

The Regional Municipality of York's Grade-Related
Residential Incentive Program | **November 2015**



Servicing **Incentive Program**

IMPLEMENTATION GUIDE





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Chapter One

Let's get started.



Chapter One Let's get started.

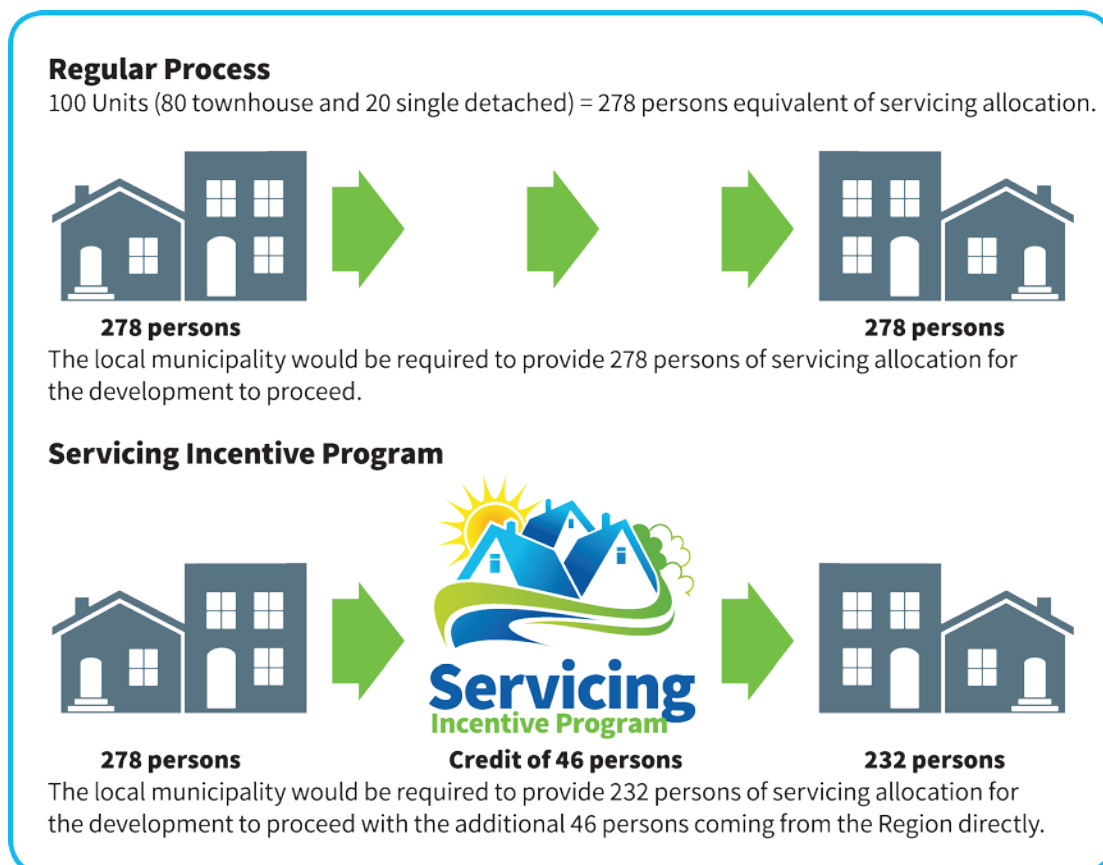


1.0 What is the **Servicing Incentive Program**?

The “Servicing Incentive Program” or SIP (the Program) offers additional servicing capacity assignment credits to the local municipality as an incentive to promote sustainable residential grade-related developments that are a maximum of three storeys in height in York Region. The focus of the Program is to promote water efficiency in and reduce wastewater flow from residential grade-related developments.

By meeting all of the Program criteria, residential projects may qualify for servicing capacity assignment credits of up to 20 per cent. **Figure One** illustrates the regular process for servicing capacity allocation based upon the local municipal distribution of servicing allocation for developments versus participation in the Program where additional credits can be attained.

Figure One: Compares the regular planning process to the Program process





2.0 How do you qualify?

In order to participate in this voluntary program, all of the following criteria must be met:

1. The proposed development is a residential grade-related project with homes that have a maximum height of three storeys.
2. The proposed development is permitted under all applicable Regional Official Plan policies.
3. The proposed development is situated within a local municipality that has formally advised York Region that it will participate in the Program.

2.1 Calculating the servicing capacity assignment credit

1. To calculate the 20 per cent additional servicing capacity assignment, it is necessary to convert the proposed total number of units in the development to its population equivalent. The servicing capacity assignment credit will be calculated as shown in **Figure Two**.
2. **Table One** outlines person per unit (PPU) values for grade-related dwelling types by each York Region municipality. These PPU values should be applied when calculating the servicing capacity assignment credit for proposed developments.

Figure Two: Example of how to calculate the servicing capacity assignment credit

If a proposed development contains 100 units (80 townhouse and 20 single detached units) and qualifies for the 20 per cent servicing credit, the following formulas should be used to calculate:

1. Population equivalent to the proposed units
 2. Local municipal servicing allocation commitments
 3. Servicing capacity assignment credits awarded through this incentive program
- | | |
|---|--|
| 1. Proposed Population | = proposed units x persons per unit (PPU) factor (refer to Table 1) |
| | = 80 x 2.7 (ppu) + 20 x 3.1 (ppu) |
| | = 278 persons |
| 2. Local Municipal Standard Servicing Allocation | = proposed population ÷ (1 + incentive) |
| | = 278/1.2 |
| | = 232 persons |
| 3. Servicing Capacity Assignment Credits | = proposed population – local municipal regular allocation |
| | = 278 - 232 |
| | = 46 persons |



Table One: York Region 2011 Census – Person Per Unit Values for Dwelling Units

Municipality	Person Per Unit Values for Singles	Person Per Unit Values for Semi-Detached	Person Per Unit Values for Rows or Townhouses	Person Per Unit Values for Duplexes
Aurora	3.28	2.89	2.69	2.51
East Gwillimbury	3.01	2.65	2.58	2.65
Georgina	2.78	2.63	2.74	2.65
King	3.04	2.55	2.29	2.76
Markham	3.61	3.38	2.88	3.60
Newmarket	3.25	2.88	2.63	2.50
Richmond Hill	3.51	3.15	2.99	2.82
Vaughan	3.58	3.41	3.06	3.28
Whitchurch-Stouffville	3.01	2.81	2.32	2.61

3.0 How to get **Started**.

1. The development team, local municipal staff and Regional staff must attend a pre-application meeting prior to the formal submission of the intent to participate in the Program. This meeting is to discuss eligibility and program requirements.
2. The local municipality submits a letter supporting the proposal in principle which confirms the following:
 - The local municipality supports the application to enroll in the Program.
 - The local municipality will formally circulate all subdivision and/or site plan applications (including a full set of drawings), involving lands subject to this Program to York Region for comments.
 - All developments subject to this Program shall not receive exemption from the draft plan of subdivision approval process and shall require a subdivision agreement.

(Refer to the “Forms and Administrative Details” **Chapter Three** under **Section 1.0** Local Municipal Confirmation Letter Requirements)

Note: *It is beneficial if the local municipality can confirm at the early stage that it will provide servicing allocation to the proposed development; however, this is not a requirement.*



3.0 How to get **Started**. (continued)

3. The owner/applicant submits a cover letter to the Region which includes the following information:
 - Total number and type of units proposed in the development (include a breakdown if the project is phased) and requested capacity assignment credit.
 - Brief description of how the proposed development will meet each eligibility criteria.
 - Signed letter from the local municipal planning official with signing authority which confirms that the local municipality supports the proposed development being considered under the Program and that they are of the opinion that the development meets the Program Eligibility Criteria as outlined in the **“2.0 How do you qualify?”** on page 8.
 - Brief description of how the owner/applicant will achieve the program outlined in the program.

Note: *The owner/applicant shall notify the Region of any revisions to the project involving unit count as the project proceeds through the planning process.*

4. Regional staff provides a letter to the owner/applicant and the local municipality informing them that if the project meets the eligibility criteria, the project may proceed.
 - Based upon the proposed development the additional servicing capacity assignment will be calculated. The preliminary capacity assignment credit is effective within one year from the date the Region issues the preliminary capacity assignment credit notice.
5. Upon acceptance into the Program, the applicant/owner is required to enter into a Tri-Party Agreement with York Region and the local municipality outlining the terms and conditions of the Program. The Agreement will expire after five years, at which time it will be at the sole discretion of the Region to renew the Agreement. The Region will confirm the Capacity Assignment Credit to the local municipality through the Tri-Party Agreement.

Note: *Conditions of draft plan or site plan approval will include program related requirements. Participants in the Program do not “own” the capacity assignment credit earned through this Program. The credit will be extended to the local municipality to assign in accordance with its respective allocation policies.*

Note: Developments Serviced by Stand-Alone Systems

For developments serviced by stand-alone water and wastewater systems including Kleinburg, Nobleton, Mount Albert, Schomberg, Sutton and Ballantrae, the Region at its sole discretion will carry out a system capacity assessment to determine if capacity assignment credit (if any) can be provided without compromising the safe operation of the water and wastewater system at the time of request, based on the most current plant performance data.



4.0 The **Fine** Print.

4.1 Development Charge Credits Do Not Apply

1. The granting of the Capacity Assignment Credit under this Program does not entitle the applicant to a reduction in regional development charges.

4.2 Conditions in the Subdivision and/or Site Plan Agreement

1. The requirements of this Program (**Chapter Two**) shall be included within the Subdivision and/or Site Plan Approvals as deemed appropriate by York Region staff in consultation with local municipal staff. A condition is required in both the Subdivision and/or Site Plan Agreement that ensures the owner has entered into the Program and will fulfill all of the necessary Program requirements.

4.3 Requirements Not Achieved

1. If all requirements are not fully met to the satisfaction of York Region and the local municipality in accordance with the “Detailed Program Requirements” specified in **Chapter Two**, up to the full value of the Letter of Credit shall be forfeited by the applicant for use by York Region or the local municipality.

Forfeited Letters of Credit shall be drawn upon by York Region to fund remedial works within the development, and/or carry out retrofits (outside the development) under the regional inflow and infiltration reduction program.

5.0 Letter of **Credit**.

1. Letters of Credit shall be posted to the Region upon execution of the Tri-Party Agreement in the amount of \$500 per dwelling unit in the proposed development.

Figure Three: *Example of how to calculate the amount for the letter of credit*

100 units (80 townhouse and 20 single detached units) are proposed with a PPU of 2.7 and 3.1 respectively would be awarded 46 credit persons, as explained in **Chapter One** of this Program guide.

Letter of Credit Amount = Proposed units x \$500 per unit
= all 100 units x \$500
= **\$50,000**



6.0 Roles and Responsibilities.

Responsibility: Pre-Application Meeting

Owner/Applicant's Role:

1. Provide overview of the project and propose servicing capacity assignment credit for the development.

Regional Role:

1. Facilitate the meeting.
2. Provide overall project objectives, process, requirements and milestones.
3. **Post meeting** – Confirm Program eligibility and calculate preliminary Capacity Assignment Credit.

Local Municipal Role:

1. Identify any major planning issues.
2. Discuss the servicing allocation situation in the municipality or within the development area.
3. **Post meeting** - Provide preliminary support for the development in a formal letter to the Region and if possible, commitment to servicing allocation – See “Forms and Administrative Details” **Chapter Three** under **Section 1.0** Local Municipal Confirmation Letter Requirements.

Responsibility: Application Package

Owner/Applicant's Role:

1. Submit cover letter with the proposed number and type of units and how the project will achieve the program requirements (**Chapter Three** under **Section 2.0** Cover Letter).
2. Notify Region of unit count changes.

Regional Role:

1. Review the application for completeness.
2. Formally provide acknowledgment that the project meets the program requirements.

Local Municipal Role:

1. Receive and process the development application.



Responsibility: Program Conformity Plan

Owner/Applicant's Role:

1. Submit Program Conformity Plan to the Region which provides the detailed engineering drawings and specifications how the project will achieve the program requirements, (**Chapter Three** under **Section 3.0** Program Conformity Plan).
2. Notify Region of unit count changes.

Regional Role:

1. Review the Program Conformity Plan for completeness.
2. Inform owner/applicant and local municipality if all program requirements have been fulfilled or can be satisfied.
3. Confirm Capacity Assignment Credit subject to Tri-Party Agreement.

Responsibility: Draft Plan Conditions and/or Site Plan Conditions

Regional Role:

1. Issue conditions for draft plan of subdivision and/or site plan to fulfill Program requirements.

Local Municipal Role:

1. Prepare draft plan conditions and/or site plan conditions.
2. Include Program conditions in subdivision/site plan agreement.

Responsibility: Tri-Party Agreement

Owner/Applicant's Role:

1. Execute Tri-Party Agreement.
2. Post Letter of Credit.

Regional Role:

1. Execute Tri-Party Agreement.
2. Receive and hold Letter of Credit.
3. Confirm Capacity Assignment Credit.
4. Clear subdivision and/or site plan conditions prior to subdivision registration and/or site plan approval.

Local Municipal Role:

1. Execute Tri-Party Agreement.
2. Receive additional servicing capacity assignment from Region upon execution of Tri-Party Agreement.



Responsibility: Completed Works

Owner/Applicant's Role:

1. Submit Conformity Report to peer reviewer to confirm works have been completed in accordance with Program requirements including peer review verification to the Region(**Chapter Three** under **Section 4.0** Conformity Report Submission Requirements).
2. Complete any corrective works necessary to fulfill the requirements of the Program.

Regional Role:

1. Receive Conformity Report, verified by the peer reviewer, confirming completeness of works and successful testing.

Local Municipal Role:

1. Confirm the works are constructed and inspected to the satisfaction of the local municipality and in conformance with the Program requirements.

Responsibility: Monitoring

Owner/Applicant's Role:

1. Conduct flow monitoring.
2. Submit **I and I** and Flow Monitoring Report to peer reviewer to confirm **I and I** requirements have been achieved.

Regional Role:

1. Release Letter of Credit after the monitoring period has ended and the **I and I** and Flow Monitoring report has been received and accepted.

Local Municipal Role:

2. Confirm concurrence with full release of security.



7.0 York Region Peer Review Verification.

For peer review verification as required by York Region, only a Professional Engineer in Ontario (P.Eng.) as approved by the Region will be accepted. The peer reviewer shall have demonstrated professional qualification with no conflict of interest. Engineers retained by the Owner/Applicant for the design and contract administration of the site and building servicing works are not qualified for peer review verification.

Program Requirement: Water Fixture Report

Owner/Applicant's Engineering Consultant:

1. Preparation of report confirming that "Watersense® 4L/flush toilets or 3/6 L siphonic dual flush toilets" and "rough-in ON-DEMAND hot water recirculation system" or "ON-DEMAND hot water recirculation system" installed throughout participating development.

Peer Review Engineering Consultant (P.Eng):

1. Verification of report accuracy.

Program Requirement: Construction of Sanitary Sewer System

Owner/Applicant's Engineering Consultant:

1. Resident site inspection to ensure conformance with "York Region Sewer Installation/Performance Testing Specification" (See **Chapter Two**, Appendix 1).

Program Requirement: I and I, Flow Monitoring Report

Owner/Applicant's Engineering Consultant:

1. Preparation of I and I and Flow Monitoring Report.

Peer Review Engineering Consultant (P.Eng):

1. Verification that report in conformance with the requirements specified in (See **Chapter Two**, Appendix 1 – Parts 3, 4 and 5).

Program Requirement: Closed Circuit Television (CCTV) Report

Owner/Applicant's Engineering Consultant:

1. Preparation of report including video/report for each mainline sanitary sewer and service lateral (from mainline to building) inspection constructed under the Program.

Peer Review Engineering Consultant (P.Eng):

1. Verification that report in conformance with the requirements specified in (See **Chapter Two**, Appendix 1 – Parts 6).



8.0 Program Application **Process** and **Milestones**.

A high level overview of the Servicing Incentive Program application process and key milestones are outlined in **Figure Four**. Detailed program requirements are identified in **Chapter Two** of this Program guide.

Figure Four: *Program Milestones*

- 1** • Pre-application meeting with owner/applicant, local municipal and regional staff to review Program entry requirements

- 2** • Local municipality supports application in a formal letter to the Region
• Cover Letter submitted to the Region from owner/applicant requesting to be a part of the Program
• Preliminary capacity assignment credit determined

- 3** • Application acceptance by the Region

- 4** • Owner/applicant submits Program Conformity Plan to Region in accordance with **Chapter Two** - Detailed Program Requirements

- 5** • Region issues draft plan/site plan conditions subject to satisfaction of of Program Conformity Plan
• Local municipality processes the development application

- 6** • Execution of Tri-Party Agreement
• Letter of Credit posted by the owner/applicant
• Region issues servicing capacity assignment credit to the municipality

- 7** • Region clears subdivision/site plan conditions related to the Program
• Subdivision is registered

- 8** • Construction of subdivision/site plan occurs

- 9** • Commencement of monitoring program

- 10** • Performance monitoring of sanitary sewer system is completed
• Testing of inflow and infiltration (**I and I**) measures completed - any deficiencies mitigated
• Submission of **I and I** Flow Monitoring Report to Peer Reviewer to ensure **I and I** requirements have been achieved
• Conformity Report submission to the Region which contains peer review verification
• Securities Released



Chapter Two

Detailed Program Requirements



Chapter Two Detailed Program Requirements.



1.0 Water Efficiency.

To reduce water demands in new construction achieved through the use of high-efficient plumbing fixtures and hot water delivery systems.

1.1 Program Requirements

- Install only WaterSense® labelled/certified high efficiency toilets (maximum four litres per flush (LPF) or 3/6 siphonic dual flush) within the development.
- All units shall be equipped with one of the following options:
“Rough-in” of an ON-DEMAND hot water recirculation system. The rough-in will consist of the necessary wiring and piping to service the kitchen sink and master ensuite bathroom through those areas of the home which are finished. A dedicated ambient water return line will be installed to service both the kitchen sink and master ensuite. An independent electrical circuit will be wired to ensure power is available at all required locations to activate the system when needed. The electrical system will also be carried to the future pump location and to the electrical panel to allow for straightforward respective connections to the pump and circuit breaker in the future. The Homeowner will be provided with details in the Home Owner Manual of the roughed-in system layout and its components including instruction on any outstanding installations, connections, requirements, etc. needed to enable future activation of the on-demand hot water recirculation system.

OR

ON-DEMAND hot water recirculation system connected to one of either the second floor master ensuite bathroom or second floor main bathroom or main floor bathroom for a bungalow. Method for activation of the system shall be determined by the developer. Available options to activate the system include a motion sensor, a separate switch, or wiring the system to the bathroom light switch. A thermostat is not permitted to activate the system. The homeowner will be provided with details in the Home Owner Manual of the system layout and its components including instruction on the safe system operation and maintenance.

- Submit peer review verification that each unit in the development has been inspected and meets the Region’s water conservation requirements. The peer review verification shall be provided by a professional engineer licensed within the Province of Ontario.

Verification of toilet fixtures will be satisfied by providing the Region with invoices/ purchase orders of the toilets purchased for the development/phase or other suitable documentation acceptable to the Region. All documentation supporting verification shall be included in the Conformity Report.



Inspections of the on-demand hot water recirculation systems will be conducted using a graduated system based on the number of new homes constructed by each builder.

Table Two outlines the verification process for each builder:

Table Two: Graduated Builder Verification Requirements

Number of Homes	Verification Requirements by a Third Party Verifier
First 25 new homes	Full inspection
26 new homes and greater	Full inspection of an additional 10 per cent of new homes

Notes:

1. *Should a new home be found not in compliance with the program, the Region and/or its agents have the right to re-inspect all previous homes that had not been inspected for verification by the third party inspection process to ensure they comply with the program. Any deficiencies discovered in this process will be remedied by the builder.*
2. *Once a deficiency is discovered by the Region, the verification process for that specific builder will be restarted for the balance of the homes. This will occur each time deficiencies are discovered.*
3. *The same inspection program will be applicable to each builder within the subdivision should there be a subdivision that has multiple builders.*

2.0 Wastewater **Flow** Reduction.

To reduce and monitor extraneous flows from the grade-related development projects.

2.1 York Region Requirements

1. Achieve the wastewater inflow and infiltration (**I and I**) control requirements through meeting the Sewer Installation/ Performance Testing Specification (New Construction) in **Appendix One**.
2. Prior to plan registration, submit the following items along with the Program Conformity Plan (see the Forms and Administrative Details **Chapter Three** under **3.0 Program Conformity Plan**):
 - a. Proposed engineering plans and specifications to achieve the sewer installation/ performance testing requirements as required in **Appendix One**.
 - b. A flow monitoring plan showing the location and types of meters to be used and data collection and reporting strategies.
 - c. A verification plan including the list of professional engineers to be employed.



2.1 York Region Requirements (continued)

- d. A contingency remedial plan should performance requirements not be met after construction.
 3. The owner/applicant shall submit peer review verification as part of the Conformity Report that the development has achieved the sewer installation/performance testing requirements, CCTV records, flow data and analysis report as set out in **Appendix One**. The peer review verification shall be provided by a professional engineer licensed within the Province of Ontario.
 4. The peer reviewer shall be one with demonstrated professional qualification and with no conflict of interest. Engineers retained by the developer for the design and contract administration of the site and building servicing works are not qualified as peer reviewer.



Detailed Program Requirements.

Chapter Two



Appendix One

York Region Sewer Installation/
Performance Testing Specification
(New Construction)





Part 1 General.

1.1 Objective

The Regional Municipality of York and its nine local municipalities are committed to reducing the impact of extraneous flows within their wastewater collection systems. Through the proactive introduction of improved design and construction standards and hydraulic performance specifications for new wastewater collection infrastructure and through the tactical abatement of existing extraneous flow sources via infrastructure rehabilitation and replacement.

The primary objective of this document is to reduce the ingress of rainfall derived inflow and infiltration (RDII) and to reduce groundwater infiltration (GWI) resulting from newly constructed sanitary sewer systems.

This Specification document is intended to enhance the existing *Sanitary Sewer System Inspection, Testing and Acceptance Guideline* while providing methods to objectively identify those systems that do not meet the extraneous flow reduction goals of York Region.

1.2 Background

This Sanitary Sewer Specification follows the York Region *Sanitary Sewer System Inspection, Testing and Acceptance Guideline (formerly Sanitary Sewer Commissioning Guidelines)* released in October 2011, that provides direction for the preferred test methods, quality control (testing limits) and specific requirements for the construction of new sanitary sewer systems throughout the Region for the duration of the construction and maintenance period, including the installation of lateral connections to property line and the subsequent building connections. Furthermore this document allows for the measurement of the hydraulic performance of newly constructed wastewater infrastructure.

This Specification document's standards intend to enhance the existing *Sanitary Sewer System Inspection, Testing and Acceptance Guideline* while providing methods to objectively identify those systems that do not meet the extraneous flow reduction goals of York Region.

This Specification document's standards are based on current and amended Ontario Provincial Standard Specifications (OPSS), Ontario Ministry of Environment Guidelines (MOE), and or American Society of Testing Materials (ASTM).



Part 2 Construction of New Sanitary Sewer Systems.

2.1 General

All installation, testing and inspection shall be undertaken, at a minimum, as per Local Area Municipal Sanitary Design Standards; York Region Sanitary Sewer System Inspection, Testing and Acceptance Guidelines; and this Specification document.

2.2 Sanitary Maintenance Holes

- a. Each sanitary maintenance hole shall be precast with a prebenched monolithic base.
- b. Each sanitary maintenance hole shall be watertight and free from leakage, with a sealed chimney and pre-manufactured gasketed connections.
- c. Sanitary maintenance hole frame and cover shall be as per the applicable Local Area Municipal Standard.
- d. All sanitary maintenance holes constructed in the vicinity of low points or outside the paved roadway or within an overland flow or on downsloping cul-de-sacs shall have watertight covers, as per Local Area Municipal Standards. Maintenance hole covers shall be locked (bolted) where requested by local municipality.

2.3 Sanitary Sewers

- a. Sanitary sewer pipes shall be constructed in a manner to ensure the absence of extraneous flows, using best available technology.
- b. Only pre-manufactured tees and standard fittings shall be permitted.
- c. Sanitary sewer pipes shall be comprised of PVC DR 35 (or better) based on the pipe depth, and shall be installed with bell and spigot gasketed joints, as per Local Area Municipal Standards.
- d. C900 (100 mm to 300 mm) or C905 (340 mm to 600 mm) PVC pipe (or concrete pressure pipe) will be specified in areas of high water table or where sewer is greater than 8.5 metres deep.
- e. Connections/joints shall be pre-manufactured gasketed connections.

2.4 Service Connections

- a. Only sealed manufactured cleanouts shall be permitted at service connection at property line, with no extension pipe to surface.
- b. Sanitary service connections shall be comprised of PVC DR 28 (or better), and shall be installed with bell and spigot gasketed joints, as per Local Area Municipal Standards.



2.5 Bulkheads

- a. Sewers under construction shall be bulkheaded, sealed from the existing wastewater system, as required, in such a manner as to prevent infiltration or flushing water entering the existing wastewater system during construction and prior to commissioning. Installation of bulkheads and their subsequent removal shall be at the developer's expense.
- b. Approval for the removal of bulkheads from the sanitary sewer post commission and testing will not occur without the written consent of the local area municipality's authorized representative.

Part 3 Extraneous Flow Performance Testing.

- a. Sanitary sewer flow monitoring shall take place during a minimum eight-month period commencing in April, in such a manner as to capture any wet weather flows above the dry weather flow, at the following stages of construction:
 - Immediately following the removal of bulkhead(s) and the first building connection to the existing system, for a tributary catchment area or phase within the tributary catchment;
 - For eight months commencing in April, after 85 per cent occupancy is achieved for a tributary catchment area or phase within the tributary catchment;
 - An owner/applicant may opt to maintain continuous flow monitoring throughout the development, at the owner/applicant's cost.

- b. Flow monitoring shall continue for at least eight months, until sufficient storm events are captured and results reviewed.

The flow monitoring period could be extended at the discretion of the Region if the data is, in the opinion of the Region, insufficient or incomplete.

- c. Flow monitors and equipment shall be installed, at a minimum, at the point of connection to the existing system, whenever possible, whereby at least 90 per cent of new development flow within a phase is captured. A flow monitoring plan must be submitted to the Region as part of the Conformity Plan submission, including:
 - Flow monitoring locations
 - Type of flow monitoring equipment
 - Rain gauge locations
- d. All flow data shall be collected and provided to York Region on a minimum bi-weekly basis (or immediately if deemed necessary by the Region) at no cost to the Region and the Region shall determine and advise if the quality of flow data provided satisfies program requirements. The Region must have the right to use the data for purposes other than this application.



- e. Approval of servicing performance for a phase in accordance with Part 5 of this appendix shall be at the sole discretion of York Region upon completion of the monitoring and inspection program and meeting the performance criteria to the satisfaction of York Region.

Part 4 Rainfall Monitoring.

- a. Rainfall gauges within two km of the flow monitoring locations shall be utilized to log rainfall data at a minimum of five minute intervals for the entirety of the flow monitoring period. If there is no existing Regional rainfall gauge within two km of the site, the developer shall install one at his/her expense at the request of the Region.
- b. Rainfall data produced by the local rain gauge, if not a York Region gauge, shall be vetted against precipitation data records from Environment Canada and/or Regional station.

Part 5 Flow Monitoring Performance Analysis and Results.

