Design Criteria for Sewers and Watermains

Second Edition, January 2021

TORONTO

Orientation Sessions

Online via Web Ex

- Wednesday December 9, 2020
- Friday December 11, 2020
- Monday December 14, 2020
- Wednesday December 16, 2020

Welcome / “Web Etiquette”

“Web Etiquette”:

- ✓This session will be recorded
- ✓Please keep your microphone on mute
- ✓Sharing your camera view is optional
- ✓Please use the chat function to ask the questions – so we can keep a written record for updated tools/follow up
- ✓Ask questions as they occur to you: but questions will be answered at the end of the presentation.

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Overview

Background

- This document is currently maintained by Business Improvement & Standards (BIS), part of Engineering & Construction Services, on an as required basis.
- This document is divided into 6 chapters:
  - ✓(1) Engineering Submission
  - ✓(2) Sanitary Sewers
  - ✓(3) Storm Sewers
  - ✓(4) Watermains
  - ✓(5) Lot Grading and
  - ✓(6) Material Specifications and Appendix.
- First Edition of this document was released in November 2009.
- Second edition is expected to release in January 2021 and is available on the external City of Toronto Website at www.toronto.ca/ecs-standards.

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Scope

The Design Criteria for Sewers and Watermains update will include/exclude:

"IN" Scope	"OUT" of Scope
• Revising chapters in the Design Criteria Manual • Review City Design Criteria Manual against Design Manuals of different regions in GTA, if required. • Revising the document based on comments received from different stakeholders.	• Revisions to design guidelines such as DIPS, Streetscape Manual, Complete Streets, etc. • Update City specifications and standard drawings referenced in the manual.

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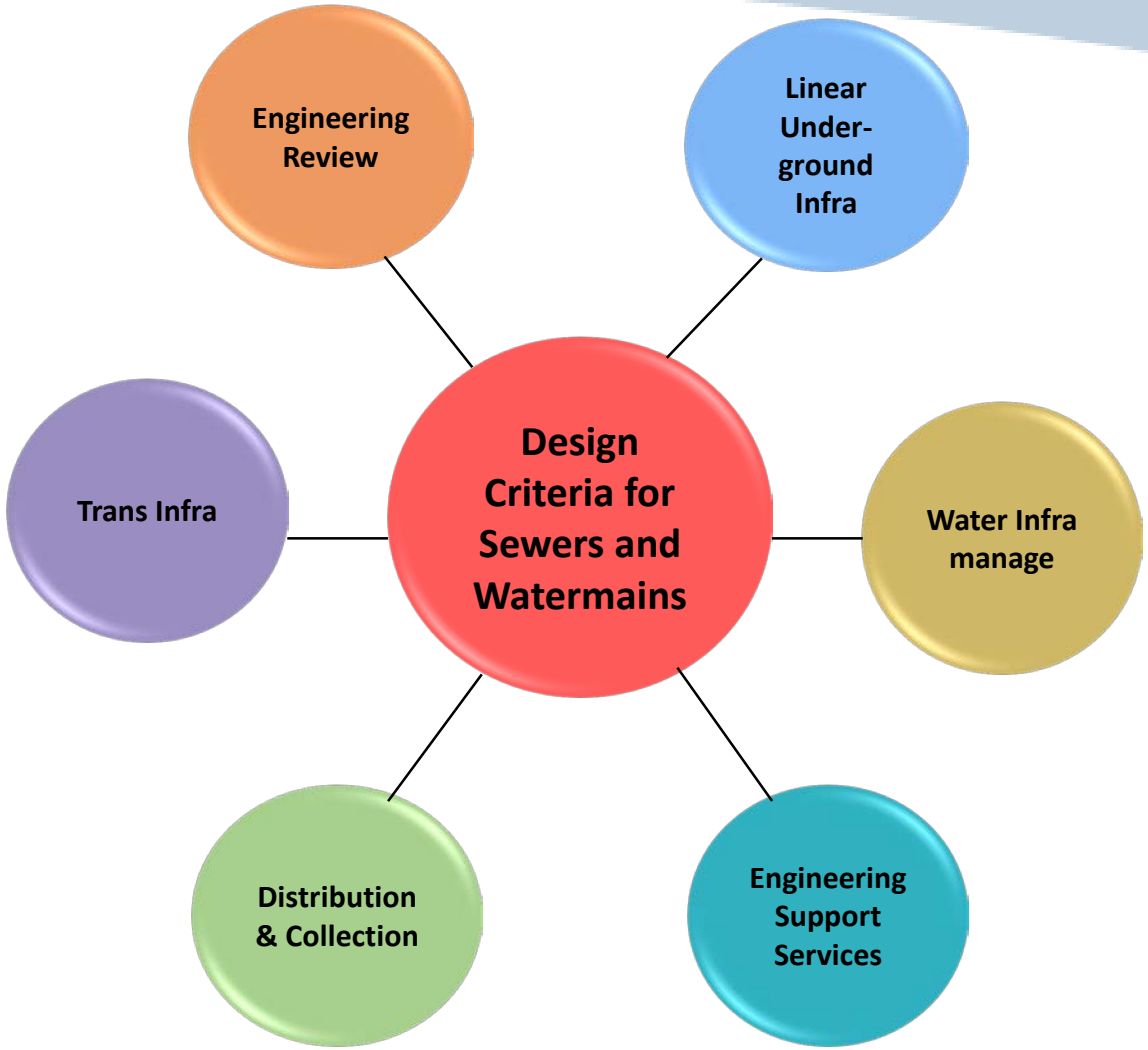
Stakeholders in a Glance



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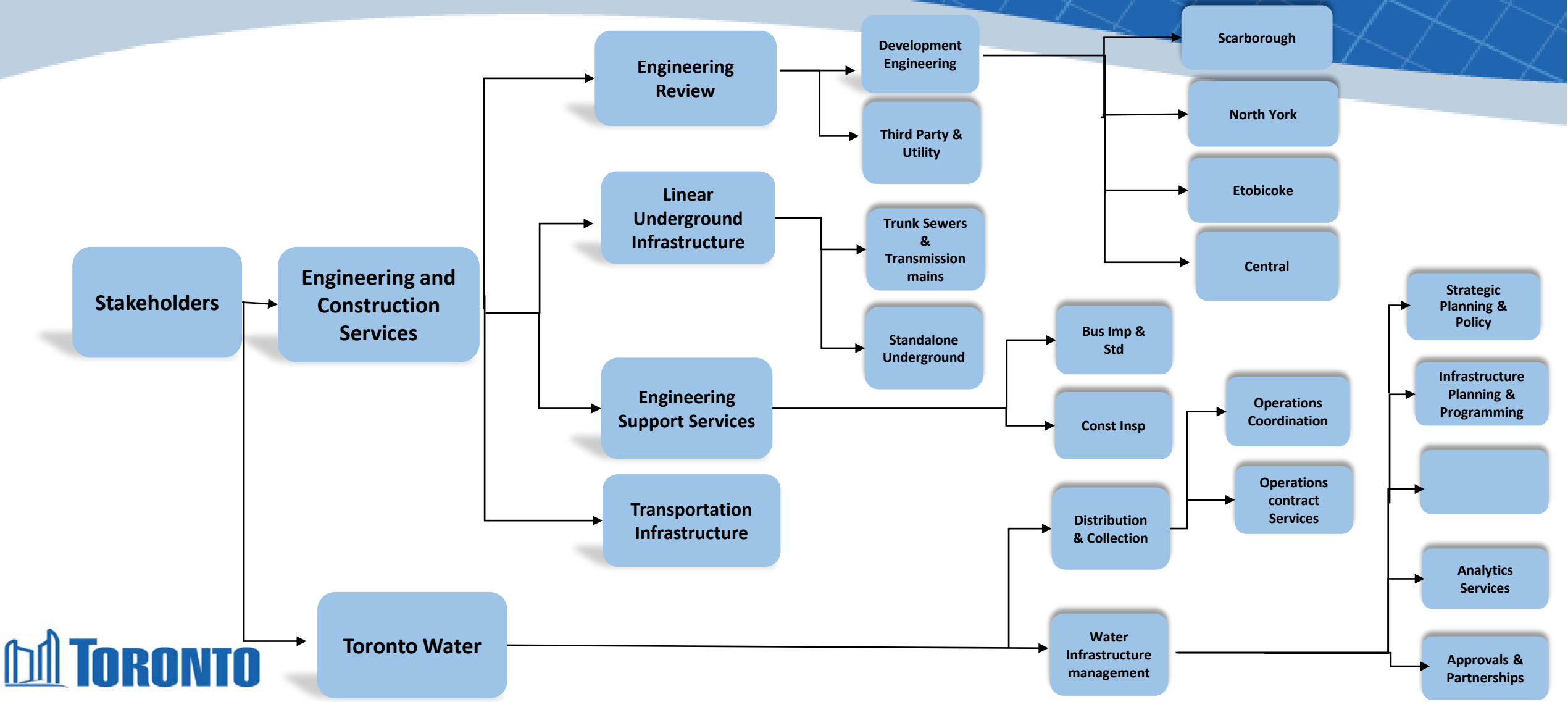
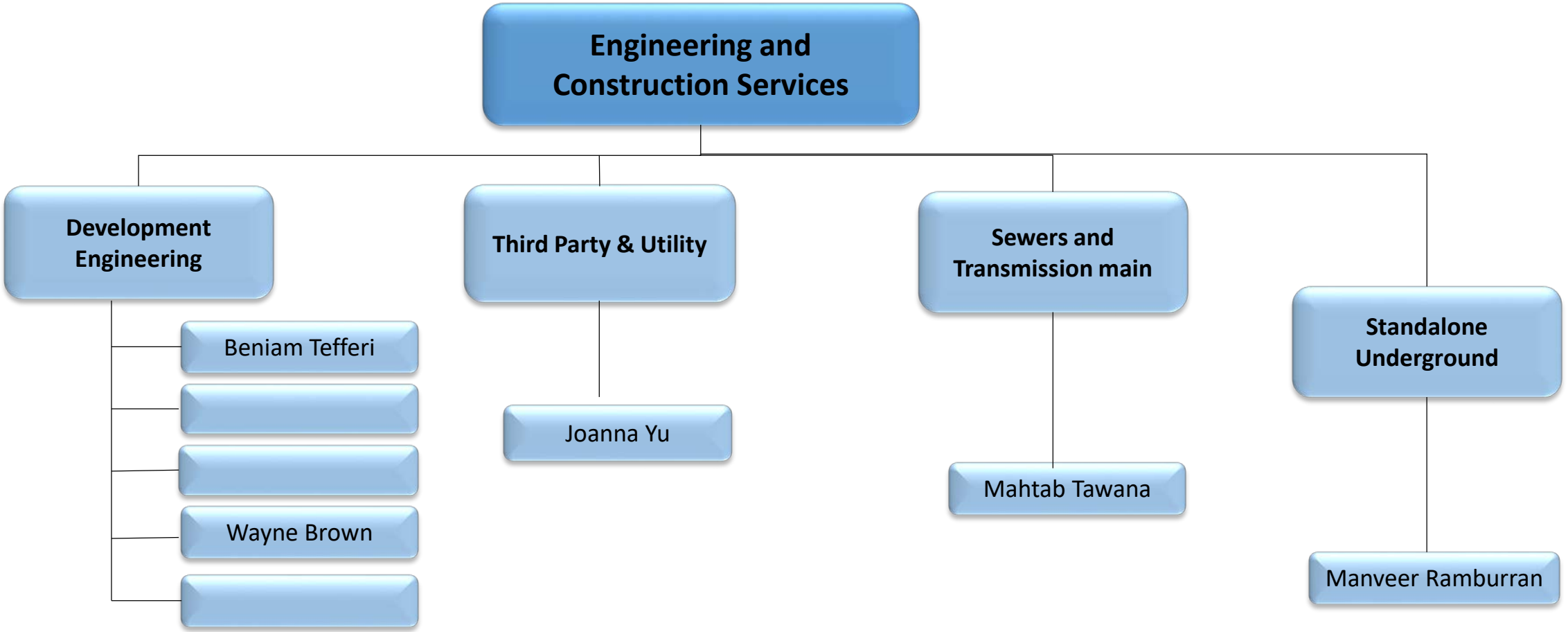
Stakeholders – Divisions and Sections



