



**.1 General**

- .1 The University's power distribution and communications campus backbone consists of underground ducts and manholes which provide durability and flexibility during maintenance operations and when new facilities are being constructed.
- .2 Consideration shall be given to design new ductbanks that have spare capacity and that provide flexibility for providing services to potential future campus development sites.
- .3 Typical ductbanks for the campus will include concrete encased ducts that carry power, telephone cabling, copper data communications cabling, fiber optic cabling, security cabling and fire alarm cabling.

**.2 Cable Protection**

- .1 Provide plastic marker tape with metallic backing strip above all ductbanks in order to facilitate future locating of ducts.

**.3 Direct Burial Of Cables**

- .1 Direct buried cables are to be avoided as much as possible. When needed, they shall be enveloped in sand bedding and separated as required by code.
- .2 Underground cable splices not acceptable.
- .3 Minimum permitted radius at cable bends for rubber, plastic or lead covered cables, 8 times diameter of cable; for metallic armoured cables, 12 times diameter of cables or in accordance with manufacturer's instructions.
- .4 Cable separation shall be as prescribed by the Canadian Electrical Code.

**.4 Cable Installation In Ducts**

- .1 Installation of cables in ducts is the preferred underground installation. Cabling shall be installed without splices inside ducts.
- .2 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .3 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.
- .4 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.
- .5 After installation of cables, seal duct ends with duct sealing compound.

**.5 Markers**

- .1 Mark cable every 150 m along duct runs and changes in direction.
- .2 Mark underground splices.
- .3 Where markers are removed to permit installation of additional cables, reinstall existing markers.
- .4 Install cedar post type markers.
- .5 Lay concrete markers flat and centred over cable with top flush with finish grade.

**.6 Field Quality Control**

- .1 All cables and wires shall be checked for phase rotation, for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.
- .2 After installing cable but before splicing and terminating, contractors are to perform insulation resistance test with 1000 V megger on each phase conductor.



## 16.8 Installation of Cables in Trenches and Ducts

### Construction Standards

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- .3 Provide Consultant with list of test results showing location at which each test was made, circuit tested and result of each test.
- .4 Remove and replace entire length of cable if cable fails to meet any of test criteria.