

Section XV

PRESSURE SEWER (FORCE MAIN)

CONSTRUCTION PROCEDURES

This section covers construction procedures normally required for work within the District. It does not cover any special construction procedures which may be encountered for abnormal conditions.

Special construction procedures are to be presented to the District by the Developer's Design Engineer.

All design criteria, materials, and construction shall be in accordance with DHEC regulations, AWWA, and ASTM standards.

A. HANDLING OF MATERIALS

1. Handle pipe so as to ensure delivery to the trench in sound, undamaged condition:
 - a. Carry pipe into position - do not drag.
 - b. Use pinch bars or tongs for aligning or turning the pipe only on the bare end of the pipe.
 - c. Use care not to injure pipe linings.
2. Thoroughly clean interior of pipe and accessories before lowering pipe into trench. Keep clean during layout operations by plugging or other approved method.
3. Before installation, inspect each piece of pipe and each fitting for defects:
 - a. Replace material found to be defective before or after laying with sound material meeting the specified requirements.
4. Rubber gaskets: Store in a cool dark place until just prior to time of installation.

B. PIPE CUTTING

1. Cut pipe neatly and without damage to the pipe.

2. Unless otherwise recommended by the pipe manufacturer, cut pipe with mechanical cutter only.
 - a. Use wheel cutters when practicable.
 - b. Cut plastic pipe square and remove all burrs.

C. LOCATING

1. Where possible, locate pressure sewer at least ten (10) feet away, horizontally, from water mains.
2. Should ten (10) foot separation not be practical, then the pressure sewer may be located closer provided:
 - a. It is laid in a separate trench.
 - b. It is laid in the same trench with the water main located at one side on a bench of undisturbed earth.
 - c. In either of the above cases, the sewer pipe must be a minimum of 18" below the water pipe measured outside to outside.
3. Where pressure sewers cross over or under water lines, maintain 18" minimum clearance between outside edges of the two pipes.
 - a. Use full length of pressure sewer pipe located so that the joints will be equal distance from the water main.

D. ALIGNMENT OF PIPE

1. Pipelines intended to be straight shall be so laid.
2. Where vertical or horizontal alignment requires deflection from straight lines or grade, do not exceed maximum deflection recommended by the pipe manufacturer.
3. If alignment requires deflection exceeding recommended limits, furnish bends to provide angular deflections within the allowable limits.

E. PLACING AND LAYING

1. General:

- a. Lower pipe and accessories into trench by means of derrick, ropes, belt slings, or other equipment approved by the manufacturer.
- b. Do not dump or drop any of the materials into the trench.
- c. Except where necessary in making connections to other lines, lay pipe with the bells facing in the direction of laying.
- d. Rest the full length of each section of pipe solidly on the pipe bed, with recesses excavated to accommodate bells, couplings, and joints.
- e. Take up and relay pipe that has the grade or joint disturbed after laying.
- f. Do not lay pipe in water, or when trench conditions are unsuitable for the work; keep water out of the trench until jointing is completed.
- g. Securely close open ends of pipe, fittings, and valves when work is not in progress.
- h. Replace pipe where any part of lining is damaged.

2. Ductile iron pipe:

- a. Mechanical and push on joints, install in accordance with ANSI/AWWA C600.
- b. Gaskets: Handle, lubricate where necessary and install in strict accordance with manufacturer's recommendations.

3. Plastic pipe:

- a. Install in accordance with ASTM D-2321, latest revision.
- b. Clean gasket, bell or coupling interior, especially groove area.
- c. Lubricate gasket as recommended by manufacturer.

d. Align spigot to bell, insert spigot into bell until it contacts gasket uniformly.

e. Use manufacturer's approved leverage bar to bell pipe.

1) Do not use machinery.

2) Home line is to be clearly visible when pipe is joined.

4. Restrained joints:

a. Install in accordance with manufacturer's instructions.

b. Tighten set screws to the manufacturer's rated torque using a torque wrench.

1) If twist-off nuts are provided, tighten screws until nut breaks loose.

