

# **Chapter 10**

## **Water Mains**

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## Chapter 10 Water Mains

### 10.1 General

**10.1.1 Design Standards:** The design for water main facilities shall be in conformance with this chapter. All water main facilities shall be designed and sealed by a licensed engineer in the state of South Dakota. Where design information is not provided herein, the most current edition of the following standards shall be used:

- *Recommended Standards for Water Works*, Great Lakes—Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (Ten State Standards).
- 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 Material Specifications:** Material specifications are included in the Supplemental Standard Specifications for Water Main Construction—Section 300.

**10.1.3 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.

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

**10.1.5** 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.

## 10.2 Water Main

- 10.2.1** Transmission mains shall be defined as water mains 16 inches in diameter and larger. Distribution and service mains shall be defined as water mains less than 16 inches in diameter.
- 10.2.2** Minimum size distribution main shall be 8 inches in diameter. Exceptions include dead-end water mains less than 500 feet in length, which can be 6 inches in diameter, unless otherwise specified by the City Engineer.
- 10.2.3** 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 or deflection shall be used to achieve the desired offset, as approved by the City Engineer.
- 10.2.4** Distribution and service mains shall be at least 20 feet away from structures and under paved areas whenever possible, unless otherwise specified by the City Engineer.
- Transmission mains shall be at least 40 feet away from structures and under paved areas whenever possible, unless otherwise specified by the City Engineer.
- Water mains will not be allowed under structures. Water mains under enclosed walkways and tunnels must be ductile iron and installed as required in accordance with the City of Sioux Falls Supplemental Standard Specifications for Water Main Construction—Section 300.
- 10.2.5** 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.
- 10.2.6** 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 half-mile grid pattern.
- 10.2.7** 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, or as noted in Chapter 4 of the City of Sioux Falls Engineering Design Standards for Public Improvements—Utility Locations and City Utility Easements.
- 10.2.8** A minimum horizontal separation of 10 feet shall be provided when measured edge to edge between water mains and sanitary and storm sewers as required in the Ten States Standards.

Water mains crossing sanitary or storm sewers shall be laid to provide a minimum vertical distance of 18 inches when measured edge to edge. This shall be the case where the water main is either above or below the sewer with preference to the water main located above the sewer.

When it is impossible to obtain the minimum specified separation distances, the City Engineer must specifically approve any deviations. Such deviations may allow for installation of the water main closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at which there is 18 inches above the top of the gravity sewer. In addition, the sewer pipe shall meet water main standards. The pipe shall be at least 20 feet in length, and the length of water pipe is located so both joints are as far as possible from the sewer main.

**10.2.9** Water mains constructed under drainage structures or drainage mains shall be installed using the following guidelines:

- If a transmission main shall pass under culverts, drainage pipe, or closer than 10 feet from a drainage structure, water main shall be constructed with a steel encasement. Encasement shall end 10 feet from the outside edge of the drainage structure.
- If a transmission main is routed around a drainage structure, the water main system shall be installed 15 feet away (either upstream or downstream) from the outside edge of the structure.
- On all water mains, 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.
- If a distribution or service main shall pass under drainage structures or drainage mains 24 inches and larger, with 2 feet or less in clearance, the water main shall be constructed with a steel encasement. Encasement shall end 10-feet from the outside edge of the drainage structure.

### **10.3 Valves**

**10.3.1** All valve operation on the existing water distribution system shall only be by a Water Utility employee.

**10.3.2** 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.

- 10.3.3** Valves shall be located such that they will not be in the sidewalk line or in driveways whenever possible.
- 10.3.4** All valves shall be installed with valve boxes.
- 10.3.5** 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.
- 10.3.6** All shut-off valves and curb stop valve shall be installed at least 20 feet away from the structure(s).

## **10.4 Fire Hydrants**

- 10.4.1** Fire flow requirements for buildings or portions of buildings and facilities shall be determined by methods approved by the Fire Marshall.

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. When collector or local streets intersect arterial streets, hydrants on the opposite side of the arterial street are not considered for purposes of the 500-foot fire hydrant spacing requirement for the collector or local street.

- 10.4.2** Spacing of fire hydrants around multiple family, commercial, or manufacturing establishments shall be considered as individual cases and shall be determined by consultation with the Fire Marshall.
- 10.4.3** Fire hydrants shall be located not less than 40 feet from structures. Private fire hydrants on private water systems shall be located a minimum of 15 feet from structures.
- 10.4.4** Fire 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.
- 10.4.5** 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 Marshall. 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.

- 10.4.6** 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 this Engineering Design Standard.
- 10.4.7** When fire hydrants are located outside City ROW and are subject to impact by motor vehicles, they shall be protected by guard posts, bollards, curb and gutter, or other approved means.
- 10.4.8** 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.
- 10.4.9** Finish grades for all hydrants shall be shown on the plans.

## **10.5 Fire Service Lines**

- 10.5.1** 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*.
- 10.5.2** Fire lines shall be a minimum of 6 inches in diameter, or as approved by Fire Marshall.
- 10.5.3** Combination fire service line and domestic service line may be installed for apartment buildings with 6 units up to, and including, 15 units. Design calculations and documentation shall be submitted to the Fire Marshall for usage and sizing approval.
- 10.5.4** Domestic service lines and fire service lines shall be separate lines from the property line to the structure. The only exception is combination fire service line and domestic service lines as outlined in 10.5.3.
- 10.5.5** An indicator valve is required on all dedicated fire service lines as dictated by the fire code. Post Indicator Valve (PIV) or Wall Indicator Valve (WIV) must be specified for approval.
- 10.5.6** Domestic service lines may be connected to the fire service main sized 6 inches or greater. Domestic service lines shall be tapped on the water main side of the PIV valve or at the property line if a WIV is proposed.
- 10.5.7** Shut-off valves for the domestic service shall be installed at the property line or as approved by the City Engineer.
- 10.5.8** A minimum of 40-foot spacing is required of a PIV from structure(s), unless otherwise approved by the Fire Marshall.

## 10.6 Domestic Service Lines

- 10.6.1** All platted lots are to front on and have a separate water service to a water main. No water service system shall be located in a lot other than the lot that is the site of the premise being served.
- 10.6.2** A minimum of 10-foot spacing is required of a service line from any structure(s).
- 10.6.3** Service lines may be constructed to the property line as a part of the street construction project, if the service line size is known. When the property develops, permanent service disconnection at the main will be required for services not utilized.
- 10.6.4** All service lines installed for future connection 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.
- 10.6.5** Minimum size water service piping shall be 1 inch in diameter. Service sizes shall be detailed within the Construction Drawings.
- 10.6.6** The criteria for sizing service piping 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.

## 10.7 Manufactured Home Parks

- 10.7.1** Manufactured home parks will be allowed to have individually metered services if the distribution system within the park meets design standards and the streets meet the requirements of Ordinance 157.098 (g) Water and access easements in accordance with Chapter 4 of the Engineering Design Standards shall be granted to the City for access to the water main and the service lines to the curb stop.

**10.7.2** If individually metered homes are not desired, a metering structure is required for each water main entrance into the park per Ordinance Chapter 50 and Chapter 59. If a metering structure is used, the distribution system within the park will be considered privately owned and privately maintained and will not be maintained by the City.