

SECTION 02610

SANITARY SEWER PIPE

PART 1 GENERAL

1.01 DESCRIPTION

- A. The work of this section includes, but is not limited to:
 - 1. Sanitary sewer gravity pipelines
 - 2. Sanitary sewer pressure pipelines
 - 3. Laterals/service connections
 - 4. Cleanout (Two Way Tee)

- B. Related Work Specified Elsewhere
 - 1. Trenching, Backfilling & Compaction: Section 02221
 - 2. Manholes: Section 02601
 - 3. Sewer Pipeline Testing: Section 02651

1.02 QUALITY ASSURANCE

- A. Reference Standards
 - 1. American National Standards Institute (ANSI):
 - A21.4 Cement-Mortar Lining for Cast-Iron and Ductile-Iron Pipe and Fittings.
 - A21.11 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
 - A21.51 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand Lined Molds, for water or other liquids.

 - 2. American Society for Testing and Materials (ASTM)
 - 377 Standard Specifications for Gray Iron and Ductile Iron Pressure Pipe

 - D3034 Specifications for Solid Wall Polyvinyl Chloride (PVC) Gravity Sewer Pipe, SDR 35 15" diameter and smaller, SDR 26 12" diameter and smaller

 - F679 Specifications for Solid Wall Polyvinyl Chloride (PVC) Gravity Sewer Pipe, SDR 35 18" diameter through 27" diameter.

 - 3. American Water Works Association (AWWA)

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C900 Standard Specifications for Polyvinyl Chloride (PVC) Pressure Pipe (DR 18), 4" diameter through 12" diameter.

- B. Reject materials contaminated with gasoline, lubricating oil, liquid or gaseous fuel, aromatic compounds, paint solvent, paint thinner, or acid solder.

1.03 SUBMITTALS

A. Certificates

- 1. Submit 2 copies of each manufacturer's certification attesting that the pipe, pipe fittings, joints, joint gaskets and lubricants meet or exceed specification requirements.

B. Test Reports

- 1. Tests of pipe shall be made by the pipe manufacturer in accordance with requirements of ASTM and/or AWWA.
- 2. Certified copies of the tests made by the manufacturer, or by a reliable commercial laboratory acceptable to the Owner, shall be submitted to the Owner prior to the first shipment of pipe.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Handling

- 1. Do not place materials on private property without written permission of the property owner.
- 2. During loading, transporting and unloading, exercise care to prevent damage to materials.
- 3. Do not drop pipe or fittings. Avoid shock or damage at all times.
- 4. Take measures to prevent damage to the exterior surface or internal lining of the pipe.

B. Storage

- 1. Pipe may be strung along alignment where approved by the Owner.
- 2. Do not stack pipe higher than recommended by the pipe manufacturer.
- 3. Store gaskets for mechanical and push-on joints in a cool, dry location out of direct sunlight and not in contact with petroleum products.

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PART 2 PRODUCTS

2.01 DUCTILE IRON PIPE

- A. Pipe (Gravity Sewer greater than ten feet in depth, Pressure Sewer, Road, Stream and Railroad Crossings)
 - 1. ANSI A21.51, Minimum Class 50 Ductile Iron Pipe unless Contract Drawings state a higher class pipe.
 - 2. Interior Linings (as approved by the Authority depending on site conditions):
 - a. Double cement-mortar lining, ANSI A21.4. or
 - b. Protecto 401, minimum thickness of 40-mils
 - 3. Exterior Bituminous coating shall be provided on all pipe and fittings.
- B. Fittings
 - 1. Ductile-iron or gray-iron, ANSI A21.10
 - 2. Provide with double cement lining as for ductile iron pipe.
- C. Joints: ANSI A21.11
 - 1. Where not specifically shown on the Contract Drawings, joints shall be push-on joint, except fittings which shall be mechanical joints. Restrained type mechanical joints, in addition to the above requirements, shall be the Lock Type mechanical joint as manufactured by United States Pipe and Foundry Company, or approved equal.
- D. Mechanical joint gaskets shall be of rubber of such quality that they will be unaffected by the liquid or gases with which they will come in contact. Gland bolts for mechanical joints shall be of high-strength, corrosion-resistant alloy with tee-head and hex nut. Rubber gaskets, Lubricants, Glands, Bolts and nuts shall conform to ANSI A21.11 standards.
- D. Rubber gaskets, Lubricants, Glands, Bolts and nuts: ANSI A21.11

2.02 Polyvinyl Chloride (PVC) Sewer Pipe

- A. Gravity Sewer Pipe and Fittings (for pipe to be installed less than 10 feet in depth)
 - 1. Pipe 4" and smaller: ASTM D-2241, SDR 26/PR 160 or SDR 21 (min.), Type PSM Polyvinyl Chloride (PVC)

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2. Pipe 6" to 15" diameter: ASTM D-3034, SDR 35 (min.), Type PSM Polyvinyl Chloride (PVC).
 3. Pipe 18" to 27" diameter: ASTM F679, SDR 35.
 4. Flexible Elastomeric Seals: ASTM 3212
Seal Material: ASTM F477
- B. Gravity Sewer Pipe and Fittings (for pipe to be installed greater than 10 feet in depth)
1. Pipe 4" and smaller: ASTM D-2241, SDR 26/PR 160 or SDR 21 (min.), Type PSM Polyvinyl Chloride (PVC)
 2. Pipe 6" to 15" diameter: ASTM D-3034, SDR 26 (min.), Type PSM Polyvinyl Chloride (PVC).
 3. Pipe 18" to 27" diameter: ASTM F679, SDR 26 (PS115).
 4. Flexible Elastomeric Seals: ASTM 3212
Seal Material: ASTM F477
- C. Pressure Pipe and Fittings (4" and Greater)
1. Outside Diameter Dimension Pipe: AWWA C900
Pressure Class 150 and conform to the requirements of DR 18.
 2. Fittings:
 - a. Polyvinyl Chloride (PVC) Fittings, Pressure Class 150 and conform to the requirements of DR 18.
- D. Pressure Pipe and Fittings (3" and Smaller)
1. Pipe: ASTM D2241 (SDR 26 - Class 160)
 2. Gaskets: ASTM F477
 3. Fittings: Pressure Class 160 conforming to Requirements of SDR 26.

2.03 CAST IRON PIPE

- A. Pipe and Fittings: ASTM A74; Extra Heavy Duty Class.
1. Hub and spigot or double hub.
- B. Joints: Double-seal compression gaskets.

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1. Gaskets: Conform to requirements of ASTM C564.

2.04 STEEL CASING PIPE

- A. Pipe: ASTM A53; 35,000 psi minimum yield strength, asphalt coated.
 1. Wall thickness as indicated on the Design Plans.
- B. Joints: Electric resistance welded.

PART 3 EXECUTION

3.01 PREPARATION

- A. Perform trench excavation to the line and grade indicated on the Contract Drawings and as specified in Section 02221.
- B. Provide pipe bedding in accordance with the Contract Drawings. Place aggregate in a manner to avoid segregation, and compact to the maximum practical density so that the pipe can be laid to the required tolerances.
- C. All pipe shall be carefully inspected for defects prior to laying. If any pipe is found to be defective, it shall be laid aside and replaced with acceptable pipe at no cost to the Owner.

3.02 LAYING PIPE IN TRENCHES

- A. Give 48 hour (minimum) notice to the Owner in advance of pipe laying operations. All pipe laying operations must be inspected by the Authority.
- B. A laser beam should be used for maintaining alignment of the pipe during the installation. Such control shall be available for check by the Owner, at all times at no additional costs. Where laser cannot be used, the Contractor shall use double offset string line methods for vertical and horizontal control of the pipe installation when approved by the Owner.
- C. Lower pipe into trench using handling equipment designed for the purpose to assure safety of personnel and to avoid damage to pipe. Do not drop pipe.
- D. Lay pipe proceeding up-grade with the bell or groove pointing upstream.
- E. The minimum allowable slope of new pipe shall be 1% or 0.01'/' regardless of pipe diameter or as approved by the Board. Lay pipe to a true uniform line with the barrel of the pipe resting solidly in bedding material throughout its length. Excavate recesses in bedding material to accommodate joints, fittings and appurtenances. Do not subject pipe to a blow or shock to achieve solid bearing or grade.

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- F. Lay each section of pipe in such a manner as to form a close concentric joint with the adjoining section and to avoid offsets in the flow line.
- G. Clean and inspect each section of pipe before joining. Assemble to provide tight, flexible joints that permit movement caused by expansion, contraction, and ground movement. Use lubricant recommended by the pipe or fitting manufacturer for making joints. If unusual joining resistance is encountered or if the pipe can not be fully inserted into the bell, disassemble joint, inspect for damage, reclean joint components, and reassemble joint.
- H. Assemble joints in accordance with recommendations of the manufacturer.
 - 1. Push-on Joints
 - a. Clean the inside of the bell and the outside of the spigot. Insert rubber gasket into the bell recess.
 - b. Apply a thin film of gasket lubricant to either the inside of the gasket or the spigot end of the pipe, or both.
 - c. Insert the spigot end of the pipe into the socket using care to keep the joint from contacting the ground. Complete the joint by forcing the plain end to the bottom of the socket. Mark pipe that is not furnished with a depth mark before assembly to assure that the spigot is fully inserted.
 - 2. Mechanical Joints
 - a. Wash the socket and plain end. Apply a thin film of soapy water. Slip the gland and gasket over the plain end of the pipe. Apply soapy water to gasket.
 - b. Insert the plain end of the pipe into the socket and seat the gasket evenly in the socket.
 - c. Slide the gland into position, insert bolts, and finger-tighten nuts.
 - d. Bring bolts to uniform tightness. Tighten bolts 180-degrees apart, alternately.
 - e. Jointing of mechanical joint pipe and fittings shall be done in accordance with the requirements of Section 9b of AWWA C600, and also in accordance with the "Notes on Method of Installation"

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3. Coupled Joints
 - a. Assemble in accordance with the manufacturer's recommendations.
4. Solvent Cemented Joints
 - a. Chamfer and deburr pipe. Clean socket and plain end. Measure and mark socket depth on outside of pipe.
 - b. Apply primer to inside socket surface using a scrubbing motion to ensure penetration. Repeated applications may be necessary. Soften surface of male end of pipe to depth of fitting socket by applying a liberal brush coat of primer. Do not pour primer on surfaces. Assure entire surface is well softened.
 - c. Repeat application of primer then apply cement uniformly to pipe while surfaces are still wet with primer.
 - d. Immediately after applying cement and while surfaces are wet, forcefully seat the pipe into the socket, and turn pipe $\frac{1}{4}$ turn during assembly to distribute cement uniformly. Assembly should be completed within 20 seconds.
- I. Disassemble and remake improperly assembled joints using a new gasket.
- J. Check each pipe installed as to line and grade in place. Correct deviation from line and grade immediately. A deviation from the designed grade as shown on the drawings, or deflection of pipe joints, will be cause for rejection. See 3.02.E
- K. Place sufficient compacted backfill on each section of pipe, as it is laid, to hold firmly in place.
- L. Clean interior of the pipe as work progresses. Where cleaning after laying is difficult because of small pipe size, use a suitable swab or drag in the pipe and pull forward past each joint immediately after the jointing has been completed.
- M. Keep trenches and excavations free of water during construction.
- N. When the work is not in progress, and at the end of each work day, securely plug open ends of pipe and fittings to prevent trench water, earth, or other substances from entering the pipes or fittings.
- O. Deflection
 1. When it is necessary to deflect pressure sewer mains from a straight alignment horizontally or vertically, do not exceed the following limits:
 - a. Ductile Iron Pipe: Deflections shall not exceed 5 degrees.
 - b. PVC: Deflections shall not exceed 2.5 degrees.

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- P. The maximum depth of pipe shall be fifteen feet or as approved by the Board.

3.03 COMBINATION TEE WYE BRANCHES AND CAPS (CLEANOUTS)

- A. Install combination tee wye branches at locations designated by the Owner concurrent with pipe laying operations. Use standard fittings of the same material and joint type as the pipeline into which they are installed. Saddles shall not be installed in lieu of combination tee wyes for new pipelines.
- B. For taps into an existing pipeline, only if approved by the Engineer, use a combination tee wye. Cut existing pipe using an approved cutting device and install new wye. Connect both ends with approved slide-on or Fernco couplings and secure with metal bands. Where approved by the Engineer, a saddle wye or tee with stainless steel clamps or core drill pipe and install watertight resistant boot. Mount saddles with gasket and secure with metal bands. Layout holes with a template and cut holes with a mechanical hole cutter. No hand cutting will be allowed.
- C. All cleanouts shall be covered with a metal sewer cover.

3.04 LATERALS

- A. Construct laterals from the combination tee wye branch to a terminal point as indicated on the drawings. A special adapter will be required where DIP pipe joins cast-iron pipe or PVC pipe. Construct laterals at a minimum slope of 0.020.
- B. Where the depth of the main pipeline warrants, construct riser type laterals from the combination tee wye branch in accordance with contract drawings. The determination as to the type of riser, slope, and depth of lateral pipe at the termination point shall be as directed by the Owner.
- C. Install an approved watertight gasketed cap, braced to withstand pipeline test pressure thrust, at the termination of the lateral. Install a temporary marker stake extending from the end of the lateral to 1-foot above finished grade. Indicate on stake the depth from finished grade to the lateral invert.
- D. Install detectable warning tape on the top of the pipe bedding for the entire length of the lateral.
- E. Inserta Tee may be used to make lateral connections ranging in diameter from 2 inches through 30 inches on gravity mainlines, with the Boards approval. Inserta Tee's will consist of a PVC hub, rubber sleeve, and stainless steel band. The stainless steel band shall be made of a minimum of 301 grade steel. The connection hole shall be core drilled with a saw purchased from Inserta Tee. The use of hole saws not purchase from Inserta Tee will void the performance warranty. The water-based solution provided by the manufacturer shall be used

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during assembly. The typical pipe lube shall not be used. Inserta Tee products include a watertight bell connection meeting the requirements of ASTM D3212 for joint performance.

3.05 DETECTABLE WARNING TAPE

A. Provide and install detectable warning tape on top of pipe bedding for laterals and where PVC pressure pipe is allowed

B. Detectable warning conform to the following

1. Color: Green
2. Thickness: 4.5 mil (min)
3. Width: 3" (min)
4. Core: Solid Aluminum Foil 0.35 mil (min)
5. Lettering: "Caution Buried Sewer" or approved equal

3.06 ROAD, STREAM AND RAILROAD CROSSINGS

A. Whether installed by boring or open cut, all road, stream and railroad crossings shall utilize ductile iron pipe.

B. Casing pipes shall be provided for all road, stream and railroad crossings.

C. Required casing pipe diameter shall be approved by the Authority Engineer

3.07 CAST-IN-PLACE CONCRETE CONSTRUCTION

A. Conform to the applicable requirements of Section 03300.

3.08 CRADLES AND ENCASEMENT

A. Provide concrete cradles and encasement for pipeline where indicated on the drawings, or as directed by the Owner.

3.09 THRUST RESTRAINT

A. Provide thrust blocking or restrained joints for pressure pipeline at all bends, tees, and changes in direction.

3.10 STREAM CROSSINGS

A. Construct sanitary sewer pipeline stream crossings in accordance with the Stream Crossing Detail on the Contract Drawings. A casing pipe shall be utilized on all stream crossings. Perform buoyancy checks as directed by the Engineer.

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3.11 BACKFILLING TRENCHES

- A. Backfill pipeline trenches only after examination of pipe laying by the Owner.
- B. Backfill trenches as specified in Section 02221.

3.12 WATER AND SEWER LINE RELATIONSHIP

- A. All sewers shall be installed in accordance with PaDEP regulations and guidelines relative to the separation distances between water mains and sanitary sewers.

3.13 TESTING

- A. All sewer pipelines shall be tested in accordance with Section 02651, Sewer Pipeline Testing.

**** END OF SECTION ****