

Part 1 General

1.1 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 Canadian Standards Association (CSA International)
 - .1 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).
 - .2 CSA B182.1-02, Plastic Drain and Sewer Pipe and Pipe Fittings.

Part 2 Products

2.1 MATERIALS

- .1 Perforated plastic pipe and fittings: to CAN/CSA-B182.1. Nominal pipe sizes as indicated.
- .2 Bedding gravel or crushed stone; hard, durable particles, graded evenly in size from 16 to 8 mm.
- .3 Granular filter material to following requirements:
 - .1 Screened stone or gravel.
 - .2 Gradations to be within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB-8.2.

.4	Table	
	Sieve Designation	% Passing
	200 mm	-
	75 mm	-
	50 mm	-
	38.1 mm	-
	25 mm	-
	19 mm	-
	12.5 mm	100
	9.5 mm	-
	4.75 mm	70-100
	2.00 mm	60- 95
	0.425 mm	15- 40
	0.180 mm	0- 10
	0.075 mm	-

- .5 Geotextile filter: Acceptable material: Filter Soc by Princo.

- .6 Cleanouts: as indicated and as recommended by manufacturer.
- .7 Backfill material: In accordance with Section 31 23 33 Excavating, Trenching and Backfill.

Part 3 Execution

3.1 TRENCHING

- .1 Do excavating trenching and backfilling in accordance with Section 31 23 33- Excavating Trenching and Backfilling.
- .2 Place bedding filter material after approval of excavation, trench by Contract Administrator.

3.2 BEDDING

- .1 Place layer thickness as indicated of bedding filter material to full trench width as indicated and compact to minimum 95% of corrected maximum dry density.
- .2 Grade bedding to establish pipe slope.

3.3 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 perforated and non perforated pipe to slopes indicated.
- .5 Make watertight connections to existing drains, new or existing manholes and catch basins, sump pumps where indicated or as directed by Contract Administrator.
- .6 Plug open upstream ends of pipes with watertight concrete, steel or wood bulkheads.
- .7 Surround pipe with bedding gravel and compact as directed by Contract Administrator.
- .8 Surround and cover drain with filter material in uniform 150 mm layers as indicated 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 as indicated.
- .10 Backfill remainder of trench to Section 31 23 33- Excavating Trenching and Backfilling, as directed by Contract Administrator and as indicated.
- .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.
- .14 Connect pipe sub-drains to sump pit where indicated.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 11 - Construction/Demolition Waste Management and Disposal.
- .3 Section 26 05 00 - Common Work Results - Electrical.

1.2 REFERENCES

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

1.3 SUBMITTALS

- .1 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada, and Health and Welfare Canada for solvent cement. Indicate VOC content.
- .2 Submit manufacturer's data and certification at least 2 weeks prior to commencing work.
- .3 Submit manufacturer's information data sheets and instructions.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and Handle materials in accordance with Section 01 61 00 - Common Product Requirements.

1.5 RECORD DRAWINGS

- .1 Provide record drawings, including details of pipe and cable duct materials, maintenance and operating instructions.

PART 2 PRODUCTS

2.1 PVC DUCTS AND FITTINGS

- .1 Rigid PVC duct: to CSA C22.2 No. 211.1, type rigid PVC for direct burial with minimum wall thickness at any point of 2.8 mm. Nominal length: 3.0 m plus or minus 12 mm. Type DB2 (thinwall) PVC conduits unacceptable.
- .2 Rigid PVC split ducts as required.

- .3 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, adaptors same product material as duct, to make complete installation.
- .4 Rigid PVC 90° and 45° bends as required.
- .5 Rigid PVC 5° angle couplings as required.
- .6 Expansion joints as required.
- .7 Preformed, interlocking intermediate duct spacers for duct size as indicated.
- .8 Use epoxy coated galvanized steel conduit for sections extending above finished grade.

2.2 SOLVENT WELD COMPOUND

- .1 Solvent cement for PVC duct joints.

2.3 FRE CONDUITS AND FITTINGS

- .1 FRE conduits to CSA C22.2 No. 211.3.
- .2 Conduits to be composed of glass filaments encapsulated in an epoxy matrix. Each conduit to have an integral expanded coupling with urethane gasket for sealing. No threads or adhesives to be used for assembling joints.
- .3 Conduit to be suitable for continuous operation from -40° C to +100° C without change in mechanical properties.
- .4 FRE 90° Bends, 5° Bends, couplings, adaptors caps, etc to make complete installation as indicated on drawings.

2.4 CABLE PULLING EQUIPMENT

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

2.5 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.
- .2 150 mm wide, 4 mil, polyethylene marker tape in all trenches. Use red colored tape. Install at depth as per drawings.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Install duct in accordance with manufacturer's instructions.

- .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 OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 26 24 02 Service Entrance Board.

1.2 REFERENCES

- .1 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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit installation depths, installation run locations and as-constructed details in red-line drawings following installation.

1.4 QUALITY ASSURANCE

- .1 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
- .2 Regulatory Requirements:
 - .1 Perform Work to comply with applicable Provincial/Territorial regulations.
 - .2 Co-ordinate and meet requirements of power supply authority.
 - .1 Ensure availability of power when required.
- .3 Certificates: submit certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.

1.5 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:
 - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Underground ducts: rigid type DB2, size as indicated.
- .2 Rigid steel galvanized conduit and fittings: size as indicated.
- .3 Conductors: aluminum, type RWU-90, size and number of conductors as indicated.
- .4 Meter socket: approval of supply authority.
- .5 Concrete: to CAN/CSA A23.1/A23.2.
- .6 Backfill: clean and free of debris.
- .7 Pulling Iron:
 - .1 22 mm diameter hot dipped galvanized steel bar with exposed triangular shaped opening.

Part 3 Execution

3.1 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

- .1 Install cables in trenches and in conduit in accordance with Section 26 05 43.01 - Installation of Cables in Trenches and in Ducts.
- .2 Allow adequate conductor length for connection to supply by power supply authority.
- .3 Install meter socket and conduit.
- .4 Allow adequate conductor length for connection to service equipment.
- .5 Make grounding connections in accordance with Section 26 05 28 - Grounding - Secondary.
- .6 Install concrete encased ducts for electrical systems as indicated and in accordance with CAN/CSA A23.1.
- .7 Install pulling irons as required.
- .8 Seal ducts and conduits at building entrance location after installation of cable.

3.3 FIELD QUALITY CONTROL

- .1 Site Tests:

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform additional tests if required by authority having jurisdiction.
- .2 Submit written test results to Contract Administrator for review.

3.4 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste.

END OF SECTION