

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 31 23 10 - Excavating, Trenching and Backfilling.
	.4	Section 31 05 16 - Aggregate Materials.
	.5	Section 03 30 00 - Cast-in-Place Concrete.
1.3 REFERENCES	.1	American Society for Testing and Materials International, (ASTM) .1 ASTM C 117-05, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing. .2 ASTM C 136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates. .3 ASTM D 698-00a1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³ (600 kN-m/m ³)). .4 ASTM D 1056-07, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
	.2	Canadian Standards Association (CSA International) .1 CAN/CSA A5-2002, Portland Cement. .2 CSA B182.8, Profile Polyethylene Storm Sewer and Drainage 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).

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- 1.4 DEFINITIONS .1 A pipe section is defined as length of pipe between successive catchbasins and/or manholes.
- 1.5 SUBMITTALS .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings to indicate proposed method for installing carrier pipe for undercrossings.
- .3 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of bedding materials and provide access for sampling.
- .5 Submit manufacturer's test data and certification at least 2 weeks prior to beginning Work.
- .6 Certification to be marked on pipe.
- .7 Submit to Departmental Representative 1 copy of manufacturer's installation instructions.
- 1.6 WASTE MANAGEMENT AND DISPOSAL .1 Divert unused concrete materials from landfill to local quarry as approved by Departmental Representative.
- .2 Divert unused aggregate materials from landfill to quarry for reuse as approved by Departmental Representative.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- 1.7 SCHEDULING .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.
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1.8 MEASUREMENT FOR .1
PAYMENT

Granular Pipe Bedding (Type I) - Measurement for pipe bedding shall be by cubic metre (m³). Measurement widths and lengths shall be as specified for trench excavation and backfill. Measurement depth shall be actual depth installed up to limits shown on the contract drawings.

- .2 Storm Sewer - Storm sewer will be measured through fittings and manholes after the work is completed. Measurement will be horizontally in metres over the center line of the pipe when the grade of the pipe is less than 10% and in metres along the slope length of the pipe when the grade of the pipe is 10% or greater, for each size pipe and depth class supplied and installed. Measurement will be made from center to center of manholes, catch basins, ditch inlets or from center of manholes, catch basins, ditch inlets to the end of the pipe where no manhole, catch basin or ditch inlet is installed under this contract. Include incidental to this unit price all testing and camera inspection, marking tape. Contractor will be paid to a maximum of 90% of the value of this item until such time as the section of work passes all tests.
- .3 Trenching and backfilling will be measured under Section 31 23 10.

PART 2 - PRODUCTS

2.1 HDPE PIPE

- .1 HDPE pipe: to CSA-B182.8 and conform to ASTM F667 for Storm Sewers.
- .1 Pipe to have smooth inner wall.
- .2 Pipe stiffness 320 kPa, polyethylene resin to ASTM D 1248.
- .3 Weathering resistance to ASTM D 1248 Class C.
- .4 Pipes may be bell and spigot style or plain end fastened with a coupling recommended by manufacturer.
- .5 Standard of Acceptance: Soleno 320, or approved equal.

2.2 PIPE BEDDING
AND SURROUND
MATERIAL

- .1 Granular material in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
- .1 Crushed or screened stone, gravel or 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, CAN/CGSB-8.2.

2.2 PIPE BEDDING .2 Table
AND SURROUND
MATERIAL
(Cont'd)

Sieve Designation (mm)	% Passing	
	Stone/Gravel	Gravel/Sand
200	-	-
75	-	-
50	-	-
38.1	-	-
25	100	-
19	-	-
12.5	65-90	100
9.5	-	-
4.75	35-55	50-100
2.00		30-90
0.425	10-25	10-50
0.180	-	-
0.075	0-8	0-10

- .3 Concrete mixes and materials for bedding, cradles, encasement, supports: in accordance with Section 03 30 00 - Cast-in-Place Concrete.

2.3 BACKFILL
MATERIAL

- .1 As indicated.
- .2 Type 3 to Section 31 23 10 - Excavating Trenching and Backfilling.
- .3 Unshrinkable fill: in accordance with 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.

3.2 TRENCHING
(Cont'd)

- .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 HDPE pipe may be permitted if recommended by manufacturer and approved by Departmental Representative.

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 manholes or catch basins with compacted bedding material compacted common backfill.

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 Lay HDPE pipe:
 - .1 With outside circumferential laps facing upgrade and longitudinal laps or seams at side or quarter points.

3.4 INSTALLATION
(Cont'd)

- .5 Lay HDPE pipe:(Cont'd)
 - .2 With longitudinal centre line of paved invert coinciding with flow line.
- .6 Do not exceed maximum joint deflection recommended by pipe manufacturer.
- .7 Do not allow water to flow through pipes during construction except as may be permitted by Departmental Representative.
- .8 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
- .9 Joints:
 - .1 HDPE pipe:
 - .1 Bell and spigot style or plain end fastened with a coupling recommended by the manufacturer.
- .10 When any stoppage of Work occurs, restrain pipes as directed by Departmental Representative, to prevent "creep" during down time.
- .11 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.
- .12 Make watertight connections to manholes and catch basins.
 - .1 Use shrinkage compensating grout when suitable gaskets are not available.
- .13 Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes.
 - .1 Joint to be structurally sound and watertight.
- .14 Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.

3.5 PIPE SURROUND

- .1 Place surround material in unfrozen condition.
- .2 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes as indicated.
 - .1 Leave joints and fittings exposed until field testing is completed.

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- 3.5 PIPE SURROUND (Cont'd)
- .3 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.
 - .4 Place layers uniformly and simultaneously on each side of pipe.
 - .5 Compact each layer from pipe invert to mid height of pipe to at least 95% corrected maximum dry density.
 - .6 Compact each layer from mid height of pipe to underside of backfill to at least 90% corrected maximum dry density.
 - .7 When field test results are acceptable to Departmental Representative, place surround material at pipe joints.
- 3.6 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.
 - .4 Place unshrinkable backfill in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.
- 3.7 UNDERCROSSING
- .1 Excavate working pit to minimum of 0.5 m below lowest invert of encasing pipe.
 - .2 Dewater excavation.
 - .3 Dewater area of undercrossing.
 - .4 Place encasing pipe to exact line and grade as indicated. Encasing pipe shall undercross obstruction at 90 degrees.
 - .5 Provide shop drawings showing proposed method of installation for storm sewer pipe.
 - .6 Couplings of storm sewer pipe: not to rest on levelling pad when carrier pipe is in position.
 - .7 Do field testing before placing concrete cradle and grouting.
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- 3.8 FIELD TESTING
- .1 Repair or replace pipe, pipe joint or bedding found defective.
 - .2 When directed by Departmental Representative, draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction.
 - .3 Remove foreign material from sewers and related appurtenances by flushing with water.
 - .4 Television and photographic inspections:
 - .1 Carry out inspection of installed sewers by television camera, photographic camera or by other related means.
 - .2 Provide means of access to permit Departmental Representative to do inspections.