

1. GENERAL

1.1 Action and Informational Submittals

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for communications equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.2 Delivery, Storage and Handling

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect material and products from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

2. PRODUCTS

2.1 Telephone and internet Wires

- .1 **Service wires is to be coordinated by Northwestel, for reference only** :4#22 AWG solid annealed copper conductors with polyethylene insulation, spiral four lay-up, inner jacket polyvinyl chloride, close serving of flat galvanized steel wire armour, outer jacket of polyvinyl chloride designed for buried service connections.
- .2 Ground wire: 1 No. 6 AWG solid stranded annealed copper conductor with polyvinyl chloride insulation designed for ground connections to protect cable terminals and protectors.

3. EXECUTION

3.1 Examination

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for communications equipment installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation

- .1 Install internet and telephone drop wires from pole lines to buildings using drop wire hooks and cable clamps at pole and at building.
- .2 Install internet and telephone ground wires from pedestals and protectors.

3.3 Cleaning

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.
- .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.4 Protection

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by communications equipment installation.

End of Section

1. GENERAL

1.1 References

- .1 CAN/CSA-C22.2 No.65 Wire Connectors
- .2 CAN/CSA-C22.2 No.18.1-13 Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware
- .3 EEMAC 1Y-2 Bushing Stud Connectors and Aluminum Adapters

1.2 Definition

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.3 Submittals

- .1 Submittals: in accordance with Section 01 33 23.01 – Submittal Procedures.
- .2 Product data: submit WHMIS MSDS.
- .3 Shop drawings
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province within Canada.
 - .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure coordinated installation.
 - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .4 Indicate on drawings clearances for operation, maintenance, and replacement of equipment devices.
 - .5 If changes are required, notify the Representative of these changes before they are made.
- .4 Quality Control: in accordance with Section 01 45 00– Quality Control.
 - .1 Provide CSA certified equipment.
 - .2 Where CSA certified equipment is not available, submit such equipment to inspection authorities for approval before delivery to site.
 - .3 Submit test results of installed electrical systems and instrumentation.
 - .4 Permits and fees: in accordance with General Conditions of contract.
 - .5 Submit, upon completion of work, load balance report as described in PART 3 – LOAD BALANCE.

1.4 Quality Assurance

- .1 Quality Assurance: in accordance with Section 01 45 00– Quality Control.

- .2 Qualifications: electrical work to be carried out by qualified, licensed electricians, by a master electrician or by an electrical contractor who holds a valid license as per the conditions of the Act of the province in which work is to be executed.
 - .1 Employees registered in provincial apprentice program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
 - .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

1.5 **Delivery, Storage and Handling**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect equipment from nicks, scratches, and blemishes .
 - .3 Replace defective or damaged materials with new.

2. **PRODUCTS**

2.1 **Telecommunications Grounding**

- .1 6 AWG copper conductor, green insulated to ANSI J-STD-607-A.

3. **EXECUTION**

3.1 **Installation**

- .1 When placed in ferrous metallic conduit or EMT longer than 1 m, bond to each end of conduit or EMT using grounding bushing 6 AWG copper conductor.

End of Section

1. GENERAL

1.1 References

- .1 CAN/CSA-C22.2n°18 – Outlet Boxes, Conduit Boxes, Fittings, and Associated Hardware.
- .2 TIA-569-C Telecommunications Pathways and Spaces.

2. PRODUCTS

2.1 General

- .1 The list below shows the main equipment required for the completion of the project. This list should not be regarded as limiting. The Contractor may propose an equivalent or better product for some items, and any other products not included in this list but considered necessary to carry out the work.

2.2 Conduits

- .1 The Conduits used within the building comply with the following specifications:
 - .1 Electrical Metallic Tubing (EMT) with bonding conductors along the entire route.
 - .2 All the ends of conduits are provided with a nylon tip to protect against abrasions.

2.3 Pull Boxes

- .1 Pull boxes comply with the following specifications
 - .1 Pull boxes are constructed and sized in accordance with Canadian Electrical Code and TIA/EIA standards of code gauge steel and have a rust resistant finish.
 - .2 Pull boxes sizes are selected according to detail drawings.

2.4 Outlet Boxes

- .1 Outlet Boxes comply with the following specifications:
 - .1 Outlet boxes are installed in identified locations.
 - .2 The outlet box is installed at 450mm Above Floor Finish (AFF) or at the same height and within 450mm of the adjacent electrical duplex receptacles, unless otherwise noted on the building plans.
 - .3 Wherever possible, the face of the plastic ring is installed flush with the finished wall.
 - .4 Refer to drawings for details.

3. EXECUTION

3.1 Installation: General

- .1 The inside radius of a bend in a conduit isn't less than six times the internal diameter when the conduit is less than 50 mm in diameter and ten times the internal diameter when conduit is 50 mm in diameter or larger.
- .2 All zone conduits are identified and labeled at both ends. Tags identify start and finish of conduit runs.

