

PART 1 - GENERAL

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| <u>1.1 SECTION INCLUDES</u> | .1 | Materials and installation for constructing new precast manholes and catch basins.  |
| <u>1.2 RELATED SECTIONS</u> | .1 | Section 01 33 00 - Submittal Procedures.  |
|                             | .2 | Section 01 74 21 - Construction/Demolition Waste Management And Disposal.   |
|                             | .3 | Section 31 23 10 - Excavation, Trenching and Backfilling.   |
|                             | .4 | Section 31 05 16 - Aggregate Materials.   |
|                             | .5 | Section 03 20 00 - Concrete Reinforcing.  |
|                             | .6 | Section 03 30 00 - Cast-in-Place Concrete.  |
| <u>1.3 REFERENCES</u>       | .1 | American Society for Testing and Materials (ASTM International)<br>.1 ASTM A 48/A48M-03, Standard Specification for Gray Iron Castings.<br>.2 ASTM C117-04, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.<br>.3 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.<br>.4 ASTM C 139-05, Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.<br>.5 ASTM C 478M-07, Specification for Precast Reinforced Concrete Manhole Sections Metric.<br>.6 ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft <sup>3</sup> (600 kN-m/m <sup>3</sup> )). |
|                             | .2 | Canadian General Standards Board (CGSB)<br>.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.<br>.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.   |
|                             | .3 | Canadian Standards Association (CSA International)<br>.1 CAN/CSA-A3000-06, Cementitious Materials Compendium. Includes:<br>.1 CAN/CSA-A5-98, Portland Cement.<br>.2 CAN/CSA-A8-98, Masonry Cement.  |

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- 1.3 REFERENCES .3 (Cont'd)
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- .3 CAN/CSA-A23.5-98, Supplementary Cementing Materials.
- .2 CSA-A23.1/A23.2-04, 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-M92(R2002), Billet Steel Bars for Concrete Reinforcement.
- .5 CAN/CSA-G164-M92(R2002), Hot Dip Galvanizing of Irregularly Shaped Articles.
- 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.
- 1.5 WASTE .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste MANAGEMENT AND DISPOSAL Management And Disposal.
- .2 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.
- .3 Divert unused concrete materials from landfill to local quarry as approved by Departmental Representative.
- .4 Divert unused aggregate materials from landfill to quarry for reuse as approved by Departmental Representative.
- .5 Fold up metal banding, flatten and place in designated area for recycling.
- 1.6 MEASUREMENT FOR .1 Manholes/Catch Basins - Manholes/Catch Basins will PAYMENT be measured by the each. Include incidental to this cost all costs for excavation, backfilling, testing, frames, covers, connection to existing and all other components as detailed.
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## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Cast-in-place concrete:
  - .1 In accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .2 Concrete reinforcement: in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 Precast manhole units: to ASTM C 478M, circular or oval. Top sections eccentric cone or flat slab top type with opening offset for vertical ladder installation. Monolithic bases to be approved by Departmental Representative and set on concrete slabs cast in place.
- .4 Precast catch basin sections: to ASTM C 139, ASTM C478M.
- .5 Joints: to be made watertight using rubber rings.
- .6 Mortar:
  - .1 Masonry Cement: to CAN/CSA-A3000.
- .7 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).
- .8 Adjusting rings: to ASTM C 478M.
- .9 Concrete Brick: to CSA-A165 Series.
- .10 Drop manhole pipe: to be same as sewer pipe.
- .11 Galvanized iron sheet: to be approximately 2 mm thick.
- .12 Steel gratings, I-beams and fasteners: as indicated.
- .13 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 A 48/A48M, strength class 30B.
  - .3 Castings: sand blasted 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.

2.1 MATERIALS  
(Cont'd)

- .13 (Cont'd)
- .5 Catch basin frames and covers: minimum 190 kg per set.
- .6 Size: 762 mm clear diameter.
- .14 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 C 136 and ASTM C 117. 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.
- .15 Unshrinkable fill: in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILL

- .1 Excavate and backfill in accordance with Section 31 23 10 - 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.
- .2 Place concrete reinforcement in accordance with Section 03 20 00 - Concrete Reinforcing.

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- 3.2 CONCRETE WORK (Cont'd)
- .3 Position metal inserts in accordance with dimensions and details as indicated.
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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 of granular bedding compacted to 100% maximum 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.
- .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 full diameter of sewer. Slope adjacent floor at 1 in 20. Curve channels smoothly. Slope invert to establish sewer grade.
- .7 Compact granular backfill to 95% corrected maximum dry density.
- .8 Place unshrinkable backfill in accordance with Section 31 23 10 - Excavating, Trenching and Backfill.
- .9 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, and 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.
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3.3 INSTALLATION  
(Cont'd)

- .9 (Cont'd)
  - .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.
- .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.
- .12 Install safety platforms in manholes having depth of 5 m or greater, as indicated.

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, moduloc or grade rings.
- .3 Monolithic units:
  - .1 Raise monolithic units by roughening existing top to ensure proper bond and extend to required elevation with 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.

3.5 LEAKAGE TEST

- .1 Install watertight plugs or seals on inlets and outlets of each new liquid waste 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.