

1.0 **GENERAL**

1.1 **Related UBC Guidelines**

- .1 Section 33 71 00 Electrical Utility Transmission and Distribution

1.2 **Coordination Requirements**

- .1 UBC Energy & Water Services
- .2 UBC Building Operations

1.3 **Description**

- .1 UBC requirements for Duct Banks and Manholes.

2.0 **MATERIALS AND DESIGN REQUIREMENTS**

2.1 **Design Standards**

- .1 Work shall comply with requirements of:
 - .1 WorkSafe BC.
 - .2 BC Safety Authority.
- .2 All civil work including duct banks, manholes and cast-in-place and precast concrete shall comply with UBC Technical Guidelines, BC Hydro Standards, or Master Municipal Construction Documents (MMCD) as applicable.

2.2 **Trenching**

- .1 Prior to any trenching the duct runs shall be surveyed and staked out. Approval of the staked runs shall be obtained from the Consultant.
- .2 All trenching, excavating, and backfill shall be done to MMCD specifications. Backfill and bedding materials shall be supplied by the Contractor. Trench bottom shall be continuous, firm and shall provide uniform support to the ducts.
- .3 Backfill materials shall be free of rocks larger than 75mm diameter, wood, cinders, ash, and frozen materials. Top surface shall be landscaped to match the existing ground and any road surfaces shall be made good to match existing conditions.

2.3 **Other Services**

- .1 There are existing services and may be additional runs of other services such as electrical, telephone, water, sewers, gas, oil, drainage, etc. Exercise the maximum care to avoid interference or damages to these. Refer to Underground Utility Services.

2.4 **Requirements for Ducts**

- .1 Ducts shall be rigid PVC, encased burial type duct conforming to the specific of CSA standard C22.2 No. 211.1 "Rigid Types EB1 and DB2 / ES2 PVC Conduit". Ducts shall be 125mm (5") for all ducts between manholes.

- .2 Ducts shall be:
 - .1 Power services: minimum: 6 – 125 mm (5") between manholes and 4 – 100 mm (4") into buildings. Larger size may be required by CSA or UBC Energy & Water Services.
 - .2 Communication services: minimum 4 - 125 mm (5") between manholes and 4 -100 mm (4") into buildings.
- .3 Ducts shall be sized on the drawings.
- .4 Ducts shall be buried at a minimum depth of 900 mm. Duct runs shall be sloped away from the building towards the first manhole outside.
- .5 Ducts shall terminate with bell mouth ends.
- .6 All duct bends shall be long sweep "Utility" bends manufactured to utility pulling specifications.

2.5 Requirements for Manholes

- .1 Manholes shall be 1830 mm x 3300 mm x 2000 mm high inside dimensions or as specified by Facilities Management.
- .2 Manhole shall be complete with cast manhole cover, frame and brick assembly between manhole and manhole lid.
- .3 Materials shall include:
 - .1 Pre-cast Manhole Assembly.
 - .2 Manhole Frame.
 - .3 Manhole Cover.
 - .4 Spacer Rings.
 - .5 Pulling Irons.
 - .6 Ground Rods.
 - .7 Sump Cover.
- .4 Manholes shall be constructed to the following UBC Utility Standards:
 - .1 E 3-1 Standard Electrical Precast Manhole.
 - .2 E 3-2 Standard Electrical Manhole Pour in Place.
 - .3 E 3-3 Additional Reinforcing for Pour in Place Electrical Manhole.
 - .4 E 3-4 Standard Electrical Manhole Cover & Riser Details.
 - .5 E 3-5 Standard Electrical Manhole Sump Detail.
 - .6 E 3-6 Typical Manhole Grounding & Details.
 - .7 E 3-7 Typical Manhole Separation.
- .5 Pre-cast Manhole using BC Hydro 4212 Chamber may be substituted as an alternate.
- .6 Concrete shall not be placed in foundations until the soil breaking has been reviewed by the Engineer.
- .7 All manholes shall have a sump with positive drainage. Manhole drains shall be connected to the storm water system.
- .8 Testing costs for compaction and concrete tests shall be paid for by the project.

2.6 Requirements for Concrete Encased Duct Bank

- .1 All Service Ducts shall be concrete encased.
- .2 All Civil Work associated with Duct Banks shall be to BC Hydro and MMCD Specifications.
- .3 Duct Banks shall be constructed in accordance with UBC Standards Drawings:
 - .1 E2-1 Standard Concrete encased Electrical Duct.
 - .2 E2-3 Standard Electrical Duct Bank.
 - .3 E2-4 Electrical Ductbank Clearances to Steam Distribution Lines.
- .4 Forms must be used on the walls of the duct bank.
- .5 Duct connectors shall be staggered so they are never adjacent to another coupling. Manufactured intermediate spacers shall be used throughout the length of the duct run every 2 meters.
- .6 Concrete shall have maximum 200 mm (3/4") aggregate, minimum 20 MPA strength at 28 days, and shall contain "Anti-Hydro" mixed as recommended by the additive Manufacturer.
- .7 Immediately after installation, ducts shall be tested for blockages and cleaned as necessary. Prior to completion the ducts shall be swabbed and mandrel led.
 - .1 The civil contractor shall ensure the quality of installation of all ducts by passing a mandrel or test slug sized not less than indicated in the table below and through the entire length of all installed conduits and in both directions:

Duct Diameter (mm)	Mandrel Diameter min. (mm)
75	69
100	91
125	114

- .2 The civil contractor shall provide written verification of mandrel tests to UBC Energy & Water Services upon successful completion.
- .3 The civil contractor shall identify and remediate any portions of installed ducts that do not easily permit passage of the mandrel or test slug.
- .8 A 10 mm (1/4") pulling line shall be installed in all ducts.

2.7 Requirements for Warning Tape During Construction

- .1 During construction a warning tape (yellow) imprinted "CAUTION BURIED ELECTRICAL LINE" shall be installed at all duct banks and buried conduit.
- .2 Warning tape shall be laid in the trench midway between duct bank and finished grade.

END OF SECTION