



Section F – Sanitary Sewers and Appurtenances

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F1.00 Hydraulic Design**F1.01 Confirmation of Capacity**

Prior to commencement of any design for sanitary sewage works within the township, the Developer shall contact the Township to ensure that adequate external trunk sewer and treatment plant capacity is available for the proposed development.

If the Township does not have a confirmed capacity within the downstream system, the Developer's engineer shall undertake an assessment to the nearest downstream trunk sewer, or at the discretion of the Township. In the event that the Township does not have sufficient system records or an understanding of the available reserve capacity, then the Township and the Developer will agree to a scope of work for determining available capacity. The costs associated with undertaking a comprehensive reserve study will be determined through the pre-consultation process, prior to commencing any design work.

The system shall be designed to service all areas within the subdivision to their maximum future development potential and must take into consideration external flows within the drainage area, in accordance with the Township's Official Plan. Allowance shall be made for inflows from the appropriate adjacent subdivisions or areas and shall meet with the approval of the Township's Public Works Department. Discharges of the system are to be connected into appropriate sewers and are to be approved by the Township's Public Works Department. The exact location for connecting to sewers in adjacent subdivisions or areas shall be as approved by the Township's Public Works Department.

In accordance with MECP guidelines and Township policy, all urban and hamlet developments are to be serviced by municipal wastewater systems. Individual septic systems are only permitted in estate lot developments and where approved by the Planning Department, MECP, and the NVCA.

F1.02 Sanitary Drainage Drawing

The sanitary drainage drawing shall be drawn to a scale suitable to show all the tributary areas that are being used to determine the design flows.

The design flow in each MH and length of sewer shall be computed on the sanitary design sheets and shall be included in the drawing set. Excel files or similar to be provided for review. For each area entered on the design sheet, the MH numbers, the size and grade of the sewers, and the number of the detailed drawing and profile for each section of the sanitary sewer shall be shown.

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F1.03 Residential Sewage Flows

Peak domestic sewage flows are to be calculated using the following formula:

$$Q(d) = \frac{PqM}{86.4} + IA$$

Where:

$Q(d)$ = Peak domestic sewage flows (incl extraneous flows in L/s)

P = Design population, in thousands

Q = Average daily per capita domestic flow in L/cap/day (exclusive of extraneous flows).

M = Peaking factor

I = Unit of peak extraneous (infiltration) flows in L/ha/s

A = Gross tributary area in hectares

The peaking factor shall be calculated based on the Harmon formula:

$$M = 1 + \frac{14}{4 + P^{0.5}}$$

Where:

P = Population, in thousands

Maximum M = 4.0

Minimum M = 1.5

The design population shall be derived from the drainage area and expected population based on the Official Plan and the most current Master Servicing Study and FSR. The following design populations should be used:

- Single Detached Dwellings = 3.0 ppu.
- Semi-detached Dwellings = 3.0 ppu.
- Townhouses = 2.4 ppu.
- Apartments = 1.6 ppu.

In the absence of sufficiently detailed development concepts, unit densities shall be used per the Official Plan or a Secondary Plan.

An average daily per capita flow of 400 L/cap/day shall be used. In the absence of a proposed Plan of Subdivision, populations should be estimated based on drainage areas and the land uses identified in the Township's Official Plan or Master Servicing Studies.

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A wet weather infiltration rate of 20,000 L/d/ha (0.23 L/s/ha) is to be applied for all lands tributary to the sewer system. To satisfy self-cleansing requirements in sanitary sewers, assume dry weather infiltration reduces to zero for several days during dry months.

F1.04 Industrial, Commercial, and Institutional Sewage Flows

In accordance with the Township's CLI-ECA, a minimum design flow of 28 m³/ha/day plus allowances for infiltration shall be used for the design of sewers on commercial sites, unless better information is available and approved by the Township Public Works Department prior to design. The area shall be based on the gross developable area. Maximum Day and Peak factors shall be generally in accordance with MECP Guidelines and shall be confirmed with the Township.

Industrial sewage flows shall be determined in consultation with the Township and MECP Guidelines. Generally, an average design of 0.40 to 0.64 L/s/ha plus allowances for infiltration shall be used for the design of sewers on industrial sites.

A peaking factor shall also be incorporated into the design based on the gross development area as follows:

$$M_i = 6.6604 \times \text{Area}^{-0.1992}$$

Where:

M_i = industrial peaking factor

A = gross lot area (ha)

At a minimum, a peaking factor of two should be used.