Working Groups Members and their Respective Divisions/Sections



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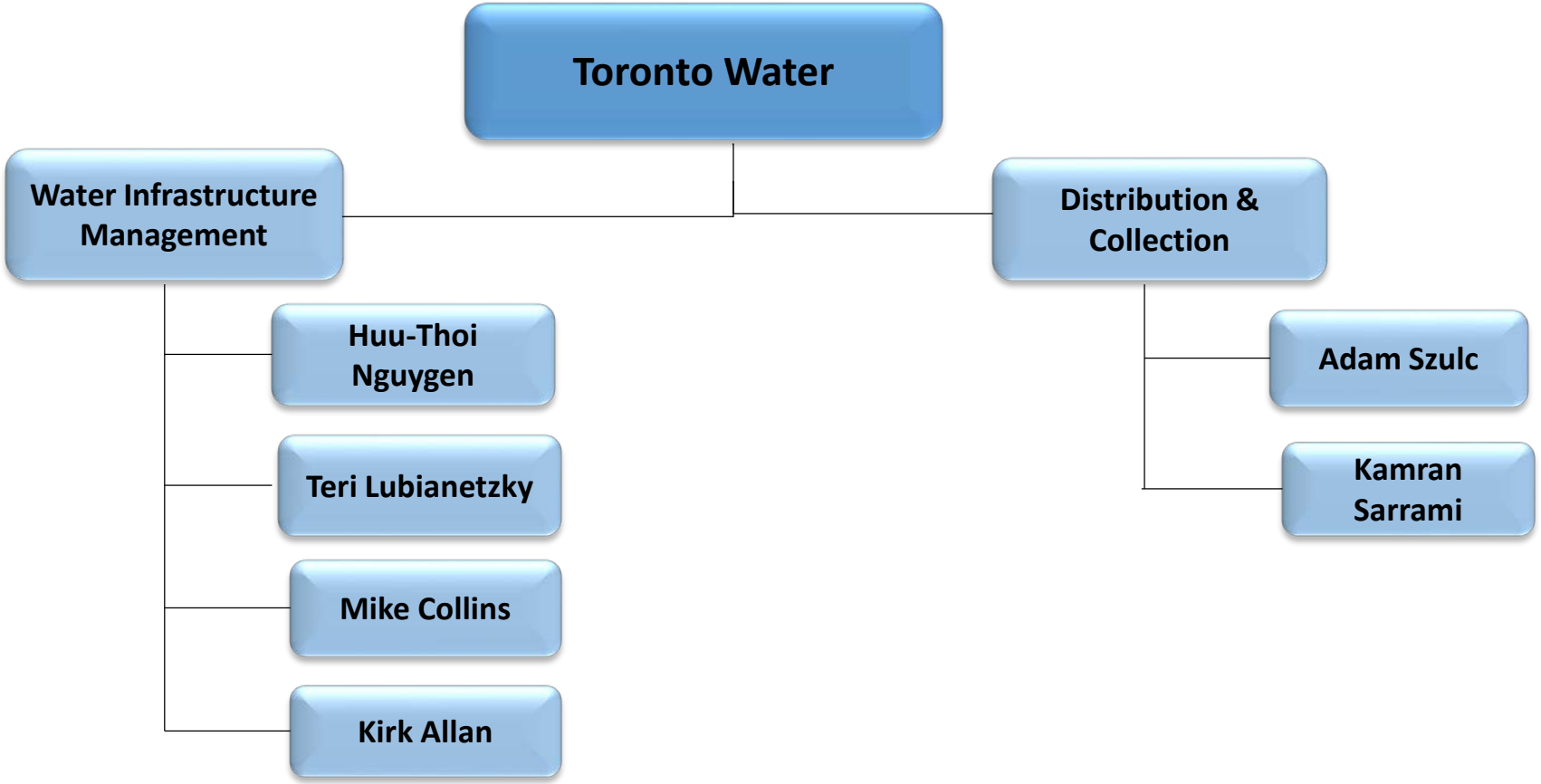
Working Groups Members and their Respective Divisions/Units



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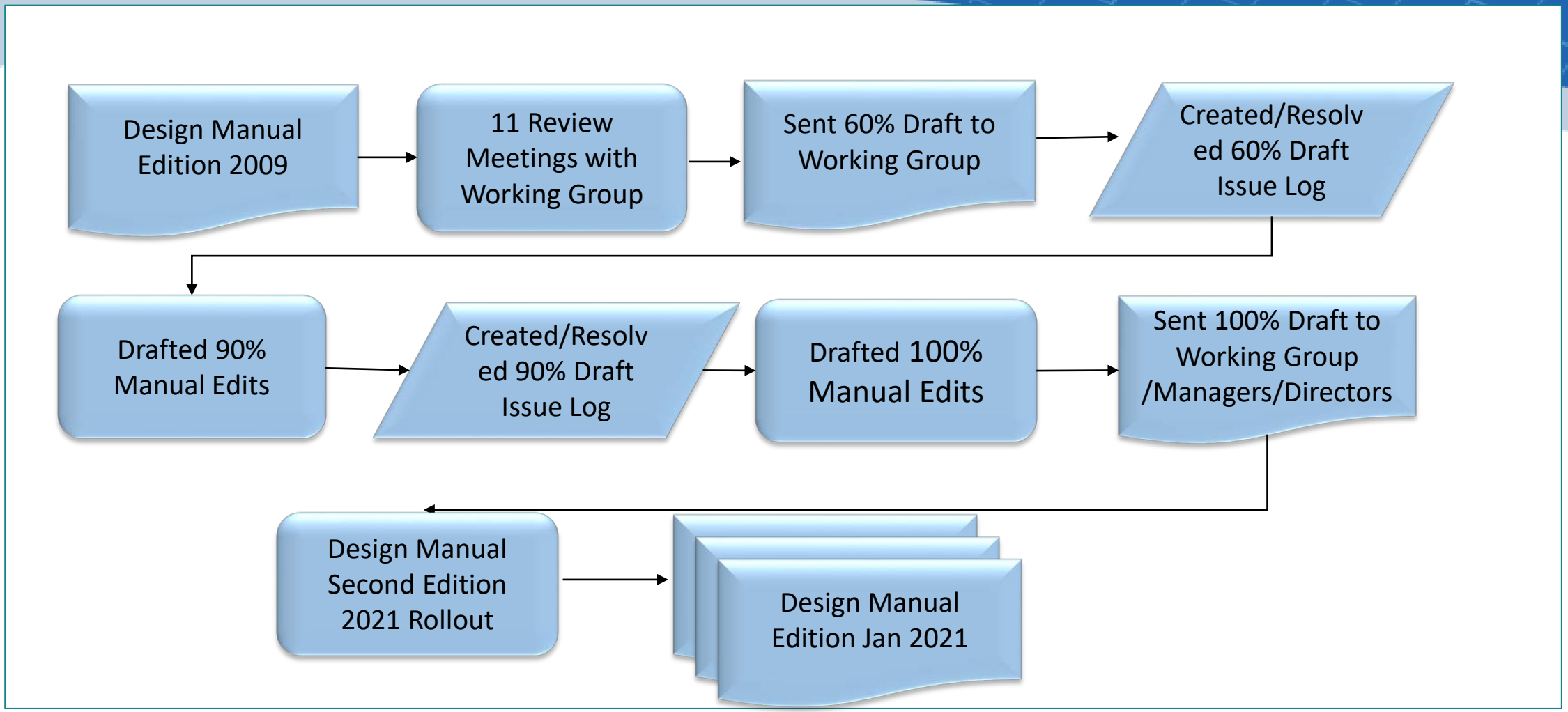
Manual Update Process



