

# Chapter 10

## Water Mains

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# Chapter 10

## Water Mains

### 10.1 General

**10.1.1 Design:** 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:

1. Recommended Standards for Water Works, Great Lakes—Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (Ten State Standards).
2. Requirements and Standards of the South Dakota Department of Environment and Natural Resources.
3. American Water Works Association Standards.
4. South Dakota Plumbing Code.
5. Uniform Plumbing Code.
6. International Fire Code and referenced NFPA Standards.
7. City of Sioux Falls Cross Connection Control Manual.

**10.1.2 Material Specifications:** Material specifications are included in the Supplemental Standards Specifications for Water Main Construction.

**10.1.3 Construction Standards.** Construction standards shall be the most recent revision of the City of Brandon Engineering Design Standards, City of Brandon Code of Ordinances, Supplemental Standard Specifications and City of Sioux Falls 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 walkway and tunnels must be ductile iron and installed as required in accordance with the City of Brandon Supplemental Standard Specifications for Water Main Construction.

**10.2.5** Disinfection, bacteriological, and hydrostatic tests shall be required in accordance with requirements of the City of Brandon Supplemental Standard Specifications for Water Main Construction.

**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 Brandon 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 shall pass under culverts, drainage pipe, 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.
- 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.
- 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 City of Brandon Public Works 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 City's Building Inspector.

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 the City Engineer.

**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 City Engineer. 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 City Building Inspector 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 outline 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 City Engineer.

## **10.6 Domestic Service Lines**

**10.6.1** Water meters will be furnished and installed by the City of Brandon Water department. Ownership of the meter will remain with the City of Brandon.

**10.6.2** 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.

**10.6.3** A minimum of 10-foot spacing is required of a service line from any structure(s).

**10.6.4** 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.

**10.6.5** 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.

**10.6.6** Minimum size water service piping shall be 1 inch in diameter.

**10.6.7** 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 40FU 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 Cross-Connection Control and Backflow Prevention**

**10.7.1** The City of Brandon potable water system shall be protected from all cross connections by a backflow prevention assembly.

## **10.8 Lawn Irrigation Systems**

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

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

## **10.9 Service Lines**

**10.9.1** 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. If newly developing separate 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 the City Engineer.

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

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

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

**10.9.5** 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.

**10.9.6** If newly developing separate 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, provided the final lift of asphalt or final surfacing has not been installed.

**10.9.7** Polyethylene (PEX) pressure pipe and tubing will be acceptable for use as water service piping between the curb stop or valve and the water meter, except as defined in the Uniform Plumbing Code. PEX tubing will not be permitted within the City ROW or dedicated public water main utility easement.

**10.9.8** Water service connections 2 inches and smaller will not be permitted on water mains 16 inches and larger unless otherwise approved by the City Engineer.

**10.9.9** 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 requires 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 10.7.9 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.

## **10.10 Material Specifications**

**10.10.1** Material specifications are included in the Supplemental Standard Specifications for Water Main Construction—Section 300. However, ductile iron pipe is required to be used 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.

## **10.11 Manufactured Home Parks**

**10.11.1** 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 design standards. Water and access easements in accordance with Chapter 4 of the Engineering Design Standards shall be granted to the City of access to the water main and the service lines to the curb stop.

**10.11.2** If individually metered homes are not desired, a metering structure is required for each water main entrance into the park. 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.