City of Brandon

Municipal Servicing Standards

Section 3

Water Distribution System

Rev 00 (2025)

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WATER DISTRIBUTION STANDARDS REVISION HISTORY

Municipal Servicing Standards (MSS) Sections may be reviewed, updated or otherwise modified at any time. The Proponent's Engineer shall ensure that the current version of the MSS Section is applied.

Where such alternative solutions, systems, or approaches are being considered, a written proposal outlining the benefits, limitations, and total cost of ownership of the proposed solution shall be submitted to the City of Brandon Engineering Department for formal approval.

Table 1-1 below summarizes the revision history.

Table 1-1 – Revisions to MSS

Date	Modification or Adjustment
July 2025	Municipal Service Standards – Section 3 – Water Distribution

1.0 INTRODUCTION

This standard describes the requirements and procedures for design of the water distribution system serving the City of Brandon. The water distribution system provides water to the public for domestic consumption, commercial and industrial uses and fire fighting. The water quality shall be safe for consumption in accordance with Canadian Drinking Water Guidelines and have adequate pressure for domestic needs and fire fighting. The system is supplied with treated water from the Water Treatment Plant and pressure augmented by several booster pumping stations. The distribution system includes distribution piping known as watermains, isolation valves, fire hydrants for fire protection and for periodic flushing and sampling and building services.

This standard is presented with the following main subject areas:

- Design parameters including residential and non-residential demand, fire fighting requirements, system pressure and velocity, staging of construction and modeling.
- Watermain pipe design criteria
- Hydrant requirements
- Isolation valve placement requirements
- Thrust Restraint
- Building Services

1.1 Engineering Submissions

For all submissions and approvals required as part of a Proponent's project refer to Section 2 – Engineering Submission Standards.

2.0 DESIGN CRITERIA

Additions and/or modifications to the existing water distribution system shall be designed and constructed to deliver a safe, reliable, and high-quality drinking water supply to the public while protecting the environment, minimizing interruption in service delivery, providing adequate fire flow and pressure at each fire hydrant, and promoting operational and maintenance efficiencies. Water distribution system design shall be based, where applicable, on a land-use context to minimize unnecessary oversizing of infrastructure.

No part of the water distribution system shall be altered or constructed until the design has been stamped as reviewed for construction by the Engineering Department and/or Development Services.

This section provides the minimum design requirements within the City of Brandon. Actual engineering analysis and design may warrant exceedance of these requirements. It should be noted that the responsibility to ensure that the design meets all applicable standards and regulations remains that of the Design Engineer.

Water distribution systems shall be designed such that they can deliver the Maximum Daily Demand (MDD) plus the Peak Hour Demand (PHD) and should be designed to meet required hydrant Fire Flow (FF).

2.1 Design Population & Water Demand

The design population shall be the ultimate population in the area under consideration based on the approved conceptual site development, unless otherwise indicated in writing by the City.

2.1.1 Residential Design Population Density

In the absence of direction from the City Development Plan, Secondary Plan, Neighbourhood Plan or Master Plan, density ranges should be projected based on planned zoning and/or dwelling type.

Table 2-1 – Residential Design Population Density

Land Use Zone	Dwelling Type	Persons per Unit	Units / Net Developable Area (ha)*
Residential Single Detached (RSD)	Detached dwellings	2.7	15
Residential Low Density (RLD)	Duplex/Semi-detached dwellings, townhouses	2.7	20
Residential Low Density (RLD)	Walk-up apartments	2.7	30
Residential Moderate Density (RMD)	Moderate Density Multiple Dwellings (4 storey or less Apartment buildings) with or without commercial on main Floor	1.7	86
Residential High Density (RHD)	High Density Multiple Dwellings (5 or more storey Apartment Buildings) with or without commercial on main floor	1.7	148

* Where actual number of dwelling units are known, known values should be used in lieu of given values.
* Future development may be limited to the number of units assumed during the planning stages.

2.1.2 Residential Per Capita Consumption Rates

Table 2-2 – Residential Per Capita Consumption Rates

Demand	Consumption Rate* (Liters per capita per day)
Average Day Demand (ADD)	250
Maximum Day Demand (MDD)	1.7 x ADD
Peak Hour Demand (PHD)	3.4 x ADD

* Where actual water demand is known, those values should be used. For design purposes, where specific land uses are known, water demand can be derived from literature values; references must be included with design assumptions and submissions.

2.1.3 Non-Residential Consumption Rates

Table 2-3 – Non-Residential Consumption Rates

Non-Residential Lan Use Zone	Type	ADD* (L/Ha/day)
Commercial – General (CG)		16,800
Low / Medium Density Commercial (CN, CR, CG, CHW)	Service stations, convenience stores, motels, medium sized hotels, smaller shopping centres, highway commercial, etc.	40,000
High Density Commercial (CG, CAR)	Shopping malls, retail centers	132,500
Light Industrial (CN, CR, CG)	Light manufacturing, offices	22,500
Wet Industrial (IH)	Food Processors	33,600
Dry Industrial (IR, IG)	Storage, dry manufacturing	4,000
Mixed Industrial (IR, IG, CG)	Combination of wet industrial, dry industrial and commercial	32,500
Institutional (EI)	Schools/churches, recreational facilities	40,000

* Where actual consumption rates are known or may be estimated by breaking larger facilities down into individual units, these values should be used in lieu of above values.

In addition, water demand for large developments including high density commercial and wet or heavy industrial should be evaluated based on site specific demand and fire flow requirements.

Non-residential consumption rates may be estimated using Residential Equivalent Unit (REU) methodology. Example consumption rates may be found in Appendix A of the Manitoba Public Utilities Board "Guidelines for use by utilities in preparing submissions for approval of Water and Sewer Rates", available at:

http://pubmanitoba.ca/v1/regulated-utilities/w-ww/water-ww/pubs/board-order-guidelines-for-preparing-rate-application.pdf

2.2 Fire Flow Requirements

Fire flow requirements shall be in accordance with the recommendations of the Fire Underwriters Survey, "Water Supply for Public Fire Protection" taking into consideration all applicable existing and proposed structures on the affected lands. This guidance document is available from:

https://fireunderwriters.ca/downloads.html

Where information from the City water model is unavailable or at the request of the Engineering Department, it is the Developer's responsibility to conduct hydrant flow testing to determine the available flow that can be delivered to the proposed development area. Flow tests for development are to be carried out in accordance with Clause 4.3.

Table 2-4 – Minimum Fire Flow

Zoning Classification	Minimum Fire Flow* (L/s)
RSD, RLD	90
RMD	150
RHD	220
CN, CR, CG, CAR	150
DCB, DMU	180 To be verified by Engineer
IR, IG, IH	275 To be verified by Engineer
EI	220 To be verified by engineer

* Minimum available fire flow may not be achievable in all areas of the City. However, the Design Engineer will remain responsible for meeting all safety requirements by other methods.

Refer to the City of Brandon Zoning By-law for zoning classifications, available at:

https://www.brandon.ca/images/pdf/planning/bylaws/zones/Zoning_By-law_-_2018-10-04.pdf

2.3 Minimum & Maximum Pressure

The values provided in Table 2-5 are the desired targets for the water system design. These pressures are necessary to provide domestic water at the building main floor elevation on each lot.

Table 2-5 – Pressure Requirements

Condition	Pressure (kPa / psi)
Maximum Static Pressure	552 / 80
Minimum Static Pressure	275 / 40
Minimum System Pressure at Peak Hour	241 / 35
Minimum System Pressure at Fire during Fire Fighting Conditions	140 / 20

* The water system operating at/below 20 psi due to a proposed development will not be accepted.

2.4 Pressurized Flow

The Hazen-Williams Equation shall be used for the estimation of flow vs. head loss for the modeling and design watermains:

For all new watermain design the roughness coefficient C = 140 will be used regardless of pipe material. Pressure calculations for existing watermains will utilize roughness coefficients corresponding to the pipe material, refer to Table 2-6.

