City of Brandon

Municipal Servicing Standards

Section 1

Introduction and Definitions

Rev 00 (2025)

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1.0 INTRODUCTION

The Municipal Servicing Standards manual is intended to serve as a design aid for the City of Brandon (CoB), developers and their consultants in the design, preparation and submission of the required documentation for the construction of surface and underground municipal linear infrastructure improvements in order to meet appropriate servicing requirements for residential, commercial, institutional and industrial development within the CoB. The primary purpose of the Manual is to ensure that additions and/or modifications to the City of Brandon's municipal infrastructure are designed and constructed in a consistent manner from one area of the CoB to another and in conformance with current design practices and trends in Canada. The result will be:

- Quality infrastructure that will meet an acceptable long term life expectancy, whilst maintaining cost efficiency and practicality so as to not prohibit land development; and
- Maintenance and/or life cycle costs associated with land development and municipal infrastructure or private infrastructure connected to CoB services are minimized.

The Manual is divided into multiple sections as follows:

- Section 2 – Engineering Submission Standards
- Section 3 - Water Distribution System;
- Section 4 - Domestic Sewer System;
- Section 5 – Land Drainage;
- Section 6 - Transportation; and
- Section 7 - Pavements.

The intent of this Manual is to identify and address areas that apply to the local conditions and climate of the City of Brandon that differ or are not addressed in nationally recognized manuals. This manual, as well as other City documents, shall take precedence over these national guides.

It is the Engineer's responsibility to review all City by-laws, policies, standards, and guidelines and to review with the City the design criteria for the specific project prior to commencing any design work.

This manual has been prepared to provide process and design information to interested parties who require information about infrastructure servicing studies, conceptual and preliminary designs, and engineered construction drawings for new development proposals and City related capital and renewal projects.

These standards apply to the design of municipal services for new subdivisions, infill development and redevelopment of properties, and the rehabilitation or replacement of existing infrastructure in the CoB. Information is also provided on the requirements for the submission of plans and specifications.

It should be noted that standards for landscaping will also apply to the development of a new subdivision, infill development and redevelopment of properties. Landscaping standards are outside the scope of this manual and should be obtained from the City of Brandon Zoning By-law, Tree Protection By-law and other applicable guidelines and by-laws.

2.0 DEFINITIONS

Active Depth – The difference in height between Normal Water Level (NWL) in a retention pond or bottom of a detention pond and High Water Level (HWL).

Active Storage – The volume of storage in a pond or conveyance system above the Normal Water Level elevation or bottom of a detention pond, up to or beyond the design high water level.

Active Transportation – Any form of human powered transportation, such as walking, jogging, cycling, skateboarding, and use of mobility aids.

Air Valve – A specialty valve that automatically releases air that collects at high points in a pressurize sewer system.

Ancillary structure – Any installation that supports the primary use of the principal structure, includes sound attenuation, fencing, roadside safety systems, illumination, and traffic control devices.

Arterial Streets – Streets used to carry large volumes of all types of traffic moving at medium-to-high speeds.

Auxiliary Lanes – A space for motorists to park outside the travel lanes, decelerate outside of the travel lanes, accelerate and merge into a travel lane, and provide storage for vehicles that are turning.

Back Lanes – Roads located behind or between houses to provide direct land access. Back lanes are not considered primary access to industrial or commercial developments, or for emergency access. Back lanes may be considered for secondary emergency access.

Boulevard – The portion of a right of way not intended for vehicular traffic, as defined in Part 1 of the Traffic By-law.

Boundary Valves – Any valve that separates different pressure zones in a water distribution network (boosted vs. non-boosted, etc.).

Catchment – The overall area draining stormwater to a point of collection or outlet. Often used with the term Subcatchment, which refers to a smaller subarea of a catchment.

Channelization – The separation and direction of traffic movements and pedestrians/cyclists into defined paths at an at-grade intersection through the use of geometric features, pavement markings, and traffic control devices.

City – The City of Brandon or the area contained within the City boundaries as the context requires.

City of Brandon Reference Atlas (COBRA) – The City's online interactive map detailing property, infrastructure, traffic and transportation, parks, operations, planning, economic development, orthophotos and other information using an ESRI ArcGIS environment.

Clear Zone - the unobstructed, traversable area beyond the edge of the travelled way that allows a driver to stop safely or regain control of a vehicle that has left the roadway

Collector Streets – Streets that collect and distribute traffic to the Arterial Streets and Local Streets as well as provide access to adjacent areas. Collector Streets typically operate as neighbourhood-wide connections and may connect to higher capacity Arterial Streets, other Collector Streets, or lower capacity Local Streets.