- .3 All conduits entering or exiting through the ceiling or walls of the Telecom cabinet or Entrance Facility protrude.
- .4 All conduits are thin wall EMT, reamed and bushed at both ends and bonded to the distribution system.
- .5 All conduit runs are concealed where possible.
- .6 Unless otherwise specified, all conduit runs are of a maximum of 30 meters (100 ft) in length with a maximum of two 90 degree bends between pull points, unless otherwise specified.
- .7 A pull box is placed in conduit runs where the sum of the bends exceeds 180 degrees, where the overall length of the conduit run is more than 30m, or if there is a reverse bend in the run.
- .8 Pull boxes are installed at a reasonable height, in an exposed location and such that access for installation of cables is not prohibited. Pull boxes are not be placed in a suspended ceiling space, unless immediately above a suitably marked and hinged access panel.
- .9 Cables fill capacity of conduit is not greater than 40%.
- .10 All Category 6 cables are installed in conduits originating from the outlet box to the Telecommunication cabinet.

End of Section

1. GENERAL**1.1 Reference Standards**

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-C22.2 No. 214-02, Communications Cables (Bi-National standard with UL 444).
- .2 Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA)
 - .1 TIA/EIA-568-B.1-(2001), Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.
 - .2 TIA/EIA-568-B.2-(2001), Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.
 - .3 TIA/EIA-606-A-(2002), Administration Standard for the Commercial Telecommunications Infrastructure.

1.2 General

- .1 Telecommunication systems are to meet national code and standards, Government of Canada standards and functional criteria requirements for the building facility. The criteria identified herein are provided to assist the contractor in the design and installation of telecommunication systems of the building facility and shall be used in conjunction with all applicable standards.
- .2 Provide and install all equipment, technical specifications, equipment and materials, and provide all labor and equipment necessary for the execution and quality control of all work indicated on the plans and in the specifications.
- .3 No additional compensation will be given for moving, if necessary, conduits and installed or not equipment, due to the structure or any other normal condition.
- .4 The Professional reserves the right to move equipment of Section 27, without charge or credit, provided that the displacement does not exceed 5m and the change notice is given before installation.
- .5 Provide labor and equipment required to carry out all the tests required by authorities having jurisdiction and / or in specifications. Repeat the test until obtaining satisfactory results.
- .6 Switch on all equipment and systems installed, once tested, adjusted and balanced.

1.3 Manufacturer's Instructions

- .1 All fixtures, fittings and equipment, etc. are installed, connected and switched on strictly in accordance with the guidelines and the latest Manufacturer's recommendations. When the plans and specifications do not show the detail of the accessories required to make connections or to install an equipment, that means the Manufacturer's recommendations apply to the equipment in question, and these fixtures and fittings are part of plans and specifications as if they were specifically mentioned. If the Contractor has any doubt, he will submit the case to the Professionals whose decision is final.
- .2 For any installed item, if there are inventories, the spare is given to a responsible person designated at the beginning of the project. As well as all literature, brochures or other Manufacturer's documents, provided with the equipment, is delivered properly to the same person.
- .3 During cables installation, a special attention is given to avoid sheath or cable insulation damage caused by twisting or bending. Accidentally damaged cables during installation are replaced to the satisfaction of the supervisor and at the expense of the Contractor. No cable with a damaged sheath is installed.

1.4 System Description

- .1 Structured telecommunications wiring system consist of unshielded-twisted-pair, terminations, connectors, cross-connection hardware and related equipment installed inside building for occupant's telecommunications systems, including voice (telephone), data, and image.
- .2 Installed in physical star configuration with separate horizontal and backbone sub-systems.
 - .1 Horizontal cables link work areas to telecommunications cabinet located on Storage # 105A.
 - .2 Telecommunications cabinet linked to main entrance by backbone cables.

1.5 Action and Informational Submittals

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 As-built Records and Drawings:
 - .1 Provide database reflecting cable installation and cross-connections.
 - .2 Provide electronic drawings in CAD format depicting all construction.
 - .3 Provide two (2) bound complete hard-copy sets of as-built records to the Departmental Representative.

1.6 Delivery, Storage and Handling

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect equipment from nicks, scratches, and blemishes .
 - .3 Replace defective or damaged materials with new.Products

1.7 Four-Pair 100 Ω Balanced Twisted Pair Cable

- .1 Four-pair, 100 ohm balanced unshielded-twisted-pair (UTP) cable, flame test classification FT4 to CSA-C22.2 No.214, Category 6 (Cat. 6) to TIA/EIA-568-B.2.

1.8 Work Area UTP 4-Pair Modular Jack

- .1 Eight-position modular jack "RJ-45", type T568B, Category 6 to TIA/EIA-568-B.2.
 - .1 In self-contained surface-mount box, two jacks per box.
 - .2 Mounted in compatible single gang faceplate.

1.9 Termination and Cross-Connection Hardware for UTP

- .1 IDC Terminal strips, 25 pair, for terminating multi pair 100 Ω balanced twisted pair cables and supporting cross-connections using jumper wires or compatible plug-ended patch cords: Category 6 to TIA/EIA-568-B.2.

