

SECTION 33 41 00
STORM UTILITY DRAINAGE PIPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Storm drainage piping.
 - 2. Accessories.
 - 3. Concrete Collars.

- B. Related Sections:
 - 1. Section 31 23 17 - Trenching: Excavation, bedding, and backfill requirements for trenching required by this Section.
 - 2. Section 33 01 32 - Sewer and Manhole Testing: Pressure, infiltration, and deflection tests.
 - 3. Section 33 05 14 - Utility Manholes and Structures: Concrete and masonry manholes, catch basins, inlets, junction boxes, and frames and grates for storm drains.

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 – Corrugated Polyethylene Pipe

- B. ASTM International:
 - 1. ASTM C14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
 - 2. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 3. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
 - 4. ASTM C924 - Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method.
 - 5. ASTM C969 - Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
 - 6. ASTM C1103 - Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
 - 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 for pipe and pipe accessories.
- C. Manufacturer's Installation Instructions: Submit special procedures required to install products specified.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

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, catch basins, cleanouts, and invert elevations.
 - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with SCDOT Standard Specifications.
- B. Maintain one copy of document on site.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum 5 years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum 5 years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Block individual and stockpiled pipe lengths to prevent moving.
- C. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
- D. Do not place pipe flat on ground. Cradle to prevent point stress.
- E. Store UV sensitive materials out of direct sunlight.

1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with local storm drain authority.
- C. Notify affected utility companies minimum of 72 hours prior to construction.

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, or as otherwise specified on Drawings.
 - 2. Fittings: Reinforced concrete.
 - 3. Joints: ASTM C443, rubber compression gasket.
- B. HDPE Corrugated Polyethylene Pipe: AASHTO M294, Type S or Type D.
 - 1. Fittings: PVC conforming to pipe specifications.
 - 2. Joints: ASTM F477, elastomeric gaskets.
- C. Corrugated Metal Pipe (CMP):
 - 1. Steel Pipe: ASSHTO M36.
 - 2. Aluminum Pipe: AASHTO M196.
 - 3. Fittings: Corrugated Steel or Aluminum to match pipe.
 - 4. 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.
- D. Bituminous Coated CMP: AASHTO M 190, Coated inside and out with 0.050 inch thick bituminous coating.

2.2 MANHOLES AND STRUCTURES

- A. Manholes: As specified in Section 33 05 14 and indicated on Drawings; covers inscribed with "STORM SEWER."
- B. Catch Basins, Inlets and Junction Boxes: Conform to Section 33 05 14 and as indicated on Drawings.

2.3 CONCRETE AND GROUT

- A. Concrete: Class A Concrete conforming to Divisions 500 and 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.
- B. Grout: Non-shrink, non-metallic in accordance with Divisions 500 and 700 of SCDOT Standard Specifications with a compressive strength of at least 5,000 psi at 3 days.

2.4 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.

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. 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.

3.3 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. Lay pipe to slope gradients indicated on Drawings; with maximum variation from indicated slope of 1/8 inch in 10 feet. Begin at downstream end and progress upstream.
- E. Assemble and handle pipe in accordance with manufacturer's instructions except as modified on the Drawings or by Engineer.
- F. Keep pipe and fittings clean until work is completed and accepted by Engineer. Cap open ends during periods of work stoppage.
- G. Lay bell and spigot pipe with bells upstream.
- H. Connect pipe to existing sewer system as indicated on Drawings at existing manhole or using doghouse manhole connection per Section 33 05 14.
- I. Install underground marking tape continuously 12 inches above pipe line.

- J. Connect to subdrainage tile system piping. Refer to Section 33 46 00.
- K. Install site storm drainage system piping to 5 feet of building and plug.

3.4 INSTALLATION - CONNECTION TO EXISTING STRUCTURES

- A. Core drill existing manhole to clean opening. Do not use pneumatic hammers, chipping guns, and sledge hammers.
- B. Install watertight neoprene gasket and seal with non-shrink concrete grout.
- C. Concrete encase new sewer pipe minimum of 24 inches to nearest pipe joint. Use epoxy binder between new and existing concrete.
- D. Prevent construction debris from entering existing sewer line when making connection.

3.5 INSTALLATION – MANHOLES, CATCH BASINS AND CLEANOUTS

- A. Install manholes in accordance with Section 33 05 14.
- B. Form bottom of excavation clean and smooth to correct elevation.
- C. Form and place cast-in-place concrete base pad or pre-cast concrete base with provision for storm sewer pipe end sections.
- D. Level top surface of base pad; sleeve concrete shaft sections to receive storm sewer pipe sections.
- E. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.
- F. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.6 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. Perform tests on storm drain system in accordance with Section 33 01 34 and local code. Perform the following tests:
 - 1. Gravity Sewer Testing:
 - a. Low Pressure Air Test.
 - b. Infiltration Test.
 - 2. Deflection Testing of Plastic Piping.
 - 3. Manhole Testing: Vacuum Test.
 - 4. Notify Engineer 72 hours in advance of test and have witness test.
- D. Soil Compaction Testing: In accordance with Section 31 23 17.
- E. When tests indicate Work does not meet specified requirements, remove work, replace, and retest.

3.7 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished Work.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.
 - 1. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.
 - 2. Repair or replace pipe that is damaged or displaced from construction operations.

END OF SECTION