

SECTION 33 31 00  
SANITARY UTILITY SEWERAGE PIPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Sanitary sewer pipe and fittings.
  2. Underground pipe markers.
  3. Connection to existing manholes.
  4. Wye branches and tees.
  5. Sanitary Laterals.
- 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 manholes, frames and lids for sanitary sewer.

1.2 REFERENCES

- A. ASTM International:
1. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
  2. ASTM A746 - Standard Specification for Ductile Iron Gravity Sewer Pipe.
  3. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
  4. ASTM C425 - Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.
  5. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
  6. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
  7. ASTM C923 - Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes and Laterals.
  8. ASTM C1479 - Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations.
  9. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
  10. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
  11. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
  12. ASTM D2729 - Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  13. ASTM D2751 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
  14. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
  15. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  16. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

- B. American Water Works Association:
  - 1. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. Through 48 in. (75 mm through 1200 mm), for Water and Other Liquids.
  - 2. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
  - 3. AWWA C153 - American National Standard for Ductile-Iron Compact Fittings for Water Service.
  - 4. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
- 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. Permits: Submit copies of construction permits obtained for this Work.
- C. Product Data: Submit catalog cuts and other pertinent data indicating proposed materials, accessories, details, and construction information.
- D. Submit reports indicating field tests made and results obtained.
- E. Manufacturer's Installation Instructions:
  - 1. Indicate special procedures required to install Products specified.
  - 2. Submit detailed description of procedures for connecting new sewer to existing sewer line and directional drilling, or pipe jacking installation.
- F. 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: Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.
- C. 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 three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum 3 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. Deliver and store valves in shipping containers with labeling in place.
- C. Block individual and stockpiled pipe lengths to prevent moving.
- D. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
- E. Do not place pipe flat on ground. Cradle to prevent point stress.
- F. Store UV sensitive materials out of direct sunlight.

## 1.8 FIELD MEASUREMENTS

- A. Verify field measurements and elevations are as indicated.

## 1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate Work with local sewerage authority. Convene pre-installation meeting minimum of one week prior to starting Work of this Section.
- C. Notify affected utility companies minimum of 72 hours prior to construction.

## PART 2 PRODUCTS

### 2.1 SANITARY SEWER PIPE AND FITTINGS

- A. PVC Flexible Joint Plastic Pipe: ASTM D3034, Type PSM, Poly (Vinyl Chloride) (PVC) material; bell and spigot style rubber ring sealed gasket joint.
  - 1. Pipe Class: SDR 35.
  - 2. Fittings: PVC conforming to pipe specifications.
  - 3. Joints: ASTM-D 3212, elastomeric gaskets.
- B. Ductile Iron Gravity Sewer Pipe: ANSI/AWWA C150, bell and spigot ends. Conforming to ASTM A-377.
  - 1. Pipe Class: 8" through 12" pressure class 350 psi., 14" and larger pressure class 250 psi.
  - 2. Fittings: Ductile iron, AWWA C110. Compact fittings, AWWA C153.
  - 3. Joints: Rubber gaskets per AWWA C111.

### 2.2 FLEXIBLE PIPE BOOT FOR MANHOLE PIPE ENTRANCES

- A. Furnish materials in accordance with authority having jurisdiction.
- B. Flexible Pipe Boot: ASTM C923, ethylene propylene rubber (EPDM), Series 300 stainless steel clamp and stainless steel hardware.

### 2.3 UNDERGROUND PIPE MARKERS

- A. Plastic Ribbon Tape: Brightly colored green continuously printed with "SANITARY SEWER" in large letters, minimum 6 inches wide by 4 mils thick.

## 2.4 MANHOLES

- A. Manholes: As specified in Section 33 05 14 and indicated on Drawings; cover inscribed with "SANITARY SEWER".

## 2.5 CONCRETE AND GROUT

- A. Concrete: Class A Concrete conforming to Division 500 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.

## 2.6 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 (DIP and 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 (PVC, ABS): 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 existing sanitary sewer utility main size, location, and inverts are as indicated on Drawings.

### 3.2 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.

### 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. Install VCP, fittings, and accessories in accordance with ASTM C12.
- D. Install RCP, fittings, and accessories in accordance with ASTM C1479.
- E. Install CIP and DIP, fittings, and accessories in accordance with applicable portions of AWWA C600.
- F. Seal joints watertight.
- G. 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.
- H. Ensure entire pipe is supported by bedding.
- I. Assemble and handle pipe in accordance with manufacturer's instructions except as modified on the Drawings or by Engineer.
- J. Keep pipe and fittings clean until work is completed and accepted by Engineer. Cap open ends during periods of work stoppage.
- K. Lay bell and spigot pipe with bells upstream.
- L. Connect pipe to existing sewer system as indicated on Drawings at existing manhole or using doghouse manhole connection per Section 33 05 14.
- M. Place haunching material, rod, and tamp per Section 31 23 17 to eliminate voids.
- N. Install underground marking tape continuously 18 inches above pipe line.

### 3.4 CONNECTION TO EXISTING MANHOLE

- A. Core drill existing manhole to clean opening. Using pneumatic hammers, chipping guns, and sledge hammers is not permitted.
- 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 MANHOLE INSTALLATION

- A. Install manholes in accordance with Section 33 05 14.

### 3.6 INSTALLATION - WYE BRANCHES AND TEES

- A. Install wye branches or pipe tees at locations indicated on Drawings concurrent with pipe laying operations. Use standard fittings of same material and joint type as sewer main.
- B. Maintain minimum 5 feet separation distance between wye connection and manhole.
- C. Use saddle wye or tee with stainless steel clamps for taps into existing piping. Mount saddles with solvent cement or gasket and secure with metal bands. Layout holes with template and cut holes with mechanical cutter.

### 3.7 INSTALLATION - SANITARY LATERALS

- A. Construct laterals from wye branch to terminal point at right-of-way or as indicated on Drawings.
- B. Where depth of main pipeline warrants, construct riser type laterals from wye branch.
- C. Maintain 3-foot minimum depth of cover over pipe.
- D. Maintain minimum 5-foot separation distance between laterals.
- E. Install watertight plug, braced to withstand pipeline test pressure thrust, at termination of lateral. Install temporary marker stake extending from end of lateral to 24 inches above finished grade. Paint top 6 inches of stake with fluorescent orange paint.

### 3.8 BACKFILLING

- A. Backfill around sides and to top of pipe in accordance with Section 31 23 17.
- B. Maintain optimum moisture content of backfill material to attain required compaction density.

### 3.9 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 test on sanitary sewage 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 and Owner 72 hours in advance of test and have witness test.
- D. Compaction Testing: In accordance with Section 31 23 17.
- E. When tests indicate Work does not meet specified requirements, remove work, replace, and retest.

### 3.10 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION