

407-1 - MAINTENANCE HOLES, CATCH  
BASINS AND DITCH INLETS  
- MTC FORM 407

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#### 407-1.1 GENERAL

Maintenance holes, catch basins and ditch inlets are structures of varying design characteristics employed in the drainage system of roads and highways in order to intercept surface water runoff and also provide access to sewer pipes and junctions for maintenance purposes.

For the purpose of these guidelines the term "structures" is used when reference is made to maintenance holes, catch basins and ditch inlets collectively.

##### Maintenance Holes

A maintenance hole is any structure large enough to allow entry for maintenance purposes, usually 1200 mm diameter minimum. Maintenance holes may be catch basins and/or access structures by function, depending on whether a grate or solid cover is placed on the top.

Maintenance holes are placed at intermediate locations in a sewer run.

##### Catch Basins

Generally, all structures which are designed to allow water to enter into through a grate, are catch basins.

Specifically, a catch basin is a small structure, usually 600 mm x 600 mm in opening size which is designed to be placed at the beginning of a sewer run in the gutter line. The small size of the catch basin does not allow entry for maintenance purposes.

##### Ditch Inlets

Ditch inlets are specifically designed to be placed in ditches to intercept ditch flow. They may be non-accessible small size (600 mm x 600 mm) or any of the accessible larger sizes.

Ditch inlets are designed to be placed either in the bottom of a ditch, or to fit into the ditch slopes.

##### Spacing

The spacing of structures is dependent on two requirements:

- hydrological (i.e. inlet capacities, outlet locations, etc.)
- maintenance

The maximum spacing based on maintenance requirements are:

- a) 30 m between a 600 mm x 600 mm catch basin or ditch inlet at the beginning of a sewer run and the next downstream structure.
- b) 150 m between any two consecutive structures in a sewer run other than under a) above.

Inlet spacing based on hydraulic requirements are detailed in the Drainage Design Manual. Usually the maintenance requirements govern the maximum structure spacing.

Where it is necessary to remove pavement in order to construct the above structures, the necessary removals will be included in the maintenance hole item, except if there is overlap of removals for grading purposes. Removal of curb & gutter is always a separate tender item.

Designs will be based on precast concrete catch basin and maintenance hole standards. Form 407 gives the contractor the option to build poured-in-place units.

When Corrugated Steel Pipe (CSP) sewers are called for in the contract, Form 407 also provides the option to the contractor to construct CSP catch basins and maintenance holes.

#### Tender Items

Tender items for maintenance holes, catch basins and ditch inlets are all inclusive, with the exception of rock excavation and the installation of frames and grates if they form part of the curb & gutter system - OPSS 353.

#### Item Descriptions

Each size requires a separate tender item as follows:

- 600 mm x 600 mm Maintenance Holes, Catch Basins and Ditch Inlets
- 600 mm x 1200 mm Maintenance Holes, Catch Basins and Ditch Inlets
- 600 mm x 1450 mm Maintenance Holes, Catch Basins and Ditch Inlets
- 1200 mm Maintenance Holes, Catch Basins and Ditch Inlets
- 1200 mm Maintenance Holes, Catch Basins and Ditch Inlets, Over 4 m
- 1500 mm Maintenance Holes, Catch Basins and Ditch Inlets
- 1500 mm Maintenance Holes, Catch Basins and Ditch Inlets, Over 4 m
- 1800 mm Maintenance Holes, Catch Basins and Ditch Inlets
- 1800 mm Maintenance Holes, Catch Basins and Ditch Inlets, Over 4 m
- 2400 mm Maintenance Holes, Catch Basins and Ditch Inlets
- 2400 mm Maintenance Holes, Catch Basins and Ditch Inlets, Over 4 m
- 3000 mm Maintenance Holes, Catch Basins and Ditch Inlets
- 3000 mm Maintenance Holes, Catch Basins and Ditch Inlets, Over 4 m

3600 mm Maintenance Holes, Catch Basins and Ditch Inlets  
3600 mm Maintenance Holes, Catch Basins and Ditch Inlets, Over 4 m

When large diameter sewers are required, the designer may wish to specify maintenance hole tees instead of standard maintenance holes. In this case the tee sections will be part of the sewer, whereas the riser sections will be part of the maintenance hole items with the appropriate diameter. This requires a special provision.

Rock excavation for maintenance holes will be part of the item Rock Excavation for Sewers, Maintenance Holes, Catch Basins and Ditch Inlets. (See Section B407-2)

Specifications

All information regarding the construction of maintenance holes, catch basins and ditch inlets is indicated in MTC Form 407.

Information regarding the installation of frames and grates, if part of the construction of curbs and gutters, is indicated in OPSS 353.

Special Provisions

The designer should refer to Chapter "E" of this manual to review the applicable Special Provisions.

Standard Drawings

The standard drawings applicable to the construction of maintenance holes, catch basins and ditch inlets are contained in the Ontario Provincial Standard Drawings Manual (OPSD). Only precast maintenance holes, catch basins and ditch inlet standard drawings and their CSP options are referenced in the contract.

INFORMATION REGARDING MAINTENANCE HOLES, CATCH BASINS AND DITCH INLETS

Structure Size (mm)	Type of Structure	Precast Concrete (OPSD)	Corrugated Steel (OPSD)	Maximum Structure Depth (mm)	Maximum Sewer Dia. (Straight) (mm)	Maximum Sewer Dia. (Rt. Angle) (mm)	Sump Depth (mm)	Benching	Twin Inlets	Other Std's Used in Conjunction
600 x 600	C.B.	705.010	N/A	4.0	525	525	600	NO	NO	
600 x 600	D.I.	705.030	N/A	4.0	525	525	600	NO	NO	
600 x 1200	D.I.	705.040	N/A	4.0	600ww 375nw	600ww 375nw	600	NO	NO	
600 x 1450	TWIN INLET C.B.	705.020	N/A	4.0	600ww 375nw	600ww 375nw	600	NO	YES	
1200 x 1200	D.I. Type A	702.040	N/A	3.6	600	600	300	YES	NO	
700 DIA.	C.B.	N/A	709.030	4.0	2 STD SIZES < 700	2 STD SIZES < 700	600	YES	NO	
1000 DIA.	C.B.	N/A	709.030	4.0	2 STD SIZES < 1000	2 STD SIZES < 1000	600	YES	NO	
1200 DIA.	M.H.	701.010	709.010 709.020	4.0	P.C. - See 701.021 CSP-2 STD SIZE < 1200	P.C. - See 701.021 CSP - 2 STD SIZE < 1200	300	YES	NO	
1500 DIA.	M.H. TWIN OPTION	701.011	N/A	10.0	SEE 701.021	SEE 701.021	300	YES	YES	701.021 701.040 703.010
1800 DIA.	M.H. TWIN OPTION	701.012	N/A	10.0	SEE 701.021	SEE 701.021	300	YES	YES	701.021 701.050 703.020
2400 DIA.	M.H. TWIN OPTION	701.013	N/A	10.0	SEE 701.021	SEE 701.021	300	YES	YES	701.021 701.060 703.030
3000 DIA.	M.H. TWIN OPTION	701.014	N/A	10.0	SEE 701.021	SEE 701.021	300	YES	YES	701.021 701.070 703.040
3600 DIA.	M.H. TWIN OPTION	701.015	N/A	10.0	SEE 701.021	SEE 701.021	300	YES	YES	701.021 701.070 703.050

Remarks: Caps, grates, tees, ladder rungs, safety grates, connections, supports and adjustment units apply as required (see OPSD's). Where depths exceed 4.0 m CSP Maintenance Holes cannot be specified. CSP's to be specified as alternatives only when all pipes at structures are CSP pipes. All references to "Conc" and "CSP" in above chart refer to structures only, not CSP's.

TABLE 407-1

MAXIMUM PIPE SIZES FOR PRECAST MAINTENANCE HOLES (mm)

CIRCULAR PRECAST MAINTENANCE HOLES

MAINTENANCE HOLE INSIDE DIAMETER	MAXIMUM CONCRETE PIPE SIZE FOR STRAIGHT THROUGH INSTALLATION	MAXIMUM CONCRETE PIPE SIZE FOR RIGHT ANGLE INSTALLATION
1200	600	450
1500	825	600
1800	1050	825
2400	1500	1050
3000	1950	1500
3600	2400	2100

RECTANGULAR PRECAST MAINTENANCE HOLES

CIRCULAR PRECAST SIZE DIAMETER	EQUIVALENT RECTANGULAR SIZE	MAXIMUM CONCRETE PIPE SIZE FOR STRAIGHT THROUGH INSTALLATION	MAXIMUM CONCRETE PIPE SIZE FOR RIGHT ANGLE INSTALLATION
1200	1200 x 1200	900	450 & 450
1500	1500 x 1800	1050 & 1350	600 & 750
1800	1650 x 2400	1200 & 1800	750 & 1200
1800	1650 x 3000	1200 & 2400	750 & 1500
2400	2400 x 2400	1800 & 1800	1200 & 1200
--	2400 x 3000	1800 & 2400	1200 & 1500
--	2400 x 3800	1800 & 3000	1200 & 1950
--	3000 x 3800	2400 & 3000	1500 & 1950
3000	--	--	--
3600	--	--	--

TABLE 407-2

407-1.1.1 Frame and Grate Selection

The selection of frames and grates depends on the location of the inlet and the size of opening required. Both aspects are adequately covered in the Drainage Design Manual.

407-1.1.2 Selection of Structure

The selection of the type and size of structure is dependent on the type and number of grates required, on the size of the sewer pipes entering and leaving the structure, on the angle at which the pipes meet at the structure and on whether or not access is required for maintenance purposes. Tables 407-1 and 407-2 are a guide to the selection of maintenance holes.

## 407-1.2 COMPUTATION

These items are Plan Quantity Payment items.

### 407-1.2.1 Source of Information

The main sources of information for the computation of the above items are:

- a) Ontario Provincial Standard Drawings for the type and size of structure and for frames and grates;
- b) Storm Sewer Design for the type, size, spacing and locations of the structures;
- c) Regional Geotechnical Section to determine the presence of rock on the contract;
- d) Photogrammetric Drainage Information.

### 407-1.2.2 Method of Calculation

The unit of measurement for the drainage structures is "each".

The number of drainage structures is dependent on the hydraulic design (i.e. run-off, inlet capacity, allowable spread, pavement design, etc.), sewer alignment and maximum spacing for clean out purposes. The depths of structures have to be determined in order to separate the tender items of certain sizes into those less than and those over 4 m depth.

The depth of structure is the difference between the top of grate elevation at the centre of the grate and the elevation of the inside bottom of the structure at the centre (sump or flow line).

Maintenance holes, catch basins and ditch inlets are to be designed with a minimum sump depth of 300 mm.

Where precast structures are not feasible, special design structures may be required. Each special design structure will be a separate item, by each, with concrete volumes and steel quantities detailed separately.

Maintenance holes exceeding the depth of 5.0 m require installation of safety gratings.

All items require 100% checking.

## 407-1.3 DOCUMENTATION

Details of all structures are to be documented on the "Quantities - Drainage, Maintenance Holes, Catch Basins and Ditch Inlets" sheet.

Tender totals, are to be transferred to the tender document.

All applicable standard drawing numbers, including the numbers for optional CSP application, frames and grates, ladder rungs and safety grates, are to be listed by number and revision number. Cast-in-place standard drawing numbers are not to be listed.

Precast concrete ditch inlet maintenance holes OPSD 702.040 and 702.050 are alternatives to other standard precast maintenance holes.

Offsets are determined from centre line (or control line) to the centre of the grate or cover. Offsets are recorded to 0.01 m accuracy.

Stations are recorded in whole number metres.

Special design structures are separate tender items by "each". They require design drawings for inclusion in the contract and listing on the quantity sheet including separate columns for concrete volumes and reinforcing steel tonnage.

Rock excavation for Sewers, Maintenance Holes, Catch Basins and Ditch Inlets may be summarized on either the Maintenance Holes Quantity Sheet or the Sewers Quantity Sheet before transferring to the tender document.

407-1.4 BREAKING INTO MAINTENANCE HOLES, CATCH BASINS, DITCH INLETS, CULVERTS & SEWERS - MTC FORM 407

407-1.4.1 GENERAL

This item consists of providing whatever size openings are necessary in the walls of the above existing structures, rigid or flexible, in order to install and secure the required pipe connection. This includes all rigid pipes, flexible pipes and subdrains.

Tender Item

Breaking into Maintenance Holes, Catch Basins, Ditch Inlets, Culverts and Sewers.

Specification

All information regarding the above item is indicated in MTC Form 407.

Special Provisions

The designer should refer to Chapter E of this Manual to review the applicable Special Provisions.

407-1.4.2 COMPUTATION

This item is a Plan Quantity Payment item.

407-1.4.3 Source of Information

The main source of information for the computation of this item are the field note books, Plans, Contour Plans and the sewer drawings.



407-1.4.4 Method of Calculation

The unit of measurement for this item is "each", based on the number of pipe connections required regardless of size and type and distance from any adjacent openings. It is possible to have more than one opening at any given structure. 100% checking is required for this item.

407-1.4.5 DOCUMENTATION

Any of the above types of structures which are affected by this item are to be indicated on the contract drawing sewer profile sheets. Entries are required on the Quantities - Drainage, Maintenance Hole, Catch Basin and Ditch Inlets sheet for each location where "Breaking Into" is required and the number of openings required is to be listed under a separate column. Usually these structures are numbered sequentially as an integral part of the drainage design.

Breaking into culverts and sewers will be listed on the appropriate Quantity Sheet (Quantities - Culverts or Quantities - Sewers) by station and location. The totals will be transferred to the maintenance hole quantity sheet and summarized for a combined tender total.

The tender total is then transferred to the tender document.

407-1.5 ADJUSTING AND REBUILDING MAINTENANCE HOLES, CATCH BASINS AND DITCH INLETS - MTC FORM 407

407-1.5.1 GENERAL

Work to be carried out under this item consists of changing the elevation of any of the above structures by either raising or lowering the top of the existing structure according to the design requirements of the contract regardless of type or size. This item also includes all necessary excavation and backfill required to adjust or rebuild the existing structure.

Removal of bituminous or concrete pavement is also part of the item, unless the project includes separate removal items which cover such work in the same location as the adjustment. Removal of curb & gutter will always be a separate item.

The existing frame and grate is to be salvaged and reused if suitable. When the existing frames and grates are not to be reused, due to their condition or type, disposal instructions are to be set out in a special provision (e.g. delivery to MTO yard or disposal arranged for by contractor).

Tender Item

Adjusting and Rebuilding Maintenance Holes, Catch Basins and Ditch Inlets.

This tender item will be used regardless of the amount of change in elevation, type or size of drainage structure.

### Specifications

All information regarding the item is indicated in MTC Form 407.

### Special Provisions

The designer should refer to Chapter "E" of this manual to review the applicable special provisions.

### Standard Drawings

The standard drawings applicable to this tender item are contained in the Ontario Provincial Standard Drawings Manual (Frames and Grates and Adjustment Units).

#### 407-1.5.2 COMPUTATION

This item is a Plan Quantity Payment item.

#### 407-1.5.3 Source of Information

The main source of information for the computation of this item are the field note books, B-Plans, Contour Plans and the drainage design.

#### 407-1.5.4 Method of Calculation

The unit of measurement is "each". When existing maintenance holes are to be adjusted more than once (because of staging, etc.) only one adjustment will be considered for payment.

The adjustment of a double inlet maintenance hole or catch basin is considered one adjustment, requiring two frames and grates or covers, new or existing.

New maintenance holes or catch basins, which have to be partially built and later adjusted under the same contract, are not considered under this tender item.

100% checking is required for this item.

#### 407-1.5.5 DOCUMENTATION

All types of existing structures affected by this item will be numbered and listed on the Quantities - Maintenance Holes ... sheet by station and location, showing type (straight or domed), existing top of grate and new top of grate elevations. Also the type of frame and grate to be placed will be shown.

When an existing structure requires more than one adjustment either due to staging or other construction requirements, interim top of grate elevation(s) and interim type(s) of grate must be shown in addition to the final elevation and type. The item column will reflect one adjustment only, regardless of the number of interim adjustments.

When new frames and grates are required, the standard number is required in the "grate" column. When the existing frames and grates are to be re-used, the word "existing" is to be written in the same column. For double inlet maintenance holes and catch basins, the grate column should show (2) behind the type.

Stage construction of new maintenance holes, catch basins and ditch inlets are not considered to be adjustments for payment purposes.

If temporary covers are required they should also be indicated on the quantity sheet along with the final frame and grate to be used.

Stations are recorded in whole number metres. Offsets are recorded to 0.1 m accuracy.

The tender total is the number of structures to be adjusted, which is transferred to the tender document.