Institutional sewage flows shall be designed per MECP Guidelines or specific usage, plus allowances for infiltration, unless better information is available and approved for use by the Township.

The area shall be based on the gross area of the institutional site, unless more accurate information is available at the time of development.

F2.00 Sanitary Sewer Design

F2.01 General

For subdivisions in which sanitary sewers are required, the sewer system shall be designed to carry domestic, commercial, and industrial sewage for each area or subdivision under consideration. Flow is to be by gravity and pumping will be

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considered only where other alternatives are not possible and only with the approval of the Township's Public Works Department.

If the need for a pumping station is approved by the Township, it shall be designed in accordance with the Township's Sewage Pumping Station (SPS) Design Guide, MECP Guidelines including standby power, and to the satisfaction of the Township's Public Works Department.

The Developer shall design sanitary infrastructure in accordance with the most current version of the Township's CLI-ECA and associated design requirements. If the design does not fulfill these requirements, an application to the MECP for a Schedule C amendment to the CLI-ECA will be required.

New sanitary sewers shall be plugged at the point of connection to the existing sanitary sewer system throughout construction, until all of the new sewer has been installed and successfully passed all required testing. The location of the plug shall be reviewed with the Township prior to installation. The plug shall remain in place and shall not be removed until that phase of the development has received the Certificate of Acceptance of Underground Works (Initial Acceptance) of all underground and above ground infrastructure works. Prior to the removal of the plug, the contractor shall be required to remove all debris in the pipe behind the plug.

F2.02 Drains

All floor drains are to be connected to the sanitary sewer. Foundation drains, sump pumps, and roof water leaders **are not** to be connected to the sanitary sewer.

F2.03 Location

All sanitary sewers shall be located as per the standard Township road cross-section detail drawings. Placement of MHs in the wheel track of a travel lane shall be avoided whenever possible.

Any sewers which are situated in off-road locations, shall be contained within a block. Where sanitary sewers are located in blocks, the block width shall be 3.0 m for sewers at a depth less than 2.0 m and 6.0 m for sewers greater than 2.0 m depth, unless depth or size of sewer dictates a larger width necessary for maintenance. Sewer to be centred within the block. Additional depth of footings for houses adjacent to the sanitary sewer block shall be considered in the design.

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F2.04 Pipe Capacities

The allowable sanitary sewer capacities and gradients to be as per MECP and CLI-ECA design criteria. In the case of partial pipe flow, the actual velocity is to be checked against the minimum allowable velocity at the design flow rate. Pipes are designed to be a maximum of 80% full before increasing to the next pipe size.

F2.05 Pipe Strength

Pipe strength design calculations shall be provided to the Township's Public Works Department for approval. Sewer pipe shall be minimum strength PVC-DR 35 with rubber gasket joints as approved for use by the MECP and shall be a minimum diameter of 200 mm. Plastic pipe shall be green in colour.

F2.06 Flow Velocities

Minimum acceptable velocity = 0.6 m/s. For rehabilitation / replacement of an existing sewer where deepening of individual sewer section will not be possible, design flow velocities of less than 0.6 m/s may be considered by the Township's Public Works Department. Maximum acceptable velocity = 3.0 m/s.

F2.07 Minimum Size

The minimum allowable size for a sanitary sewer shall be 200 mm in diameter. Except for special cases, the downstream pipe diameter shall always be greater than or equal to the upstream pipe diameter.

F2.08 Minimum Grade

The minimum and maximum grades for pipes shall be the grade necessary to meet the minimum and maximum velocity requirements; however, the absolute minimum grade for sanitary sewers is 0.3% subject to achieving minimum acceptable velocity at the design flow and acceptance shall be at the sole discretion of the Township. The minimum desirable grade for sanitary sewers is 0.5%. The minimum grade for the first upstream leg of any sewer shall not be less than 1.0%.

F2.09 Depths

The depth of the sewer shall be measured from the final centreline finished road elevation to the top of the sanitary sewer. The minimum depths of sewers for residential areas shall be 2.8 m or sufficient depth for basement floor drains and frost cover shall be provided. Where sewers are located within a block, a minimum frost cover of 1.5 m may be used, provided such sewers cross below watermains.

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The installation of an additional local sewer will be required for service connections when the depth of the sanitary sewer main is 6.5m or greater in order to provide a standard sanitary service lateral.

