The Blue Mountains Sanitary Sewer Commissioning Protocol

August 2025

Version 3

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1.0 General

1.1 General Requirements

This Commissioning Plan outlines the general procedures and minimum requirements required for acceptance of new sanitary sewer systems to be commissioned within The Town of The Blue Mountains. This plan is based on requirements and procedures from the Ontario Provincial Standard Specifications (OPSS) and American Society of Testing Materials (ASTM).

All newly constructed sanitary sewers and manholes shall be watertight and free from leakage. No part of the works 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 plan for each sewer section, maintenance hole to maintenance hole.

When tests results 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 necessary to obtain a system that passes testing requirements.

The Contractor shall bear the complete cost and supply all equipment necessary to perform the tests required.

Sanitary sewer construction shall be inspected throughout the construction period for general adherence to Contract specifications.

Testing shall be completed after final backfill is placed in the trench and before asphalt has been placed.

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:

Cleaning and flushing with high pressure water blasting

Deflection or out of round testing – thermos-plastic pipes only

Water-tightness (leakage) testing

CCTV at time prior to the maintenance period and at the time prior to assumption of the works.

1.2 Definitions

Town: Town of The Blue Mountains

Director: Director of Operations or designate and/or Direct of Planning and Development Services or designate

Contractor: General Contractor as defined in Ontario Provincial Standard Specifications

Contract Administrator: Consultant Engineer responsible for the administration of the Contract

ORO: Overall Responsible Operator for the Town

1.3 Sanitary Sewer Commissioning Plan

Submit a Sanitary Sewer Commissioning Plan for review by the Town. The Sanitary Sewer Commissioning Plan shall contain a complete description of all the steps the Contractor will undertake to ensure the sanitary sewer satisfies all the testing requirements. The Sanitary Sewer Commissioning Plan shall be submitted a minimum of two (2) weeks in advance of the initiation of sanitary sewer commissioning. This plan shall also include the specific reporting protocols as described within the commissioning procedures in the following sections.
An example template for a Sanitary Sewer Commissioning Plan can be received at the Town of The Blue Mountains' Municipal Offices and is attached as Appendix 'A'.

2.0 Gravity Sanitary Sewer

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 the 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 retested as required until the test results are within the limits specified.

Testing requirements follow the OPSS and ASTM standards.

2.2 Field Testing

Water-tightness testing parameters are dependent on groundwater levels prior, during and after testing of the sanitary sewer. The static water level shall be measured and recorded. Testing shall be carried out from maintenance hole to maintenance hole, including house service connections as work progresses.

The construction of new mainline pipe sewers shall not proceed when three previously placed sections of the pipe sewer have not been tested or have been tested and are unsatisfactory.

Pipe sewers shall be repaired and retested, as required. All visible leaks shall be repaired.

No part of the work will be accepted until the pipe sewers are satisfactorily tested following completion of the installation of service connections and backfilling.

2.3 Infiltration Test

Discontinue dewatering operations at least three days before conducting the test and allow the groundwater level to stabilize. Infiltration test shall be conducted where the groundwater level at the time of testing is 600mm or more about the crown of the pipe for the entire length of the test section. The test section is normally between adjacent maintenance holes.

A watertight bulkhead is constructed at the upstream end of the test section. All service laterals, stubs and fittings are plugged or capped to prevent water entering at these locations. A V-notch weir or other suitable measuring device is installed at the downstream end of the test section. Infiltration water is allowed to build up behind the weir until the flow through the V-notch has stabilized. The rate of flow is then measured. The rate of flow shall not exceed the maximum allowable infiltration calculated for the test section. Allowable infiltration is calculated as 0.075 litres/millimeter diameter/ 100 metres of pipe sewer/hour.

2.4 Exfiltration Test

Exfiltration tests shall be conducted where the groundwater level is lower than 600mm above the crown of the pipe or the highest service connection included in the test section.

The pipe section is normally between adjacent maintenance holes. The test section of the pipe sewer shall be isolated by temporarily plugging the downstream end and all incoming pipes of the upstream maintenance hole. All service laterals, stubs and fittings are plugged or capped to prevent water entering at these locations.

