



TOWN OF EAST GWILLIMBURY

SUSTAINABLE DEVELOPMENT

INCENTIVE PROGRAM

IMPLEMENTATION GUIDELINES

(FINAL DRAFT)

January 2015

Table of Contents

EXECUTIVE SUMMARY	4
1.0 PROGRAM OVERVIEW	5
1.1 PLANNING AND POLICY CONTEXT (TOWN AND REGION)	5
1.1.1 York Region	5
1.1.2 Town of East Gwillimbury	6
1.2 DESCRIPTION OF THE PROGRAM	6
1.3 PARTNERSHIP BETWEEN REGION, TOWN AND DEVELOPMENT INDUSTRY	7
2.0 INSTITUTIONAL, COMMERCIAL, INDUSTRIAL (ICI) REQUIREMENTS	8
2.1 ICI CRITERIA	8
2.2 WATER AND ENERGY SAVINGS BEST PRACTICES	8
2.2.1 Water & Energy Efficient Fixtures, Appliances and Equipment	8
2.2.2 Cooling Equipment	8
2.2.3 Outdoor Landscaping	9
2.2.4 Heating, Ventilation and Air Conditioning Equipment	9
2.2.5 Food Preparation and Operations	9
2.2.6 Office Equipment	9
2.2.7 Swimming Pools/Large Non-Process Water Use (e.g. wading pools, fountains or ponds) and Ice Rinks	9
2.3 WATER AND ENERGY CONSERVATION PLANS	10
2.3.1 Implementation Strategy and Verification	10
3.0 YORK REGION ALLOCATION CREDIT REQUIREMENTS	11
3.1 MINIMUM PERFORMANCE STANDARDS REQUIRED FOR REGION TO ADVANCE ALLOCATION CREDIT	11
3.2 YORK REGION REQUIREMENTS	11
3.2.1 Water Efficiency	11
3.2.2 Wastewater Flow Reduction	11
3.3 YORK REGION ALLOCATION CREDIT RELEASE	12
4.0 SUSTAINABLE HOME CRITERIA	13
4.1 WATER CONSERVATION MEASURES	13
4.2 ENERGY CONSERVATION MEASURES	13
4.3 INDOOR AIR QUALITY MEASURES	13
4.4 RENEWABLE ENERGY MEASURES	14
4.5 RESOURCE MANAGEMENT	14
4.6 HOME OWNER MANUAL	14
4.7 SECURITIES	14
4.8 BUILDER ACKNOWLEDGEMENT AND POST CONSTRUCTION INSPECTION	15

List of Tables

Table 1: Graduated Builder Verification Requirements

List of Appendices

Appendix A: Calculation of Increase in Allocation

Appendix B: Technical Specification and Builder Accountability Checklist for Drawing Verification Form (Form 1)

Appendix C: Post Construction Inspection and Verification Checklist (Form 2)

Appendix D: Letter of Credit Release Request Form (Form 3)

Appendix E: Sample Home Owner's Guide Outline

Appendix F: Sample Wording for Purchase and Sale Agreement

Appendix G: Construction Techniques to Reduce Inflow/Infiltration

Appendix H: Approved Whole-home Water Efficient Humifiers

EXECUTIVE SUMMARY

The Town of East Gwillimbury and the Regional Municipality of York have committed to ensuring that growth occurs in a sustainable way to meet challenging environmental, social and economic goals. In order to maximize the use of existing and new infrastructure, and to encourage more sustainable development, the Town has developed the Sustainable Development Incentive Program Implementation Guidelines to allow developers the opportunity to obtain additional servicing allocations by satisfying various sustainability requirements. This report establishes a program that advances sustainable development practices in relation to grade related residential developments through the provision of a servicing allocation incentive and also provides recommendations to Industrial, Commercial and Institutional (ICI) developments.

The objective of the Sustainable Development Program is:

- ▶ To create a comprehensive town-wide sustainable development program for the Town of East Gwillimbury, in conjunction with the Region and the Development Industry, that will result in reduced water consumption, reduced wastewater production, more efficient infrastructure, reduced waste, and more energy efficient developments.

These guidelines build on the policies included in the Town's new Official Plan and the Region's Servicing Incentive Program (SIP), and establishes an approach consistent with SIP for advancing additional allocation credits. The development of the program has been through a three tier partnership between the Region, the Town and the development industry. The Town's Sustainable Development Program will facilitate development within the Town, particularly in areas where all other approvals necessary for development to proceed are in place (i.e. Sharon, Holland Landing and Queensville).

The Sustainable Development Program includes:

- ▶ The reduction of inflow/infiltration and adopting design and commissioning standards for new development;
- ▶ Achievement of the SIP program requirements, through the implementation of the East Gwillimbury sustainable development measures and verification program identified in this document;
- ▶ Ensuring that all new ICI development incorporate best practices to maximize water and energy efficiency, and the adoption of water and energy conservation policies; and
- ▶ The development of a detailed monitoring program (and fixture retrofit program if required) to ensure that the water/wastewater and energy saving targets are achieved.

One of the benefits to this effort is the opportunity to secure additional water and wastewater servicing allocation. The water demand target for the non-residential sector has been set at a maximum of 1,240m³ per day for new ICI developments connected to the YDSS after June 30, 2014, and this target will remain in place until the Upper York Sewage Solutions is completed. Meeting the East Gwillimbury SDIPIG which incorporates the SIP sustainability requirements will enable the Region to provide an additional Allocation Credit of up to 1,535 homes.

Although the Region's SIP is the basis for the Town's Sustainable Development Program, the Town's "made in East Gwillimbury" program goes above and beyond SIP and provides the opportunity for this additional allocation.

1.0 PROGRAM OVERVIEW

1.1 Planning and Policy Context (Town and Region)

1.1.1 York Region

Servicing Incentive Program

In June 2007, Regional Council endorsed the Sustainable Development through LEED® program. The program provides additional servicing allocation as an incentive to encourage more sustainable high density development within Regional Centre's and Corridors. As a next step, the Region introduced a low rise sustainability program based upon the high-rise program called the Sustainable Home Incentive Program in 2009. Together, these two programs create a full range of sustainable housing within the Region.

The Sustainable Home Incentive Program (SHIP) was designed to address grade related development which, for the purposes of this program, includes single detached residential, semi-detached residential, townhomes, and low-rise multi-unit residential development with a maximum height of three stories. The grade-related SHIP was updated in 2014 as part of a program review of both programs whereby SHIP was replaced with the Servicing Incentive Program (SIP). The SIP is a new program and focuses primarily on servicing to incorporate inflow and infiltration reduction strategies as well as reducing water consumption through water conservation measures.

York Region Sustainability Strategy

In 2007, Regional Council endorsed the York Region Sustainability Strategy, "Toward a Sustainable Region". The purpose of this strategy is to provide a long-term framework informing municipal decisions based on the triple bottom line of a sustainable natural environment, economic vitality, and social equity. Specifically, the Sustainable Home Incentive Program provides a number of benefits including:

- Using key resources like energy, water, materials, and land more efficiently;
- Improving indoor environments to enhance comfort and health;
- Reducing the life-cycle costs associated with operating a home and enhancing resale values; and,
- Creating product differentiation and increased sales for builders/developers.

York Region Official Plan

In 2010, the Regional Municipality of York received the Ministry of Municipal Affairs and Housing approval of the York Region Official Plan 2010. This Plan was founded on the principles of sustainability and includes policies to ensure that sustainable buildings are a key component of York Region's new sustainable communities. Encouragement for greater water conservation, energy efficiency and conservation are key components of these policies which are reflected in the Town of East Gwillimbury's Official Plan policies.

1.1.2 Town of East Gwillimbury

East Gwillimbury Official Plan

Sustainable Development Policies are included in the Town of East Gwillimbury's Official Plan adopted by the Town in June 2010. The long-term vision for the Town is to transition from a rural community into a more urban community that supports a strong economy, protects its environment, and provides an opportunity for a vibrant and high quality lifestyle. The Town's Official Plan includes policies and objectives that support water and energy conservation in new development and promote the creation of complete and sustainable communities.

East Gwillimbury Engineering Standards

The Town's Engineering Standards and Design Criteria (September 2012, Section F) have set out guiding principles to follow with respect to enhancing the design, construction and materials for both water and wastewater systems. These Standards are often more restrictive than the Ontario Provincial Standard Drawings and Specifications (OPSDS) and also reference York Region's Sanitary Sewer Commissioning Guidelines for all sewer testing.

1.2 Description of the Program

To encourage more sustainable development within the Town of East Gwillimbury, the Town, in conjunction with York Region and the development industry, has developed the East Gwillimbury Sustainable Development Incentive Program Implementation Guidelines to allow developers that meet specific requirements to obtain additional servicing allocations. These specific requirements include:

- ▶ Improved water efficiency;
- ▶ Improved energy efficiency;
- ▶ Improved indoor air quality;
- ▶ Use of renewable energy;
- ▶ Enhanced monitoring programs;
- ▶ Improved resource management; and
- ▶ Enhanced home owner education.

These guidelines build on policies included in the Town's Official Plan and the Region's Servicing Incentive Program (SIP). These guidelines are consistent with the SIP approach for advancing allocation credits.

The development of the program has been achieved through a three tier partnership between the Region, the Town, and the Development Industry.

The objective of the Sustainable Development Program is:

- ▶ To create a comprehensive town-wide sustainable development program for the Town of East Gwillimbury, in conjunction with York Region and the Development Industry, that results in reduced water demands, reduced wastewater production, reduced waste production, and developments that are more energy efficient., and enables the Region to increase Allocation by 28% or approximately 1,535 residential units.

