

DESIGN CRITERIA FOR  
WATER LINE CONSTRUCTION

- A. GENERAL. Proposed extensions of the water distribution system shall, in general, follow the pattern established in the Water Facilities Plan as adopted by the City of Liberty. Deviations from this general policy may be deemed necessary by the City Engineer should the provision of adequate service to prospective customers or fire protection needs, existing or anticipated, in the area to be served warrant said deviations.

No public water line shall be constructed less than six (6) inches in diameter.

- B. LOCATION OF WATER MAINS AND APPURTENANCES. Proposed water mains shall be so located within street right-of-way to provide the least interference with the location of other utility lines. Street grades and elevations of proposed main shall be taken into consideration so that once constructed they will not require regrading or relocation.

- C. DEPTH. All water mains shall have a minimum cover of forty-two (42) inches.

- D. MATERIALS OF CONSTRUCTION. Water main material may be ductile-iron, PVC or HDPE described as follows:

1. Ductile-Iron Pipe. Unless indicated otherwise on the construction plans or directed by the Engineer, all 6 inch pipes and larger shall be Class 50 ductile iron, all 4 inch pipes shall be Class 51 Ductile iron complete with all accessories and conforming to ANSI A21.51, AWWA C151, ASTM A536, and Grade 60-42-10.

The outside coating used under normal conditions shall be an asphaltic coating approximately 1 mil thick. The coating shall be applied to the outside of all pipes, unless otherwise specified. The finished coating shall be continuous and smooth, neither brittle when cold nor sticky when exposed to the sun, and shall be strongly adherent to the pipe.

The lining for use under normal conditions shall be a cement-mortar lining in accordance with ANSI/AWWA C104/A21.4, unless otherwise specified.

Joints, unless otherwise specified, shall be of the push-on type conforming to ANSI A21.11/AWWA C111, except gaskets shall be synthetic rubber. Natural rubber will not be acceptable.

Restrained joints (if required) shall be Loc-Tite, Meg-a-Lug, or approved equal.

2. Ductile-Iron Fittings. Ductile-iron fittings shall be complete with all accessories and shall be ASTM A536, Grade 70-50-05, conforming to ANSI A21.10/AWWA C110, ANSI A21.53/AWWA C153, 350 psi pressure rating. Joints shall be of the standard mechanical joint type conforming to ANSI A21.11/AWWA C104 and shall be coated inside and out with a bituminous coating. Fittings shall have distinctly cast upon them the pressure rating and letters "DI" or "DUCTILE".

3. PVC Pipe. The non-restrained PVC pipe will be push-on joints. PVC pipe will be DR14 C-900 DIPS or C-909 PC150 DIPS. Restrained joints will be Certainteed Certa-lok C-900 Restrained Joint Pipe, EBAA bell restrained harnesses, or Diamond Plastic Bulldog Restraint Joint System.

Bends may either be Certa-lok sweeps or MJ ductile iron bends. Tees and valves will be ductile iron mechanical joints. For changes in alignment less than 11-1/4 degrees but more than the allowable joint deflection, then Certainteed High Deflection Couplings shall be used. Romac Grip Rings or EBAA Iron Mega-Lugs designed for PVC for MJ fittings and valves shall be used.

4. HDPE Pipe. HDPE will be AWWA C906 with a working pressure rating of PC 160 (Diameter Ratio, DR11), nominal Ductile Iron Pipe Size (DIPS).
  - a. Butt Fusion Fittings – All butt fusion fittings will be AWWA C906 and have nominal burst values of three and one-half times the Working Pressure Rating (WPR) of the fitting.
  - b. Electrofusion Fittings – All electrofusion fittings will be PE3408 HDPE. Electrofusion fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All electrofusion fittings shall be suitable for use as pressure conduits, and per AWWA C906, have nominal burst values of three and one-half times the working pressure rating (WPR) of the fitting.
  - c. Mechanical Joint Adapters – Mechanical joint adapters shall be PE 3408 HDPE, Cell Classification of 345464C as determined by ASTM D3350-02. Flanged and mechanical joint adapters shall have a manufacturing standard of ASTM D3261. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans.

- E. FIRE HYDRANTS. Fire hydrants shall conform to AWWA C502 and shall be traffic models with breakaway flanges and shall have one (1) 4-inch Storz pumper nozzle with integral locking mechanism and two (2) 2 1/2 inch nozzles. All hydrants shall be furnished with auxiliary gate valves, and conform to acceptable models as listed in Appendix “A” of Section 5000 Water Lines as set forth in the Technical Specifications of the City of Liberty.

Hydrants should be placed at or near street intersections and at intermediate points when block lengths become long. Under no circumstances shall the spacing of fire hydrants exceed five hundred (500) feet in residential areas or three hundred (300) feet in commercial areas.

Fire Hydrant installations shall conform to the Standard Drawings.

- F. LINE VALVES. Gate valves shall be of the resilient-seated configuration and shall conform to the applicable requirements of AWWA C509. Gate valves shall be used in all water mains twelve (12) inches in diameter and smaller. Butterfly valves shall conform to

AWWA C504. Butterfly valves shall be used in mains larger than twelve (12) inches in diameter or where otherwise approved by the City Engineer.

Valves shall be placed in all straight runs of pipe at intervals not to exceed 800 feet. Valves should be placed so that no more than an average of 25 customers (maximum of 30) would be without service due to a line being shutdown.

Extension stems shall be provided for buried valves when the operating nut is more than three feet below finished grade. Each extension stem for a buried valve shall extend to within three feet of the ground surface, shall be provided with spacers which will center the stem in the valve box, and shall be equipped with a wrench nut.

- H. TAPPING SLEEVES AND VALVES. Tapping sleeves and valves shall be used where required to connect to existing in-service mains.

The valves shall be Stainless Steel as set forth in the Technical Specifications of the City of Liberty.

Tapping sleeves shall be of the flanged-outlet type designed for attachment to the flanged inlet end of the tapping valve, and shall be provided with mechanical joint ends at each end of the run.

- I. CONNECTIONS TO EXISTING WATER MAINS. Connections to existing water mains shall be made in such a manner as to provide the least amount of interruption to water service. In the event closing of valves to make a connection will affect a customer who cannot be without service, provisions shall be made on the plans for a temporary service.

- J. PROVISIONS FOR FUTURE EXTENSIONS OF WATER MAINS. At the termination of all water mains or at locations as specified by the City Engineer, a dead end assembly in accordance with the Standard Drawings of Section 5000 of the Technical Specifications of the City of Liberty shall be provided to allow for future water main extensions.

Flushing assemblies shall be used only at locations approved by the Engineer to provide for thorough flushing of all water mains in the project area. Whenever practical, water mains five hundred (500) feet and longer shall be provided with a fire hydrant for flushing.

- K. THRUST BLOCKING. Reaction blocking of adequate size shall be provided at all tees, elbows and bends to resist all resultant thrusts due to hydrostatic pressure. All blocking shall conform to the Standard Drawings. Restrictive joints may be used as set forth in the Technical Specifications of the City of Liberty.

- L. HIGHWAY AND RAILROAD CROSSINGS. All crossings of highways or railroads shall be made by boring or tunneling. The work shall be in conformity with all requirements and regulations and be under the control of the authority owning or having jurisdiction over and control of the right-of-way in each case.

- M. STREET CROSSINGS. Open cutting of streets shall be allowed only where permitted by the City Engineer. At locations where open cutting is not permitted, the crossing shall be made by boring or tunneling. Crossings made by boring or tunneling shall require a casing pipe unless otherwise approved by the City Engineer. All work and materials shall be in

conformity with all requirements of Section 6000 Tunneling, Boring, and Jacking (Pipelines) of the Technical Specifications of the City of Liberty. The diameter and length of the casing pipe to be used shall be as determined by the City Engineer.

- N. FIRE FLOW REQUIREMENTS. Public improvement plans for water line projects serving development sites other than single family or duplex subdivisions shall be reviewed for fire protection sufficiency. The Fire Code Official shall determine the amount of water that is required for fire protection based on Appendix B Section 105 Table 105.1 (2) of the Liberty Fire Code for the proposed type of structures to be built within the development. The design engineer shall obtain the flow requirement and then determine if the existing and proposed water lines can provide this flow based on existing operating conditions. Calculations verifying that the required flows can be met shall accompany the drawings when submitted for approval.
- O. BACKFLOW PREVENTION. All private, non-potable water uses shall require backflow prevention devices at all connections to the public main. This shall include but not be limited to fire protection lines.
- O. EASEMENTS. Public water mains outside of the public right-of-way shall be encompassed entirely by a public water line easement, at least fifteen (15) feet minimum width, and centered over the facilities. Excessively deep facilities, or other special circumstances may require a wider easement as determined by the City Engineer.
- P. TRACER WIRE PIPE DETECTION SYSTEM. Tracer wire pipe detection shall be installed on non-ductile public mains and private service lines within the public right-of-way per Section 9100 Tracer Wire Pipe Detection System.