Table 2-6 – Hazen-Williams Roughness Coefficients (C)

Pipe Material	C Value
PVC	140
High Density Polyethylene (HDPE)	140
Asbestos Cement	130
Concrete Pressure Pipe	120
Ductile Iron	120
Cast Iron	110

Equation 2-1 – Hazen-Williams Equation

$$Q = kCD^{2.63}S^{0.54}$$

Where:

- Q is the estimated flow (L/sec)
- k is a constant equal to 3.588E-06 or 1 / 278,691 (for L/sec)
- C is the Hazen-Williams Roughness (dimensionless, but actual units of feet$^{-0.,37}$ per second)
- D is the pipe diameter (mm)
- S is the slope of the hydraulic grade line (m/m)

2.5 Velocity

Main line flow velocities should ideally be at least than 0.6 m/s during peak hour flow conditions, it should be identified through the design submission if this is not possible due to mains oversized for fire fighting.

2.6 Water Quality

The design must address low demand conditions, even if they will be temporary, which could affect water quality parameters in the system. In order to address these conditions staging practices, system looping or a dead-end flushing hydrant must be provided.

2.7 Staging

A valve and hydrant shall be installed at the interim limits of construction, where practicable, to provide the ability to flush the stagnant section of watermain. Otherwise, a valve and an additional 6.0 m length of main should be installed past the interim limits of construction. Refer to Clause 3.7 for information regarding looping and Dead-End mains.

- The City will work with the Proponent to identify key points of connectivity between new and existing developments.

- For every phase of construction, the proponent shall prepare a unidirectional flushing, disinfection and pressure testing plan and submit to the City for approval. The plan shall demonstrate no impacts on the existing water network when bringing new sections of watermains online.
- Adequate fire flows shall be provided during all phases of staging.
  - If adequate fire flows cannot be supplied, proponents must communicate with property owners and the Fire Department and make provisions for fire safety as required.
- Subdivisions require a minimum of two connections to independent sources. The time period allowed for a phase of a subdivision to have less than the minimum number of connections is based on the more stringent condition of size of the subdivision and population services and is summarized in Table 2-7. The service population is based on Residential Single Detached (RSD) zoning from Table 2-1 (e.g. 2.7 persons/unit x 15 units/ha = 40 persons/ha). Phases of a subdivision (individually or cumulatively) which exceed the requirements of Table 2-7 will be required to connect to a minimum of two independent sources.

Table 2-7 – Subdivisions Allowed Less Than Two Independent Sources

Time Frame	Size of Subdivision Phase (ha)	Maximum Service Population
Short Term (less than 2 years)	Less than 20	800
Midterm (2 to 5 years)	Less than 10	400
Long Term (greater than 5 years)	Less than 2	80

2.8 Water Distribution Modeling

Hydraulic analysis may be required upon request from the City. The development model and its results along with the water distribution plan shall be submitted to the City for approval. The City may ask for hydraulic analysis outside of the above requirements when deemed necessary.

The City has developed an InfoWater model of the overall water distribution system, however, the development model may be built using alternate modelling software. The development modelling input files and the simulation results shall be transferred in EPANET format. The electronic copy of the EPANET model including all associated files will be submitted to the City for review and approval.

- The City shall provide information for existing nodes that will be connection points for the proposed network.
- The City shall provide the datum for node elevations.
- The Developer shall model the total design flow at each major stage of development.

Demands shall be distributed throughout the network in accordance with the planned land use surrounding each node. Overall, demands shall be distributed as evenly as possible across the entire network unless otherwise approved. The following multipliers shall be applied to calculate maximum day demand and peak hour demand from average day demand:

- Maximum Day Demand = 1.7 x Average Day Demand
- Peak Hour Demand = 3.4 x Average Day Demand
- All pipes 150 mm diameter and larger shall be modeled.

Model trials shall include the simulation of:

- Pressures during maximum daily flow
- Pressures during maximum hour flow
- Available fire fighting flow plus maximum day flow with a 14 m (20 psi) residual pressure, at key locations in the proposed development.

The nodes for pressure and fire flow analysis shall be set at street elevations (ground elevation, not watermain elevation).

The model shall be submitted to the City for verification. The City shall import the proposed development model into the overall City-wide model to determine the impact of the development distribution system on the overall system.

The City may require the Developer to perform transient analysis as part of booster pumping station design to demonstrate that power failure, main valve closure, or other situations would not result in damage to the pump station or watermains.

3.0 WATERMAINS

3.1 General

For physical material product, properties, and installation requirements, refer to the SCS.

3.2 Distribution Main Sizes

Watermains must coincide with those in adjacent developments to maintain the continuity of main sizes between developments. Refer to COBRA or the Engineering Department for existing distribution main sizes.

Minimum distribution watermains diameter shall be:

- 150 mm in residential areas
- 200 mm in industrial or commercial areas

3.3 Pipe Grade

Watermains should be designed with a continuous grade wherever possible to minimize high points in the main. Where a high point is unavoidable, a hydrant shall be installed at that point.

3.4 Alignments & Clearances

Watermains must be designed such that:

- They follow a straight alignment between intersections, at offsets parallel to the adjacent property line.
- Are located within the road right of way serviced by a street, avoiding conflict with other infrastructure.
- Where watermains are not located within the street, hydrants, valves, and other appurtenances shall be accessible by a road suitable for travel by a heavy maintenance vehicle.
- Are in accordance with the City of Brandon *Water and Wastewater* Control *By-Law*.

It is the responsibility of the Design Engineer to ensure the watermain is not in a location that conflicts with other existing or proposed utilities both above and below ground, existing or future trees, or other green infrastructure.

See Table 3-1 for all minimum separation distances required between watermains and other infrastructure.

Table 3-1 – Minimum Watermain Separations

Watermain in Proximity to:	Minimum Clearance (m)	
	Horizontal[1]	Vertical[2]
Storm Sewer Mains	3.0	0.50
Domestic Sewer Mains	3.0	0.50
Domestic Sewer Services	3.0	0.30
Existing or Proposed Shallow/Above Ground Utilities	3.0	
Catch Basins & Storm Sewer Manholes	1.5[3]	
Edge of Right of way and/or Easements	3.0	

[1] Separation is defined as centreline to centreline.
[2] Separation is defined as actual clearance from outside of pipe to outside of other pipe.
[3] Where separation from catch basins and storm sewer manholes cannot be met, watermain shall be insulated.

Refer to the typical cross-sections in Section 6 – Transportation Design Standards.

At watermain crossings of domestic and storm sewers, the following shall apply:

- Under normal conditions, watermains shall cross above domestic sewers.
- Where it is necessary for the watermain to cross below the sewer, the watermain shall be protected, at minimum, by providing:
  - Structural support of the sewer to prevent excessive joint deflection and settling.
  - Centering of a full length of watermain pipe segment at the point of crossing so that the joints are a minimum of 1.5 m from the sewer main.
  - Insulated in accordance with the SCS.

3.5 Depth of Cover & Insulation Requirements

Watermains shall be designed with a minimum and maximum depth of cover of 3.0 and 4.0 m respectively. Depth of cover not meeting these depth requirements may be considered but will only be allowed with the express written approval of the Engineering Department.

Watermains designed with less than 3.0 m of cover require insulation in accordance with the SCS – Section 03-010 Excavation Bedding & Backfill.

Watermains within 1.5 m of a manhole or catch basin in any direction shall be insulated.

3.6 Pipe Structure Design

Pipe structure design for external dead and live loading is not typically required for pressure pipes, however an external load check should be considered if the watermain will remain unpressurized for a period longer than 30 days following installation. For PVC watermains, this analysis shall use the design methodology for flexible pipe described in Section 5 – Land Drainage.