F. INSTALLATION OF AIR RELEASE VALVES

1. Compact backfill thoroughly over pressure sewer.

2. Install gravel drainage bed.

3. Set valve plumb, use a 316 stainless steel nipple between pressure sewer and valve.

4. Install manhole wall sections plumb and level.

a. Install HDPE concrete protective liner in accordance with Section XI.

G. METALLIC DETECTION TAPE

1. Install on all buried PVC lines.

2. Locate 12" below the ground surface in the pipe trench.

H. THRUST BLOCKS

1. Thrust blocking or restraint joints shall be provided at all changes in alignment greater than or equal to thirty (30) degrees.

2. Size of the blocking as detailed. For soil bearing capacities less than 2000 psf, design for specific soil and sewer pressure conditions.
3. Locate thrust blocking between solid ground and the fitting to be anchored.
4. Provide 8 mil polyethylene film between the thrust block and fitting.
5. Place the base and thrust bearing sides of thrust blocking directly against undisturbed earth.
6. Sides of thrust blocking not subject to thrust may be placed against forms.
7. Place thrust blocking so the fitting joints will be accessible for repair.

I. HYDROSTATIC TESTING

1. General:

- a. Clean and flush line of dirt and foreign material.
- b. Do not perform hydrostatic tests until at least five days after installation of concrete thrust blocking.
- c. Temporarily plug and block open ends.
- d. Tests are to be conducted in the presence of a representative of the District.

2. Leakage test:

- a. Duration of each test: At least two (2) hours.
- b. During the test, subject pressure sewer lines to a hydrostatic pressure of 100 psi.
- c. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved or approved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.
 - 1) No piping installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

- a. $L = 0.000007 \text{ SD} \times \text{sq. root of } P$; where
 - b. L = allowable leakage in gallons per hour;
 - c. S = length of pipe tested in feet;
 - d. D = nominal diameter of pipe in inches; and
 - e. P = average test pressure psi gauge.
- 2) When testing against closed metal seated valves, an additional leakage per closed valve of 0.0078 gallons per hour per inch of nominal valve size will be allowed.
 - 3) Should any test of pipe disclose leakage greater than that specified above, locate and repair the defective joint or joints until the leakage is within the specified allowance.

J. EXCAVATION AND BACKFILLING

- 1. Comply with specification Section XXII.

K. NOTICE OF CONSTRUCTION ACTIVITY

- 1. Immediately prior to the beginning of construction the "Notice of Construction Activity" form as included in the appendix is to be completed and mailed to the district representative with a copy mailed to the district's engineering representative.

L. FORCE MAINS

- 1. Velocity in force mains shall be at least two (2) feet per second at design flow. However, lower initial velocities may be permitted by the department if provisions to maintain a flushing velocity can be made, or if the wastewater does not contain suspended solids.
- 2. Force mains carrying raw domestic sewage shall be at least four (4) inches in diameter, except force mains that follow grinder pump systems or solids interceptor tanks, for which a two (2) inch diameter force main is approvable.

3. Thrust blocking or restraint joints shall be provided at all changes in alignment greater than or equal to thirty (30) degrees.
4. An automatic air relief valve shall be placed at high points in the force main sewer to prevent air locking. Vacuum relief valves may be necessary to relieve negative pressures on force mains. The Department may require alternative design in order to reduce possible odor problems from air relief valves located in highly populated areas.
5. Force mains tying onto manholes shall enter the manhole a vertical distance of not more than two (2) feet above the flow line of the receiving manhole. For connections to existing manholes, special consideration may be granted by the Department to allow the force main to enter the manhole at a higher elevation and be directed down on the inside of the manhole, if justified.
6. Design and construction of force mains shall be such that they satisfy a leakage test in accordance with American Water Works Association (AWWA) Standard C600.
7. When force mains serving individual residences (and other similar situations) connect to the primary force main serving the area, a check valve shall be placed on the individual customer's force main at the point where ownership changes in that force main.