

**Construction Specification for
Sewer Bypass Flow Pumping for Local Sewers**

Table of Contents

TS 4.01.01	SCOPE	2
TS 4.01.02	REFERENCES	2
TS 4.01.03	DEFINITIONS	2
TS 4.01.04	DESIGN AND SUBMISSION REQUIREMENTS.....	3
TS 4.01.04.01	Temporary Sewer Bypass Plan	3
TS 4.01.04.02	Spill Response Plan	4
TS 4.01.04.03	Acceptance of the Plans	4
TS 4.01.05	MATERIALS – Not Used	4
TS 4.01.06	EQUIPMENT	4
TS 4.01.06.01	Pumps	4
TS 4.01.06.02	Temporary Sewer Bypass Piping	4
TS 4.01.07	CONSTRUCTION	5
TS 4.01.07.01	Licensed Wastewater Collection Operator	5
TS 4.01.07.02	Bypass Equipment and Piping	6
TS 4.01.07.03	Noise from Operations	6
TS 4.01.07.04	Plugging.....	7
TS 4.01.07.05	Crossings.....	7
TS 4.01.07.06	Removal, Cleanup and Restoration.....	7
TS 4.01.08	QUALITY ASSURANCE – Not Used	7
TS 4.01.09	MEASUREMENT FOR PAYMENT	7
TS 4.01.10	BASIS OF PAYMENT.....	8

TS 4.01.01 SCOPE

This specification covers the requirements related to sewer bypass flow pumping required for the temporary conveyance of sanitary or combined sewage flows during rehabilitation of the sewer pipe or when the sewer pipe is put out of service. This specification is for sewer pipe diameters 450 mm or less.

The Work shall include the following: design of a fully operational temporary sewer bypass system; obtaining regulatory approvals for the bypass installation, commissioning, operation and maintenance, monitoring, decommissioning and removal; spill prevention and cleanup; protection of traffic, road, rail, and water body or crossings as required.

TS 4.01.02 REFERENCES

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

Provincial Statute

Ontario Regulation 129/04 Licensing of Sewage Works Operators Regulation

City of Toronto Standard Specifications

TS 4.60 Construction Specification for Utility Cut and Restoration

American Society for Testing and Materials

F714-13 Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter
F1417-11a Standard Practice for Installation of Acceptable Plastic Non-Pressure Sewer Lines Using Low-pressure Air
F2164-13 Standard Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure

TS 4.01.03 DEFINITIONS

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

Engineer means the licensed individual or firm responsible for the design of the works or their designate and registered with the Professional Engineers of Ontario.

Licensed Wastewater Collection Operator means a person licensed as an operator in the province of Ontario. The person performing operational duties holds a valid license under Ontario Regulation 129/04.

Temporary Sewer Bypass System means temporary piping, plugs, pumping and standby equipment installed and operated for the purpose of intercepting the incoming sewage flow, conveying the flow around the work area, and discharging the flow into the existing sewer system downstream of the work area.

TS 4.01.04**DESIGN AND SUBMISSION REQUIREMENTS**

The Contractor shall prepare and submit the following:

- a) 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; and
- b) 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 and the City. The Sewer Bypass Plan and Spill Response Plan shall be submitted four weeks prior to the start of construction to the Contract Administrator.

TS 4.01.04.01**Temporary Sewer Bypass Plan**

The Temporary Sewer Bypass Plan shall include all of the following:

- Flow rates
- Other hydraulic considerations provided by the City
- Size of the sewer to be bypassed
- Bypass connection proposed
- Site and equipment monitoring
- Staging areas for pumps
- Duration of each phase of the work
- Sewer plugging method, type and size of plugs
- Location of maintenance holes or access points for suction and discharge piping, including a suitable site map
- Size, material, location and method of installation of suction and discharge piping
- Characteristics of bypass pump such as size, capacity and power requirements;
- Calculations of static lift, friction losses and flow velocity
- Pump curves showing pump operating range
- Characteristics of standby pump(s) such as size, capacity and power requirements
- Standby power generator(s) size and location, and refuelling requirements and restrictions
- Method of protecting discharge maintenance holes or structures from erosion and damage
- Method of noise control for each pump and generator
- Details of bypass pipe crossings, for example, driveways and sidewalks
- Any plans and procedures to mitigate issues related to night work, e.g. light, noise, odour and protection of environmental features specific to work
- Schedules for installation and demobilization
- Engineering plans depicting the work; and
- All provisions and precautions that will be taken during the bypass operations to prevent sewage backups, overflows and spills.

TS 4.01.04.02 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.
- Measures to be taken to avoid or mitigate the adverse effects of the spill on the environment, and
- Name of responsible person and their responsibilities to document and liaise with all agencies during a spill.

TS 4.01.04.03 Acceptance of the Plans

The Temporary Sewer Bypass Plan and Spill Response Plan should allow the Contract Administrator and the City 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 plans shall be submitted in PDF format.

The construction shall start only after the City reviews and accepts the Temporary Sewer Bypass Plan and Spill Response Plan. The Contract Administrator will 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 4.01.05 MATERIALS – Not Used

TS 4.01.06 EQUIPMENT

TS 4.01.06.01 Pumps

Provide electric or diesel powered fully automatic self-priming low noise pumps and low noise generators. The pumps shall be equipped with all necessary stop and start controls.

TS 4.01.06.02 Temporary Sewer Bypass Piping

The temporary sewer bypass piping shall be able to withstand pressures that are greater than the peak bypass pressure and the traffic load at road crossing ramps. Under no circumstances shall aluminum irrigation type piping or glued PVC pipe be used. The Contract Administrator shall approve discharge hose material type.

TS 4.01.07**CONSTRUCTION**

The Contractor shall cease bypass pumping operations when no longer required and return flows to the new or existing sewer or both. During bypassing, no wastewater shall be leaked, dumped, or spilled in or onto any area outside the existing wastewater system. Evacuation plan prepared by the Contractor shall be feasible and easy to implement in case of an emergency.

The Contractor shall immediately put the Spill Response Plan in action and notify the supervisor in the Divisional Operations Services unit and the Contract Administrator should a sanitary sewer overflow occur and take the necessary action to clean up and disinfect the spillage to the satisfaction of the City and the MECP and other governmental agencies. If sewage is spilled onto public or private property, the Contractor shall wash down, clean up, and disinfect the spillage to the satisfaction of the property owner at no extra cost to the City.

Remove maintenance hole top sections or make connections to the existing sewer and construct temporary bypass pumping structures only at the access location indicated on the Contract Drawings and as may be required to provide adequate suction conduit. If the Contractor proposes an alternate sewer temporary bypass plan and location, the maximum flow for that section may be adjusted by the Contract Administrator.

On all liner installation dates, the Contractor must maintain on site both a primary and standby bypass pump and pump power supply. Sufficient power supply and hoses must be on site in order to allow the pump to discharge into the downstream sewer section. The standby bypass pump and power supply shall be of an equal or better capability than the primary bypass pump and power supply. No bypass pumps or related equipment shall be disconnected or removed from the sewer or job site until after all service connections have been reinstated and the Contractor has recorded the post-installation video.

All by-pass pumping shall be in place and operation prior to the final pre-installation inspection. All bypass pumping capacities and configurations must be approved by the Contract Administrator prior to the actual liner installation date. For the standard flow control, the Contractor is required to complete a form which indicates date, time and location of when flow control starts and ends. The form must be emailed to the Contract Administrator for logging and recording purposes as per regulatory guidelines on a daily basis.

Protect the environment, public, and private property from any damage during the construction and operation of the bypass system.

Minimize the interruption of existing services to the public, residents, and all facilities connected to the bypassed sewer.

TS 4.01.07.01**Licensed Wastewater Collection Operator**

The temporary sewer bypass system shall be monitored at all times by the Contractor. The Contractor's employees must have the knowledge, experience and skill to maintain and operate all equipment and to switch to standby equipment if the need arises. The bypass system shall not be in operation unless it is monitored constantly by the Contractor's employee(s).

A licensed wastewater collection operator must be present on site for initial start up and shut down of a sewer bypass system to evaluate and inspect the process and the redirection of wastewater flow within the wastewater collection system. An Engineer must approve any changes to the bypass system after the initial set up such as adding a pump to the bypass system due to spike in flows, removal of a pump, changing discharge point and so on. A Toronto Water licensed operator must be present to witness the changes.

Immediately after the flow is redirected, and again after the flow is reinstated, the licensed operator must be present on site during the flow redirection. The licensed operator shall also confirm that the locations of the sewer bypass suction and discharge points are in compliance with the approved Temporary Sewer Bypass Plan.

TS 4.01.07.02 Bypass Equipment and Piping

Place pumps in temporary containments/berms to contain any fuel or sewage that may spill during the bypass operations.

Prior to pumping, flush and clean the sewer section, or maintenance hole, where the suction pumping is located.

When requested by the Contract Administrator, submit the pump maintenance records, pump operation records and fuel monitoring records for review.

Provide and connect standby equipment which can be operational for immediate use in the event of emergency or equipment breakdown.

Perform leakage tests of the bypass system using clean water prior to the actual operation. The sewer bypass pumping system shall be tested prior to installation using clean water. Provide Contract Administrator and the City 48 hours' notice. A licensed wastewater collection operator must complete such test in the presence of Toronto Water licensed operator to witness the test. Give the City 48-hour notice prior to testing.

TS 4.01.07.03 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.

All bypass pumps and related equipment must be silenced equipment or contained within an acceptable sound reduction structure below 65 dB(A) at 7 m. The site inspector shall ask the Contractor to operate one pump at a time and measure noise at 7 m radius for each pump. If the noise does not meet the requirement, the Contractor shall have to install additional noise control barrier or replace the pump at no cost to the City.

If further noise reduction is specified in the Contract Documents for sound sensitive areas, provide additional sound attenuation measures, such as soundproof canopy, acoustic foam insulation and anti-vibration devices. Pumps must not be operated with open acoustic covers. The pump shall be turned off prior to removing covers for maintenance purposes.

At all times the emission of sound from pumps and generators shall be according to Toronto Municipal Code, Chapter 591, Noise requirements.

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

TS 4.01.07.04 Plugging

Select sewer plugs based on the flow characteristics, size of the sewer and the location of the flow diversion point. Always provide a secondary plug, in the event the primary plug fails. Plug a sewer system by means and methods that will not cause any damage or blockage to the sewer pipes and maintenance holes.

Inspect all plugs for defects prior to every use.

When a plug is no longer needed, remove it gradually to allow flow to return gradually to the normal flow condition.

TS 4.01.07.05 Crossings

At all times keep the bypass piping within the limits of the Working Area and away from paved roadways and sidewalks.

When the bypass piping is crossing roadways, either construct traffic ramps or place the bypass pipelines in trenches and temporarily restore utility cuts according to TS 4.60.

TS 4.01.07.06 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 Toronto Municipal Code, Chapter 681, Sewers requirements.

TS 4.01.08 QUALITY ASSURANCE – Not Used

TS 4.01.09 MEASUREMENT FOR PAYMENT

Measurement shall be by lump sum and payment shall be when the Work is completed:

- 1) Temporary Sewer Bypass Plan and Spill Response Plan upon approval of these plans.
- 2) Installation of each phase of temporary bypass upon successful hydrostatic testing and trial run.
- 3) Operation and maintenance of temporary bypass system.
- 4) Successful disassembly and removal of the temporary bypass system.

TS 4.01.10**BASIS OF PAYMENT**

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

Appendix 4.01-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 specify the following in the Contract Documents:

- peak flows and surcharge flow rates (4.01.04.01)

The Contractor should indicate the following:

- how many persons to monitor the flow at all times, for example, 1 or 2 (4.01.07.01)
- how much standby equipment will be available, for example, 1 or 2 sets (4.01.07.02)

The Contract Administrator will determine who needs to review the plans prior to acceptance:

- the Temporary Sewer Bypass Plan and Spill Response Plan are reviewed by Toronto Water or Engineering and Construction Services or both division staff. If revisions and resubmissions are required, this will be communicated through the Contract Administrator
- the Sewer Bypass Plan and the Spill Response Plan is circulated to the manager of sewer asset planning in Toronto Water division for review and acceptance (4.01.04.03)

Other notes:

After witnessing any changes, the Toronto Water licensed operator will record any changes in a log (4.01.07.01).