2.5 Testing With Water

The test section shall be slowly filled with water making sure that all air is removed from the line. A period of 24 hours for absorption or expansion shall be allowed before starting the test, except when exfiltration requirements are met by a test carried out during the absorption period.

Water shall be added to the pipeline prior to testing until there is a head in the upstream maintenance hole of 600mm minimum over the crown of the pipe or at least 600mm above the existing groundwater level, whichever is greater. The maximum limit of the net internal head on the line is 8m. In calculating net internal head, allowance for groundwater, if any, shall be made.

The distance from the maintenance hole frame to the surface of the water shall be measured. After allowing the water to stand for one hour, the distance from the frame to the surface of the water shall be measured again. The leakage shall be calculated using volumes.

The leakage at the end of the test period shall not exceed the maximum allowable calculated for the test section. Allowable leakage is calculated as 0.075 litres/millimeter diameter/100 meters of pipe sewer/hour.

An allowance of 3.0 litres/hour per metre of head above the invert for each maintenance hole included in the test section shall be made.

Maintenance holes shall be tested separately, if the test section fails.

2.6 Low Pressure Air Testing

The Town may allow or require testing by use of air where water is not readily available or the difference in the head in the test section is greater than 8 meters or freezing conditions exist. The Contract Administrator will be required to demonstrate to the Town why low pressure air testing is required instead of water testing.

Air control equipment that includes a shut off valve, safety valve, pressure regulating valve, pressure reduction valve and monitoring pressure gauge with pressure range from 0 to 35kPa with a minimum division of 0.5kPa and accuracy of 0.25kPa shall be provided.

Tests shall be conducted between two consecutive maintenance holes. The test section shall be plugged at each end. One plug shall be equipped with an air inlet connection to fill the pipe sewer with air.

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 that the groundwater level is above the invert of the pipe.

The air pressure shall be stabilized for five minutes and then regulated to maintain it to 20.5kPa plus the allowance for groundwater, if any. After the stabilization period, the time taken for a time taken for a pressure drop of 3.5kPa shall not be less that the times shown in Table 1.

If the length of the test section is greater than the length for the minimum time, the new testing time shall be a product of the length of the test section multiplied by the time shown in Table 1 for the appropriate size of the pipe.

If the results of an air test are marginal, the Contract Administrator may require the section to retested using water.

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

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	1:52	182	0.623
150	2:50	121	1.140

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)
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

2.7 Mandrel Deflecting Testing

Ring deflection testing shall be performed on all pipe sewers constructed using plastic pipe. The allowable deflection pipe diameter is calculated as:

Pipes 100 to 750mm 7.5% of the Base Inside Diameter of the Pipe

Pipes Greater than 750mm 5.0% of the Base Inside Diameter of the Pipe

Where:

Base Inside Diameter is defined in the CSA or ASTM standard to which the pipe is manufactured.

A suitably designed device as defined below shall be pulled through the pipe sewer to demonstrate that the pipe deflection does not exceed the allowable deflected pipe diameter. The device shall be pulled manually through the pipe not sooner than 30 days after the completion of the backfilling and installation of the service connections.

A suitable designed device shall be mandrel, 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 +/- 1mm. The contact length of the mandrel shall be measured between the points of the contact on the mandrel arm or between sets of prongs. The 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 +/- 0.1mm. An acceptable mandrel shall not pass through the proving ring. The proving ring shall be fabricated from a steel a minimum of 6mm thick.

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

All sections of the pipe that fail the deflection test shall be repaired and retested.

Table 2: Deflection Testing of Pipe Sewers (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 Closed Circuit Television (CCTV) Inspections

All pipe sewers, maintenance holes and laterals shall be inspected using CCTV equipment. Testing shall be completed at time prior to Maintenance and at a time prior to Assumption. Inspection and reporting shall be compliant with NASSCO PACP/MACP/LACP Assessment Certification Program.

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 actually conditions. Should the video not be of this quality, as determined by the Town, 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%.

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 Town. 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.

Media storage shall be on a high-quality USB drive, in an MP4 format file and inspection report shall consist of one pipe section only. A record on USB drive 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 shall be provided and two copies of the printed report.

