

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 31 23 33.01 - Excavation, Trenching and Backfilling.
- .3 Section 03 30 00 - Cast-in-Place Concrete.
- .4 Section 33 31 13 - Public Sanitary Utility Sewerage Systems
- .5 Section 33 41 00 - Storm Utility Drainage Piping.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM International)
 - .1 ASTM A 48M-03(2012), Standard Specification for Gray Iron Castings.
 - .2 ASTM A 36/A 36M-12, Standard Specification for Structural Steel.
 - .3 ASTM C 139-11, Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
 - .4 ASTM C 478M-09, Specification for Precast Reinforced Concrete Manhole Sections Metric.
 - .5 ASTM C 618-12a, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 - .6 ASTM C 858-10e1, "Underground Precast Concrete Utility Structures"
 - .7 ASTM D 698-12, 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-A3000-08, Cementitious Materials Compendium.
 - .2 CAN/CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

- .3 CSA A165 Series-04, CSA Standards on Concrete Masonry Units.
- .4 CAN/CSA-G30.18-09, Billet Steel Bars for Concrete Reinforcement.
- .5 CSA G40.21-04(R2009), Steel sections and Plates.
- .6 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Cast-in-place concrete:
 - .1 In accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .2 Precast manhole units: to ASTM C 478M-09, circular or oval. Top sections, flat slab top type with opening offset for vertical ladder installation.
- .3 Precast utility vaults: to ASTM C 478M-09.
- .4 Precast catch basin sections: to ASTM C 478M-09.
- .5 Joints: to be made watertight using rubber rings.
- .6 Mortar:
 - .1 Masonry Cement: to CAN/CSA-A3002.
- .7 Adjusting rings: to ASTM C 478M-09.
- .8 Ladder:
 - .1 Rungs to CAN/CSA-G30.18-09, No. 25M billet steel deformed bars, hot dipped galvanized to CAN/CSA-G164-M92(R2003).
 - .1 Rungs to be safety pattern (drop step type).
- .9 Drop manhole pipe: to be same as sewer pipe.
- .10 Galvanized iron sheet: to be approximately 2 mm thick.
- .11 Frames and covers to dimensions as indicated and the following requirements:
 - .1 Metal 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 A 48/A 48M-03(2008), strength class 30B.
 - .3 Castings: coated with two applications of asphalt varnish sand blasted or cleaned and ground to eliminate surface imperfections.
 - .4 Manhole frames and covers: heavy duty type for road service. Cover cast without perforations and complete with two 25 mm square lifting holes.
 - .5 Access openings to all manholes and catch basins shall be minimum 760 mm clear.
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- .12 Granular bedding and backfill to Section 31 23 33.01 - Excavating, Trenching and Backfilling, and as indicated.
 - .13 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.

2.2 STORM WATER TREATMENT UNITS

- .1 Storm water treatment units must meet the following:
 - .1 Flow rate: 0.07m³/s
 - .2 Storage volume: 9.3m³
 - .3 Sediment capacity: 1.4m³
 - .4 Lower chamber diameter: 2.4m
 - .5 Hydrocarbon storage capacity: 3m³

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILL

- .1 Excavation 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 Backfill around manholes shall be 25 mm crushed gravel extending a minimum of 300 mm outward from manhole and vertically from bedding material to underside of roadbed gravels.
- .4 Compact backfill around manholes in 150 mm lifts for a width of 600 mm from base to approved subgrade.

3.2 CONCRETE WORK

- .1 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
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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, or as indicated, of granular bedding compacted to 98% Standard Proctor corrected maximum dry density to ASTM D 698.
 - .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.
 - .4 In addition to "O" ring gaskets, joints in the precast sections shall be sealed with 25 mm Butyl Resin cord. The cord shall be placed on the upper inside ledge of the joint prior to placement of the subsequent section.
 - .6 For sewers:
 - .1 Place stub outlets and bulkheads at elevations and in positions indicated.
 - .2 Bench to provide a smooth U-shaped channel. Side height of channel to be 0.75 times full diameter of sewer. Slope adjacent floor at 1 in 20. Curve channels smoothly. Slope invert to establish sewer grade.
 - .7 Place flat top section with cast in access hatches as indicated. Access hatch to be installed to manufacturers specifications and recommendations during flat top fabrication.
 - .8 Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.
 - .9 Where pipes enter manholes through base, the base shall be fitted with cast in place "O" ring seals and a formed channel to the sewer.
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- .10 If final grade adjustment exceeds 150 mm in height, rebar must be incorporated in the raised section.
- .11 "A-LOK" or approved "O" ring gaskets shall be thoroughly cleaned, then covered generously with lubricant specified by the pipe manufacturer.
- .12 Cast in place grade adjustment to be completed with air entrained 40 MPa concrete on an approved non-shrink grout.
- .13 Install ladder 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 Locate and repair defects if test fails. Retest using same methodology.
- .3 If permissible leakage is exceeded, correct defects. Repeat until approved by Departmental Representative.
- .4 Departmental Representative will issue Test Certificate for each manhole passing test.