

Table of Contents

| | | |
|----------|--|-----------|
| 1 | STATEMENT OF PURPOSE | 3 |
| 1.1 | GENERAL | 3 |
| 2 | APPLICABLE SPECIFICATIONS AND STANDARDS..... | 4 |
| 2.1 | GENERAL | 4 |
| 2.2 | CAN/CSA STANDARDS | 4 |
| 2.3 | ANSI/TIA/EIA STANDARDS..... | 4 |
| 2.4 | BICSI STANDARDS | 4 |
| 3 | INFORMATION TRANSPORT SYSTEM (ITS) CABLING REQUIREMENTS | 5 |
| 3.1 | GENERAL | 5 |
| 3.2 | ELECTROMAGNETIC INTERFERENCE (EMI) | 5 |
| 3.3 | HORIZONTAL CABLING | 5 |
| 3.4 | BACKBONE CABLING | 8 |
| 3.5 | WORK AREA | 9 |
| 3.6 | TELECOMMUNICATIONS ROOM (TR) SIZING | 10 |
| 3.7 | TELECOMMUNICATIONS ROOM (TR)..... | 11 |
| 3.8 | EQUIPMENT ROOM (ER) | 13 |
| 3.9 | ENTRANCE FACILITIES | 15 |
| 3.10 | FIELD TESTING..... | 16 |
| 3.11 | SYSTEM ADMINISTRATION | 17 |
| 4 | CONSULTANT SERVICES REQUIREMENTS..... | 22 |
| 4.1 | BASIC ELEMENTS | 22 |
| 4.2 | GENERAL REQUIREMENTS..... | 22 |
| 4.3 | TECHNICAL SPECIFICATIONS | 22 |
| 4.4 | INFORMATION TRANSPORTATION SYSTEM (ITS) DRAWINGS..... | 24 |
| 5 | VENDOR REQUIREMENTS | 27 |
| 5.1 | BASIC ELEMENTS | 27 |
| 5.2 | VENDOR QUALIFICATIONS | 27 |
| 5.3 | RCDD PROJECT MANAGER | 27 |
| 5.4 | CERTIFICATION AND TESTING | 28 |
| 6 | PROJECT DOCUMENTATION..... | 29 |
| 6.1 | BASIC ELEMENTS | 29 |

| | |
|--------------------------------------|----|
| 6.2 AS-BUILT DRAWINGS | 29 |
| 6.3 TEST RESULTS..... | 29 |
| 6.4 MANUFACTURER'S WARRANTY | 30 |
| 6.5 RCDD PROJECT CERTIFICATION | 30 |

1 Statement of Purpose

1.1 General

- 1.1.1 The Nova Scotia Government has developed Information Transport System Cabling Guidelines. These guidelines form part of the Nova Scotia Department of Transportation and Infrastructure Renewal (NSDTIR), Document DC350 Design Requirements Manual and apply to all information transport system cabling installed in government leased or owned premises.
- 1.1.2 The purpose of this guideline is to ensure industry standards and code compliance, system integrity, vendor performance, and to protect the interests of the Provincial Government of Nova Scotia related to information transport systems and associated infrastructure.
- 1.1.3 This document supports a multi-purpose / multi-vendor environment whilst establishing a minimum performance and technical acceptance criteria.

2 Applicable Specifications and Standards

2.1 General

2.1.1 All work shall comply with the latest editions (including all addenda) of the codes and standards listed in this section. Additional requirements and exceptions to these standards are described in Section 3 of this document. Deviations from this document are not permitted without written approval from NSDTIR.

2.2 CAN/CSA Standards

2.2.1 CAN/CSA C22.1-06 - Canadian Electrical Code.

2.2.2 CAN/CSA-C22.2 No. 226-92 (Reaffirmed 2006) - Protectors in Telecommunications Networks.

2.3 ANSI/TIA/EIA Standards

2.3.1 TIA-526-7 - Measurement of Optical Power Loss of Installed Singlemode Fibre Cable Plant.

2.3.2 TIA-526-14-A - Optical Power Loss Measurements of Installed Multimode Fibre Cable Plant.

2.3.3 ANSI/TIA/EIA-568-B.1 - Commercial Building Telecommunications Cable Standard: General Requirements.

2.3.4 ANSI/TIA/EIA-568-B.2 - Commercial Building Telecommunications Cabling Standard: Balanced Twisted-Pair Cabling Components.

2.3.5 ANSI/TIA/EIA-568-B.3 - Optical Fibre Cabling Components Standard.

2.3.6 ANSI/TIA-569-B - Commercial Building Standard for Telecommunications Pathways and Spaces.

2.3.7 ANSI/TIA-569-C - Optical Fibre Colour Coding.

2.3.8 ANSI/TIA/EIA-606-A - Administration Standard for Commercial Telecommunications Infrastructure.

2.3.9 ANSI-J-STD-607-A - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.

2.3.10 ANSI/TIA-758-A - Customer-Owned Outside Plant Telecommunications Infrastructure Standard.

2.4 BICSI Standards

2.4.1 BICSI Telecommunications Distribution Methods Manual (TDMM).

2.4.2 BICSI Information Transport Systems Installation Methods Manual (ITSIMM).

3 Information Transport System (ITS) Cabling Requirements

3.1 General

3.1.1 The ANSI/TIA/EIA-568 standards and the BICSI/TDMM define the basic elements of the information transport system cabling structure. The applicable requirements of those elements as provided to the Province of Nova Scotia are detailed in this section.

3.2 Electromagnetic Interference (EMI)

3.2.1 The proximity of horizontal cabling to electrical facilities that generate Electromagnetic Interference (EMI) shall be considered in the design and installation of the ITS metallic cabling. The table below indicates the minimum separation of horizontal cabling, pathways and spaces from typical sources of EMI.

| Potential EMI Source (power exceeding 5KVA) | Minimum Separation Distance |
|---|-----------------------------|
| Electrical conductors not enclosed in a ferrous metal pathway or unshielded electrical equipment in proximity to open or non-metal structured cabling pathways or telecommunications equipment. | 610mm (24") |
| Electrical conductors not enclosed in a ferrous metal pathway or unshielded electrical equipment in proximity to a grounded metal conduit structured cabling pathway or telecommunications equipment. | 305mm (12") |
| Electrical conductors enclosed in a bonded metal conduit (or equivalent shielding) in proximity to a bonded metal conduit structured cabling pathway or telecommunications equipment. | 152mm (6") |
| Electrical Motors and Transformers | 1220mm (48") |

3.3 Horizontal Cabling

3.3.1 The three types of cables recognized for use in horizontal cabling are:

3.3.1.1 Four-pair 100 ohm balanced, unshielded, twisted-pair augmented Category 6 cable (category 6A cable).

3.3.1.2 Series 6, 75 ohm coaxial cable (CATV applications only).

3.3.1.3 Two or more strands of 62.5/125 or 50/125 μm multimode optical fibre cable.

3.3.2 Copper Cabling (UTP)

3.3.2.1 NSDTIR requires minimum of two balanced, unshielded, twisted-pair, 4-

pair cables to be installed to each telecommunications outlet location within work area of 10 m² (100 ft²) minimum. Provide two (2) telecommunications outlets in each office to accommodate furniture layout changes.

- 3.3.2.2 All horizontal cables shall be terminated on modular eight-position connectors with T568A pin/pair assignments using insulation displacement connectors (IDC).
- 3.3.2.3 Horizontal distribution UTP cabling shall provide outer cable jacket colours assigned for voice and data applications as listed:
 - 3.3.2.3.1 Voice cabling shall have BLUE outer jacket.
 - 3.3.2.3.2 Data cabling shall have WHITE or GREY outer jacket.
 - 3.3.2.3.3 Special application cabling (ie CCTV) shall have YELLOW outer jacket.
- 3.3.2.4 The maximum horizontal distance in cable length from the horizontal termination equipment connections in the Telecommunications Room (TR) space to the work area Telecommunications Outlet (TO) is 90 meters (295 feet). For each horizontal channel, a total of 10 meters (33 feet) is permitted for patch cords or jumpers and for equipment cables or cords located in the work area and TR space respectively. The total channel link (horizontal cabling and cords) shall not exceed 100 meters (328 feet).
- 3.3.2.5 Provide a service loop in the Telecommunications Room / Equipment Room (TR/ER) and cable slack in the ceiling space above the telecommunications outlet in the horizontal cabling to accommodate future cabling system changes.
 - 3.3.2.5.1 Preferred Service Loop Method: A 3 m (10 ft) service loop shall be provided at the Telecommunications / Equipment Room by routing the cables to the rack by the “longest route” in the cable tray within the TR/ER. Ensure a “shortest route” is provided in the cable tray.
 - 3.3.2.5.2 Alternate Service Loop Method: A 3 m (10 ft) service loop shall be provided at the Telecommunications / Equipment Room by routing a single loop of cable (stored in the cable tray) within the TR/ER, the loop shall have a minimum bend radius of 225mm (9”).
 - 3.3.2.5.3 Provide 1.5 m (5 ft) cable slack above the telecommunications outlet in the accessible ceiling space. Do not store slack in bundled loops, store cable slack in a figure-eight configuration with each loop of the figure-eight supported on individual J hooks, the loops shall have a minimum bend radius of 225mm

(9”).

3.3.3 Copper Cabling (Coaxial)

3.3.3.1 Coaxial cabling for CATV applications shall be Series 6, 18 AWG bare copper-clad steel conductor with aluminum tape and aluminum braid shield (100% coverage), CMR (FT-4), 100% sweep tested 5 MHz to 1 GHz.

3.3.3.2 All coaxial cable terminations shall be compression Type F.

3.3.4 Optical Fibre Cabling:

3.3.4.1 There are three classes of optical fibre cabling, as described in the table below. The recommended class is OM3.

| Classification | Type | Performance |
|----------------|--|--|
| OM1 | 62.5/125 μm Multimode | Minimum bandwidth of 200 and 500 MHz-km at 850 and 1300 nm, respectively. |
| OM2 | 50/125 μm Multimode | Minimum bandwidth of 500 and 500 MHz-km at 850 and 1300 nm, respectively. |
| OM3 | 50/125 μm Multimode Laser Optimized | Minimum bandwidth of 2000 and 500 MHz-km at 850 and 1300 nm, respectively. |

3.3.4.2 All horizontal cables shall be terminated on duplex 568SC connectors.

3.3.5 Horizontal Cabling Pathways:

3.3.5.1 A ceiling distribution system shall serve as the horizontal pathway, including a combination of ladder type cable tray, EMT conduit and J hooks.

3.3.5.2 Cable trays shall be installed in corridors to distribute horizontal cables from the telecommunications room to the vicinity of the work areas.

3.3.5.3 Cable trays shall be filled to a maximum fill ratio of 25%.

3.3.5.4 The underside of the cable tray supports shall be a minimum of 150 mm (6") above the suspended ceiling support channels.

3.3.5.5 Conduit shall be used in areas without suspended ceilings and accessible ceiling spaces.

3.3.5.6 A vertical conduit stub, minimum 27 mm (1"), shall be installed from each telecommunications outlet and television outlet to the accessible ceiling space.

3.3.5.7 Horizontal conduit stub(s), minimum one 63 mm (2 1/2"), shall be

installed from the cable tray in the corridor to the accessible ceiling spaces of all rooms in which telecommunications outlets and/or television outlets are installed. These conduit stubs are to be bonded to the nearest available telecommunications bonding infrastructure.

- 3.3.5.8 J hooks and adjustable cable support loops shall be installed only in rooms in which telecommunications outlets and/or television outlets are installed, with a maximum spacing of 1220 mm (48").
- 3.3.5.9 Standard J hooks shall be used to support up to ten cables; J hooks with a reusable cable retention system or adjustable type cable supports shall be used to support eleven or more cables.
- 3.3.5.10 Utility columns (e.g. pac poles) shall not be used.
- 3.3.5.11 J Hooks shall not be used in corridor or common area ceiling spaces.

3.4 Backbone Cabling

3.4.1 General

- 3.4.1.1 The five types of cables recognized for use in backbone cabling are:
- 3.4.1.2 Multi-pair 100 ohm balanced, unshielded, twisted-pair Category 3 cable.
- 3.4.1.3 Four-pair 100 ohm balanced, unshielded, twisted-pair augmented Category 6 cable.
- 3.4.1.4 Twelve or more strands of 62.5/120 or 50/125 μ m multimode optical fibre cable.
- 3.4.1.5 Twelve or more strands of singlemode optical fibre cable.
- 3.4.1.6 Series 6 or Series 11 coaxial cable (CATV applications only).

3.4.2 Voice Backbone Cabling (UTP):

- 3.4.2.1 All voice copper backbone cabling shall be multi-pair Category 3.
- 3.4.2.2 All backbone cables shall have 25% spare capacity.

3.4.3 Data Backbone Cabling (UTP):

- 3.4.3.1 All data copper backbone cabling shall be 4-pair augmented Category 6.
- 3.4.3.2 All backbone cables shall have 25% spare capacity (minimum one cable).

3.4.4 Data Backbone Cabling (Optical Fibre):

- 3.4.4.1 There are four classes of optical fibre cabling, as described in the table below. The recommended class for lengths up to 300 metres is OM3.

| System | Maximum Backbone Length | Maximum Data Rate |
|---|-------------------------|-------------------|
| Campus Backbone (OM1 fibre) | 2000 m (6560 feet) | 155 Mb/s |
| Campus Backbone (OM2 fibre) | 550 m (1804 feet) | 1 Gb/s |
| Building Backbone (OM2 fibre) | 300 m (984 feet) | 1 Gb/s |
| Building Backbone (OM3 fibre) | 300 m (984 feet) | 10 Gb/s |
| Campus or Building Backbone (OS1 fibre) | 2000 m (6560 feet) | 10 Gb/s |

3.4.5 All backbone cables shall have 25% spare capacity, with a minimum of twelve strands.

3.4.5.1 A redundant, parallel, spare augmented Category 6 UTP cable shall be installed for each pair of strands of optical fibre backbone cable where distances do not exceed the maximum recommended installed length of Category 6A cable.

