

PART 1 - GENERAL

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| <u>1.1 RELATED SECTIONS</u> | .1 | Cast-in-Place Concrete: Section 03 30 00 |
| | .2 | Earthwork: Section 31 20 00 |
| <u>1.2 SHOP DRAWINGS</u> | .1 | Submit shop drawings in accordance with Section 01 33 00. |
| <u>1.3 REFERENCES</u> | .1 | CSA C22.2 No. 211.1-06(R2011), Rigid Types EB1 and DB2/ES2 PVC Conduit. |
| | .2 | CSA C22.3 No. 7-2010, Underground Systems. |
| | .3 | ASTM D1557-2012, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort. |

PART 2 - PRODUCTS

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| <u>2.1 PVC DUCTS</u> | .1 | PVC ducts, type DB2, encased in reinforced concrete. Concrete to Section 03 30 00. |
| <u>2.2 PVC DUCT FITTINGS</u> | .1 | Rigid PVC solvent welded and pushfit type couplings, bell end fittings, plugs, caps, adaptors as required to make complete installation. |
| | .2 | Expansion joints. |
| | .3 | Rigid PVC 5° angle couplings. |
| | .4 | PVC long radius bends, 5 ft. radius: 90° and 45°. |
| <u>2.3 CABLE PULLING EQUIPMENT</u> | .1 | Pull rope: 6mm stranded polypropylene, tensile strength 5 kN, continuous throughout each duct run with 3m spare rope at each end. |
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- 2.4 MARKERS
- .1 Concrete type cable markers: 600mm x 600mm x 100mm, with words: "cable", "joint" or "conduit" impressed in top surface, with arrows to indicate change in direction of duct runs.

PART 3 - EXECUTION

- 3.1 INSTALLATION
GENERAL
- .1 Install underground duct banks including formwork.
 - .2 Build duct bank on well compacted sand bedding not less than 150mm thick, compacted to 95% to ASTM D1557.
 - .3 Open trench completely before ducts are laid and ensure that no obstructions will necessitate change in grade of ducts.
 - .4 Where unstable soil (clay) is encountered, construct "mud slab" not less than 75mm thick prior to laying ducts.
 - .5 Install ducts at elevations and with slope as indicated and minimum slope of 1 to 400 away from building or manholes.
 - .6 Install spacers to provide duct spacing indicated, at maximum intervals of 1.5m levelled to grades indicated for bottom layer of ducts.
 - .7 Lay PVC ducts with configuration and reinforcing as indicated with intermediate spacers to maintain spacing between ducts as indicated. Stagger joints in adjacent layers at least 150mm and make joints watertight. Encase duct bank with concrete cover as indicated. Use galvanized steel conduit for sections extending above finished grade level unless otherwise indicated.
 - .8 Make transpositions, offsets and changes in direction using 5° bend sections, do not exceed a total of 20° with duct offset.
 - .9 Use bell ends at duct terminations in buildings and manholes. Comply with utility requirement for termination at poles.
 - .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, where indicated.
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3.1 INSTALLATION
GENERAL
(Cont'd)

- .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. Tie ducts to spacers with twine or other non-metallic material. Remove weights or wood braces before concrete has set and fill voids.
- .15 Clean ducts before laying. Cap ends of ducts during construction and after installation to prevent entrance of foreign materials.
- .16 Immediately after placing of concrete, pull through each duct a steel or wooden mandrel not less than 300mm long and of a diameter 8mm 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.
- .17 In each duct install pull rope continuous throughout each duct run with 3m spare rope at each end.

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 90m along straight runs and at all 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 25mm above earth surface.
- .5 Provide drawings showing locations of markers.

3.3 INSPECTIONS

- .1 Inspection of duct will be carried out by Departmental Representative prior to placing. Placement of concrete and duct cleanout to be done when Departmental Representative present.
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3.4 CABLE <u>INSTALLATION</u>	.1	Supply and installation of cables in utility company ducts will be provided by the respective utilities.
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