

- Part 1 General
- 1.1 RELATED SECTIONS
 - .1 Section 31 23 33 – Excavation, Trenching and Backfilling.
 - .2 Section 03 30 00 – Cast-in-Place Concrete.
 - .3 Section 26 05 00 – Common Work Results for Electrical.
- 1.2 REFERENCES
 - .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- 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 two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29 – Health and Safety Requirements.
 - .3 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Test reports: submit certified test reports for specified materials from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .4 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
- 1.4 QUALITY ASSURANCE
 - .1 Pre-Installation Meetings: convene pre-installation meeting prior to beginning work of this Section with contractor's representative and Departmental Representative to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building sub trades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 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.

1.6 MEASUREMENT PROCEDURES

- .1 No measurement will be made under this Section. Include costs in items of work for Division 26.

Part 2 Products

2.1 PVC DUCTS

- .1 PVC conduit, encased in concrete.

2.2 PVC DUCT FITTINGS

- .1 Rigid PVC opaque solvent welded type couplings, bell end fittings, plugs, caps, adaptors as required to make complete installation.
- .2 Expansion joints.
- .3 Rigid PVC 5 degree angle couplings.

2.3 MARKER TAPE

- .1 Polyethylene marker tape: 75mm wide suitable for burial below grade directly over buried cable.
 - .1 Marker tape to be red in colour with the following words printed in large black, block letters: "CAUTION CAUTION CAUTION ELECTRIC LINE BURIED BELOW".

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION GENERAL

- .1 Install underground duct banks including formwork.
- .2 Build duct bank on undisturbed soil or on well compacted granular fill not less than 150 mm thick, compacted to 95% of maximum proctor dry density.
- .3 Open trench completely before ducts are laid and ensure that no obstructions will necessitate change in grade of ducts.
- .4 Prior to laying ducts, construct "mud slab" not less than 75 mm thick.
- .5 Install ducts at elevations and with slope as indicated and minimum slope of 1 to 400.
- .6 Install base spacers at maximum intervals of 1.5 m levelled to grades indicated for bottom layer of ducts.
- .7 Lay PVC ducts with configuration and reinforcing as indicated.
 - .1 Stagger joints in adjacent layers at least 150 mm and make joints watertight.
 - .2 Encase duct bank with 75 mm thick concrete cover.
 - .3 Use long sweep bends for sections extending above finished grade level.
- .8 Make transpositions, offsets and changes in direction using 5 degree bend sections, do not exceed a total of 20 degree with duct offset.
- .9 Use conduit to duct adapters when connecting to conduits.
- .10 Cut, ream and taper end of ducts in field in accordance with manufacturer's recommendations, so that duct ends are fully equal to factory-made ends.
- .11 Allow concrete to attain 50% of its specified strength before backfilling.
- .12 Use anchors, ties and trench jacks as required to secure ducts and prevent moving during placing of concrete.
 - .1 Tie ducts to spacers with twine or other non-metallic material.
 - .2 Remove weights or wood braces before concrete has set and fill voids.
- .13 Clean ducts before laying:
 - .1 Cap ends of ducts during construction and after installation to prevent entrance of foreign materials.

- .14 Duct cleaning:
 - .1 Pull 300 mm long x diameter 6 mm less than internal diameter of duct wooden mandrel through each duct, immediately after placing of concrete.
 - .2 Then pull stiff bristle brush through duct; avoid disturbing or damaging ducts where concrete has not set completely.
 - .3 Pull stiff bristle brush through each duct immediately before pulling-in cables.
- .15 Install pull rope continuous throughout each duct run with 3 m spare rope at each end.

3.3 MARKER TAPE

- .1 Install marker tape continuously over entire duct run.

3.4 FIELD QUALITY CONTROL

- .1 Site Tests/Inspections:
 - .1 Inspection of duct will be carried out by Departmental Representative prior to placing.
 - .2 Placement of concrete and duct cleanout to be done when Departmental Representative present.

3.5 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 – Common Work Results For Electrical.
- .2 Section 26 24 01 – Service Equipment.

1.2 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.
- .3 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

1.3 QUALITY ASSURANCE

- .1 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.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Protection:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

.3 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.

1.5 UTILITY COSTS

- .1 Arrange for any pole relocations, line extensions, utility installation and energization.
- .2 Any fees or costs required by the utility to provide new services is to be paid for by the contractor, as part of the contract price. This includes energization fees for new metered service.

1.6 MEASUREMENT PROCEDURES

- .1 No measurement will be made under this Section. Include costs in items of work for Division 26.

Part 2 Products

2.1 MATERIALS

- .1 Underground ducts: to Section 33 65 73 – Concrete Encased Duct Banks, Rigid type DB2, size as indicated.
- .2 Service entrance head: rigid PVC conduit.
- .3 PVC coated rigid galvanized steel conduit: to Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.
- .4 Conductors: copper, type RW90, to Section 26 05 21 – Wires and Cables (0 – 1000 V), size and number of conductors as indicated.
- .5 Concrete: to CAN/CSA A23.1/A23.2.
- .6 Backfill: clean and free of debris.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install cables in ducts and conduit in accordance with Section 26 05 43.01 - Installation of Cables in Trenches and in Ducts.
- .2 Install conduit up service pole complete with service entrance head.
- .3 Allow adequate conductor length for connection to supply.
- .4 Allow adequate conductor length for connection to service equipment.
- .5 Make grounding connections in accordance with Section 26 05 28 - Grounding - Secondary.
- .6 Seal ducts and conduits at service entrance 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 Departmental Representative for review.

3.4 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION