

**Construction Specification for  
Sewer and Maintenance Hole Cleaning**

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## **TS 411.01 SCOPE**

This specification covers the requirements for the flushing and cleaning of existing sewers and maintenance holes, including the removal of debris, obstruction and blockages. Sewer bypass flow pumping may be required for the temporary conveyance of sanitary or combined sewage flows during cleaning operations.

The Work shall include the following: if necessary, design of a fully operational temporary sewer bypass system; obtaining regulatory approvals for the bypass installation, removal and operation; commissioning and decommissioning; spill prevention and cleanup as required.

## **TS 411.02 REFERENCES**

This specification refers to the following standards, specifications or publications:

### **City of Toronto Standard Specifications**

- |         |   |
|---------|---|
| TS 4.01 | Construction Specification for Sewer Bypass Flow Pumping for Local Sewers |
| TS 4.02 | Construction Specification for Sewer Bypass Flow Pumping for Trunk Sewers |

### **Canadian Standards Association**

- |           |   |
|-----------|---|
| CSA B64.5 | Backflow Preventers, Double Check Valve Type (DCVA) |
|-----------|---|

## **TS 411.03 DEFINITIONS**

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

**CCTV** means closed circuit television

**Combination Hydro-jet Cleaner** means a service vehicle or equipment capable of pressure washing, suction vacuum cleaning of debris.

**CIPP** means cured-in-place pipe

**Debris** means sludge, dirt, sand, gravel, rocks, bricks, roots, grease, encrustations and other solid or semi-solid materials that may cause restriction to flow in pipe sewers, catchbasins, maintenance holes and ditch inlets.

**IICRC** means Institute of Inspection Cleaning and Restoration Certification

**MECP** means the Ministry of the Environment, Conservation and Parks

## **TS 411.04 DESIGN AND SUBMISSION REQUIREMENTS**

The Contractor shall prepare and submit the following:

- 1) Sewer Cleaning Plan providing information for the equipment and operating parameters required for cleaning.

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- 2) Temporary Sewer Bypass Plan ensuring there is capacity and size to handle the existing peak flows and surcharge flow rates at all times during the bypass operation.
  - 3) Spill Response Plan.

The Contractor shall not procure or install temporary bypass system, until the Temporary Sewer Bypass Plan and the Spill Response Plan are approved by the Contract Administrator. The Temporary Sewer Bypass Plan and Spill Response Plan shall be submitted four weeks prior to the start of construction to the Contract Administrator.

#### **TS 411.04.01 Sewer Cleaning Plan**

The Sewer Cleaning Plan for providing information for the equipment and operating parameters required for cleaning shall include the following:

- Equipment and materials that will be utilized to clean the sewers inclusive of sewer flushing, removal of encrustations, calcite build-up, sewer solids and debris; and other large objects.
- Permits and approvals required for cleaning.
- Normal operating and maximum pressure limits that will be utilized by the contractor.
- Sewer debris material and disposal plan.
- Risk assessment based on sewer pipe condition and construction method.
- Emergency contact list and plan.

#### **TS 411.04.02 Temporary Sewer Bypass Plan**

If the Contract Documents requires a temporary bypass or the Contractor, at their discretion, has determined that the sewer flow bypass are required to facilitate cleaning operations, the Contractor shall prepare a Temporary Sewer Bypass Plan according to TS 4.01 or TS 4.02.

#### **TS 411.04.03 Spill Response Plan**

A site-specific Spill Response Plan shall include the following:

- Procedures for notification to the City and the Ministry of the Environment, Conservation and Parks (MECP) Spill Action Centre.
- Mandatory regulatory reporting requirements.
- Plan for investigating the cause of the spill.
- Plan for containing the spill and addressing the source of the spill.
- Determine if any service connections, storm drains, watercourses or other infrastructure that could be negatively affected by a spill.
- Plan for preventing public exposure to the spill, including procedures for redirecting pedestrians and traffic away from the impacted area.

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- Measures to be taken to avoid or mitigate the adverse effects of the spill on the environment.
  - Name of responsible person and their responsibilities to document and liaise with all agencies during a spill.

#### **TS 411.04.04                    Acceptance of the Plans**

The Temporary Sewer Bypass and Spill Response Plans should allow the Contract Administrator to understand the manner in which construction on the sewer is to take place, the flow rates accommodated by the bypass and evacuation and contingency plans in case of a spill including cleanup.

The construction shall start only after the City reviews and accepts the Temporary Sewer Bypass Plan and Spill Response Plan. The Contract Administrator shall then issue the acceptance letter to the Contractor. The letter will indicate whether a pre-construction meeting is required and who should be contacted at the City prior to the start of construction.

Both plans shall be posted at the site office or site trailer during the sewer bypass operations.

#### **TS 411.05                        MATERIALS – Not Used**

#### **TS 411.06                        EQUIPMENT**

The Contractor shall review the available CCTV as footage may be incomplete or limited due to obstructions and debris. The cleaning contractor shall review the available CCTV and shall carry a conservative level of effort to review any obstructions and debris which may increase beyond the point of last CCTV footage.

Manual cleaning methods shall be at the Contractor's discretion. Suggested equipment include buckets, brushes, scrapers and high-pressure water nozzles.

#### **TS 411.06.01                    Combination Hydro-Jet Cleaner**

A combination hydro-jet cleaner specifically designed for the purpose of cleaning sewer pipes, catchbasins, maintenance holes and ditch inlets. The equipment shall be capable of producing a flow rate of 4.1 L/s at 13,800 kPa of pressure complete with the following requirements:

- Selection of nozzles capable of effectively scouring and removing grease from the sewer pipe wall and transporting debris in all sizes of the sewers to be cleaned
- Water tank
- Auxiliary engines
- Pumps
- Hydraulically driven hose reel with a wash down gun for cleaning maintenance holes and
- Double check valve backflow prevention device according to CSA B64.5 requirements for filling a water tank from a hydrant.

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### **TS 411.06.02 Debris Removal**

Vacuum unit(s) used for removing sewer debris from sewer cleaning operation to be completed with the following requirements:

- Positive displacement pumps or fans producing a minimum 700 L/s of air movement
- Storage tank; and
- Minimum 150 mm diameter suction hoses attached to a hydraulic boom.

Configure the storage tank to allow the liquid portion of the debris to be returned to the sewer.

### **TS 411.06.03 Solid Debris Cutting and Intruding Sewer Service Removal**

Solid debris cutting equipment shall consist of remote controlled hydraulically driven saw or blade cutters, root cutters, remotely operated robots or other types of equipment capable of removing/cutting heavy roots and solid debris such as encrustation and grease.

Intruding sewer service pipe removal equipment shall consist of remote controlled hydraulically driven cutters and reamers and remotely operated robotic routers or grinders capable of cutting back intruding sewer service pipes.

Select the cutting equipment to be used after considering debris type, intruding sewer service pipe material and sewer pipe condition. Debris that cannot be removed with multiple flusher passes shall be reamed, cut out and removed.

Solid debris removed shall not be flushed as the debris can settle in downstream sections. The debris shall be only permitted to be flushed to the next maintenance hole and arrangement shall be made to collect all debris using vacuum units. The material removed shall be dried and mixed in equal parts with sand. The resulting material is then to be disposed of as a non-hazardous, non-registerable solid industrial waste by the Contractor.

### **TS 411.06.04 Man-entry Cleaning Equipment**

Equipment commonly used for manual cleaning of large diameter sewers shall include, the following for the removal of debris such as roots, hardened encrustations and grease deposits

- bucket machine: mechanical jaws scrape material off sewer walls and deposit into the bucket
- scrapers and brushes: manual removal of debris
- cutters, reamers and grinders: mechanical removal of debris.