The Sustainable Development Program comprises the following key requirements for allocation credit:

- ▶ Achieve the Servicing Incentive Program (SIP) water efficiency and inflow and infiltration control requirements by implementing the East Gwillimbury sustainable development measures outlined in this report;
- ▶ Ensure that all new industrial commercial, and institutional (ICI) developments incorporate best practices to maximize water and energy efficiency, and adopt water and energy conservation policies;
- ▶ Limit the combined non-residential water demand of new ICI developments to 1,240m³ per day prior to commissioning of Upper York Sewage Solutions (UYSS) project
- ▶ Develop detailed monitoring programs to ensure that target wastewater and energy savings are achieved.

Although the Region's SIP program is the basis for the Town's Sustainable Development Program, the Town's "made in East Gwillimbury" program goes above and beyond SIP and creates the potential for additional allocation.

1.3 Partnership Between Region, Town and Development Industry

The Town and Region have been working with the Development Industry in order to develop a comprehensive municipally-initiated program.

In May of 2014, in Report No. 10 of the Region's Committee of the Whole provided an update of the East Gwillimbury program to Committee to assign additional water and wastewater servicing capacity up to 1,535 units to the Town. The additional servicing capacity is subject to the Town updating the Sustainable Development Incentive Program Implementation Guidelines to incorporate additional water conservation and inflow and infiltration reduction measures as outlined in the SIP as well as establish infrastructure trigger projects.

2.0 INSTITUTIONAL, COMMERCIAL, INDUSTRIAL (ICI) REQUIREMENTS

2.1 ICI Criteria

- ▶ The Town shall implement an interim total combined daily flow target for all new ICI development of 1,240m³/day until the Upper York Sewage Solution (UYSS) is in place.
- ▶ To help meet this target, all new ICI developments are required to submit water and energy conservation plans at the site plan stage demonstrating:
 - A minimum 10% water savings over baseline operations; and
 - A minimum 25% energy savings over the Model National Energy Code for Buildings.
- ▶ The Town shall develop an ICI monitoring program to ensure that conditions identified in the water and energy conservation plans are properly implemented. Each new ICI facility is expected to actively and fully participate in the program. Water-intensive or wastewater-intensive facilities (e.g., bottling plant, canning plant, nursery or garden centre, dairy, etc.) will be evaluated on an individual basis.

2.2 Water and Energy Savings Best Practices

Examples of acceptable best practices include:

2.2.1 Water & Energy Efficient Fixtures, Appliances and Equipment

- ▶ Use of Energy Star and WaterSense labeled fixtures, appliances and equipment.

2.2.2 Cooling Equipment

- ▶ Cooling towers that operate at a minimum 5.0 cycles of concentration;
- ▶ Cooling tower makeup water that's sub-metered and a record of makeup water demands that's maintained with a reading frequency \geq once per month;
- ▶ Elimination of once-through (single pass) cooling wherever possible and practical;
- ▶ Re-use of process or cooling water wherever possible and practical;
- ▶ Where evaporative coolers are proposed, the air temperature is lowered by drawing the air through water saturated pads. Evaporative coolers also include a re-circulating pump;
- ▶ Boilers that include a condensate return system and do not mix the condensate with fresh water; and
- ▶ Maintenance programs to prevent scaling, corrosion and bio-fouling.

2.2.3 Outdoor Landscaping

- ▶ Xeriscaping/water-efficient landscaping utilizing drought tolerant plant and grass species. Use native plant species where possible;
- ▶ Mulch landscaped areas to maintain soil moisture;
- ▶ Use of automatic irrigation systems are discouraged, unless connected to a non-potable water source;
- ▶ If an irrigation system is unavoidable, no more than 12.5mm of water per week (e.g. drip system) is used. The irrigation system is directed to landscape surfaces and not hard surfaces and includes soil moisture sensors and rain shut-off sensors; and
- ▶ Irrigation systems are sub-metered and a record of irrigation demands is maintained with a reading frequency \geq once per month during the irrigation season.

2.2.4 Heating, Ventilation and Air Conditioning Equipment

- ▶ HVAC system is designed to be as energy efficient as possible; and
- ▶ Development is designed to facilitate connection to District Energy where available.

2.2.5 Food Preparation and Operations

- ▶ Reduce water flow to dipper wells wherever possible/practical;
- ▶ Water-efficient pre-rinse shut-off spray nozzles with a maximum flow rate of 6.1 litres per minute;
- ▶ Garbage disposals must not be installed - as per the Region's Sewer Use By-law;
- ▶ Connectionless steamers are used to keep food warm which recycle steam internally wherever possible/practical;
- ▶ Continuous flow of water is not used to clean drain trays of the coffee/milk/soda beverage islands; and
- ▶ Best practices for fat/oil and grease disposal are applied with properly sized, installed and maintained grease traps - as per the Region's Sewer Use By-law.

2.2.6 Office Equipment

- ▶ Equipment is turned off when not in use either manually or by using a power management product. Best practices document shall include communication protocol for energy efficiency usage.

2.2.7 Swimming Pools/Large Non-Process Water Use (e.g. wading pools, fountains or ponds) and Ice Rinks

- ▶ Makeup water must be sub-metered and records maintained and made available to the Town/Region.

2.3 Water and Energy Conservation Plans

In conjunction with the Site Plan Application for new ICI developments, the applicant is required to submit a Water and Energy Conservation Report describing all water and energy conservation measures to be implemented and the associated monitoring program.

Water and Energy Conservation Plans will also be required as part of the Site Plan/Building Permit package to illustrate the location of the water conservation measures and any energy efficient equipment/appliances. The plans must demonstrate:

- ▶ A minimum 10% water savings over baseline operations;
- ▶ A minimum 25% energy savings over the Model National Energy Code for Buildings;
- ▶ Monitoring and reporting structure to ensure that water demand targets are maintained and that the required levels of conservation are achieved; and
- ▶ Communications Plan for employees/tenants.

2.3.1 Implementation Strategy and Verification

A draft monitoring and verification strategy, based upon the principles of water and energy conservation, is intended to be refined through consultation with the ICI development industry. The elements to be considered in this strategy include:

- ▶ Post-construction audit to ensure proposed conservation measures are in place and functioning; and
- ▶ Monitoring program to verify water usage and confirm water savings.

Note: the implementation and verification guidelines are general in nature in order to cover the various ICI developments and will be modified on an individual basis.

3.0 YORK REGION ALLOCATION CREDIT REQUIREMENTS

3.1 Minimum Performance Standards Required for Region to Advance Allocation Credit

For Region to assign additional capacity:

- New residential developments will be required to implement measures to satisfy the requirements of York Region for both water efficiency and wastewater flow reduction as stated in Section 3.2.
- The Town demonstrates that the combined non-residential developments water demand from new development is limited to 1,240m³ per day, prior to commissioning of the Upper York Sewage Solutions (UYSS) project

3.2 York Region Requirements

- To reduce water demands in new construction achieved through the use of high-efficiency toilets and on-demand hot water delivery systems; and
- To reduce inflow and infiltration through implementation of enhanced design and construction standards and hydraulic performance specifications.

3.2.1 Water Efficiency

- i. Install only WaterSense® labelled/certified high efficiency toilets (maximum 4 litres per flush (LPF) or 3/6 LPF siphonic dual flush) within the development.
- ii. Meet the Town's requirement for ON-DEMAND hot water delivery system as specified in Section 4.1 of these guidelines.

3.2.2 Wastewater Flow Reduction

- i. Achieve the wastewater inflow and infiltration control requirements through meeting the Sewer Installation/ Performance Testing Specification (New Construction) in Appendix G.
- ii. Prior to plan registration, submit the following items as part of the Program Conformity Plan:
 - a. Proposed engineering plans and specifications to achieve the sewer installation/ performance testing requirements as required in Appendix G
 - b. A flow monitoring plan showing the location and types of meters to be used, and data collection and reporting strategies for each phase within a tributary catchment area
 - c. A verification plan including the list of Professional Engineers to be employed
 - d. A contingency remedial plan should performance requirements not be met after construction

The owner/applicant shall pay for a peer review to review and approve a Conformity Report prior to the submission to the Region. The submission will demonstrate that the development has achieved the water efficiency and wastewater flow reduction requirements. Information to

be included in the report is detailed in the Conformity Report Submission Requirements, Appendix G-2 under Section 2.4 of these guidelines.

The peer review shall be provided by a Professional Engineer licensed within the Province of Ontario and approved by the Region. The peer reviewer shall also possess 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 cannot act as the peer reviewer.

3.3 York Region Allocation Credit Release

York Region will assign the first stage of credit allocation of 20% to the Town for allocation to a development:

- upon receipt of the development's Conformity Plan to the satisfaction of the Region and the Town;
- the Town confirms that the development letter of credit has been secured (see Section 4.7 for further detail); and
- the Town has confirmed in writing that the combined average water consumption from new ICI developments (commencing July 2014) do not exceed 1,240m³/day.

York Region will assign the second stage of credit allocation of 8%, upon written confirmation from the Peer Reviewer, that the Conformity Report submitted by the Owner's/Applicant's Engineer demonstrates:

- that the works have been constructed to Regional requirements in Appendix G;
- that high efficiency toilets have been installed to Regional requirements in Appendix G;
- that on-demand hot water delivery system requirements of the Town as outlined in Section 4.1 have been met;
- that CCTV has been undertaken as per Regional requirements in Appendix G and no defects are identified;
- that flow monitoring has been completed and measured sewage flows are within the limits specified in Appendix G; and
- the Town has confirmed in writing that the combined average water consumption from new ICI developments (commencing July 2014) do not exceed 1,240m³/day.

Prior to completion of UYSS, any additional capacity assignment to the Town beyond 7,000 units will be considered under the Region-wide capacity assignment process. Prior to this Region-wide capacity assignment, the second stage of credit assignment will be limited to 8%.

