

SECTION 00446 GRAVITY SEWER PIPE AND FITTINGS

00446.00 Scope

This section covers gravity sewer pipe materials for outfall, sewer mains and service laterals, including fittings, anchors, complete installation, and testing. Interpretation of these specifications will be by the District Engineer (Engineer) whose decision will be final.

Materials

00446.10 4-inch through 15-inch PVC Gravity Sewer Pipe and Fittings

1. Polyvinyl chloride (PVC) plastic gravity sewer pipe with integral wall bell and spigot joints for the conveyance of domestic sewage. Pipe shall be colored green for identification as sewer pipe. Pipe shall be furnished in 20-foot laying lengths. Pipe shall meet ASTM D-3034, SDR 35.
2. PVC compounds shall meet the requirements of ASTM D-1784, cell classification 12454-B.
3. Bells shall consist of an integral wall section with a solid cross-section rubber ring, factory assembled, and securely locked in place to prevent displacement during assembly. Spigot ends shall be supplied from the factory with beveled ends. Joints shall provide a tight, flexible seal meeting the requirements of ASTM D-3212. Material used for elastomeric seal in push-on joints shall meet the requirements of ASTM F-477.
4. All fittings and accessories shall be as manufactured and furnished by the pipe supplier, or approved equal, and shall have bell and/or spigot configurations compatible with that of the pipe. Fittings shall meet the same requirements as the pipe.
5. Pipe and fittings shall be Ring-Tite PVC Gravity Sewer Pipe and Fittings as manufactured by J-M Manufacturing Company, Inc.; or approved equal.

00446.11 4-inch through 15-inch Ductile Iron Pipe and Fittings

1. Use only where shown in the approved drawings.
2. Pressure Class 350 minimum thickness, conforming to ANSI/AWWA C151/A21.51. Cement mortar lined and seal coated per ANSI/AWWA C104/A21.4. Furnish in 18-foot laying lengths.
3. Push-On Joints shall be bell and spigot type with circular rubber gasket conforming to ANSI/AWWA C111/A21.11 and suitable for sewage conveyance. Plain ends of pipe shall be supplied from the factory with beveled ends. "Tyton Joint" or approved equal.
4. Mechanical Joint fittings and accessories shall meet all applicable requirements of ANSI/AWWA C110/A21.10 and C111/A21.11. All glands, bolts, and gaskets required for each fitting shall be supplied by the fitting manufacturer.
5. Material shall be U.S. Pipe or approved equal.

00446.12 Tracer Wire

Tracer wire shall consist of 12 gauge solid-core copper wire with green insulation. Splices shall be accomplished with NEC approved underground splice kits.

Construction

00446.20 Pipe Installation

1. PVC gravity pipe shall be installed, stored and handled in accordance with the manufacturer's installation guide, the Uni-Bell PVC Pipe Association Installation Guide for PVC Sewer Pipe (UNI-B-6), ASTM D-2321, the applicable standard drawings and these specifications.
2. Remove material from job site, that in the judgment of the Engineer is damaged, not as specified, or otherwise rejected.
3. Preparation of Trench. Excavate and prepare trench for pipe laying to the lines and grades as specified and shown in the project drawings. Place and compact any required foundation stabilization and at least 4 inches of pipe bedding prior to pipe laying. Excavate for pipe bell to allow full contact between pipe barrel and bedding.
4. Maximum deviation from line and grade shall not exceed $1/20\text{O}$ for line and $1/8\text{O}$ for grade. The Contractor shall use a laser to establish line and grade where practical.
5. Thoroughly clean inside the pipe before laying. Prevent foreign material from entering the pipe while it is being placed in the trench. Remove all foreign material from the inside of the pipe and joint before the next pipe is placed. Keep debris, tools, rags or other materials out of the pipes at all times. When pipe laying is not in progress, close the open end of the pipe with a water tight plug, or by other approved means to prevent entry of trench water or other foreign materials into the pipe.
6. Lay pipe up-grade with the bell-end facing in the direction of laying (up slope).
7. Properly clean and lubricate gaskets and pipe at joints and fittings. Use only the lubricant recommended by the pipe manufacturer. Ensure gasket is properly seated when assembling joints.
8. Care must be taken to ensure the pipe is not moved and the side support fill is not disturbed when moving sheeting or trench boxes.
9. Install tracer wire continuously from the main to the cleanout riser, wrapping around the riser twice. Secure to pipe every 20' and at all bends. Extend a loop of wire to the top of each cleanout.
10. All pipes shall be thoroughly flushed with water prior to testing. Removal of water and debris shall be done by exposing the pipe on the low end of the gravity main in each section after testing, and pumping water from trench to the ground surface for disposal. The Contractor shall be responsible for the removal of all debris which enters into the sewer system from construction.

00446.21 Pipe Connections

1. Make connections to existing pipes, manholes or other structures water tight, with smooth flow surfaces and curves and per the applicable standard drawings.
2. All transition pipe joints (PVC to CI etc) shall be made with an approved "Calder" coupling or equal, and shall be free of horizontal or vertical deflection at the joint.
3. Provide all service line ends not immediately connected to a building sewer with water tight plugs and markers of 2x4 lumber extending continuously from the pipe to ground surface.
4. Where the slope of the service line between the curb and the wye or tee on the sanitary sewer is greater than 45 degrees, construct a deep connection riser in conformance with the details shown on the standard plan. Avoid concentrated loads on the sewer main.
5. District personnel shall be present during taps to District mains.

00446.22 Cleanouts

1. A full size cleanout shall be provided for each service. Place the cleanout adjacent to the back of sidewalk or at the Right of Way line at the engineers discretion. The district will maintain pipe on the street side of the cleanout.
2. The cleanout shall consist of a sanitary wye, 45 degree bend and riser of the same size and material as the service line and cast iron lid set in concrete. See standard drawing.

Testing

00446.25 Low-Pressure Air Testing of Gravity Sewer - The Contractor shall furnish all equipment, materials and personnel required for properly conducting low-pressure air testing of all lines under observation of the Engineer as follows:

1. Use a pressure gauge having minimum divisions of 0.10 psig and an accuracy of +/- 0.10 psi. Provide a relief valve to limit pressure to no more than 10 psig.
2. Plug all sewer outlets with suitable test plugs, brace plugs securely. Check the average height of groundwater over the sewer. Increase the test pressure required below 0.433 psig for each foot of average water depth over the sewer. Add air slowly to the section of sewer being tested until the internal air pressure is raised to 4.0 psi greater than the average back pressure of any ground water as noted above.
3. Allow at least 2 minutes for the air temperature to stabilize, adding only the amount of air required to maintain pressure at 4 psig plus groundwater back pressure.
4. Disconnect the air supply.
5. Determine and record the time in seconds that is required for the internal air pressure to drop from 3.5 psig (plus ground water back pressure) to 2.5 psig (plus ground water back pressure).
6. Compare the time recorded in step 5 with the time required by the calculation illustrated

below:

Allowable time calculation

Record the diameter in inches and the length in feet of all pipe in the section being tested in the table below. Calculate K and C values as indicated and total them.

Diameter of Pipe (d in inches)	Length (L in feet)	K= $0.011(d^2)(L)$	C= $0.0003882(d)(L)$
		_____	_____
	Total		

If the total of all the C values is less than one, the time required by the specifications shall be two times the total of all the K values.

If the total of all the C values is more than one, the time required by the specifications shall be two times the total of all the K values divided by the total of the C values.

7. Any lines failing the above test shall be repaired or replaced and retested before acceptance by the District. Short sections or services which are impractical to pressurize may, at the option of the engineer, be tested by filling with water and observing for leaks. In this case, all joints must be observable and any observable leakage will be grounds for rejecting the pipe until the leaks are corrected.