It is essential that the cleaning contractor remove all equipment required for the manual removal of roots, hardened encrustations, grease deposits from the sewer upon the completion of cleaning operations.

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**TS 411.07****CONSTRUCTION****TS 411.07.01****Sewer and Maintenance Hole Cleaning**

Notify the Contract Administrator of the location where the sewer or maintenance hole cleaning will be done one full Working Day before starting the cleaning work at that location. Deliver notices prepared by the Contractor and approved by the Contract Administrator to residents and businesses.

Clean sewers and maintenance holes completely of debris including sludge, dirt, sand, gravel, rocks, bricks, grease and other solid and semi-solid materials removed from the sewer by the equipment identified in TS 411.06, herein.

Take necessary precautions to ensure that no flooding of public or private property occurs during sewer cleaning. Reduce pressure of cleaning equipment, if required.

Start the cleaning operation with the upstream sewers and associated maintenance holes in the system and proceed downstream with the direction of flow. It is recommended to clean the maintenance holes walls, benching and invert prior to the sewer sections to avoid the collection of debris downstream after the sewer section has been cleaned. All debris collected as part of cleaning operations shall not be allowed to flow downstream of the next immediate downstream maintenance hole.

Advise the Contract Administrator immediately when pipe material or backfill material is observed during the cleaning of a sewer. The Contract Administrator shall direct one of the following operations be performed,

- complete or attempt to complete cleaning of the sewer,
- suspend cleaning operations and inspect the sewer, and
- simultaneously clean and inspect the sewer.

Limit the distance required for the nozzle to travel in the sewer to one maintenance hole-to-maintenance hole sewer segment.

Sewers shall be cleaned using a maximum pressure of 10,350 kPa to prevent damage to the sewer. Sewer cleaning using pressures greater than 10,350 kPa shall be discussed with the City staff and approved by the Contract Administrator. Approved locations shall be monitored by CCTV.

**TS 411.07.02****Reverse Set-Up Cleaning**

Perform a reverse set-up cleaning when a blockage in the sewer prevents completion of cleaning from the downstream maintenance hole by moving equipment to the upstream maintenance hole and attempting to complete the cleaning of the entire sewer.

Attempt to remove a specific blockage in the sewer for a minimum of one hour before advising the Contract Administrator that the blockage cannot be removed. Provide the Contract Administrator with the following information for blockages that cannot be removed:

- 1) Location of the blockage indicated by a paint mark on the ground surface above the sewer and the distance from the nearest maintenance hole.

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- 2) An inspection photograph, video recording or digital file of the blockage.
  - 3) The effect the blockage has on completion of the Work and the requirement for action to deal with the blockage such as an emergency sewer repair or scheduled maintenance.

#### **TS 411.07.03            Excavations for Retrieval of Equipment or Other Purposes**

Where the retrieval of lodged equipment is required by open-cut excavation, the Contractor shall immediately notify the Contract Administrator. The Contractor shall provide for retrieval including any excavation, maintenance of flow, repair, backfill and restoration. However, if the equipment became lodged in a portion of a sewer section for which no previous CCTV inspection or other advice was provided to the Contractor by the City, then the City will pay the Contractor for 75 per cent of the total above noted cost only if such cost occurs during the preliminary V1 CCTV inspection or during preliminary cleaning operations for the V1. However, the City will not entertain any other associated cost related to this work.

If it is necessary to excavate for any reason such as repair of defective liner, reinstatement of service connections or bypass of flow, the Contractor shall provide such excavation, repair, backfill and restoration as required. However, dependent on the reason why an excavation is required and at the discretion of the Contract Administrator, additional payment for such work may be negotiated with the Contractor. In such case where the work is determined by the Contract Administrator to be an extra to the Contract, the work shall not proceed without the approval of the Contract Administrator prior to the work.

