

Part 1 General

1.1 WORK INCLUDED

- .1 This section specifies requirements for supply and constructing storm drainage system and culverts. Work includes supply and installation of pipe, fittings and connections.

1.2 CERTIFICATES

- .1 Submit manufacturer's test data and certification that products and materials meet requirements of this section.
- .2 All materials must be new.

1.3 HANDLING AND STORAGE

- .1 Handle and store pipe and fittings in such manner as to avoid shock and damage. Do not use chains or cables passed through pipe bore.
- .2 Store gaskets in cool location, out of direct sunlight, and away from petroleum products.

Part 2 Products

2.1 PIPE

- .1 All storm drainage system lines shall consist of a HDPE Dual Wall Pipe.
- .2 HDPE pipe shall be double wall to CSA B182.6 with smooth interior surface with corrugates exterior to 320 KPa standard.
- .3 Diameter, material, strength class and dimensional ratio of pipe and fittings as indicated on drawings.

2.2 PIPE JOINTS

- .1 HDPE pipe shall be bell and spigot with flexible rubber gasket.

2.3 UNDERGROUND WARNING TAPE

- .1 Warning tape shall be polyethylene with a message approved by the Engineer.

Part 3 Execution

3.1 PREPARATION

- .1 Carefully inspect products for defects and remove defective products from site.
- .2 Ensure that pipe and fittings are clean before installation.

3.2 TRENCHING, BEDDING AND BACKFILLING

- .1 Do trenching, bedding and backfilling to Section 02223.

3.3 PIPE INSTALLATION

- .1 Lay and joint pipe and fittings as specified herein and according to manufacturer's published instructions.

- .2 Lay pipe and fittings on prepared bed, true to line and grade indicated within the following tolerances:
 - Horizontal Alignment: 25 mm.
 - Vertical Alignment: the lesser of 3mm or one-half the rise per pipe length.
- .3 Commence laying at outlet and proceed in upstream direction with bell ends facing upgrade.
- .4 Prevent entry of bedding material, water or other foreign matter into pipe. Use temporary watertight bulkheads when pipe laying is not in progress.
- .5 Install gaskets in accordance with manufacturer's published instructions. During cold weather, store gaskets in heated area to assure flexibility.
- .6 Align pipe carefully before joining. Do not use excessive force to joint pipe sections.
- .7 Support pipes as required to assure concentricity until joint is properly completed.
- .8 Keep pipe joints free from mud, silt, gravel or other foreign material.
- .9 Avoid displacing gasket or contaminating with dirt, petroleum products, or other foreign material. Remove, clean, reinstall and lubricate gaskets so disturbed.
- .10 Complete each joint before laying next length of pipe.
- .11 Where deflection at joints is permitted, deflect only after the joint is completed. Do not exceed maximum joint deflection recommended by pipe manufacturer.
- .12 At structures provide flexible joint not more than 300 mm from outside face of structure.
- .13 Cut pipe as required for fittings or closure pieces, square to centerline, and as recommended by manufacturer.
- .14 Make watertight connections to manholes and catch basins. Use non-shrink grout when suitable gaskets are not available.
- .15 Place underground warning tape 1.0 meter directly above storm main. Where main is shallow, the minimum cover over the tape shall be 500 mm.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Materials and installation for foundation and underslab drainage.

1.2 RELATED SECTIONS

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

1.3 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2-00(June 2001), Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
 - .2 CSA B1800-02, Plastic Non-pressure Pipe Compendium - B1800 Series.
 - .1 CSA B182.2-02, PVC Sewer Pipe and Fittings (PSM Type).
 - .3 CSA-G401-01, Corrugated Steel Pipe Products.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

1.5 SITE CONDITIONS

- .1 Examine sub-surface investigation report which bound into specification following Section 01 91 00 - Commissioning.
- .2 Known underground utility lines and buried objects are as indicated on plans.

Part 2 Products

2.1 BEDDING AND SURROUND MATERIALS

- .1 Coarse filter aggregate: to CSA-A23.1/A23.2, Group 1 20-5 mm.
- .2 Fine filter aggregate: to CSA-A23.1/A23.2.
- .3 Flexible plastic tubing and fittings. Corrugated, Perforated, nominal inside diameter 100 mm.
- .4 Rigid plastic pipe and fittings: to CSA-B182.1.
- .5 Geotextile filter

2.2 BACKFILL MATERIAL

- .1 In accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.
- .2 Excavated or graded material existing on site may be suitable to use if approved by Consultant.

Part 3 Execution

3.1 EXAMINATION

- .1 Ensure graded base conforms with required drainage pattern before placing bedding material.
- .2 Ensure improper slopes, unstable areas, areas requiring additional compaction or other unsatisfactory conditions are corrected to approval of Consultant.
- .3 Ensure foundation wall and dampproofing and rigid insulation have been installed and approved by Consultant before placing bedding material.

3.2 BEDDING PREPARATION

- .1 Cut trenches in base and place bedding materials in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.
- .2 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.
- .3 Shape transverse depressions, as required, to suit joints.
- .4 Compact each layer full width of bed to at least 95% of corrected maximum dry density.
- .5 Fill excavation below design elevation of bottom of specified bedding with compacted bedding material.

3.3 PIPE OR TUBING INSTALLATION

- .1 Ensure pipe interior and coupling surfaces are clean before laying.
- .2 Lay perforated pipe to slope of 1:100. For pipe face perforations and coupling slots downward.
- .3 Grade bedding to establish pipe slope.
- .4 Install end plugs at ends of collector drains to protect pipe ends from damage and ingress of foreign material.

3.4 PIPE OR TUBING SURROUND MATERIAL

- .1 Upon completion of pipe laying and after Consultant has inspected Work in place, surround and cover pipe and install geotextile filter.
- .2 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness. Do not drop material within one m of pipe.
- .3 Place layers uniformly and simultaneously on each side of pipe.

- .4 Compact each layer from pipe invert to mid-height of pipe to at least 95% of corrected maximum dry density.
- .5 Compact each layer from mid-height of pipe to underside of backfill to at least 90% of corrected maximum dry density.

3.5 BACKFILL MATERIAL

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

END OF SECTION