3.4.6 CATV Backbone Cabling (Coaxial):

3.4.6.1 Series 6 cabling for CATV application shall be 18 AWG bare copper-clad steel conductor with aluminum tape and aluminum braid shield (100% coverage), 100% sweep tested 1 MHz to 1 GHz.

3.4.6.2 Series 11 cabling for CATV application shall be 14 AWG bare copper stranded conductor with aluminum tape and aluminum braid shield (100% coverage), 100% sweep tested 1 MHz to 1 GHz.

3.4.7 Backbone Cabling Pathways:

3.4.7.1 A ceiling distribution system shall serve as the backbone pathway, including ladder type cable tray and/or EMT conduit.

3.4.7.2 Vertically aligned telecommunications spaces shall be interconnected using conduit sleeves.

3.4.7.3 All optical fibre backbone cabling shall be installed in 32 mm (1-1/4") orange innerduct. Inner-duct shall be minimum FT-4 (riser) rated and complete with pull tape. The innerduct shall be installed in cable tray or EMT conduit.

3.4.7.4 J-hooks shall not be used for placement of communications backbone cabling.

3.5 Work Area

- 3.5.1 Telecommunications Outlet Box:
 - 3.5.1.1 Each telecommunications outlet box shall be a minimum two gang, complete with one gang raised, square welded tile ring.
 - 3.5.1.2 Each telecommunications outlet box shall have an EMT conduit, minimum 27 mm (1"), stubbed up with a 90 degree or offset bend into the accessible ceiling space of the same room and terminated with a bushing.
 - 3.5.1.3 Each telecommunications outlet box shall be installed within 1000 mm (39") of an electrical outlet and installed at the same height and have a matching coverplate.
 - 3.5.1.4 Work area telecommunications outlets with unique applications shall be addressed appropriately to conform to industry standards and practices (e.g. system furniture bezels, weatherproof outlets and keystone adaptors).
 - 3.5.1.5 Provide a 3m (10') equipment patch cord for each installed data outlet plus 25% of the total number as spare equipment patch cords.
 - 3.5.2 Telecommunications Outlet Connector:
 - 3.5.2.1 Each work area shall be served by a minimum of two augmented Category 6 cables terminated on modular eight-position connectors with T568A pin/pair assignments using insulation displacement connectors (IDC).
 - 3.5.2.2 Work area telecommunications outlets shall have a minimum 4 port modular jack capacity, be mounted in a single gang brushed stainless steel coverplate.
 - 3.5.2.3 Telecommunications outlet connectors shall be colour coded as follows:
 - 3.5.2.3.1 Grey for data or Local Area Network (LAN) connections.
 - 3.5.2.3.2 Blue for voice or other telephony connections.
 - 3.5.2.3.3 Yellow for special applications (POE, CCTV, etc.).
 - 3.5.3 Optical Fibre Information Transport System (ITS) Outlet Connector:
 - 3.5.3.1 Horizontal optical fibre cables shall be terminated on duplex 568SC connectors.
- 3.6 Telecommunications Room (TR) Sizing
- 3.6.1 Every building is to be served by at least one TR, with a minimum of one TR per floor; where possible vertically align TR's located on separate floors.
 - 3.6.2 Each TR is to be sized for the installed equipment plus 25 % spare capacity, the spare capacity shall be a minimum of one equipment rack. The table below indicates the minimum room size based on the floor area being served by the TR.

| Serving Floor Area Size | Minimum Interior Room Dimensions |
|--|----------------------------------|
| 500 m ² | 3.1m X 2.5m (10' 2"x 8' 3") |
| Larger than 500 m ² and less than or equal to 800 m ² | 3.1m X 2.7m (10' 2"x 8' 10") |
| Larger than 800 m ² and less than or equal to 1000 m ² | 3.1m X 3.4m (10' 2"x 11' 2") |

3.7 Telecommunications Room (TR)

3.7.1 Copper Terminations:

3.7.1.1 Horizontal and backbone cabling shall be terminated on patch panels containing modular eight-position connectors with T568A pin/pair assignments using insulation displacement connectors (IDC).

3.7.1.2 Horizontal distribution and backbone cabling system termination panels within the TR space shall be 48 port capacity.

3.7.1.3 TR patch panels shall occupy a maximum of 2U rack space per individual panel.

3.7.1.4 Voice backbone cabling shall be terminated using two pairs per connector (pairs 1 and 2).

3.7.1.5 Connectors shall be colour coded as follows:

3.7.1.5.1 White for copper data backbone cabling.

3.7.1.5.2 Purple for incoming voice backbone cabling.

3.7.1.5.3 Grey for data horizontal cabling.

3.7.1.5.4 Blue for voice horizontal cabling.

3.7.1.5.5 Yellow for special applications (POE, CCTV, etc.) horizontal cabling.

3.7.1.6 Populate unused / spare ports in all patch panels with modular connectors colour coded to match the active ports in the patch panel.

3.7.2 Optical Fibre Terminations:

3.7.2.1 Horizontal and backbone cabling shall be terminated on patch panels containing duplex 568SC connectors.

3.7.3 Equipment Rack Layouts:

3.7.3.1 Loading of equipment racks within the telecommunications room shall be as indicated in Figure 3.1, "Telecommunications Room Typical Rack Layout".

3.7.3.2 Provide separate equipment racks for voice and data applications.

3.7.3.3 Provide shelving suitable for supporting heavy rack mounted equipment (e.g. rack mounted UPS).

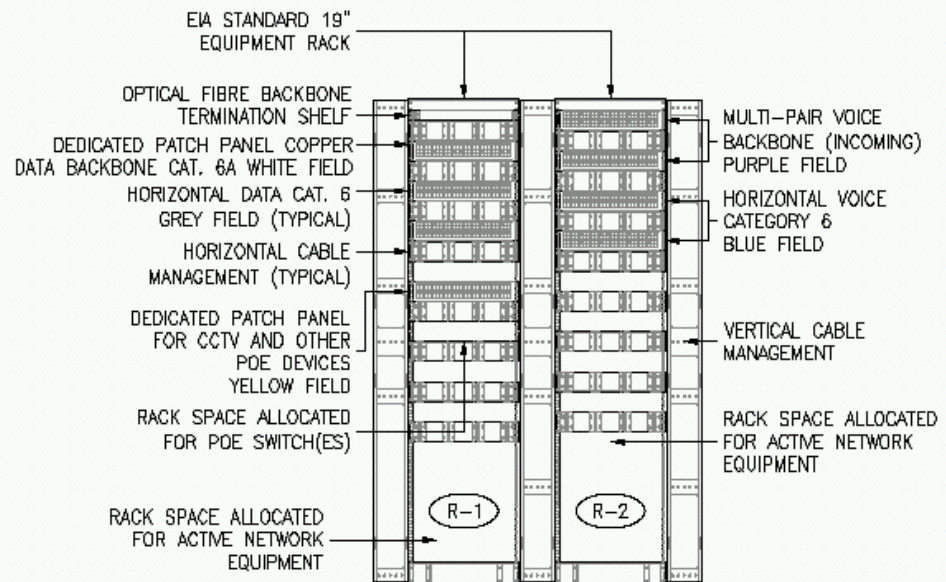


FIGURE 3.1
TELECOMMUNICATIONS ROOM
TYPICAL RACK LAYOUT

Telecommunications Room (TR) Layout:

3.7.3.4 Equipment racks for voice and data shall be 480 mm (19") open frame type with holes tapped 10-32 at EIA standard spacing and a minimum capacity of 44U. Equipment racks shall be complete with vertical cable management (minimum size 254mm (10") wide x 230mm (9") deep) on both sides and be of the same height as the rack.

3.7.3.5 Open frame equipment racks shall be oriented to provide the following minimum clearances:

3.7.3.5.1 1000 mm (39") at the front of the rack.

3.7.3.5.2 1500 mm (59") from the vertical mounting rails at the rear of the rack.

3.7.3.5.3 600 mm (39") from the vertical mounting rail at one side of the rack or continuous row of racks.

3.7.3.6 Equipment racks in shallow telecommunications rooms shall be wall-mounted cabinets with holes tapped 10-32 at standard spacing. Cabinets shall be hinged and oriented to provide 1000 mm (39") of clearance at the rear. **Note:** the use of shallow telecommunications rooms requires prior approval by DTIR.

3.7.3.7 Equipment racks shall have 25% spare capacity.

3.7.3.8 Provide a patch cord for each installed voice and data port plus 25% spare; patch cord lengths are to be minimized, spare patch cords are to be a

variety of lengths to a maximum of 5m (15').

- 3.7.3.9 Provide horizontal cable management for owner supplied active network equipment. The horizontal cable management provided for this equipment shall be equal in number to the horizontal cable management provided for the patch panels.
- 3.7.3.10 Populate unused / spare ports in all patch panels with modular connectors colour coded to match the active ports in the patch panel.
- 3.7.3.11 Cable tray shall be installed around the perimeter of the telecommunications room to facilitate service cable loops, sufficient cable support and organization.
- 3.7.3.12 Cable tray shall be installed above all equipment racks, spanning across the perimeter cable tray, to facilitate cable support, cable drops and organization.
- 3.7.3.13 Cable tray shall be ladder type or wire basket type.

3.8 Equipment Room (ER)

3.8.1 Copper Terminations:

- 3.8.1.1 Horizontal and backbone cabling shall be terminated on patch panels containing eight-position connectors with T568A pin/pair assignments using insulation displacement connectors (IDC).
- 3.8.1.2 Voice backbone cabling shall be terminated using two pairs per connector (pairs 1 and 2).
- 3.8.1.3 Horizontal distribution and backbone cabling system termination panels within the ER space shall be maximum 48 port capacity.
- 3.8.1.4 ER patch panels shall occupy a maximum of 2U rack space per individual panel.
- 3.8.1.5 Connectors shall be colour coded as follows:
 - 3.8.1.5.1 White for copper data backbone cabling.
 - 3.8.1.5.2 Orange for incoming voice backbone cabling from the demarcation point.
 - 3.8.1.5.3 Purple for outgoing voice backbone cabling.
 - 3.8.1.5.4 Grey for data horizontal cabling.
 - 3.8.1.5.5 Blue for voice horizontal cabling.
 - 3.8.1.5.6 Yellow for special applications (POE, CCTV, etc.) horizontal cabling.

3.8.2 Optical Fibre Terminations:

- 3.8.2.1 Horizontal and backbone cabling shall be terminated on patch panels containing duplex 568SC connectors.

3.8.3 Equipment Rack Layouts:

- 3.8.3.1 Loading of equipment racks within the equipment room shall be as

indicated in Figure 3.2, "Equipment Room Typical Rack Layout".

3.8.3.2 Provide separate equipment racks for voice and data applications.

3.8.3.3 Provide shelving suitable for supporting heavy rack mounted equipment (e.g. rack mounted UPS).

3.8.4 ER Layout:

3.8.4.1 Equipment racks for voice and data shall be 480 mm (19") open frame type with holes tapped 10-32 at EIA standard spacing and a minimum capacity of 44U. Equipment racks shall be complete with vertical cable management (minimum size 254mm (10") wide x 230mm (9") deep) on both sides and be of the same height as the rack.

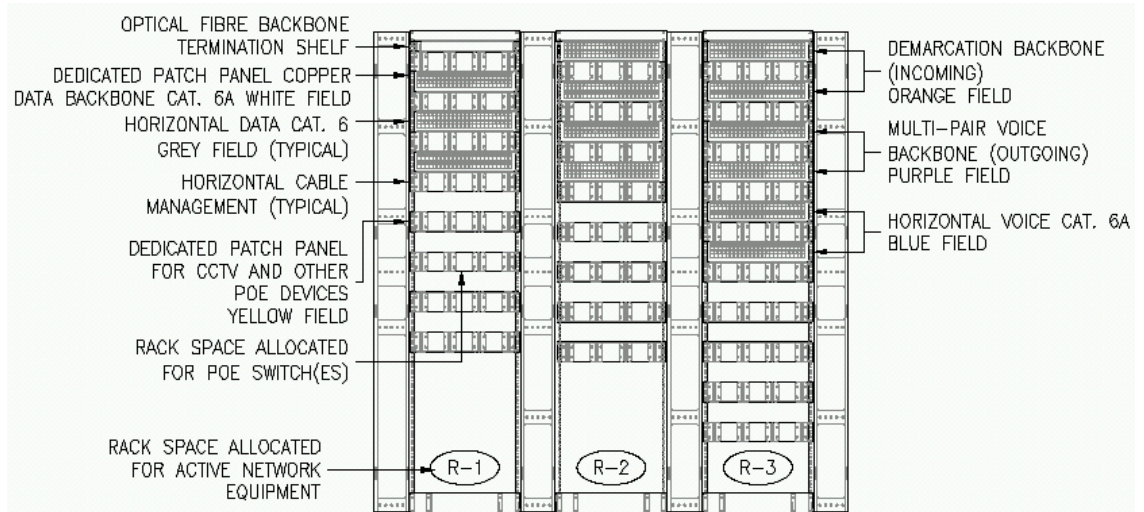


FIGURE 3.2
EQUIPMENT ROOM
TYPICAL RACK LAYOUT

- 3.8.4.2 Open frame equipment racks shall be oriented to provide the following minimum clearances:
- 3.8.4.2.1 1000 mm (39") at the front of the rack.
 - 3.8.4.2.2 1500 mm (59") from the vertical mounting rails at the rear of the rack.
 - 3.8.4.2.3 600 mm (39") from the vertical mounting rail at one side of the rack or continuous row of racks.
- 3.8.4.3 Equipment racks shall have 25% spare capacity.
- 3.8.4.4 Provide horizontal cable management for owner supplied active network equipment. The horizontal cable management provided for this equipment shall be equal in number to the horizontal cable management provided for the patch panels.
- 3.8.4.5 Provide a patch cord for each installed voice and data port plus 25% spare; patch cord lengths are to be minimized, spare patch cords are to be a variety of lengths to a maximum of 5m (15').
- 3.8.4.6 Populate unused / spare ports in all patch panels with modular connectors colour coded to match the active ports in the patch panel.
- 3.8.4.7 Cable tray shall be installed around the perimeter of the equipment room to facilitate cable service loops, sufficient cable support and organization.
- 3.8.4.8 Cable tray shall be installed above all equipment racks, spanning across the perimeter cable tray, to facilitate cable support, cable drops and organization.
- 3.8.4.9 Cable tray shall be ladder type or wire basket type.