#### **TS 411.07.04            Noise from Operations**

Minimize the emission of sound by using low noise pumps and generators and implement additional sound attenuation measures, such as soundproof canopy, acoustic foam insulation and anti-vibration devices in the sound sensitive areas.

The emission of sound from pumps and generators shall be according to Toronto Municipal Code, Chapter 591, Noise.

Apply for a permit for an exemption from a noise prohibition or noise limitation, if required.

#### **TS 411.07.05            Disposal of Material**

In accordance with the requirements of the Environmental Protection Act, R.S.O. 1990, Section 27 and subject to all terms and conditions related to Waste Management, the Contractor shall be responsible for the complete removal and disposal off-site, of all foreign materials flushed, scraped, or cut out of the sewer line. Flushing and abandoning of debris in sewer lines is not permitted.



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Before disposing of solids, the Contractor shall decant all liquids into the City designated sanitary sewer main. There shall not be any dumping or decanting into any storm sewers. Decanting of solids into any sewer main is not permitted. The Contractor shall decant liquid only into sanitary or combined sewers greater than 250 mm in diameter clear of debris and with low flow. Filtering devices shall be used during the decanting process to prevent any debris from entering the sewer system. Prior to decanting, the Contractor shall verify the type of flow in the sewer. Should a blockage occur in the sanitary or combined sewer due to decanting, the cost of all sewer backups and cleaning shall be at no extra cost to the City.

Prior to commencement of the Contract, the Contractor shall notify the Contract Administrator of the disposal site(s). The Contractor shall provide the Contract Administrator with the following documentation attached to all relevant invoices:

- a) Contract name and No.
- b) Vehicle ID – License Plate Number
- c) Date of disposal
- d) Time of disposal
- e) Net weight of load
- f) Provide log books and scale printouts to the Contract Administrator.

All debris must be decanted prior to disposal. Off-site debris dewatering facilities must meet provincial environmental regulations and requirements. Provide copies of required licenses, permits and relevant documentation required for dewatering facility to the Contract Administrator before starting the Work.

#### **TS 411.07.06 Sewer Reaming, Cutting and Grinding**

The sewer section shall be reamed to remove deposits and protrusions using an approved reaming method. Deposits and protrusions can include calcite build up, roots and protruding service connections. An acceptable CCTV camera must monitor reaming operations.

#### **Reaming Tolerances**

All protrusions, deposits, build-ups and other foreign material in the sewer section shall be removed such that the internal diameter of the sewer pipe is not reduced by more than 5 mm for sewers 450 mm diameter or less, and no more than 10 mm for sewers greater than 450 mm in diameter. Any material remaining after reaming providing that such material is hard and firmly attached to the sewer wall. There should not be any sharp pointed protrusions after reaming that may damage future Cured-In-Place Pipe (CIPP) liners or spot repairs.

#### **Protruding Service Connections**

Service connections that protrude into the sewer section must be cut or ground back prior to reaming of the sewer with any type of reaming device that may damage the service connection. Protruding service connections shall be cut back sufficiently to preclude damage from reaming operations and the extent of the protrusion left in place must not interfere with the installation or long-term performance of the CIPP liner. Cut back protruding service connections shall be smooth and even with no jagged edges. If the service lateral piping or service connection is damaged or broken by the Contractor, then the Contractor shall repair the damage by using excavation if necessary. The Contractor shall submit for approval, the proposed method of repair and reinstatement for damaged drain piping or service connections.

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### **Precaution to Prevent Damage to the Sewer Section**

The Contractor shall plan and execute the reaming operation to prevent damage to the sewer section and any service connections in the sewer section. Proper precautions shall be taken by the Contractor to ensure that the reaming operation does not cut into the sewer itself, to ensure that the reaming tools do not become jammed in the sewer and that any areas of the sewer that are structurally unsound are not further damaged. Any extraction of reaming tools or other equipment, including extraction by excavation, is the responsibility of the Contractor.

