



**CONSTRUCTION SPECIFICATION FOR
DEWATERING AND TEMPORARY FLOW PASSAGE SYSTEMS**

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This specification covers the requirements for the design, installation, operation, maintenance, and removal of a dewatering or temporary flow passage system or both to control water during construction, and the control of the water prior to discharge to the natural environment and sewer systems.

517.02 REFERENCES

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

Ontario Provincial Standard Specifications, Construction

OPSS 404	Support Systems
OPSS 492	Site Restoration Following Installation of Pipelines, Utilities, and Associated Structures
OPSS 510	Removal
OPSS 539	Temporary Protection Systems
OPSS 804	Temporary Erosion Control
OPSS 805	Temporary Sediment Control

Ontario Ministry of Transportation Publications

Highway Drainage Design Standards

MTO Forms:

PH-CC-822 Certificate of Conformance

Other

Ontario Water Resources Act, R.S.O. 1990, c. O.40

O. Reg. 169/03: Ontario Drinking Water Quality Standards under Safe Drinking Water Act, 2002, S.O. 2002, c. 32

517.03 DEFINITIONS

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

Automatic Transfer Switch means an electrical device that transfers power supply to a backup power source when there is an outage of the primary power source.

Cofferdam means as defined in OPSS 539.

Cut-Off Wall means a below grade wall that restricts groundwater flow and/or supports excavations.

Design Flow means the peak flow, volume of water per unit of time, generated by the design storm or calculated using a frequency analysis of recorded flows. The design flow will typically have a specific return period.

Design Storm means the rainfall event with a specified return period, where the rainfall is assumed to occur in a specified distribution.

Dewatering System means the components required to remove groundwater and/or carry out unwatering from within an excavation or work area to permit construction work to proceed under specified conditions, and may include a groundwater control system, impermeable barriers, pumps, and/or equipment.

Erosion means as defined in OPSS 804.

Groundwater Control System means sump pumps, oversized excavations with perimeter ditches, deep wells or well points or other systems used to lower the groundwater table.

Operation Plan means measures taken to accommodate flows higher than the conveyance capacity of the temporary flow control devices, channels, pipes, pumps, and other materials used to channelize, separate and/or isolate a work area within an existing waterbody.

Plug means an impervious, natural, or constructed device that blocks water.

Return Period means the average number of years based upon probability, between the occurrence of events equalling or exceeding the design flow. The return period typically ranges between 2-years and 100-years.

Sediment means as defined in OPSS 804.

Temporary Flow Control Device means a material or a group of materials that are used to control water flow into and out of a temporary flow passage system and may include a plug.

Temporary Flow Passage System means the temporary flow control devices, channels, pipes, pumps and operation plans used to manage sustained flow and flow resulting from precipitation events in order to separate and/or isolate a work area within an existing waterbody to permit work as specified in the Contract Documents. A temporary flow passage system may include temporary drainage facilities (e.g. channels, pipes, culverts and bridges) constructed as a temporary alignment of a natural watercourse.

Unwatering means the removal of ponded or flowing surface water.

Vegetated Discharge Area means a sloped, open area of land with existing vegetation suitable to prevent erosion.

Waterbody means any permanent or intermittent, natural or constructed body of water including lakes, ponds, wetlands and watercourses, excluding sewage works as defined in the *Ontario Water Resources Act*.

Watercourse means a stream, creek, river, or channel including ditches, in which the flow of water is permanent, intermittent, or ephemeral.

517.04 DESIGN AND SUBMISSION REQUIREMENTS

517.04.01 Design Requirements

517.04.01.01 Dewatering or Temporary Flow Passage System

The dewatering or temporary flow passage system or both shall be designed:

- a) To control water at the locations specified in the Contract Documents and at any other location where a system is necessary to complete the work.
- b) To be sufficient to permit the work at each location to be carried out as specified in the Contract Documents.
- c) To meet the requirements of the Contract Documents.
- d) To include channel and inlet and outlet protection measures as required to protect the environment in the event of system failure or the design flow rate being exceeded where a waterbody is present.
- e) To prevent soil loss or erosion where water is removed, pumped, or discharged.
- f) To prevent basal heave or instability.
- g) To maintain the flow of water and the natural functions of the waterbody upstream and downstream of the work area and shall not interfere with other uses of the water where the system involves the taking of water from a waterbody.

The design shall not:

- a) Result in displacement or damage to property, buildings, structures, utilities and other facilities adjacent to the Working Area, including from drawdown related settlement or other groundwater related effects
- b) Include the use of embankments and/or structures in public use, either existing or to be constructed as part of the work, to control or stop water flow.

Temporary flow passage system design shall include provision for fish passage at locations specified in the Contract Documents.

The temporary flow passage system shall allow the work to be conducted as specified in the Contract Documents. Design flow shall include groundwater discharge and flow resulting from a minimum 2 year return period design storm. A longer return period shall be used when determined appropriate for the work.

Temporary flow passage systems shall be designed according to TW-1 - Temporary Flow Passage Systems and Temporary Drainage Facilities from the Highway Drainage Design Standards.

517.04.02 Submission Requirements

517.04.01.01 Working Drawings

Working Drawings are required at locations where the dewatering system and / or temporary flow passage system items are specified in the Contract Documents. Three sets of Working Drawings shall be submitted to the Contract Administrator at least 7 Days prior to commencement of the dewatering or temporary flow passage system installation, for information purposes only.

The seals and signatures of a design Engineer and a design-checking Engineer shall be affixed on the Working Drawings verifying that the drawings are consistent with the Contract Documents.

One person shall not perform both the design Engineer and design-checking Engineer roles for a system.

Where multi-discipline engineering work is depicted on the same Working Drawing and the design or design-checking Engineer or both are unable to seal and sign the Working Drawing for all aspects of the work, the drawing shall be sealed and signed by as many additional design and design-checking Engineers as necessary.

The following information and details shall be shown on the Working Drawings, where applicable:

- a) Plans, elevations, and details
 - i. Type of system and operation plan.
 - ii. Design calculations demonstrating adequacy of the system and equipment.
 - iii. Design flow rate(s).
 - iv. Plan location, description, and dimensions of system components, including dams, cofferdams, cut-off walls, temporary channels, pipes, culverts, sewers, groundwater control systems employing wells and/or well points, sedimentation basins, tanks, pumps, power supply, and standby equipment.
 - v. Method of management of pumped water and plan location of all dewatering discharge points.
 - vi. Profile drawings shall extend through and immediately beyond the limits of the system.
 - vii. Water elevations upstream and downstream of the system at design flow rate.
 - viii. Dam height or crest elevation, cofferdam depth and tip elevation, cut-off wall depth or base elevation, pipe invert elevations, depths of wells and wellpoints, pump intake elevation, and sedimentation basin depth or base elevation.
 - ix. Plan location, elevation, type and dimensions of environmental protection measures.
 - x. Plan location, type and timing implementation of temporary erosion control according to OPSS 804 and temporary sediment control according to OPSS 805.
 - xi. Pipe type, size, and length, pump capacity, and tank capacity.
 - xii. Material and construction standards to be used for the work.
 - xiii. Method for establishing and monitoring construction site groundwater levels.
 - xiv. Criteria and method of removal of the system.
- b) Procedures for the system construction, operation, and maintenance, including daily start-up sequence where applicable, and operation shut down.
- c) Procedures for the removal of the system, including the removal sequence, and well decommissioning.
- d) Stand-by power or pumping system requirements and the use of automatic transfer switching, when required to protect the environment and the Work.
- e) Procedures that fully describe the associated waterbody and fish habitat protection measures, monitoring, and the related contingency measures associated with each stage of the temporary flow passage and dewatering system.
- f) A statement confirming the experience and expertise of the design Engineer and design checking Engineer

The following shall be submitted with the Working Drawings, where applicable:

- a) When a permit or registration is required, a copy of the Permit to Take Water issued by the Ministry of the Environment, Conservation and Parks or confirmation of registration of water taking for construction dewatering.
- b) A copy of the water taking report and discharge plan.
- c) A copy of any necessary permits for the discharge of water to a sanitary sewer, or stormwater sewer system, stormwater pond, or other facility.

517.04.03 Preconstruction Survey

When a groundwater control system by wells or a well point system will be used, a preconstruction survey of property and structures that may be affected by the work shall be carried out. The survey shall include the location and condition of adjacent properties, buildings, underground structures, water wells, Utilities, and structures, within the preconstruction survey distance specified in the Contract Documents from the groundwater control system. In addition, all water wells used as a supply of drinking water and located within the preconstruction survey distance specified in the Contract Documents from the groundwater control system shall be tested for compliance with O. Reg. 169/03: Ontario Drinking Water Quality Standards.

Water wells within the preconstruction survey distance can be located using the website www.ontario.ca/environment-and-energy/map-well-records or its successor site.

Copies of the survey and water quality test results shall be submitted to the Contract Administrator prior to the operation of the groundwater control system.

517.07 CONSTRUCTION

517.07.01 General

Dewatering systems and temporary flow passage systems shall be constructed and operated in a manner that prevents scour, erosion and discharge of sediment to the natural environment and shall be according to the submitted Working Drawings.

Temporary erosion control shall be according to OPSS 804, and temporary sediment control shall be according to OPSS 805.

When required, support systems shall be according to OPSS 404, and temporary protection systems shall be according to OPSS 539.

When required, fish salvage shall be according to the Contract Documents.

Water intakes or outlet pipes that are below the water level in fish bearing waters shall be screened according to the Contract Documents.

Unwatering shall be carried out as necessary.

Water suspected of being contaminated as indicated by visual observations or smell shall be reported to the Contract Administrator immediately upon detection.

517.07.02 Dewatering System

Dewatering systems shall be continuously operated in a manner to keep:

- a) Excavations stable;
- b) Avoid erosion impacts, and

- c) Keep the work area in the condition required to complete the associated work as specified in the Contract Documents.

Dewatering systems shall be discontinued in a manner that does not disturb any structure, pipeline, or flow channel. Operation of the dewatering system shall be shut down according to the procedures specified in the Working Drawings, where applicable.

517.07.03 Temporary Flow Passage System

517.07.03.01 General

Installation and removal of temporary flow passage systems shall be according to this specification, and the submitted Working Drawings.

Temporary flow passage systems shall be revised or realigned as required by construction staging.

When a temporary flow passage system is to remain operational through a seasonal shutdown period, the Contractor shall be responsible for any maintenance or repair costs due to the temporary flow passage system during the seasonal shutdown period.

517.07.03.02 Activation

517.07.03.02.01 Outside of a Waterbody

Temporary flow passage systems outside of a waterbody shall be activated according to the following sequential steps:

- a) The temporary flow passage system shall be constructed in its entirety, with upstream and downstream plugs separating the original waterbody channel and the temporary flow passage system remaining in place.
- b) The downstream plug shall be opened to allow water into the temporary flow passage system and water pressure shall be allowed to equalize between the original waterbody channel and the temporary flow passage system.
- c) The upstream plug shall be opened to allow water to flow through both the original waterbody channel and the temporary flow passage system.
- d) A plug shall be installed in the original waterbody channel, at the inflow confluence of the original waterbody channel and the temporary flow passage system, to fully divert the water to flow through the temporary flow passage system.
- e) A plug shall be installed in the original waterbody channel, at the outflow confluence of the temporary flow passage system and the original waterbody channel, to prevent backflow into the original waterbody channel.

517.07.03.02.02 Within a Waterbody

Temporary flow passage systems within a waterbody shall be activated according to the following sequential steps:

- a) An upstream temporary flow control device shall be installed to divert water flow into the temporary flow passage system.
- b) A plug shall be installed in the original waterbody, at the inflow confluence of the original waterbody channel and the temporary flow passage system, to fully divert the water to flow through the temporary flow passage system.
- c) A plug shall be installed in the original waterbody, at the outflow confluence of the temporary flow passage system and the original waterbody, to prevent backflow into the original waterbody channel.

517.07.04 Discharge of Water

Water from dewatering and unwatering operations shall be directed to a temporary sediment control and/or a vegetated discharge area 30 m away from waterbodies or as far away as practicable from the top of the bank of any waterbody, prior to discharge to the natural environment. Where distance and/or vegetative conditions are not suitable for effectively removing sediment from the water prior to discharge, other methods of sediment removal shall be implemented.

Equipment and materials shall not be used or stored in vegetated discharge areas.

The discharge of water to the natural environment shall not be directed across pavements, sidewalks, curb and gutter or similar hard surfaces except through appurtenances as specified in the Contract Documents.

517.07.05 Inspection of Dewatering and Temporary Flow Passage System

For dewatering and temporary flow passage system locations specified in the submitted Working Drawings, the Contractor's Engineer shall inspect and verify that the system was installed and subsequently removed according to the Working Drawings and Contract Documents.

A MTO form PH-CC-822, Certificate of Conformance shall be submitted to the Contractor Administrator upon completion of:

- a) The installation of the dewatering system.
- b) The installation of the temporary flow passage system.
- c) The removal of the dewatering system.
- d) The removal of the temporary flow passage system.

517.07.06 Monitoring

The Contract Administrator shall be notified of any complaints and any action taken or proposed to be taken in response to complaints.

Daily external visual monitoring of the surrounding area and property and structures on the preconstruction survey, if applicable, for impacts such as settlement and erosion shall be completed. Any observed impacts shall be immediately reported to the Contract Administrator. When public safety, the environment, or property is impacted or potentially impacted, the design Engineer shall, without delay, make a full assessment and direct amendments to the system to eliminate impacts or potential impacts. Any amendments shall be documented according to the System Amendments subsection.

Daily visual monitoring of the discharge, discharge point and receiving waterbody for impacts such as erosion and release of sediment-laden water shall be completed. Any observed impacts shall be immediately reported to the Contract Administrator and the proper authorities, according to the Contract Documents. When the environment has been or is imminently going to be impacted or potentially impacted, a full assessment and direct amendments to the system shall be made immediately to eliminate impacts or potential impacts. Any amendments shall be documented according to the System Amendments subsection.

517.07.07 System Amendments

When displacement or damage to embankments and/or structures, or property adjacent to the Working Area, occurs due to the operation of the system, or soil loss or erosion occurs where water is removed, pumped, or discharged, the dewatering or temporary flow passage system design shall be amended to stop the displacement, damage, soil loss, erosion, or sedimentation.

The submitted Working Drawings shall be amended and bear the seal and signature of the design Engineer and design-checking Engineer. Within 2 Business Days of the Working Drawings being amended they shall be submitted to the Contract Administrator.

517.07.08 Temporary Flow Passage System Deactivation

517.07.08.01 Outside of a Waterbody

Deactivation of temporary flow passage systems outside of a waterbody shall be according to the following sequential steps:

- a) The downstream plug in the original waterbody channel shall be opened to allow water into the original waterbody channel and water pressure shall be allowed to equalize between the original waterbody channel and the temporary flow passage system.
- b) The upstream plug in the original waterbody channel shall be opened to allow water to flow through both the original waterbody channel and the temporary flow passage system.
- c) A plug shall be installed at the inflow confluence of the original waterbody channel and the temporary flow passage system, to fully divert the water to flow through the original waterbody channel.
- d) A plug shall be installed at the outflow confluence of the original waterbody channel and the temporary flow passage system, to prevent backflow into the temporary flow passage system.

517.07.08.02 Within a Waterbody

Deactivation of temporary flow passage systems within a waterbody shall be according to the following sequential steps:

- a) The downstream plug shall be removed.
- b) The upstream plug shall be removed.

517.07.09 Removal

Dewatering and temporary flow passage system components shall be removed when no longer required. Removal of system components shall be according to the procedures specified on the submitted Working Drawings, and as specified in the Contract Documents.

Removal of temporary drainage work shall be according to OPSS 510.

Environmental protection measures and cut-off walls shall be removed, unless approved otherwise by the Contract Administrator.

Sedimentation basins and other excavations shall be backfilled with the original soil excavated, unless approved otherwise by the Contract Administrator. All disturbed areas shall be restored to an equivalent or better condition than existed prior to the commencement of construction.

Site restoration shall be according to OPSS 492.

517.07.10 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

517.10 BASIS OF PAYMENT

517.10.01 Dewatering System - Item Temporary Flow Passage System - Item

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

Progress payment for the above tender items shall be based on the following percentages of the Contract price:

- a) 40% for system installation,
- b) 40% for system operation, prorated over the duration of the system operation, and
- c) 20% for system removal.

When the system is passive and does not require active operation of pumps or other equipment or ongoing maintenance, the 40% prorated payment for system operation shall be paid after system installation.

When the Contract does not contain separate tender item(s) for dewatering system or temporary flow passage system; or when dewatering is required outside the specified limits of the dewatering system or temporary flow passage system tender items, the Contract price for the items directly associated with the required dewatering shall include full compensation for all labour, Equipment, and Material to do the work.