City of Brandon

Municipal Servicing Standards

Section 4

Domestic Sewer System

Rev 00 (2025)

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DOMESTIC SEWER SERVICING 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 4 – Domestic Sewers

1.0 INTRODUCTION

This standard describes the requirements and procedures for design of the domestic sewer system serving the City of Brandon. The domestic sewer system collects domestic or sanitary wastewater from buildings and conveys it to the Wastewater Treatment Plant. The system includes domestic wastewater collection sewers, manholes, building service lines, sewage lift stations and force mains and low-pressure sewer systems both public and private. The domestic sewer system must also accommodate extraneous flow from minor surface inflow through manhole covers, groundwater infiltration, and building weeping tile flow for those buildings without sump pumps. The domestic sewer system is separate from the land drainage sewer system and the two systems are not interconnected. Older combined sewers handling both domestic wastewater and stormwater still remain in some of the older neighbourhoods, but these systems are being phased out and replaced with separate sewers.

This standard is presented with the following main subject areas:

- Design parameters including dry weather flow from building pumping systems, wet weather flow allowances, and weeping tile flow.
- Gravity sewer design criteria
- Private sewer systems
- Force mains
- Low pressure sewer systems
- Building service lines

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 PARAMETERS

2.1 General

The Sewer collection system design shall be based on a land-use context.

On-site sewage disposal is not permitted within the City if the development/lot can be practicably serviced by municipal domestic sewer in accordance with City of Brandon *Water and Wastewater Control* By-Law.

No domestic sewer system shall be altered or constructed until the design drawings have been stamped as reviewed for construction by the Engineering Department and/or Development Services. Interconnectivity with the storm sewer system is not permitted.

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.

2.2 Design Population

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.

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)	Row-house dwellings, 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 assumption made through the planning stages.

2.3 Design Flows

2.3.1 Residential Flow Rates

Daily Domestic Wastewater Generation: 270 Litres / capita / day (L/c/d)

Average Dry Weather Flow (ADWF):

ADWF = Number of dwellings units x Number of people per unit x 270 L/c/d

Peak Dry Weather Flow (PWWF):

PDWF = ADWF x Peaking Factor (PF)

Where: peak dry weather flow for each contributing area is calculated using the rate of flow multiplied by a peaking factor in accordance with the Harmon formula:

Equation 2-1 – Harmon Peaking Factor

$$PF = 1 + \frac{14}{4 + \sqrt{P}}$$

Where:

- PF is the Harmon Peaking Factor
- P is the Population in Thousands, based on the total population using the sewer at full buildout

2.3.2 Non-Residential Flow Rates

For industrial developments that generate domestic wastewater in their processes, estimated peak flow rates shall be submitted by the Developer to the City as part of the design approval from the City.

For all other developments, in the absence of practical data or site-specific service requirements, the below non-residential flow rates may be used for estimating.

Table 2-2 – Non-Residential Flow Generation Rates

Non-Residential Use	Type	ADWF* (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 (IR, IG)	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.

Peak Dry Weather Flow (Non-Residential):

PDWF = ADWF x Peaking Factor

Where: Non-Residential PDWF Peaking Factor = 1.67

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

2.3.3 Wet Weather Flow

The following wet weather flows are relevant for new and existing construction, however actual wet weather flows should be used where available.

Peak Wet Weather Flow (PWWF):

PWWF = PDWF + Extraneous Flows

Extraneous Flows shall be included as follows:

- Infiltration: 2,200 L/Ha/day. The contributing area may be simplified for design by using the length of mainline sewer multiplied by a 100 m wide corridor.
- Inflow (at manholes): 12 L/min/manhole. For conceptual designs where manhole information is not known, a manhole density of 1.6 manholes/Ha shall be applied.
- Conservative design practice is to add the infiltration flow and surface inflow at the upstream end of a sewer segment.

2.3.4 Sump Pump & Weeping Tile Flow

Roof drains connecting to the domestic sewer system are not permitted in accordance with the City of Brandon *Water and Wastewater Control* By-Law.

Foundation drains (weeping tile) shall only be connected to the domestic sewer system as directed by the City and in accordance with the *Water and Wastewater Control and Building By-Laws.*

Where weeping tiles connect, an allowance of 4.55 L/min/service connection (1.0 Igpm) shall be included, in addition to extraneous flows.

2.4 Staging

A manhole and sewer main stub-out shall be installed at the interim limits of construction to provide the ability to jet and mandrel the sewer main. An additional short length of main should be installed to beyond the interim limits of construction such that manhole benching and surface works near the manhole may be completed. The suggested length of this stub is 6 to 10 m, so that excavation for the future connection to the stub will not impact finished ground or pavement near the manhole. A manhole will be required should future staging require a grade change from the existing stub.

3.0 GRAVITY SEWER MAINS

3.1 General

Domestic sewer systems shall be designed for gravity flow unless approved otherwise by the City. Cleanouts on City gravity sewer collection systems are not permitted.

For physical material product, properties, and installation requirements, refer to City of Brandon Standard Construction Specification.

3.2 Design Flow

Sewers shall be sized for maximum depth of peak wet weather flow not to exceed:

- 75% of the pipe diameter for local sewers
- 50% of the pipe diameter for trunk sewers 750 mm and larger

Gravity sewers shall be design using the Manning Equation

Equation 3-1 - Manning Equation

$$Q = \frac{k}{n} AR^{2/3}S^{1/2}$$

Where:

- Q is the estimated flow (m^3/s)
- n is the Manning roughness coefficient, dimensionless
- A is the cross sectional area of flow (m^2)
- R is the hydraulic radius (m), = Flow Area / Wetted Perimeter = D/4 for full flow
- S is the slope of the hydraulic grade line (as a fraction in m/m)
- k is a Unit Conversion Factor equal to 1.0

The minimum Manning's coefficient to be used for design is n = 0.013 for all pipe materials.

3.3 Velocity

Velocity shall be calculated using the Continuity Equation:

Equation 3-2 - Continuity Equation

$$V = \frac{Q}{A}$$

Where:

- V is the velocity of flow (m/s)
- Q is flow (m^3/s)
- A is the cross-sectional area of flow (m^2)

Sewer velocities for full pipe flow shall be as follows:

- 0.61 m/s Minimum Velocity, for minimizing settling of suspended solids
- 3.0 m/s Maximum Velocity, for reducing headloss and mitigating scour and abrasion of pipe walls

3.4 Main Sizes

The required circular pipe sizing is determined by using the continuity equation with design flow and minimum full flow design velocity to compute the required full flow area (A=Q/V), and then computing the required pipe diameter from the full flow area. The required pipe diameter will typically be a number not matching a standard pipe size, so the next larger nominal pipe diameter is then selected.

Equation 3-3 - Pipe Sizing Equation

$$D = \left(\frac{4(Q/V)}{\pi}\right)^{0.5}$$

Where:

- D is the required full flow pipe diameter (m^2)
- Q is the Design Flow (m^3/s)
- V is the required minimum full flow design velocity (m/s), equal to 0.61 m/s for domestic sewers.

Minimum domestic sewer sizes shall be:

- 200 mm in residential areas
- 250 mm in industrial and commercial areas

Upstream domestic sewer main size may not exceed the size of the downstream sewer main. Refer to COBRA or the COB Engineering Department for existing collection main sizes, which are to be confirmed in the field.

Upsizing of domestic gravity sewers for the purpose of reducing pipe gradient shall not be permitted where the flow generated from future service population would not support the increase in sewer size.

Note: the minimum Manning roughness to be used for gravity sewer design is n = 0.013 for concrete, PVC and smooth wall HDPE pipes. Reduction of the Manning roughness shall not be permitted.

3.5 Sewer Slope

The minimum and maximum sewer slopes based on the velocity constraints, Manning n=0.013 and typical imperial pipe sizing are shown in the following table:

Table 3-1 – Minimum and Maximum Sewer Slopes (n=0.013)

Pipe Diameter (mm)	Minimum Slope (%) V = 0.61 m/s	Maximum Slope (%) V=3.0 m/s
200*	0.40 (* 0.80)	8.34
250*	0.25 (* 0.50)	6.20
300	0.22	4.90
375	0.15	3.60
450	0.12	2.83
525	0.10	2.30
600	0.08	1.93
750	0.06	1.43
900 and larger*	0.05	1.10

* The sewer segment at the high end of the system shall have double the minimum design slope, to reduce the potential for settlement of solids due to insufficient flow.

Pipes 750 mm and larger are considered to be trunk sewers and the City may permit the use of modified design slopes.

3.6 Alignments & Clearances

Sewer mains must be designed as follows:

- Straight alignment between manholes, at an offset parallel to the adjacent property line.
- Located within the street section of the road right of way. Where sewer mains are not located within a road right of way, manholes and other appurtenances shall be accessible by a route suitable for travel by a heavy maintenance vehicle.
- Not located within a specified drainage path, stormwater channel, ditch, etc.

- Typically aligned along the centre of the road crown to minimize infiltration through manhole frames and covers.
- In accordance with the City of Brandon *Water and Wastewater By-Law.*

It is the responsibility of the Design Engineer to ensure the sewer main is not in a location that conflicts with existing utilities or other proposed (in the case of developments) utilities.

See – Minimum Domestic Sewer Main SeparationsTable 3-2 for all minimum separation distances required between sewer mains and other infrastructure.

Table 3-2 – Minimum Domestic Sewer Main Separations

Sewer Main in Proximity to:	Minimum Clearance (m)	
	Horizontal[1]	Vertical[2]
Storm Sewer Mains	3.0	0.5
Watermains	3.0	0.5
Water Services	3.0	0.3
Existing or Proposed Shallow/Above Ground Utilities	3.0	
Catch Basins & Storm Sewer Manholes	3.0[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, sewer main shall be insulated.

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

- Under normal conditions, sewer mains shall cross below watermains.
- Where it is necessary for the watermain to cross below the sewer, the watermain shall be protected by providing:
  - Centering of a full length of watermain pipe segment at the point of crossing so that the joints are a minimum of 1.5 metres from the sewer main.
  - Insulated in accordance with the SCS.

3.7 Depth of Cover & Insulation Requirements

Sewer mains shall be installed with a minimum and maximum depth of cover of 3.0 metres and 5.0 metres respectively. Depth of cover greater than 5.0 metres may be considered but will only be allowed with the express written approval of the Engineering Department. Depth of cover over the sewer main will be defined as the difference between the design surface elevation over the crown of the sewer main pipe in that location, excluding the depth of any storm sewer infrastructure (pipe or manholes).

Sewer mains designed with cover less than 3.0 metres of cover require insulation in accordance with the SCS.

3.8 Pipe Structure Design

Pipes shall be designed using the rigid or flexible design methods described in Section 5 – Land Drainage.

All sewers shall have Modified Class B Bedding, sand or gravel as per SCS Section 03-010 Excavation, Bedding & Backfill, including :

- Minimum 100 mm of sand bedding beneath the pipe.
- Pipe bedding material in the pipe surround including haunch and initial backfill beside and overtop of pipe to be compacted to a density of at least 95% Standard Proctor Maximum Dry Density.
- Minimum 300 mm of sand cover above the pipe crown.

Gravity sewers shall be designed to mitigate floatation in high groundwater areas. This may include the use of Class A (Concrete Cradle) pipe bedding, ballasting of the trench above the pipe surround, dewatering of the trench using a subdrain system draining to a land drainage system, or other methods. The pipe structure design should account for the loading or constraint to the pipe/prevention of deflection resulting from the floatation mitigation scheme.

An engineered installation should be used when these conditions are not met. Design will need to consider the trench wall support, the effects of ground water, selection of embedment material, increased percent compaction, live load, and surcharge load. Where the pipe crosses under another pipe, a heavily travelled roadway, or a large waterway, an engineered installation design should be used.

3.9 Sewer Inspection

All new and modified sewer mains shall be inspected in accordance with the SCS.

4.0 MANHOLES

Manholes are required at all changes in grade, pipe size, alignment, junctions of mains, and limits of construction.

Placement of domestic manholes near roadway sag low points should be avoided if possible. This must be coordinated with drainage design and the desire to avoid to placement of sag low points in or near intersections.

Domestic manhole rim elevations in landscaped areas must be installed above any adjacent storm manhole rim elevation and 25 mm above the surrounding finished surface grade. Where possible, domestic manhole rim elevations should be installed above any expected water levels so that inflow as a result of ponding is less likely to occur. If a manhole is placed in a location where inflow is expected, watertight manhole covers and/or cover ring seals/gaskets must be used in accordance with SCS Section 02700 Sewers.

Manholes which are installed at or within interim limits of construction should have the rim installed nominally 150 mm above interim surface grades to avoid inflow. The use of temporary riser rings may be required to meet both the interim and final grade requirements.

4.1 Minimum Manhole Sizing & Spacing

The minimum diameter of standard manholes shall be 1200 mm. Manholes should be sized to retain a minimum 300 mm of pipe wall in any direction between breakout holes for connecting pipes. Assume a 50 mm breakout allowance all around for pipes 600 mm and smaller and 75 mm breakout allowance all around pipes larger than 600 mm.

Refer to the manufacturer's recommendations for minimum manhole diameters to suit various connecting pipe sizes and connection angles. Suggested minimum manhole sizes are shown in Table 4-1.

Table 4-1 – Suggested Minimum Manhole Diameters

Sewer Diameter (mm)	Manhole Diameter (mm) Straight Through Installation	Manhole Diameter (mm) Right Angle Installation
450 and smaller	1200	1200
525	1200	1500
600	1500	1500
750	1500	1800
900	1800	2100
1050	1800	2400
1200	2100	2700

Manholes must be placed where future extensions are anticipated and must be spaced no greater than 120 m apart. Placement of manholes within roadways should attempt to avoid placing the manhole frame and cover in existing or future wheel paths.

4.2 Hydraulic Losses Across Manholes

The crown of the upstream pipe must not be lower than the crown of the downstream pipe.

Minimum drop in invert levels across manholes shall be 30 mm for all junction types.

The maximum deflection angle between an incoming pipe and outgoing pipe should not be less than 85°, and the use of a pipe bend outside of the manhole should be considered as a means or reducing sharp changes in flow direction within the manhole.

4.3 Drop Manholes

Drop manholes shall be used when the invert of the incoming and outgoing sewer differ by more than 600 mm to minimize splashing, solids separation and the release of sewer gas and odour, but the preference is to avoid drop manholes by increasing pipe gradient within the allowable limits. The drop shall be a horizontal tee type type draining into a vertical drop pipe, and the vertical drop pipe shall terminate one pipe diameter above the benched manhole floor. The manhole diameter shall be increased to a minimum of 1500 mm to accommodate the interior drop pipe and a 1.0 m diameter clearance circle for worker access within the manhole.

Exterior drop manholes will not be permitted.

Refer to the City of Brandon SCS for a typical drop manhole detail.

5.0 PRIVATE SEWER MAINS

Sewer collection 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 site's design capacity, available capacity, generated flows, and velocities in accordance with Subsection 3.0.
- Submit Record Drawings showing as-constructed details of the private main and services in accordance with Section 2 Submission Standards.

6.0 FORCE MAINS

Refer to SCS for pipe and fitting material requirements for pressure sewers.

6.1 Force Mains and Low-Pressure Sewer Mains

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

Equation 6-1 – Hazen-Williams Equation

$$Q = k_2 C D^{2.63} S^{0.54}$$

Where:

- Q is the estimated flow (L/sec)
- k_2 is a constant equal to 3.588E-06 (for L/sec)
- C is the Hazen-Williams Roughness Coefficient (dimensionless)
- D is the pipe diameter (mm), using actual inside diameter
- S is the slope of the hydraulic grade line (m/m)

The Hazen-Williams coefficients that shall be used for design are presented below in Table 6-1. Contact the City for materials not listed in this table.

Table 6-1 – Hazen-Williams Coefficients for Pressure Sewer Design

Pipe Material	Coefficient Typical Design Value
High Density Polyethylene (HDPE)	120
Polyvinyl Chloride (PVC)	120
Steel	110

6.2 Velocity

Velocity of full pipe flow should be within the limits shown in Table 6-2, with the minimum velocity specified to reduce the potential for settlement of suspended solids and the maximum intended to reduce headlosses and the potential for damage due to water hammer.

Approval from the City is required if design velocity exceeds the maximum shown in this table.

Table 6-2 – Domestic Sewer Force Main Velocities

Domestic Sewer	Minimum Velocity (m/s)	Maximum Velocity (m/s)
Force Main	0.9	2.5
Low Pressure	0.9*	1.5

* Estimated minimum velocity for low pressure sewers with 10% of users pumping simultaneously

Mainline low pressure sewers shall be equipped with flush ports to permit periodic cleaning.

6.3 Bends and Tees

No bends greater than 45° are permitted on forcemains.

No tees are permitted except in pumping stations. Exterior tees shall consist of a Wye and 45° bend with nominal minimum centreline separation of two pipe diameters.

6.4 Air Valves

Air Valves are required at force main high points or wherever needed to release entrapped air during normal operation of a vacuum when the pump stops, or the sewer is drained. Valves not located within a lift station or other structure should be installed within a manhole, with a drain line to an adjacent sewer or to a minimum 300 mm deep sump.

Air valves and air valve manholes will require insulation for freezing protection.

6.5 Isolation Valves

Isolation valves are required along the pipeline to isolate a section for servicing, repair, or regular maintenance. Valve spacing should not exceed 500 m, and valves should be installed immediately adjacent to all lift stations and at all force main intersections, where each branch can be isolated (if applicable) and in accordance with best engineering practice.

6.6 Termination

Force mains should enter the gravity sewer system so that the force main invert is not more than 200 mm above the crown of the pipe in the receiving manhole and directed towards the downstream pipe. The objective is to create a smooth transition between pressurized flow and gravity flow, with minimal splashing and potential for releasing odour. If the receiving manhole design does not allow for this, then a manhole drop structure in accordance with the City of Brandon SCS, is required.

6.7 External Loads

All force mains must be designed to prevent damage from dead and live loading.

6.8 Internal Pressure Design

Force mains and low pressure sewers must be designed for internal pressure and to prevent damage from water hammer or column separation phenomena. The methodology described for PVC force mains in the Uni-Bell / PVC Pipe "Force Main Design Guide for PVC Pipe" is recommended, and available at:

https://www.uni-bell.org/Portals/0/ResourceFile/force-main-design-guide-for-pvc-pipe.pdf

Cyclic loading analysis must demonstrate that the selected pipe wall thickness will provide a minimum 75-year life of the pipe under the expected number of pumping on-off cycles per day.

6.9 Connections to Forcemains

Service connections, including low pressure sewer connections, to force mains within the City are not permitted.

7.0 SEWER SERVICES

7.1 General

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

All sewer 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 “Reviewed 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 the SCS.

7.2 Service Sizes

A sewer service line shall be sized according to demand, but not less than 100 mm in diameter. Non-residential or apartment service lines shall be sized according to peak anticipated user requirements and the National Plumbing Code of Canada.

A sewer service line larger than 150 mm diameter shall be connected to the sewer main via a manhole.

New sewer service lines shall not be larger in diameter than the sewer main in which it connects. If a larger service is required, then 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 m shall be maintained for the entirety of the service; if 3.0 m is unachievable, service to be insulated as per Subsection 3.7.

7.4 Minimum & Maximum Grades

Sewer service line grades shall be as follows and in accordance with the SCS.

- Minimum Sewer Service Grade: 2.0%
- Maximum Sewer Service Grade: 6.0%

A continuous grade through the entire length of the service is recommended, however a service with varying grade may be allowed to achieve separation from the watermain and maintain depth of cover. All varying grades and the use of standpipes and/or long sweep elbows to connect the service to the sewer main are to be noted on the Design Drawings. Any

grade change, outside of the use of a long sweep bend and standpipe when appropriate, is to occur within private property.

Minimum grades may not be achieved by lowering connection point at the main. All sewer services are to connect above the spring line of the sewer main.

7.5 Alignment & Clearances

It is the responsibility of the Developer and Design Engineer to ensure that the location for the sewer 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.

Sewer service lines shall be located South or East of the water service wherever possible and shall maintain the following separations from other utilities:

Table 7-1 – Minimum Domestic Sewer Service Line Separations

Domestic Sewer Service Line 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 outside edge to outside edge of infrastructure.
[3] Where separation from catch basins and manholes cannot be met, services shall be insulated.

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

Sewer service pipes must connect to the public sewer main at right angles. Sewer service pipes must cross public easements at right angles. Long sweep elbows may be used to horizontally deflect the service so long as the above requirements are met, and the location of the sweep is noted on the Design Drawings.

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

Pre-serviced sewer 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.

7.6 Cleanouts

Cleanouts must be installed on sewer service lines in accordance with the most recent version of the *National Plumbing Code of Canada*, on private property, outside of the City right-of-way.

The sewer service line shall not change direction between cleanouts, except that pipes not more than 150 mm in diameter may change direction by the use of fittings with a cumulative change in direction of not more than 45 degrees.

Except where the developed length of a sewer service line between the building and the first manhole to which the sewer service connects does not exceed 75.0 m, the following size and spacing of cleanouts will apply:

Table 7-2 – Permitted Size and Spacing of Cleanouts

Size of Sewer Connection Diameter (mm)	Minimum Size of Cleanout Diameter (mm)	Maximum Spacing (m)	
		One-Way Rodding*	Two-Way Rodding
100	75	15	30
Over 100	100	26	52

* Cleanouts that allow rodding in one direction only shall be installed to permit rodding in the direction of flow.

7.7 Abandoning Service Lines

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

8.0 LOW PRESSURE SEWER SYSTEMS

Low pressure sewer systems may not be designed within the City if the development can be reasonably serviced by a gravity sewer main. Engineering Department approval of concept must be obtained prior to the implementation of a low pressure sewer system design.

In addition to the above standards regarding domestic sewer mains, low pressure sewer design shall also adhere to the following subsections:

8.1 Design Flow

Low pressure sewer systems should be designed based on the *EPA 625 – Manual for Alternative Wastewater Collection Systems (1991)* maximum number of pumps operating simultaneously, which is a function of the total number of pumps connected to the system. The design flow can then be determined as the product of the maximum number of pumps in operation simultaneously, and the capacity of the average pump within the system.

A simplified equation recommended for estimating design flow for low pressure sewer system design is shown below:

Equation 8-1 – Low Pressure Sewer Design Flow Equation

$$Q = AN + B$$

Where:

- Q is the design flow (Litres per second)
- A is a coefficient selected by the Engineer (recommended 0.03 L/sec/REU)
- N is the number of residential equivalent units (REU)
- B is a baseflow constant selected by the Engineer (recommended 1.26 L/sec)

A and B may vary to account for anticipated high water use (and corresponding high domestic wastewater flows), to allow for a greater safety factor, and especially to allow for inflow and infiltration. However, low pressure sewer systems shall not receive building foundation drain flow except from elevator pits.

Refer to Subsection 6.2 for velocity limitations.

8.2 Service Sizes

The minimum size of a low pressure sewer service line shall be 38 mm diameter.

8.3 Service Connections

Low pressure sewer service connections, unless otherwise approved by the City, shall only be made after the service requirements have been determined and a permit, approving the installation, is issued by the City. If there is an easement for shallow utilities adjacent to the

road right of way, the low-pressure sewer service connection shall be installed to 0.5 metres beyond the limits of the shallow utility easement onto private property.

8.3.1 Curb Stops

A sewer curb stop is required when a pressurized service is connecting to a pressurized sewer main and should be marked “S” for sewer.

A curb stop for each service must be located on the property line which runs adjacent to the right of way and should be located 4.0 m from either of the property lines running perpendicular to the domestic sewer main. Where existing conditions or a water service curb stop conflicts with this placement, the low-pressure sewer curb stop shall be placed on the property line no more than 1.0 m from the water curb stop. Where such locations are not practicable or will conflict with other services, the location may be revised with the approval of the City.

8.4 Bends and Tees

No bends greater than 45° are permitted on low pressure sewers.

No mainline tees are permitted.

8.5 Cleanouts

Cleanouts should be provided at all bends of 45 degrees or more, main line termination points, and along the main with a maximum separation of 120 m.

8.6 Isolation Valves

Isolation valves are recommended along the pipeline as a means to isolate a section for servicing, repair, or regular maintenance. Valves should be installed at intersections, where each branch can be isolated.

8.7 Termination

Low pressure sewer systems shall enter the gravity sewer system by way of manhole connection so that the low-pressure main invert is not more than 200 mm above the crown of the pipe in the receiving manhole to minimize splashing and odour release. If the receiving manhole design does not allow for this, then a manhole drop structure in accordance with the City of Brandon SCS is required. Low pressure sewer systems may not connect to a forcemain.