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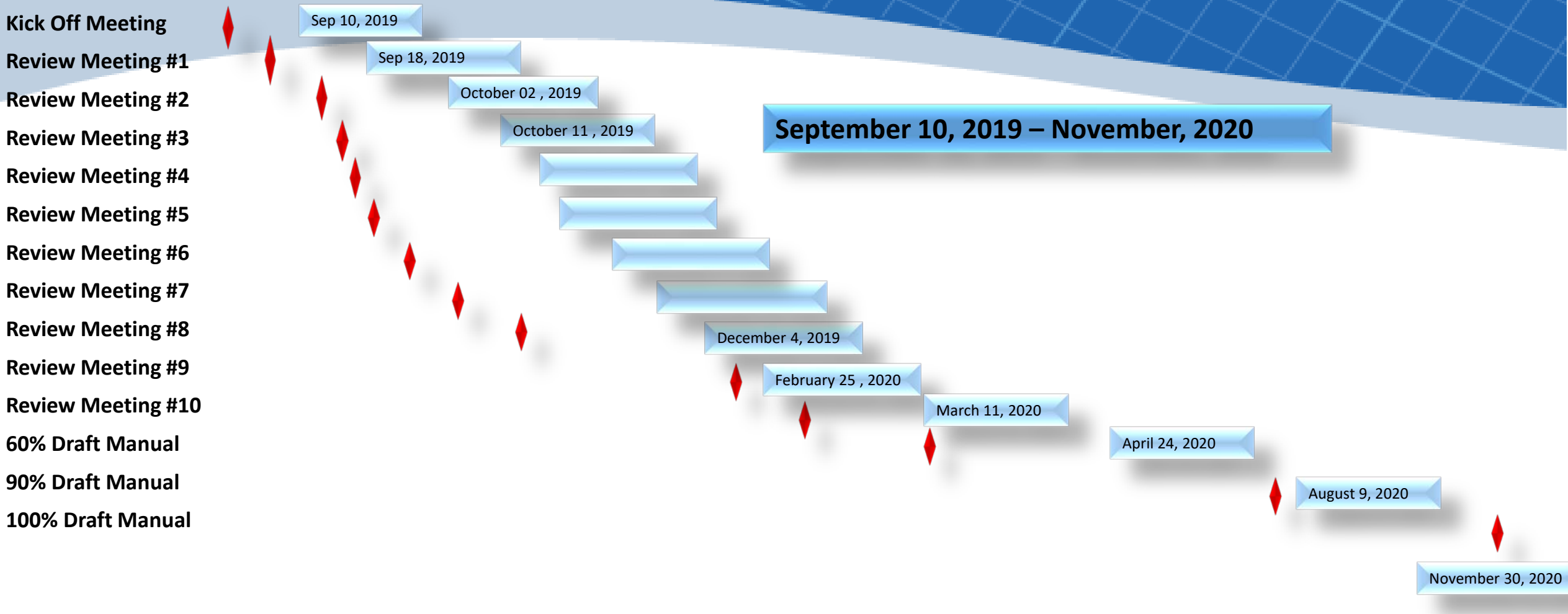
Project Schedule



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Chapter Contents of Manual

- Chapter 1 – Engineering Submissions
- Chapter 2 – Sanitary Sewers
- Chapter 3 – Storm Sewers
- Chapter 4 – Watermains
- Chapter 5 – Lot Grading
- Chapter 6 – Material Specifications

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Appendixes

- Appendix A – As-built Drawings
- Appendix B – General Notes
- Appendix C – Maps
- Appendix D – Utility Separations
- Appendix E – Unit Conversion Table
- Appendix F – Reverse Slope Driveway Guidelines
- Appendix G – Servicing in Confined Spaces (New)
- Appendix H – Hydraulic Calculations for Junction and Transition Maintenance Holes (New)
- Appendix I – Pumping Stations (New)
- Appendix J – Sewer pipe Air Testing (New)
- Appendix K – Bibliography

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Chapter # 1 – Engineering Submissions

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Chapter # 1 – Engineering Submissions
New Content

Engineering Drawing Requirements

If a survey is integrated with a coordinate system:

- The system shall be referenced to the North American Datum 1983 Canadian Spatial Reference System, NAD 83 CSRS.
- The coordinates shall be expressed as grid coordinates in 3 Degree Modified Transverse Mercator projection.
- Vertical datum will be Canadian Geodetic Vertical Datum (GVD) datum, pre 1978 re-adjustment.

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Chapter # 1 – Engineering Submissions
New Content

As-built PDF File

As-built drawing will show the accurate locations of construction such as storm sewers, sanitary sewers, combine sewers watermains and other appurtenances. For more details on collecting features, see Appendix E – As-built Features Requirements in the Field Services Manual.

- Separate single page PDF file for each drawing sheet
- Each PDF should have a file name separated by underscores, not spaces, and include both the assigned drawing number and the contract number
- PDF properties populated: Title not to be confused with the file name, author, subject, and at least the City contract number as one of the keywords
- PDF format, not PDF/A or PDF/e, which are different
- Exported from CADD software, not scanned from hard copies
- Correct scale embedded in the PDF
- Unlocked, so the City can add its own drawing numbers later, if necessary

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Chapter # 1 – Engineering Submissions
New Content

Subsurface Underground Engineering

- Standard ASCE 38-02 for the collection and depiction of existing subsurface utility data shall be used to provide guidance, when City expects the various quality levels D through A. Quality levels are explained as following;
- Quality Level D – Information derived from existing records or oral recollections.
- Quality Level C – Information obtained by surveying and plotting visible above-ground utility features and by using professional judgement in correlating this information to Quality Level D.
- Quality Level B – Information obtained through the application of appropriate surface geophysical techniques to determine the existence and approximate horizontal position of subsurface utilities.
- Quality Level A – Information obtained by exposing and measuring the precise horizontal and vertical position of a utility at a specific point.

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Chapter # 1 – Engineering Submissions
New Content

Composite Utilities Plan

New bullet points (20) added to this section, for example:

- The correct lotting is to be shown as per the draft plan.
- All utility line locations including City sanitary sewer, storm sewer, rear yard catch basins, watermain and hydrant locations are to be identified.
- All utility service drop locations are to be shown including sewer and water service laterals.
- The complete street lighting system is to be identified.
- The street furniture is to be indicated, i.e. pedestals, transformers.
- All sidewalks are to be located and their dimensions to be shown.
- Location of all proposed trees and landscaping on the subdivision road allowance are to be shown.
- All driveways are to be indicated as well as clearances from transformers, fire hydrants and streetlights.

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Chapter # 1 – Engineering Submissions
New Content

Piling and Shoring

Where piling and shoring is to take place, the maximum allowable vibration level requirements for construction work near bridges, trunk and local sewers, and transmission and distribution watermains, heritage or structurally sensitive buildings will be according to GN117SS. This supplementary specification should be included in the tender package. In addition, the applicant shall enter into a Tie-Back Piling and Shoring Agreement with Transportation Services division.

Crossing of Cast Iron Transmission Watermain

Where a crossing under any cast iron transmission watermain is to take place, it shall be according to supplementary specifications GN118SS. This supplementary specification should be included in the tender package.

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Chapter # 1 – Engineering Submissions
New Content

Table: Minimum Easement Widths

If service, size and depth is …	Then easement width is …
Rear lot catchbasin lead regardless of diameter and depth	3 m
Single sewer or watermain equal or less than 600 mm diameter and less than 3.7 m deep	6 m
Single sewer in excess of 3.7 m deep or single watermain equal or larger than 750 mm diameter	9 m
A combination of two mains, either sewer or water, less than 3.7 m deep	9 m
A combination of two mains, either sewer or water, in excess of 3.7 m deep and no closer than 3 m to easement limit	12 m
Major trunk sewer or transmission watermain	15 m [a]
Three or more mains, no closer than 3 m to easement limits	Add 3 m for each additional sewer or watermain

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Chapter # 2 – Sanitary Sewers

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Chapter # 2 – Sanitary Sewers
Population Equivalents Based on Type of Housing

If type of housing is …	Then persons per unit is …
single family dwelling	3.5
semi-detached	2.7
townhouse	2.7
duplex	2.3
triplex	3.7
apartments or condominium:	
bachelor	1.4
1 bedroom	1.4
2 bedroom	2.1
3 bedroom	3.1
4 bedroom	3.7

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Chapter # 2 – Sanitary Sewers
Peak Flow Design Parameters

Average wastewater flows for new local sewers	
average wastewater flow	450 litres/capita/day
commercial average peak flow	180,000 litres/floor ha/day a,b
industrial average peak flow	180,000 litres/floor ha/day a,b
institutional average peak flow	180,000 litres/floor ha/day c
Peaking factors	
residential peak factor	Harmon equation: $PF=1 + (14/(4+(P/1000)^{½}))$ Where P=population PF=ratio of peak flow to average flow
commercial peak factor	included in average peak flow
institutional peak factor	included in average peak flow
industrial peak factor	included in average peak flow
Extraneous flows	
infiltration allowance	0.26 litre/second/ha (all areas)
Foundation drain allowance	
<10 ha	5 l/s/ha (if necessary for existing partially separated and combined areas only)
>10 ha and ≤ 100 ha	3 l/s/ha for additional area above 10 ha (if necessary for existing partially separated and combined areas only)
>100 ha	2 l/s/ha for additional area above 100 ha (if necessary for existing partially separated and combined areas only)
Groundwater discharges	
groundwater inflow allowance	Included in sanitary discharge agreement

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Chapter # 2 – Sanitary Sewers
New Content

Extraneous Flows – New Areas

In case there exist groundwater discharges permitted under the future Sanitary Discharge Agreements, these groundwater inflows must be accounted as another element of extraneous flows in addition to the allowance of 0.26 l/s/ha when computing design flow.

Extraneous Flows – Existing Areas

- When groundwater flows are quantified on a sanitary sewer design sheet, the capacity of the existing sewers must be checked to confirm that they have capacity to receive these flows.
- For new condominium developments where the hydrogeological investigation indicates that groundwater or the effluent quality does not meet the Toronto Municipal Code, Chapter 681, Sewers requirements for discharge to storm sewers, the capacity of the existing sanitary sewers receiving these groundwater inflows must be checked to confirm that they have capacity to receive these flows.

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Chapter # 2 – Sanitary Sewers
New Content

Analysis of Existing System Flows

- In computing design flows to size the new sewers, Table Peak flow design parameters is required to use. In this table, the average wastewater flow of 450 litre/capita/day is applied for the residential population.
- The City recognizes that this rate for the design of a proposed sewer is More conservative than the rates to be used for the analysis of an existing sewer system, and The proposed sewer will ultimately be part of the existing sewer system.
- When an application is made for Ministry of the Environment Conservation and Parks (MECP), Environmental Compliance Approval (ECA) for proposed sanitary sewers, the consultant is to perform calculations for both 450 litre/capita/day and 240 litre/capita/day for residential population, or 250 litre/capita/day for ICI equivalent population for the proposed sewer, when analysing the impact on the hydraulic grade line of the existing downstream sewer system, prior to connecting to the trunk sewer system.
- The analysis of the 450 litre/capita/day rate shall be supported by a Design Brief which Interprets the results of the analysis, and compares the results to the 240 litre/capita/day for residential or 250 litre/capita/day for ICI equivalent population.
- The Design Brief shall provide conclusions and recommendations on the ability of the existing sewer system to accommodate the proposed sanitary sewer flows.