Conceptual Design – An early phase in the design process used to identify requirements and broadly outline design solutions. Typically preceded by the identification of a problem and undertaken as part of a study. Also referred to as Functional Design.

Conceptual Plan Memorandum – A document that outlines the project, its existing environment/location, and how the project will impact the environment and transportation network.

Contractor – A person, persons, or corporation who undertakes the construction of a Development or Municipal Infrastructure works.

Crossfall – The transverse gradient of a roadway cross-section, to promote drainage of the pavement surface.

Crown (Pipe) – The highest point of the external surface of a pipe.

Curb Stop – A shutoff valve on a building water service located on the public/private property line between the water connection and building water service, and accessible for operation by a curb stop box.

Dead Load – Load exerted on a buried pipe-soil structure due to soil or backfill above the pipe, or any surcharge loading that is constant and does not change over time. For a pipe in a trench, typically considered to be the depth of fill from outside crown of the pipe to finished ground elevation, multiplied by the trench width (rigid pipe design) or the width of a ‘prism’ of soil equal to the pipe outside diameter (flexible pipe design).

Dead Storage – The volume of storage in a retention pond or conveyance system below the elevation of a control element such as a weir used to set a specific Normal Water Level of a pond. The dead storage volume is always held in the pond.

Dead End Watermain – A section of watermain without a looped connection to another watermain.

Depression Storage – Storage of water in small depressions that would otherwise become runoff (e.g. undulating terrain, surface roughness, puddles, etc.).

Depth of Cover – The vertical distance from finished surface grade to the top of the pipe (pipe crown).

Design Drawings – Engineering plans, profiles, and details, in hard copy or electronic form, prepared by an Engineer, showing the details for the installation of the various municipal improvements using standard engineering symbols and forms, and conforming to the Municipal Servicing Standards, Standard Construction Specifications, and other applicable design guidelines and by-laws.

Design Engineer – A Professional Engineer registered to practice in the province of Manitoba retained by another party such as the City or a private developer to undertake engineering services. Also referred to as the consulting engineer.

Design Rainfall – Actual or Synthetic rainstorms based on statistical characteristics of historic weather data for a particular location and used for estimating runoff.

Detailed Design – The final stage in the design process which fully details and quantifies the project works and construction methods and is suitable to be used for construction.

Detention Pond (Dry Pond) – A pond designed to not hold water on a permanent basis. Stormwater routed to the pond is stored briefly following rainfall or snowmelt events with gradual release to a downstream receiving system until the pond is completely drained.

Developer – A person, persons, or corporation who has applied to subdivide and/or develop, or to service an existing parcel of land, whether as the owner or an agent for the owner of the land.

Development – as defined in The Planning Act of Manitoba.

Distribution Mains – water pipes that distribute water from the water treatment plan and pumping stations to water service lines and fire protection systems.

Downstream – The direction towards the point of outlet of a pipe, channel or drainage system in the normal direction of flow.

Drop Manhole – A large manhole where one or more of the inlet pipes has an invert elevation significantly higher than the invert of the outlet pipe, where vertical pipes located inside the manhole convey flow from the higher inlets to the lower outlet.

Engineering Department – The City of Brandon Engineering Services Department.

Forcemain – A pressure sewer that conveys wastewater by internal pressure, with pressure typically created by a lift station. Force mains are typically larger than low pressure sewers.

Freeboard – The vertical height between the design High Water Level of a stormwater pond to the adjacent ground level or top of dike and used as a buffer in the event that flooding conditions exceed the design high water level.

Functional Planning Study – Study that includes sufficient functional design of all elements of the street (including intersections, property requirements and access locations) to allow for right-of-way acquisition and permitting/approvals.

Gravity Sewer Main – Domestic sewer main that uses gravity to convey wastewater flows.

Hazen and Williams Equation – An empirical relationship relating the velocity of flow in a pipe flowing full to the pipe hydraulic radius, slope of the hydraulic grade line and ‘Hazen and Williams’ roughness coefficient representing the frictional resistance of the pipe walls to flow. Typically used for the design of pressure flow conditions in water distribution systems or sewage forcemains.

High Water Level (HWL) – The maximum water level a pond or hydraulic element will reach during operation under its design parameters, as designated by its design probability of exceedance (or return period).

Horizontal Alignment – The configuration of the streets as seen in plan view, consisting of tangent sections, circular curves, and spiral transitions.

Horizontal Curves – A horizontal transition between two tangent roadway segments, allowing a vehicle to negotiate a turn at a gradual rate rather than as an abrupt turn. Typical horizontal curves use a circular arc, but higher speed roadways may also utilize spiral transition curves between the tangent sections and circular arc.

Horton Decay Constant – Horton infiltration parameter, used to estimate the reduction in infiltration capability over time as soils become increasingly saturated.

Hydraulic Grade Line (HGL) – The sum of pressure and elevation head in a system; or the surface water elevation of water flowing in a conveyance system open to atmosphere; or for closed pipe systems under pressure, the elevation to which water would rise in a piezometer connected to the pipe and open to atmospheric pressure.

Hydrograph – A graphical representation of depth, velocity, flow or volume plotted as a function of time.

Hyetograph – A graphical representation of the variation of rainfall depth or intensity plotted as a function of time.

Imperviousness – The fraction of a catchment covered by surfaces that do not allow infiltration.

Infiltration – The absorption of water into the ground, governed by the type of surface cover, soil type, soil compaction and soil moisture content.

Inlet Time – The time required for flow from the farthest point of a subcatchment to reach the first point of inflow into a defined conveyance system (flow channel or LDS inlet)

Intensity-Duration-Frequency (IDF, or IDF Curve) – A mathematical function which relates rainfall intensity, time (or duration) and probability or return frequency, developed from historical records of severe rainfall events.

Interim Limits of Construction – The boundaries of a construction phase within a development, which will be extended by future phases of construction.

Invert – The bottom of a channel or lowest point of the inside diameter of a pipe cross section.

Lift Station – A domestic sewer or land drainage pumping station, typically receiving inflow by gravity and conveying outflow by pumping into a receiving system.

Link – A connector with a water distribution or gravity drainage system model representing a conduit or other element that adds or subtracts head as a function of flow. Besides conduits, links can represent valves, rating curves, pumps, weirs or orifices.

Live Load – Load exerted on buried pipe-soil structure due to vehicle, pedestrian, or any load which may change over time, often including an allowance for impact or vibration loading from movement of the loading (e.g., moving vehicles).

Local Sewer – A gravity sewer main typically routed along a right of way, receiving wastewater from sewer service lines and discharging into Trunk sewers.

Local Streets – Streets that provide direct land access with traffic movement as a secondary consideration.

Longitudinal Grades – The gradient of rise or fall in elevation with length along a roadway, often expressed as a percentage grade.

Low Pressure Sewer (LPS) – A pressurized, small diameter sewer. LPS systems utilize small holding tanks and pumps serving one or a few buildings that discharge into a pressurized sewer main to a point of discharge into a receiving gravity sewer.

Major System – Stormwater system components designed to store and transport runoff from large sporadic rainfall events that exceed the capacity of the minor system, and consists of storm drains, ditches, gutters, retention ponds, detention ponds and naturalized stormwater ponds.

Mandrel – A go-or-no-go testing device that is pulled through a flexible pipe to determine if the pipe has deflected due to surface or backfill loading.

Manhole – A vertical shaft with a removable cover that allows human access to a sewer.

Manning Equation – An empirical relationship relating the velocity of flow in a pipe part full or full to the pipe hydraulic radius, slope of the hydraulic grade line and Manning Roughness Coefficient representing the frictional resistance of the pipe walls to flow. Typically used for the design of gravity flow systems including sewers and ditches.

Manning Roughness Coefficient – An empirically-derived value representing the magnitude of frictional resistance to flow in a pipe or channel pipe due to the surface roughness of the pipe walls or channel bottom and sides and including the sinuosity of the channel.

Median – That portion of a divided street separating the travelled ways for traffic in opposite directions.

Minor System – Stormwater system components designed to transport runoff from typical rainfall events, and consists of sewers, catch basins, manholes, culverts, outfall structures and oil and grit separators.

Multi Use Pathway (MUP) – A pathway physically separated from motor vehicle traffic. Multi-use pathways include bicycle paths, rail-trails or other facilities built for shared use by bicycle and pedestrian traffic.

Multi-modal – Supporting the needs of all users, not solely for the purpose of personal vehicle use.

Naturalized Stormwater Pond (NSP) – Constructed stormwater pond that is designed to mimic the appearance and function of a natural wetland through the incorporation of native plant species and natural design principles.

Node – A junction within the water distribution or gravity drainage system model where head, inflow, or outflow is known or may be calculated. The term is typically used within the context of a one-dimensional link and node model.

Normal Water Level (NWL) – The design level of water within a retention pond, typically controlled by a weir.

Oil and Grit Separators (OGS) – Underground devices designed to capture floating debris or hydrocarbons and settleable materials and sediment prior to entering the sewer network or detention areas.

On-grade Inlet – A catch basin inlet located on a continuous grade used to intercept stormwater or snowmelt flow in the gutter. These inlets experience flow velocity and typically only capture a portion of the flow. Also known locally as a 'fly-by' inlet.

Planning and Buildings Department – The City of Brandon Planning and Buildings Department.

Post-Development – The condition of land following development.

Pre-Development – The condition of land prior to any proposed development construction taking place. Pre-development conditions are typically considered to be within a 5 year window.

Preliminary Design – An intermediate design stage between Conceptual and Detailed Design, where the conceptual design is refined into a recommended solution.

Probability of Event – The expected time between occurrence or exceedance of a particular threshold value, or the frequency of occurrence of a particular storm or flood event. The frequency of occurrence may be expressed either as a probability or as the estimated average number of years between events and is also known as return period or return frequency.

Professional Engineer – A registered professional engineer licensed to practice in the Province of Manitoba with Engineers Geoscientists Manitoba (EGM).

Public Reserve – City-owned land that is not part of the public right-of-way and is to be used in accordance with provisions as detailed in The Planning Act.

Rational Method – A simplified hydrologic calculation that uses average rainfall intensity for a given time of concentration, catchment area and runoff coefficient to estimate the peak runoff flow from a catchment.

Record Drawings – Drawings that are prepared by the Consulting Engineer after verifying in detail the actual conditions of the completed project as defined in Engineers Geoscientists Manitoba's *Authentication of Hardcopy and Electronic Professional Documents 2011*.

Regulator – Any Provincial or Federal authority that supervises an industry or business sector, e.g. Fisheries and Oceans Canada.

Retention Pond (Wet Pond) – A stormwater pond that permanently holds water and receives and temporarily stores runoff following rainfall or snowmelt.

Roundabout – A type of circular intersection in which vehicles travel counter-clockwise around a central island but that does not require vehicles to stop. Roundabouts may contain multiple lanes.

Runoff – The surface flow of water from rainfall or snowmelt, occurring when the quantity of flow exceeds the infiltration capacity of the ground.

Runoff Coefficient – An empirical hydrologic parameter that relates the depth of rainfall falling on to a catchment to the depth of runoff generated.

Saddle – A fitting used to connect a building service to an existing sewer main, without needing to install a Tee fitting.

Sag Low Inlet – Drainage inlet located at the lowest point of a roadway gutter or swale, with no velocity or momentum carrying flow over the inlet.

Sewer – An underground pipe typically operating under gravity flow conditions but known as a forcemain or pressure sewer (or low pressure sewer) if operating under pressurized flow conditions.

Sewer Service Line – the complete assembly of the sewer connection and building sewer service as defined in the Water and Wastewater Control By-law. The sewer service line runs between the building wastewater drainage plumbing and the gravity sewer main.

Shallow Utilities – A broad category of buried utilities including electrical, gas, and telecommunications (telephone, cable TV, internet, fibre optic) infrastructure.

Side Slope – The gradient to or from a structure, typically associated with a ditch cross-section. Two terms are sometimes used, with side slope referring to the slope of a roadside ditch cross-section nearest the roadway and back slope referring to the slope of a roadside ditch cross-section on the other side of the channel away from the road.

Sight Distance – The unobstructed distance a driver can see along the roadway in front of them.

Spread (Flow Encroachment) – The horizontal width of gutter flow or ponding at sag low points encroaching into a roadway surface between the gutter and roadway crown, measured from the face of curb.

Spring Line – The horizontal centreline of the pipe with a circular cross section at the 3 and 9 o’clock positions.

Standard Construction Specifications (SCS) – The City of Brandon Standard Construction Specifications.

Standard Drawing (Standard Detail) – A drawing developed by the City to indicate the typical construction or configuration of infrastructure.

Subcatchment – A distinct subarea of a larger catchment, defined as the overland flow area draining to a specific design point, or entry point into a conveyance system such as a catch basin inlet.

Sump – A pit or depressed floor in a manhole or catch basin to capture sediment, or a smaller pit within a building or pumping station to aid in the capture of water.

Superelevation – A method of roadway construction where the outer edge of the pavement is raised above the inner edge.

Support Materials – Guiding documents adopted by the City including but not exclusive to by-laws, regulations and the Standard Construction Specifications**.**

Surcharge – When the hydraulic grade line or water level within a conveyance system exceeds the crown of pipe.

Sweep – A pipe bend with a larger radius designed to provide a gradual change in direction of the pipe to establish the desired slope, horizontal or vertical alignment of the line. Typically used on sewer services.

Tee – A “T” shaped fitting that makes a perpendicular connection from one pipe into another pipe.

Time of Concentration – The time required for runoff to travel from the hydraulically furthest point in a subcatchment to a point of collection under constant rainfall.

Traffic Calming – The process and measures applied by road authorities to address concerns about the behaviour of motor vehicle drivers travelling on streets within their jurisdictions.

Traffic Control Devices – Installations to control traffic including all pavement markings, traffic signs and traffic signals required to operate the transportation system in a safe and efficient manner.

Traffic Impact Study / Memorandum – A study or memo that assesses the impacts of a new or changed development on the existing or proposed transportation network.

Transportation Association of Canada Geometric Design Guide (TAC GDG) – Refers to the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads

Travel Time – The time required for flow to travel from the upstream end to the downstream end or outlet of a conveyance system.

Trunk Sewer – A domestic sewer which serves as the collection point for multiple neighbourhoods, typically 750 mm and larger.

Turnout Pocket – Small paved and curbed pavement widenings that are used to locate drainage inlets outside of roadway travel lanes.

Ultimate Stage – The planned final configuration of the infrastructure at full buildout and as described in the Functional Plan**.**

Upstream – The direction towards the source of flow in a conveyance system (or in in opposite direction of flow).

Valve – A valve in the water distribution, sewage forcemain or low pressure sewer system that is used to stop flow or isolate a part of the system.

Vertical Curve – A vertical transition constructed between roadway segments that have different gradients, to form a comfortable transition between the segments and aid in sight distance. A parabolic curve is often used.

Water Service Line – the complete assembly of the water connection and building water service as defined in the Water and Wastewater Control By-law. The water service line runs between the building water meter setter and the watermain.

Watermain – Any pipe conveying water within a water distribution system excluding water service lines. The term ‘water main’ is used interchangeably, however the term ‘watermain’ is preferred for compliance with City of Brandon by-laws.

Wye – A fitting makes a branch connection from one pipe into another pipe at 45° similar to the appearance of a lower-case letter ‘y’. Similar in function to a Tee, but with better hydraulic performance and implied direction of flow.

3.0 ABBREVIATIONS

AACEI	American Association of Cost Engineers International
AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ACP	Asphalt Concrete Pavement
ACPA	American Concrete Pipe Association
ASTM	American Society for Testing and Materials
AT	Active Transportation
BARN	Brandon and Area Road Network
CBR	California Bearing Ratio
CCPPA	Canadian Concrete Pipe and Precast Association
CCTV	Closed Circuit Television
CHBDC	Canadian Highway Bridge Design Code.
COBRA	City of Brandon Reference Atlas, an online interactive map server detailing property, infrastructure, traffic and transportation, parks, operations, planning, economic development, orthophotos and other information using the ESRI ArcGIS environment.
DSTAC	City of Brandon Development Services Technical Advisory Committee
EPA	United States Environmental Protection Agency
EPANET	Water distribution analysis software developed by the US EPA
EPA SWMM	Storm Water Management Model. Hydrologic, hydraulic and water quality modeling software developed by the US EPA

ESAL	Equivalent Single Axle Loads
FHWA	United States Department of Transportation Federal Highways Administration
FWD	Falling Weight Deflectometer
GBC	Granular Base Course
GF	Growth Factor
GSC	Granular Subbase Course
GWL	Ground Water Level
GWL	Groundwater Level
HDPE	High Density Polyethylene pipe material
HEC-15	Hydraulic Engineering Circular No. 15 “Design of Roadside Channels with Flexible Linings”, published by the US FHWA.
HEC-22	Hydraulic Engineering Circular No. 22 “Urban Drainage Design Manual” published by the US FHWA.
HGL	Hydraulic Grade Line
HWL	High Water Level
IDF	Intensity-Duration-Frequency
LDS	Land Drainage Sewer.
LEF	Load Equivalency Factor
M_R	Resilient Modulus
MSS	The City of Brandon Municipal Servicing Standards
NMS	Nominal Maximum Size

NSP	Naturalized Stormwater Pond
NWL	Normal Water Level
OCPA	Ontario Concrete Pipe Association
P_I	Initial Serviceability
P_T	Terminal Serviceability
PVC	Polyvinyl Chloride thermoplastic pipe material
R	Reliability
RCP	Reinforced Concrete Pipe
SCS	City of Brandon Standard Construction Specifications
SN	Structural Number
S_O	Standard Deviation
SPD	Standard Proctor Density
SPMDD	Standard Proctor Maximum Dry Density
SUT	Single Unit Trucks
TAC	Transportation Association of Canada
TTC	Tractor Trailer Combinations
USCS	United Soil Classification System
W_{18}	Design Period ESALs based on an equivalent 18,000-lb single axle load
ΔPSI	Serviceability Loss