



## **CONSTRUCTION SPECIFICATION FOR DEWATERING**

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### **517.01 SCOPE**

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

#### **517.01.01 Specification Significance and Use**

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

## 517.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

## 517.02 REFERENCES

When the Contract Documents indicate that provincial-oriented specifications are to be used and there is a provincial-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.PROV, unless use of a municipal-oriented specification is specified in the Contract Documents. When there is not a corresponding provincial-oriented specification, the references below shall be considered to be to the OPSS listed, unless use of a municipal-oriented specification is specified in the Contract Documents.

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 805	Temporary Erosion and Sediment Control Measures

## 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, typically using soil-bentonite or cement-bentonite.

**Design Flow Rate** means the volume of water per unit of time expected to flow into the area of construction during or after the design storm event, and may include groundwater discharge.

**Design Storm Return Period** means the average number of years based upon probability, between the occurrences of a storm event of a certain severity or greater.

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

**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.

**Plug** means an impervious, natural, or constructed drainage work that blocks water.

**Sediment** means soil particles detached from an earth surface by erosion.

**Sediment Control Measure** means a measure to remove sediment from water prior to discharge to the natural environment and sewer systems.

**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 can include a plug.

**Temporary Flow Passage System** means temporary flow control devices, channels, pipes, and other materials used to convey or divert water past an area under construction.

**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 as any permanent or intermittent, natural or constructed body of water including lakes, ponds, wetlands and watercourses, but does not include 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 temporary.

## **517.04 DESIGN AND SUBMISSION REQUIREMENTS**

### **517.04.01 Design Requirements**

A dewatering or temporary flow passage system shall be designed 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. The design of the system shall be sufficient to permit the work at each location to be carried out as specified in the Contract Documents.

The design shall meet the requirements of the Contract Documents, and where a waterbody is present, shall 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.

The design shall not 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, unless approved by the Contract Administrator.

The design shall not 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.

The system shall be designed to prevent soil loss or erosion where water is removed, pumped, or discharged. The system shall be designed to prevent basal heave or instability.

Where the system involves the taking of water from a waterbody, the design shall 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.

Temporary flow passage systems shall be designed, as a minimum, for a 2 year design storm return period or the period specified in the Contract Documents, and groundwater discharge. A longer return period shall be used when determined appropriate for the work.

Temporary diversion channels that are part of a temporary flow passage system design shall include provision for fish passage during low flows.

#### **517.04.02 Submission Requirements**

The submission of Working Drawings is only required for the dewatering system item and temporary flow passage system item locations specified in the Contract Documents. Other locations requiring a system do not require the submission of Working Drawings.

Three (3) sets of Working Drawings shall be submitted to the Contract Administrator at least 7 Days prior to commencement of the dewatering system installation, for information purposes only. Prior to submission of Working Drawings, 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.
- 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, cutoff 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, and dimensions of environmental protection measures.
- x. Pipe type, size, and length, pump capacity, and tank capacity.
- xi. Material and construction standards to be used for the work.
- xii. Method for establishing and monitoring construction site groundwater levels.
- xiii. 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) A copy of the Permit to Take Water issued by the Ministry of the Environment and Climate Change or confirmation of registration of water taking for construction dewatering, if a permit or registration is required by provincial regulation.
- f) When applicable, a copy of the water taking report and discharge plan required by provincial regulation.
- g) 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 condition survey of property and structures that may be affected by the work shall be carried out. The condition 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 Ontario Drinking Water Quality Standards.

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

Copies of the condition 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 according to the Working Drawings, where applicable.

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

Temporary erosion and sediment control measures, including to control the discharge of water, shall be according to OPSS 805. Measures not specified in OPSS 805 shall be according to the Working Drawings. Temporary erosion and sediment control measures and cover material to protect exposed soils, as required by the Working Drawings, shall be installed as soon as is practical.

Stranded fish shall be managed as specified in the Contract Documents.

Unwatering shall be carried out as necessary.

Water suspected of being contaminated as indicated by visual or olfactory observations shall be reported to the Contract Administrator.

## **517.07.02                    Dewatering System**

The dewatering system shall be continuously operational to control buoyancy forces until such forces can be resisted by backfill and structure self-weight, to keep excavations stable, to avoid erosion impacts from the release of accumulated water, and to keep the work area in the condition required to complete the associated work as specified in the Contract Documents.

The dewatering 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 subsection, and the Working Drawings if applicable.

The temporary flow passage system 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.
- b) 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 sediment control measure 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.

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 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 changes to the system to eliminate impacts or potential impacts. Any changes shall be documented according to the System Amendments subsection.

When a groundwater control system is observed to negatively impact water supplies obtained from any adequate sources that were in use prior to groundwater control system operation, then water shall be supplied to the affected water users. The water shall be equivalent in quantity and quality to the normal water takings of the users. Supply shall continue until the negative impacts on the water supplies are removed, or until Contract Completion, whichever occurs first.

#### **517.07.06 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, or erosion.

When Working Drawings are required for the work, amendments shall be submitted to the Contract Administrator within two Business Days of the system being amended, on revised Working Drawings bearing the seal and signature of the design Engineer and design-checking Engineer.

#### **517.07.07 Temporary Flow Passage System Deactivation**

##### **517.07.07.01 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.

**517.07.07.02                      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.

**517.07.08                      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 Working Drawings, where applicable, 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.

**517.07.09                      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.

**Appendix 517-A, November 2010  
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS**

**Note:** This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal 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.

**Designer Action/Considerations**

No information provided here.

**Related Ontario Provincial Standard Drawings**

No information provided here.