All watermains shall have Modified Class B Bedding, sand or gravel as per Section 02210 Excavation, Bedding & Backfill, including:

- Minimum 100 mm of sand bedding beneath the pipe.
- Minimum 300 mm of sand cover above the pipe crown.

3.7 Looping & Dead-Ends

Except in cul-de-sacs of less than 120 metres length, all distribution mains, including private mains, shall be looped (connected at two ends). In instances where segments of 150 millimetre mains exceed 200 metres in length without looping and cannot be avoided, pipe shall be upsized to 200 millimetre diameter in accordance with the recommendations of the Fire Underwriters Survey, “Water Supply for Public Fire Protection”.

A standard valve and hydrant shall be installed at the farthest reach of a dead-end main to aid in flushing.

3.8 Pressure Testing & Disinfection

All new and modified watermains shall be disinfected, flushed, and pressure tested as per the SCS.

3.9 Private Mains

Water distribution systems must comply with the MSS where they service a private development. Private mains shall be installed and tested in accordance with the City of Brandon *Water and Wastewater Control* By-Law and the City of Brandon SCS, under the supervision of the Professional Engineer sealing the Record Drawings.

In addition to the above requirements and submittals for private mains, Developers shall also adhere to the following:

- Submit a design rationale to the City detailing the sites maximum day demand and maximum hourly demand and velocity in pipes during maximum daily demand during in accordance with Clause 2.5.
- Submit Record Drawings showing as-constructed details of the private main and services in accordance with City of Brandon Standards, including but not exclusive to system geometry with grid coordinates, stations, and offsets, watermain diameter, watermain inverts at grade breaks, hydrants and valves, hydrant flange elevations, finished ground elevations, the location and size of services and the manufacturer and class of all materials installed as part of the water system.

4.0 HYDRANTS

Hydrant specifications shall be consistent with and designed in accordance with the SCS, and *Water and Wastewater Control* By-Law and *Fire Prevention* By-law.

The minimum pipe size required to service a hydrant is 150 mm.

4.1 Hydrant Location

The Developer's Engineer must consider the existing and intended land use in the area and ensure that adequate spacing is provided. The maximum spacing between hydrants, as measured along the centerline of the right of way, shall be:

- 150.0 m in low-density residential areas in accordance with Brandon Fire and Emergency Services (BFES) – Fire Hydrant Location Policy Regulation P20.
- 90.0 m in industrial, commercial, institutional, and residential moderate and high-density developments in accordance with the Fire Underwriters Survey Guidelines.
- The maximum spacing of hydrants shall be such that a circle of protection touching building footprints is not more than a 75.0 m radius in accordance with Fire Underwriters guidelines.

Hydrants shall be placed at or near street intersections and all cul-de-sac near the bulb. Hydrants shall be placed at permanent watermain dead-ends for the purpose of flushing. The City may adopt specialty flush hydrants in the future.

4.2 Alignment & Placement

Table 4-1 – Hydrant Alignment and Placement

Centre Line of Hydrant in Proximity to:	Minimum Horizontal Clearance (m)
Edge of Sidewalk	0.6
Back of Curb	1.2
Property Boundary Line	1.0
Utility Pedestal/Power Pole/Street Light Standard	3.0
Driveways	1.0 (longitudinal)

Where a hydrant is installed at the corner of an intersection, it shall be installed at a location that does not conflict with existing or future accessibility ramps and sidewalks. Hydrants not located at the corner should be at the projection of flankage property lines and not within the sidewalk.

All hydrants must be separated from the distribution system by means of a 150 mm hydrant lead and a hydrant service valve. Hydrants shall be located on the same side of the street as the watermain to avoid having the hydrant leads crossing domestic or storm sewers. The hydrant valve is to be located 1.0 to 1.25 m from the hydrant unless it conflicts with other above ground infrastructure in which case the City may accept an alternate location. Valve placement should be located within the boulevard.

