

SECTION 33 42 13
PIPE CULVERTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipe culverts.
 - 2. Joints and accessories.
 - 3. Bedding.
 - 4. Slope protection at pipe end.
- B. Related Sections:
 - 1. Section 31 23 17 - Trenching: Excavating and backfilling for culvert piping.
 - 2. Section 31 37 00 – Riprap: Erosion protection at culvert ends.

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M36 – Corrugated Steel Pipe, Metallic Coated, for Sewers and Drains.
 - 2. AASHTO M190 – Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches.
 - 3. AASHTO M196 – Corrugated Aluminum Pipe for Sewers and Drains.
 - 4. AASHTO M294 - Specification for Corrugated Polyethylene Pipe, 305- to 915-mm (12- to 36-In.) Diameter.
 - 5. AASHTO M294 - Corrugated Polyethylene Pipe
- B. ASTM International:
 - 1. ASTM A929 - Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe.
 - 2. ASTM C14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
 - 3. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 4. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
 - 5. ASTM C506 - Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe.
 - 6. ASTM C507 - Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
 - 7. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 - 8. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - 9. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- C. SCDOT Standard Specifications:
 - 1. Standard Specifications for Highway Construction, 2007, published by the South Carolina Department of Transportation.

1.3 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.

1.4 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

2.1 STORM DRAINAGE PIPING

- A. Reinforced Concrete Pipe (RCP): ASTM C76, bell and spigot or tongue and groove ends.
 - 1. Pipe Class: Class III with Wall Type B, unless otherwise shown on Drawings.
 - 2. Fittings: Reinforced concrete.
 - 3. Joints: ASTM C443, rubber compression gasket.
- B. Reinforced Non-Circular Concrete Pipe:
 - 1. Reinforced Concrete Arch Pipe: ASTM C506, Class A-III.
 - 2. Reinforced Horizontal Elliptical Concrete Pipe: ASTM C507, Class HE-II.
 - 3. Reinforced Vertical Elliptical Pipe: ASTM C507, Class VE-III.
- C. HDPE Corrugated Polyethylene Pipe: AASHTO M294, Type S or Type D.
 - 1. Fittings: PVC conforming to pipe specifications.
 - 2. Joints: ASTM F477, elastomeric gaskets.
- D. Corrugated Metal Pipe (CMP):
 - 1. Steel Pipe: ASSHTO M36, Gage 16 for 6" through 48", Gage 14 for 54", Gage 12 for 60".
 - 2. Fittings: Corrugated Steel or Aluminum to match pipe.
 - 3. Joints: Corrugated coupling bands, galvanized steel or aluminum to match pipe, minimum 10 inches wide; connected with two neoprene "O" ring gaskets per and two galvanized steel bolts.
- E. Bituminous Coated CMP: AASHTO M 190, Coated inside and out with 0.050 inch thick bituminous coating.

2.2 BEDDING AND COVER MATERIALS

- A. General: Conform to Section 31 23 17 for bedding and backfill around and on top of pipe.
- B. Bedding for Rigid Pipe (RCP): Clean sand, slightly silty sand, or slightly clayey sand having a Unified Soil Classification of SP, SP-SM or SP-SC.

- C. Bedding for Flexible Pipe (HDPE and CMP): Clean course aggregate Gradation No. 57 conforming to Division 700 of the SCDOT Standard Specifications.
- D. Cover and Fill: Conform to Section 31 23 17.

2.3 ACCESSORIES

- A. Geotextile Fabric: Non-woven, non-biodegradable conforming to Division 800 of the SCDOT Standard Specifications for Type 1 Engineering Fabric.
- B. Concrete: Class A Concrete conforming to Division 700 of the SCDOT 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

3.1 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.

3.2 PREPARATION

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

3.3 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.

3.4 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 D2321.
- 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. Lay bell and spigot pipe with bells upstream.
- G. Repair surface damage to pipe with protective coating with two coats of compatible bituminous paint coating.
- H. Install cover at sides and over top of pipe

3.5 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.

3.6 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.

3.7 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.

3.8 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