PART 1 - GENERAL

1.1 Measurement for Payment

.1 Supply and installation of fuel collector pre-cast concrete manhole including excavating, backfilling, bedding material, pre-cast manhole bases, riser, top, frame, cover, and Impermeable Geomembranes(Liner)will be measured in units of each size installed regardless of depth.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM A 48/A 48M-00, Standard Specification for Gray Iron Castings.
.2 ASTM C 117-04, Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.
.3 ASTM C 136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.4 ASTM C 139-05, Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
.5 ASTM C 478M-06, Standard Specification for Precast Reinforced Concrete Manhole Sections Metric.
.6 ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m^3)).

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Canadian Standards Association (CSA International)
.1 CAN/CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
.2 CAN/CSA-A3000-03(R2005), Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
.1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
.2 CSA-A3002-03, Masonry and Mortar Cement.
.3 CAN/CSA-A165 Series-04, CSA Standards on Concrete Masonry Units (Consists of A165.1, A165.2 and A165.3).
.4 CAN/CSA-G30.18-M92(R2002), Billet Steel Bars for Concrete Reinforcement.

1.2 REFERENCES (Cont'd)

.3 (Cont'd)
.5 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.5 Ontario Provincial Standard Specifications (OPSS)
.1 OPSS 407-November 2004, Construction Specification For Maintenance Hole, Catch Basin, Ditch Inlet And Valve Chamber

.6 CAN/CSA-A5-93, Portland Cement. Installation.

.7 CAN/CSA-A8-93, Masonry Cement.

.8 CSA A23.1-00/A23.2-00, Concrete Materials and Methods for Concrete Construction.

.9 CSA A82.56-M1976, Aggregate for Masonry Mortar.

.10 A165 Series-94(2000), CSA Standards on Concrete Masonry Units.

.11 CAN/CSA-G30.18-M92 (R1998), Billet Steel Bars for Concrete Reinforcement.

.12 CAN/CSA-G164-M92 (R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

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 Catch Basin units: to ASTM C478M, circular.
.1 Top sections flat slab top type with opening offset for vertical ladder installation.
.2 Monolithic bases to be approved by Departmental Representative and set on concrete slabs cast in place.

.3 Joints: made watertight using rubber rings, bituminous compound, epoxy resin cement or cement mortar.

2.1 MATERIALS (Cont'd)

.4 Mortar:
.1 Aggregate: to CSA A82.56-1950(R71).
.2 Cement: to CAN/CSA-A8-93.

.5 Ladder rungs: to CAN/CSA-G30.18, No.25M billet steel deformed bars, hot dipped galvanized to CAN/CSA-G164.
.1 Rungs to be safety pattern (drop step type).

.6 Adjusting rings: to ASTM C 478M.

.7 Polyethylene wrap: 0.2 mm (8 MIL) polyethylene to AWWA C 105-88.

.8 Concrete Brick: to CAN3-A165 Series.

.9 Drop manhole pipe: same as sewer pipe.

.10 Galvanized iron sheet: approximately 2 mm thick.

.11 Steel gratings, I-beams and fasteners: as indicated.

.12 Aircraft pavement area steel manhole frames and gratings: extra heavy duty, open gratings, for airfield service, minimum Load Class 85 (imperial system).

.13 Frames, gratings, covers to dimensions as indicated and following requirements:
.1 Metal gratings and covers to bear evenly on frames.
.1 Frame with grating or cover to constitute one unit.
.2 Assemble and mark unit components before shipment.
.2 Gray iron castings: to ASTM A 48/A 48M, strength class30B.
.3 Castings: coated with two applications of asphalt varnish sand blasted or cleaned and ground to eliminate surface imperfections.
.4 Catch basin frames and covers:; heavy duty municipal type..
.1 Cover cast without perforations and complete with two 25 mm square lifting holes.
.5 Size: 762 mm clear diameter.

2.2 Pipe Bedding Materials

.1 In accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.

2.3 Backfill Materials

.1 Base Material 19mm size.

.2 Unshrinkable fill: To section 03 30 00.

.3 Use Base Material 19mm size backfill.

.4 Wrap riser sections with Impermeable Geomembranes(Liner) prior to backfilling.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 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 catch basins.

3.3 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.

3.4 INSTALLATION

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

.2 Dewater excavation to approval of Departmental Representative and remove soft and foreign material before placing concrete base.

.3 Set precast concrete base on 150 mm minimum of granular bedding compacted to 98% corrected

3.4 INSTALLATION (Cont'd)

.3 (Cont'd)
maximum dry density maximum density. Make each successive joint watertight with approved rubber ring gaskets or bituminous compound.

.4 Precast units:
.1 Set bottom section of precast unit in bed of cement mortar and bond to concrete slab or base.
.2 Make each successive joint watertight with Departmental Representative's approved rubber ring gaskets, bituminous compound, cement mortar, epoxy resin cement, or combination of these materials.
.3 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.
.4 Plug lifting holes with precast concrete plugs set in cement mortar or mastic compound.

.5 Compact granular backfill to 95 % corrected maximum dry density.

.6 Place unshrinkable backfill in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.7 Set frame and cover to required elevation on no more than four courses of brick.
.1 Make brick joints and join brick to frame with cement mortar.
.2 Parge and make smooth and watertight.

.8 Place frame and cover on top section to elevation as indicated.
.1 If adjustment required use concrete ring.

.9 Clean units of debris and foreign materials.
.1 Remove fins and sharp projections.
.2 Prevent debris from entering system.

3.5 FIELD QUALITY CONTROL

.1 Leakage Test:

.2 Install watertight plugs or seals on inlets and outlets of each new Catch Basin and fill with water.

.3 Leakage not to exceed 0.3% per hour of volume of manhole.

.4 If permissible leakage is exceeded, correct defects.

3.5 FIELD QUALITY CONTROL (Cont'd)

.5 Repeat until approved by Departmental Representative.

.6 Departmental Representative will issue Test Certificate for each catchbasin passing test.

3.6 Restoration

.1 In accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END

PART 1 - GENERAL

1.1 Samples

.1 At least 2 weeks prior to commencing work, inform Departmental Representative of proposed source of Class I backfill and filter materials and provide samples of each.

1.2 Material Certification

.1 At least 2 weeks prior to commencing work, submit manufacturer's test data and certification that drain pipe and filter fabric materials meet requirements of this section.

1.3 Measurement for Payment

.1 Supply and installation of Corrugated Metal perforated pipe sub-drains including trenching, backfill, stone filter materials, filter fabric, disposal of surplus excavation material, backfill and compaction of trench bottom, removal of existing piping, breaking into existing manholes and sealing new piping will be measured in linear meters of each type and size installed. Measurement will be made from centre of manholes to the end of pipe horizontally.

.2 Connection to all manholes and existing subdrains will be incidental to work and will not be measured separately.

PART 2 - PRODUCTS

2.1 Materials

.1 Perforated corrugated steel pipe:
.1 To G401-93.
.2 Bolt type corrugated couplers.
.3 Metal thickness unless otherwise indicated, as follows:

Diameter	Thickness of metal
200 mm	1.3 mm
250 to 400 mm	1.6 mm

2.2 Filter Stone .1 Filter stone; clean, hard, durable particles, graded uniformly in size from 9.5 to 16 mm.

2.3 Filter Fabric .1 Fuel Resistant non woven geotextile to section 31 32 19,02- Geomembrane and Geotextile

2.4 Backfill Materials .1 Class 1: Use traffic 19 mm size base material as bedding, surround, and backfill unless other shown on drawings.

2.5 Grout .1 Non-shrink type.

PART 3 - EXECUTION

3.1 Trenching .1 Do trenching in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling and as indicated on the drawings.

.2 Trench cages or boxes may be required to prevent undermining of the adjacent pavements or adjacent electrical ducts use as directed by Departmental Representative.

.3 Do not place filter fabric prior to approval of trench by Departmental Representative.

3.2 Filter Fabric Installation .1 Wrap pipe filter stone with filter fabric as indicated on Drawing using a minimum 600 mm overlap both longitudinally and laterally.

3.3 Bedding .1 As indicated on drawings.

3.4 Installation of Pipe Sub-drains .1 Install sub drains in accordance with Drawing.

.2 Confirm existing manhole inverts, notify Departmental Representative of any discrepancies.

3.4 Installation of Pipe Sub-drains (Cont'd)

.3 Lay pipe drains on prepared bed, true to line and grade with inverts smooth and free of sags or high points. Ensure barrel of each pipe is in contact with bed throughout full length.

.4 Commence laying at outlet and proceed in upstream direction.

.5 Lay perforated pipes with perforations downwards.

.6 Make joints tight in accordance with manufacturer's instructions. Trim pipes at 90° to pipe centreline. Ensure pipe ends are at mid-point of couplers.

.7 Do not allow water to flow through pipes during construction except as approved by Departmental Representative.

.8 Make watertight connections to manholes.

.9 Surround and cover drain with filter stone material in uniform 150 mm layers to 150 mm above top of pipe and compact to at least 95% of corrected maximum dry density.

.10 Cover top of filter stone with filter fabric overlapped 600 mm.

.11 Backfill remainder of trench upto pavement subgrade levelwith Class 1 backfill in maximum 150 mm layers to 95% corrected maximum dry density in accordance with Section 31 23 10 - Excavating Trenching and Backfilling.
.1 Under pavement areas bring backfill to top of sub-base.

END

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 33 00 - Submittal Procedures.

1.2 References

.1 Canadian Standards Association (CSA)
.1 CSA C22.2 No. 211.1-M1984(R1999), Rigid Types EBI and DB2/ES2 PVC Conduit.
.2 CSA C22.2 No. 211.3-96(R2000), Reinforced Thermosetting Resin Conduit (RTRC) and Fittings (Bi-national standard, with UL 1684).

1.3 Submittals

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

.2 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada and Health and Welfare Canada for solvent cement. Indicate VOC content.

1.4 Waste Management and Disposal

.1 Place materials defined as hazardous or toxic in designated containers.

.2 Fold up metal banding, flatten and place in designated area for recycling.

.3 Do not dispose of preservative treated wood through incineration.

.4 Do not dispose of preservative treated wood with other materials destined for recycling or reuse. Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill as approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 Plastic Polyethylene Pipe

.1 Flexible plastic polyethylene pressure pipe to CAN/CSA - B137.1, type PE 1404, series 75, size as indicated, with approved couplings and fittings required to make complete installation.

2.2 Cable Pulling Equipment

.1 6 mm stranded nylon pull rope tensile strength 5 kN.

2.3 Markers

.1 Concrete type cable markers: as indicated, with words: "Cable", "Joint" or "Conduit" impressed in top surface, with arrows to indicate change in direction of duct runs.

PART 3 - EXECUTION

3.1 Installation

.1 Install pipe in accordance with manufacturer's instructions and as indicated on contract drawings.

.2 Clean inside of ducts before laying.

.3 Ensure full, even support every 1.5 m throughout duct length.

.4 Slope ducts with 1 to 400 minimum slope.

.5 During construction, cap ends of ducts to prevent entrance of foreign materials.

.6 Pull through each duct wooden mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each duct immediately before pulling-in cables.

.7 In each duct install pull rope continuous throughout each duct run with 3 m spare rope at each end.

.8 Install markers as required.

END