The camera lens should be positioned along the center axis of the pipe. Lighting in the sewer pipe must be sufficient to illuminate approximately 2 metres ahead of the camera and be evenly distributed around the periphery of the pipe without loss of contrast. The camera must maintain a speed that will allow for the defects to be observed clearly. The camera must stop and pan special features within the pipe, such as maintenance hole interfaces, junctions, service connections and major defects.

Any visible defects shall be repaired to the Town’s satisfaction.

3. Forcemain Requirements

3.1 General Requirements

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

3.2 Hydrostatic Leak Test

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

Test pressure shall be specified in the Contract Documents or be provide by The Town.

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

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

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

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

4.0 Maintenance Hole Testing Requirements

4.1 General Requirements

Every maintenance hole shall be chimney seal tested and visually inspected, and where specified by the Town, shall be tested by either exfiltration water testing or infiltration water testing. As an alternative at the discretion of the Town, testing may be performed by vacuum testing. Vacuum testing shall be conducted on un-backfilled maintenance holes.

A photographic record and inspection with condition rating shall be completed on every maintenance hole.

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 Town.

Leakage shall not exceed a rate of 3 litres per hour per meter of head above the lowest pipe invert in the maintenance hole.

Maintenance holes shall be repaired and retested, as required, until the test results are within the limits specified. Visible leaks shall be repaired regardless of the test results.

4.3 Maintenance Hole Infiltration Water Test

This test shall be used in place of the maintenance hole exfiltration test at the discretion of the Town.

4.4 Negative Air (Vacuum) Test

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

Equipment used for this test 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 33.8kPa of Hg to 30.4kpa of Hg meets or exceeds the values in the Table 4 from ASTM 1244M.

4.5 Chimney Seal Leak Test

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

Pull the top of the seal away from the maintenance hole's frame and pour approximately 4 litres of water behind the seal. Observe the bottom seal for a minimum of 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 bottom expansion band will be required to be moved, replaced or repositioned then retested.

5.0 Final Connection to Existing Sanitary Sewer

After the pressure, leakage, deflection and CCTV tests have passed; the Contractor shall obtain written approval from the ORO to make the final sanitary sewer system connection to the existing collection system.

The Town shall be contacted two (2) full working days prior to the final connection to determine if any special measures shall be taken and/or an appropriately licensed operating authority employee is required to oversee the works. The Contractor will be responsible for all costs for call outs of Town staff if the Contractor fails to notify the Town that the connection will not take place prior to two (2) hours of the intended start time.

The Contract Administrator and Town staff shall be present to witness the entire final connection process of the new sanitary main to the existing collection systems.

During the final connection of the new sanitary sewer system to the existing collection system, the Contractor shall insure that the new tracer wire is connected to the existing tracer wire.

6.0 Tracer Wire Connectivity Test

Before the installation of base asphalt or final grading, the Contractor or the Town's Locate Technician, shall demonstrate the integrity of the underground tracer wire by applying a conductivity signal and confirming the signal on all sanitary sewer lines and services. The Contract Administrator and Town staff shall witness the conductivity test(s).

The intent of this test is to confirm that the tracer wire has been installed on all sewer mains and services as specified. Specifically, the test shall demonstrate the integrity and continuity of the tracer on all sanitary sewers and services.

A continuity signal shall be applied to the tracer wire and the signal confirmed over the entire length of all tracer wire installed. The signal shall be detectable for a distance of at least 300m from either side of the signal connection point. At no time shall there be a break in the continuity of the tracer wire.

Services require tracer wire from the service "T" along the service line to the inspection port and brought to the surface.

For sanitary sewers, including LPF systems, the tracing wire shall be brought to the surface inside of valve boxes. The tracer wire must be brought up the outside of the valve box and installed through a grommet near the surface.

The Contractor shall demonstrate that the tracer wire in chambers can be accessed from finished grade and that the signal is detectable on the sewer mains outside of the chamber.

Acceptable means of undertaking the conductivity test include using traditional locating techniques.

7.0 Valve Positioning

The Contractor shall demonstrate that all valves, main line and service, are in the final positioning as outlined in the Contract Documents or as directed by the Contract Administrator.

8.0 Reference Standards

1. OPSS 407 Construction Specifications for Maintenance Hole, Catch Basin, Ditch Inlet and Valve Chamber
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