### **Damage to City and Private Property**

The Contractor shall be held accountable for all damage to City and private property caused by cleaning or inspection operations. The Contractor shall repair all damaged property to the satisfaction of the Contract Administrator. All costs associated with these repairs shall be at no extra cost to the City.

Notify the Contract Administrator immediately when damage to property occurs. The Contractor shall provide written reports for each property attended for investigation of damage. Reports shall include photographs of all damage, dates and times the damage occurred, verbal or written agreements with property owner and all actions taken or proposed to rectify the identified damage. Reports shall be submitted to the Contract Administrator within 24 hours of attending the property.

Sewers may be located within easements through private property or City owned parklands and right-of-ways where no paved access may exist. It will be the Contractors responsibility to identify these sewers and arrange for access and to restore any surface damage to private and City owned property to the satisfaction of the Contract Administrator.

Sewer backup or “blow-back” on private property resulting from cleaning or inspection activities is not acceptable and shall be avoided at all costs. It is expected that where this possibility exists the Contractor shall take appropriate measures such as making modifications to cleaning equipment and/or taking additional time to clean such sewers.

Clean-up of affected residences shall be done by cleaning professionals. Under no circumstances are cleaning equipment operators to enter residences

Where actual sewage or “grey water” has flooded private property, the Contractor shall immediately clean and disinfect all affected areas as well as flush all weeping tile. The Contractor shall immediately hire an independent IICRC certified water damage or flood restoration contractor to assess any damage to contaminated building materials such as drywall, insulation, carpets, weeping tile or sub-floors, and immediately make any required repairs.

If a residence is uninhabitable as a result of a sewer back-up the Contractor shall pay for reasonable hotel accommodations and meals for all affected residents.

The Contractor shall provide the Contract Administrator with a 24-hour contact number to arrange for immediate clean-up and repair of private property.

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**TS 411.07.07            Flow Control and Bypass**

No flow control or bypass pumping shall be employed that has insufficient capacity to maintain flow in the sewer system. It is the Contractor's responsibility to employ flow control of sufficient capacity. No work requiring flow control shall proceed until flow control arrangements are in place that provide sufficient flow control capacity including for situations that exceed the Flow Control Included Limit Provision.

When interruption of sewer line flows is necessary to properly conduct the work including such as CCTV inspection and CIPP lining operations, acceptable methods of flow control shall be provided. Where bypass pumping is used, flow control shall be according to TS 4.01 or TS 4.02. These specifications outline the requirements and submittals required for the design of a fully operational temporary bypass system and associated requirements.

The Contractor shall make all necessary arrangements with the owners of each building. The Contractor shall contact all property owners or tenants or both to coordinate the repair work to the sewer and minimize any impact on residents, businesses or both.

**When Flow Control Is Required**

Flow control of the sewer flow will be required periodically during the work as set out below. Achieving flow control may require temporary bypass pumping, diversion or other method that will achieve the required flow control.

**Measurement of Sewers to Determine Sizing for Liners**

Flow control shall be sufficient so that dimensions needed for sizing the CIPP liners can be accurately and reliably determined including accounting for liner sizing for hydrogen sulfide gas corroded sewers.

**Cleaning and Preparation**

Flow control during cleaning and preparation operations shall be sufficient for the work and the need for flow control shall be at the Contractor's discretion.

**CCTV Inspections**

Flow control is required for the preliminary CCTV inspection (V1), the post-cleaning and preparation CCTV inspection (V2) and for the final CCTV inspection after CIPP lining and lateral reinstatement are complete (V3). The flow control shall be sufficient such that any flow or standing fluid in the sewer shall not obscure the inspection of all surfaces that will result in difficulty or inability to view all surfaces of the sewer to sufficiently judge, in the opinion of the Contract Administrator, the results of the work. The results of the work include cleaning, preparation, lining and service connection reinstatement.

**TS 411.07.08            Water Supply for Sewer Cleaning and Flushing**

Water shall be made available from the City for the Contractor's use in conducting the required Work. The Contractor shall obtain hydrant use permits for water supply from the City.