For reference and use, included in these guidelines is Appendix G entitled *York Region Sewer Installation/Performance Testing Specification (New Construction)* including two sub-appendixes:

- Sub-Appendix "G-1" – Sanitary Sewer System Inspection, Testing and Acceptance Guideline, Including Flow Charts and Glossary of Terms, October 2011; and
- Sub-Appendix "G-2" CCTV Sewer Inspection Specifications.

4.0 SUSTAINABLE HOME CRITERIA

The following technical specifications are mandatory (as outlined in the Appendices B and C, Forms 1-2):

4.1 Water Conservation Measures

Water Efficient Fixtures and Appliances

- ▶ All direct installs and/or agreements of purchase and sale must identify the strict use of only applicable fixtures and appliances that meet the Energy Star and WaterSense® approval including maximum 4.0 litres per flush (LPF) toilets or 3/6 LPF siphonic dual flush toilets.

Homes must be equipped with an on-demand hot water delivery system to either the 2nd floor ensuite bathroom, or 2nd floor main bathroom, or *main floor bathroom for a bungalow*. The system will be in the “normally off” condition until activated by the homeowner. Once the hot water has completed its circuit, the system pump will shut off. No systems incorporating timers or motion sensors will be accepted. No “passive” systems shall be accepted. This is not a tankless hot water system.

- ▶ Homes must be equipped with an approved furnace-mounted whole-home water-efficient humidifier (see Appendix H for list).

Landscaping/Outdoor Measures

- ▶ A minimum requirement of 6 inches of topsoil provided throughout development;
- ▶ Provision of native or drought-tolerant landscaping design throughout the development where landscaping is offered as a package to the home owner (sod is excluded from this requirement); and
- ▶ Automatic irrigation systems will not be offered or roughed in by the builder.

4.2 Energy Conservation Measures

- ▶ Homes to be constructed according to Energy Star® for New Homes Technical Specifications in effect at the time of pre-sales for any phase and in accordance with NRCan requirements.

4.3 Indoor Air Quality Measures

- ▶ Install water-resistant, hard-surface flooring in kitchens, bathrooms, entryways, laundry areas and utility rooms. Laminate flooring and engineered wood are considered acceptable for kitchens. Unfinished concrete floors are acceptable for laundry and utility rooms;
- ▶ Use of low VOC paints, varnishes, stains and sealers;
- ▶ Installation of HVAC systems which reduce exposure to indoor air pollutants by ventilating with outdoor air (HRV); and
- ▶ No HVAC in the garage to service the garage. Service duct to other areas must be within fire-rated envelope, e.g. enclosed insulated duct to bedroom over garage.

4.4 Renewable Energy Measures

- ▶ Solar Ready - Conduit from roof to mechanical room and increased structural capacity in the roof system (as required) to enable retrofit to solar energy.

4.5 Resource Management

- ▶ Material efficient framing – builder must verify that a minimum of 90% of the materials ordered for each home is used on site;
- ▶ Use of recycled and/or environmentally preferred product whenever possible (e.g. FSC Certified materials if tropical wood is used); and
- ▶ Construction waste management plans.

4.6 Home Owner Manual

- ▶ Home owners will be provided with an approved Educational Home Owner’s Manual that explains the use and maintenance of the sustainability features incorporated into the home (see Appendix F), as required in the subdivision agreement; and
- ▶ Developers are encouraged to provide home owners with additional information on water and energy efficiency.

4.7 Service Laterals – Private Property

- ▶ All sanitary service laterals extended from the streetline to just inside the building foundation (private property) shall be constructed using 125mm PVC DR 28 (or better), rubber gasketed, green coloured piping, the same material used within the public road allowance; and
- ▶ Bedding and backfilling will be completed per the geotechnical and manufacturer’s specifications to ensure that the Town of East Gwillimbury’s requirements for service laterals is met or exceeded.

4.8 Securities

- ▶ It is intended that the Town’s subdivision security requirements for servicing performance and/or maintenance will be sufficient so there will be no additional securities related to the Town of EG’s SDIPIG. The Town will identify the obligations of the program as part of its financial schedules in the subdivision agreement but it will not be included in the security obligations;
- ▶ Reductions of the subdivision security will take into consideration the status of the requirements of this program and the Conformity Report as described in Section 3.0 of the guidelines. Once the:
 - Conformity Report has been accepted by the Region;
 - all required forms have been submitted to the Town; and
 - the verifications outlined in Section 4.8 are successfully completed.

the security requirement for the SDIPIG is zero. Any other interim reductions will follow the procedures outlined in the Town’s subdivision agreement.

4.9 Builder Acknowledgement and Post Construction Inspection

- ▶ All water and energy conservation measures must be installed in accordance with the specifications indicated on the approved Building Permit Drawings;
- ▶ A Technical Specification and Builder Accountability Checklist for Drawing Verification (Form 1) will only be submitted for every model. A copy of Form 1 can be found in Appendix B;
- ▶ A Post Construction Inspection & Verification Checklist (Form 2) shall be completed and verified by a third party verification. Form 2 will be completed in accordance with the Graduated Builder Verification Requirements in Table 1 below. A copy of Form 2 can be found in Appendix C;
- ▶ Form 1 for each model must be submitted to the Town prior to issuance of building permits. Form 2 and associated inspection reports should be submitted as soon as practical after installation of the appliances, and outdoor requirements have been completed given seasonal limitations with some of those items;
- ▶ Should the forms be incomplete, or not submitted, the Town's Building Department cannot delay the issuance of the Occupancy permit; however, securities may not be released/reduced until the required forms are submitted;
- ▶ The Third Party Verification must be undertaken by one or more of the following:
 - Professional Engineer (or technician working under the direct supervision of a Professional Engineer), Architect (or technician working under the direct supervision of an Architect), LEED AP®, Certified Engineering Technician or Technologist (CET), member of the Association of Architectural Technologists of Ontario (AATO), or an Energy Evaluator licensed to deliver NRCan's residential energy evaluation service;
 - Verifier must carry minimum amount of Errors and Omissions Insurance (TBC); and
 - The third party verifier's credentials must accompany the checklists.
- ▶ Inspections will be conducted using a graduated system based on the number of new homes constructed by each builder. Table 1 outlines the verification process for each builder.

Table 1: Graduated Builder Verification Requirements

Number of Homes	Verification Requirements by a Third Party Certifier
First 25	Full inspection
26-and greater	Full inspection of an additional 10% of new homes

Notes:

1. Should a new home be found not in compliance with the program, the Town 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 Town, 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.
 4. The first sample of every different model of home offered within a subdivision shall be inspected.
- Builders are to arrange for third party access through the purchase and sale agreements with individual purchasers. Sample wording is provided in Appendix F.

East Gwillimbury Conservation and Increase in Allocation

Residential

1. Method for calculating allocation for residential water demands is based on EG base unit rate of 229 litres per capita per day (Lcd).
2. Volume of water used by 5,465 residential units, 3.11 ppu @ 229 Lcd = 3,892m³/day
3. Residential water efficiency savings agreed by all at 68 Lcd, not including any outdoor uses.
4. Revised unit target rate = 161 Lcd.

ICI

1. Method for calculating water consumption for ICI based on EG base unit rate of 198 litres per employee per day (Led).
2. Volume of water used by 7,725 employees, @ 198 Led = 1,530m³/day
3. ICI water efficiency savings prorated based on residential savings.
4. Revised unit rate = 139 Lcd

Total volume of water planned for consumption in EG = **5,422m³/day** (e.g. 3,892 + 1,530 m³/day)

Increased Residential Allocation

1. Total volume of water used by current 5,465 residential units @ 229 Lcd is 3,892m³/day.
2. Total number of units using 3,892m³/day @ 161 Lcd and 3.11 ppu is 7,773 units.
3. Additional units: 7,773 units – 5,465 units = 2,308 residential units.
4. Include 30% buffer for system security: 2,308 – 692 = 1616 residential units.

Note: The allocation limit of 7,000 units prior to completion of UYSS for Queensville, Holland Landing and Sharon is based on capacity constraints identified in the regional wastewater system in addition to the regional water system.

Form 1

**Technical Specification Checklist for Drawing Verification and
Builder Accountability Form (All Buildings)**

All declarations and affirmations made in this accountability form are made to the Town of East Gwillimbury solely for the purpose of assisting in determining whether verification under the Sustainable Development Incentive Program Implementation Guideline is merited. No such declaration or affirmation can be construed as a warranty or guarantee of the performance of the building.

Subject Property Information

Municipal Address	Lot No.	M. Plan. No.
	Town's File Number	
Development Name		

Registered Builder

Builder / Company Name	Contact Name of A.S.O.
Address	Telephone No.
	Fax No.
	E-mail Address

Agent / Applicant (if different from Builder)

Agent / Applicant (Company) Name	Contact Name
Address	Telephone No.
	Fax No.
	E-mail Address

AREAS OF INTEREST AND ACCOUNTABILITY BY APPLICANT

Water Conservation Measures

<i>Indoor Measures</i>	Appropriate Location on Dwg	Complies with Guidelines	Manufacturer Specification Provided	Builder's Confirmation
WaterSense labeled toilets (maximum 4.0 LPF single flush or 3/6 LPF siphonic dual flush toilets)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
WaterSense labeled lavatory faucets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
WaterSense labeled shower faucets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Form 1

**Technical Specification Checklist for Drawing Verification and
Builder Accountability Form (All Buildings)**

Energy Star dishwasher (≤ 20.0 litres per cycle)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Energy Star clothes washer (Water Factor of ≤ 6.0)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
On-demand Hot Water Recirculation system installed to one 2 nd Storey full bathroom or main floor bathroom in a bungalow.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Approved furnace-mounted whole-home water-efficient humidifier	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Outdoor Measures	Specified on Drawing	Builder's Confirmation
A minimum of 6 inches of topsoil to be provided throughout development. (Noted on house siting)	<input type="checkbox"/>	<input type="checkbox"/>
Native or drought-tolerant landscaping to be provided throughout the development, where landscaping is offered to home owner (Noted on house siting. Sod is excluded from this requirement.)	<input type="checkbox"/>	<input type="checkbox"/>
Automatic irrigation systems NOT permitted	n/a	<input type="checkbox"/>

Other Measures	Specified on Drawing	Manufacturer's Specification Provided	Builder's Confirmation
Energy Conservation Measures			
Drawings indicate home to be constructed per Energy Star® for New Homes Technical Specifications (In effect at time of Pre-sales)	<input type="checkbox"/>	n/a	<input type="checkbox"/>
Indoor Air Quality			

Form 1

**Technical Specification Checklist for Drawing Verification and
Builder Accountability Form (All Buildings)**

Other Measures	Specified on Drawing	Manufacturer's Specification Provided	Builder's Confirmation
Water-resistant, hard-surface flooring to be used in kitchens, bathrooms, entryways, laundry areas & utility rooms (this excludes unfinished basement area, laminate flooring engineered wood are acceptable for kitchens.)	<input type="checkbox"/>	n/a	<input type="checkbox"/>
Low VOC paints, varnishes, stains and sealers to be used	<input type="checkbox"/>	n/a	<input type="checkbox"/>
HVAC system ventilates with outdoor air (HRV)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No HVAC in garage to service garage.	<input type="checkbox"/>	n/a	<input type="checkbox"/>
Renewable Energy Measures			
Electrical Conduit & increased structural capacity in the roof system for potential solar panels	<input type="checkbox"/>	n/a	<input type="checkbox"/>

Resource Management		
	Included in Submission Package	Builder's Confirmation
Material efficient framing – at least 90% of materials ordered to be used on site	<input type="checkbox"/>	<input type="checkbox"/>
Tropical Wood for Lumber is FSC Certified (If applicable)	<input type="checkbox"/>	<input type="checkbox"/>
Construction Waste Management Plan	<input type="checkbox"/>	<input type="checkbox"/>

Home Owner Education		
	Sample included in Submission Package	Builder's Confirmation
Educational home owner manual explains the use and maintenance of the sustainability features to be provided.	<input type="checkbox"/>	<input type="checkbox"/>

Form 1

**Technical Specification Checklist for Drawing Verification and
Builder Accountability Form (All Buildings)**

Builder / Applicant Verification		
By signing this form, I understand and commit to implementing the mandatory technical specifications identified in the checklist above. I understand that these mandatory measures must be achieved as a condition of participation in the Sustainable Development Incentive Program Implementation Guideline, and may be above and beyond the technical specification required through any third party verification process.		
Builder's Representative Signature A.S.O.		Date (DD/MM/YY)
Third Party Verification		
By signing this form, I am verifying that the applicant is pursuing the mandatory technical specifications of the Town's Sustainable Development Incentive Program Implementation Guideline through the third party verification.		
Company Name (Print)	Verifier's Signature	Date (DD/MM/YY)
Company Address	Phone Number	
	E-mail Address	

Builder Post Construction Inspection & Verification Checklist of Sustainable Measures (Random Inspection per Graduated System)

Subject Property Information		
Municipal Address	Lot No.	M.Plan No.
	Town's File Number	
Development Name		
Registered Builder		
Owner / Company Name	Contact Name of A.S.O.	
Address	Telephone No.	
	Fax No.	
	E-mail Address	
Agent / Applicant (if different from Owner)		
Agent / Applicant (Company) Name	Contact Name	
Address	Telephone No.	
	Fax No.	
	E-mail Address	
Water Conservation Measures		
<i>Indoor Measures</i>		
WaterSense labeled toilets installed (maximum 4.0 LPF single flush or 3/6 LPF siphonic dual flush toilets)	<input type="checkbox"/>	
WaterSense labeled lavatory faucets installed	<input type="checkbox"/>	
WaterSense labeled shower faucets installed	<input type="checkbox"/>	
Energy Star dishwasher (≤ 20 litres per cycle) installed	<input type="checkbox"/>	
Energy Star clothes washer (water factor of ≤ 6) installed	<input type="checkbox"/>	
On-demand hot water recirculation system installed to one 2 nd storey full bathroom or main floor bathroom in a bungalow.	<input type="checkbox"/>	
Installation of approved furnace-mounted whole-home water-efficient humidifier	<input type="checkbox"/>	
<i>Outdoor Measures</i>		
No irrigation system has been provided	<input type="checkbox"/>	
A minimum of 6 inches of topsoil has been provided throughout development	<input type="checkbox"/>	
Native or drought-tolerant landscaping has been provided throughout the development	<input type="checkbox"/>	

Builder Post Construction Inspection & Verification Checklist of Sustainable Measures (Random Inspection per Graduated System)

Energy Conservation Measures	
Home built per Energy Star® for New Homes Technical Specifications (In effect at time of Pre-sales)	<input type="checkbox"/>
Indoor Air Quality	
Water-resistant, hard-surface flooring installed in kitchens, bathrooms, entryways, laundry areas and utility rooms (this excludes unfinished basement areas, laminate flooring engineered wood are acceptable for kitchens.)	<input type="checkbox"/>
Low VOC paints, varnishes, stains and sealers used	<input type="checkbox"/>
HVAC system ventilates with outdoor air (HRV)	<input type="checkbox"/>
No HVAC in garage to service garage	<input type="checkbox"/>
Renewable Energy Measures	
Electrical Conduit & increased structural capacity in the roof system for potential solar panels installed per approved drawing	<input type="checkbox"/>
Resource Management	
Lumber Take-Off and framing material order provided for each model home. Material used ≥ 90% overall.	<input type="checkbox"/>
Tropical Wood for Lumber is FSC Certified (If applicable)	<input type="checkbox"/>
Waste Audit Form per MOE has been provided	<input type="checkbox"/>
Home Owner Education	
Educational home owner manual has been placed inside house on closing day.	<input type="checkbox"/>

Builder / Applicant Verification		
By signing this form, I verified that the mandatory technical specifications identified in the checklist above have been implemented. I understand that these mandatory measures must be achieved as a condition of participation in the Sustainable Development Program and may be above and beyond the technical specification required through any third party verification process.		
Builder's Representative Signature (A.S.O)	Date (DD/MM/YY)	
Third Party Verification		
By signing this form, I am verifying that the applicant is pursuing the mandatory technical specifications of the Town's Sustainable Development Program through the third party verification.		
Company Name (Print)	Verifier's Signature	Date (DD/MM/YY)
Company Address	Phone Number	
	E-mail Address	

Form 3
SDIPIG Security Reduction Request Form

Subject Property Information		
Municipal Address	Lot No.	M. Plan No.
	Town's File Number	
Development Name		
Registered Builder		
Builder / Company Name	Contact Name of A.S.O.	
Address	Telephone No.	
	Fax No.	
	E-mail Address	
Agent / Applicant (if different from Builder)		
Agent / Applicant (Company) Name	Contact Name	
Address	Telephone No.	
	Fax No.	
	E-mail Address	
Please indicate the following:		
What percentage reduction of the subdivision security is being requested?	_____ %	
Checklist	Enclosed	
Request for release of security (this form)	<input type="checkbox"/>	
A copy of all Form 1 - Technical Specification Checklist for Drawing Verification and Builder Accountability Forms	<input type="checkbox"/>	
A copy of Form 2 – Builder Post Construction Inspection & Verification Checklist of Sustainable Measures	<input type="checkbox"/>	
Confirmation that Conformity Report is Approved by York Region and Town	<input type="checkbox"/>	

Home Owner's Guidelines

Sample Outline

Welcome to your New Home

Acknowledgements – all the builders and developers who helped develop the guidelines.

Table of Contents

- 1.0 Inside Your Home
 - 1.1 Floor Finishes
 - 1.2 Paint
 - 1.3 Appliances
 - 1.4 Plumbing
 - 1.5 Mechanical Systems
 - 1.6 Solar Ready
 - 1.7 Lighting
- 2.0 Outside Your Home
 - 2.1 Landscaping
 - 2.2 Recycling and Composting
- 3.0 Green Cleaning and Maintenance
- 4.0 Commuting and Travel Options

1.0 INSIDE YOUR HOME

Floor Finishes

- Discuss durability and Low VOC

Tile (Ceramic, Porcelain or Glass)

- Installed because of durability and ability to prevent mold;
- Instructions on how to clean and remove stains; and
- Signs that flooring needs to be replaced.

Source: Ceramic Tile Institute of America (www.ctioa.org/)

Add source for other types if available

Wood Flooring

- Installed instead of carpeting because of lower VOC's;
- Describe how Home Owners can install mats at entrances to prevent grit and sand from scratching floors;
- Instructions on how to sweep, vacuum and dust mop floor; and
- Standing water can cause warping – needs to be cleaned up as soon as possible.

Source: National Wood Flooring Association

(<http://www.woodfloors.org/consumer/why.aspx>)

Paint

- Paint provides decoration and protection for the interior of your home;
- How to care for your painted surfaces (wash with mild soap and little water);
- What's Normal (consistent finish with no obvious differences in paint layers) and Not Normal (peeling, blistering, etc.); and
- Manufacturer's specifications about the type of paint builders will be using.

Appliances

General description of Energy Star program.

Dishwasher, Refrigerator, Stove, Dishwasher, Dryer (if provided)

- Energy Star rated – water and energy savings that homeowner can expect;
- Tips on efficient use;
- How to clean the interior and exterior of the dishwasher;
- What's Normal vs. Not Normal operation (i.e. fridge may hum or make other slight noises); and
- Contact information for retail outlet and manufacturer.

