

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 26 05 00 – Common Work Results – Electrical.

1.2 SUBMITTALS

- .1 Provide submittals in accordance with Section 26 05 00.
- .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 Shop Drawings:
 - .1 Submit shop drawings for precast concrete manholes and vaults. Shop drawings to be sealed by a professional engineer licensed in the province of Saskatchewan. Shop drawings to include design loads and structural details.
 - .2 Submit shop drawings for pull pits.
- .4 Quality assurance submittals: submit following in accordance with Section 26 05 00.
 - .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.
- .5 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

Part 2 Products**2.1 PVC DUCTS**

- .1 PVC ducts, type DBII, encased in reinforced 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 PRECAST CONCRETE MANHOLES AND VAULTS

- .1 Precast concrete manholes, vaults and auxiliary sections fabricated in steel forms to ASTM C478/C478M.
- .2 Aggregates: to CSA A23.1/A23.2.
- .3 Cement: CAN/CSA-A3001, Type HS. Minimum 35MPa.
- .4 Steel reinforcing: to CAN/CSA-G30.18.
- .5 Supply and install cable pulling inserts and equipment and bolts/cable racks. Cast in-anchors as required.
- .6 Provide and install ladder access to base.
- .7 Neoprene gasket seals between manhole sections: to ASTM D1056.
- .8 Manhole Size: as shown on drawings.
- .9 Vault for Sectional Switchgear: Minimum exterior dimensions of 2000mm long x 1800mm wide x 2550mm deep. Equipment load on lid = 10kN.
- .10 Coordinate size, quantity and location of all openings including those required for duct and conduit installation.

2.4 MANHOLE FRAMES AND COVERS

- .1 Cast iron manhole frames and covers.
- .2 Padlocked or bolt down covers to prevent unauthorized entry. A minimum of 4 – 10mm stainless steel bolts drilled and tapped at 90 degrees shall be used for bolt down covers.
- .3 Size: 762 mm clear diameter.

2.5 PULL PITS

- .1 Electrical pull pits to be constructed of thick ‘traffic’ rated pre-cast concrete with a galvanized steel lid seat cap ring permanently molded into the concrete body.

- .2 Pull pit covers to be galvanized 13mm thick checker plate steel, 'traffic' rated.
- .3 Pull pits to be 762 mm W x 1524 mm L x 1524 mm D and complete with the following accessories:
 - .1 Padlock and eye bolt cover lock
 - .2 Cable racks
 - .3 3000 lb. pulling eye at each end
 - .4 Ground Bus
- .4 Pour 50 mm concrete 'mud slab' floor in the pull pit after all ducts are roughed in.
- .5 Seal all duct entries with cementitious grout to ensure a 'rodent free' enclosure.
- .6 Acceptable Product: New Castle 'Christy' series.

2.6 GROUNDING

- .1 Ground rods: in accordance with Section 26 05 28 - Grounding - Secondary for cable rack grounding.

2.7 CABLE RACKS

- .1 Hot dipped galvanized cable racks and supports.
- .2 12 x 100 mm preset inserts for rack mounting.

2.8 CABLE PULLING EQUIPMENT

- .1 Pulling iron: galvanized steel rods, size and shape as indicated.
- .2 Pull rope: 6 mm stranded polypropylene, tensile strength 5 kN, continuous throughout each duct run with 3 m spare rope at each end.

2.9 MARKERS

- .1 Concrete type cable markers: 600 x 600 x 100 mm, with words: "Cable", "Joint", "Conduit" impressed in top surface, with arrows to indicate change in direction of duct runs.

2.10 DUCT BANK CONCRETE

- .1 Cast-in-place concrete in accordance with CSA A23.1.
- .2 Reinforcing to CSA G30.18, Grade 400R.
- .3 Concrete to be minimum 20MPa.

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, manholes and pull pits including formwork.
- .2 Build duct bank, manholes and pull pits on undisturbed soil or on well compacted granular fill not less than 150 mm thick, compacted to 95% of maximum proctor dry density unless noted otherwise.
- .3 Open trench completely between manholes or pull pits 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 with preformed interlocking, rigid plastic intermediate spacers to maintain spacing between ducts at not less than 75 mm horizontally and vertically.
 - .1 Stagger joints in adjacent layers at least 150 mm and make joints watertight.
 - .2 Encase duct bank with 100 mm thick concrete cover.
- .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 bell ends at duct terminations in manholes or buildings.
- .10 Use conduit to duct adapters when connecting to conduits.
- .11 Terminate duct runs with duct coupling set flush with end of concrete envelope when dead ending duct bank for future extension.

- .12 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.
- .13 Allow concrete to attain 50% of its specified strength before backfilling.
- .14 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.
- .15 Clean ducts before laying:
 - .1 Cap ends of ducts during construction and after installation to prevent entrance of foreign materials.
- .16 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.
- .17 Install four 3 m lengths of 10M reinforcing rods, one in each corner of duct bank when connecting duct to manholes, pull pits or buildings.
 - .1 Wire rods to 10M dowels at manhole or building and support from duct spacers.
 - .2 Protect existing cables and equipment when breaking into existing manholes.
 - .3 Place concrete down sides of duct bank filling space under and around ducts.
 - .4 Rod concrete with flat bar between vertical rows filling voids.
- .18 Install pull rope continuous throughout each duct run with 3 m spare rope at each end.

3.3 MANHOLES

- .1 Install precast manholes on granular base as per drawings.
- .2 Provide 115 mm deep window to facilitate cable bends in wall at each duct connection.
 - .1 Terminate ducts in bell-end fitting flush with window face.

- .2 Provide four 10M steel dowels at each duct run connection to anchor duct run. Embed and anchor to manhole with adhesive minimum 125mm.
- .3 Build up concrete manhole to grade with precast rings. Cover to be flush with finished grade in paved areas and 50 mm above grade in unpaved areas.
- .4 Install manhole frames and covers for each manhole:
 - .1 Set frames in concrete grout onto manhole neck.
- .5 Install cable racks, anchor bolts and pulling irons as indicated.
- .6 Damp-proof exterior side of walls and lid.

3.4 PULL PITS

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 - .4 Ground Bus
- .4 Pour 50 mm concrete 'mud slab' floor in the pull pit after all ducts are roughed in.
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- .6 Acceptable Product: New Castle 'Christy' series.

3.5 MARKERS

- .1 Mark location of duct runs under hard surfaced areas not terminating in manhole with railway spike driven flush in edge of pavement, directly over run.
 - .1 Place concrete duct marker at ends of such duct runs.
 - .2 Construct markers and install flush with grade.
- .2 Mark ducts every 150 m along straight runs and changes in direction.

- .3 Where markers are removed to permit installation of additional duct, reinstall existing markers.
- .4 Lay concrete markers flat and centered over duct with top 25 mm above earth surface.
- .5 Provide drawings showing locations of markers.

3.6 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.

3.7 CLEANING

- .1 Proceed in accordance with Section 26 05 00.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION