



**CONSTRUCTION SPECIFICATION FOR NEW
MAINTENANCE HOLE, CATCH BASIN, DITCH INLET,
AND VALVE CHAMBER INSTALLATION**

TABLE OF CONTENTS

407.01	SCOPE
407.02	REFERENCES
407.03	DEFINITIONS
407.04	DESIGN AND SUBMISSION REQUIREMENTS
407.05	MATERIALS
407.06	EQUIPMENT - Not Used
407.07	CONSTRUCTION
407.08	QUALITY ASSURANCE - Not Used
407.09	MEASUREMENT FOR PAYMENT
407.10	BASIS OF PAYMENT

APPENDICES

407-A	Commentary
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407.01 SCOPE

This specification covers the requirements for the installation of maintenance holes, catch basins, ditch inlets, and valve chambers.

407.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be as specified in the Contract Documents.

407.01.02 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.

407.02 REFERENCES

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

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

Ontario Provincial Standard Specifications, Construction

OPSS 353	Concrete Curb and Gutter Systems
OPSS 402	Excavating, Backfilling, and Compacting for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers
OPSS 404	Support Systems
OPSS 408	Adjusting or Rebuilding Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers
OPSS 490	Site Preparation for Pipelines, Utilities, and Associated Structures
OPSS 491	Preservation, Protection, and Reconstruction of Existing Facilities
OPSS 492	Site Restoration Following Installation of Pipelines, Utilities, and Associated Structures
OPSS 517	Dewatering for Excavations
OPSS 904	Concrete Structures

Ontario Provincial Standard Specifications, Material

OPSS 1004	Aggregates, Miscellaneous
OPSS 1301	Cementing Materials
OPSS 1302	Water
OPSS 1350	Concrete – Materials and Production
OPSS 1351	Precast Reinforced Concrete Components for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers
OPSS 1440	Steel Reinforcement for Concrete
OPSS 1850	Frames, Grates, Covers, and Gratings
OPSS 1853	Rubber Adjustment Units for Maintenance Holes, Catch Basins, and Valve Chambers

OPSS 1854 High Density Polyethylene (HDPE) and Expanded Polystyrene (EPS) Adjustment Units for Maintenance Holes, Catch Basins, and Valve Chambers

ASTM International

C923 / C923M - 20 Resilient Connectors Between Reinforced Concrete Maintenance hole Structures, Pipes, and Laterals

407.03 DEFINITIONS

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

Adjustment Units means circular and rectangular units used between the structure and the frame to adjust the elevation of the frame for grates and covers.

Structure means cast-in-place and precast maintenance holes, catch basins, ditch inlets, and valve chambers.

407.04 DESIGN AND SUBMISSION REQUIREMENTS

407.04.01 Submission Requirements

The Contract Administrator shall be notified in writing a minimum of 10 Business Days prior to precast components for structures being delivered to the Working Area. The notification shall include:

- a) Name of the company that shall be supplying the materials.
- b) The schedule for the delivery of each component to the Working Area.

407.05 MATERIALS

407.05.01 Concrete

Concrete for cast-in-place structures shall be according to OPSS 1350 with a nominal minimum 28-Day compressive strength of 30 MPa.

407.05.02 Steel Reinforcement

Steel bar reinforcement, bar mats, and wire fabric for cast-in-place structures shall be according to OPSS 1440.

407.05.03 Precast Concrete Components for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers

Precast units shall be according to OPSS 1351 and as specified in the Contract Documents.

407.05.04 Steps and Ladders

Steps shall be according to OPSS 1351 and as specified in the Contract Documents.

Ladders shall be as specified in the Contract Documents.

407.05.05 Adjustment Units

Precast concrete adjustment units shall be according to OPSS 1351.

Rubber adjustment units shall be according to OPSS 1853.

High density polyethylene (HDPE) and expanded polystyrene (EPS) adjustment units shall be according to OPSS 1854.

407.05.06 Mortar and Grout

Mortar shall consist of a mixture of one part Portland cement according to OPSS 1301 and three parts mortar sand according to OPSS 1004, wetted with sufficient water to make the mixture plastic.

Grout shall consist of a mixture of one part Portland cement according to OPSS 1301 and two parts mortar sand according to OPSS 1004, wetted with sufficient water to make the mixture plastic.

Water for mortar and grout shall be according to OPSS 1302.

407.05.07 Frames with Covers or Grates

Frames with covers or grates shall be according to OPSS 1850 and as specified in the Contract Documents.

407.05.08 Aluminum Safety Platforms

Aluminum safety platforms shall be according to OPSS 1351 and as specified in the Contract Documents.

407.05.09 Joint Seal Systems

Joint seal systems for precast concrete structures shall be according to OPSS 1351.

407.05.10 Resilient Connectors

Resilient connectors between pipes and structures shall be according to ASTM C923M.

407.07 CONSTRUCTION

407.07.01 General

Structures shall be constructed plumb and true to alignment and shall be installed on undisturbed and competent foundations at the locations and to the elevations as specified in the Contract Documents.

The top of structures shall be installed below the final grade to allow for the placement of adjustment units to facilitate the placement of the top of the frame with grate or cover to the final grade.

407.07.02 Operational Constraints

Precast concrete maintenance hole tees may be used only when the mainline pipe sewer is concrete.

Precast concrete maintenance hole tees shall not be used when a change in pipe size, longitudinal grade, or direction is required.

All work shall be protected from freezing. Structures shall not be installed on frozen ground.

Damage to structures due to floatation shall be prevented during construction and until Completion.

407.07.03 Site Preparation

Site preparation shall be according to OPSS 490.

407.07.04 Preservation and Protection of Existing Facilities

Preservation and protection of existing facilities shall be according to OPSS 491.

407.07.05 Transporting, Unloading, Storing, and Handling

Manufacturer recommendations for transporting, unloading, storing, and handling of structures shall be followed.

Materials that are unsound or damaged shall be rejected.

407.07.06 Excavating, Backfilling, and Compacting

Excavating, backfilling, and compacting for the installation of structures shall be according to OPSS 402.

407.07.07 Support Systems

Support systems shall be according to OPSS 404.

407.07.08 Dewatering

Dewatering shall be according to OPSS 517.

407.07.09 Cast-In-Place Structures

Concrete placement shall be according to OPSS 904.

All inside wall projections, such as fins and bulges, shall be removed once the forms are stripped.

407.07.10 Precast Structures

Precast or mono bases shall be placed level. Subsequent sections complete with joint seal systems shall be installed according to the manufacturer's recommendations. Joint seal systems for special site conditions (infiltration/exfiltration) shall be as specified in the Contract Documents.

Adjustment of the structure shall be carried out by lifting the affected sections free of the excavation, re-leveling the base, if necessary, and re-installing the sections. Damaged sections and gaskets shall be replaced.

Lift holes shall be plugged with mortar.

407.07.11 Installation of Inlet and Outlet Pipes into Concrete Structures

To accommodate inlet and outlet pipe installation into the concrete structure, the appropriate size opening in the wall shall be constructed as specified in the Contract Documents.

Inlet and outlet pipes shall be securely set into the concrete structure's concrete base or walls using grout or approved pipe connectors so that the structure is watertight.

One of the following connections shall be provided where a pipe connects to a structure:

- a) A flexible pipe joint shall be provided within 300 mm of the outside face of the structure for flexible and rigid pipe.
- b) A concrete cradle to the first joint for rigid pipe.
- c) A resilient connector (i.e., a flexible, watertight connector) in the structure opening for flexible and rigid pipe.
- d) A special approved structure designed for pipe support.
- e) An external joint sealing product according to OPSS 1351.

Installation of pipe connectors shall be according to the manufacturer's recommendations. All pipes, except in valve chambers, shall be flush with the inside walls of the structure.

When specified in the Contract Documents, a goss trap shall be placed at the outlet pipe of the catch basin.

When a subdrain is specified in the Contract Documents, the opening for the connection of the subdrain outlet shall be formed by coring. The subdrain outlet pipe shall be sealed into place using non-shrink grout. A 50 mm diameter weep hole shall be cored into the same wall as the subdrain connection and at the same invert elevation.

407.07.12 Benching and Channelling

When specified in the Contract Documents, the inside concrete bottom of the structures shall be benched and channelled to accommodate the pipe.

Where benching is hand finished, it shall have a wood float finish and channelling shall have a steel trowel finish. Channelling shall be smooth and flush with adjacent pipe inverts.

407.07.13 Installation of Adjustment Units

Installation of adjustment units shall be according to OPSS 408.

407.07.14 Installation of Frames with Grates or Covers

When precast concrete adjustment units are used, frames with grates or covers shall be set in a full bed of mortar on the precast concrete adjustment units.

When HDPE or EPS adjustment units are used, frames with grates or covers shall be installed and sealed according to the HDPE or EPS adjustment unit manufacturer's instructions.

When rubber adjustment units are used, frames with grates or covers shall be set firmly in place on the rubber adjustment unit by laying a continuous strip of butyl tape on the top surface of the rubber adjustment units and on the bottom of the frame.

Ditch inlet grates shall be installed as specified in the Contract Documents.

Installation of frames with grates or covers which lie within the flow lines of a curb and gutter system shall be according to OPSS 353.

407.07.15 Installation of Aluminum Safety Platforms

Aluminum safety platforms shall be installed as specified in the Contract Documents.

407.07.16 Installation of Extension Stems and Boxes for Valve Chambers

Extension stems and boxes shall be installed as specified in the Contract Documents.

Caps for valve boxes shall be installed flush with the final grade. Guides for the valve extension stems shall be securely anchored to the valve chamber.

407.07.17 Installation of Ladders and Steps

Ladders shall be installed as specified in the Contract Documents.

If the structure is being cast-in-place, steps shall be accurately set in the forms and supported to prevent their displacement during the placing of concrete.

407.07.18 Installation of Frost Straps

Frost straps shall be installed as specified in the Contract Documents.

407.07.19 Valve Chamber Insulation

Insulation for the roof, wall, or access way of the valve chamber shall be installed as specified in the Contract Documents.

407.07.20 Clean Out of Structures

During the progress of the work and until Completion, structures shall be kept clean and free of all foreign material.

407.07.21 Site Restoration

Site restoration shall be according to OPSS 492.

407.07.22 Leakage Test

Maintenance holes shall be tested for leakage when specified in the Contract Documents. Leakage shall not exceed a rate of 3 litres per hour per metre of head above the lowest pipe invert in the maintenance hole.

The test shall be performed by plugging all pipe openings in the maintenance hole and filling the maintenance hole with water. After 1 hour has elapsed, the distance the surface of the water has dropped shall be measured and the leakage determined by calculating the volume of that portion of the maintenance hole formerly occupied by the water.

Maintenance holes failing the initial test shall have the leaks repaired and be re-tested until the leakage is below the allowable limit.

There shall be no visible infiltration.

407.07.23 Management of Excess Material

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

407.09 MEASUREMENT FOR PAYMENT

407.09.01 Actual Measurement

- 407.09.01.01 Maintenance Hole**
- Catch Basin**
- Ditch Inlet**
- Valve Chamber**

For measurement purposes, a count shall be made of the number of structures installed.

407.09.01.02 Maintenance Hole Leakage Testing

For measurement purposes, a count shall be made of the number of maintenance holes passing the leakage test.

407.09.02 Plan Quantity Measurement

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

407.10 BASIS OF PAYMENT

- 407.10.01 Maintenance Holes, “type, size” - Item**
- Catch Basins “type, size” - Item**
- Ditch Inlets “size” - Item**
- Valve Chambers “size” - Item**
- Maintenance Hole Leakage Testing - Item**
- Maintenance Hole Leakage Testing - 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.

407.10.02 Elevation Adjustment

Prior to the installation of a structure, the Owner may, at its sole discretion, raise or lower the invert or grate elevation by 150 mm or less, at no additional cost. Bedding elevations shall be adjusted accordingly.

A change in invert or grate elevation exceeding 150 mm shall be administered as a Change in the Work.

407.10.03 Adjusting or Rebuilding Maintenance Holes, Catch Basins, and Ditch Inlets

Payment for adjusting or rebuilding maintenance holes, catch basins, and ditch inlets shall be according to OPSS 408.

**Appendix 407-A, November 2021
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

The designer may consider including soil boring data, a geotechnical report, a subsurface report, and/or a soils report in the Contract Documents.

The designer should specify the following in the Contract Documents:

- Minimum Working Days. (407.04.01)
- Material requirements for:
 - Precast units. (407.05.03)
 - Steps and ladders. (407.05.04)
 - Frames with covers or grates. (407.05.07)
 - Aluminum safety platforms. (407.05.08)
- Structure type, location, and elevation. (407.07.01)
- Precast Structures. (407.07.10)
- Inlet and outlet pipe installation into concrete structure. (407.07.11)
- Goss trap and subdrains. (407.07.11)
- Type and location of goss traps. (407.07.11)
- Joint seal systems for special site conditions. (407.07.12)
- Benching and channeling. (407.07.12)
- Installation of:
 - Ditch inlet grates. (407.07.14)
 - Aluminum safety platforms. (407.07.15)
 - Extension stems and boxes. (407.07.16)
 - Ladders and steps. (407.07.17)
 - Frost straps. (407.07.18)
 - Valve chamber insulation. (407.07.19)
- Sanitary sewer maintenance holes and storm sewer maintenance holes leakage test(s). (407.07.22)
- Adjusting or rebuilding maintenance holes, catch basins, and ditch inlets. (407.10.03)

The Contractor may use any of the connections shown in subsection 407.07.13 d). If a specific connection is required, it shall be specified in the Contract Documents.

Designer should determine if leakage testing for storm and sanitary sewer maintenance holes is required. If it is required, it shall be specified in the Contract Documents. Ground water conditions shall determine

the type of test required and shall be specified in the Contract Documents. Alternative leakage test method(s) can be considered such as air or CCTV inspection. (407.07.25)

The tender item description for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers should include reference to one or more of the attributes shown (i.e., type of structure or size of structure, to be complete). (407.10.01)

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

OPSD 400.001	Hoisting Hook Rib for Cast Iron Frames for Catch Basins, Maintenance Holes, and Valve Chambers
OPSD 400.010 to 400.120	Cast Iron Catch Basin Frames with Grates
OPSD 401.010 to 401.060	Cast Iron Maintenance Hole Frames with Covers
OPSD 402.010 to 402.021	Cast Iron Valve Chamber Frames with Covers
OPSD 403.010	Galvanized Steel Honey Comb Grating for Ditch Inlets
OPSD 404.010 to 404.022	Aluminum Safety Platforms
OPSD 405.010 to 405.020	Maintenance Hole Steps
OPSD 610.010 to 610.030	Catch Basin Frame with Grate Installation
OPSD 701.010 to 701.015	Precast Concrete Maintenance Holes, 1,200 to 3,600 mm in Diameter
OPSD 701.021	Maintenance Hole Benching and Pipe Opening Details
OPSD 701.030 to 701.081	Precast Concrete Maintenance Hole Components, 1,200 to 3,600 mm in Diameter
OPSD 701.100	Frost Strap Installation
OPSD 702.040 to 702.050	Precast Concrete Ditch Inlet Maintenance Hole
OPSD 703.011 to 703.015	Precast Concrete Single Inlet Flat Cap, 1,500 to 3,600 mm in Diameter
OPSD 703.021 to 703.024	Precast Concrete Twin Inlet Flat Cap, 1,500 to 3,000 mm in Diameter
OPSD 704.010 to 704.012	Maintenance Hole, Catch Basin, and Valve Chamber Adjustment Units
OPSD 705.010 to 705.020	Precast Concrete Catch Basins
OPSD 705.030 to 705.040	Precast Concrete Ditch Inlets
OPSD 706.010 to 706.041	Precast Concrete Ditch Inlets Types A and B with 1,500 to 3,000 mm Diameter Flat Cap
OPSD 707.010	Precast Maintenance Hole Manufactured Tee
OPSD 708.020	Support for Pipe at Catch Basin or Maintenance Hole
OPSD 1100.010	Cast-In-Place Chamber for Valves Up to 350 mm Diameter
OPSD 1101.010	Precast Valve Chamber 1,200 mm and 1,500 mm Diameter
OPSD 1101.020	Valve Operator