One hose/nozzle connection will be permitted per hydrant.

Two or more consecutive hydrants shall not be permitted to be used for water supply at the same time.

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For hydrant use during the winter period between November and March, the hydrant shall be protected with an insulated box to prevent freezing.

The Contractor shall be responsible for all costs associated with the provision and supply of water under the hydrant permit to be used in conducting the required Work.

**TS 411.07.09            Removal, Cleanup and Restoration**

Ensure all sewage from the bypass pipes, pumps and fittings is discharged to the specified sanitary or combined sewer. Flush the bypass system with potable water before removal.

Restore bypass pump areas to pre-bypass condition including any cleanup measures necessary due to fuel, oil or sewage leaks. All cleanup measures taken shall be documented.

The disposal or discharge shall be according to requirements of Toronto Municipal Code, Chapter 681, Sewers.

**TS 411.08                    QUALITY ASSURANCE – Not Used**

**TS 411.09                    MEASUREMENT FOR PAYMENT**

**TS 411.09.01                Actual Measurement**

**TS 411.09.01.01          *Sewer Pipe Cleaning***

Measurement for sewer pipe cleaning and flushing shall be by length in metres, by time in hours, or by volume in cubic metres, as specified in the Contract Documents.

**TS 411.09.01.01.01      *By Length***

Measurement of sewer pipe cleaned shall be by length in metres (m) along the centerline of the sewer pipe from the centre of the maintenance hole, catch basin or ditch inlet at each end of the sewer pipe system.

Measurement for pipe culverts shall be from one end of the pipe culvert to the other end of the pipe.

When cleaning and flushing is incomplete due to a collapsed pipe or immovable blockage, the length of collapsed pipe or blockage shall be deducted from the length measured for payment.

**TS 411.09.01.01.02      *By Time***

Measurement shall be by time in hours that the hydro-jet cleaner is in effective operation.

**TS 411.09.01.01.03      *By Volume***

Measurement shall be by volume in cubic metres of decanted debris, in predetermined truck box capacities.

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**TS 411.09.01.02      *Maintenance Hole Cleaning***

For measurement purposes, a count shall be made of the number of maintenance holes cleaned.

**TS 411.09.02              **Plan Quantity Measurement****

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clause under Actual Measurement.

**TS 411.10                  **BASIS OF PAYMENT****

**TS 411.10.01              **Sewer Pipe Cleaning – Item****

Payment at the Contract Price for the above tender item shall be full compensation for all labour, Equipment and Material to do the Work.

- 5% payment after submission of all plans.
- 5% payment after approval of all plans.
- 75% payment for cleaning upon completion of cleaning and payment shall be prorated based on the completed work. Remaining 15% upon final acceptance of the sewer cleaning as determined by the review of the corresponding video inspection. Deficiencies shall be addressed prior to claiming the remaining 15% amount.

For rehabilitation projects, if a separate cleaning pay item is not included, cost of cleaning shall be included with rehabilitation of the sewer. Payment for cleaning will be prorated.

If sewer section not attempted to be cleaned, no payment shall be made.

**TS 411.10.02              **Maintenance Hole Cleaning – Item****

Payment at the Contract Price for the above tender item shall be full compensation for all labour, Equipment and Material to do the Work.

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**Appendix 411-A, September 2019  
For Use While Designing and Administrating City Contracts**

Note: This is a non-mandatory commentary appendix intended to provide information to a designer and contract administrator during the design and construction stage of a contract on the use of this TS specification in a City contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an owner's design decisions and methodology.

Notes to Designer:

*The designer should insert the following text into the tender template in Section 2, Clause 8.1 Mandatory Bid Submission Requirements*

**Information to be Submitted with Bid**

The Contractor shall submit its Ministry of the Environment, Conservation and Parks (MECP) license to haul and dispose materials from sewer lines.