3.9 Entrance Facilities

3.9.1 Building Telecommunications Demarcation:

- 3.9.1.1 The building information transport system demarcation facilities shall include three basic components:
- 3.9.1.1.1 Building cross-connect hardware.
 - 3.9.1.1.2 Demarcation backbone cable.
 - 3.9.1.1.3 Building demarcation termination hardware.

3.9.1.2 Demarcation connectors shall be RJ21X female for the service provider and RJ21X male for the building.

3.9.1.3 The layout shall be as indicated in Figure 3.3, "Building Telecommunications Demarcation".

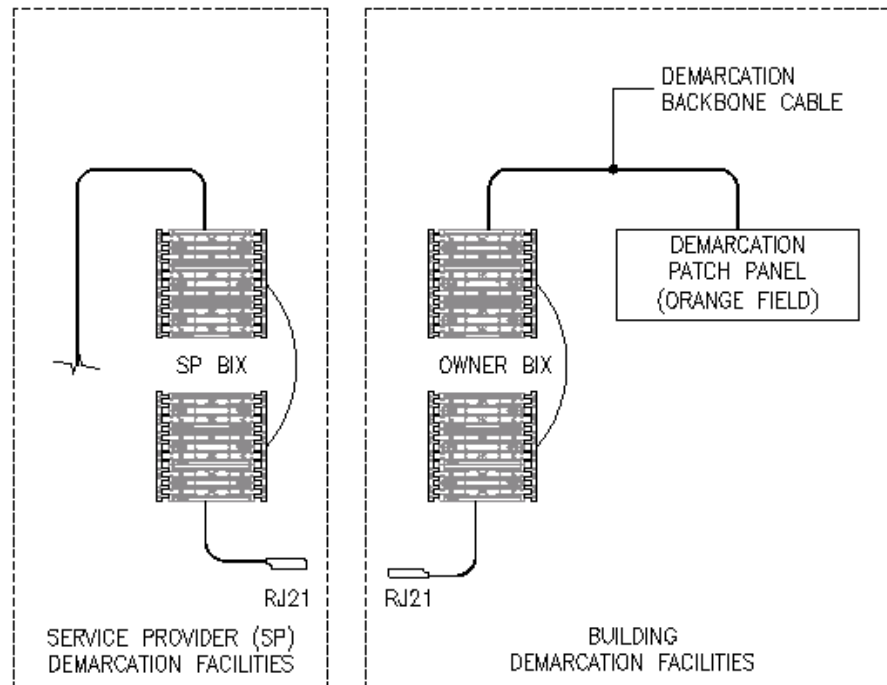


FIGURE 3.3
BUILDING TELECOMMUNICATIONS
DEMARCATON

3.9.2 Entrance Cables

3.9.2.1 Outside plant (OSP) cables shall be exposed within the premise for a maximum of 15 m (50 ft) from the building entrance.

3.9.2.2 OSP entrance cables may only extend beyond 15 meters provided they are enclosed in rigid conduit.

3.10 Field Testing

3.10.1 UTP Horizontal Cable Testing:

3.10.1.1 Cables shall be tested in accordance with the latest approved testing procedures with Level IIIe field test instruments.

3.10.2 UTP Backbone Cable Testing:

3.10.2.1 Field testing acceptance parameters for Category 3 backbone cabling shall be:

3.10.2.1.1 Wire map.

3.10.2.1.2 Length.

3.10.2.2 Field testing acceptance parameters for augmented Category 6 backbone cabling shall be the same as for the permanent link.

3.10.3 Coaxial Cable Testing

3.10.3.1 All coaxial cabling used in broadband applications shall be tested for the following acceptance parameters:

3.10.3.1.1 DC loop resistance.

3.10.3.1.2 Impedance.

3.10.3.1.3 Length.

3.10.3.1.4 TDR.

3.10.3.1.5 Attenuation.

3.10.3.1.6 Noise.

3.10.4 Optical Fibre Cable Testing:

3.10.4.1 Multimode cables shall be tested using Method B of TIA-526-14-A.

3.10.4.2 Singlemode cables shall be tested using Method A.1 of TIA-526-7.

3.11 System Administration

3.11.1 General

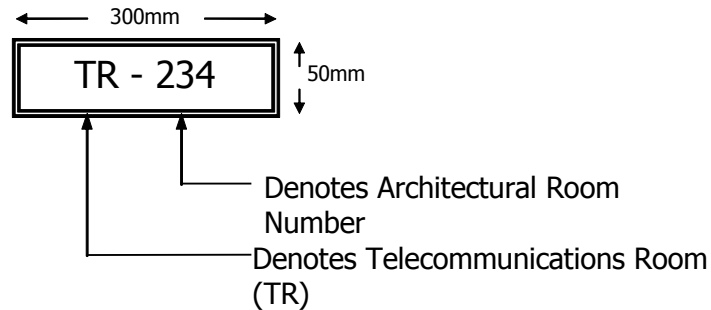
3.11.1.1 The requirements for system administration are Class 2 specified within the ANSI/EIA/TIA-606-A standard which provides for the Information Transport System (ITS) infrastructure administration needs within a single building.

3.11.1.2 A unique identifier is to be associated with each element of the ITS infrastructure to be administered.

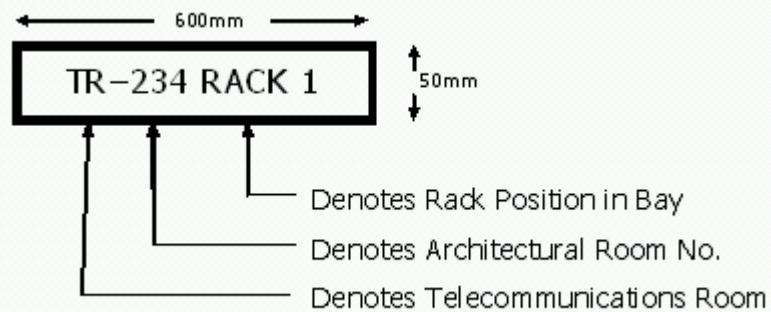
3.11.1.3 All components of the ITS administration system shall be designed and installed to last the intended life (20 year warranty period) of the ITS system installed.

3.11.2 Telecommunications Spaces

3.11.2.1 All telecommunications spaces within a building shall be uniquely identified as part of a complete administration system. The TR, ER or MTR shall be identified by the room designation assigned by the architectural design. The assigned number shall be used within the administration system identifier and shall be a "lamicoid" type plate minimum (50mm H) X (300mm L) as shown below and secured to the exterior of the door frame entering that space.



3.11.2.2 All telecommunications equipment racks within the telecommunications space require a unique component identifier as part of the administration system by a “lamicoid” nameplate, minimum (50mm H) X (600mm L) as shown below and secured to the upper horizontal rail of the equipment rack.

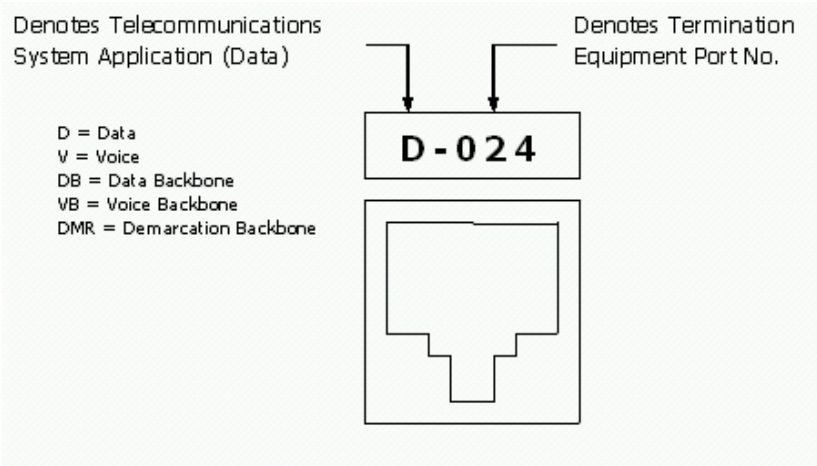


3.11.2.3 All ITS termination hardware within the telecommunications space requires a unique component identifier as part of the administration system. Identifiers must be self adhesive thermal transfer type and placed appropriately to indicate all ports.

3.11.3 Horizontal Distribution System

3.11.3.1 All horizontal cabling shall be uniquely identified with a wrap type self-laminating adhesive label with mechanically generated (not hand written) identifier.

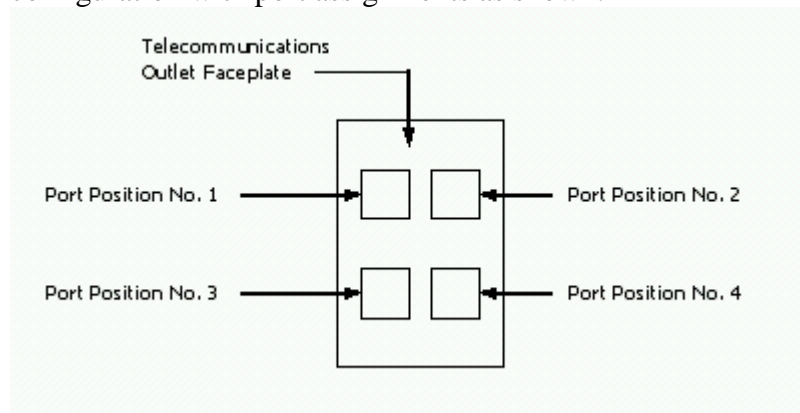
3.11.3.2 Horizontal cable identifiers shall denote basic information transport system application and originating telecommunications space termination equipment port as shown;



3.11.4 Work Area

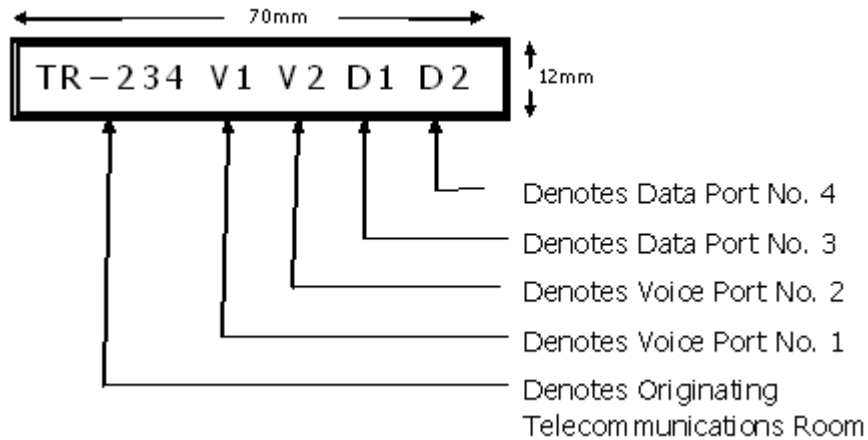
3.11.4.1 For the purposes of system administration the work area shall include the telecommunications outlet faceplate and all outlet termination hardware.

3.11.4.2 All telecommunications outlet faceplates shall be standard four port configuration with port assignments as shown.



3.11.4.3 All telecommunications outlet locations require a unique component identifier as part of the administration system by a “lamicoid” nameplate, minimum 120mm H X 70mm L and secured to the wall-space centered and above (min. 12mm) the telecommunications outlet faceplate.

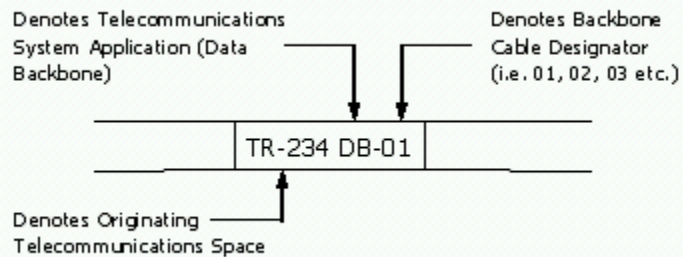
3.11.4.4 Telecommunications work area outlet identifiers must denote basic information transport system application, originating telecommunications space and termination equipment port as shown;



3.11.5 Backbone System

3.11.5.1 All backbone system cabling shall be uniquely identified with a wrap type self-laminating adhesive label with mechanically generated (not hand written) identifier.

3.11.5.2 Backbone cable identifiers shall denote basic information transport system application and originating telecommunications space as shown;



3.11.6 Telecommunications Demarcation Facilities

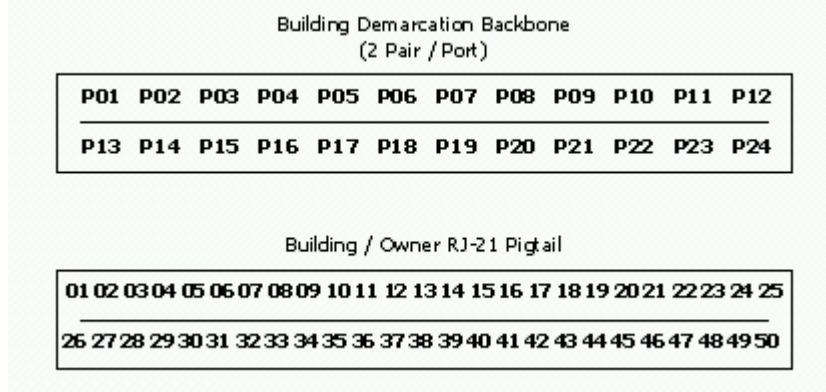
3.11.6.1 For the purposes of system administration, the information transport system demarcation facilities shall include three basic components;

3.11.6.1.1 Building cross-connect hardware.

3.11.6.1.2 Building demarcation backbone cable

3.11.6.1.3 Building demarcation termination hardware.

3.11.6.2 All Building cross-connect hardware within the telecommunications space requires a unique component identifier as part of the administration system. Identifiers must be self adhesive thermal transfer type and placed appropriately to indicate applicable pair assignments as shown;



- 3.11.7 All information transport system demarcation backbone cabling shall be uniquely identified with a wrap type self-laminating adhesive label with mechanically generated (not hand written) identifier.
- 3.11.8 All information transport system demarcation backbone cable identifiers shall denote basic telecommunications system application and originating telecommunications space as shown;

4 Consultant Services Requirements

4.1 Basic Elements

4.1.1 The CAN/CSA, ANSI/TIA/EIA and BICSI standards as listed in Section 2 of this document define the basic elements of the Information Transport System (ITS) cabling structure. Design consultants providing services to the Province of Nova Scotia shall prepare contract documents as detailed within this section.