- .2 Mount or block for housing 12 IDC terminal strips, mounted on cabinet.
 - .1 Distribution rings or channels capable of externally mating with the above mount for managing cross-connection wires.
- .3 Patch panel, two rack units high, 24 ports:
 - .1 Each port equipped with factory installed "RJ-45" jacks, type T568B Category 6 to TIA/EIA-568-B.2..
 - .2 Horizontal cable-management unit for every 48 ports.
- .4 Consolidation point, terminates 12 UTP horizontal cables from telecommunications cabinet on IDC terminations. Cables extending to work areas terminate on RJ-45 jacks T568B.

1.10 UTP Cross-Connect Wire

- .1 Category 6, 4 pairs to TIA/EIA-568-B.2.

1.11 UTP PATCH CORDS

- .1 1 metres long, with factory-installed male plug at one end to mate with "RJ-45" jack and with factory-installed male plug at other end to mate with "RJ-45" jack Category 6, 4 pairs.

1.12 UTP Work Area Cords

- .1 3 metres long, each end equipped with "RJ-45" plug Category 6.

1.13 Telecommunication Cabinet

- .1 The telecommunication cabinet to install in the storage #105A, shall comply with the following specifications:

Height	1800 mm (70.875")
Rack Units	42U
Depth	671 mm (26.40")
Width	559 mm (22")
Rails	Front and Back Mounting Rails, adjustable for EIA 19 inches equipment
Static Load Rating	1150 kg (2500 lbs)
Material Type	Steel, min. gauge 14
Mounting	Welded and bolted profiled steel. Welds and edges should be ground
Color	Black
Front door	Single screen door (vented) with handle and safety hinges
Rear door	Double screen door (vented) with opening in the middle and safety hinges
Side panels	Closed and recessed side panels
Top panel	Panel closed with 4-1/2" quiet fans and fan controller.
Finish	Primer inside and outside antirust, and at least two layers of enamel finishing
Cables management	Grid for cable management, over full height of cabinet Vertical cable managers of 'fingers' type, on each side at the front of the cabinet, over full height of cabinet
Grounding	1 vertical grounding busbar

Electrical Power Strip	2 vertical power bars with 10 Nema 5-20R outlets.
Installation kit	Include the necessary equipment for floor anchoring with grounding isolation
Accessories	Two pairs cage nut style rackrail (NVR enclosure). One pair of cage nut style Z-rail adapters.
Standards	ULC, RoHS, EIA 310-E

2. EXECUTION

2.1 Installation of Termination and Cross-Connect Hardware

- .1 Install termination and cross-connect hardware in cabinet according to manufacturers' instructions. Identify and label as indicated to: TIA/EIA-606-A.
- .2 Install consolidation points, as indicated according to manufacturer's instructions. Identify and label as indicated to: TIA/EIA-606-A.

2.2 Installation of Horizontal Distribution Cables

- .1 Install horizontal cables in "J" hooks from telecommunication cabinet to individual work-area jacks. Identify and label as indicated to: TIA/EIA-606-A.
- .2 Support horizontal cables at intervals not exceeding 1.5 metres.
- .3 Install horizontal cables from consolidation point to individual work-area jacks.
 - .1 Provide supplementary "J" hooks to support cables at intervals not exceeding 1.5 metres.
 - .2 Identify and label as indicated to: TIA/EIA-606-A.
- .4 Terminate horizontal cables in telecommunications cabinet and at individual work-area jacks.
 - .1 Identify and label as indicated to: TIA/EIA-606-A.
- .5 Coil spare cables and store in ceiling space in zone.
- .6 Harness slack cable in cabinets, racks, and wall-mounted termination and cross-connection hardware.

2.3 Installation of Backbone Cables

- .1 Install backbone cables from the telecommunication cabinet to carrier demarcation point in Entrance Room #113 and according to manufacturer's instructions.
 - .1 Identify and label as indicated to: TIA/EIA-606-A.

2.4 Installation of Equipment Cables

- .1 Install equipment cables from equipment patch panel.
 - .1 Identify and label as indicated to: TIA/EIA-606-A.

2.5 Implement Cross-Connections

- .1 Implement cross-connections using patch cords as specified.

2.6 Field Quality Control

- .1 Test horizontal UTP cables as specified below and correct deficiencies provide record of results as electronic record on CD.
 - .1 Perform tests for Permanent Link on installed cables, including spares:
 - .1 Category 6 using certified level III tester to: TIA/EIA-568-B.2.
 - .2 Perform tests for Channel on [20]% of cross-connected data horizontal cabling installed from each telecommunications room, including shortest and longest drops from each telecommunications room: should more than 5% of tested cables fail, test remaining cross-connected data cables.
 - .1 Category 6 using certified level III tester to: TIA/EIA-568-B.2.
- .2 Test backbone UTP cables as specified below and correct deficiencies: provide record of results as electronic record on CD.
 - .1 Perform tests for Permanent Link on 4-pair cables:
 - .1 Category 6 using certified level III tester to: TIA/EIA-568-B.2.
 - .2 Perform Wire Map tests on multi-pair UTP cables to: TIA/EIA-568-B.1.
- .3 Provide record of results as electronic record on CD to: TIA/TSB-140.

End of Section