Chapter 10

Water Mains
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Chapter 10
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10.1 General

10.1.1 Design Standards: The design for water main facilities shall be in conformance with this chapter. Where design information is not provided herein, the most current edition of the following standards shall be used:

- Requirements and Standards of the South Dakota Department of Environment and Natural Resources.
- *American Water Works Association Standards*.
- *South Dakota Plumbing Code*.
- *Uniform Plumbing Code*.
- *International Fire Code* and referenced NFPA Standards.
- City of Sioux Falls *Cross-Connection Control Manual*.

10.1.2 Construction Standards: Construction standards shall be the most recent version of the City of Sioux Falls Engineering Design Standards, City of Sioux Falls Code of Ordinances, Supplemental Standard Specifications and Standard Plates, together with the latest addenda. All details, materials, and water appurtenances shall conform to these standards.

10.1.3 Where a conflict occurs between the above standards, the most restrictive requirement shall apply.

10.1.4 An average daily water flow rate of 1,500 gallons per minute with a residual pressure of 20 psi at the most remote hydrant shall be maintained for all residential developments. Multifamily, commercial, and industrial developments shall be designed according to acceptable methods to determine their water flow demands.

10.1.5 Water main, a minimum of 16 inches in diameter, shall be installed in a one-mile grid pattern. Water main, a minimum of 12 inches in diameter, shall be installed in a one-half-mile grid pattern.

10.1.6 Minimum size water main shall be 8 inches in diameter. Exceptions include dead-end water mains less than 500 feet in length, which shall be 6 inches in diameter. Dead-end mains longer than 500 feet shall be 8 inches in diameter.
10.1.7 Minimum depth of cover, as measured from the top of the pipe to the finished surface elevation, shall be 6 feet. Where an adjustment is required in order to pass under another utility, the length of the deeper main shall be kept to a minimum, and bends shall be used to achieve the desired offset. The existing main may be lowered in place, if this method is practical and acceptable to the City of Sioux Falls Engineering Division.

10.1.8 Disinfection, bacteriological, and hydrostatic tests shall be required in accordance with requirements of the City of Sioux Falls Supplemental Standard Specifications for Water Main Construction—Section 300.

10.1.9 Water mains shall be located so as to best conform to the layout of the existing facilities. In streets where no pattern has been established, mains shall generally be located 10 feet to the north or west of the center line. A minimum horizontal separation of 10 feet shall be provided between water mains and sanitary and storm sewers except as allowed in the Ten States Standards and as noted in Chapter 4 of the City of Sioux Falls Engineering Design Standards for Public Improvements—Utility Locations and City Utility Easements.

Water mains shall be at least 20 feet away from buildings and under paved areas whenever possible. Water mains will not be allowed under buildings and must be encased under enclosed walkways and tunnels.

10.1.10 Transmission water mains (16 inches and greater) constructed under drainage structures whose single or multiple pipe dimensions exceed 4 feet in width shall be installed using the following guidelines:

- If the water main will pass under the culverts or closer than 10 feet from the drainage structure, water main shall be constructed with a steel encasement. Encasement shall end 10 feet from the outside edge of the drainage structure and shall have a minimum wall thickness of 0.188 inch.

- If the water main is routed around the drainage structure, the pipe system shall be installed 15 feet away (either upstream or downstream) from the outside edge of the structure. If necessary, the owner will provide public water main easements for the maintenance of the system.

- Valves must be provided on each side of the drainage channel or creek to the maximum extent practicable; the means to provide for future access to water for development must be provided if the water main is taken off line.

10.1.11 Finish grades for all hydrants shall be shown on the plans.

10.1.12 No pipe smaller than 6 inches in diameter shall be installed as a fire service main. For mains that do not supply hydrants, sizes smaller than 6 inches shall be approved by the Fire Prevention Division.
10.1.13 Fire service mains and appurtenances shall be installed in accordance with current edition of NFPA 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances. Fire flow requirements for buildings or portions of buildings and facilities shall be determined by methods approved by the Fire Prevention Division.

10.2 Fire Hydrants

10.2.1 For arterial streets, fire hydrants shall be staggered on both sides of the street such that they are spaced not more than 500 feet along the centerline of the street. Fire hydrants on each street side shall be spaced at not more than 1,000 feet measured along the centerline of the street.