Plumbing

Toilet (4.0 L HET or 3/6 L siphonic dual flush HET)

- Description of toilet and water it will save.

Shower Heads and Faucets

- Sinks and showers are two of the most water demanding systems in the home;
- Low flow faucets used in combination with aerators to ensure that the lower volume of water use doesn't impact home owners comfort; and
- Products installed in your home are low-flow; energy and water savings will result from the reduced amount of water used.

Hot Water Recirculation System

- Describe the recirculation system which is installed; and
- Describe purpose, benefits and maintenance tips.

Mechanical Systems

Heating, Ventilation and Air Conditioning (HVAC) Systems

- Describe the HVAC System;
- Benefits of a well-designed system including reducing air pollutants, etc.;
- Describe any Energy Star standards that have been met;
- Maintenance tips – including timing for replacing filters etc.; and
- Programmable thermostats – operation and tips.

Humidifier

- Describe the purpose of a humidifier;
- Benefits of the water and energy efficient whole home humidifier; and
- Maintenance and operational tips for the homeowner.

Solar Ready

- Chase (conduit) provided from attic to mechanical room. This will allow retrofit for solar energy.

Lighting (Indoor and Outdoor)

- Energy Star lighting provides light using less energy;
- Benefits of using less energy in the lighting system including decreasing greenhouse gases;

- Cost more to purchase initially; but last much longer and save money by reducing energy costs; and
- How to properly dispose of spent light bulbs.

2.0 OUTSIDE YOUR HOME

Landscaping

- A minimum 6 inches of topsoil has been provided;
- Water-reduced landscaping design (where offered as a package to homeowner);
- Should not require pesticides, fertilizers or watering to maintain; and
- Native plants suit today's interest in low maintenance gardening and landscaping (where offered).

Recycling and Composting

- Info on recycling, green bin and yard waste pick –up. – material from Town & Region;
- Location and operating hours for transfer stations and community environmental centres; and
- Home composting info.

3.0 GREEN CLEANING AND MAINTENANCE

- Tips and instructions on cleaning your home in an environmentally responsible manner.

4.0 COMMUTING AND TRAVEL OPTIONS

- Copies of York Region Transit maps;
- Copies of Town trail and bike routes maps;
- Contact information highlighted for special needs; and
- Reference Town website.

DRAFT PURCHASE AND SALE AGREEMENT WORDING

Purchaser acknowledges and accepts that the home being purchased has been built in accordance with sustainability features mandated by the Regional Municipality of York (Region) and implemented through the Town of East Gwillimbury's (Town's) Sustainable Development Incentive Program Implementation Guidelines (SDIPIG).

Purchaser further acknowledges and accepts that an essential element of this Program, as required by both the Region and the Town, is a post-closing inspection by an approved inspector on behalf of the Region and the Town to verify that the washing machine, dishwasher, plumbing fixtures and fittings installed in the home conform to the guidelines of the Program.

Purchaser agrees to allow access to the approved inspector, so designated by the Region and the Town, for a one time post-closing inspection within the first twenty-four months of closing to conduct the necessary inspection, upon providing the purchaser reasonable advanced notice.

Purchaser further covenants that any replacement of the washing machine, dishwasher, plumbing fixtures and fittings will meet the requirements of the Sustainable Development Incentive Program Implementation Guidelines (SDIPIG).

Table of Contents

PART 1 GENERAL	G-3
1.1 <i>OBJECTIVE</i>	G-3
1.2 <i>BACKGROUND</i>	G-3
PART 2 CONSTRUCTION OF NEW SANITARY SEWER SYSTEMS	G-4
2.1 <i>GENERAL</i>	G-4
2.2 <i>SANITARY MAINTENANCE HOLES</i>	G-4
2.3 <i>SANITARY SEWERS</i>	G-4
2.4 <i>SERVICE CONNECTIONS</i>	G-5
2.5 <i>BULKHEADS</i>	G-5
PART 3 EXTRANEOUS FLOW PERFORMANCE TESTING	G-5
PART 4 RAINFALL MONITORING.....	G-6
PART 5 FLOW MONITORING PERFORMANCE ANALYSIS & RESULTS.....	G-6
PART 6 INSPECTION	G-7
PART 7 TESTING REQUIREMENTS	G-8
7.1 <i>GENERAL</i>	G-8
7.2 <i>MAINTENANCE HOLE TESTING</i>	G-8
7.3 <i>SANITARY SEWER TESTING</i>	G-8
PART 8 SUBMITTALS.....	G-8
PART 9 APPROVAL OF SERVICING.....	G-9
GLOSSARY	
REFERENCED DESIGN STANDARDS, GUIDELINES AND MANUALS.....	G-9
SUB- APPENDICES	G-10

List of Appendices

- Appendix G-1 Sanitary Sewers Systems inspection, Testing and Acceptance Guidelines
- Appendix G-2 CCTV Sewer Inspection Specifications

APPENDIX “G”

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

PART 1 - GENERAL

1.1 OBJECTIVE

- York Region 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; and
- 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. The 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; and
- 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 pre-benched 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; and
- 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 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 (100mm to 300mm) or C905 (340mm to 600mm) PVC pipe (or concrete pressure pipe) will be specified in areas of high water table or where sewer is greater than 8.5metres deep; and
- 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.

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; and
- 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 (8)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; and,
 - For eight (8) months commencing in April, after 85% 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 (8) 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% 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 (Appendix G-2, page G-2-16), including:
 - Flow monitoring locations;
 - Type of flow monitoring equipment; and
 - 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 attachment 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 2 km of the flow monitoring locations shall be utilized to log rainfall data at a minimum of 5-minute intervals for the entirety of the flow monitoring period. If there is no existing Regional rainfall gauge within 2 km of the site, the Developer shall install one at his/her expense at the request of the Region; and
- 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 & RESULTS

- a. Flow monitoring data at a minimum of 5 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 Town shall ensure that the repair works and/or retrofit be carried out. The performance of the system will then be reassessed via flow monitoring prior to approval of the works by the Region; and
- d. Maximum GWI allowance shall be **0.0375 L/mm diameter per 100m of sewer pipe per hour**, as per OPSS 410.

PART 6 - INSPECTION

The requirements for inspections will be reviewed bi-annually by the Town and Region of York, or if in the sole opinion of the Region of York that review is required before the lapse of the bi-annual period.

- a. The 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 (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 Appendix G-2: CCTV Sewer Inspection Specification;
- 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; and
- f. Sanitary Laterals (private side) – 100% of private sanitary laterals shall be visually inspected and CCTV inspected from the main line to building face. Inspection

equipment can be launched from either mainline or from building face, and after backfilling.

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 Appendix G-1, 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; and
- 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

The following will make up the submittals to the Peer Reviewer for approval prior to the submission to York Region:

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

PART 9 - APPROVAL OF SERVICING

- a. Acceptable performance of the servicing for allocation credit will be determined at the sole discretion of York Region through flow monitoring and achievement of performance criteria; and
- 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.

GLOSSARY

- a. **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 modoloc/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;
- b. **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;
- c. **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; and
- d. **Extraneous Flow** – Flow resulting from rainfall entering sanitary sewer systems via downspouts and/or illicit storm drain connections.

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; and
- e. York Region. *Sanitary Sewer System Inspection, Testing and Acceptance Guideline (Formerly Sanitary Sewer Commissioning Guidelines)*. October 2011.

SUB- APPENDICES

The following Regional Municipality of York guidelines, specifications and protocols are provided for reference and use:

Appendix G-1 – York Region Sanitary Sewer System Inspection, Testing and Acceptance Guideline (Formerly Sanitary Sewer Commissioning Guidelines).
October 2011

Appendix G-2 – CCTV Sewer Inspections Specification

APPENDIX G-1

THE REGIONAL MUNICIPALITY OF YORK

Sanitary Sewer System Inspection, Testing and Acceptance Guideline (formerly Sanitary Sewer Commissioning Guidelines)

October 2011

Table of Contents

1	GENERAL	G-1-3
1.1	GENERAL REQUIREMENTS.....	G-1-3
2	GRAVITY SANITARY SEWER TESTING REQUIREMENTS	G-1-5
2.1	GENERAL REQUIREMENTS.....	G-1-5
2.2	TEST METHOD & SEQUENCE	G-1-5
2.3	EXFILTRATION TEST - LOW PRESSURE AIR	G-1-6
2.4	INFILTRATION TEST.....	G-1-7
2.5	EXFILTRATION TEST - WATER	G-1-8
2.6	JOINT TEST – CONCRETE PIPE (GREATER THAN 600MM DIAMETER)	G-1-8
2.6.1	<i>Supplementary Joint Testing</i>	<i>G-1-8</i>
2.7	MANDREL DEFLECTION TESTING	G-1-9
2.8	CCTV INSPECTIONS.....	G-1-10
2.8.1	<i>Video Inspection Equipment.....</i>	<i>G-1-11</i>
2.8.2	<i>Video Camera Transport Equipment</i>	<i>G-1-11</i>
2.9	TESTING PRESSURE PIPE USED AS GRAVITY SEWER.....	G-1-11
3	FORCEMAIN TESTING REQUIREMENTS	G-1-11
3.1	GENERAL REQUIREMENTS.....	G-1-11
3.2	HYDROSTATIC LEAK TEST.....	G-1-12
4	MAINTENANCE HOLE TESTING REQUIREMENTS	G-1-12
4.1	GENERAL REQUIREMENTS.....	G-1-12
4.2	MAINTENANCE HOLE EXFILTRATION WATER TEST	G-1-13
4.3	MAINTENANCE HOLE INFILTRATION WATER TEST.....	G-1-13
4.4	NEGATIVE AIR (VACUUM) TEST	G-1-13
4.5	CHIMNEY SEAL LEAKAGE TEST	G-1-13
5	GROUNDWATER MEASUREMENT	G-1-14
6	REFERENCED STANDARDS	G-1-15

1 General

This 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 (9) 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/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 (9) 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/I reduction, and are not intended to supplement or replace current York Region or nine (9) 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 Municipality and their Qualified Representative (e.g. consulting engineer) of the planned commencement date ten (10) days prior to such commencement and reconfirm three (3) 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 Municipality or their Qualified Representative. Results for tests conducted in the absence of the Municipality or their Qualified Representative will not be accepted.

The 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 Page G1-6 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, referred to in this guideline and appendices.

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 Municipality or their Qualified Representative).

Where the groundwater table cannot be visually monitored in terms of elevation from the pipe, the 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 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 2.0;
- forcemains refer to Section 3.0;
- maintenance holes refer to Section 4.0; and
- groundwater measurement refer to Section 5.0.

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 & 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 ex filtration testing fails and leak location and repair is unsuccessful, the use of other test methodology may be accepted at the discretion of the Municipality or their Qualified Representative. Any other water-tightness method will only be allowed following the submittal of the procedure to the 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 Municipality or their Qualified Representative, see Sections 2.5 and 2.6 respectively.

When specified by the 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 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 (5) 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 1 (Column B) for lengths equal to or less than the length shown in Table 1 (Column C).

Table 1: Exfiltration Test – Low Pressure Air Testing (OPSS 410)

Column A	Column B	Column C	Column D
Nominal Pipe Size (mm)	Minimum Time (min:sec)	Length of Pipe for Minimum Time (m)	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 1 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 1 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 Municipality or their Qualified Representative may be permitted. The 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 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 (3) 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 minutes intervals shall be performed to ensure that 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 Municipality or their Qualified Representative.

The leakage at the end of the one (1) 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 Municipality or their Qualified Representative.

When directed to utilize this test method, all joints shall be tested unless otherwise directed by the 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 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 Municipality or their Qualified Representative.

Representative testing on 5% of all joints, joints selected to be approved by the 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%) 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 thirty (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 9 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 \pm 1mm. 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 2.

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 0.1mm. An acceptable mandrel shall not pass through the proving ring. The proving ring shall be fabricated from steel a minimum of 6mm thick.

For pipes 100mm to 750mm in diameter, the allowable deflected pipe diameter is 7.5% of the base inside diameter of the pipe. For pipes greater than 750mm in diameter, the allowable deflected pipe diameter is 5.0% 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.

Table 2 -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

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 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 (2) 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 (2) 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 2m 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 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%.

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 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 100mm.

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 (2) 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 (2) 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 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 (2) 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 (0)). All leaks shall be located and stopped and the test section shall be retested until leakage is zero (0).

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 (0).

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 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 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, 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 Municipality or their Qualified Representative.

Leakage shall not exceed a rate of 3 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 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 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 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 holes frame and pour approximately 4 litres of water behind the seal. Observe the bottom seal for a minimum of one (1) 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 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.

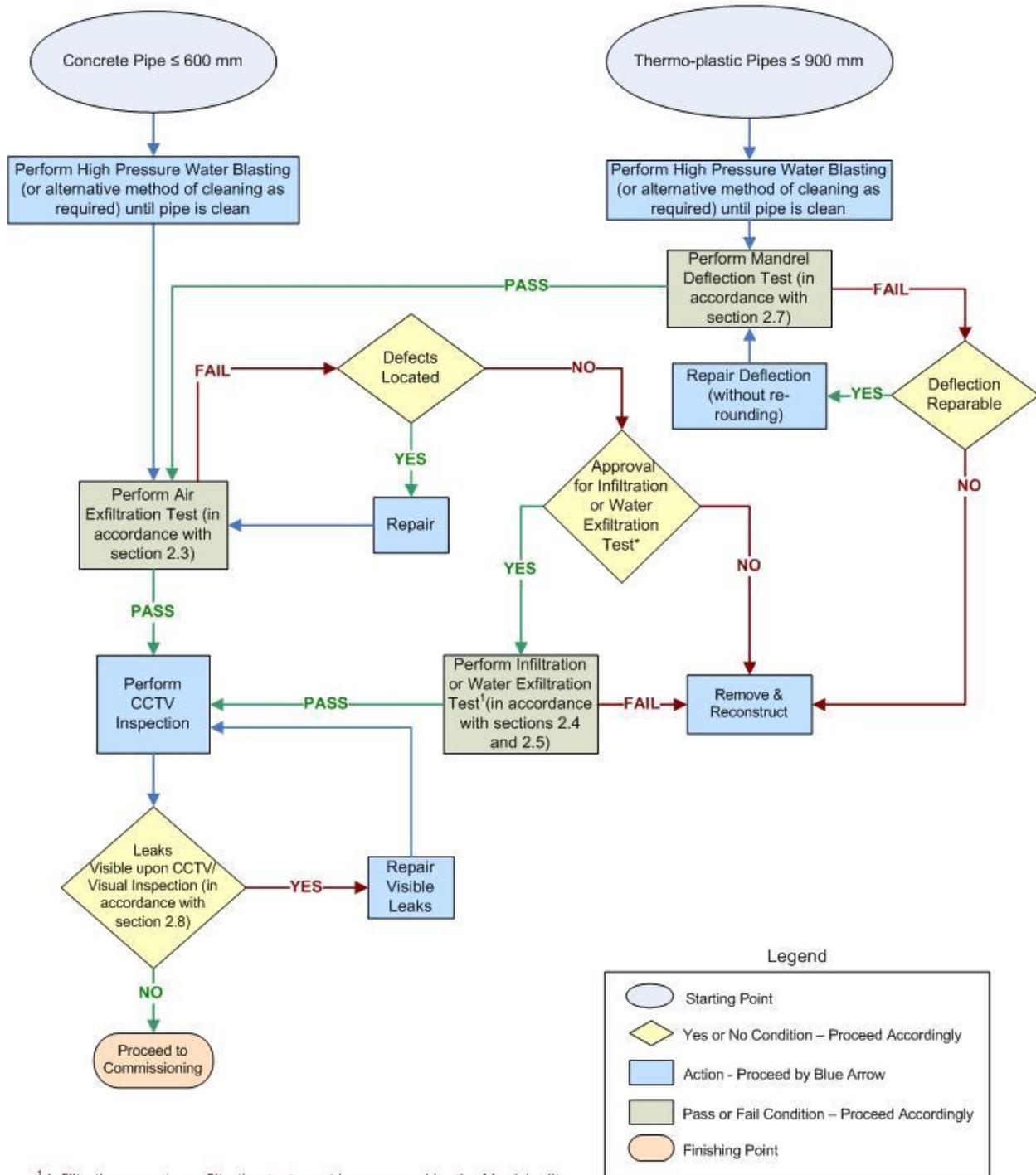
6 Referenced Standards

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).

**The Sanitary Sewer System Inspection, Testing and
Acceptance Guideline:**

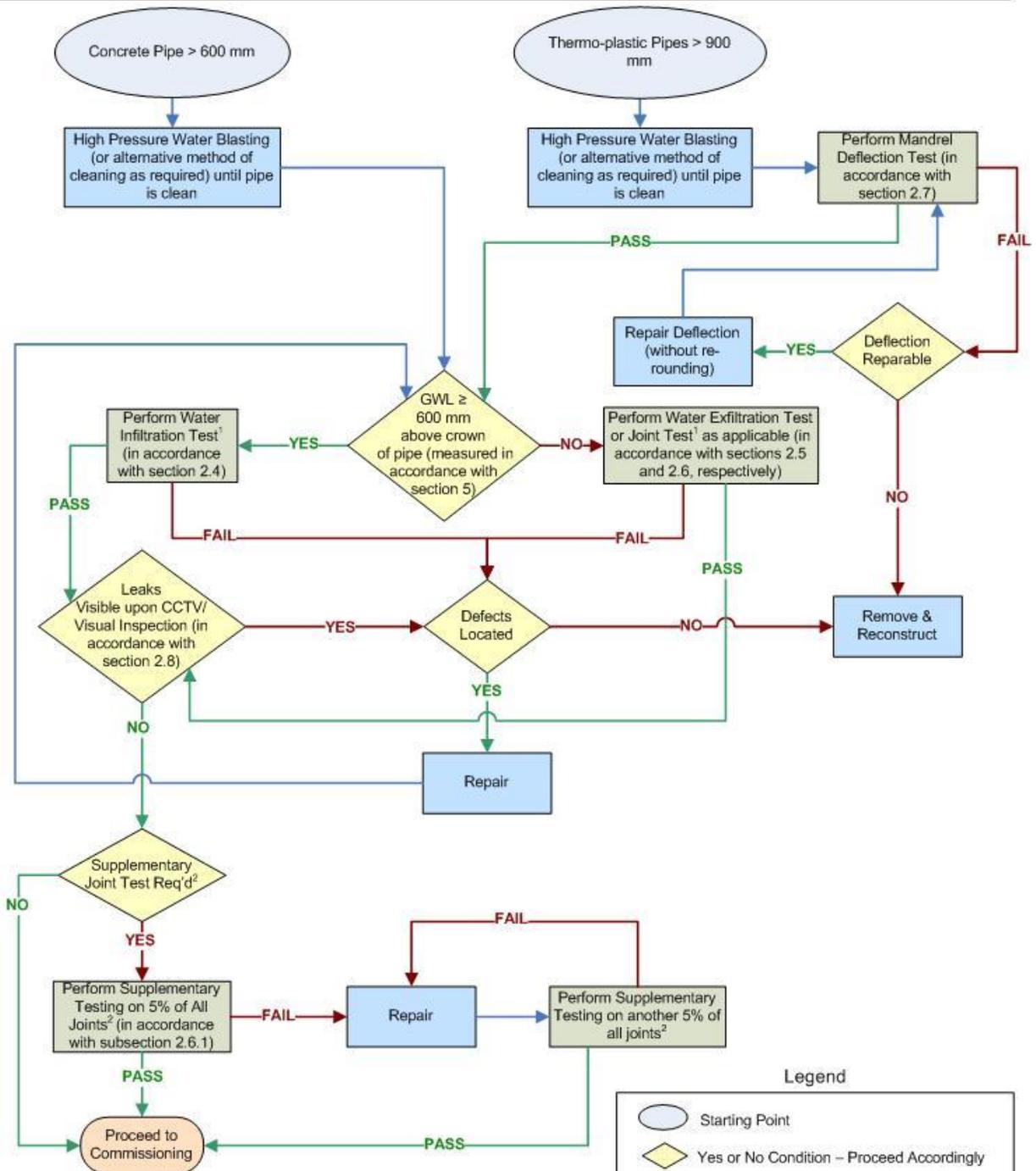
**York Region and Local Area Municipalities
Sanitary Sewer Inspection, Testing and
Acceptance Flow Charts for Concrete and
Thermo-Plastic Pipes and Maintenance Holes**

**York Region and Local Area Municipalities Sanitary Sewer
Inspection, Testing and Acceptance Flow Chart
for Concrete Pipes ≤600mm and Thermo-plastic Pipes ≤900mm**

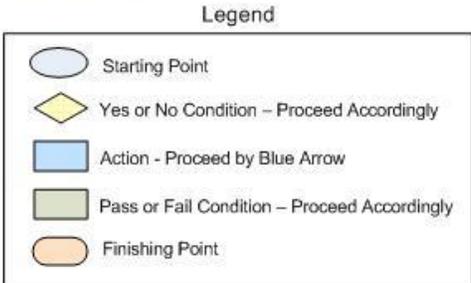


¹ Infiltration or water exfiltration test must be approved by the Municipality or their Qualified Representative based on groundwater elevation

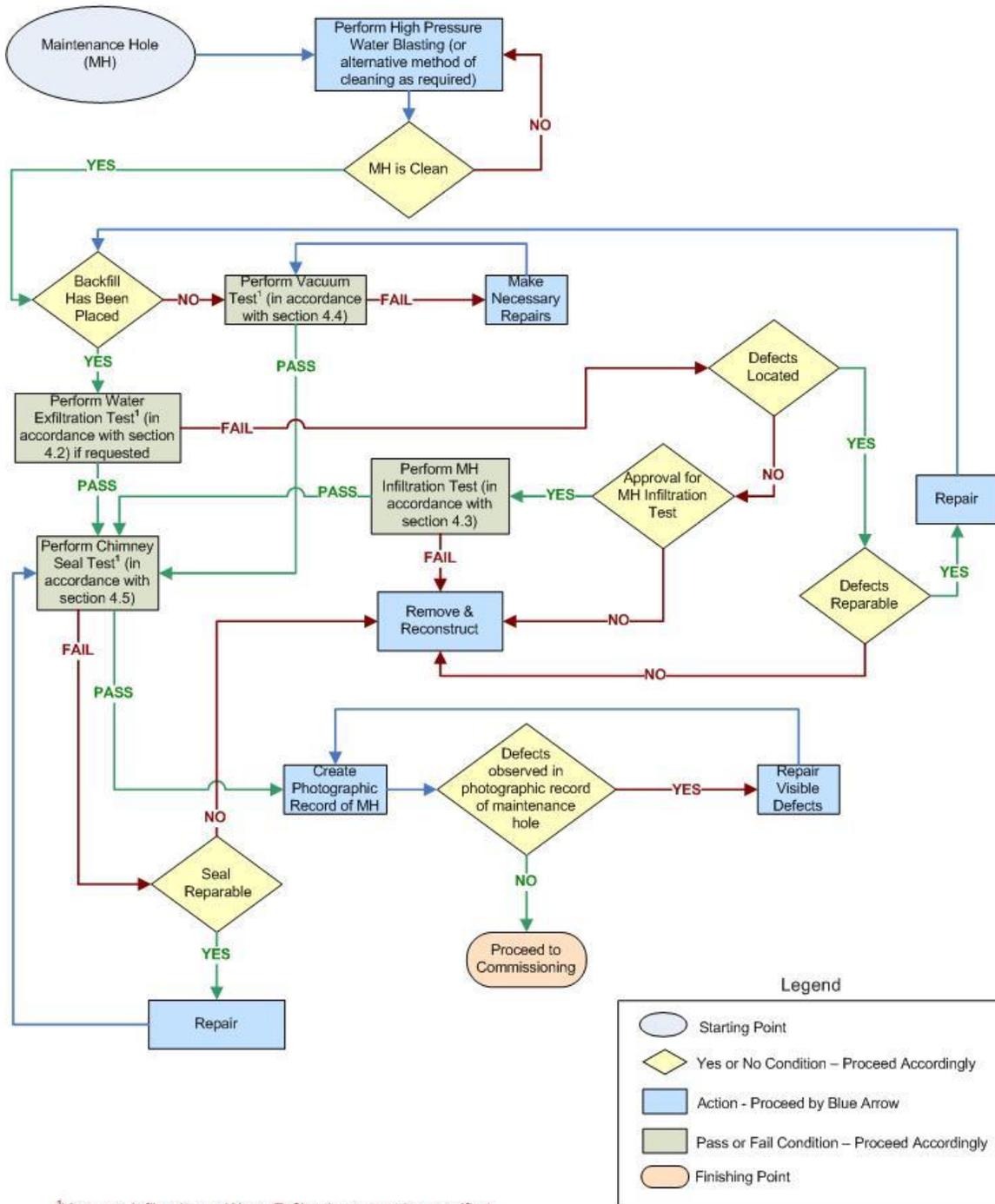
**York Region and Local Area Municipalities Sanitary Sewer
Inspection, Testing and Acceptance Flow Chart
for Concrete Pipes >600mm and Thermo-plastic Pipes >900mm**



¹ Test must be approved by the Municipality or their Qualified Representative based on groundwater elevation
² Joint Testing to be specified at the discretion of the Municipality or their Qualified Representative



**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 Municipality or their Qualified Representative

The 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: Means 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: Means compact disc.

Contract: An agreement between two or more parties, one that is written and enforceable by law; the agreement between the Municipality and the Contractor for the construction of a sanitary sewer system or components.

Contractor: A properly licensed individual or 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 “G-2”

THE REGIONAL MUNICIPALITY OF YORK

CCTV Sewer Inspection Specifications

Table of Contents

CONTENTS

1	GLOSSARY	G-2-3
2	CCTV INSPECTION	G-2-3
2.1	DESCRIPTION.....	G-2-3
2.2	EQUIPMENT	G-2-4
2.2.1	<i>Inspection Equipment.....</i>	<i>G-2-4</i>
2.3	METHODOLOGY	G-2-6
2.3.1	<i>Sewer Inspection</i>	<i>G-2-7</i>
2.3.2	<i>INSPECTION REPORTS</i>	<i>G-2-12</i>
2.4	<i>QUALITY CONTROL / ACCEPTANCE</i>	<i>G-2-15</i>
3.0	PROGRAM CONFORMITY PLAN	G-2-15
4.0	CONFORMITY REPORT SUBMISSION REQUIREMENTS	G-2-17
4.1	COVER LETTER.....	G-2-17
4.2	CONFORMITY REPORT.....	G-2-17
4.3	YORK REGION CONTACT INFORMATION	G-2-18

Technical / Functional Specification for Sewer CCTV Inspection

1 GLOSSARY

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

- Business Day means any day except Saturdays, Sundays, and statutory holidays;
- CCTV means closed-circuit television;
- CD means compact disc;
- Contractor Administrator means the third party certifier hired by the developer;
- Drainage Structure means a catch basin, maintenance hole, or ditch inlet;
- DVD-Video means digital video disc;
- MPEG means movie photographic experts group; and
- WRc means Water Research Centre.

2 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 EQUIPMENT

2.2.1 Inspection Equipment

2.2.1.1 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.

2.2.1.1 VIDEO INSPECTION EQUIPMENT

Mainline Sanitary and Manhole CCTV Camera

Camera equipment shall consist of a self-contained, closed-circuit color 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 100mm 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%.

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 is 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 (2) 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 Sustainable Development Incentive Program

shall be consulted as a guide for the selection of different type nozzles and recommended pressure applications for various cleaning requirements.

2.2.1.3 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 1500m 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 100mm.

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 300mm (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% 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.

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 (described in Section 0) 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 200mm, 9m/min for pipes between 200mm and 300mm, 12m/min for pipes larger than 300mm.

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 (2) 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;
 - o arranging to have solid debris cutting or removal of intruding connections by the Contract Administrator;
 - o modifying the camera setup (position and/or method of transport); and
 - o 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 6m/min for pipes less than 200mm and all lateral inspections, 9m/min for pipes between 200mm and 300mm, 12m/min for pipes larger than 300mm. 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 2m 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.

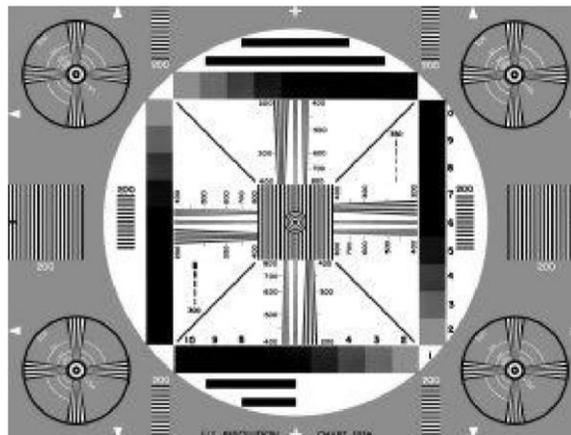


Figure 1 - Line Resolution Chart

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.

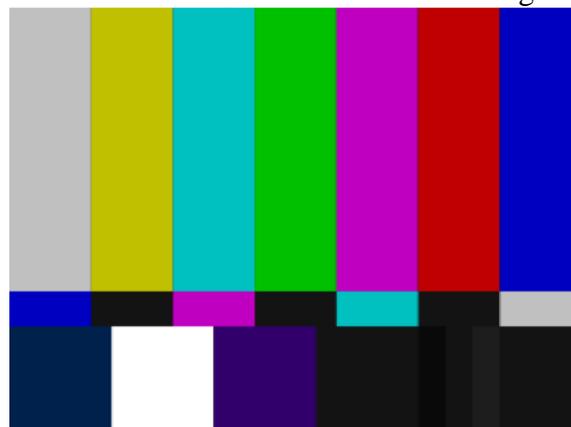


Figure 2 - Colour Resolution Chart

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.

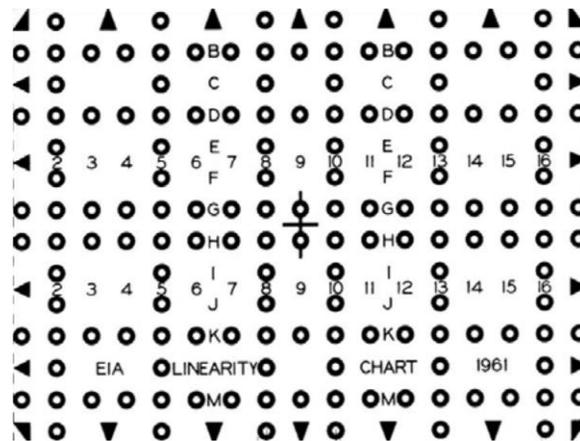


Figure 3 - Linearity Chart

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 % or 0.3m 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.

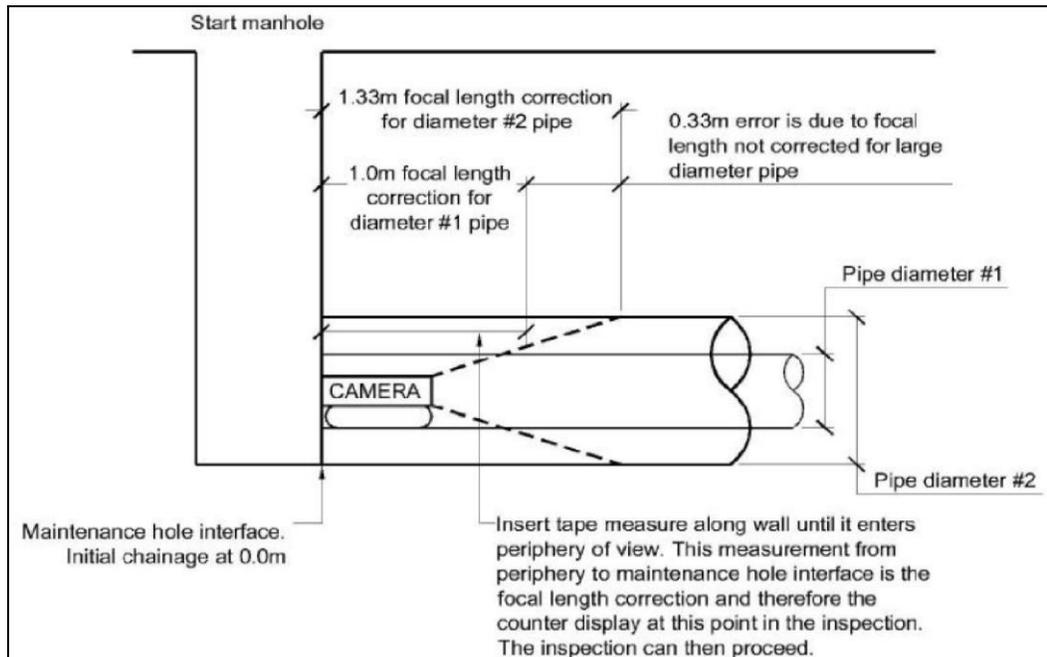


Figure 4 - Focal Length Correction Detail (Source: NAPPI)

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 (3) 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); and
- 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 | • Size |
| • Time | • Shape |
| • Location | • Material |
| • Road Name | • Lining |
| • Start/Finish Depth | • Pipe length |
| • Start/Finish Cover | • Total length |
| • Start/Finish Invert | • Weather |
| • Direction | • Comments |
| • Surveyed By | |

*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:

Sustainable Development Incentive Program
Implementation Guidelines

- Header accuracy – 95%
- Detail accuracy – 90%

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, or; and
- 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 fifteen (15) working days of submission. The Contract Administrator may adjust the frequency of reviews based on the results of previous reviews. The Contactor 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 ten (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.

3.0 PROGRAM CONFORMITY PLAN

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

Sustainable Development Incentive Program
Implementation Guidelines

January 2015
G-2-15

- Three (3) hard copies and one (1) electronic copy of the assembled Program Conformity Plan;
- Submitted to the York Region Transportation and Community Planning Department, Community Planning Branch c/o the Manager of Integrated Community Planning; and
- The Program Conformity Plan as outlined in the Table #G-2-1 below.

Table #G-2-1 Program Conformity Plan requirements

Requirement	Program Details
Report Title	Title of the report shall be “Program Conformity Plan For [<i>Insert Community Name, Builder Name and M-plan Number</i>] ”.
Introduction/ Project Description	A brief written description of the report supported by drawings/sketches.
Water Conservation	<p>Confirm the Development will include:</p> <ol style="list-style-type: none"> 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. On-Demand hot water delivery system in each unit to one of either the 2nd story main bathroom or ensuite bathroom or in a bungalow the main bathroom. <p>The owner/applicant will submit:</p> <ol style="list-style-type: none"> 3. Third party verification plan including the list of Professional Engineers to be employed.
Wastewater Flow Reduction	<p>Plan showing how the Development will meet the sewer installation/ performance testing requirements set out in Appendix G</p> <p>A verification plan including the list of Professional Engineers to be employed.</p> <p>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.).</p> <p>A flow monitoring plan showing how the flow meters will delineate development flow for monitoring purposes, including the type of meters to be installed.</p>

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.

- Five (5) hard copies and one (1) electronic copy of the Post Development Submission package; and,
- Submitted to the York Region Transportation and Community Planning Department, Community Planning Branch c/o the Manager of Integrated Community Planning.

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); and,
 - Area of the subject lands (in hectares).
3. Contact Information
 - Registered Owner of the subdivision and Builder's Name;
 - Contact name if different from the Registered Owner;
 - Contact information for Registered Owner (mailing and email addresses and telephone and facsimile numbers); and,
 - 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 program requirements including:

- water efficiency requirements outlined in the guidelines;
- wastewater flow reduction requirements outlined in the guidelines; and,
- constructed to meet York Region's Sewer Installation/Performance Testing Specification.

This Conformity Report shall contain:

- Water Fixture Report outlining the internal fixtures, and On Demand system, have been installed;
- Sanitary Sewer System has been constructed in accordance with the Program Requirements;
- CCTV Report; and
- I&I and Flow Monitoring Report.

4.3 YORK REGION CONTACT INFORMATION

Transportation and Community Planning Department
c/o the Manager of Integrated Community Planning

YORK REGION

17250 Yonge Street

Newmarket, Ontario

L3Y 6Z1

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

www.york.ca

Approved Furnace Mounted Whole-Home Water Efficient Humidifiers

Furnace mounted humidifiers must be from the approved list below or an approved equivalent. For proposed equivalents, specifications must be provided to demonstrate a minimum 50 L of water sent to drain per day.

Allowed:

Pulsed Flow Through Desert Spring Pulsed Flow Through DS-PFT
Pulsed Flow Through Airia Lifebreath -
Flow Restriction Best Air Pro Green Humidifier GH2500

Preferred:

Rotary Disc Desert Spring Rotary Disc with Auto Flush(1) DS-3200 and DS-AF5 (must have auto-flush)
Steam EWC (formerly Autoflo) Ultra-Zone S2000
Steam EWC (formerly Autoflo) Ultra-Zone S2020
Steam GeneralAire Elite Steam - Duct Mount RS15P
Steam GeneralAire Elite Steam - Duct Mount RS25
Steam GeneralAire Elite Steam - Duct Mount DS15
Steam GeneralAire Elite Steam - Duct Mount DS15P
Steam GeneralAire Elite Steam - Duct Mount DS25
Steam GeneralAire Elite Steam - Duct Mount DS25LC
Steam GeneralAire Elite Steam - Duct Mount DS35
Steam GeneralAire Elite Steam - Duct Mount DS50
Steam GeneralAire Elite Steam - Duct Mount DS50LC
Steam Honeywell TrueSTEAM HM506
Steam Honeywell TrueSTEAM HM509
Steam Honeywell TrueSTEAM HM512
Steam Thermolec Acu-Steam Acu-5
Steam Thermolec Acu-Steam Acu-10
Steam Thermolec Acu-Steam Acu-15
Steam White-Rodgers HSP Series HSP2000 ♦
Steam White-Rodgers HSP Series HSP2600 ♦

NOTE:

**Important: The above list is subject to change at any time.*

**Disclaimer of Endorsement:* Reference herein to any specific commercial products, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the Town of East Gwillimbury.