

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 03 20 00 - Concrete Reinforcing.

 .3 Section 03 30 00 - Cast-in-Place Concrete.

 .4 Section 31 23 10 - Excavation, Trenching and Backfilling.

 .5 Section 33 41 00 - Storm Utility Drains.

1.3 REFERENCES .1 American Society for Testing and Materials (ASTM International).

 .1 ASTM A48/A48M, Standard Specification for Gray Iron Castings.

 .2 ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

 .3 ASTM C139, Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.

 .4 ASTM C478M, Specification for Precast Reinforced Concrete Manhole Sections Metric.

 .5 ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

 .6 ASTM D2240, Standard Test Method for Rubber Property-Durometer Hardness.

- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.
- .3 Canadian Standards Association (CSA International).
 - .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
 - .2 CSA G30.18, Carbon Steel Bars for Concrete Reinforcement.
 - .3 CAN/CSA-A165 Series, CSA Standards on Concrete Masonry Units (Consists of A165.1, A165.2 and A165.3).
 - .4 CSA A3000 "Cementitious Materials Compendium".

1.4 SUBMITTALS

- .1 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.

1.5 SCHEDULING OF WORK

- .1 Schedule work to minimize interruptions to existing services and to maintain existing flow during construction.
- .2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

1.6 MEASUREMENT FOR PAYMENT

- .1 Manholes and Catch Basin Structures will not be measured for payment. Contractor shall include all costs including plant, materials, equipment and labour required to complete the work under lump sum items.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Cast-in-place concrete: to Section 03 30 00 - Cast-in-Place Concrete.
- .2 Concrete reinforcement: to Section 03 20 00 - Concrete Reinforcing.
- .3 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.
- .4 Precast catch basin sections: to ASTM C478M.
- .5 Joints: to be made watertight using rubber rings.
- .6 Mortar:
 - .1 Aggregate: to CSA A82.56.
 - .2 Cement: to CAN/CSA-A8.
- .7 Ladder rungs: to CAN/CSA-G30.18, No.25M billet steel deformed bars, hot dipped galvanized to ASTM A123/A123M. Rungs to be safety pattern (drop step type).
- .8 Adjusting rings: to ASTM C478M.
- .9 Concrete Brick: to CAN/CSA-A165 Series.
- .10 Drop manhole pipe: to be same as sewer pipe.
- .11 Steel gratings, I-beams and fasteners: as indicated.
- .12 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: coated with two applications of asphalt varnish or cleaned and ground to eliminate surface imperfections.
- .4 Manhole frames and covers: heavy duty municipal type for road service; Cover cast without perforations and complete with two 25 mm square lifting holes.

- .13 Granular bedding and backfill: in accordance with the following requirements:

- .1 Crushed screed stone, gravel or sand.
- .2 Granulations to be within limits specified when tested to ASTM C136. 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.

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILL

- .1 Excavate and backfill in accordance with Section 31 23 10 - Excavation, 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.
- .2 Position metal inserts in accordance with dimensions and details as indicated.

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% corrected maximum dry density.

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- .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 precast concrete plugs set in cement mortar or mastic compound.
 - .6 Compact granular backfill to 95% corrected maximum dry density.
 - .7 Place unshrinkable backfill in accordance with Section 31 23 10 - Excavating, Trenching and Backfill.
 - .8 Set frame and cover to required elevation on no more than 4 courses of brick. Make brick joints and join brick to frame with cement mortar. Parge and make smooth and watertight.
 - .9 Place frame and cover on top section to elevation as indicated. If adjustment required use concrete ring.
 - .10 Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.
 - .11 Install safety platforms in manholes having depth of 5 m or greater, as indicated.

3.4 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.
- .4 Provide copy certification of leakage test acceptance to Departmental Representative. Include certification in Commissioning Manual.