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Chapter # 2 – Sanitary Sewers
New Content

Groundwater

- The discharge of private water, including groundwater, directly or indirectly into City's sewage works is prohibited under Toronto Municipal Code Chapter 681, Sewers, unless the subject property has obtained discharge approval in the form of a discharge agreement in accordance with Section 681-6 from Toronto Water, Environmental Monitoring and Protection unit.
- Discharge of groundwater into the City's storm, sanitary or combined system, including the water quality must comply with Toronto Municipal Code Chapter 681 Table 1 and Table 2 and Chapter 851, if permitted.
- The discharge of groundwater that does not meet the City or MECP criteria for storm sewers may be discharged to the sanitary sewer system and is subject to a Sanitary Discharge Agreement, with the amount excluded to the maximum possible extent, if permitted.
- Furthermore, discharge of groundwater into the City's sewage works must be factored into the municipal sewer capacity analysis and stormwater management design, as applicable.

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Chapter # 2 – Sanitary Sewers

Table 6: Assessment criteria for sanitary and combined sewers

Criteria	Discharge to sewer system	
	Sanitary sewer	**Combined sewer**
Criterion 1 *"Design Function"*	Under proposed design flow conditions, there will be no surcharge[1] in the sewer system.	Under proposed design flow conditions, in addition to contributing peak stormwater flows under the 2-yr design storm event, there shall be no surcharge in the sewer systems.
Criterion 2 *"Basement Flooding Protection"*	Under proposed extreme WWF conditions, including I&I generated under the May 12, 2000 storm event[2], the HGL in the sewer will be at least 1.8 m below grade.	[Criteria applicable when Criterion 3 is not met, for systems containing no CSO points] Under proposed extreme WWF conditions, WWF including I&I generated under 100-yr design storm event, the HGL in the sewer will be at least 1.8 m below grade.
Criterion 3 *"WWF Mitigation"*	[Criteria applicable when Criterion 2 is not met] Under proposed extreme WWF conditions, WWF mitigation measures will ensure the proposed HGL will be no higher than the existing HGL. The proposed peak flow rate will be no greater than existing peak flow rate at the connection to the trunk sewer or pumping station.	Under the 2-yr design storm event, off-site WWF mitigation measures will offset two times the proposed increase from on-site discharges to the system. For systems containing CSO points for CSO control, ensure there will be no increase in peak overflow rate at the CSO point.

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Chapter # 2 – Sanitary Sewers
New Content

Basement Flooding Protection Requirements

- To help mitigate the impacts of basement flooding, City Council has adopted a level of protection representing the May 12, 2000 storm for the sanitary sewer system. When designing sanitary sewers discharging to or located in a basement flooding protection area, the affected sanitary systems must be assessed under this storm event. In this assessment, the domestic or residential flow component is computed by using the most recent population data available and applying the rate of 240 litres/capita/day.
- The ICI components are computed based on the most recent land uses and water consumption data. In case water consumption data are not available, the peak flow design parameters for ICI can be used.
- The inflow/infiltration (I/I) component is the I/I generated from May 12, 2000 storm event as gauged at City's Oriole Yard location. In addition, if there exist permitted groundwater inflows, these inflows to the assessed sewer systems are also taken into account. The flow in sanitary sewers is the total of these flow components.

Minimum Velocity

- All sewers should be designed with such slopes that they will have a minimum sewage flow velocity, when flowing full, of at least 0.6 m/s. In cases where the flow depth in the sewer, under peak flow, will not be 0.3 of the pipe diameter or greater the actual flow velocity at the peak flow should be calculated using a hydraulic elements chart. If this velocity is less than 0.6 m/s and the pipe size is the minimum allowable one–250 mm, the pipe slope should be increased to achieve adequate flushing velocity.
- For replacement sewers where there is an alignment change and fixed inverts at two ends, the minimum velocity requirements will be reviewed at the discretion of the City on a case-by-case basis.

Chapter # 2 – Sanitary Sewers
New Content

Flow From Less Than 10 Single Family Dwellings

- Flows in upper reaches of sewer systems are often insufficient to reach flushing velocity, resulting in deposition of solids.
- It is recommended that upstream legs in a sewer system be installed with a 1 % slope, until 10 single family units are connected, or at whatever slope can achieve the recommended 0.6 m/s velocity.
- The designer is expected to maximize the actual cleansing velocity by adjusting the slope to ensure

  ✓the service connections can be connected to the pipe and

  ✓that the full bore velocity of 3 m/s scouring velocity will not be exceeded, which is approximately 5 percent for a 250 mm pipe.

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Chapter # 2 – Sanitary Sewers
New Content

Bedding Requirements—Flat Sewers

- Reinforced concrete pipe is only available for diameters 300 mm and larger. Non-reinforced sewer pipe 250 mm and smaller is not acceptable for use.
- For flat grade PVC sewers, it is preferred to use granular bedding compacted to 100% Standard Proctor Density. Should concrete bedding be used for PVC sewers, the pipe must be encased in concrete all the way around the pipe, with the encasement terminating at a pipe joint to provide flexibility in case of differential settlement.
- Cradling the pipe in concrete bedding up to the spring line will not be permitted. This is due to the possibility of expansion/contraction of the PVC pipe relative to the concrete bedding or due to differential settlement, which may result in the pipe popping out of its cradle.

Chapter # 2 – Sanitary Sewers
New Content

Shallow Sewers

- Shallow sewers will be insulated according to OPSD 1109.030.

Bedding Requirements

- Rigid pipe bedding will be as per OPSD 802.030, 802.031, 802.032 802.033 and 802.034. Granular A Native or Granular A RCM shall be according to TS1010 and TS401. Granular A RAP id not allowed.
- Specialty designs that require custom bedding to compensate for poor soil conditions, are subject to additional review and approval by the City. These situations may include areas of flat slope, steep slope, fill areas, and areas of high groundwater.

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Chapter # 2 – Sanitary Sewers
New Content

Geoweb Geocell

- Geoweb geocell is permitted by the City to compensate for poor soil conditions and to provide a stable, uniform trench base and bedding condition. The Geoweb serves as a compaction aid on the subgrade allowing for proper compaction of the base granular.
- Geosynthetic reinforced bedding is permitted by the City to promote embankment and trench stability. The geosynthetic can be used for land formation created by lakefill, which can consist of non-homogenous waste materials that are prone to decomposition and settling.

Clay Seals, Filter Diaphragms and Subdrains

- Specific attention is required at crossings with other utilities and plant which rely on the stability of the existing sewer.
- The following conditions are to be considered as sufficient reasons for discussing the need for additional seepage controls along the pipe alignment with the engineer on a specific pipe location basis
  - ✓the natural sub-base and sewer bedding materials are of a granular nature
  - ✓Significant hydraulic head between ends of the culvert
  - ✓the embankment material is of a non-cohesive nature
- For details and additional design information on clay seals in pipe trenches, see OPSD 802.095 and OPSS.MUNI 1205.

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Chapter # 2 – Sanitary Sewers
New Content

Pipe Connections to Existing Sanitary Sewer

- New plastic pipe such as PVC or HDPE connections to trunk sewers (or trunk sewer maintenance holes) are not allowed due to not being able to achieve a chemical or mechanical bond, the potential for differential settlement, the criticality of the infrastructure, and the need to ensure a watertight connection during the lifespan of the asset.
- There may be situations where a maintenance hole cannot be constructed at an intersection. For these projects City standard T-1006.01-1 can be applied.
- The preferred pipe-to-pipe connection location is 2 metres downstream of the nearest maintenance hole so the maintenance hole can be used for both inspection and installing flow monitoring equipment. The standard can also be applied to pipe-to-maintenance hole
- The 8 m dimension from the main line sewer to the connection maintenance hole was determined by the standard easement width of 50 feet (15.24 metres); half of which is approximately 8 metres. For proposed projects this dimension can be adjusted.
- Concrete pipe must be used to achieve a mechanical bond with the concrete pipe. Plastic pipe cannot be used.

Chapter # 2 – Sanitary Sewers
New Content

Abandoned Pipes

- Abandoned pipes shall be left in place according to TS 510 and the pipe shall be capped on both ends. Removal of abandoned pipe will be on case-by-case basis.

Drop Structure

- A drop pipe should be provided for a sewer entering a maintenance hole at an elevation of 610 mm above the invert. Where the difference in elevation between the incoming sewer and the maintenance hole invert is less than 610 mm, the invert should be benched to prevent solids deposition.
- Preferred drop structures are Type 'B' or 'C' according to the City Standard T-1003.01.

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Chapter # 2 – Sanitary Sewers
New Content

Stacked Maintenance Hole

- Where congestion of utilities precludes the preferred horizontal pipe connection to be made, and it is difficult to install a standard type of maintenance hole or catchbasin, a stacked maintenance hole or catchbasin can be used.
- A maintenance hole over a stack is allowed in certain conditions, but there are limitations when connecting to brick sewers because the material is fragile, brittle, and can break. Therefore, an overstack installation is not recommended.
- A structural analysis of the maintenance hole over the stack should address the following:
  - ✓Failure or deflection strain of the pipe from dead and live load bearing directly on the pipe crown which has been compromised by the penetration needed for the new connection pipe.
  - ✓Consideration of fatigue failure from repetitive traffic loadings.
  - ✓Long term differential settlement on the pipe section from the dead and live load bearing on the pipe section and the associated strain(s) on the pipe section connections with the adjoining pipe sections.

Chapter # 2 – Sanitary Sewers
New Content

Sanitary Service Connections to Sewers

New Residential Service Connections

- Sanitary service connections to the newly installed mainline sewer will be made with a manufactured tee for sewers size up to 375 mm, while saddles and Inserta–Tees or EZ–Tee are preferred for larger sizes and for tie–ins to existing sewer mainlines of all diameters. Inserta–Tees and EZ–Tee can be installed on mainlines up to 1050 mm and 1500 mm, respectively, with outlet sizes ranging from 100 mm to 300 mm. Strap–On Gasketd PVC saddles can be made to pipe as large as 1050 mm with outlet sizes up to 150 mm.
- All service connections to the mainline sewer will be made above spring line on the main pipe.
- No gravity drain sanitary service connections 150 mm and smaller will be constructed into any existing sanitary maintenance hole.
- For additional design information, see City Standard T-708.01 for rigid sewer service connections and T-1006.010 for flexible sewer service connection.