- a. Flow monitoring data at a minimum of five minute intervals shall be plotted against rainfall data such that the volume of extraneous flows is computed for each separate storm event, based on the contributing gross drainage area of the catchment. The effective area tributary to the flow monitoring locations will be determined by York Region.
- b. Maximum instantaneous extraneous RDII flow allowance shall be **0.12 L/s/ha, under a 25 year event** in the newly constructed sanitary sewer system. This shall be considered the Performance Limit. An extraneous flow less than the Performance Limit shall be deemed acceptable by the Region.
- c. A variation of this Performance Limit, in 5 (b), can be considered acceptable at the sole discretion of York Region. Should it not be deemed acceptable, the developer shall repair the problem within a three month period from the confirmation of performance results. The performance of the system will then be reassessed via flow monitoring prior to approval of the works by the Region.
- d. Maximum GWI allowance shall be **0.0375 L/mm diameter per 100 m of sewer pipe per hour**, and as per OPSS 410.

Part 6 Inspection.

- a. The local municipality shall inspect all main sanitary sewer sections and maintenance hole installations and related work during all phases of the construction.
- b. CCTV Inspection of Sanitary Laterals (local municipal side) - Timing and quantity of CCTV inspection of sanitary laterals shall be undertaken in conformance with local



policies, with inspection equipment launched from the main line up to the property line, prior to any service connections, and after backfilling. If all laterals meet the requirements, then no further CCTV inspections will be required.

- c. CCTV inspection of all sanitary mains and manholes will be performed in accordance with the specifications in this document and Attachment B: CCTV Sewer Inspection Specifications.
- d. CCTV inspection work shall be carried out by certified and qualified Pipeline Assessment and Certification Program (PACP) / Manhole Assessment and Certification Program (MACP) trained operator(s) using established rating systems developed by the **Water Resources Council (WRC)**.
- e. Visual Inspection of Sanitary Maintenance Holes – All maintenance holes shall be visually inspected for leakage after assembly and backfilling. Any visible leaks shall be repaired, irrespective of any test results prior to the acceptance of the new works.
- f. Sanitary Laterals (private side) – 100 per cent of private sanitary laterals shall be CCTV inspected from the main line to building face. Inspection equipment can be launched from either mainline or from building face, and after backfilling. If all laterals meet the requirements, then no further CCTV inspections will be required.

Part 7 Testing Requirements.

7.1 General

- a. If the test results are deemed to be unsatisfactory, the test section shall be repaired at the developer's expense and retested until satisfactory results are obtained, and should generally follow the repair and testing process outlined in Attachment A of the York Region and Local Area Municipalities *Sanitary Sewer Inspection, Testing and Acceptance Guideline*.

7.2 Maintenance Hole Testing

- a. Installed chimney seals in sanitary maintenance holes shall be chimney seal tested, per Section 4.5 of the *Sanitary Sewer System Inspection, Testing and Acceptance Guideline*.

7.3 Sanitary Sewer Testing

- a. Gravity sanitary sewer pipes shall be cleaned and flushed with high pressure water blasting after construction and just prior to inspection and/or testing.
- b. Mandrel deflection testing shall be performed on all Thermo-Plastic pipe sewer, per Section 2.7 of the *Sanitary Sewer System Inspection, Testing and Acceptance Guideline*.



Part 8 Submittals.

- a. Test Reports** – Test reports showing the sanitary works meets the performance requirements shall be submitted to York Region, including:
- Visual inspection of sanitary maintenance holes
 - CCTV Inspection Report
 - Chimney seal test results of maintenance holes, if applicable
 - Mandrel deflection test results
- b. Conformance Reports** verified by a peer reviewer:
- I and I and Flow Monitoring Report
 - Water Fixture Report
 - CCTV Inspection Report

Part 9 Approval of Servicing.

- a.** Acceptable performance of the servicing will be determined at the sole discretion of York Region through flow monitoring and achievement of performance criteria.
- b.** Flow monitoring and subsequent analysis of RDII and GWI flows will be based on methodology approved and adopted by the Region and will be considered in conjunction with water consumption records to determine savings.

Part 10 Glossary.

Chimney – The cylindrical variable height portion of the maintenance hole structure used to support and adjust the finished grade of the maintenance hole frame. The chimney extends from the top of the corbel or cone to the base of the maintenance hole frame. The chimney includes the ring, concrete extensions, and moduloc/adjustment rings used to raise the maintenance hole. Maintenance hole covers are often disturbed during paving or as a result of traffic. The crack between the ring and cover can often be leaky. The intent of the chimney seal is to prevent inflow from the area beneath the rim of the maintenance hole.

Cone – The portion of the maintenance hole structure which slopes downward and outward from the bottom of the maintenance hole frame to the required barrel or diameter of the maintenance hole.

Cleanout – A fitting access in a drainage system or venting system that is installed to provide access for cleaning and inspection and that is provided with a readily replaceable air tight cover.

Extraneous Flow – Flow resulting from rainfall entering sanitary sewer systems via downspouts and/or illicit storm drain connections.



Part 11 Referenced Design Standards, Guidelines and Manuals.

- a. Ontario Ministry of the Environment. *Design Guidelines for Sewage Works*. 2008
- b. Ontario Provincial Standard Specification. *OPSS 410 - Construction Specification for Pipe Sewer Installation in Open Cut*. November 2013
- c. Water Research Centre (WRC). *Manual of Sewer Condition Classification (3rd Edition)*. 1993.
- d. York Region. *Inflow and Infiltration Reduction Strategy*. January 2011
- e. York Region. *Sanitary Sewer System Inspection, Testing and Acceptance Guideline (Formerly Sanitary Sewer Commissioning Guidelines)*. October 2011

Part 12 Attachments.

Attachment A – *Sanitary Sewer System Inspection, Testing and Acceptance Guideline (Formerly Sanitary Sewer Commissioning Guidelines)*. October 2011

Attachment B – *CCTV Sewer Inspection Specifications*





Appendix One Attachment A

Sanitary Sewer System Inspection, Testing and Acceptance Guideline

(formerly Sanitary Sewer Commissioning Guidelines)

October 2011





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1 General.

The Sanitary Sewer System Inspection, Testing and Acceptance Guideline outlines the general procedures and minimum requirements required for inspection, testing and acceptance of new sanitary sewer systems commissioned in York Region and the nine Local Area Municipalities. The Guideline is based on requirements and procedures from Ontario Provincial Standard Specifications (OPSS) and American Society of Testing Materials (ASTM).

Without limiting the foregoing, it is a set of standards that outline specific requirements for inspecting and testing the construction of sanitary sewer systems to help prevent Inflow and Infiltration (I and I) from entering new sanitary sewer systems. It provides direction for the preferred test methods, performance rates (testing limits) and specific requirements for the construction of sanitary sewer systems dedicated to York Region and the nine local area municipalities for the duration of the construction period, including the installation of lateral connections to property line.

The details in the Guideline only delineate specific features of sanitary sewer system construction that impact I and I reduction, and are not intended to supplement or replace current York Region or nine local area municipality Water and Wastewater Design Standards and Guidelines.

1.1 General Requirements

All newly constructed sanitary sewers and manholes shall be watertight and free from leakage.

The contractor shall be responsible for payments and scheduling all testing required and informing the local municipality and their qualified representative (e.g. consulting engineer) of the planned commencement date 10 days prior to such commencement and reconfirm three days prior to testing.

When specified in the contract documents, leakage or water-tightness tests shall be carried out on completed pipe sewers 1,200mm in diameter and smaller. There shall be no visible leakage for pipe sewers larger than 1,200mm diameter. All tests shall be carried out in the presence of and accepted by the local municipality or their qualified representative. Results for tests conducted in the absence of the local municipality or their qualified representative will not be accepted.

The local municipality or their qualified representative shall inspect sanitary sewer and manhole installations and related work during all phases of the construction.

No part of the work will be accepted until the sanitary sewers are satisfactorily tested following completion of installation of service connections and backfilling. Upon completion, sanitary sewers and maintenance holes shall be inspected by visual observation and tested in accordance with this Guideline for each sewer section (maintenance hole to maintenance hole). When tests are unsatisfactory, the test section shall be repaired at contractor's expense and retested until satisfactory results are obtained. If the defective portion of the sanitary



sewer cannot be located or repaired, the contractor shall remove and reconstruct as much of the work as is necessary to obtain a system that passes testing requirements. See **Section 1:** York Region and Local Area Municipalities Sanitary Sewer Inspection, Testing and Acceptance Flow Charts for Concrete and Thermo-Plastic Pipes and Maintenance Holes.

The contractor shall bear the complete cost and supply all equipment necessary to perform the tests required, refer to **Section 1:** York Region and Local Area Municipalities Sanitary Sewer Inspection, Testing and Acceptance Flow Charts for Concrete and Thermo-Plastic Pipes and Maintenance Holes for acceptable testing processes.

Sanitary sewer construction shall be inspected throughout the construction period for general adherence to contract specifications and follow the sequence of testing provided in subsequent sections.

The test(s) shall be done after final backfill is placed in the trench and before asphalt has been placed (except where vacuum testing of maintenance holes has been requested by the local municipality or their qualified representative).

Where the groundwater table cannot be visually monitored in terms of elevation from the pipe, the local municipality or their qualified representative may request that groundwater level be measured with piezometers placed in representative locations throughout the length of sanitary sewers under construction and as detailed in **Section 5.**

Smoke and dye testing may be used only to locate leaks and in no case shall be considered conclusive.

General sequence of testing for sanitary sewer system is as follows (but not limited to):

1. Cleaning and flushing with high-pressure water blasting.
 2. Deflection or out of round testing (for Thermo-plastic pipes only).
 3. Water-tightness (leakage) testing.
 4. CCTV (photographic record & inspection form for maintenance holes) after testing and at the start of maintenance.
 5. Additional CCTV may be specified by the local municipality or their qualified representative at a time prior to maintenance and at the time prior to assumption of the works.
- For testing requirements specific to gravity sanitary sewers refer to **Section 2.**
 - For testing requirements specific to forcemains refer to **Section 3.**
 - For testing requirements specific to maintenance holes refer to **Section 4.**
 - For groundwater measurement refer to **Section 5.**



2 Gravity Sanitary Sewer **Testing Requirements.**

2.1 General Requirements

Gravity sanitary sewer pipes shall be cleaned and flushed with high pressure water blasting after construction and just prior to inspection and testing.

Testing shall be carried out from maintenance hole to maintenance hole and shall include lateral connections to property line. Testing shall be conducted prior to any service connections being made. All service laterals, stubs, and fittings shall be plugged or capped prior to testing.

Sanitary sewers shall be repaired and re-tested, as required, until the test results are within the limits specified. Visible leaks shall be repaired regardless of the test results.

The testing requirements follow the OPSS and ASTM standards and are generally described in each subsection of this section. Changes or deviations to the OPSS standards are as noted herein.

2.2 Test Method and Sequence

Water-tightness testing parameters are dependent on groundwater levels prior, during and after testing of the sanitary sewer, the static water level shall be recorded in accordance with **Section 5.**

The water-tightness test method for small diameter pipe (Thermo-Plastic pipe 900mm diameter and less and concrete pipe 600mm diameter and less) shall be Exfiltration Test – Low Pressure Air (air exfiltration), see Section 2.3. In the event that air exfiltration testing fails and leak location and repair is unsuccessful, the use of other test methodology may be accepted at the discretion of the local municipality or their qualified representative. Any other water-tightness method will only be allowed following the submittal of the procedure to the local municipality or their qualified representative for review and upon their written approval.

The water-tightness test method for large diameter pipe (Thermo-Plastic pipe greater than 900mm diameter and concrete pipe greater than 600mm diameter) and where the groundwater is at least 600mm above the highest sewer crown shall be Infiltration Test, see Section 2.4. In the event that groundwater levels are less than 600mm above the crown of the pipe, the Exfiltration Water Test or Joint Test as applicable shall be used only when specified by the local municipality or their qualified representative, see **Sections 2.5 and 2.6** respectively.

When specified by the local municipality or their qualified representative, supplementary joint testing on large concrete pipe (greater than 600mm diameter) shall be conducted on representative joints, see **Section 2.6.**



2.3 Exfiltration Test - Low Pressure Air

Standard practice for testing, equipment used, and other specifications shall follow OPSS 410, ASTM C924, ASTM F1417-11 and as noted herein.

The contractor is responsible for ensuring that the test is conducted in a safe manner and all applicable safety procedures are followed. Do not enter, or allow anyone to enter, the maintenance hole during testing.

Tests shall be conducted between two consecutive maintenance holes or to a stub end where the sewer does not terminate at a maintenance hole. The test section shall be plugged at each end. The test section shall be filled slowly until a constant pressure of 24kPa is maintained. If the groundwater is above the pipe sewer being tested, the air pressure shall be increased by 3.0kPa for each 300mm from interior pipe invert that the groundwater level is above the invert of the pipe.

Whereby the groundwater table cannot be visually monitored in terms of elevation from pipe, the local municipality or their qualified representative may request that groundwater level be measured prior to testing in accordance with **Section 5**.

The air pressure shall be stabilized for five minutes and then regulated to maintain it to 20.5kPa plus the allowance for groundwater, if any. After the stabilization period, the time taken for a pressure loss of 3.5kPa shall be recorded.

The time taken for a pressure drop of 3.5kPa shall not be less than the times shown in **Table Three**, Column B for lengths equal to or less than the length shown in Column C.

Table Three: Exfiltration Test – Low Pressure Air Testing (OPSS 410)

Column A Nominal Pipe Size (mm)	Column B Minimum Time (min:sec)	Column C Length of Pipe for Minimum Time (m)	Column D Time per Unit for Longer Lengths of Pipe (sec/m)
100	1:53	182	0.623
150	2:50	121	1.140
200	3:47	91	2.493
250	4:43	73	3.893
300	5:40	61	5.606
375	7:05	48	8.761
450	8:30	41	12.615
525	9:55	35	17.171
600	11:20	30	22.425
675	12:45	27	28.382
750	14:10	24	30.040
825	15:35	22	42.397
900	17:00	20	50.450

*If the length of the test section is greater than the length shown in Column C, the testing time shall be the product of the length of the test section multiplied by the value in Column D (i.e. Minimum time = test length x Column D).



Determination of Acceptance

If the time shown in **Table 3** for the designated pipe size and length elapses before the air pressure drops 3.5kPa, the section undergoing test shall have passed and shall be presumed to be free of defects. The test may be discontinued once the prescribed time has elapsed even though the drop 3.5kPa has not occurred.

Determination of Failure

If the pressure drops 3.5kPa before the appropriate time shown in **Table Three** has elapsed, the air loss shall be considered excessive and the section of pipe shall be determined to have failed the test.

In the event that air exfiltration testing on the sanitary sewer system or any section thereof fails, and/or leak repair is unsuccessful, the use of other test methodology at the discretion of the local municipality or their qualified representative may be permitted. The local municipality or their qualified representative can also request air exfiltration testing again once the repair is complete. The contractor may conduct a water infiltration test in accordance with **Section 2.4** to establish whether the 0.0375 litres/millimeter diameter /100 metres of pipe sewer/hour maximum allowable infiltration rate is being exceeded. If the field conditions do not allow for infiltration test due to low groundwater table, a water exfiltration test in accordance with **Section 2.5** may be used upon written approval from the local municipality or their qualified representative.

If the air test on the sanitary sewer system or any section thereof fails, but the water infiltration or exfiltration test on the sanitary sewer system or section thereof passes, the sanitary sewer system or section thereof shall be deemed acceptable. However, the contractor shall be responsible for repairing all visible leaks regardless of the ability of the sanitary sewer system or section thereof to pass any established test criteria specified in this Guideline.

2.4 Infiltration Test

Standard practice for testing, equipment used, and other specifications shall follow OPSS 410, ASTM C969M and as noted herein.

The rate of infiltration into the sanitary sewer system shall not be in excess of 0.0375 litres/millimeter diameter /100 metres of pipe sewer/hour.

Infiltration test shall be conducted only where the ground water level at the time of testing is 600mm or more above the crown of the pipe for the entire length of the test section, otherwise infiltration will be considered an invalid water tightness test.

Prior to testing, discontinue dewatering operations at least three days before conducting the test and allow the groundwater level to stabilize. Measure groundwater levels in accordance with **Section 5**.

A V-notch weir or other suitable measuring device shall be installed at the downstream end of



the test section. Infiltrating water shall be allowed to build up behind the weir until the flow through the V-notch has stabilized. Several tests (minimum three) at 15-30 minute intervals shall be performed to ensure the flow through the weir is steady and not changing. The rate of flow shall then be measured and shall not exceed the maximum allowable infiltration calculated for the test section.

2.5 Exfiltration Test - Water

Standard practice for testing, equipment used, and other specifications shall follow OPSS 410, ASTM C969M and as noted herein.

Exfiltration tests utilizing water shall be conducted where the groundwater level is lower than 600mm above the crown of the pipe or the highest point of the highest service connection included in the test section and only when specified by the local municipality or their qualified representative.

The leakage at the end of the one hour test period shall not be in excess of 0.0375 litres/millimeter diameter/100 metres of pipe sewer/hour.

An allowance for each maintenance hole included in the test section shall be made in accordance with the exfiltration rate for maintenance holes detailed in **Section 4**.

Water shall be added to the pipeline prior to testing until there is a head in the upstream maintenance hole of the greater of 600mm minimum over the crown of the pipe or above the groundwater level (refer to Section 5 for Groundwater Measurement).

2.6 Joint Test – Concrete Pipe (Greater than 600mm Diameter)

Standard practice for testing, equipment used, and other specifications shall follow ASTM C 1103M and as noted herein.

This test shall be used when groundwater levels are less than 600mm above the crown of the pipe and only when specified by the local municipality or their qualified representative.

When directed to utilize this test method, all joints shall be tested unless otherwise directed by the local municipality or their qualified representative.

Equipment used shall be made specifically for joint testing of pipelines.

2.6.1 Supplementary Joint Testing

Standard practice for testing, equipment used, and other specifications shall follow ASTM C 1103M and as noted herein.

This test shall be used as an additional supplementary test only when specified by the local municipality or their qualified representative. After successful water tightness testing, supplementary joint testing is to be completed as an additional pass/fail test on selected joints on all precast concrete pipes greater than 600mm in diameter when specified by the local municipality or their qualified representative.



Representative testing on 5 per cent of all joints, joints selected to be approved by the local municipality or their qualified representative, is to be conducted. Joints shall be selected evenly spaced along the complete pipe sewer. Failed joints are to be repaired.

All joints tested shall pass the test otherwise a different representative sample (5 per cent) shall be tested following the same sequence.

Joints that fail to meet the verified test criteria (stated in ASTM C 1103M) shall be resealed and retested until the test criteria can be met.

2.7 Mandrel Deflection Testing

Standard practice for testing, equipment used, and other specifications shall follow OPSS 410.

Mandrel deflection testing shall be performed on all Thermo-Plastic pipe sewers. The mandrel deflection test shall be performed no sooner than 30 days after final backfill to road subgrade elevation has been placed.

The mandrel shall be cylindrical in shape, and constructed with an odd number of evenly spaced arms or prongs, minimum nine in number. The minimum diameter of the circle scribed around the outside of the mandrel arms shall be equal to the allowable deflected pipe diameter ± 1 mm. The contact length of the mandrel shall be measured between the points of contact on the mandrel arm or between sets of prongs. This length shall not be less than that shown in **Table Four**.

Table Four: Deflection Testing of Pipe Sewers (from OPSS 410)

Nominal Pipe Size (mm)	Mandrel Contact Length (mm)
150	100
200	150
250	200
300	250
350	300
375	300
400	300
450	350
500	400
525	450
600	500
675	575
750	675
900	750
1050	900
1200	1050



The mandrel shall be checked with a go-no-go proving ring. The proving ring shall have a diameter equal to the allowable deflected pipe diameter $\pm 0.1\text{mm}$. An acceptable mandrel shall not pass through the proving ring. The proving ring shall be fabricated from steel a minimum of six mm thick.

For pipes 100mm to 750mm in diameter, the allowable deflected pipe diameter is 7.5 per cent of the base inside diameter of the pipe. For pipes greater than 750mm in diameter, the allowable deflected pipe diameter is 5 per cent of the base inside diameter of the pipe. The base inside diameter is defined in the CSA or ASTM standard to which the pipe is manufactured.

Any section of pipe that does not allow the mandrel to pass shall be considered to have failed the deflection test.

All sections of pipe that fail the deflection test shall be repaired and retested. Re-rounding is not accepted. Retesting shall be carried out no sooner than 30 days after backfill has been placed.

2.8 CCTV Inspections

Standard practice for testing, equipment used, and other specifications shall follow OPSS 409. Observations and defect coding standard shall be in accordance with Water Research Centre Publication Manual (WRC) Manual of Sewer Classification (3rd Edition).

Closed Circuit Television (CCTV) inspection shall be performed to observe and record structural and service defects, construction features and to assess thoroughness of cleaning.

Defects to be repaired shall be in accordance with the local municipalities specifications.

Media storage shall be high quality CD or DVD (reference 409.05.01).

Each digital .MPEG file and inspection report shall consist of one pipe section only (unless a reversal is required), where two inspection records will be required. A record on CD or DVD of the internal condition of the piping system shall be provided in addition to a printed and digital inspection report. Two copies of the digital media (CD's or DVD's) shall be provided and two copies of the printed report (reference 409.07.05.01).

The camera lens should be positioned along the center axis of the pipe. Lighting in the sewer must be sufficient to illuminate approximately two metres ahead of the camera and be evenly distributed around the periphery of the pipe without loss of contrast. The camera must maintain a speed that will allow for the defects to be observed clearly. The camera must stop and pan special features within the pipe, such as maintenance hole interfaces, junctions, service connections and major defects.

2.8.1 Video Inspection Equipment

The video shall be of quality that all minor defects (hairline cracks, etc.) are clearly visible and the colour of the pipe inspected is true to actual conditions. Should the video not



be of this quality, as determined by the local municipality or their qualified representative, the contractor shall be required to re-inspect the line to produce an acceptable quality video at no additional cost. The picture quality on the monitor shall provide a minimum continuous 460 line resolution video picture. Linear measure through pipes must be accurate to +/- 0.5 per cent.

2.8.2 Video Camera Transport Equipment

The camera shall be transported through the sewer by means of a rubber tire or crawler tractor. The transport unit must be capable of passing over minor surface imperfections including but not limited to broken joints and solid debris up to 40mm in height.

Mounting of the camera on a float or skid for tow through the sewer shall only be permitted where the condition of the sewer precludes the use of a tractor and where authorized by the local municipality or their qualified representative. If the camera is towed the supporting equipment shall not impede the view of the camera and shall be stable to ensure steady and smooth progress.

The camera transport shall permit complete inspection of the sewer from the centre of the start maintenance hole to the centre of the finish maintenance hole. A remote reading counter shall be used to measure distance travelled from the centre of the start maintenance hole and measurements shall be recorded in metres to the nearest 100 mm.

2.9 Testing Pressure Pipe Used as Gravity Sewer

Standard practice for testing pressure pipe used for gravity sewer service, equipment used, and other specifications shall follow OPSS 412.

Test pressure shall be 1035KPa and test duration of two hours.

Allowable leakage shall be in accordance with OPSS 412; 0.082 litres per millimetre of pipe diameter per kilometre of pipe for the two hour test period.

3 Forcemain Testing Requirements.

This section provides the testing requirements specific to forcemains and low pressure systems.

3.1 General Requirements

All forcemains for lift stations and common force mains in low pressure systems shall be tested for leakage by a Hydrostatic Leak Test.

Forcemain construction shall be inspected throughout the construction period for general adherence to contract specifications and good practice.



The testing requirements follow the standards and are generally described in each subsection of this section.

Changes or deviations to the OPSS standards are as noted herein.

3.2 Hydrostatic Leak Test

Standard practice for testing, equipment used, and other specifications, shall follow OPSS 412.

A test section shall be either a section between valves or the completed forcemain. The forcemain to be tested shall be backfilled before testing commences.

Test pressure shall be as specified in the contract documents or be provided by the local municipality or their qualified representative.

The test section shall be filled slowly with water, and all air shall be removed from the pipeline. A 24-hour absorption period may be allowed before starting the test. The test section shall be subjected to the specified continuous test pressure for two hours.

The leakage is the amount of water added to the test section to maintain the specified test pressure for the test duration.

No leakage will be permitted (the allowable leakage is zero). All leaks shall be located and stopped and the test section shall be retested until leakage is zero.

All defective pipe, fittings, valves and other appurtenances discovered shall be removed and replaced with sound material and tests repeated until the leakage is zero.

4 Maintenance Hole Testing Requirements.

4.1 General Requirements

Standard practice for testing, equipment used and other specifications shall follow OPSS 407 and ASTM C1244M.

Every maintenance hole shall be chimney seal tested and visually inspected, and whereby specified by the local municipality or their qualified representative shall be tested by either exfiltration water testing or infiltration water testing. As an alternative at the discretion of the local municipality or their qualified representative, testing may be performed by vacuum testing. Vacuum testing shall be conducted on un-backfilled maintenance holes in accordance with the standards noted above.

A photographic record and inspection with condition rating shall be completed on every maintenance hole, local municipality or their qualified representative to provide inspection form.

Maintenance holes shall be inspected during all phases of construction. Each maintenance hole shall be visually inspected for leakage after assembly and backfilling.



4.2 Maintenance Hole Exfiltration Water Test

Each maintenance hole shall be tested for leakage after assembly and backfilling where requested by the local municipality or their qualified representative.

Leakage shall not exceed a rate of three litres per hour per metre of head above the lowest pipe invert in the maintenance hole.

Maintenance holes shall be repaired and re-tested, as required, until the test results are within the limits specified. Visible leaks shall be repaired regardless of the test results. The method of repair shall be per the approval of the local municipality or their qualified representative.

4.3 Maintenance Hole Infiltration Water Test

This test shall be used in lieu of Maintenance Hole Exfiltration Water Test only when specified by the local municipality or their qualified representative.

Standard practice for testing, equipment used, and other specifications shall follow OPSS 407 or ASTM C1244M. The test shall be conducted as an Infiltration Water Test.

4.4 Negative Air (Vacuum) Test

All joints between the top of the casting to the bottom of the maintenance hole base shall be included in the test.

Equipment used shall be made specifically for vacuum testing maintenance holes.

A vacuum will be drawn and the vacuum drop over a specified time period shall be within the limits in the standard to determine the acceptability of the maintenance hole.

The maintenance hole shall pass if the time for the vacuum reading to drop from 33.8 kPa of Hg to 30.4 kPa of Hg meets or exceeds the values in the Table 4 from ASTM 1244M.

If the maintenance hole fails the initial test, necessary repairs shall be made by an approved method. The maintenance hole shall then be retested until a satisfactory test is obtained. Visible leaks shall be repaired regardless of the test results.

4.5 Chimney Seal Leakage Test

If specified by the local municipality or their qualified representative, installed chimney seals (an internal flexible rubber frame seal) shall be tested in accordance with this Guideline.

Install the chimney seal and only the bottom expansion band in accordance with the manufacturer's recommendation. Fully tighten the bottom band. Do not install the top expansion band.

Pull the top of the seal away from the maintenance hole's frame and pour approximately



four litres of water behind the seal. Observe the bottom seal for a minimum of one minute for leakage. No leakage shall be allowed.

If the bottom expansion band holds water without leaking, the chimney seal will have passed the test.

If the bottom expansion band has any leakage during the test time, the chimney seal will have failed the test. The contractor shall be required to remove, replace, or reposition the bottom expansion band and retest.

5 Groundwater Measurement.

Whereby the groundwater table cannot be visually monitored in terms of elevation from the pipe, the local municipality or a qualified representative may request that groundwater level be measured with piezometers placed in representative locations throughout the length of sanitary sewers under construction.

The contractor shall provide all materials and equipment necessary for the construction of piezometers for measuring groundwater level and equipment to measure the water level within the piezometer.

Piezometers shall be placed in the excavation alongside the sewer at approved locations.

Piezometers shall be constructed of 19mm PVC pipe and shall be equipped with 1.0m well screens or sections of a slotted PVC pipe at the end with gravel pack filled in around the screen to approximately 0.5m - 1m above and below the screen.

All casing and screen material shall be assembled and installed with sufficient care to prevent damage to the sections and joints.

Prior to installation an end cap must be placed at the bottom of the PVC piping. During installation, a cap shall be placed on top of the casing to avoid materials from entering the PVC piping.

A completed monitoring piezometer shall be sufficiently straight to allow passage of measuring devices.

Provide a water level indicator designed to measure groundwater levels in small diameter tubes and piezometers. The cable reel device shall be equipped with a probe that on entry to water completes an electrical circuit and sends a signal back to the reel where a light and audible buzzer are activated. The water level is then determined by taking a reading directly from the cable at the top of the piezometer casing. Prior, during and after testing of the sewer, the static water level shall be recorded.



6 Referenced **Standards.**

1. OPSS 407 Construction Specification for Maintenance Hole, Catch Basin, Ditch Inlet and Valve Chamber Installation
2. OPSS 409 Construction Specification for Closed-Circuit Television Inspection of Pipelines
3. OPSS 410 Construction Specification for Pipe Sewer Installation in Open Cut
4. OPSS 412 Construction Specification for Sewage Forcemain Installation in Open Cut
5. ASTM C924 - 02(2009) Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method
6. ASTM C969M - 02(2009) Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines (Metric)
7. ASTM C 1103 Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
8. ASTM F1417 - 11 Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air
9. ASTM C1244M - 05ae1 Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill (Metric)
10. Water Research Centre Publication Manual (WRC) Manual of Sewer Classification (3rd Edition).



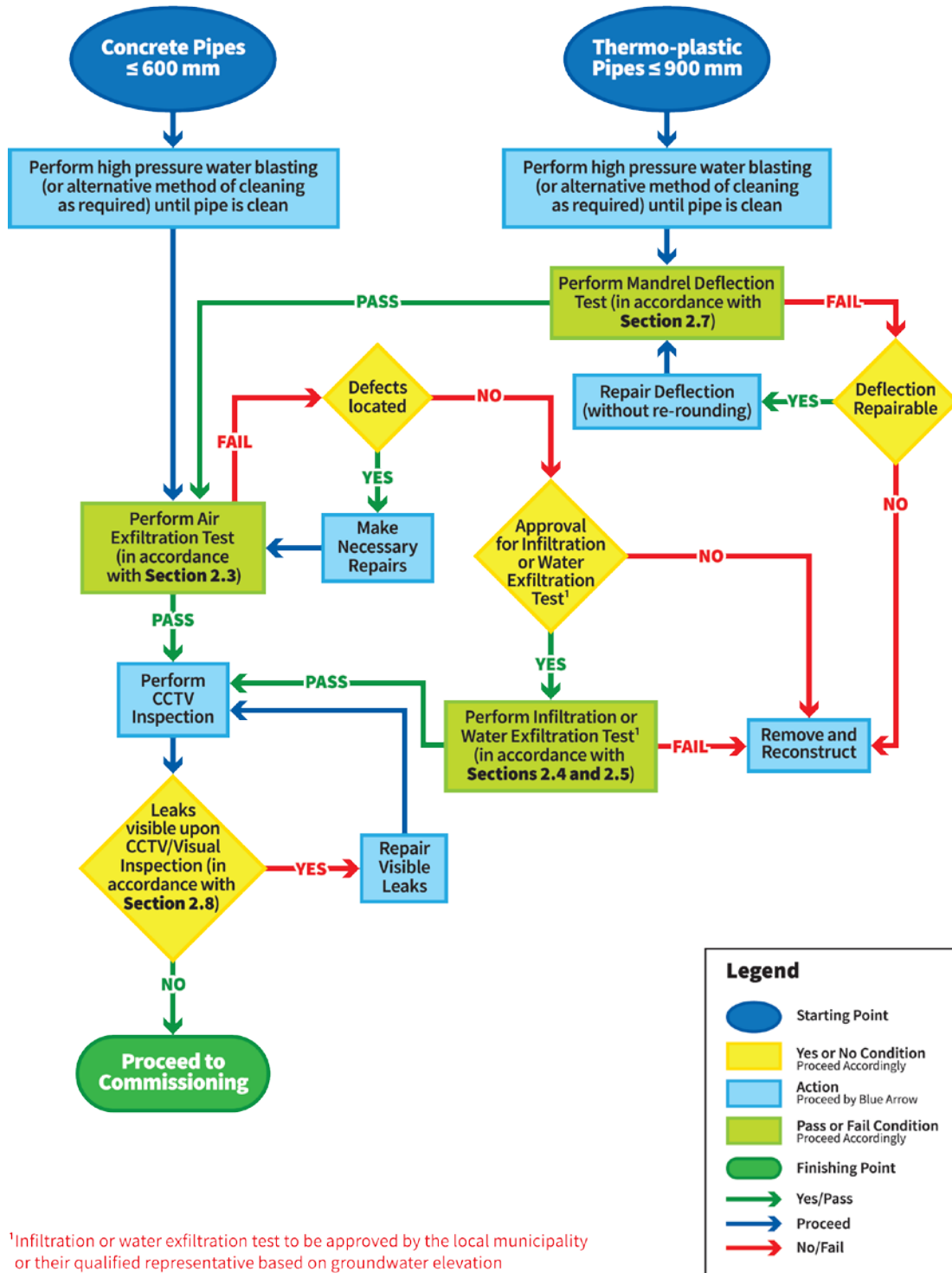


Section One to Attachment A
York Region and Local Area Municipalities
Sanitary Sewer Inspection, Testing
and Acceptance Flow Charts for
Concrete and Thermo-Plastic
Pipes and Maintenance Holes

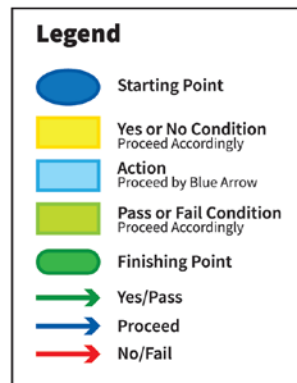


York Region and Local Area Municipalities Sanitary Sewer Inspection, Testing and Acceptance Flow Chart

for Concrete Pipes ≤ 600 mm and Thermo-Plastic Pipes ≤ 900 mm

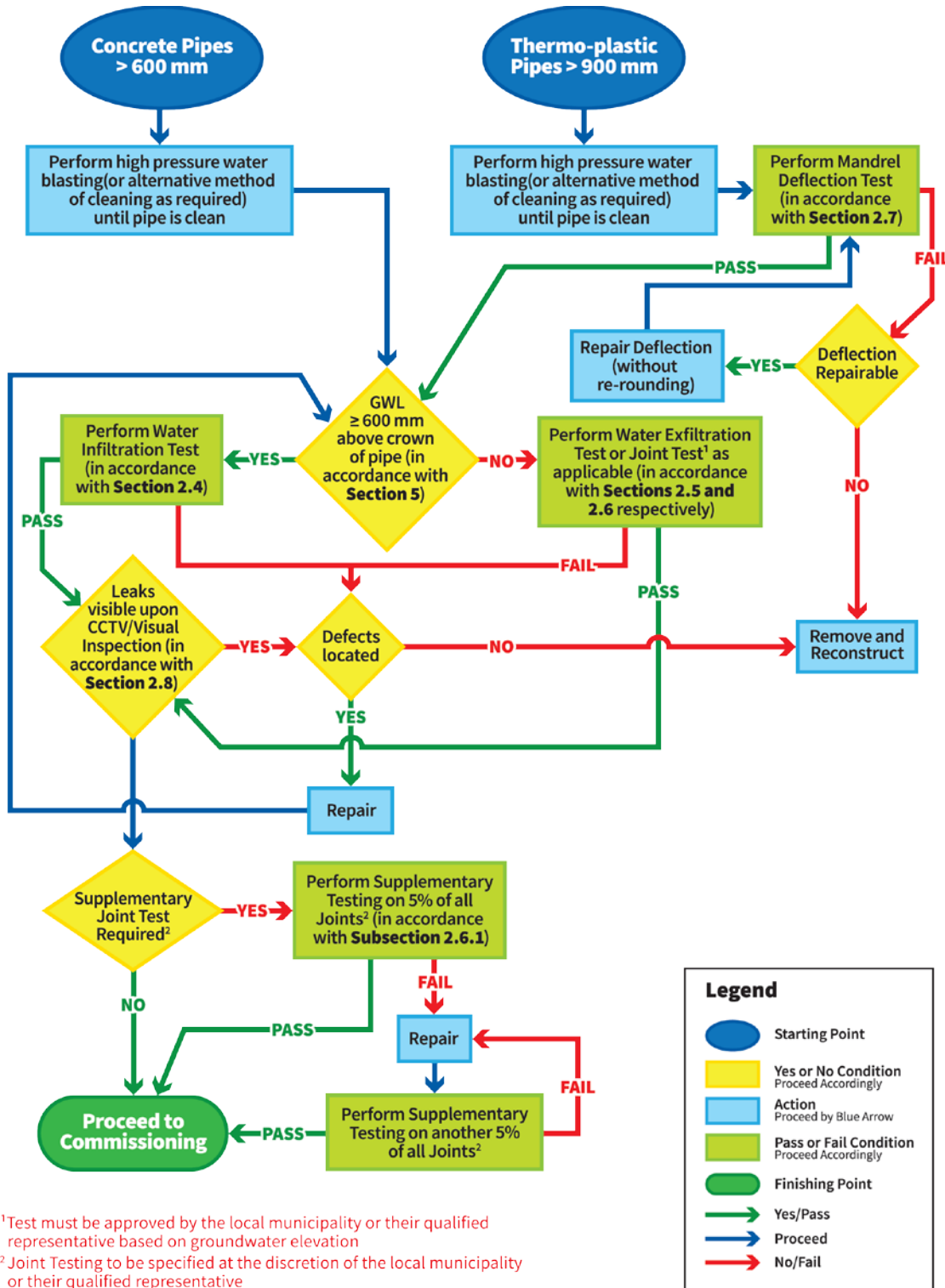


¹Infiltration or water exfiltration test to be approved by the local municipality or their qualified representative based on groundwater elevation

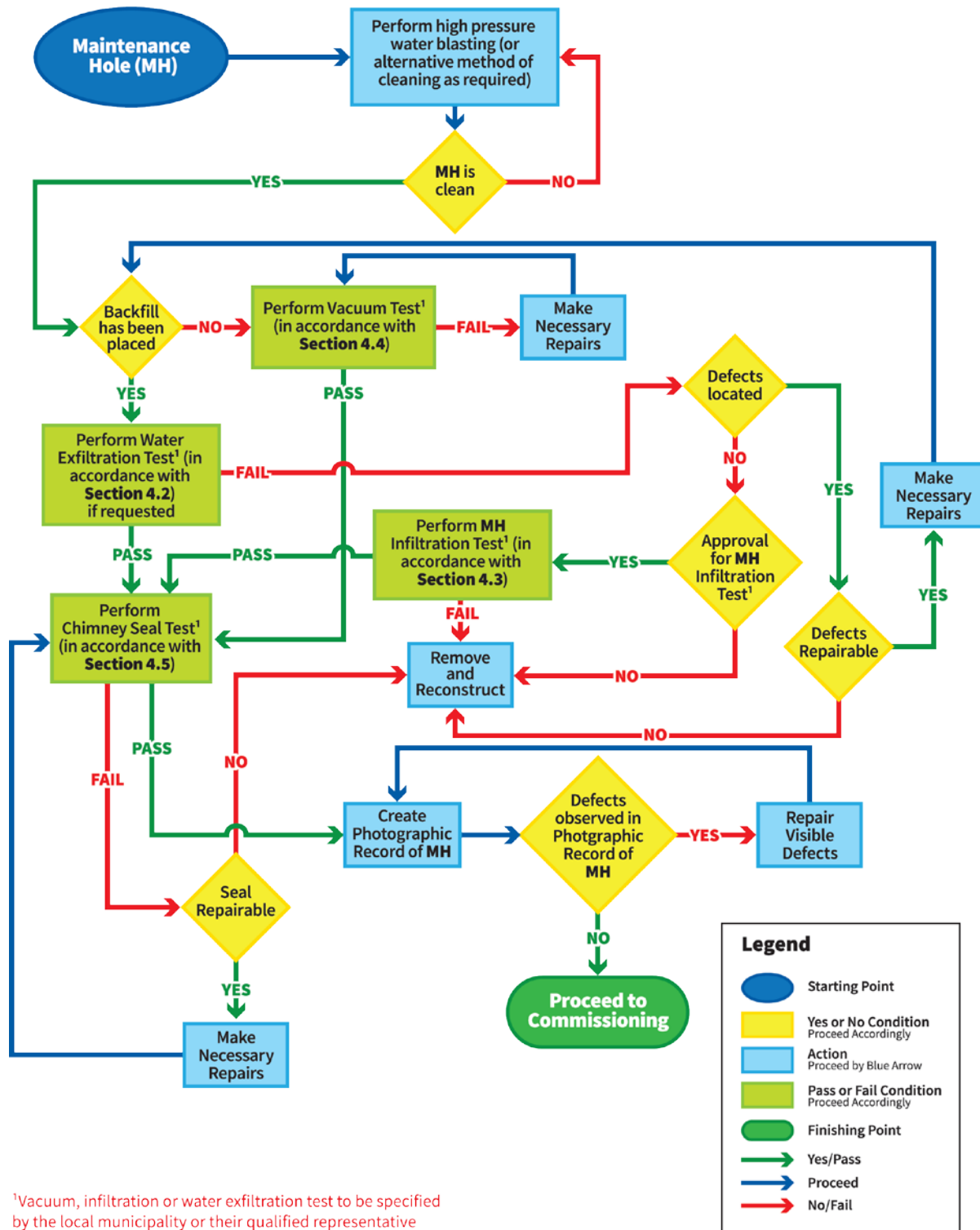


York Region and Local Area Municipalities Sanitary Sewer Inspection, Testing and Acceptance Flow Chart

for Concrete Pipes > 600 mm and Thermo-Plastic Pipes > 900 mm



York Region and Local Area Municipalities Sanitary Sewer Inspection, Testing and Acceptance Flow Chart for Maintenance Holes



¹Vacuum, infiltration or water exfiltration test to be specified by the local municipality or their qualified representative





Section Two to Attachment A
Sanitary Sewer System
Inspection, Testing and
Acceptance Guideline

Glossary of Terms





Borehole: A hole drilled into the earth into which well casings or piezometers may be installed.

CCTV: A closed-circuit television. An inspection method using a closed-circuit television camera system with appropriate transport and lighting mechanisms to view the interior surface of sewer pipes and structures.

CD: A compact disc.

Contract: An agreement between two or more parties, one that is written and enforceable bylaw; the agreement between the local municipality and the contractor for the construction of a sanitary sewer system or components.

Contractor: A properly licensed individual of company that agrees to furnish labour, materials, equipment and associated services to perform the work as specified for a specified price.

Crown: The top of the internal (the inside) cross section of the pipe.

Deflection: Any change in the inside diameter of the pipe resulting from installation and imposed loads. Deflection may be either vertical or horizontal and is usually reported as a percentage of the base (un-deflected) inside pipe diameter.

Exfiltration: Leakage or discharge of flows from sewer systems into the ground through leaks in pipes, joints, maintenance holes or other sewer system appurtenances.

Forcemain: A pipeline that conveys sewage from one area to another under pressurized flow. The word "force" refers to the fact that the pipeline uses pressure, provided by pumping stations, rather than gravity to move flows.

Good Practice: Is the proven and accepted methods, procedures, and practices that provide appropriate, cost-effective, and well-documented solutions to meet user-requirements and compliance with applicable regulations.

Groundwater Level (table): Upper surface of the zone of saturation in permeable rock or soil.

Groundwater: All water under the surface of the ground whether in liquid or solid state. It originates from rainfall or snowmelt that penetrates the layer of soil just below the surface.

Head: Fluid mechanical energy per unit weight of fluid, which correlates to the elevation that water will rise to, also hydraulic head.

Hydrostatic Pressure: The pressure equal to that which is (or would be) induced by the weight of the overlying column of water, the height of water above the point in question.



Infiltration: The water entering a sewer system, including building sewers, from the ground through such means as defective pipes, pipe joints, connections or maintenance hole walls. Flow deriving from groundwater tends to be continuous and dependent on groundwater levels. Infiltration can experience seasonal changes as the groundwater table varies. Infiltration does not include inflow.

Inflow: Water other than wastewater that enters a wastewater system and building sewer from sources such as roof leaders, cellar drains, yard drains, area drains, foundation drains, drains from springs and swampy areas, maintenance hole covers, cross connections between storm drains and sanitary sewers, catch basins, cooling towers, storm-water, surface runoff, street wash waters, or drainage.

Inspection: The act of inspecting. An official examination or review of the work completed or in progress to determine its compliance with contract requirements.

Invert: The lowest point of the internal cross section of a pipe or sewer.

Joint: The location at which two pieces of pipe or a pipe and a fitting are connected. The joint may be made by a mechanical device, such as threads or ring seals, by heat fusion and cementing, or by finished ends made to fit together (bell and spigot).

Lateral: Any pipe connected to the main sewer.

Maintenance (Manhole) Components: The sections of a maintenance hole are the base, the riser (which may include a conical section as the top riser), the cover section (a conical section is built to include the cover section), grade rings or chimney to adjust to final grade, and the maintenance hole's frame and cover.

Maintenance Hole (Manhole): A sewer access large enough for a person to enter to trouble-shoot service problems or perform maintenance work.

Mandrel: A rigid device - spindle or an axle – pulled through flexible Thermo-Plastic pipe to test alignment and deflection.

Monitoring Well: A well that is used to obtain water quality samples or measure groundwater levels.

Municipality: the corporation of a municipal district being either The Regional Municipality of York or one of the nine local municipalities. The corporation that the Provincial Government, through an act of the legislature, has granted decision-making power over a part of the province.

Operator/Owner: The party that has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications.

Performance Test (Testing): the technical investigation done to determine or validate the characteristics of the product under test.

Piezometer: A measuring device for groundwater level. This typically is an instrument that measures fluid pressure or level at a given point.



Plastic: A material that contains as an essential ingredient one or more organic polymeric substances of large molecular weights, is solid in its finished state, and, at some stage in its manufacture or processing into finished articles, can be shaped by flow.

Qualified (Authorized) representative: One hired by the owner or client to give professional advice and may be a consultant hired by the Municipality. A qualified individual authorized by the owner to assist in the administration of a specific construction contract.

Sanitary sewer: A sewer receiving and carrying liquid and water-carried wastes under gravity flow, to which storm, surface, or groundwater are not intentionally admitted.

Sewage (or wastewater): The used water and added waste of a community which is carried away by drains and sewers.

Sewer System: Any system of pipes, drains, pumping works, equipment, structures, and other things used for the collection, transportation or disposal of wastewater, but does not include any building drain, plumbing, or building sewer.

Specifications: A detailed, exact statement of particulars, especially statements prescribing materials and methods; and quality of work for a specific project.

Standard: The prescribed, concise set of conditions and requirements that must be satisfied by a material, product, process, procedure, convention, or test method; and the physical, functional, performance and/or conformance characteristics thereof.

Thermo-Plastic: A plastic that repeatedly can be softened by heating and hardened by cooling through a temperature range characteristic of the plastic, and that in the softened state can be shaped by flow into articles by molding or extrusion. Thermo-plastic pipe is available in a variety of plastic compositions including the most common in sewer systems being Polyvinyl chloride (PVC), Polyethylene (PE), and Acrylonitrile-butadiene-styrene (ABS).

Visible Leak: Ingress or egress of water from the sewer system that can be seen by an inspection.

V-Notch Weir: A structure, such as a bulkhead or plate, across the pipe to intercept the water flowing down the pipe in order to determine flow rate. A V-Notch weir has a specially shaped “V” opening or notch. The V-notch, sharp-crested weir is especially good for measuring low flow rates.

Water-Tightness: Put together in such a way that no water can get in or through - except in quantities allowed by the performance test.





Appendix One Attachment B

The Regional Municipality of York
**Closed Circuit
Television (CCTV)
Sewer Inspection
Specifications**





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1.0 Glossary.

For the purpose of this specification, the following definitions apply:

Business Day: Any day except Saturdays, Sundays and statutory holidays.

CCTV: A closed-circuit television.

CD: A compact disc.

Contractor Administrator: The third party certifier hired by the developer.

Drainage Structure: A catch basin, maintenance hole, or ditch inlet.

DVD-Video: A digital video disc.

MPEG: A movie photographic experts group.

WRc: Water Research Centre.

2.0 CCTV Inspection.

The scope of work covered in this specification is understood to include the Closed Circuit Television (CCTV) inspection and cleaning of sanitary sewer mains and maintenance holes and the CCTV inspection of sanitary sewer laterals. Inspection of sanitary sewer mains and maintenance holes is to be completed with a contained, closed-circuit colour pan and tilt video camera. Inspection of laterals is to be completed with a radial view, (360 degree optical), mainline launch camera. Cleaning will be performed on sanitary sewer mains via hydraulically propelled, high-velocity jets no more than 48 hours prior to carrying out the mainline sanitary sewer CCTV inspection. If more than 48 hours has elapsed since the completion of the cleaning, the sanitary sewer main will be cleaned again following the same procedure and inspected after.

2.1 Description

Inspections shall be performed to observe and record structural and operational defects, construction features, and to assess thoroughness of cleaning. The inspection shall be carried out using high quality video and television recording equipment. All observations shall be coded in accordance with *WRc Manual of Sewer Condition Classification (3rd Edition)*.

An electronic continuous record on CD or DVD of the internal condition of the piping system shall be provided in addition to a printed and digital inspection report. All sections must be recorded using a high quality CD or DVD. All contractor staff involved in the collection and or interpretation or analysis of CCTV information under this Sewer Specification Document will be certified in current Pipeline Assessment Certification Program (PACP) and Manhole Assessment Certification Program (MACP) requirements. Proof of staff certification will be submitted to the contract administrator prior to the commencement of any works.



2.2 Inspection Equipment.

2.2.1 Inspection Unit

The inspection unit shall consist of a self-contained vehicle with separate areas for viewing and equipment storage. Each unit shall be equipped with a cellular telephone and a suitable communication system allowing crew members control and communication with fans and blowers (to remove any fog which may be present in the sewer at the time of the inspection), video cameras, lighting cables and power source, video monitor, and digital recorder. The inspection unit shall include a separate and dedicated computer system with video capture card and other related equipment.

2.2.2 Video Inspection Equipment

Mainline Sanitary and Manhole CCTV Camera

Camera equipment shall consist of a self-contained, closed-circuit colour pan and tilt video camera and monitoring unit. The camera shall be pan and tilt type capable of panning 360° and tilting 270°. The adjustment of focus and iris shall allow optimum picture quality and the focal range shall be adjustable from 100 mm to infinity. The camera unit shall include an inclinometer, which gives a profile of the pipeline, which will be required for all inspections. The camera shall be waterproof and shall have a remote controlled self-contained lighting system capable of producing effective illumination for all sizes of pipe. The light source shall be adjustable to allow an even distribution of light around the sewer perimeter without loss of contrast, flare out of picture, or shadowing. Video overlay equipment shall be capable of superimposing alpha-numeric information onto the video recording and shall be capable of providing a minimum of 15 lines of information, 30 characters per line.

The video shall be colour and recorded on Video CD or DVD in MPEG format. Equipment shall be capable of inputting site and inspection information including titles, maintenance hole identification numbers, pipe conditions and a continuous display of distance from the initial maintenance hole location. Each digital video MPEG file and inspection report shall consist of one pipe segment only (unless a reversal is required, in which case two inspection records will be required). The video shall be of quality that all minor defects (hairline cracks, etc.) are clearly visible and the colour of the pipe inspected be true to actual conditions. Should the video not be of this quality, as determined by the contract administrator, the contractor shall be required to re-inspect the line to produce an acceptable video quality at no additional cost. The picture quality on the monitor shall provide a minimum continuous 480 line resolution video picture. Linear and profile measure through pipes must be accurate to +/- 0.5 per cent.

Lateral CCTV Equipment

A radial view camera (360-degree optical lens) shall be used for the television inspection. This camera provides the operator the ability to view into the laterals to determine the accessibility of the lateral by the lateral inspection system (LIS) camera. The radial view camera must be solid state colour and have remote control of the 360-degree rotational lens.



The camera shall be capable of viewing the complete circumference of the pipe. The camera lens shall be an auto-iris type with remote controlled manual override. The camera light head shall include a high-intensity side viewing lighting system to allow illumination of internal sections of lateral sewer connections. **Cameras incorporating mirrors for viewing sides or cameras using exposed rotating heads are not acceptable.**

A main sewer television camera is used to position the lateral camera launcher. The lateral sewer camera is used to inspect a maximum of 30 linear feet of the lateral. Actual meterage inspected may vary depending on several factors such as, but not limited to, the condition of the lateral within the main sewer, the condition of the lateral pipe structure, the location of bends and other fittings within the lateral, obstructions within the lateral, and other limitations of the lateral camera launcher itself. The television inspection of the lateral must be from inside the main line sewer up into the lateral. **Inspection from cleanouts, excavations, or other access points are not allowed.**

Each digital MPEG Video file and inspection report shall consist of one lateral only. The video shall be colour and Video CD or DVD quality in MPEG format. Equipment shall be capable of inputting site and inspection information including titles, house address, access maintenance hole identification numbers, pipe conditions and a continuous display of distance from the initial maintenance hole location.

Laterals with Manhole Discharge CCTV Equipment

Laterals that discharge into maintenance holes or other chambers are to be inspected by use of a mini push camera. The CCTV inspection of laterals in maintenance holes is accomplished from inside the manhole. Inspection from cleanouts, excavations or other access points is not allowed.

The video shall be colour and Video CD or DVD quality in MPEG format. Equipment shall be capable of inputting site and inspection information including titles, house address, access maintenance hole identification numbers, pipe conditions and a continuous display of distance from the initial maintenance hole location.

Hydraulic Cleaning Equipment

The focus throughout this work must be on safety of operations. The sewer cleaning equipment shall have a selection of two or more high-velocity nozzles. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size pipes designated to be cleaned. Equipment shall also include a high-velocity gun for washing and scouring manhole walls and floor. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel. The NASSCO Jetter Code of Practice shall be consulted as a guide for the selection of different type nozzles and recommended pressure applications for various cleaning requirements.



2.2.3 Video Camera Transport Equipment

The camera shall be transported through the sewer by means of a rubber tired or crawler tractor. The transport unit must be capable of passing over minor surface imperfections including, but not limited to, broken joints and solid debris up to 40mm in height. Mounting of the camera on a float or skid for tow through the sewer shall only be permitted where the condition of the sewer precludes the use of a tractor and where authorized by the Contract Administrator. If the camera is towed the supporting equipment shall not impede the view of the camera and shall be stable to ensure steady and smooth video footage.

The camera will be capable of height adjustment to facilitate the inspection of different sizes of pipe and to allow for visual assessment of ovality, by centering the camera within the pipe. The camera height shall be adjustable so as to position the centre of the lens in the centre of circular sewers and two thirds of the vertical dimension above the invert of egg shaped sewers. The camera transport system shall permit complete inspection of the sewer from the centre of the start maintenance hole to the centre of the finish maintenance hole. The camera transport and cable shall be capable of inspecting a minimum of 1500 m of sewer from a single access point. A remote reading counter shall be used to measure distance travelled from the centre of the start maintenance hole and measurements shall be recorded in metres to the nearest 100 mm.

