Section 02631 - 2-INCH TO 4-INCH POLYVINYL CHLORIDE (PVC) PRESSURE PIPE

1. SCOPE. This section covers 2-inch through 4-inch buried polyvinyl chloride (PVC) pressure pipe. PVC pressure pipe shall be furnished complete with all fittings, jointing materials, anchors, blocking, encasement, and other necessary appurtenances.

PVC pipe smaller than 2 inches, pressure and leakage tests, cleaning, and disinfection are covered in other sections. Pipe trenching, bedding, and backfill are covered in the earthwork section.

2. MATERIALS.

Pipe and Couplings	ASTM D 2241, SDR 13.5, Class 315. ASTM D 1784 cell classification 12454-B, ASTM D 1869.
Fittings	
2 to 3 inch	Push-on PVC, ASTM D-3139, SDR 13.5, 315 psi.
3 and 4 inch	Standard cast iron or ductile iron ANSI/AWWA C110/A21.10, 250 psi pressure rating, or compact fittings ANSI/AWWA C153/A21.53 will be acceptable.
Joints	
Gaskets	ASTM D3139 rubber conforming to ASTM F477.
Burst Pressure Test	ASTM D 1599, 200 psi, SDR-21 minimum quick burst pressure 630 psi.
Impact Strength	ASTM D 2444.
Conductive Tracer	#12 plastic coated solid copper wire taped to the top of the pipe. See standard drawings for installation at valve boxes.
Location Tape	Non-Metallic location tape shall be placed 1 foot above mains.

Manufacturing quality control shall be maintained by frequent, regularly scheduled sampling and testing. Testing shall comply with governing standards. Pipe sections shall be in lengths of 20 feet. All PVC pipe for the water lines shall bear NSF logo for potable water application every 5 feet.

3. SHOP COATING AND LINING. The exterior surfaces of cast iron fittings shall be coated with a bituminous asphaltic coating. The interior surfaces of cast iron fittings shall be lined with cement mortar.

4. STORAGE AND HANDLING. Storage and handling shall be in accordance with Chapter 6 of AWWA Manual M23. Pipe, fittings, and accessories shall be handled in a manner that will ensure installation in sound, undamaged condition. Pipe shall not be stored uncovered in direct sunlight.

5. INSPECTION. Pipe and fittings shall be carefully examined for cracks and other defects immediately before installation; spigot ends and bells shall be examined with particular care. All defective pipe and fittings shall be removed from the site of the work.

6. LAYING PIPE. Pipe shall be protected from lateral displacement by pipe embedment material installed as specified in the earthwork section. Under no circumstances shall pipe be laid in water and no pipe shall be laid under unsuitable weather or trench conditions.

During cold weather, particular care shall be taken in handling and laying pipe to prevent impact damage.

Pipe shall be laid with bell ends facing the direction of laying except when reverse laying is specifically permitted by the Engineer.

Foreign matter shall be prevented from entering the pipe during installation.

Whenever pipe laying is stopped, the open end of the line shall be sealed with a watertight plug. All water in the trench shall be removed prior to removing the plug.

Pipe shall be kept shaded and as cool as possible during installation and shall be covered with backfill immediately after installation.

Prior to final acceptance by the Owner, Contractor shall perform continuity tests on the conductive tracer to ensure proper installation. All defective areas shall be repaired and the conductive tracer retested.

6.01. Cleaning. The interior of all pipe and fittings shall be thoroughly cleaned before installation and shall be kept clean until the work has been accepted.

6.02. Alignment. Piping shall be laid to the lines and grades indicated on the drawings. Pipelines or runs intended to be straight shall be laid straight. Deflections from a straight line or grade shall not exceed the maximum deflections specified by the manufacturer.

Unless otherwise specified or indicated on the drawings, and subject to the acceptance of the Engineer, either shorter pipe sections or fittings shall be installed as required to maintain the indicated alignment or grade.

7. CUTTING PIPE. Cutting shall comply with the pipe manufacturer's recommendations and Chapter 7 of AWWA Manual M23. Cuts shall be smooth, straight, and at right angles to the pipe axis. After cutting, the end of the pipe shall be dressed to remove all roughness and sharp corners and beveled in accordance with the manufacturer's instructions.

8. JOINTING.

8.01. Push-On Joints. Jointing operations shall conform to the instructions and recommendations of the pipe manufacturer. All joint surfaces for gasketed joints shall be lubricated immediately before the joint is completed. Gaskets and lubricants shall be as supplied by the pipe manufacturer, shall be suitable for use in potable water, shall be compatible with the pipe materials, shall be stored in closed containers, and shall be kept clean. Each spigot shall be suitably beveled to facilitate assembly.

All joints at valves, tees, Y-branches, bends, and plugs on 4-inch piping systems shall be restrained utilizing restrained push-on joints as specified in the ductile iron pipe Section 02620.

9. CONNECTIONS WITH EXISTING PIPING. Connections between new work and existing piping shall be made using fittings suitable for the conditions encountered. Each connection with an existing pipe shall be made at a time and under conditions which will least interfere with service to customers, and as authorized by the Owner. Facilities shall be provided for proper dewatering and for disposal of all water removed from the dewatered lines and excavations without damage to adjacent property.

Special care shall be taken to prevent contamination of potable water- lines when dewatering, cutting into, and making connections with existing pipe. No trench water, mud, or other contaminating substances shall be permitted to enter the lines. The interior of all pipe, fittings, and valves installed in such connections shall be thoroughly cleaned and then swabbed with, or dipped in, chlorine solution having a chlorine content of 200 milligrams per liter.

10. SERVICE CONNECTIONS. Tapping saddles or tapping sleeves shall be used for all service connections 2 inches and smaller. Direct tapping of PVC pipe will not be permitted. Fittings shall be used for service connections larger than 2 inches unless otherwise indicated on the drawings. Water service connections shall be as specified in the water service connections and meters section.

11. CONCRETE ENCASEMENT. Concrete encasement shall be installed as indicated on the drawings. Concrete and reinforcing steel shall be as specified in the cast-in-place concrete section. All pipe to be encased shall be suitably supported and blocked in proper position, and shall be anchored against flotation.

12. REACTION ANCHORAGE AND BLOCKING. All bell-and-spigot or all-bell tees, bends deflecting 22-1/2 degrees or more, valves, and plugs which are installed in piping subjected to internal hydrostatic heads in excess of 30 feet shall be provided with suitable reaction blocking, anchors, joint harness, or other acceptable means for preventing movement of the pipe caused by internal pressure. Regardless of the restraining system provided, all valves, tees, Y-branches, bends, and plugs on 4-inch piping systems shall be restrained utilizing restrained push-on joints as specified in the ductile iron pipe section.
Concrete blocking shall extend from the fitting to solid undisturbed earth and shall be installed so that all joints are accessible for repair. The dimensions of concrete reaction blocking shall be as indicated on the drawings or as directed by the Engineer. If adequate support against undisturbed ground cannot be obtained, metal harness anchorages consisting of joint clamps or tie rod and clamp systems acceptable to the Engineer shall be installed to provide the necessary thrust resistance. If the lack of suitable solid vertical excavation face is due to improper trench excavation, acceptable metal harness anchorages shall be furnished and installed by the Contractor at no additional cost to the Owner.
Reaction blocking, anchorages, or other supports for fittings installed in fills or other unstable ground shall be provided as required by the drawings or as directed by the Engineer.
All steel clamps, rods, bolts, and other metal accessories used in tapping saddles or reaction anchorages subject to submergence or in contact with earth or other fill material and not encased in concrete shall be protected from corrosion by two coats of coal tar paint applied to clean, dry metal surfaces. The first coat shall be dry and hard before the second coat is applied.

13. PRESSURE AND LEAKAGE TESTING AND DISINFECTION. After installation, PVC piping shall be tested for defective workmanship and materials by being subjected to a hydrostatic test and then disinfected as specified in the pipeline pressure and leakage testing and disinfection section.

14. DRAWINGS AND DATA. Drawings and data shall be submitted in accordance with the submittals section. Drawings and data shall include, but not be limited to, the following:

Details of joints.

Gasket material.

Pipe length.

Affidavit of Compliance.

Certification.

End of Section