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Chapter # 2 – Sanitary Sewers
New Content

Sanitary Service Connections to Sewers

Connections to Existing Mainline Sewer

- For retrofit installations, when the service has a size greater than half the diameter of the mainline sewer for example 250 mm service into 400 mm sewer, a maintenance hole, must be installed at the intersection of the service connection and sewer on the mainline sewer.
- Service Connections will be connected at 90 degrees to the main. For additional design information, see City Standard T-708.01 for rigid sewer service connections and T-1006.010 for flexible sewer service connection.

Exceptions

- In the case of a 150 mm service connection to a 250 mm mainline sewer, if a manufactured tee is installed and the invert of the service connection is above the spring line of the main sewer, a maintenance hole is not required.
- In neighbourhoods where there are existing 200 mm diameter mainline sewers, a 100 mm diameter service connection will be permitted to connect to the mainline sewer with a strap and saddle.
- Where it is not feasible to connect the service connection to the mainline sewer, it is permissible to connect to the upstream maintenance hole in cul-de-sacs. An effort shall be made to connect as many service connections to the mainline sewer as possible.

Chapter # 3 – Storm Sewers

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Chapter # 3 – Storm Sewers
New Content

Site Plan Applications (Updated existing paragraph)

- All commercial, institutional and industrial site plan applications must include on-site stormwater management measures to minimize the impact on the downstream storm system.

Levels of Protection

- This section outlines levels of protection required for stormwater systems in existing separated sewer areas, new greenfield developments and combined sewer areas.
- City Council adopted requirements for level of protection against basement flooding are outlined.

Minor System in Existing Separated Sewer System Areas

- Existing separated areas are defined as all currently developed areas other than combined sewer areas that have been designed and constructed with minor drainage systems only.

✓In existing separated areas, the minor system within local and collector roads shall be designed to accommodate the runoff from a storm with a return period of 2-years, under free flow conditions.

✓Within urban arterial roads the minor system shall be designed for a 10-year return period under free flow conditions.

✓Within road underpasses, the minor system shall be designed for a 10-year return to 25-year return period under free flow conditions.

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Chapter # 3 – Storm Sewers
New Content – Levels of Protection Continued

Minor System in Greenfield Development

- All new storm sewers in greenfield developments will be designed based on the principles of dual drainage. The following shall be considered when designing a storm sewer system in a greenfield development.

✓Storm sewers must be designed to convey design flows when flowing full with the hydraulic grade line at or below the crown of the pipe.

✓New sewers must incorporate inlet control measures to prevent surcharge and thereby prevent basement flooding for events up to a 100-year return frequency.

✓The minor system for local and collector roads will be designed to accommodate a 2-year and 5-year return period under free flow conditions, respectively.

✓Collector sewers will be designed to accommodate the flow they receive under free flow conditions.

✓f the downstream receiving system has capacity restrictions, the new system must be controlled to the available capacity and in a manner that will not cause adverse impacts downstream.

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Chapter # 3 – Storm Sewers

Table 19: Basement flooding performance service levels

System type	Service level to follow	
Local storm sewer (minor)	HGL must be ≥ 1.8 m below the crown of the road	
Shallow storm or combined sewers (where obvert < 1.8m below crown of the road elevation)	No surcharge permitted; and Proposed HGL must be lower than, or equal in elevation to existing HGL	
Local combined sewer	HGL must be ≥ 1.8 m below the crown of the road	
Storm overland (major) system	Local and collector roads	Maximum depth of flow shall be the lesser of 0 cm above the crown of the road or the water level up to the edge of the right-of-way.
	Permissible depths for submerged objects:	
	Water velocity (m/s)	Permissible depth (m)
	2.0	0.21
	3.0	0.09

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Chapter # 3 – Storm Sewers
New Content

Pipe Crossing Clearances

- The minimum horizontal separation between a sewer and watermain is 2.5 metres. In cases where it is not practical to maintain separate trenches or the recommended horizontal separation cannot be achieved, a deviation may be allowed, when the pipe material is upgraded to provide an equivalent factor of safety.
- A DR35 gravity rated pipe can be upgraded to DR26 pressure rated pipe, which can withstand a higher joint pressure—1100 Kpa versus 345 Kpa—and minimize the risk of cross contamination.
- The designer is advised that DR35 gravity pipe cannot be connected to DR28 sewer service connections as DR28 sewer pressure pipe has Iron Pipe Size Outside Dimension (IPSOD), In cases where different pipes are connected, the connection would have to be done with custom fabricated transition fittings.

Drop Structures (Discussed in Chapter # 2)

Stacked Maintenance Hole (Discussed in Chapter # 2)

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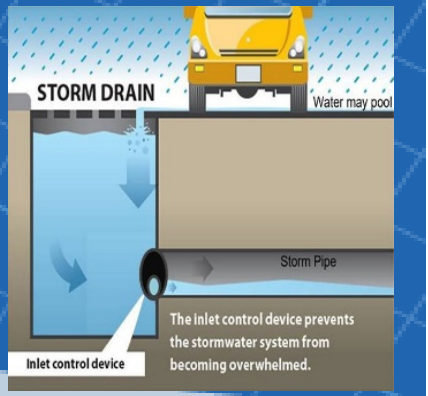
Chapter # 3 – Storm Sewers
New Content



Orifice Controls

- The maximum length of an orifice tube should be limited to one metre. For capital works projects and other proposed works within the City right-of-way, the City prefers the use of orifice plates to restrict storm flows.

- Orifice controls must be located entirely within private property and should be located as close as possible to the property line at street line for ease of access, maintenance and monitoring. Orifice controls are not permitted to be installed on the downstream side of the control maintenance hole as this hinders the ability of City staff to access, sample and monitor stormwater.

- When calculating the peak flow from an orifice plate using the orifice equation derived from Bernoulli's equation, the typical discharge coefficient (cd) value used is 0.63 while the typical discharge coefficient for an orifice tube is 0.82. The use of other values may be permitted if technical supporting documentation is included, subject to review of the case manager in Development Engineering.

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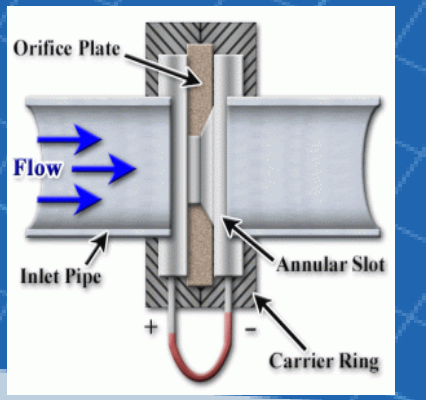
Chapter # 3 – Storm Sewers
New Content



Orifice Controls (Continued)

- When an orifice plate is permitted, openings as small at 75 mm could also be permitted subject to site specific conditions and Development Engineering case manager's approval.

- The issue relating to the type of orifice device permitted and minimum size of the orifice opening is given as follows:

  - ✓The orifice can control the rate of sites storm run-off so that the development complies with the City's Wet Weather Flow Management Guidelines.
  - ✓The plate cannot be removed easily by the property owner.
  - ✓The diameter of the opening does not result in blockage due to debris of the system on the private side.
  - ✓For orifice openings 100mm in diameter and smaller, the designer shall consider the use of a trash screen protection device to help prevent blockage due to debris buildup
  - ✓Hydro-brake systems may be permitted in lieu of orifice plates, in the right-of-way subject to Development Engineering case manager's approval.

TORONTO

Chapter # 3 – Storm Sewers
New Content

Hydro Vault Drain Connection

- Hydro vault drain connection exemption process applies to all hydro equipment on development sites, right-of-ways and private property where encroachment agreements are in place. All such approved exemptions for connections to City storm, sanitary or combined sewers shall be delineated in writing, in the form of a Sanitary Discharge Agreement (SDA) or Storm Sewer Discharge Agreement (SSDA).
- Toronto Hydro shall conduct a site specific borehole investigation for each proposed cable chambers, switching vault, transformer vault, pad mounted equipment and customer owned substations installation.
- Furthermore, Toronto Hydro shall take all reasonable measures to control the quality and quantity of private water entering the city sewer system.
- For more details, refer to the Hydro Vault Drain Connection Exemption Approval Process document by contacting Toronto Water, Water Infrastruture Management unit.

TORONTO

Chapter # 3 – Storm Sewers
New Content

Use of French Drains for Underpasses

- French drains can be considered for underpasses where low groundwater conditions exist.
- However, the pavement design and boulevard design may require additional approval by Transportation Services and there must be a secondary method to provide drainage.
- The project area should be graded such that water that originates outside of the depressed areas should not be allowed to enter the depressed areas to minimize the need for pumping. The preferred method of rainwater storage is either to enlarge the collection system or to construct an underground storage facility.
- The preferred location for the underground storage facility is under the existing roadway or in the median. Additional right-of-way should not be required. The pump station can remove stored water by either a dry well or a wet well depending on the site conditions.
- The recommended design storm for depressed areas and underpasses, where ponded water can be removed only through a storm drainage system is a 50-year event. The use of a more severe event, such as a 100-year storm can be used as a check storm event to assess hazards at critical locations where water ponds to depths over 300mm.

Chapter # 3 – Storm Sewers
New Content

Cast Iron, Square Frame with Square Flat Grate

- To be used on arterial and collector roads where additional residential catchbasin draining capacity is required.
- For details and additional design information see OPSD 400.100 or OPSD 400.110.

Cast Iron, Curb Inlet Frame with Two-Piece Raised Cover

- Side inlet catchbasin can be used on arterial and collector roads. They are also acceptable for use on local roads where snow is not plowed to the curb.
- On local roads there is a potential for blocked inlets and ponding of water, designer should review if acceptable. Where there are reduced lane widths, side inlet catchbasins are an option when surface inlet catchbasin in the road would have buses travelling over them.
- If street slopes greater than 1.5 percent, the capture efficiency diminishes and surface inlet becomes preferable due to their capture efficiency. For details and additional design information, see OPSD 400.081 or OPSD 400.082.

TORONTO

Chapter # 3 – Storm Sewers
New Content

Catchbasin Lead Connections

Rigid Catchbasin Leads

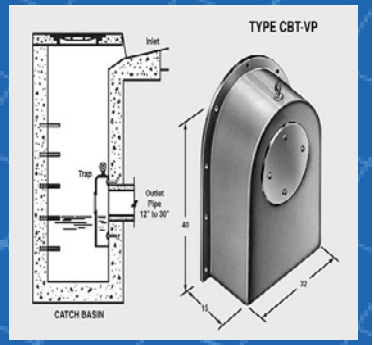
- Rigid catchbasin lead connections to rigid sewers shall be constructed according to City standard T-708.01

Flexible Catchbasin Leads

- Flexible catchbasin lead connection to flexible or rigid sewer main shall be constructed according to the City standard T-1006.010.

TORONTO

Chapter # 3 – Storm Sewers
New Content



Goss Trap

- Goss traps are required on all new single or double catchbasins on local, collector and arterial roads. Rear lot catchbasins do not require a goss trap.

Inlet Control Devices

- Catchbasin inlet control devices to restrict flow into the sewer system can be used. Designer to calculate maximum flow to determine radius of orifice.
- For details and additional design information, see City standard T-706.010

Sewer Discharging to Culverts

- Storm sewers should not discharge into culverts, for example bridge culvert for roads. Each storm sewer should have their own structure to the water course. For any future outfalls and culverts being constructed, upgraded or replaced should be separated with the outfalls on the downstream side of the culvert.
- For any proposed realignment of storm sewers within a roadway that connect to a culvert, the proposed reconnection to the culvert will be reviewed on a case-by-case basis.

TORONTO

Chapter # 4 – Watermains

TORONTO

Chapter # 4 – Watermains
New Content

Table 29: Typical water demands for selected commercial and institutional users Commercial and intuitional use	Water use daily average
shopping centres−based on total floor area	2500–5000 litres/m²/day
hospitals	900–1800 litres/bed/day
schools	70–140 litres/student/day
motels	150–200 litres/bed-space/day
hotels	225 litres/bed-space/day
commercial space retail	site specific
office space	site specific
institutional space	site specific

TORONTO

Chapter # 4 – Watermains
Peaking Factors

Land use	Minimum hour	Peak hour	Maximum day
residential >150,000 population range	0.80	2.25	1.50
commercial	0.84	1.20	1.10
industrial	0.84	1.90	1.10
institutional	0.84	1.90	1.10
apartments	0.84	2.50	1.30

TORONTO

Chapter # 4 – Watermains
New Content

Watermains Ending in Cul-de-sacs or Dead Ends

- If a 19 mm water service is to be replaced and the distance is greater than 20 metres to the existing building face within a cul-de-sac or dead end, the service shall be replaced with a 25 mm diameter copper service.
- Outside of cul-de-sacs and dead ends, if the distance is greater than 30 metres to the existing building face, the water service shall be replaced with a 25 mm diameter copper service.
- In case there is a requirement for a hydrant lead greater than 50 metres in length, an automatic hydrant flushing device will be installed, draining to a storm sewer.
- To reduce the frequency that Toronto Water, Distribution and Collection (Central Services) have to flush dead-end water systems. The designer of a new development shall minimize the frequency of flushing needed on a dead-end water system by locating a water service within three metres of a flushing hydrant.

TORONTO

Chapter # 4 – Watermains
New Content

Embedment or Bedding Requirements

- The class of pipe and the type of embedment or bedding will be selected to suit loading, pipe material and trench soil type for example Type 1, 2, 3 or 4.
- Class of pipe will be according to OPSD 806.060 and flexible pipe embedment or bedding according to OPSD 802.010 and TS 401.
- Granular A Native or Granular A RCM according to TS1010 can be used. Granular A RAP is not allowed for embedment or bedding for watermains.
- In cases where existing embedment contains reclaimed ashphalt pavement (RAP), the plastic pipe shall be fitted with hydrocarbon resistant nitrile gaskets or equivalent.
- The installation of a carrier pipe for the plastic watermain is permitted as a method to protect the plastic pipe from the RAP embedment material.

TORONTO

Chapter # 4 – Watermains
New Content

Shallow Watermains

- Designer to calculate the required insulation for shallow pipe installations and increase the thickness of the insulation accordingly. Shallow bury installation shall not be less than 0.8 m in depth.
- Ductile iron pipe is recommended in lieu of PVC or PVCO pipes where depth is less than one metre. PVC or PVCO pipes should be upgraded from DR18 to DR14 where depth is from 1.0 m to 1.3 m.
- When ductile iron is used over a short length, an additional sacrificial anode will be installed along with a test station.
- When a proposed watermain is being looped over a proposed pedestrian tunnel as an example, the additional mechanical protection provided by ductile iron over PVC is recommended.

Steam Pipes near Watermains

- Watermains that run parallel or cross steam pipes, they should encased in a metallic sleeve. For watermains that cross steam mains, only the segment that crosses the steam main should be lined with a metallic sleeve from a point one metre beyond the outside wall of the steam main.

Chapter # 4 – Watermains
New Content

Looping

- Distribution mains shall be looped whenever possible to provide redundant supply and improved circulation and water quality.
- Staging of watermain construction in new subdivisions shall be designed in a manner that provides looping to ensure adequate circulation and fire flows during all stages of construction.
- Dead ends should be avoided as much as possible by looping of mains whenever practical. Where dead-end mains cannot be avoided, they shall be a maximum 150 mm diameter, unless a larger size is needed for supply reasons, or the watermain is planned to be extended during the next phase of the development.

Chapter # 4 – Watermains
New Content

Transmission Watermain Material Type

- When selecting material types for large diameter trunk watermains, see TS 7.80 for pipe material suitability in high, medium and low risk areas.

Watermain under Railway Crossing

- For railway crossings and tunnel liners see standard drawings Tunnel Liner Detail Pre-stressed Concrete Cylinder Pipe, Tunnel Liner Detail HDPE Pipe and Tunnel Liner Detail Steel or Stainless Steel Pipe, T-1110.02-1, T-1110.02-2 and T-1110.02-3, respectively.

TORONTO

Chapter # 4 – Watermains
New Content

Number of Valves

- At "tee" intersections, three valves are required and at "cross" intersections, four valves are required for new subdivisions.
- Similarly on arterial and collector roads three to four valves are required, while on local roads two to three valves are recommended.
- The location of valves should be optimized to achieve the best performance, that is to say the minimum number of valves that will be required to be shut– off for the maintenance of any given watermain.

Burying Valves

- When burying existing valves in the open position without a box, it is necessary to protect such valves from corrosion by using corrosion protection anodes or Denso tape wrap.

TORONTO

Chapter # 4 – Watermains
New Content

Insertion Valves

- Insertion valves should only be used in isolated cases where dewatering the watermain is not feasible or advisable and must be pre-approved by Toronto Water, Distribution and Collection (Central Services) at the 60% design stage.
- Any new valves to be installed at project limits or required for constructability should be cut-in valves and not insertion valve.
- Valves to be installed at project limits should be referred to the corresponding construction yard for the opportunity to install them "in-house" in advance of project commencement.
- The use of a tapping sleeve and valve should be encouraged in lieu of insertion valves, if possible.
- Lastly, the insertion valves should not be used for structurally lined watermains. Insertion valves should not be left in place and treated as a permanent valve.

TORONTO

Chapter # 4 – Watermains
New Content

Valve Chamber

- All valves on watermains equal to or greater than 400 mm in diameter will be set in precast waterproof concrete valve chambers, according to City standard T-1101.010. Chamber size will be shown on both the plan and profile drawings.
- Valve chambers will contain a sump and be drained by a 150 mm diameter drain to a storm sewer, where possible. An approved backwater valve will be installed on the storm drain.
- If there is no storm sewer or the storm sewer is not deep enough to drain the valve chamber, a 600 mm diameter sump will be installed in the bottom of the valve chamber to allow water to infiltrate into the surrounding soils—assuming there is no high water table.
- The depth of cover at valves will be reviewed on an individual basis to ensure the operation of the valves is not compromised by excessive depth.

Chapter # 4 – Watermains
New Content

Gate versus Butterfly Valve

- Gate valves will be used on watermains 100 to 400 mm in diameter and butterfly valves may be used for watermains greater than 400 mm diameter.
- A butterfly valve can be used instead of a gate valve where there is a space constraint.

TORONTO

Chapter # 4 – Watermains
New Content

Fire Hydrants – Short Side of Street

- Install anchor tee and attach hydrant isolation valve with a 105 mm valve box to anchor tee.
- Fire hydrant lead will be pressure tested and chlorinated only. Not considered a branch connection, therefore no blow-off required for sampling.

Fire Hydrants – Long Side of Street

- Install anchor tee and attach hydrant isolation valve with a 105 mm valve box to anchor tee.
- Fire hydrant lead will be pressure tested and chlorinated only. Not considered a branch connection, therefore no blow-off required for sampling.
- Long side fire hydrant leads should only be used in situations where no other options prevail.
- An additional hydrant lead secondary valve is not required, regardless of lead length. Long side fire hydrant lead to be used in situations where no other options prevail.

TORONTO

Chapter # 4 – Watermains
New Content

Large Diameter Water Services – Short Side of Street

- Install anchor tee and valve at watermain and install secondary valve at street line. Do not bury open valve at anchor tee. Install 105 mm valve box at anchor tee and 105 mm valve box at street line.
- If length of services is less than 3.5 m then attach isolation valve to anchor tee at watermain.
- For example, in the former city of Toronto, where faces of buildings are at street line with little or no set back, it may not be possible to install street line valves, therefore anchor tee and valve would be a better option.

Large Diameter Water Services – Long Side of Street

- Install anchor tee and isolation valve at watermain, install secondary valve at street line.
- Valve at street line restrained two pipe lengths only. Do not bury open valve at anchor tee. Install 105 mm valve box at anchor tee and 105 mm valve box at street line.

Chapter # 4 – Watermains
New Content

Side Street Watermain Connections – Short Side of Street

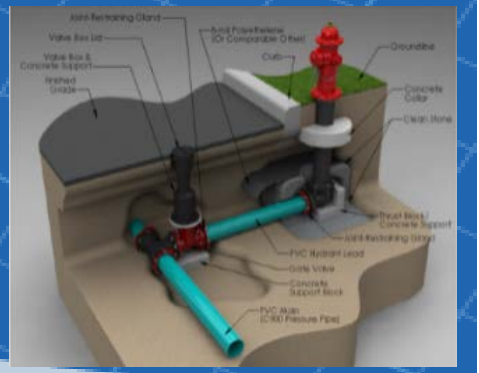
- Install anchor tee and valve at watermain with a 130 mm valve box.
- Do not bury open valve at anchor tee. Install valve with a 130 mm valve box at a location before the existing street line valve or at street line.
- In areas with heavily congested utilities,
- designer to provide valid reasons to Toronto Water, Distribution and Collection (Central Services) why both valves cannot be installed.
- Designer to confirm that the overall length of pipe is less than 6.1 m if street line valve is omitted.

Side Street Watermain Connections – Long Side of Street

- Install anchor tee and valve at watermain with a 130 mm valve box.
- Do not bury open valve at anchor tee. Install valve with a 130 mm valve box at a location before the existing street line valve or at street line.

TORONTO

Chapter # 4 – Watermains
New Content



Isolation Valve Cover Size

- Isolation valves attached to anchor tees on fire hydrants and secondary valves for large diameter water services will use a 105 mm diameter valve box with 149 mm diameter cover as opposed to line valve boxes which are 130 mm in diameter with a 184 mm diameter cover.

Fire Hydrant Leads

- Hydrant leads will be PVC regardless if the new watermain is PVC or ductile iron, except in the following cases:
  - ✓Ductile iron leads will be used under TTC subway or railway tracks to overcome stray current.
  - ✓In situations where there is low cover such as pedestrian tunnels where the watermain is shallow, it is recommended to use ductile iron or metallic pipe.

TORONTO

Chapter # 4 – Watermains
New Content

Building Higher Than 84 Metres

- In accordance with Ontario Building Code, Section 3.2.9.7, if the building(s) is 84 m or more high, measured between grade and the ceiling level of the top storey, the building(s) shall be served by not less than two sources of water supply from a public water system.
- The City requires that if two separate watermains are available to service the development, then the applicant must connect to each watermain.
- Where there is only one watermain available to service the development, the applicant can connect two service connections to the same watermain however an isolation valve is required to be installed between on the watermain between the two connections.

Sizing Water Service Line

- For sizing large diameter water services, see AWWA Manual M22 Sizing Water Service Lines and Meters.

TORONTO

Chapter # 4 – Watermains
New Content

Coupling on Water Services

- As a rule of thumb, allow for one coupling to facilitate cut and reconnects and cut and extensions.
- In the event there are more than two couplings, the recommended practice is to replace the entire water service.

Electrical Continuity

- If an existing metallic watermain is cut and a filler piece is replaced with PVC, electrical bonding of the existing metallic watermain on either side of the PVC filler piece will be electrically bonded according to City standard T-1106.03-2.

TORONTO

Chapter # 4 – Watermains
New Content

Fire Service Main

- Fire service mains must be metered to detect underground leakage or help locate illegal taps in accordance with the water supply bylaw.
- A CSA approved detector assembly should be installed in accordance with CSA B64.10 series standard. The device must have the ability to accept a positive-displacement type meter.
- Typically, the assembly comes pre-installed with a water meter. If the meter is not an approved water meter, Toronto Water will supply its own meter which the owner will install on the detector assembly's bypass.
- The required detector assembly on the fire service is determined based on the fire sprinkler or standpipe classification as found in Section 7.6.2.4, Backflow from Fire Protection Systems, of the 2012 Ontario Building Code and Section 5.5 of the CSA B64.10 series standard.
- If the building code and CSA B64.10 series standard requires a double check valve assembly for the fire service then the bylaw requires it to be a double check detector assembly.
- Alternatively, if a reduced pressure principal assembly is required by the building code or CSA B64.10 series standard, then it should be a reduced pressure detector assembly.

TORONTO

Chapter # 4 – Watermains
New Content

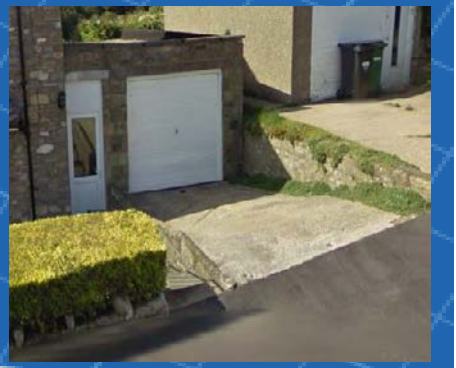
PVC and Ductile Iron Pipe near TTC Street Car Tracks

- New or replacement watermains which are parallel and within the same road allowance as Toronto Transit Commission (TTC) street car tracks can be PVC, PVCO and ductile iron pipe including service pipes.
- Ductile iron pipes will be adequately cathodically protected. In case of using PVC pipes near TTC tracks it is recommended to upgrade pipe dimension ratio or pipe wall thickness from DR18 to DR14.

Chapter # 5 – Lot Grading

TORONTO

Chapter # 5 – Lot Grading
New Content



Reverse Grade Driveways

- The City prohibits the installation of reverse driveways.
- For existing reverse driveways, their drainage will comply with the Sewer Bylaw, Section 681-11-O of the Toronto Municipal Code.
- For report submission guidelines for reverse slope driveways, see Appendix F, *Reverse Slope Driveway Guidelines* if an exemption is granted.

TORONTO

Chapter # 6 – Material Specifications

TORONTO

Chapter # 6 – Material Specifications
New Content

Horizontal Directional Drilling

- TerraBrute and Cobra Lock for PVC pipes and HDPE are approved for use on horizontal directional drilling.

Flexible Rubber Connectors

- EZ–TEE is manufactured by Galaxy Plastics Ltd and Inserta Tee manufactured by Advanced Drainage System Inc. (ADS) can be used to connect laterals to both existing and new pipes

Appendixes

TORONTO

Appendixes – New Content

There are minor changes done in the following:

- ✓Appendix A – As-built Drawings
- ✓Appendix B – General Notes
- ✓Appendix C – Maps
- ✓Appendix D – Utility Separations
- ✓Appendix F – Reverse Slope Driveway Guidelines

Following are four new appendixes added to the manual:

- ✓ Appendix G – Servicing in Confined Spaces
- ✓Appendix H – Hydraulic Calculations for Junction and Transition Maintenance Holes
- ✓Appendix I – Pumping Stations
- ✓Appendix J – Sewer pipe Air Testing

TORONTO

Appendixes – New Content

Appendix G – Servicing in Confined Spaces

Servicing in Confined Spaces

- The City of Toronto does not have standards for servicing within a confined space corridor. These types of installations are discouraged and reviewed on a case-by-case basis.
- A proponent, at its discretion can prepare a detailed submission for review by the City. The submission should address yet not be limited to the following concerns;

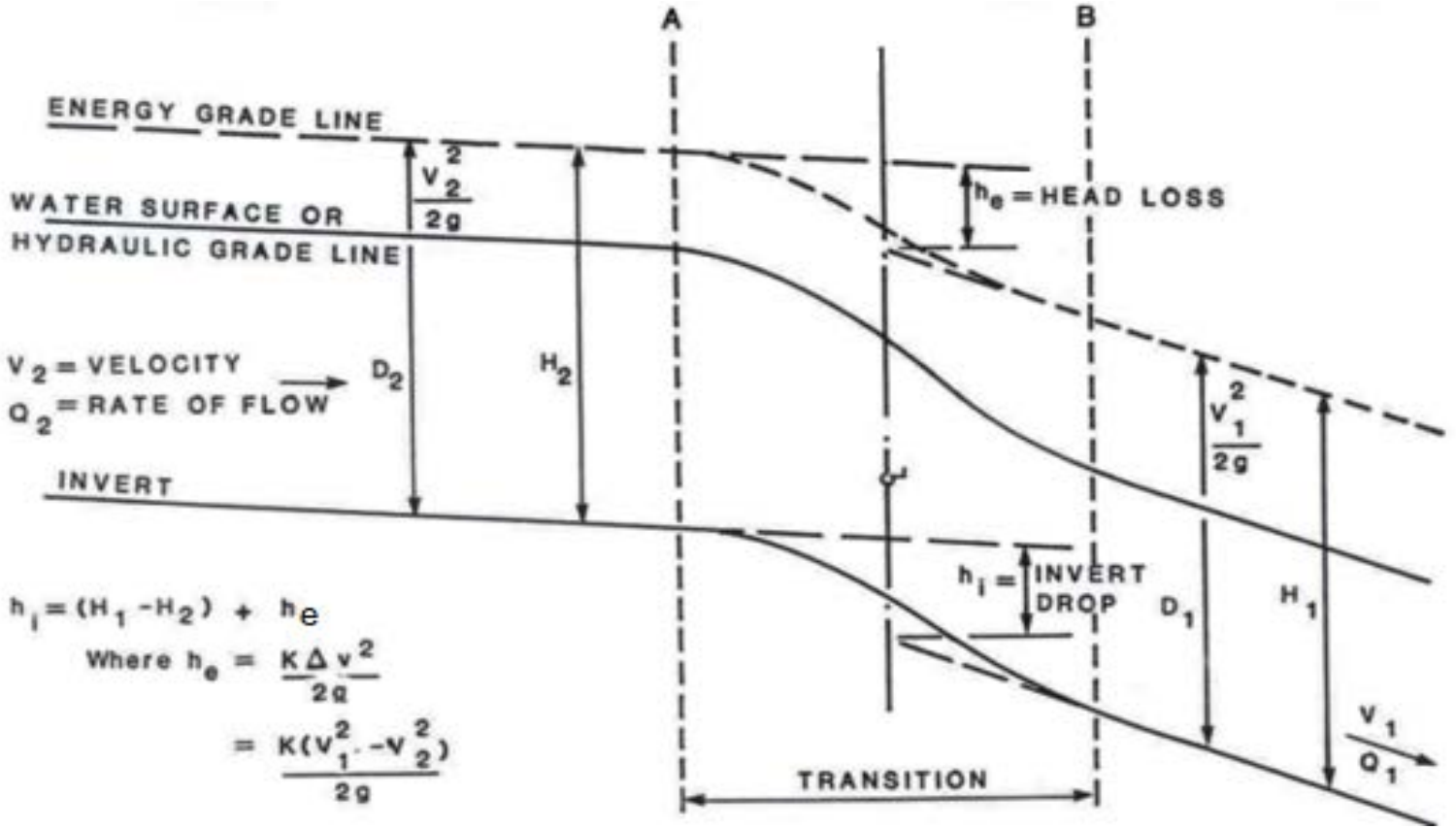
✓future site and adjacent land conditions,
✓the access road,
✓swing space for equipment and transport of material to the excavation, and
✓additional design factors to be implemented to compensate for the risk involved in installing infrastructure in a confined space.

