 - Heat Fusion Joining of Polyolefin Pipe and Fittings
4. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
5. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
6. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter

#### 1.04 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on pipe, fittings and accessories.
- C. Manufacturer's Installation Instructions: Submit special procedures required to install Products specified.
- D. HDPE Flashboard Riser
  1. Shop Drawings detailing fabrication of HDPE Flashboard Riser, and conformance to all required material and fabrication standards denoted herein.
  2. Design Computations demonstrating conformance to the specified criteria herein.
  3. Design computations shall be signed and sealed by a Professional Engineer, licensed in the State of Delaware.
  4. Handling and Installation plan of the HDPE Flashboard Riser and associated anchorage and piping connections.

#### 1.05 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents:
  1. Accurately record actual locations of pipe runs, connections, and invert elevations.
  2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- C. Operation and Maintenance Data: Procedures for submittals.

## PART 2 - PRODUCTS

### 2.01 STORM DRAINAGE PIPING

- A. HDPE Polyethylene Pipe conforming to ASTM F714:
  - 1. HDPE Iron Pipe Size (IPS): 36 inches
  - 2. Diameter Ratio: DR 32.5
  - 3. Joints: ASTM D2657 Heat fusion

### 2.02 HDPE FLASHBOARD RISER

- A. General: The HDPE Flashboard Riser Body, structural steel frame, and timber weir boards shall conform to the configuration shown in the Contract Drawings.
- B. HDPE Flashboard Riser Body
  - 1. The flashboard riser body shall be comprised of HDPE material conforming to ASTM F2160.
  - 2. The flashboard riser body shall be between ¼-inch to 3/8-inch in thick.
  - 3. The flashboard riser body shall be fused to the structural steel frame in accordance with ASTM D2657.
- C. Structural Steel Framing
  - 1. The flashboard riser frame elements shall consist of standard 'L' shapes conforming to ASTM A 276, Type 316 Stainless Steel.
  - 2. All stainless steel framing connections shall be shop-welded in accordance with AWS D.1.6.
  - 3. All corner junctions shall be mitered, and free of burrs and other similar surface imperfections.
- D. Steel Anchorage to Concrete Foundation
  - 1. As a minimum design standard, the localized anchorage to the concrete foundation cap shall consist of the following, or as required by design:
    - a. ¾" diameter ASTM F1554 anchor rods
    - b. A prequalified adhesive epoxy formula, conformed to current ICC testing data.
    - c. Bent steel plate straps conforming to ASTM A 36, or as required by design.
    - d. All steel plates and shapes shall be HDG in accordance with ASTM A123.
    - e. All steel anchor rods, bolts, hex nuts, and washers shall be HDG in accordance with ASMT A153.
  - 2. The manufacturer shall provide dielectric isolation between Stainless Steel and HDG finished in accordance with the following:
    - a. Where dissimilar metals are in contact, protect surfaces with a coat conforming to FS TT-P-664 to prevent galvanic or corrosive action.

### 2.03 TIMBER WEIR BOARDS

- A. Timber weir boards shall conform to the following:

1. All timber construction shall conform to the recommendations of the national design specification for wood construction (NDS-2005) & the American Institute of Timber Construction.
2. All timber components shall be treated with ACZA or CCA in accordance with AWWA (Use category system U1-06 commodity specification G) for timber subject to saltwater immersion. Preservative retention shall be 2.50 pounds per cubic foot for all components.
3. Field teat cuts, bevels, notches, refacing, and abrasions made in accordance with AWWA M4-06. Wood preservatives are restricted use pesticides and shall be applied according to applicable standards. Provide protective equipment for all personnel that are fabricating, field treating, or handling treated timber. Trim cuts and abrasions before field treatment. Paint depressions or openings around bolt holes, joints, or gaps including recesses formed for counterboring with preservative treatment and after bolt or screw is installed. Fill with a marine silicone sealant.
4. Provide solid sawn timbers of stress rated Number 2 Southern Pine or as required by the HDPE riser manufacturer for all timber weir boards with a stress as indicated and as identified by the grade mark of a recognized association covering the species used. Number 2 Southern Pine shall be interpreted as the minimum weir board design standard for this project. The association shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used.
5. Fabricate lumber and timbers to the greatest extent possible before preservative treatment. Each piece of treated lumber or timber shall be branded by the producer in accordance with AWWA M6-96.
6. Cut, bevel, and face timbers prior to plant preservative treatment.
7. Cut and frame lumber and timber so that joints will fit over contact surface. Secure timbers in alignment. Open joints are unacceptable. Shimming is not allowed unless shown.
8. Use only full-length timber for blocking.

#### 2.04 BEDDING AND COVER MATERIALS

- A. General: Conform to Section 31 00 00 for bedding and backfill around and on top of pipe.
- B. Bedding for Flexible Pipe (HDPE): Clean course aggregate Gradation No. 57 conforming to Division 700 of the DelDOT Standard Specifications.
- C. Cover and Fill: Conform to Section 31 00 00.

#### 2.05 ACCESSORIES

- A. Geotextile Fabric: Non-woven, non-biodegradable conforming to Division 800 of the DELDOT Standard Specifications for Type 1 Engineering Fabric.
- B. Concrete: Class A Concrete conforming to Division 700 of the DelDOT Standard Specifications.
  1. Compressive strength of 3,000 psi at 28 days.
  2. Air entrained.

3. Water cement ratio of 0.488 with rounded aggregate and 0.532 with angular aggregate.
4. Maximum slump of 3.5 inch for vibrated concrete and 4 inch for non-vibrated concrete.
5. Minimum cement content of 564 pounds per cubic yard for vibrated concrete and 602 pounds per cubic yard for non-vibrated concrete.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.

### 3.02 PREPARATION

- A. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

### 3.03 EXCAVATION AND BEDDING

- A. Excavate pipe trench in accordance with Section 31 23 17.
- B. Excavate to lines and grades shown on Drawings or required to accommodate installation of encasement.
- C. Dewater excavations to maintain dry conditions and preserve final grades at bottom of excavation.
- D. Provide sheeting and shoring in accordance with Section 31 23 17.
- E. Place bedding material at trench bottom, level continuous layer not exceeding 8-inch compacted depth; compact to 95 percent per Section 31 23 17.
- F. Maintain optimum moisture content of bedding material to attain required compaction density.

### 3.04 INSTALLATION – PIPE

- A. Install in accordance with manufactures instructions and as indicated on Drawings.
- B. Install plastic pipe, fittings, and accessories in accordance with ASTM F2160.
- C. Seal joints watertight.
- D. Begin at downstream end and progress upstream.
- E. Keep pipe and fittings clean until work is completed and accepted by Engineer.

- F. Repair surface damage to pipe with protective coating with two coats of compatible bituminous paint coating.
- G. Install cover at sides and over top of pipe

### 3.05 INSTALLATION – HDPE FLASHBOARD RISER

- A. General: The HDPE Flashboard Riser shall be installed, anchored, and connected to the Water Control Structure concrete foundation cap in accordance with the manufacturer's requirements and guidelines.
  - 1. The Contractor shall submit a detailed handling and installation plan for the HDPE Flashboard Riser, with consideration for all other construction phasing associated with the water control structure.
    - a. The HDPE Flashboard Riser Shop Drawings, Handling and Installation plans shall be approved by the Engineer prior to construction.
    - b. In addition to the Engineer, the manufacturer shall review and approve the handling and installation plan to ensure the Contractor's proposed methods will not damage or impair the riser element.
  - 2. The Contractor shall construct the slip joint connection under shored and dry conditions to ensure the best quality.
  - 3. The Contractor is responsible for the proper fit and alignment of the timber weir boards.

### 3.06 PIPE ENDS

- A. Place fill at pipe ends to match embankment slopes, concrete aprons, adjacent construction, end sections, or end walls as indicated on Drawings.

### 3.07 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Lay pipe to alignment and slope gradients noted on Drawings; with maximum variation from indicated slope of 1/8 inch in 10 feet.
- C. Maximum Variation from Intended Elevation of Culvert Invert: 1/2 inch.
- D. Maximum Offset of Pipe From Indicated Alignment: 1 inch.
- E. Maximum Variation in Profile of Structure from Intended Position: 1 percent.

### 3.08 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

- B. Request inspection prior to and immediately after placing bedding.
- C. Soil Compaction Testing: In accordance with Section 31 23 17.
- D. When tests indicate Work does not meet specified requirements, remove work, replace, and retest.

### 3.09 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Protect pipe and bedding from damage or displacement until backfilling operation is in progress.

END OF SECTION