CONSTRUCTION SPECIFICATION FOR INSTALLATION OF NEW MAINTENANCE HOLES, CATCH BASINS, DITCH INLETS AND VALVE CHAMBERS

TABLE OF CONTENTS

407.01 SCOPE

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

407.02 REFERENCES

This specification refers to the following standards, specifications, and 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
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 Manhole 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 drainage structure and the frame to adjust the elevation of the frame for grates and covers.

Benching means smoothed infill concrete placed between the channel pipes and the chamber walls of a maintenance hole.

Channeling means constructing a channel that runs through the base of the maintenance hole from incoming pipe to outflow pipe that is most typically formed by using a half pipe to form the channel through the base of the maintenance hole. The “half pipe” form creates an unobstructed flow through the maintenance hole.

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

Floatation means exhibition of upward movement.

Goss Trap means point of entry trap installed in catch basins to capture debris, sediment and oils at source.

Joint Seal System means system for sealing horizontal and vertical construction and butt joints in waterproof concrete structures against water.

Mono Base means cast as a single unit.

Support Systems means as described in the Occupational Health and Safety Act and Regulations for Construction Projects.

Steel Reinforcement means as defined in OPSS 905.

Valve Chamber means precast concrete sealed sump maintenance hole with factory-fitted saddles to house the pump.

407.04 DESIGN AND SUBMISSION REQUIREMENTS

407.04.01 Submission Requirements

407.04.01.01 Precast Components

The Contract Administrator shall be notified in writing a minimum of 10 Business Days prior to precast components for drainage 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 Adjustment Units

Concrete for 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.

407.05.02 Aluminum Safety Platforms

Aluminum safety platforms shall be according to OPSS 1351.

407.05.03 Concrete

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

407.05.04 Frames with Covers or Grates

Frames with covers or grates shall be according to OPSS 1850.

407.05.05 Grout

Grout shall be non-shrink.

Cementing materials for grout shall be according to OPSS 1301. Sand for grout shall be mortar sand according to OPSS 1004. Water for grout shall be according to OPSS 1302. Admixtures for grout shall be according to OPSS 1303.

The workability of the grout mix shall be suitable for the application.

407.05.06 Joint Seal Systems

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

407.05.07 Mortar

Mortar for joints shall be according to OPSS 904.

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

When specified in the Contract Documents, precast units shall be according to OPSS 1351.

407.05.09 Resilient Connectors

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

407.05.10 Steel Reinforcement

Steel reinforcement for cast-in-place drainage structures shall be according to OPSS 1440.

407.05.11 Steps and Ladders

Steps shall be according to OPSS 1351.

Ladders shall be as specified in the Contract Documents.

Rubber adjustment units shall be according to OPSS 1853.

407.07 CONSTRUCTION

407.07.01 General

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

The top of drainage 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.

When specified in the Contract Documents, special design drainage structures shall be according to the Contract Documents.

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. Drainage structures shall not be installed on frozen ground.

Damage to drainage structures due to floatation shall be prevented during construction and until Contract 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 drainage structures shall be followed.

Drainage structures shall not be damaged during transporting, unloading, storing, and handling.

407.07.06 Excavating, Backfilling, and Compacting

Excavating, backfilling, and compacting for the installation of drainage 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 Drainage 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 Drainage 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.

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

Lift holes shall be plugged with mortar.

Surface contaminants must be removed prior to installing the mortar.

407.07.11 Installation of Inlet and Outlet Pipes into Concrete Drainage Structures

To accommodate inlet and outlet pipe installation into concrete drainage 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 drainage structure's concrete base or walls using grout or joint sealing product to ensure the drainage structure is watertight.

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

a) A flexible pipe joint shall be provided within 300 mm of the outside face of the drainage 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 drainage structure opening for flexible and rigid pipe.

A drainage structure designed for pipe support shall be provided when specified in the Contract Documents.

An external joint sealing product shall be 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 drainage structure.

A goss trap shall be placed at the outlet pipe of the catch basin.

407.07.12 Benching and Channelling

The inside concrete bottom of the drainage structures shall be benched and channeled 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.

When specified in the Contract Documents, ditch inlet grates shall be installed.

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

A drainage structure that has a total height of 5.0 m or more shall have a safety platform installed. 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.

Steps shall be according to OPSS 1351. If the drainage 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.

If the first step is greater than 450 mm from the adjusted cover or grate reference elevation written approval from the Contract Administrator is required.

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 Drainage Structures

During the progress of the work and until Contract Completion, drainage 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. Leakage shall not exceed a rate of three 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 one 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 Holes, Catch Basins, and Ditch Inlets
Valve Chambers
Rectangular Valve Chambers
Special Design Drainage Structure

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

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, Catch Basins, and Ditch Inlets - Item
Valve Chambers - Item
Rectangular Valve Chambers - Item
Special Design Drainage Structure - 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.

Payment for safety platform installation for all drainage structures with a total height of 5 m or more shall be included with the above tender items.

407.10.02 Elevation Adjustment

Prior to the installation of a drainage 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.