2.3 Methodology.

Cleaning of Maintenance Holes and Sanitary Sewer Mains

The intent of sewer line cleaning is to provide the subsequent CCTV inspection(s) a complete and unobstructed interior view of the sanitary main and inspections for the purposes of the assessment of structural and hydraulic conditions. Since the success of the assessment is directly related to how clean the pipe is, the importance of this phase of the operation is emphasized. It is recognized that there are some conditions such as broken pipe and major blockages that prevent cleaning from being accomplished or where additional damage would result if cleaning were attempted or continued. Should such conditions be encountered, the contractor will not be required to clean those specific maintenance hole or sewer main sections.

The designated sewer maintenance hole sections shall be cleaned using hydraulically propelled, high-velocity jet powered equipment. Selection of the equipment used shall be based on the conditions of lines at the time the work commences. The equipment and methods selected shall be satisfactory to the contract administrator. The equipment shall be capable of removing dirt, grease, rocks, sand, and other materials and obstructions from the sewer lines and maintenance holes. If cleaning of an entire section cannot be successfully performed from one maintenance hole, the equipment shall be set up on the other maintenance hole and cleaning again attempted. If, again, successful cleaning cannot be performed or the equipment fails to traverse the entire sewer main section, it will be assumed that a major blockage exists and the cleaning effort shall be abandoned.



Contractor will provide full documentation of the results of the hydraulic cleaning via a daily cleaning log. This log must be made available for viewing upon request. All solid debris removed as a result of the cleaning application shall be transported and disposed of in accordance with current and amended Ministry of Environment Requirements. The liquid portion of material removed at the maintenance holes shall be decanted back into the sewer at a controlled rate.

York Region Staff will supply approved metered water source locations for the contractors use for hydraulic cleaning. Alternate water sources are not permitted. Appropriately calibrated backflow prevention devices will be employed by the contractor at all times during water transfer.

Maintenance Hole Inspection

The equipment operator shall be fully trained in NASSCO's PACP/MACP and in all aspects of MH inspection and the coding for this inspection shall be performed in accordance with MACP. The equipment operator shall be capable of making accurate observations and reporting all conditions encountered according to this standard.

The MH inspection equipment and operator will be capable of inspecting maintenance holes from 300 mm (12") diameter upwards and will be equipped with two high resolution digital cameras with distortion-free wide-angle lenses. The MH inspection will provide a digital record of the entire interior surface of the maintenance hole in one media clip. The resulting image data shall be available as a live picture immediately at the operator's disposal to allow for the option to assess the condition of the maintenance hole on-site or off-site.

The MH inspection will provide a comprehensive assessment of the interior surfaces of the MH from rim to lowest pipe invert in accordance with current MACP standards. Reports will be made available in standard MACP format in both digital and printed report form along with digital copies of all collected media in MPEG format.

2.3.1 Sewer Inspection

The contractor shall provide a minimum of 24 hours' notice to the contract administrator of the locations where the inspections will be performed on the following day(s). Completion of the CCTV Inspection shall occur within 48 hours of cleaning. During this time, it is the contractors responsibility to ensure that the main remains clean. It is acknowledged that there are some conditions, such as broken pipe or major blockages, which prevent the preparation work from being accomplished or where additional damage would result if the preparation work was attempted or continued. Should such conditions arise, the contractor shall immediately contact the contract administrator.

Prior to beginning the inspection the distance between the centres of the start and finish maintenance holes shall be measured on the ground surface using a steel tape. Flow control measures shall be implemented where permissible or utilize low flow night conditions to ensure a minimum of 90 per cent of the height of the sewer is visible for the entire inspection. The camera lens shall be kept clean at all times and the sewer shall be kept clear of fog during the entire inspection.



2.3.1 Sewer Inspection (continued)

All inspections shall be conducted in the direction of flow unless a reverse set up is required. Inspections shall generally begin with the upstream sewer in the system and proceed downstream in a consecutive manner.

The face of the start maintenance hole shall be clearly visible at the start of the inspection and the inspection shall be performed from the centre of the start maintenance hole to the centre of the finish maintenance hole. At the start of the inspection the length of sewer from the centre of the maintenance hole to the cable calibration point shall be recorded and the distance reading at the cable calibration point shall be adjusted such that zero is at the centre of the start maintenance hole.

During the inspection automatic distance measurement shall be indicated on the screen and recorded automatically as the camera progresses through the sewer main. The distance measurement shall be accurate from the cable calibration point to the centre of the finish maintenance hole. Unless otherwise agreed to, camera speeds should be limited to 6 m/min for pipes less than 200 mm, 9 m/min for pipes between 200 mm and 300 mm, 12 m/min for pipes larger than 300 mm.

During the inspection the picture shall be in focus from the point of observation to a minimum of two pipe diameters ahead. The camera shall be stopped for two seconds at major defects and connections, junctions, and major branches. Major defects shall include, but not be limited to, deformed sewers, displaced bricks, holes, large displaced joints, missing bricks, totally missing mortar, obstructions, cracks, signs of calcification, and large open joints. At major defects, connections, junctions, and major branches the camera shall be positioned in order to provide a perpendicular view. The intent of this procedure is to permit a more detailed inspection of specific defects or construction features and reduce distortion of the video.

In areas where sags in the line create standing water, the inspection shall first be performed with the water in place to determine the length and depth of the sag. As directed by the contract administrator, where possible standing water shall then be cleared and that portion of the mainline re-inspected.

If inspection of an entire sewer cannot be completed due to a collapse, excessive deformation or solid debris, intruding connections, obstructions, or large displaced joints, the equipment shall be moved to the downstream maintenance hole and inspection again attempted. If a complete inspection cannot be performed, the contract administrator shall be immediately advised. Jointly, the contractor and contract administrator shall decide to:

- Abandon the inspection;
- Re-perform the inspection subsequent to;
 - Arranging to have solid debris cutting or removal of intruding connections by the Contract Administrator;
 - Modifying the camera setup (position and/or method of transport);
 - Completion of emergency repairs.



All locations where a complete inspection could not be obtained shall be noted in a log and reviewed with the contract administrator on a weekly basis. The log shall note the sewer ID number, measurement, length inspected (up and downstream), length of missing video and the reason the inspection could not be completed.

If a new maintenance hole is discovered in the field that was not on current maps, a new MH identification number will be assigned by the local area municipality. The data / video files shall then be re-named to include the new MH ID, and a new CCTV inspection shall be started from the new MH ID. Contractors will consult with the local area municipality for assignment of new MH identification numbers.

The contractor shall take every reasonable precaution to insure that equipment does not become stuck or lodged in the sewer or lateral. Should this occur, no payment will be made by the owner for the lost time. The contractor shall be responsible for all costs associated for recovering the equipment and the restoration of all areas impacted by excavation to the contract administrator's satisfaction.

2.3.1.1 Camera Position □

The camera lens will be positioned along the center axis of the pipe / maintenance hole. A good visual gauge is when the invert and obvert of a pipe joint reach the picture periphery at the same time. Improper set up will distort the image potentially causing inaccurate linear measurement to observations, as well as errors in estimating water level and deformation.

2.3.1.2 Camera Speed □

The camera must maintain a speed that will allow for the defects to be observed clearly. If the sewer is inspected too quickly the picture may appear pixilated and defects may be missed. If the sewer is inspected too slowly, it can be difficult to review the inspection. The speed may vary depending on the sewer diameter. Unless otherwise agreed to, camera speeds should be limited to 6 m/min for pipes less than 200 mm and all lateral inspections, 9 m/min for pipes between 200 mm and 300 mm, 12 m/min for pipes larger than 300 mm. The camera should also stop and pan all features within the pipe, such as maintenance hole interfaces, joints, junctions, connections, and any defects. Camera speed should be consistent throughout the entire inspection record.

2.3.1.3 Lighting □

Lighting in the sewer must be sufficient to illuminate approximately two metres ahead of the camera and be evenly distributed around the periphery of the pipe without loss of contrast. Shadows and glaring shall be minimized as they make it difficult to see defects accurately.

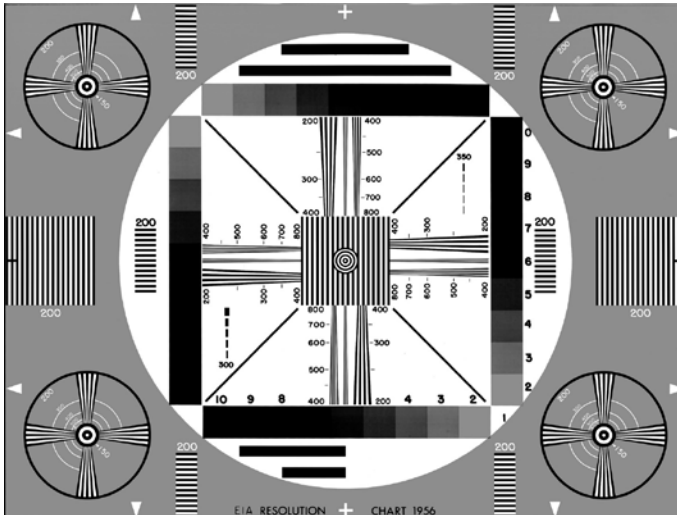


2.3.1.4 Focus and Clarity

The focus and clarity are essential to allow the assessment to properly observe and code the defects. A line resolution chart, colour resolution chart and linearity chart can be used to verify the focus and clarity of the camera. Test videos should be recorded at regular intervals during an inspection program to ensure that equipment is functioning properly.

A line resolution chart shall be used to gauge the video frequency response and resolution. The converging black and white lines and the point at which they become indistinct are used to measure the resolution.

Figure One: *Line Resolution Chart*



The colour resolution chart in consists of six highly saturated colour bars and shall be used to adjust the TV receiver or monitor colour controls during video playback.

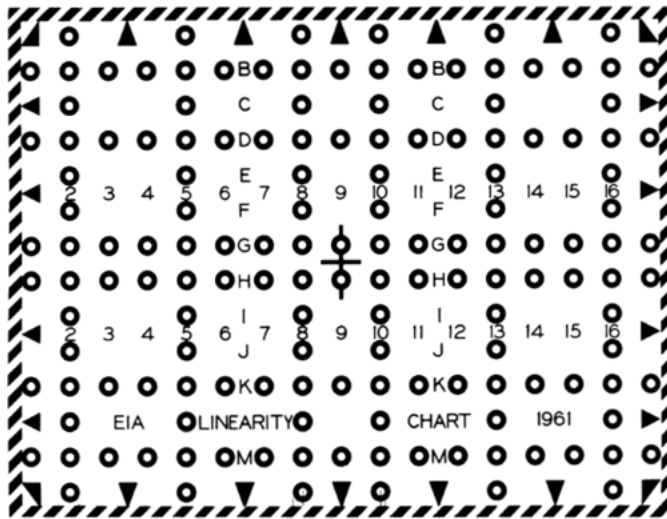
Figure Two: *Colour Resolution Chart*





The linearity chart shall be used to adjust the camera and monitor linearity. The chart is projected onto the monitor and the monitor’s display controls are used to ensure that the picture is aligned and fills the monitor screen.

Figure Three: Linearity Chart



2.3.1.5 Linear Measurements

The displayed linear measurement (the cable counter reading) is equal to the distance between the interface of the maintenance hole and the side periphery of the camera’s view at any given point in the inspection. The recorded linear measurement must accurately represent the true location of a defect or feature in the field. If the linear measurement in the inspection is not accurate, it reduces the value and integrity of the inspection report as an incorrect linear measurement may result in an excavation or renovation at the wrong location in the pipe. The inspection should pay close attention to the cable counter reading displayed in the inspection video to ensure that the cable counter does not snag or slip. The linear measurement of each inspection can be reviewed for accuracy by comparing the steel tape measurement to the inspection length. The difference between these two measurements shall not be more than the greater of either 0.1 per cent or 0.3 metres or the sewer main shall be reinspected.

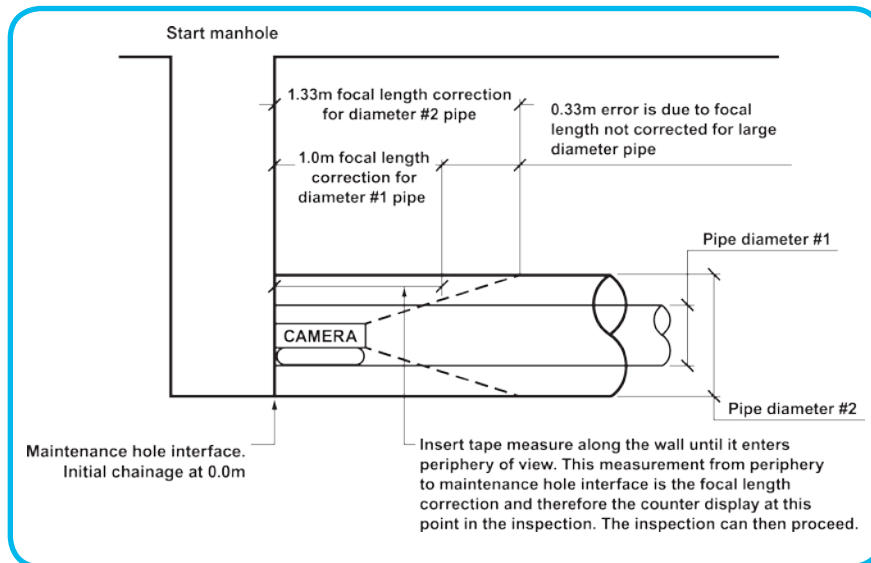


2.3.1.6 Focal Length Correction

The focal length correction is equal to the distance between the back of the camera and the side periphery of the camera’s view. To measure this distance, the camera is placed inside a sewer so that the back of the camera is flush with the maintenance hole interface. This is also known as the “Cable Calibration Point”: the point at which the camera cable is calibrated and the cable counter reading is zeroed. A tape measure is then fed along the wall of the sewer until the tip is seen at the side periphery of the video. The distance that the tape measure reads at this point is added to the cable counter reading after it is zeroed. The result is an accurate linear measurement given at the side periphery of the camera’s view.

