

## **PART 1 - GENERAL**

### **1.1 SECTION INCLUDES**

- .1 Materials and installation for storm sewer.

### **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 05 17 - Aggregate Materials.
- .5 Section 31 23 10 - Excavating, Trenching and Backfilling.

### **1.3 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM C117-95, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C136-01, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM C443M-02, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).
  - .4 ASTM D698-00a, 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>)).
  - .5 ASTM D1056-00, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
  - .6 ASTM D2680-01, Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.
  - .7 ASTM D3034-00, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  - .8 ASTM F405-97, Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings.
  - .9 ASTM F667-97, Standard Specification for Large Diameter Corrugated Polyethylene Tubing and Fittings.
  - .10 ASTM F794-01, Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

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**1.3 REFERENCES**  
**(CONT'D)**

- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-M89, 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 (Consists of A5-98, A8-98, A23.5-98, A362-98, A363-98, A456.1-98, A456.2-98, A456.3-98).
    - .1 CAN/CSA-A5-98, Portland Cement.
  - .2 CSA B1800-02, Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).
    - .1 CSA B182.2-02, PVC Sewer Pipe and Fittings (PSM Type).
    - .2 CSA B182.4-02, Profile PVC Sewer Pipe and Fittings.
    - .3 CSA B182.11-02, Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.
  
- .3 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Protection Act, 1999 (CEPA).
  
- .4 Transport Canada (TC)
  - .1 Transportation of Dangerous Goods Act, 1992 (TDGA)

**1.4 DEFINITIONS**

- .1 A pipe section is defined as length of pipe between successive catchbasins and/or manholes.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

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**1.5 WASTE MANAGEMENT AND DISPOSAL**  
**(CONT'D)**

- .4 Separate for reuse and recycling and place in designated containers steel, metal, and plastic waste in accordance with Waste Management Plan.
- .5 Divert unused metal materials from landfill to metal recycling facility for disposal approved by Departmental Representative.
- .6 Place materials defined as hazardous or toxic in designated containers.
- .7 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .8 Fold up metal banding, flatten and place in designated area for recycling.

**1.6 MEASUREMENT FOR PAYMENT**

- .1 Storm Sewer: Supply and installation of storm sewer (HDPE pipe) including couplings, testing, excavation, backfilling, granular bedding and surround material shall be measured horizontally from manhole face to manhole face in metres of each pipe size and depth class installed.

**PART 2 - PRODUCTS**

**2.1 HDPE PIPE**

- .1 Double walled, 320kPa, corrugated high density polyethylene pipe (HDPE): to ASTM F667.

**2.2 PIPE BEDDING AND SURROUND MATERIAL**

- .1 Granular material in accordance with Section 31 05 17 - Aggregate Materials and following requirements:
  - .1 Crushed or screened stone, gravel or sand.
  - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

**PART 2 - PRODUCTS**  
**(CONT'D)**

**2.2 PIPE BEDDING AND SURROUND MATERIAL**  
**(CONT'D)**

.2 Table

Sieve Designation (mm)	% Passing	
	Stone/Gravel	Gravel/Sand
25	100	100
12.5	65-90	100
4.75	35-55	50-100
2.00	25	30-90
0.425	10-25	10-50
0.075	0-8	0-10

**2.3 BACKFILL MATERIAL**

.1 As indicated, to Section 31 23 10 - Excavating Trenching and Backfilling.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

.1 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Departmental Representative.

**3.2 TRENCHING**

.1 Do trenching Work in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.

.2 Do not allow contents of sewer or sewer connection to flow into trench.

.3 Trench alignment and depth to approval of Departmental Representative prior to placing bedding material and pipe.

.4 Water jetting of backfill under haunches of corrugated steel pipe may be permitted if recommended by manufacturer and approved by Departmental Representative.

**PART 3 - EXECUTION**  
**(CONT'D)**

**3.3 GRANULAR BEDDING**

- .1 Place bedding in unfrozen condition.
- .2 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated
- .3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe. Do not use blocks when bedding pipes.
- .4 Shape transverse depressions as required to suit joints.
- .5 Compact each layer full width of bed to at least 95 % corrected maximum dry density.
- .6 Fill excavation below bottom of specified bedding adjacent to catch basins with compacted bedding material.

**3.4 INSTALLATION**

- .1 Lay and join pipe in accordance with manufacturer's recommendations and to approval of Departmental Representative.
- .2 Handle pipe using methods approved by Departmental Representative.
  - .1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.
- .3 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points.
  - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
- .4 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.
- .5 Do not exceed maximum joint deflection recommended by pipe manufacturer.
- .6 Do not allow water to flow through pipes during construction except as may be permitted by Departmental Representative.
- .7 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

**PART 3 - EXECUTION**  
**(CONT'D)**

**3.4 INSTALLATION**  
**(CONT'D)**

- .8 Install plastic pipe and fittings in accordance with CSA B182.11.
- .9 Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .10 Make watertight connections to catch basins.
  - .1 Use shrinkage compensating grout when suitable gaskets are not available.
- .11 Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes.
  - .1 Joint to be structurally sound and watertight.
- .12 Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.

**3.5 BACKFILL**

- .1 Place backfill material in unfrozen condition.
- .2 Place backfill material, above pipe surround, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
- .3 Under paving and walks, compact backfill to at least 95% corrected maximum dry density. In other areas, compact backfill to at least 90% corrected maximum dry density.

**3.6 FIELD TESTING**

- .1 Repair or replace pipe, pipe joint or bedding found defective.
- .2 Remove foreign material from sewers and related appurtenances by flushing with water.