F2.10 Radius (Curved) Sewers

Radius (Curvilinear) pipe shall be allowed for sanitary sewers 600 mm in diameter and greater, provided that an MH is located at the beginning and end of the radial section. Curve data must be shown on the design drawings. Properly deflected sewer lines are allowed with the approval of the Township's Public Works Department.

F2.11 Limits

All sewers shall be terminated at the subdivision limits when external drainage areas are being considered in the design with suitable provision in the design (depth, alignment, and slope) of the terminal MHs to allow for future extension of the sewer.

Provisions for future extension of the sewer (any oversizing) will only be considered for lands which are within the limits of the current urban boundary.

F2.12 Storm Sewer and Watermain Crossings

Generally, a minimum clearance of 0.25 m shall be provided between the outside of the pipe barrel at the point of crossing for storm and sanitary sewers. A minimum clearance of 0.5 m shall be provided when the sewer crosses over the watermain.

Sanitary sewers, forcemains, and all associated appurtenances and structures shall be designed with provisions to provide the required protection for drinking water supply systems in accordance with:

1. The MECP's F-6-1 Procedures to Govern Separation of Sewers and Watermains.
2. Section 15 of the MECP's Watermain Design Criteria for Future Alterations Authorized Under a Drinking Water Works Permit.

In the event the minimum clearances cannot be obtained, then the Work is to comply with MECP guidelines, and the pipes shall be concrete-encased to ensure that the pipes are properly bedded.

F2.13 Protection of Drinking Water Sources

An assessment of the proposed works shall be completed to determine if the Works pose a Significant Drinking Water Threat and if they are, the design shall incorporate

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features that mitigate the threat to sources of drinking water, such as those included in:

1. Ministry's Standard Operating Policy for Sewage Works as amended from time to time.
2. Source Protection Plan policies pertaining to the Works.

F2.14 Head Losses

The minimum drop for inverts in any MH shall be 0.030 m, to allow for hydraulic losses incurred at sewer MHs. Drops shall be as per MECP Design Guidelines.

In order to reduce the amount of drop required, the designer shall, wherever possible, restrict the change in velocity between the inlet and outlet to 0.6 m/sec.

Hydraulic calculations shall be submitted for all junction and transition MHs on sewers where the outlet is 1050 mm in diameter or greater. In addition, hydraulic calculations may be required for MHs where the outlet pipe is less than 1050 mm in diameter if, in the opinion of the development engineer, there is insufficient invert drop provided across any MH.

Regardless of the invert drop across an MH, as required by calculations, the obvert of the outlet pipe shall not be higher than the obvert of the inlet pipes at any MH location.

Drop structures shall be used when drops of more than 0.61 m are necessary. Only external drop structures are permitted.

F2.15 Changes in Pipe Size

No decrease of pipe size from a larger upstream to a smaller downstream will be allowed, regardless of the increase in grade.

F2.16 Pipe Bedding

The class of pipe and the type of bedding shall be selected to suit loading and proposed construction conditions, as recommended by the geotechnical engineer. Standard details of the types of bedding are illustrated in OPSD 802.010 and 802.030. The width of the trench at the top of the pipe must be carefully controlled to ensure that the maximum trench width is not exceeded unless additional bedding or higher pipe strength pipe is used. Any special conditions should be reviewed by a qualified engineer and appropriate recommendations made with respect to the class / type of bedding and pipe strength.

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In order to mitigate infiltration at MH junctions and groundwater flow along pipe bedding, “clay plugs” shall be incorporated into the trench bedding. Clay materials shall be used in the trench and be placed 2 m to 3 m upstream from any MH where groundwater is suspected, with intermediate plugs, where deemed appropriate.

F3.00 Maintenance Structures

F3.01 Location

MHs shall be located at each change in alignment, grade, or pipe material, at all pipe junctions, and at intervals along the pipe to permit for maintenance of the sewer.

A MH will be required on the private property side for sanitary services to ICI properties.

F3.02 Maximum Spacing

The maximum spacing between MHs shall be 120 m for pipe up to 400 mm and 150 m for 450 mm to 750 mm in size.

F3.03 Maintenance Holes

MHs shall be constructed of precast concrete and shall conform to CSA A257.4.

MH types and sizes shall be in accordance with MECP Guidelines and shall conform to all relevant OPSS and OPSD standards. In all cases where the standard drawings are not applicable, the MHs shall be individually designed and detailed.

MH benching and pipe opening details shall conform to OPSD 701.021.

Minimum MH size to be 1200 mm diameter.

