

## **PART 1 GENERAL**

### **1.1 Summary**

- .1 This section of specification is an integral part of the Contract Documents and shall be read accordingly.
- .2 Comply with general conditions, supplementary conditions of the contract, and section 260100-Electrical General Requirements.
- .3 Furnish all labour, materials, supervision, equipment and services specified, indicated or requested to supply and install the underground duct systems, chambers, vaults, and handholes described herein.
- .4 Perform "locates" of existing site conditions prior to any excavation work.

## **PART 2 PRODUCTS**

### **2.1 Rigid PVC**

- .1 Direct Buried ducts: Rigid PVC conduit, schedule 40 pipe dimensions, complies with CSA C22.2 No. 211.2-06.
- .2 Concrete encased ducts: PVC type DB2 conduit, complies with CSA C22.2 No.211.1-06.

### **2.2 PVC Duct Fittings**

- .1 PVC, opaque solvent welded type couplings, bell end fittings, plugs, caps, adaptors, split ducts as required to make complete installation.
- .2 Expansion joints and wobble joints.
- .3 PVC angle couplings: 90°, 45° and 22.5° bends with 915mm diameter radius bends (long sweeps).
- .4 Solvent weld compound for all PVC duct joints.

### **2.3 Grounding**

- .1 Ground rods: to Section 260526 – Grounding.

### **2.4 Markers**

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

## **2.5 Duct Spacers and Wooden Mandrel**

- .1 Rigid interlocking plastic material, for the conduit diameters and spacing required on drawings.
- .2 Wooden Mandrel: Condux International #CDX08020600.

## **2.6 Cable Pulling Equipment**

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

# **PART 3 EXECUTION**

## **3.1 Concrete-encased Duct Banks**

- .1 Perform "locates" prior to any excavation work, and coordinate all work with civil contractor (Division 3), as applicable.
- .2 Supply and install the concrete-encased underground duct banks indicated on the drawings. Supervise all excavation, formwork, reinforcement, concreting, and backfilling.
- .3 Build duct bank(s) and manholes on undisturbed soil or on well compacted granular fill not less than 150 mm thick, compacted to 95% of maximum proctor dry density.
- .4 Open trench completely between chambers to be connected before ducts are laid and ensure that no obstructions will necessitate change in grade of ducts.
- .5 Prior to laying ducts, construct "mud slab" not less than 75 mm thick.
- .6 Install ducts at elevations as indicated, with a minimum slope of 1 to 400. Solvent weld (glue) all PVC duct joints.
- .7 Install base spacers at maximum intervals of 1.5 m levelled to grades indicated for bottom layer of ducts.
- .8 Lay PVC ducts with configuration and reinforcing as indicated with preformed interlocking, rigid plastic intermediate spacers to maintain spacing between ducts horizontally and vertically as shown on drawings. Stagger joints in adjacent layers at least 150 mm and make joints watertight. Encase duct bank with concrete cover to elevation (or thickness) shown on drawings.
- .9 Make transpositions, offsets and changes in direction using 5° bend sections, do not exceed a total of 20° with duct offset.
- .10 Use bell ends at duct terminations in manholes or buildings.
- .11 Use conduit to duct adapters when connecting to conduits.
- .12 Terminate duct runs with duct coupling set flush with the end of concrete envelope when dead ending duct bank for future extension.

- .13 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.
- .14 Allow concrete to attain 50% of its specified strength before backfilling (minimum 24 hours after placing of concrete) unless otherwise authorized by Engineer. Ensure that backfill is placed in maximum 13 mm layers and compacted to the satisfaction of the Engineer.
- .15 Use anchors, ties and trench jacks as required to secure ducts and prevent moving during placing of concrete. Tie ducts to spacers with twine or other non-metallic material. Remove weights or wood braces before concrete has set and fill voids.
- .16 Clean ducts before laying. Cap ends of ducts during construction and after installation to prevent entrance of foreign materials.
- .17 Immediately after placing of concrete, pull through each duct a wooden mandrel not less than 300 mm long and of a diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Avoid disturbing or damaging ducts where concrete has not set completely. Pull stiff bristle brush through each duct immediately before pulling in cables.
- .18 Install four 3 m lengths of 15M reinforcing rods, one in each corner of duct bank when connecting duct to manholes or buildings. Wire rods to 15M dowels at manhole or building and support from duct spacers. Protect existing cables and equipment when breaking into existing manholes. Place concrete down sides of duct bank filling space under and around ducts. Rod concrete with flat bar between vertical rows filling voids.
- .19 In each duct install pull rope continuous throughout each duct run with 3 m spare rope at each end.
- .20 For long duct runs (greater than 50 m), install expansion couplings at 30 m intervals.
- .21 Provide removable watertight cap to seal each spare duct end. Install caps on all duct ends left open during construction.
- .22 Ensure that a responsible and competent supervisor is present during concreting operations, to protect against broken, damaged or disturbed ducts. Advise the Engineer in advance of concreting, so that he may inspect the ducts prior to pouring, and be present during the pour.

### **3.2 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. Place concrete duct marker at ends of such duct runs. 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 Provide drawings showing locations of markers.

### **3.3 Inspections**

- .1 Advise Engineer so that he may inspect ducts prior to placing and be present during placement of concrete and clean out.

### **3.4 Cable Installation in Ducts**

- .1 Install cables as indicated in ducts.
- .2 Do not pull spliced cables inside ducts.
- .3 Install multiple cables in duct simultaneously.
- .4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .5 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.
- .6 Before pulling cable into ducts and until cables properly terminated, seal ends of lead covered cables with wiping solder, seal ends of nonleaded cables with moisture seal tape.
- .7 After installation of cables, seal duct ends with duct sealing compound.

**END OF SECTION 26 14 00**