TORONTO

Appendixes – New Content

Appendix H – Hydraulic Calculations for Junction and Transition Maintenance Holes

Appendix H – Hydraulic Calculations for Junction and Transition Maintenance Holes



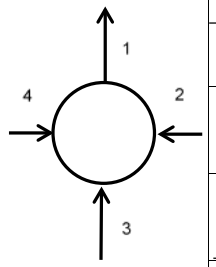
TORONTO

Appendixes – New Content

Appendix H – Hydraulic Calculations for Junction and Transition Maintenance Holes

METHOD

- Each incoming pipe must be analyzed separately together with the outgoing pipe.
- Employ Hydraulic Elements Chart for % depth of flow and % velocity.
- The designer should, wherever possible, restrict the change in velocity to not more than 0.6 m/s in special cases, consideration should be given to bell-mouth entrances.
- Complete the hydraulic calculations outlined in the following:
  - ✓Location Maintenance Hole No
  - ✓Design by:
  - ✓At
  - ✓Checked by:
  - ✓Date



PIPE NO.	DIAM.	GRADE (%)	CAPACITY (Qcap)	ACTUAL FLOW (Qact)
1				
2				
3				
4				

Appendixes – New Content

Appendix H – Hydraulic Calculations for Junction and Transition Maintenance Holes

Pipe No. 1 Q_1 cap = _____ Q_1 act = _____ $\frac{Q_1 \text{ act}}{Q_1 \text{ cap}}$ = _____

H_1 = pipe diameter x % depth = $\frac{(V_1 \text{ act})^2}{2g}$ =

_____+ x _____ + _____ = _____

Pipe No. 2 Q_2 cap = _____ Q_2 act = _____ $\frac{Q_2 \text{ act}}{Q_2 \text{ cap}}$ = _____

H_2 = pipe diameter x % depth + $\frac{(V_2 \text{ act})^2}{2g}$ +

_____ x _____ + _____ = _____

Pipe No. 3 Q_3 cap = _____ Q_3 act = _____ $\frac{Q_3 \text{ act}}{Q_3 \text{ cap}}$ = _____

H_3 = pipe diameter x % depth = $\frac{(V_3 \text{ act})^2}{2g}$ =

_____+ x _____ + _____ = _____

Pipe No. 4 Q_4 cap = _____ Q_4 act = _____ $\frac{Q_4 \text{ act}}{Q_4 \text{ cap}}$ = _____

H_4 = pipe diameter x % depth + $\frac{(V_4 \text{ act})^2}{2g}$ +

_____ x _____ + _____ = _____

TORONTO

Appendixes – New Content

Appendix I – Pumping Station

Objective

- The objective of this design criteria is to provide project designers with standardized City of Toronto requirements for pumping stations.

- The Ministry of Environment, Conservation and Parks (MECP) has guidelines for sewage pumping stations, however these do not cover design elements specific to storm water pumping stations, such as the minimum design storm event.

- City of Toronto, had no formal, standard design criteria for pumping stations. Historically, project designers and staff would use precedent set by designs of previous projects and incorporate standards from various other jurisdictions.

- In addition to the MECP guidelines, the new city design criteria for pumping stations provides relevant city references and minimum design requirements.

TORONTO

Appendixes – New Content

Appendix I – Pumping Station

Design Criteria for Pumping Station

- The design criteria was developed in consultation with operation and maintenance staff to incorporate design elements required for the long term operation of the facility, in a safe and effective manner, with current city resources, procedures and systems.

- Additional design elements have been incorporated based on staff experiences and lessons learned. Key sections of this criteria include:

  ✓Stormwater Pumping Stations, Forcemains, and Storage/ Detention Tanks
  ✓Design
  ✓Standby Power and Emergency Operations
  ✓Operation and Maintenance

TORONTO

Appendixes – New Content

Appendix J – Sewer pipe Air Testing

Ministry of the Environment and Climate Change

Environmental Approvals Access and Service Integration Branch

135 St. Clair Avenue West
Toronto ON M4V 1L5
Tel.: 416 314-8001
Fax: 416 314-8452

Ministère de l'Environnement et de l'Action en matière de changement climatique

Direction de l'accès aux autorisations environnementales et de l'intégration des services

135, avenue St. Clair Ouest
Toronto ON M4V 1L5
Tél. : 416 314-8001
Téléc. : 416 314-8452

Ontario

May 20, 2015

Alex Sandovski, P.Eng., MBA
IPEX Inc.
6810 Invader Crescent
Mississauga, ON LST 2B6

Dear Mr. Sandovski:

This is a follow up to our recent meetings where we discussed the field testing requirements for sewer pipes and the implementation of Source Water Protection (SWP) policies.

As you are aware, current MOE standards under Procedure F-6-1, section 4.0 require sewer pipes that do not meet the minimum separation distance from watermains, to have the sewer pipes constructed of materials and with joints that are equivalent to watermain standards and shall be pressure tested in accordance with Division 401 of the Ontario Provincial Standards Specification (OPSS) published by the Ontario Ministry of Transportation, at a pressure of 350 kPa (50 psi), with no leakage. In addition to this, the ministry is in the process of implementing a SWP policy that would make this similar requirement for new sanitary pipes that fall under a designated significant drinking water threats. I understand from your presentation that this stipulation is causing hardship in the industry as pressure fittings and mechanical restraints are not available in sewer pipe sizes.

After careful review of this issue please note that an alternate approach that is considered acceptable to the ministry is to construct the sanitary sewers with materials and with joints that are equivalent to watermain standards of construction and are to be pressure tested with a low air pressure test of 5 psi as per OPSS 410 performed in situ during construction. For the low air pressure test, and to satisfy ministry requirements, you must ensure that:

(1) The sanitary sewer pipe joints are certified to 50 psi hydrostatic pressure (on lab, manufacturing facility or in situ) by a third party accredited by the Standards Council of Canada; and
(2) The sanitary sewer pipes are mandrel tested or tested by laser profile with satisfactory results.

Please note that this is an interim decision and will no longer apply should the Ministry revise Procedure F-6-1 with respect to its in-site pressure testing requirements for sewers installed without the required minimum separation from watermains.

Again, thank you for bringing your concerns to my attention, and please accept my best wishes.

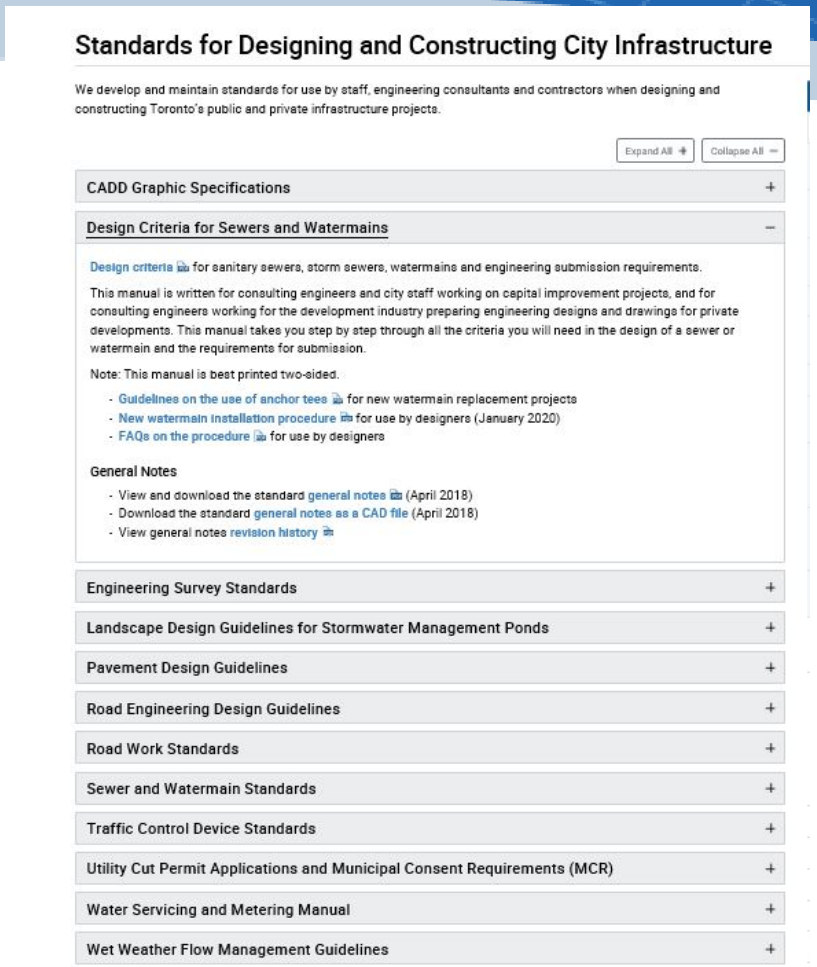
Yours sincerely,

Edgar Tovilla, P.Eng.
Director, Part II.2 of the EPA

2069 (2011/10)

TORONTO

Where to find New Design Criteria for Sewers and Watermains 2021



Standards for Designing and Constructing City Infrastructure

We develop and maintain standards for use by staff, engineering consultants and contractors when designing and constructing Toronto's public and private infrastructure projects.

Expand All + Collapse All −

- CADD Graphic Specifications +
- Design Criteria for Sewers and Watermains −

Design criteria for sanitary sewers, storm sewers, watermains and engineering submission requirements.

This manual is written for consulting engineers and city staff working on capital improvement projects, and for consulting engineers working for the development industry preparing engineering designs and drawings for private developments. This manual takes you step by step through all the criteria you will need in the design of a sewer or watermain and the requirements for submission.

Note: This manual is best printed two-sided.

- Guidelines on the use of anchor tees for new watermain replacement projects
- New watermain installation procedure for use by designers (January 2020)
- FAQs on the procedure for use by designers

General Notes

- View and download the standard general notes (April 2018)
- Download the standard general notes as a CAD file (April 2018)
- View general notes revision history

- Engineering Survey Standards +
- Landscape Design Guidelines for Stormwater Management Ponds +
- Pavement Design Guidelines +
- Road Engineering Design Guidelines +
- Road Work Standards +
- Sewer and Watermain Standards +
- Traffic Control Device Standards +
- Utility Cut Permit Applications and Municipal Consent Requirements (MCR) +
- Water Servicing and Metering Manual +
- Wet Weather Flow Management Guidelines +

https://www.toronto.ca/services-payments/building-construction/infrastructure-city-construction/construction-standards-permits/standards-for-designing-and-constructing-city-infrastructure/?accordion=design-criteria-for-sewers-and-watermains

TORONTO

Questions?

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