Frost straps are to be provided between the upper section through to the MH base section, as per OPSD. Frost straps (internal or external) shall be provided to hold MH sections together (at least two between each section). External straps to extend vertically from top to bottom and for deep MHs extended at least 1 m below frost depth.

A waterproof membrane to prevent groundwater infiltration such Blueskin or approved equal shall be required on all MH joints, including any riser rings and adjustment units.

A reference shall be made on all profile drawings to indicate the type and size of all sanitary MHs.

All MH chamber openings shall be located on the side of the MH parallel to the flow for straight run MHs, or on the upstream side of the MH at all junctions.

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The maximum change in the direction of flow in any sanitary sewer MH shall be 90%. A change of flow direction at acute interior angles will not be permitted.

Safety platforms shall be required in all MHs greater than 5.0 m in depth. Safety platforms shall not be more than 5.0 m apart and shall be constructed in accordance with the OPSD details.

All pipe connections at MHs shall be completed using Kore-N-Seal or an approved watertight rubber gasket assembly.

F3.04 Maintenance Hole Frame and Covers

All MHs located within the travelled portion of the roadway shall have the rim elevation initially set flush with the base course asphalt. A minimum of 100 mm and a maximum of 300 mm height of concrete modular adjustment rings shall be used on all MHs in new subdivisions.

Prior to the placement of the final course asphalt, the MH frame shall be adjusted to suit the final surface asphalt elevation. Steel and / or plastic MH adjustment rings may be permitted to adjust the MH to final grade on a case by case basis, with consultation and approval by the Township.

As per the CLI-ECA Design Criteria, MHs shall be located away from any flow route or ponding area. In the case where they cannot be located away from the overland flow route for the 25-year storm event, an analysis shall be completed to verify if the overland flow route will submerge the sanitary MHs. If the MH is submerged, design to be watertight including water-tight covers. Where more than one consecutive sanitary MH requires sealing, appropriate ventilation shall be provided.

Watertight lids shall be provided per “No Flo In Flow” or equivalent approved product.

F4.00 Sanitary Service Connection

F4.01 General

All sanitary sewer service connections for single detached, semi-detached, or linked / townhouse dwellings shall be single service connections and generally located as per Township Standard Drawings. Non-standard locations are subject to the Township’s approval and must be detailed on the Plan and Profile and Utility Coordination Drawings.

Connections for commercial, institutional, or multiple-use properties will be considered by the Township on an individual basis.

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Park blocks within new subdivisions may require a sanitary service at the discretion of the Township.

F4.02 Size

Sewer service connection details as per Township Standard Drawings. Service connections for single-family, semi-detached, and linked / townhouse units shall be 125 mm in diameter PVC-DR 28 with an end cap braced at the property line.

Service connections for multiple family blocks and ICI areas will be considered separately and generally shall be 150 mm minimum diameter with an end cap; however, should be sized based on their specific use and sanitary flow rates.

F4.03 Connection To Main

The connection to the main sewer shall be made with an approved manufactured tee. Approved saddles shall be used for connecting to existing sewer mains.

A 125 mm or 150 mm service connection will be permitted to connect to a 200 mm and 250 mm main sewer providing an approved manufactured tee is installed and providing the invert of the service connection is above the spring-line of the main sewer.

No service connection of a size greater than half the diameter of the main shall be cut into the main sewer.

Individual service connections shall not be permitted to connect directly into an MH.

F4.04 Depth

The depth of the service connections for single-family, semi-detached, and link / townhouse units at the property line measured from the finished centreline road elevation shall be a minimum depth of 2.7 m, unless circumstances require otherwise and it can be demonstrated that the dwellings can be fully serviced by gravity. All locations of service connections with less than 2.7 m cover shall be identified on the profile drawings along with their invert elevations.

Risers shall be used when the obvert depth of the sewer main exceeds 4.5 m. The riser section shall not exceed 3.0 m in depth. Service connections are not to cross under any watermain.

The service termination shall be marked by a 2 x 4 wooden stake, projecting 1.0 m above ground, with the top painted green.

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F4.05 Grade

Size of Service (mm)	Minimum Grade	Maximum Grade
125	2%	8%
150	1%	6%

F4.06 Connection to Multiple-family and Other Blocks

An inspection MH shall be required on the private property immediately inside the property line located 1.5 m from the property line to the centre of the rim on all connections to multiple-family and other blocks.

F4.07 Connection to Commercial / Industrial / Institutional Blocks

The service connections for ICI areas shall be sized individually according to the intended use. The preferable minimum grade is 2%. The absolute minimum grade shall be 1%. The minimum cover at the street line shall be of sufficient depth to allow servicing of the building(s) by gravity, wherever possible.