The following Figure demonstrates how the focal length correction varies for different diameters of sewers. It may also vary for individual camera optical characteristics.

Figure Four: Focal Length Correction Detail (Source: NAPP)



2.3.2 Inspection Reports

2.3.2.1 Format and Accuracy

All the data collected in an inspection shall be compiled into a report, which combines with the inspection video to form an overall inspection record. Three paper copies of the report shall be provided in colour. The report shall be comprised of two main sections; header and detail. The report can be completed manually, or populated using an electronic database tool. The report must be based on the format presented in the *WRC Manual of Sewer Condition Classification (3rd Edition)*. Contractor will supply a Sewer.xml file for each inspection which is compatible with existing information sources at York Region.



The inspection “header” shall be completed using a combination of pre-existing information and information collected from the field at the time of inspection. The contractor shall inform the contract administrator if any changes to the pre-existing information are required.

The following information is generally provided from existing sources for incorporation into the inspection record:

- Contract number
- Start/finish maintenance hole number in accordance with York Region and local area municipal nomenclature
- Sewer pipe identification number
- Job number
- Date (DD/MM/YYYY) of installation
- Pipe diameter (mm)
- Full street name
- ASTM pipe material
- From full street name/to full street name
- Pre-cleaning
- Pipe length (m)
- Use (i.e. sanitary/storm/combined)
- Weather conditions

The following information will be collected in the field prior to inspecting the sewer and should be contained within the header information:

- GPS Location Centre of From Manhole*
- GPS Location Centre of To Manhole*
- Date
- Time
- Location
- Road Name
- Start/Finish Depth
- Start/Finish Cover
- Start/Finish/Invert
- Direction
- Surveyed By
- Size
- Shape
- Material
- Lining
- Pipe length
- Total length
- Weather
- Comments

*GPS reference will be collected in accordance with UTM NAD 83 Zone 17 with instrument absolute accuracy of < 50 cm Root Mean Square (RMS) in the horizontal plane.



Additional details about the header information can be found in the *WRc Manual of Sewer Condition Classification (3rd Edition)*. The specific details should be confirmed with the contract administrator prior to commencing inspection. Contractors will provide a test CCTV assessment data record at their own cost, upon request, to ensure compliance with the specifications in this document.

It is important that the header is populated with accurate data as it serves as the primary link between the observation data, the asset and York Region’s GIS system. The QA/QC process should involve checking header information against that contained on video inspections, in field records, and on the GIS. Coding accuracy is to satisfy the following requirements:

- Header accuracy – 95 per cent
- Detail accuracy – 90 per cent

2.3.2.2 Inspection Observations

As detailed in the *WRc Manual of Sewer Condition Classification (3rd Edition)*, fields are included to store information on the video time stamp, photo number, cable distance, continuous defect number, observation code, pipe diameter, clock reference, intrusion, and remarks pertaining to each feature or defect in the inspection. All defect codes of the *WRc Manual of Sewer Condition Classification (3rd Edition)* will be used.

Observation codes are separated into four categories: structural defects, operational defects, construction features and miscellaneous features. A sample of the defect codes is shown below. It is anticipated that all codes within the *WRc Manual of Sewer Condition Classification (3rd Edition)* could be utilized.

Structural defects

- Cracks- CL (J), CC (J), CM (J)
- Fractures- FL (J), FC (J), FM (J)
- Broken- B (J)
- Hole- H (J)
- Deformed- D (J)
- Collapsed- X
- Surface Spalling- SSS(J), SSM(J), SSL(J)
- Surface Wear- SWS (J), SSM (J), SWL (J)
- Mortar Missing- MM, MS, MT
- Displaced Brick- DB
- Missing Brick- MB
- Dropped Invert – DI
- Joint Displacement- JDM, JDL
- Open Joint- OJM, OJL

Operational defects

- Roots- RF (J), RM (J), RT (J)
- Infiltration- ID (J), IG (J), IR (J), IS (J)
- Encrustation- EH (J), EL (J), EM (J)
- Scale- ESH(J), ESL(J), ESM(J)
- Debris- DE (J), DEG (J), DES (J)
- Obstruction- OB (J)
- Water Level- WL
- Line Deviation- LD, LL, LR

Construction Features

- Junction- JN, JNX
- Connection- CN, CX, CNI, CNX
- Lining Defect- LN
- Major Branch- BR
- Maintenance hole/ Node- MH



Miscellaneous Features

- Start Survey- ST
- Finish Survey- FH
- Survey Abandoned- SA
- Pipe Length Change- PC
- Dimension Change- DC
- Shape Change-SC
- Lining Change- LC
- Material Change- MC
- General Observation- GO
- General Photograph- GP
- Vermin- V
- Camera Under Water-CU

A detailed description of each code and the recording requirements are covered in detail in the *WRc Manual of Sewer Condition Classification (3rd Edition)*.

2.3.2.3 Video Recordings

The inspections shall be recorded in digital format in colour from the live video source on Video CD or DVD-R format to the following minimum requirements.

1. MPEG2 format.
2. Picture Size: NTSC 352 x 240 @ 29.97 frames per second.
3. Data/Bit Rate: MPEG2 @ 3.0 M-bits/sec.

Digital video inspections shall be obtained from first generation recordings using video capture equipment capable of capture with no frame loss. Digital video inspections can be saved to hard-drive and later transferred to recordable DVD-R media for submission.

One complete single digital MPEG file shall be submitted for each pipe segment inspected (MH to MH). One complete single digital MPEG file shall be submitted for each lateral inspection within each pipe segment (MH to MH). The final file shall be produced in one of the following ways.

- Capture the original recording continuously using a computer system and video capture card regardless of the progress of the inspection or;
- Capture the original recording intermittently using a computer system and video capture card.
- Capture original recording with specialized video recording equipment capable of pausing and resuming live recording to produce a single file for submission.

Each observation should have the video time stamp recorded in HH:MM:SS format.



2.4 Quality Control/Acceptance.

The contract administrator will review inspection reports, video recordings and data files on optical disk to ensure compliance with the specifications within 15 working days of submission. The contract administrator may adjust the frequency of reviews based on the results of previous reviews. The contractor will re-perform inspections, at the contractor's cost, where the contract administrator has determined the requirements of the specification have not been satisfied. Non-compliant inspection submissions shall be corrected and resubmitted to the contract administrator within 10 working days or as agreed to by the contract administrator. This process shall be repeated until the inspection submissions are accepted by the contract administrator.



Chapter Three

Forms and Administrative Details



Chapter Three Forms and Administrative Details.



1.0 Local Municipal Confirmation Letter Requirements.

Applications shall be accompanied by a signed letter from the local municipal planning official with signing authority which confirms that the local municipality has no objection to the proposed development being considered under this Program and which briefly explains how the proposed development meets each of the following Program Eligibility Criteria:

1. The proposed development is considered a grade-related residential use within an approved Lower Tier Official Plan and has a maximum building height of three storeys.
2. The proposed grade-related residential development is permitted under all applicable official plan policies or will require a local official plan amendment. If a local official plan amendment is required, please indicate if the application has been submitted and its status or if it is forthcoming.
3. If possible, the local municipality has already assigned or plans to assign the portion of the servicing allocation not covered by the capacity assignment credit to the development or have an agreement in place.

The local municipality will formally circulate all subdivision and/or site plan applications (including a full set of drawings), involving lands subject to this Program to York Region for comments. It is to be noted that all developments subject to this Program shall not receive exemption from the draft plan of subdivision approval process and shall require a subdivision agreement.

2.0 Cover Letter.

The cover letter as prepared and submitted to the Region by the owner/applicant shall contain the following information:

1. Brief description of the proposal.
2. Total number and type of units proposed in the development (include a breakdown if the project is phased) and requested capacity assignment credit.
3. Brief description of how the proposed development will meet the program requirements.
4. Signed letter from the local municipal planning official with signing authority which confirms that the local municipality supports the proposed development being considered under the program and that they are of the opinion that the development meets the Program Eligibility Criteria No. 1.
5. Subject property information:
 - Municipal address including the area municipality identified.
 - Legal description (lot/block number, registered plan number or lot/concession).
 - Area of the subject lands (in hectares).
6. Contact information:
 - Registered owner of the subject property.
 - Contact name if different from the registered owner.
 - Contact information (mailing, email addresses and telephone and facsimile numbers).
 - Agent/applicant contact information if different from the registered owner.



3.0 Program **Conformity Plan.**

The owner/applicant is required to submit the Program Conformity Plan which provides the details/drawings how the project will achieve the program requirements. Please submit:

- Three hard copies and one electronic copy of the assembled Program Conformity Plan
- Submitted to the York Region Corporate Services Department, Planning and Economic Development Services Branch c/o the Manager, Programs and Process Improvement.
- The Program Conformity Plan as outlined in the below.

3.1 Program **Conformity Plan:** Requirements

Report Title:

Title of the report shall be “Servicing Incentive Program Conformity Plan for *[Insert Community Name, Builder Name and M-plan Number]*”.

Introduction/ Project Description:

A brief written description of the report supported by drawings/sketches.

Water Conservation

Confirm the Development will include:

1. WaterSense® labelled/ certified High Efficiency Toilets that flush with 4.0 litres of water or less for single flush models or toilets that flush with 3/6 litres of water for siphonic dual flush models.
2. Rough-In On-Demand hot water recirculation system or installation of an On-Demand hot water recirculation system installed throughout participating development.

The owner/applicant will submit:

3. Peer review verification plan including the list of professional engineers to be employed.

Wastewater Flow Reduction:

Plan showing how the development will meet the sewer installation/ performance testing requirements set out in **Appendix 1** of the Detailed Program Requirements (**Chapter Two**) to this Guide.

A verification plan including the list of professional engineers to be employed.

A contingency remedial plan, should performance requirements not be met after construction (may include strategies related to carrying out inflow and infiltration reduction works, etc.).

A flow monitoring plan showing how the flow meters will delineate development flow for monitoring purposes, including the type of meters to be installed.



3.2 Affidavit or Sworn Declaration

As part of the Program application requirements, an affidavit or sworn declaration is required to ensure that all information has been submitted.

I, _____ of the _____
in the _____

make oath and say (or solemnly declare) that I am (please indicate one):

- owner an agent of the owner
- an officer of the owner an officer or employee of the agent of the owner

and that all the statements contained herewith and statements contained in all of the exhibits attached hereto are true, and I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath, and by virtue of the Canada Evidence Act.

Sworn (or declared before me)

at the _____

in the _____

this _____ day of _____, 20 _____

Signature of a Commissioner

Signature of Declarant

Owners Authorization

If the owner(s) is/are different from the Agent/Applicant, the owner(s) must complete the following authorization. If there is more than one owner, a separate authorization from each individual or corporation is required. Attach an additional page(s) in the same format as this authorization if necessary.

I, _____

being the registered owner of the subject land hereby authorize

to prepare and submit this application to the Regional Municipality of York.

Signature of Owner

Date



4.0 Conformity Report **Submission Requirements.**

When the owner/applicant has completed the works and required monitoring as required by the Program, a Conformity Report is to be submitted to demonstrate how the owner/applicant achieved the program requirements related to the objectives outlined in the Program.

The owner/applicant is required to submit the following information within the Conformity Report.

- 5 hard copies and 1 electronic copy of the Conformity Report.
- Submitted to the York Region Corporate Services Department, Planning and Economic Development Services Branch c/o the Manager, Programs and Process Improvement.

4.1 Cover Letter

The cover letter shall contain the following information:

1. Brief description of how the project has achieved the Program requirements.
2. Subject property information:
 - Municipal address including the area municipality identified.
 - Legal description (lot/block number, registered plan number or lot/concession).
 - Area of the subject lands (in hectares).
3. Contact information:
 - Registered owner of the subdivision and the builder's name.
 - Contact name if different from the registered owner.
 - Contact information for registered owner (mailing, email addresses and telephone and facsimile numbers).
 - Agent/applicant contact information if different from the registered owner.

4.2 Conformity Report

The submitted Conformity Report is to provide details of how the project/proposal has achieved the water efficiency requirements outlined in **Chapter Two – Appendix 1** of this Program Guide and has been constructed to meet York Region Sewer Installation/Performance Testing Specification.

This Conformity Report shall contain:

- Water Fixture Report outlining that high-efficiency toilets and “On-Demand” system have been installed.
- Sanitary Sewer System has been constructed in accordance with the Program Requirements.
- CCTV Report.
- **I and I** and Flow Monitoring Report.



4.3

Affidavit or Sworn Declaration

As part of the Program application requirements, an affidavit or sworn declaration is required to ensure that all information has been submitted.

I, _____ of the _____
in the _____

make oath and say (or solemnly declare) that I am (please indicate one):

- owner an agent of the owner
- an officer of the owner an officer or employee of the agent of the owner

and that all the statements contained herewith and statements contained in all of the exhibits attached hereto are true, and I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath, and by virtue of the Canada Evidence Act.

Sworn (or declared before me)

at the _____

in the _____

this _____ day of _____, 20 _____

Signature of a Commissioner Signature of Declarant

Owners Authorization

If the owner(s) is/are different from the Agent/Applicant, the owner(s) must complete the following authorization. If there is more than one owner, a separate authorization from each individual or corporation is required. Attach an additional page(s) in the same format as this authorization if necessary.

I, _____
being the registered owner of the subject land hereby authorize

_____ to prepare and submit this application to the Regional Municipality of York.

Signature of Owner Date



5.0 York Region **Contact Information**

Corporate Services Department,
c/o the Manager, Programs and Process Improvement

The Regional Municipality of York

17250 Yonge Street
Newmarket, Ontario
L3Y 6Z1

905-830-4444 or 1-877-464-9675

www.york.ca





Servicing
Incentive Program
IMPLEMENTATION GUIDE

