

Part 1 General**1.1 SECTION INCLUDES**

- .1 Materials and installation for constructing new outfall structures, precast and cast-in-place manholes and catch basins.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .3 Section 03 30 00 - Cast-in-Place Concrete.
- .4 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM International)
 - .1 ASTM A48/A48M-00, Standard Specification for Gray Iron Castings.
 - .2 ASTM C139-99, Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
 - .3 ASTM C478M-97, Specification for Precast Reinforced Concrete Manhole Sections Metric.
 - .4 ASTM C618-00, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 - .5 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³)(600 kN-m/m³)).
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A3000-98(April 2001), Cementitious Materials Compendium. Includes:
 - .1 CAN/CSA-A5-98, Portland Cement.
 - .2 CAN/CSA-A8-98, Masonry Cement.
 - .3 CAN/CSA-A23.5-98, Supplementary Cementing Materials.
 - .2 CSA-A23.1/A23.2-00(June 2001), Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
 - .3 CSA-A165 Series-94(R2000), CSA Standards on Concrete Masonry Units.
 - .4 CAN/CSA-G30.18-M92(R1998), Billet Steel Bars for Concrete Reinforcement.
 - .5 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

- .4 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 407-November 2001, Construction Specification For Maintenance Hole, Catch Basin, Ditch Inlet And Valve Chambers.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit manufacturer's test data and certification at least 4 weeks prior to beginning Work. Include manufacturer's drawings, information and shop drawings where pertinent.

Part 2 Products

2.1 MATERIALS

- .1 Precast manhole units: to ASTM C478M, circular or oval. Top sections eccentric cone or flat slab top type with opening offset for vertical ladder installation.
- .2 Precast catch basin sections: to ASTM C139, ASTM C478M.
- .3 Cast-in-place concrete:
 - .1 In accordance with Section 03 30 00 - Cast-in-Place Concrete.
 - .2 Portland cement: to CAN/CSA-A5, Type 10.
 - .3 Concrete mix design to produce 21 MPa minimum compressive strength at 28 days and containing 25 mm maximum size coarse aggregate, with water/cement ratio to CSA-A23.1.
 - .4 Additives: Fly ash to CAN/CSA-A23.5 ASTM C618.
- .4 Joints: to be made watertight using rubber rings, bituminous compound, epoxy resin cement or cement mortar.
- .5 Mortar:
 - .1 Masonry Cement: to CAN/CSA-A3000-A8.
- .6 Ladder rungs: to CAN/CSA-G30.18, No.25M billet steel deformed bars, hot dipped galvanized to CAN/CSA-G164. Rungs to be safety pattern (drop step type).
- .7 Adjusting rings: to ASTM C478M.
- .8 Galvanized iron sheet: to be approximately 2 mm thick.
- .9 Frames, gratings, covers to dimensions as indicated and following requirements:
 - .1 Metal gratings and covers to bear evenly on frames. A frame with grating or cover to constitute one unit. Assemble and mark unit components before shipment.
 - .2 Gray iron castings: to ASTM A48/A48M, strength class 30B.
 - .3 Castings: sand blasted or cleaned and ground to eliminate surface imperfections.
 - .4 Manhole frames and covers: cover cast without perforations complete with two 25 mm square lifting holes to OPSS 407.
 - .5 Catch basin frames and covers: to OPSS 407.

- .10 Granular bedding and backfill: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
- .1 Crushed stone, gravel sand.
 - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.
 - .3 Table

Sieve Designation	% Passing	
	Stone/Gravel	Gravel/Sand
200 mm	-	-
75 mm	-	-
50 mm	-	-
38.1 mm	-	-
25 mm	100	-
19 mm	-	-
12.5 mm	65-90	100
9.5 mm	-	-
4.75 mm	35-55	50-100
2.00 mm	-	30-90
0.425 mm	10-25	10-50
0.180 mm	-	-
0.075 mm	0-8	0-10

- .4 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .11 Unshrinkable fill: in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

Part 3 Execution

3.1 EXCAVATION AND BACKFILL

- .1 Excavate and backfill in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling and as indicated.
- .2 Obtain approval of Departmental Representative before installing manholes or catch basins.

3.2 CONCRETE WORK

- .1 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.

3.3 INSTALLATION

- .1 Construct units in accordance with details indicated, plumb and true to alignment and grade.

- .2 Complete units as pipe laying progresses. Maximum of three units behind point of pipe laying will be allowed.
- .3 Dewater excavation to approval of Departmental Representative and remove soft and foreign material before placing concrete base.
- .4 Set precast concrete base on 150 mm minimum of granular bedding compacted to 100% maximum density to ASTM D698.
- .5 Precast units:
 - .1 Set bottom section of precast unit in bed of cement mortar and bond to concrete slab or base. Make each successive joint watertight with Departmental Representative approved rubber ring gaskets, bituminous compound, cement mortar, epoxy resin cement, or combination thereof.
 - .2 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.
 - .3 Plug lifting holes with concrete plugs set in cement mortar or mastic compound.
- .6 Compact granular backfill to 95% maximum density to ASTM D698.
- .7 Place unshrinkable backfill in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfill.
- .8 Installing units in existing systems:
 - .1 Where new unit is to be installed in existing run of pipe, ensure full support of existing pipe during installation, carefully remove that portion of existing pipe to dimensions required and install new unit as specified.
 - .2 Make joints watertight between new unit and existing pipe.
 - .3 Where deemed expedient to maintain service around existing pipes and when systems constructed under this Project are ready to be put in operation, complete installation with appropriate break-outs, removals, redirection of flows, blocking unused pipes or other necessary work.
- .9 Set frame and cover to required elevation. Parge and make smooth and watertight.
- .10 Place frame and cover on top section to elevation as indicated. If adjustment required use concrete ring.
- .11 Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.

3.4 ADJUSTING TOPS OF EXISTING UNITS

- .1 Remove existing gratings, frames and I beams and store for re-use at locations designated by Departmental Representative.
- .2 Sectional units:
 - .1 Raise or lower straight walled sectional units by adding or removing precast sections as required.
 - .2 Raise or lower tapered units by removing cone section, adding, removing, or substituting riser sections to obtain required elevation, then replace cone section. When amount of raise is less than 600 mm use standard manhole brick, modoloc or grade rings.

- .3 Monolithic units:
 - .1 Raise monolithic units by roughening existing top to ensure proper bond and extend to required elevation with mortared brick course, for 150 mm or less alteration, or cast-in-place concrete.
 - .2 Lower monolithic units with straight wall by removing concrete to elevation indicated for rebuilding.
 - .3 When monolithic units with tapered upper section are to be lowered more than 150 mm, remove concrete for entire depth of taper plus as much straight wall as necessary, then rebuild upper section to required elevation with cast-in-place concrete.
 - .4 Install additional manhole ladder rungs in adjusted portion of units as required.
 - .5 Re-use existing gratings, frames and I beams.
 - .6 Re-set gratings and frames to required elevation on not more than 4 courses of brick. Make brick joints and join brick to frame with cement mortar, parge and trowel smooth.
 - .1 Re-set gratings and frames to required elevation on full bed of cement mortar, parge and trowel smooth.

3.5 LEAKAGE TEST

- .1 Install watertight plugs or seals on inlets and outlets of each new manhole and fill manhole with water. Leakage not to exceed 0.3% per hour of volume of manhole.
- .2 If permissible leakage is exceeded, correct defects. Repeat until approved by Departmental Representative.
- .3 Departmental Representative will issue Test Certificate for each manhole passing test.

END OF SECTION