

**I. PIPE LAYING:**

1. Laying: All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench by means of ropes or mechanical equipment. Under no conditions may they be dropped or thrown. If he so desires, the inspector may hammer test ductile iron pipe before it is lowered into the trench. Ends of all pipe must be thoroughly cleaned.

After placing a length of pipe in the trench, the spigot end shall be centered in the bell; the pipe forced home and brought to the proper grade and alignment. The pipe shall be secured in place with proper backfill material tamped around and over it except at the bells. Bells shall be in the direction of the laying operations.

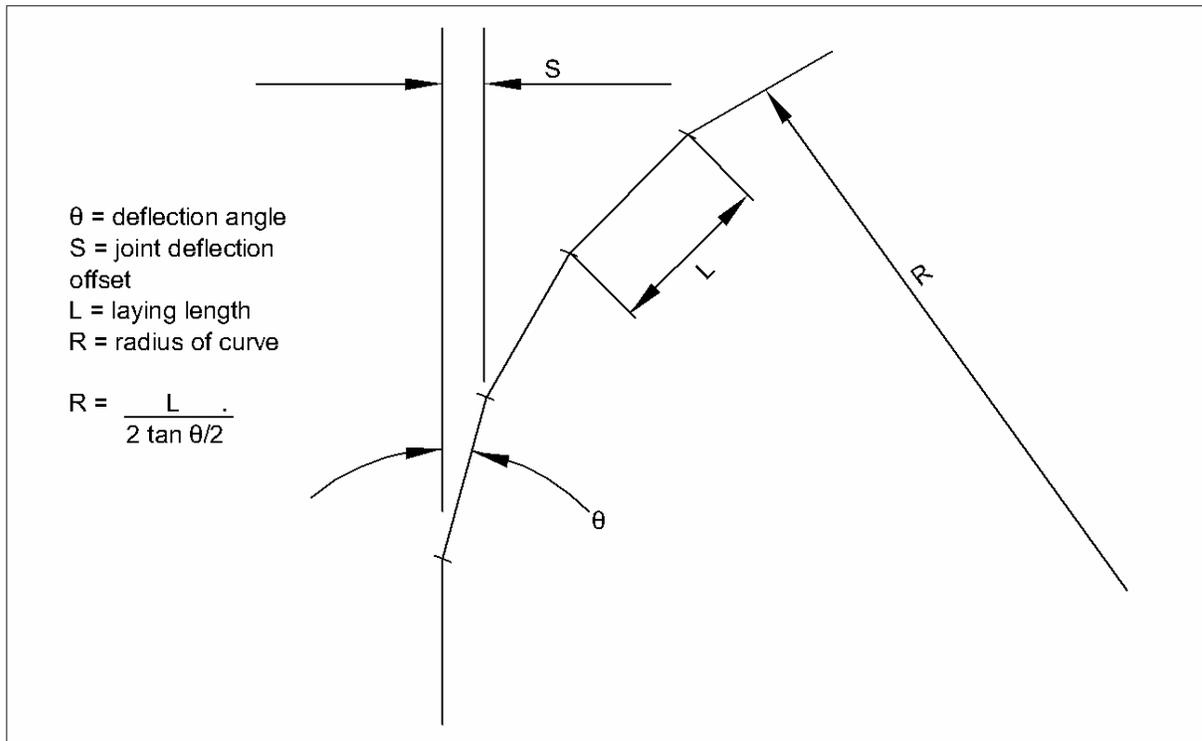
Precautions shall be taken to protect the interiors of pipes, fittings, and valves against contamination prior to and during installation in accordance with the latest revision of AWWA 651. All openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Joints of all pipe in the trench shall be completed before work is stopped. If water accumulates in the trench, the plugs shall remain in place until the trench is dry. The interior of each section of pipe shall be inspected immediately prior to installation in the trench to insure it is clean of critters, dirt, debris or other foreign matter.

All joint deflections must be within the pipe manufacturer's recommendations, and are hereby included in and made a part of these specifications. PVC pipe may be deflected around curves so long as deflection is in the joint only. No strain shall be placed on the pipe for the purpose of deflection. Manufacturers may vary in the amount of deflection which can be obtained in the pipe joint and their specifications should be consulted.

Maximum Joint Deflection\* Full Length DI Pipe – push-on type joint pipe

Nominal Pipe Size Inches	Deflection Angle – $\theta$ Degrees	Maximum Offset – S Inches		Approximate Radius of Curve – R Produced by Succession of Joints Feet	
		L=18 feet	L=20 feet	L=18 feet	L=20 feet
6	5	19	21	205	230
8	5	19	21	205	230
12	5	19	21	205	230
16	3*	11	12	340	380
20	3*	11	12	340	380
24	3*	11	12	340	380

\*For 16 inch and larger push-on joints, maximum deflection angle may be larger than shown above. Consult the manufacturer.



Allowable bending for PVC pressure pipe\*

Nominal Pipe Size – Inches	Maximum Bending Radius – Feet
6	144
8	189
12	275
*ANSI/AWWA C900 PVC pipe with cast iron (CI) outside diameters	

2. Jointing: All joints must be made as per the manufacturers and AWWA Specifications.
3. Valves: Valves shall be located as designated by Water Department at street, bridge, railroad, waterway crossings, dead ends, and at all fire hydrants.

All valves shall be protected by a valve box (See Section E).

4. Polyethylene Encasement: All ductile iron pipe, valves and fittings shall be fully bagged with 12 mil (min) polyethylene wrap in accordance with ANSI/AWWA C105/A21.5-05.
5. Locator Wire: All water mains owned by the City of Columbia shall be installed with a locator wire attached. The wire shall be 12 gauge AWG-THHN solid copper, insulation thickness .030”, and used in minimum 500 foot rolls for open trench installation. The wire shall be 12 gauge copper clad steel with HDPE insulation, thickness .045” for directional boring installation. In both cases, the wire shall be installed with as few splices as possible. Splices shall utilize end to end 3M DBR connectors, sealed with silicone sealant, aqua seal or equal and covered with scotch #33 electrical tape. No bare wire shall be exposed. The two ends of the wire shall be knotted to prevent strain on the splice. Branch connections shall be made without cutting the main wire utilizing a connection clip and sealing the joint the same as splices.

The wire shall be securely attached to the pipe to retain its position during backfill. The wire shall be looped into each valve box through a hole just below the cap or lid with enough wire to extend 12" above final grade. For fire hydrant lines with the hydrant located more than 5' from the valve, a single wire from the valve to the hydrant shall be installed.

The wire length between surface points shall not exceed 1000'. If no valve box is available to surface the wire a 2" curb box shall be used.

After construction is complete and final grading is done, a continuity test must be performed on the wire. Any breaks in the circuit must be repaired by the Contractor prior to acceptance of the water main by the City.