4.2 General Requirements

4.2.1 Consultants shall submit the following for ITS infrastructure projects:

4.2.1.1 Technical specifications.

4.2.1.2 Information Transport System drawings.

4.3 Technical Specifications

4.3.1 Document Requirements:

4.3.1.1 Consultants shall produce a complete tender document sub-section “Information Transport System Distribution” within the electrical specifications.

4.3.1.2 The ITS distribution system document shall be formatted in three parts:

4.3.1.2.1 Part 1 - General.

4.3.1.2.2 Part 2 - Products.

4.3.1.2.3 Part 3 - Execution.

4.3.2 Part 1 - General:

4.3.2.1 This portion identifies the overall general requirements of the project in reference to the provisioning of ITS infrastructure.

4.3.2.2 This section shall provide ITS technical specifications within the following sub-sections as required by the project:

4.3.2.2.1 Summary.

4.3.2.2.2 References (identified in Section 2 of this document).

4.3.2.2.3 Permits, fees and certificates of approval.

4.3.2.2.4 System description.

4.3.2.2.5 Submittals.

4.3.2.2.6 Quality assurance.

4.3.2.2.7 Warranty requirements.

4.3.2.2.8 Delivery, storage and handling.

4.3.2.2.9 Sequence and scheduling.

4.3.2.2.10 Use of site.

4.3.2.2.11 Continuity of services.

4.3.3 Part 2 - Products:

4.3.3.1 This portion identifies general requirements of the individual components incorporated in the provisioning of ITS infrastructure.

4.3.3.2 This section shall provide ITS technical specifications within the following sub-sections as required by the project:

4.3.3.2.1 Acceptable manufacturers.

4.3.3.2.2 Fabrication.

4.3.3.2.3 Suitability.

4.3.3.2.4 Voice/data building backbone cable (including optical backbone cabling as required).

4.3.3.2.5 Voice horizontal distribution cable.

4.3.3.2.6 Data horizontal distribution cable.

4.3.3.2.7 Optical fibre horizontal distribution cable (as required).

4.3.3.2.8 Campus backbone cable (campus (inter-building) applications).

4.3.3.2.9 Service provider entrance facilities.

4.3.3.2.10 Voice/data/optical fibre work area outlets.

4.3.3.2.11 Termination Blocks.

4.3.3.2.12 Patch panels.

4.3.3.2.13 Optical fibre patch panels.

4.3.3.2.14 Patch cords and jumper cables.

4.3.3.2.15 Equipment racks and cabinets.

4.3.3.2.16 Building entrance protectors (campus backbone cabling).

4.3.3.2.17 Spare parts.

4.3.4 Part 3 - Execution:

4.3.4.1 This portion identifies construction and installation requirements for system vendors when provisioning ITS infrastructure.

4.3.4.2 This section shall provide ITS technical specifications within the following sub-sections as required by the project:

4.3.4.2.1 Site survey.

4.3.4.2.2 Handling of materials.

- 4.3.4.2.3 Protection of Owner's facilities.
- 4.3.4.2.4 Installation.
- 4.3.4.2.5 Grounding and Bonding.
- 4.3.4.2.6 Labelling and administration.
- 4.3.4.2.7 Testing and certification.
- 4.3.4.2.8 Field quality control.
- 4.3.4.2.9 RCDD project manager requirement
- 4.3.4.2.10 Customer/Owner orientation and training.
- 4.3.4.2.11 Project documentation.

4.4 Information Transportation System (ITS) Drawings

4.4.1 Drawing File Requirements:

- 4.4.1.1 Consultants shall produce contract document drawings and details within the electrical drawings.
- 4.4.1.2 Consultants shall make drawing files available to the successful project vendor in AutoCAD (.dwg file format) to assist with vendor compliance requirements.
- 4.4.1.3 AutoCAD generated drawing files shall be produced to address the following requirements:
 - 4.4.1.3.1 Floor plan drawings.
 - 4.4.1.3.2 Information transport distribution system details.
 - 4.4.1.3.3 Telecommunications space - rack details.
 - 4.4.1.3.4 Telecommunications space - floor layout.
 - 4.4.1.3.5 Information transport system backbone – riser diagram.
 - 4.4.1.3.6 Information transport system grounding and bonding - riser diagram.

4.4.2 Floor Plan Drawings:

- 4.4.2.1 Floor plan drawings shall indicate the location of the following information transport system cabling components:
 - 4.4.2.1.1 Work area outlet location.
 - 4.4.2.1.2 Communications outlet type (icon specified).
 - 4.4.2.1.3 Communications outlet configuration (icon specified).
 - 4.4.2.1.4 Serving telecommunications space location.
 - 4.4.2.1.5 Special requirements/considerations notes.

4.4.3 Information Transport System Distribution Details:

- 4.4.3.1 System detail drawings shall provide additional information required for information transport system cabling components including:
 - 4.4.3.1.1 Outlet icon details and descriptions.
 - 4.4.3.1.2 Special application details.

- 4.4.3.1.3 Special installation requirements.
- 4.4.3.1.4 Architectural details (as required).
- 4.4.4 Telecommunications Space - Rack Details:
 - 4.4.4.1 Rack detail drawings shall provide rack elevations for each telecommunications space within the entire project scope.
 - 4.4.4.2 Rack elevation drawings shall provide detailed information for all ITS distribution system components within the Telecommunications Room(s) (TR) and Equipment Room (ER) including:
 - 4.4.4.2.1 Equipment rack/cabinet dimensions and requirements.
 - 4.4.4.2.2 Equipment rack/cabinet quantities.
 - 4.4.4.2.3 Termination hardware and loading requirements for:
 - 4.4.4.2.3.1.1 Quantity.
 - 4.4.4.2.3.1.2 Placement.
 - 4.4.4.2.3.1.3 Category requirement.
 - 4.4.4.2.3.1.4 Port count (active / spare).
 - 4.4.4.2.3.1.5 System application (e.g. horizontal or backbone).
 - 4.4.4.2.4 Additional hardware requirements (e.g. horizontal managers, power bars or UPS).
- 4.4.5 Telecommunications Space - Floor Layout:
 - 4.4.5.1 Telecommunications space floor layout drawings shall be scale drawings and indicate orientation of equipment and hardware as assigned to the footprint of the space.
 - 4.4.5.1.1 Floor layout drawings shall provide detailed information for all ITS infrastructure components within the TR and ER including:
 - 4.4.5.1.1.1 Equipment rack/cabinet location and orientation.
 - 4.4.5.1.1.2 Horizontal pathway requirements, location and orientation.
 - 4.4.5.1.1.3 Backbone pathway requirements, location and orientation.
 - 4.4.5.1.1.4 Information transport system requirements, location and orientation (e.g. voice and data telecommunications outlet).
 - 4.4.5.1.1.5 Associated electrical distribution system requirements, location and orientation.
 - 4.4.5.1.1.6 Dimensional and work clearance information.