For collector and local streets, fire hydrants shall be spaced at not more than 500 feet along the centerline of the street. At arterial street intersections, hydrants on the opposite side of the arterial street are not considered for purposes of the 500-foot hydrant spacing requirement.

10.2.2 Spacing of hydrants around multiple family, commercial, or manufacturing establishments shall be considered as individual cases and shall be determined by consultation with the Fire Prevention Division.

10.2.3 Hydrants shall be located on the road right-of-way 3 feet from the back of curb for sidewalk adjacent to boulevards and on a lot line whenever possible. Fire hydrants installed within curbside sidewalk shall be located 2 feet behind the back of curb and on a lot line whenever possible.

10.2.4 Fire hydrants shall be installed on the end of all dead-end mains. If the main terminates in a cul-de-sac, the fire hydrant shall be installed to meet clear space requirements as outlined in 10.2.6.

10.2.5 Flushing hydrants installed for testing purposes shall be removed once testing has been completed. If the flushing hydrants will remain in place for the duration of a winter season, they shall be installed behind the proposed curb and gutter.

10.2.6 A minimum of 3-foot clear space shall be maintained around the circumference (outside) of fire hydrants, except as otherwise required or approved by the Fire Prevention Division. This requirement pertains to posts, fences, vehicles, vegetative growth, trash, storage, mailboxes, and other materials or things shall not be placed or kept near fire hydrants in a manner that would prevent such fire hydrants from being immediately discernible and/or usable.

A minimum of 15-foot clear space shall be maintained around the circumference (outside) of the fire hydrants as it pertains to light, electric, or traffic light poles.
10.2.7 When fire hydrants are located outside City ROW and are subject to impact by motor vehicles, they shall be protected by guard posts, curb and gutter, or other approved means.

10.3 Valves

10.3.1 In general, valves on cross connecting mains shall be located so that no single break requires more than 1,000 feet to be out of service. Valves on water main 12 inches in diameter and larger shall be spaced not more than one-fourth mile apart. Valves shall be arranged so that any section can be isolated by closing not more than four valves, with a maximum of 30 residential lots out of service.

10.3.2 Valves shall be located such that they will not be in the sidewalk line or in driveways.

10.3.3 All valves shall be installed with valve boxes.

10.3.4 Valves shall be placed on all dead-end mains for future extension, unless no services are planned and rechlorination can be completed without interruption of water service.

10.3.5 Perpendicular connections to existing mains shall be by means of a Smith Tap and tapping valve.

10.3.6 Valves and curb stops for domestic services shall be installed at least 20 feet away from the building. If the domestic service is extended off of the fire line, both services shall have a shutoff downstream of the location where the services separate.

10.3.7 Valves 12 inches in diameter and greater shall be installed with two restrainer devices per valve.

10.3.8 Post Indicator Valves (PIV)—A PIV will be required on all fire service lines into a building as dictated by the fire code. The Fire Prevention Division shall be permitted to waive this requirement. A domestic service water line may be connected to the fire line service main 6 inches or greater in diameter. The domestic line shall be tapped on the water main side of the PIV valve.

Wall indicator valves (WIV) may be used when approved by the Fire Prevention Division. When a WIV is specified, a separate domestic service tapped to the water distribution will be required unless otherwise approved by City Engineering.

10.4 Meters

10.4.1 Water meters will be furnished and installed by the Sioux Falls Water Division. Ownership of the meter will remain with the City of Sioux Falls. The City will not be financially responsible for damaged or frozen meters.
10.4.2 Master meters for main line metering of industrial, commercial, and multifamily residential complexes shall be subject to the approval of the Sioux Falls Water Division. Authorization must be obtained from the Sioux Falls Water Division to allow the use of a master meter in lieu of individual meters. Metering systems shall be reviewed on an individual basis and shall include such auxiliary equipment as deemed necessary by the Sioux Falls Water Division. Systems may be required to provide heat, electrical power, and adequate ventilation. All master meter assemblies must also be constructed with adequate backflow prevention assemblies.

10.5 Cross-Connection Control and Backflow Prevention

10.5.1 The City of Sioux Falls potable water system shall be protected from all cross-connections by a backflow prevention assembly in accordance with the City of Sioux Falls Plumbing Code, the City of Sioux Falls Cross-Connection Control Manual, and approved by the City of Sioux Falls Water Division.

10.6 Lawn Irrigation Systems

10.6.1 Irrigation heads shall be located and maintained so as not to spray over or onto any impervious surface.

10.6.2 New lawn irrigation systems shall be installed with rain sensors that automatically shut off the system after 1/4 inch of rainfall has occurred.

10.7 Service Lines

10.7.1 All platted lots of a proposed subdivision are to front on and have a separate water service to a public water main without crossing any adjacent properties.

10.7.2 Apartments and over/under duplexes, triplexes, etc., do not need to be individually metered and do not need separate service lines.

10.7.3 Residential service lines shall be constructed to the property line as a part of the street construction project.

10.7.4 Commercial and industrial service lines may be constructed to the property line if the service line size is known.

10.7.5 All service lines shall be marked by a steel fence post or an approved marker. The steel fence post should be painted blue on the top 1-foot portion of the marker. The marker should be placed near the curb stop or at the termination point of the service stub-in. The service line marker shall remain in place and be maintained by the property owner until the service line is extended into the property to serve a house, building, or other structure. The property owner will be responsible for replacing damaged markers.

10.7.6 If separately platted properties are replatted to a single unit, any additional water services that were previously installed shall be removed to the
corporation stop on the City main at the expense of the owner, unless otherwise approved by City Engineering.

10.7.7 Service Piping and Fittings:

All water service piping and fittings (1–2 inches) installed between the water main and curb stop shall meet the following requirements:

- 6-foot minimum depth of cover.
- Minimum pressure rating of 250 psi.
- Type K Soft Copper Tubing as specified in the City Supplemental Specifications, Section 300.
- Copper pipe at all joints shall be flared.

All water service piping and fittings (1–2 inches) installed on the nonwater main side of the curb stop shall meet the following requirements:

- 6-foot minimum depth of cover.
- Minimum pressure rating of 250 psi.
- Material shall be copper or polyethylene as specified in the City Supplemental Specifications, Section 300.

Service fittings (4-inch and larger) shall conform to the following requirements:

- Engineering Design Standards for water main.

Ductile iron pipe (4-inch and larger) shall conform to the following requirements:

- Engineering Design Standards for water main.

PVC (4-inch and larger) shall conform to the following requirements:

- Engineering Design Standards for water main.

10.7.8 The criteria for sizing and constructing Type K Soft Copper Water Services for single-family residential homes from the City main to the curb stop or shutoff valve shall be:

- Those dwellings that have a plumbing fixture load which requires a demand of 40 Fixture Units (FU) or less are allowed to be sized with a minimum 1-inch service.
Those dwellings that have a plumbing fixture load which require a demand of greater than 40 FU shall be sized with a minimum 1 1/4-inch service.

Reference Appendix A of the most current edition of the *Uniform Plumbing Code* for FU allocations to various fixture demands.

Water services installed from the curb stop to the City water main prior to March 4, 2010, will not be subject to the above-detailed sizing criteria.

Developers and/or owners who install water services sized in accordance with Engineering Design Standard 10.7.8 will not be responsible for removing and replacing water services from the City main to the curb stop.

Service sizes shall be detailed within the Construction Drawings for review and approval.

**10.7.9** Any terminated water services shall be disconnected at the corporation stop or at the curb stop, as determined by the Sioux Falls Engineering Division.

**10.8 Material Specifications**

**10.8.1** Material specifications are included in the Supplemental Standard Specifications for Water Main Construction—Section 300. However, pipes 4 inches and larger are required to be ductile iron with nitrile or fluorocarbon gaskets, and pipes 2 inches and smaller are required to be copper in the “Downtown” area, in state highways, and in all sites known to have soil contaminated by volatile organic compounds such as fuel and petroleum products or as directed by the City Engineer. All ductile iron pipe and fittings shall be encased in polyethylene regardless of soil conditions.

**10.9 Manufactured Home Parks**

**10.9.1** New manufactured home parks will be allowed to have individually metered services if the distribution system within the park is built to meet the City of Sioux Falls Standards. Maintenance and access easements granted to the City for the water main and the service lines to the curb stop are also required.

**10.9.2** If individually metered homes are not desired, a metering structure is required for each water main entrance into the park per 10.4.2. If a metering structure is used, the distribution system within the park will be considered private and will not be maintained by the City.