Hydrants shall be installed such that the base-elbow invert is a minimum of 50 mm above the invert of the watermain at the hydrant tee to promote air release. The maximum grade of the hydrant lead shall not exceed the manufacturer's recommendation for joint deflection (5% typical).

4.3 Flow Testing

When requested by the City, it is the Developer's responsibility to provide appropriate data on hydrant flow tests, conducted by a qualified testing technician in accordance with the National Fire Protection Association *Recommended Practice for Fire Flow Testing and Marking of Hydrants* Standard NFPA 291, for model calibration and confirmation purposes.

4.4 Private Hydrants

Private hydrants shall be subject to inspection in accordance with the City of Brandon *Water and Wastewater Control* By-Law and must be installed in a location accessible for inspection. Private hydrants shall comply with the Hydrant standards specified in the MSS.

5.0 VALVES

In general, valves must be spaced as follows:

- The City may request additional valves be installed for operational purposes.
- No more than 24 detached home units are involved in a shut down.
- Boundary valves shall be clearly identified on the Design Drawings.
- Maximum spacing of shut-off valves in distribution mains shall be 200 m.

In general, valves must be located as follows:

- At intersections:
  - Valves shall preferably be aligned with the projected property lines, but the location shall be adjusted to avoid conflicts with curbs and sidewalks.
  - Minimum of 3 valves at watermain cross intersections.
  - Minimum of 2 valves at watermain tee intersections.
  - Or as directed by the City, to allow for the isolation of specific sections of the main.
- No more than four valves shall be required to shut down any section of line.
- Minimum of one valve located between two hydrants.
- Not more than one hydrant shut down at any time.
- Valves are required on a watermain at each end of a utility right of way or easement.
- Valves are required at each end of an encased section of watermain.
- Avoid placement within roadway gutters.
- Isolation valves for services 100 mm in diameter or larger are required, as determined by the Engineering Department.

Valves should be located at the extension of property lines wherever practicable. A valve and 6 m of pipe should be installed past interim limits of construction to prevent blowouts for future tie-ins.

Note, extra valves may be required to satisfy the requirements of subsection 2.7 - Staging.

6.0 THRUST RESTRAINT

Thrust restraint at bends, tees, reducers, plugs, closed valves and other fittings should be accounted for as part of design. Refer to the SCS for the hydrostatic test pressure.

The minimum bearing area of thrust blocks, as defined in SCS, are calculated using the minimum requirements below:

6.1 Horizontal and Lower Vertical Thrust Blocks

Horizontal and lower vertical thrust blocks bearing on undisturbed soil should be designed using the following criteria:

- Soil Bearing Pressure: Minimum 4,900 kg/m^2 (1,000 psf), unless site-specific Geotechnical testing has determined that higher soil bearing pressure is representative.
- Safety Factor: Minimum 1.5.

6.2 Upper Vertical Thrust Blocks

Upper Vertical thrust blocks should be design using the following criteria:

- Unit weight of Concrete 2,400 kg/m^3 (150 pcf)
- Factor of Safety for concrete block 1.0
- Factor of Safety for steel reinforcing straps 1.5

6.3 Joint Harnesses

A calculator such as the EBAA Iron Restraint Length Calculator is recommended for estimating joint harness requirements:

https://rcp.ebaa.com/calculator.php

At minimum joints shall be restrained to a full length of pipe (3 m length).

Design inputs for the software should be as follows:

- Soil Type should be representative of the in-situ and pipe bedding/backfill soil. For silty clay soils with granular backfill, use the option for CL (granular) or CH (granular).
- Safety Factor Minimum 1.5.
- Trench Type 4 (conservative assumption of pipe bedded on sand or gravel to 1/8 of pipe diameter or 100 mm minimum, backfill compacted to top of pipe to minimum 80% Standard Procter Maximum Dry Density).
- Depth of Bury should be representative of the worst case condition, which may not be final backfill level but may be an interim backfill level during watermain pressure testing.
- Test Pressure should be the typical maximum test pressure used as specified in the SCS.