- 4.4.6 Information Transport System Backbone (Riser Diagram):
 - 4.4.6.1 Information transport system backbone drawings shall be single-line type drawings to indicate quantity requirements and associated pathway assignments for all building and campus backbone cabling.
 - 4.4.6.2 Backbone system drawings shall provide detailed information for all ITS backbone cabling within and between the TR(s) and ER including:
 - 4.4.6.2.1 Backbone cable type and requirements.
 - 4.4.6.2.2 Backbone cable quantity.
 - 4.4.6.2.3 Information transport systems application.
 - 4.4.6.2.4 Pathway assignment.
 - 4.4.6.2.5 Termination hardware type and location.
- 4.4.7 Information transport system grounding and bonding - riser diagram.
 - 4.4.7.1 Information transport system backbone drawings shall be single-line type drawings to indicate size/quantity requirements and associated pathway assignments for all information transport system grounding and bonding cabling.
 - 4.4.7.2 Grounding and bonding system drawings shall provide detailed information for all ITS grounding and bonding cabling associated with this system including:
 - 4.4.7.2.1 Grounding and bonding cable type and requirements.
 - 4.4.7.2.2 Grounding and bonding cable quantity.
 - 4.4.7.2.3 Grounding and bonding bus bar sizing.
 - 4.4.7.2.4 Grounding and bonding bus bar location.
 - 4.4.7.2.5 Information transport systems application.
 - 4.4.7.2.6 Pathway assignment.
 - 4.4.7.2.7 Termination hardware type and location.

5 Vendor Requirements

5.1 Basic Elements

5.1.1 The CAN/CSA, ANSI/TIA/EIA and BICSI standards as listed in Section 2 of this document define the basic elements of the Information Transport System (ITS) cabling structure. Vendor firms providing services to the Province of Nova Scotia shall comply with the qualifications criteria as detailed within this section.

5.2 Vendor Qualifications

5.2.1 General:

5.2.1.1 Vendor firms providing services to the Province of Nova Scotia shall comply with Section 3 of this document.

5.2.1.2 Qualified vendors shall provide technical field services in compliance with labour standards (e.g. Communications Cabling Specialist (CCS)).

5.2.1.3 Vendors shall comply with all applicable Nova Scotia Workers Compensation requirements.

5.2.1.4 Vendors shall maintain current Nova Scotia Construction Safety Association (NSCSA) compliant status.

5.2.1.5 Qualified vendors shall maintain current Building Industry Constructors Services International (BICSI) membership.

5.2.1.6 Qualified vendors shall maintain manufacturer recognition as a certified installation contractor for the ITS product solution being implemented.

5.3 RCDD Project Manager

5.3.1 General

5.3.1.1 The successful Information Transport Distribution System contractor is required to retain the services of one (1) Registered Communications Distribution Designer (RCDD) for the duration of the project. The RCDD must be identified and the successful vendor must provide a copy of the RCDD current certificate and BICSI membership on a timely basis prior to award of the contract.

5.3.1.2 The RCDD shall maintain responsibility for the following;

5.3.1.2.1 Review and accept the Information Transport Distribution System materials, hardware and related components proposed.

5.3.1.2.2 Review the proposed pathways and spaces and accept the size and location of all Telecommunications Spaces (TS).

5.3.1.2.3 Notify the Consultant of any issues or concerns related to CAN/CSA, IEE and TIE/EIA specification compliance.

5.3.1.2.4 Review and approve Information Transport Distribution System

- material shop drawings prior to submission to the Consultant.
- 5.3.1.2.5 Attend regularly scheduled project construction and job meetings as requested by the project Consultant.
 - 5.3.1.2.6 Ensure system installation practices and procedures comply with all applicable CAN/CSA, IEE and TIE/EIA specifications and procedures.
 - 5.3.1.2.7 Provide regular project status reports and updates as requested by the project Consultant.
 - 5.3.1.2.8 Observe testing and certification procedures and provide manufacturers assurance and warranty.
 - 5.3.1.2.9 Review and approve all project as-built documentation including drawings, test reports, details and provide current RCDD seal on all.

5.4 Certification and Testing

5.4.1 General:

- 5.4.1.1 Vendors providing services to the Province of Nova Scotia shall provide Product Manufacturer's Application Warranty for a minimum of twenty years.
- 5.4.1.2 Certification and testing documentation shall be provided as a complete part of the project documentation requirements as specified in Section 6 of this document. Documentation shall include a RCDD letter of certification for the complete Information Transport System cabling for the project.

6 Project Documentation

6.1 Basic Elements

6.1.1 The CAN/CSA, ANSI/TIA/EIA and BICSI standards as listed in Section 2 of this document define the basic elements of the Information Transport System (ITS) cabling structure. Vendor firms providing services to the Province of Nova Scotia shall prepare and submit project documentation as detailed within this section.

6.2 As-built Drawings

6.2.1 General:

- 6.2.1.1 Vendors shall prepare record drawings in both hard copy and AutoCAD drawing format on CDROM as part of compliance with this requirement.
- 6.2.1.2 Drawings in AutoCAD .dwg file format shall be provided to the vendor by the consulting services provider for the compliance of this section.
- 6.2.1.3 Record drawings shall provide the following information:
 - 6.2.1.3.1 All work area telecommunications outlet locations as constructed.
 - 6.2.1.3.2 Project administration system identifiers for telecommunications outlets.
 - 6.2.1.3.3 Project administration system identifiers for telecommunication spaces (TR and ER).
- 6.2.1.4 Hard copy format record drawings shall be provided in two complete sets as defined:
 - 6.2.1.4.1 One complete floor plan and riser drawing set, black and white (colour optional).
 - 6.2.1.4.2 One complete floor plan drawing set, black and white (colour optional), is to be provided and mounted under plexiglass in all associated telecommunications spaces.
 - 6.2.1.4.3 One complete backbone riser drawing set, black and white (colour optional), is to be provided and mounted under plexiglass in the main telecommunications room.
 - 6.2.1.4.4 One complete grounding / bonding riser drawing set, black and white (colour optional), is to be provided and mounted under plexiglass in the main telecommunications room).

6.3 Test Results

6.3.1 Vendors shall provide test results hard (paper) copy and in digital format on CDROM as part of compliance with this requirement.

6.4 Manufacturer's Warranty

6.4.1 General:

6.4.1.1 Vendors shall provide a manufacturer generated and support Product Warranty and Application Assurance certificates upon completion of installation and acceptance by NSDTIR.

6.4.1.2 Product warranty and appliance assurance shall provide coverage of materials and labour for a minimum of Twenty Years from date of installation and acceptance regardless of installing agent/vendor status.

6.5 RCDD Project Certification

6.5.1 General

6.5.1.1 Vendors shall provide RCDD Project Certificate in hard copy format as part of compliance with this requirement.

6.5.1.2 The RCDD certification shall be provided for compliance as per the requirements within this document.