An inspection MH shall be required on private property located 1.5 m from the property line to the centre of the rim.

F4.08 Service Connection Material

Sanitary service connection pipes shall only be green in colour. All service connections shall be PVC unless site specific circumstances dictate otherwise, then concrete pipe shall be used. Pipe and fittings shall be manufactured to the latest edition of CSA Standard B-182.1 (ASTM Specification D 3034) with rubber gasketed bell and spigot joints.

All service connections shall be constructed to be watertight.

Backflow valves shall be provided on the sanitary services in existing areas where basements could be susceptible to overflow, based on the hydraulic grade line analysis.

In new developments, basements shall be located a minimum 0.5 m above the highest hydraulic grade line elevation and thus backflow protection will not be necessary.

F4.09 Standard Service Record Sheets

Upon completion of the Work, Standard Service Record Sheets (one for each lot) shall be prepared by the Developer's engineer and provided to the Township. The sheets shall show clearly:

1. Lot, lot number, and street lines.

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2. Tie from the end of the service to the lot lines. Tie / distance in meters to the nearest MH.
3. North arrow.
4. Type, diameter, and depth below-grade at the end of each service.
5. Any other pertinent information.

Standard Service Record Sheet is provided by the Township's Public Works Department upon request. Service record sheets shall be provided within 90 days of connection to the system.

F5.00 Inspection and Testing

F5.01 General

The complete sewer system including service connections to the property line and MHs shall be tested in accordance with MECP Guidelines, OPS specifications (OPS 410, 411), and to the satisfaction of the Township. Testing shall also be in accordance with the most current version of the York Region "Sanitary Sewer System Inspection, Testing, and Acceptance Guideline".

Inspection and testing Plans including procedure, equipment, schedule, safety requirements, and emergency response Plan shall be submitted to the Township at least two weeks prior to the inspection or testing. Plans must be accepted by the Township prior to proceeding with the inspection or testing.

All testing shall be done in the presence of Township staff and in accordance with the Township's CLI-ECA. The Township requires a minimum of five business days' notice to arrange to be present for testing.

Pre-testing is to be completed by the Developer, prior to attendance by Township staff to witness any required testing.

F5.02 Infiltration / Exfiltration Testing

Upon completion of the system, but prior to the placement of concrete curb and gutter and base course asphalt, an infiltration or exfiltration test, in accordance with MECP Design Criteria, York Region "Sanitary Sewer System Inspection, Testing, and Acceptance Guideline", and OPSS 410 shall be completed on all sewers, services, and MHs. The most stringent requirement of the listed standards will apply.

The Township shall be the sole judge of which test is to be undertaken.

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F5.03 Deflection Test

All newly installed PVC sanitary sewers shall be subjected to deflection testing in accordance with OPSS 410.

The deflection test by the Developer shall not be completed until the system has been thoroughly flushed and cleaned and a minimum of 30 days following backfilling of pipe.

F5.04 CCTV Inspection

All newly constructed sanitary sewers, service laterals and MHs shall be CCTV inspected in accordance with OPSS 409, upon satisfactory completion of all other testing, at the following milestones:

- Prior to the Township's issuance of Acceptance of Underground Works (Initial Acceptance).
- Prior to the placement of top course asphalt.
- Prior to Assumption of the Phase or Subdivision.
- Anytime at the Township's discretion.

A permanent record in high quality colour MPEG-2 or higher saved on a DVD or USB 2.0 or higher compatibility form shall be supplied, illustrating a continuous record of the sewer installations, service connection, MHs, etc. A report identifying any unusual or substandard conditions will be produced using NASSCO observation and defect coding and recommendations on how these issues will be rectified shall also be submitted. All CCTV work shall be performed with a colour camera equipped with a full-swivel head capable of examining lateral connections, MH interiors, and other key features of the sewer installation. The camera must maintain a speed, orientation, and proper lighting that will allow for the defects to be observed clearly.

The Township will require certification from the Developer's consulting engineer that they have reviewed the videos and have found the sewers to be acceptable and free of all defects. Any deficiencies should be clearly identified in the engineer's letter and confirmation that all deficiencies have been / shall be rectified must be included with the certification.

Any sections of sewer or service connections, which fail to meet the requirements, shall be repaired or replaced at the direction of the Township's Public Works Department. Only chemical pressure grouting repair techniques will be considered acceptable.