7.0 WATER SERVICES

7.1 General

Water service lines which includes both the public water connection and private building water service, shall be installed in accordance with the City of Brandon *Water and Wastewater Control* By-Law. The water service line may be installed in the same trench as the sewer service line, however, if the water service line exceeds 50 millimetres in diameter, it should be installed with a minimum of 2.0 metre separation from the sewer service.

All water service lines are to be installed under the supervision of the City of Brandon Engineer, or Engineering Consultant who assumes responsibility to ensure that all as-constructed information provided is accurate and was completed as per the Design Drawings stamped as revised for construction. As-constructed information to be provided in accordance with Section 2 – Submission Standards.

For physical material products, properties, and installation requirements, refer to SCS.

7.2 Service Sizes

Water service lines shall be sized according to demand, but not less than 19 mm in size. Non-residential or apartment service connections shall be sized according to peak demand flow of anticipated user requirements or fire demands, whichever is greater, and the National Plumbing Code of Canada.

New water service lines shall not be larger in diameter than the watermain to which it connects. If a larger service is required, the developer must upsize the main to which it connects, at their own cost.

7.3 Depth of Cover & Insulation Requirements

A minimum depth of cover of 3.0 metres shall be maintained for the entirety of the service. If 3.0 m is unachievable, the service is to be insulated in accordance with the SCS – Section 03-010 Excavation Bedding & Backfill.

7.4 Minimum & Maximum Grades

Water services shall typically follow the grade of the domestic sewer service unless this will result in insulating requirements.

7.5 Alignment & Clearances

It is the responsibility of the Developer and Developer's Engineer to ensure that the location of the water service pipe within the public right of way does not conflict with power poles, pole anchors, transformers, trees, catch basins, underground chambers, or other facilities existing and/or proposed to be within the public right of way.

Water service lines shall be located North or West of the sewer service wherever possible and shall maintain the following separations from other utilities:

Table 7-1 – Minimum Water Service Line Separations

Water Service in Proximity to:	Minimum Clearance (m)	
	Horizontal[1]	Vertical[2]
Storm Sewer Mains	3.0	0.5
Domestic Sewer Mains	3.0	0.3
Watermains	3.0	0.3
Property Line Parallel to Service	4.0	
Existing or Proposed Shallow/Above Ground Utilities	3.0	
Sewer Manholes & Catch Basins	3.0[3]	

[1] Separation is defined as centreline to centreline.
[2] Separation is defined as actual clearance from outside of pipe to outside of other pipe.
[3] Where separation from catch basins and manholes cannot be met, water service shall be insulated.

Water service pipes must cross public easements perpendicular to the right of way.

Residential water services at corner lots should be made from the frontage street and property address street, and not from the flankage street.

Where such locations will conflict with other services, the location may be revised with the approval of the City.

Pre-serviced water service connections shall be installed to 0.5 m past where a utility easement has been proposed, on to private property (typically 4.5 m from property line to end of service). The remaining private building service portion is to be installed at the time of development and should be joined with a no-drain curb stop without a service box as the coupler.

7.6 Thaw Wire

Thaw wires for services shall be shown on all design drawings and indicate thaw wire location and connections. No more than two services may be joined with a thaw wire. Refer to the SCS for details regarding thaw wire requirements.

7.7 Curb Stops

Curb stops shall be installed on each water service in accordance with the SCS.

Curb stops shall be located at the limit of the right of way (on property line) and installed as shown in the SCS. Curb stops should not be installed within driveways, sidewalks, or landscaping beds.

7.8 Water Meter Pits

At the discretion of the City Engineer, a water meter pit may be required in accordance with the *City of Brandon Water and Wastewater Control* By-Law. Water meter pits will be installed under the supervision of the Developer's Engineer or designate.

7.9 Abandoning Service Lines

Refer to the *City of Brandon Water and Wastewater Control By-Law* for service disconnection (abandonment) requirements.