

**PART 1**      **GENERAL**

**1.1**            **RELATED SECTIONS**

- .1      Section 01 33 00 - Submittal Procedures.
- .2      Section 01 78 10 - Closeout Submittals.
- .3      Section 01 91 00 - Commissioning.
- .4      Section 26 05 00 - Common Work Results.
- .5      Section 27 20 00 - Data Communications.

**1.2**            **REFERENCES**

- .1      Canadian Standards Association (CSA)
  - .1      CAN/CSA-T530, Building Facilities, Design Guidelines for Telecommunications.
  - .2      CAN/CSA-T529, Design Guidelines for Telecommunications Wiring System in Commercial Buildings.
  - .3      CAN/CSA-C22.2 No. 214, Communications Cables.
  - .4      CAN/CSA-C22.2 No. 182.4, Plugs, Receptacles, and Connectors for Communication Systems.
- .2      Electronic Industries Association (EIA)
  - .1      EIA/TIA Bulletin TSB-36, Technical Systems Bulletin Additional Cable Specifications for Unshielded Twisted Pair Cables.
  - .2      ANSI/TIA-568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components, Category 6.
  - .3      ISO/IEC 11801, Information Technology – Generic Cabling for Customer Premises, Edition 2, Class E.

**1.3**            **SYSTEM DESCRIPTION**

- .1      Structured system of telecommunications cables (copper and optical fibre) installed within buildings for distributing voice and data (including video) signals.
- .2      Installation of Category 6 cabling (300'-0" maximum length per drop) from patch panel locations in electrical room to outlet faceplate.
- .3      Cable manufacturer to be: Panduit, Nordx/CDT, Belden, Amp-NetConnect or Commscope-SYSTIMAX.
- .4      Provide cable certification report to Contract Administrator upon completion of work.
- .5      Visually inspect all cables, cable reels, and shipping cartons to detect cable damage incurred during shipping and transport. Visibly damaged items shall not be installed.

- .6 All Category 6 cabling shall be terminated in the telecommunications closet on 19 inch rack mount RJ45 patch panels to match existing configuration.
- .7 The Category 6 cabling in the racks shall be installed with sufficient and appropriate mounting clips, brackets, and cable management to provide a secure and maintainable system.
- .8 No installed cabling may be exposed to view outside of the telecommunications closet. It shall be within a raceway, within a conduit, behind a suspended ceiling or concealed with wire molding.
- .9 All terminations must be wired according to the TIA568A pinout FIGURE 1.0: TIA 568A Standard Pinout.
- .10 Category 6 data cabling will be terminated TIA568A-Standard. The termination jack shall be of type RJ45 and shall be TIA/EIA certified Category 6, in black unless otherwise specified.
- .11 The UTP Category 6 cable tail shall be terminated with a minimum of 14" of slack but not to exceed 18".
- .12 Analog or digital voice cabling will be Category 6 terminated in blue using TIA568A Standard pinout at the drop location.
- .13 The Contract Administrator will supply cable naming conventions for use by Contractors for labeling each termination point.
- .14 Pull tension during installation of cables must not exceed the cable manufacturer's specifications;
- .15 Cables kinked, compressed, or otherwise damaged during installation will be considered destroyed, and must be replaced.
- .16 A single line run must not exceed 300 feet in length.
- .17 All horizontal cabling runs shall run from each work area in a star topology to a telecommunications closet. There shall be no connector or splice in the cable run between the outlet in the work area and the closet.
- .18 Cabling must be run a minimum of 12 inches from luminaires and power cables.
- .19 Cabling must not be run directly adjacent to and parallel to power cables.
- .20 Minimum cable bend radius shall be 4 times the cable diameter.
- .21 Cabling runs cannot traverse floors.
- .22 Cable ties cannot distort the cable jacket. Staples will not be used to secure cables to any surface.
- .23 Maintain the manufacturer's wire twist of all conductor pairs as close as possible to the termination point. For Category 6 wiring, the maximum length of un-twisted pairs is 0.5".

- .24 During termination, the cable sheath shall only be removed the minimum amount required to properly terminate the cable.

**1.4 Category 6 Testing Requirements;**

- .1 Cabling must be minimum Category 6 and plenum rated.
- .2 Contractor must test the ANSI/TIA/EIA-568-C.2 Category 6 Cable standard.
- .3 All cabling must be certified using an instrument designed for communication cable certification to EIA/TIA 568-C.2 standards applicable to the cable category and acceptable to the Contract Administrator or the City. Cable verification instruments are not acceptable.
- .4 Certification records for each cable will be forwarded to the CR with cable number identification as per the CR.
- .5 The Contractor must test with their own equipment.
- .6 The Contractor must provide a record of the successful testing to the CR upon completion.

**PART 2      PRODUCTS**

**2.1      CATEGORY 6 WIRE (CAT6)**

- .1 4-pair, 23 or 24 AWG, 100 ohm cable with insulated copper conductor in separate outer jacket: to C22.2 No.214. FT-4 flame spread rating on jacket for riser cables in conduit systems, otherwise FT-6 flame spread rating on jacket for horizontal cable runs in plenum ceiling spaces.
- .2 Voice-grade electrical transmission requirements: to CAN/CSA T529 and TSB-36, Category 6.
- .3 Data-grade electrical transmission requirements to: ANSI/TIA-568-C.2, Category 6.

**2.2      COAXIAL CABLE (CXC)**

- .1 Coaxial members, 75 ohm impedance each having metallic centre conductor surrounded by dielectric material and metal outer conductors separated by dielectric material and surrounded by jacket: to CAN/CSA C22.2 No. 214. FT-4 and FT-6 flame rated jacket in plenum ceiling spaces.
- .2 For cable television, 75 ohm impedance. Centre conductor No. 22 AWG solid; insulation of solid polyethylene shield of aluminum foil plus braid shield coverage 97%. Loss at 500 MHz not to exceed 3.5 dB per 30 m.

**2.3      OPTICAL/FIBRE CABLE (OFC)**

- .1 Number of pair as required tight buffer tube 50/125 micrometre multi-mode graded index fibre: to CAN/CSA T529.

**PART 3**      **EXECUTION**

**3.1**            **INSTALLATION OF CABLES**

- .1            Install cables as indicated in conduit in walls and through crawlspace from server location in electrical room to outlets.

**3.2**            **FIELD QUALITY CONTROL**

- .1            Perform tests in accordance with Section 26 05 00 – Common Work Results and Section 01 91 00 –Commissioning.

**END OF SECTION**

**PART 1**      **GENERAL**

**1.1**            **SYSTEM DESCRIPTION**

- .1      Data system includes data outlets and wiring for office and school applications.
- .2      Data system equipment consists of:
  - .1      Data outlets.
  - .2      UTP cabling.
  - .3      Patch Panels.
  - .4      Patch Cords.
  - .5      Line Cords.
  - .6      Data Rack.
  - .7      Conduit System.
  - .8      System Switches
  - .9      Cable Management Systems
- .3      Do not provide systems switches for school projects. System switches provided under separate Contract.

**1.2**            **RELATED SECTIONS**

- .1      Section 01 33 00 – Submittal Procedures.
- .2      Section 01 91 00 –Commissioning.
- .3      Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.
- .4      Section 27 05 14 – Communication Cables – Inside Buildings.

**1.3**            **REFERENCES**

- .1      Canadian Standards Association (CSA)
  - .1      CAN/CSA-C22.2 No. 182.4, Plugs, Receptacles, and Connectors for Communication Systems.
  - .2      CAN/CSAC-22.2 No. 214, Communications Cables.
  - .3      CAN/CSA-T529, Design Guidelines for Telecommunications Wiring System in Commercial Buildings.
  - .4      CAN/CSA-T530, Building Facilities, Design Guidelines for Telecommunications.
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  - .2      ANSI/TIA-568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components, Category 6.
  - .3      ISO/IEC 11801, Information Technology – Generic Cabling for Customer Premises, Edition 2, Class E.

- .3 Building Industry Consulting Services International (BICSI) Telecommunications Distribution Methods Manual (TDMM).

#### **1.4 SUBMITTALS**

- .1 Shop drawings to include the following items as a minimum:
  - .1 Outlets.
  - .2 UTP Patch Panels.
  - .3 Labels.
  - .4 UTP Wire.
  - .5 Patch Cords.
  - .6 Line Cords.
  - .7 Cable Management Equipment

#### **1.5 MAINTENANCE AND OPERATION**

- .1 Provide maintenance and operation data for incorporation in manual specified in Section 01 78 10 – Closeout Submittals.

#### **1.6 WARRANTY**

- .1 Ensure each piece of equipment installed including wiring is warranted by the manufacturer to be free of defects in operation, material and workmanship for a period of 15 years from date of Substantial Completion.

### **PART 2 PRODUCTS**

#### **2.1 OUTLETS**

- .1 Provide single or dual data outlet as indicated.
- .2 Dual flush mounted data outlet.
- .3 Single flush mounted data outlets:
- .4 Acceptable manufacturers: Panduit, Nordx/CDT, Belden, Amp-NetConnect or Commscope-SYSTIMAX.

#### **2.2 COVER PLATES**

- .1 Provide flush mount type to accept four (4) modular data outlets.
- .2 Indicate outlet number of “Data” cover plate. Provide labeling as indicated and to Contract Administrator or City requirements.
- .3 Color: grey.
- .4 Construction: Thermo – plastic.

- .5 Acceptable product: Panduit, Nordx/CDT, Belden, Amp-NetConnect or Commscope-SYSTIMAX.

### **2.3 LABELS**

- .1 Provide indicating labels on UTP wiring and outlet assemblies.
- .2 Labels to be:
  - .1 Outlet identification labels. Computer printable type: indicating “Data Outlet”.
  - .2 Labeling on wire from outlet to patch panel: heat shrink labels sized for data cables indicating data outlet # and port # on respective ends.
  - .3 Coordinate labeling with Contract Administrator or the City prior to fabrication.

### **2.4 UTP WIRING**

- .1 4 pair, 23 or 24 gauge copper, solid conductor, unshielded twisted pairs, CSA FT4 and FT-6 flame spread rating as required, Category 6, performance bandwidth 250 MHz, and standard Gbps data transmission/receiving rates.
- .2 Provide one cable from each single outlet back to patch panel (two cables from each dual data outlet back to patch panel).

### **2.5 CONDUIT SYSTEMS**

- .1 Install conduit systems and pull boxes for data wiring including:
  - .1 Vertical stubs in walls from outlets into accessible ceiling space.
  - .2 Zone conduits as indicated on drawings for collection of UTP wiring in ceiling spaces.
  - .3 Pull boxes.

## **PART 3 PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- .1 Install data system wiring and components.
  - .1 Use FT-4 rated cable jacket for riser cables installed in totally enclosed conduit systems.
  - .2 Use FT-6 rated cable jacket for horizontal cable runs in plenum type ceiling spaces (i.e.: where ceiling space is used as a return air plenum as part of the HVAC system).
- .2 Install patch panels and switches in data racks at data closet locations as indicated.
- .3 Terminate UTP and fiber optic cables at outlets and patch panel as indicated. Ensure that the minimum number of twists per inch in the cable pairs is maintained at each connection point.
- .4 Ensure that manufacturer’s bending radius limitations are adhered to.
- .5 Protect cables from damage during installation.

- .6 Zone conduits to be installed, as indicated, running back to patch panel location.
- .7 Conduits to be run from data outlets to corridor ceiling space. Provide insulated conduit bushing at open end of wall stub-up.
- .8 Turn over UPT patch and line cords to Contract Administrator.

### **3.2 CONDUIT SYSTEM RESTRICTIONS**

- .1 Do not provide conduit raceways that exceed 30 m or contain more than two 90° bends (or approved equal in accordance with B6) between pull points or pull boxes.
- .2 Do not provide pull boxes in lieu of conduit bends.
- .3 LB connectors not permitted.
- .4 Provide inside radius bends to a minimum of 6 times the internal diameter for conduits 50 mm and smaller. For larger conduits provide inside radius bends to a minimum of 10 times the internal diameter of the conduit.
- .5 Ensure conduits terminations are free from sharp edges and fitted with insulated bushings.
- .6 Ream individual lengths of conduit to remove sharp edges.
- .7 Provide sufficient conduit size to permit maximum 50% fill capacity.

### **3.3 TESTING GENERAL**

- .1 Cabling and connectors to be tested by an experienced company employing trained technicians with minimum 5 years experience in data cabling industry. Experience to be acceptable to the Contract Administrator or the City.

### **3.4 TESTING UTP CABLING**

- .1 System to meet continuity and attenuation tests outlined in IBDN Testing Note: IBDN-TESTS-9104.
- .2 UTP cabling to meet ANSI/TIA-568-C.2 Category 6 and ISO/IEC 11801, 2<sup>nd</sup> Edition, Class E channel standards.
- .3 Perform system and channel tests after UTP cable installation to ensure that installation meets the standard indicated above and values indicated in the IBDN design guide issue 2 (IBDN-DG-9202). Tests to be performed using a Level IV tester. Minimum tests to be performed.
  - .1 Continuity.
  - .2 Attenuation.
  - .3 Near and Crosstalk.
  - .4 Resistance.
  - .5 Pair Assignment Test.
  - .6 Low Band Noise.

- .7 High Band Noise.
- .8 Mid Band Noise.
- .9 Length of Cable.
- .10 Return loss
- .11 ELFEXT
- .12 Propagation delay.
- .13 Deby skew.

Perform permanent link tests to cover all equipment wiring including patch panels and line cords. Perform tests from data closet outwards to data outlet line cord.

- .4 Provide to construction manager written copy of the testing sequence to be performed, testing equipment to be used, and standards to which cable is being tested.
- .5 Provide a written report to the Construction Manager indicating each cable tested and the results of the testing. Provide printout from the Level IV tester for each cable.
- .6 Replace cable and/or connection equipment that fails tests.
- .7 Provide additional testing in accordance with Section 01 91 00 –Commissioning.

**END OF SECTION**