

Part 1 General**1.1 SECTION INCLUDES**

- .1 Materials and installation for foundation and underslab drainage.
- .2 Materials and installation for manhole structure drainage and subdrain outlet.

1.2 RELATED REQUIREMENTS

- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.3 REFERENCES

- .1 ASTM International
 - .1 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .2 ASTM D698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³(600 kN-m/m³)).
- .2 Bureau de normalisation du Québec (BNQ)
 - .1 BNQ 3624-115-04, Polyethylene (PE) Pipe and Fittings-Flexible Corrugated Pipes for Drainage-Characteristics and Test Methods.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .4 CSA International
 - .1 CAN/CSA-B1800-11, Thermoplastic Non-Pressure Pipe Compendium.
- .5 U.S. Environmental Protection Agency (EPA) / Office of Water
 - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Inform Departmental Representative of proposed source of bedding and filter materials and provide samples at least 4 weeks prior to commencing work.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for pipes, pipe fittings, and aggregate and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Samples:
 - .1 Submit for testing, following samples of materials proposed for use.
 - .1 Aggregate bedding and filter materials.

- .3 Certificates:
 - .1 Submit manufacturer's certification that drain pipe materials meet requirements of this Section.
- .4 Test and Evaluation Reports:
 - .1 Submit manufacturer's test data that drain pipe materials meet requirements of this Section.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations.
 - .2 Store and protect pipes from damage.
 - .3 Replace defective or damaged materials with new.

1.7 SITE CONDITIONS

- .1 Examine sub-surface investigation report which is bound into specification .
- .2 Known underground utility lines and buried objects are as indicated on plans. The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

Part 2 Products

2.1 MATERIALS

- .1 Plastic pipe and fittings: to BNQ 3624-115, nominal inside diameter 150 mm.
- .2 Perforated plastic pipe and fittings: to CAN/CSA-B1800. Nominal pipe sizes 150 mm.
- .3 Bedding gravel or crushed stone; hard, durable particles, graded evenly in size to OPS Granular A.
- .4 Granular filter material in accordance with the following requirements:
 - .1 Screened stone or gravel to conform to OPS Clear Stone requirements.
 - .2 Gradations to be within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB-8.1 and CAN/CGSB-8.2.
- .5 Geotextile filter cloth: In accordance with –OPSS 1860.

Part 3 Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sub-drainage piping installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after approval to proceed from Departmental Representative.

3.2 PREPARATION

- .1 Temporary Erosion and Sedimentation Control:
 - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
 - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TRENCHING

- .1 Do excavating, trenching and backfilling in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Place filter material after approval of excavation by Departmental Representative.

3.4 BEDDING

- .1 Place 100 mm layer of bedding or filter material to full trench width and compact to minimum 95% of corrected maximum dry density.

3.5 INSTALLATION OF PIPE SUB-DRAINS

- .1 Lay pipe drains on prepared bed, true to line and grade with inverts smooth and free of sags or high points.
 - .1 Ensure barrel of each pipe is in contact with bed throughout full length.
- .2 Begin laying at outlet and proceed in upstream direction.
- .3 Lay perforated pipes with perforations downwards.
- .4 Lay bell and spigot pipe with bell ends facing upstream.
- .5 Make joints tight in accordance with manufacturer's instructions.
- .6 Make watertight connections to existing drains, new or existing manholes and catch basins where indicated or as directed by Departmental Representative.
- .7 Plug open upstream ends of pipes with watertight concrete, steel or wood bulkheads.

- .8 Surround and cover drain with filter material in uniform 150 mm layers to an elevation of at least 150 mm above top of drain and compact to at least 95% of corrected maximum dry density.
- .9 Wrap or sleeve perforated pipe with geotextile filter cloth.
- .10 Backfill remainder of trench as indicated or as directed by Departmental Representative.
- .11 Do not place bedding surround and backfill materials in frozen condition.
- .12 Protect sub-drains against flotation during installation.
- .13 Install "Y" connections to surface as indicated, for flushing.

3.6 PIPE OUTLET

- .1 Outlet pipe sub-drains where indicated or as directed by Departmental Representative, at grade and elevation required to provide positive drainage.
- .2 Clearly mark end of pipe sub-drain and install rodent grate to protect the pipe.

3.7 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION