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## Section 1 Statement of Purpose

### 1.1 General

- .1 The Nova Scotia Government has developed Structured 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 communications cabling installed in government leased or owned premises.
- .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 telecommunications systems and infrastructure.
- .3 This document supports a multi-purpose / multi-vendor environment whilst establishing a minimum performance and technical acceptance criteria.

## Section 2 Applicable Specifications and Standards

### 2.1 General

- .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

- .1 CAN/CSA C22.1-06 - Canadian Electrical Code.
- .2 CAN/CSA-C22.2 No. 226-92 (Reaffirmed 2006) - Protectors in Telecommunications Networks.

### 2.3 ANSI/TIA/EIA Standards

- .1 TIA-526-7 - Measurement of Optical Power Loss of Installed Singlemode Fibre Cable Plant.
- .2 TIA-526-14-A - Optical Power Loss Measurements of Installed Multimode Fibre Cable Plant.
- .3 ANSI/TIA/EIA-568-B.1 - Commercial Building Telecommunications Cable Standard: General Requirements.
- .4 ANSI/TIA/EIA-568-B.2 - Commercial Building Telecommunications Cabling Standard: Balanced Twisted-Pair Cabling Components.
- .5 ANSI/TIA/EIA-568-B.3 - Optical Fibre Cabling Components Standard.
- .6 ANSI/TIA-569-B - Commercial Building Standard for Telecommunications Pathways and Spaces.
- .7 ANSI/TIA-569-C - Optical Fibre Colour Coding.
- .8 ANSI/TIA/EIA-606-A - Administration Standard for Commercial Telecommunications Infrastructure.

- .9 ANSI-J-STD-607-A - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
- .10 ANSI/TIA-758-A - Customer-Owned Outside Plant Telecommunications Infrastructure Standard.

#### 2.4 BICSI Standards

- .1 BICSI Telecommunications Distribution Methods Manual (TDMM).
- .2 BICSI Information Transport Systems Installation Methods Manual (ITSIMM).

## Section 3 Communications Cabling Requirements

### 3.1 General

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

### 3.2 Horizontal Cabling

- .1 The three types of cables recognized for use in horizontal cabling are:
  - .1 Four-pair 100 ohm balanced, unshielded, twisted-pair augmented Category 6 cable.
  - .2 Series 6, 75 ohm coaxial cable (CCTV/CATV applications only).
  - .3 Two or more strands of 62.5/125 or 50/125  $\mu\text{m}$  multimode optical fibre cable.
- .2 Copper Cabling (UTP):
  - .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 m<sup>2</sup> (100 ft<sup>2</sup>) minimum.
  - .2 All horizontal cables shall be terminated on eight-position connectors with T568A pin/pair assignments using insulation displacement connections (IDC).
  - .3 Horizontal distribution UTP cabling shall provide outer cable jacket colours assigned for voice and data applications as listed:
    - .1 Voice cabling shall have BLUE outer jacket.
    - .2 Data cabling shall have WHITE or GREY outer jacket.
    - .3 Special application cabling shall have YELLOW outer jacket.
- .3 Copper Cabling (Coaxial):
  - .1 Coaxial cabling for CCTV applications shall be Series 6, 18 AWG bare copper conductor with bare copper braid shield (92% coverage), 100% sweep tested 1 MHz to 1 GHz.
  - .2 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), 100% sweep tested 5 MHz to 1 GHz.
  - .3 All coaxial cable terminations shall be compression Type F.

.4 Optical Fibre Cabling:

- .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 $\mu\text{m}$ Multimode	Minimum bandwidth of 200 and 500 MHz-km at 850 and 1300 nm, respectively.
OM2	50/125 $\mu\text{m}$ Multimode	Minimum bandwidth of 500 and 500 MHz-km at 850 and 1300 nm, respectively.
OM3	50/125 $\mu\text{m}$ Multimode Laser	Minimum bandwidth of 2000 and 500 MHz-km at 850 and 1300 nm, respectively.

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

.5 Horizontal Cabling Pathways:

- .1 A ceiling distribution system shall serve as the horizontal pathway, including a combination of ladder type cable tray, EMT conduit and J hooks.
- .2 Cable trays shall be installed in corridors to distribute horizontal cables from the telecommunications room to the vicinity of the work areas.
- .3 Cable trays shall be filled to a maximum fill ratio of 25%.
- .4 Where sufficient space is available, the underside of the cable tray supports shall be a minimum of 150 mm (6") above the suspended ceiling support channels.
- .5 Conduit shall be used in areas without suspended ceilings and accessible ceiling spaces.
- .6 A vertical conduit stub, minimum 21 mm (3/4"), shall be installed from each telecommunications outlet and television outlet to the accessible ceiling space.
- .7 Horizontal conduit stub(s), minimum one 53 mm (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.
- .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 1525 mm (60").

- .9 Standard J hooks shall be used to support up to ten cables; J hooks with a reusable cable retention system shall be used to support eleven or more cables.
- .10 Utility columns (pac poles) shall not be used.
- .11 J Hooks shall not be used in corridor or common area ceiling spaces.

### 3.3 Backbone Cabling

- .1 General:
  - .1 The five types of cables recognized for use in backbone cabling are:
    - .1 Multi-pair 100 ohm balanced, unshielded, twisted-pair Category 3 cable.
    - .2 Four-pair 100 ohm balanced, unshielded, twisted-pair augmented Category 6 cable.
    - .3 Twelve or more strands of 62.5/120 or 50/125µm multimode optical fibre cable.
    - .4 Twelve or more strands of singlemode optical fibre cable.
    - .5 Series 6 or Series 11 coaxial cable (CCTV/CATV applications only).
- .2 Voice Backbone Cabling (UTP):
  - .1 All voice copper backbone cabling shall be multi-pair Category 3.
  - .2 All backbone cables shall have 25% spare capacity.
- .3 Data backbone Cabling (UTP):
  - .1 All data copper backbone cabling shall be 4-pair augmented Category 6.
  - .2 All backbone cables shall have 25% spare capacity (minimum one cable).

.4 Data Backbone Cabling (Optical Fibre):

- .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

- .2 All backbone cables shall have 25% spare capacity, with a minimum of twelve strands.
- .3 A redundant, parallel, spare augmented Category 6 UTP cable shall be installed for each pair of strands for optical fibre backbone cable where distances do not exceed the maximum recommended installed length of Category 6A cable.

.5 CCTV/CATV Backbone Cabling (Coaxial):

- .1 Series 6 cabling for CCTV applicable shall be 18 AWG bare copper conductor with bare copper braid shield (95% coverage), 100% sweep tested 1 MHz to 1 GHz.
- .2 Series 11 cabling for CCTV application shall be 14 AWG bare copper conductor with bare copper braid shield (95% coverage), 100% sweep tested 1 MHz to 1 GHz.
- .3 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.
- .4 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.

.6 Backbone Cabling Pathways:

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

- .2 Vertically aligned telecommunications spaces shall be interconnected using conduit sleeves.
- .3 All optical fibre backbone cabling shall be installed in 32 mm (1-1/4") orange innerduct. The innerduct shall be installed in cable tray or EMT conduit.

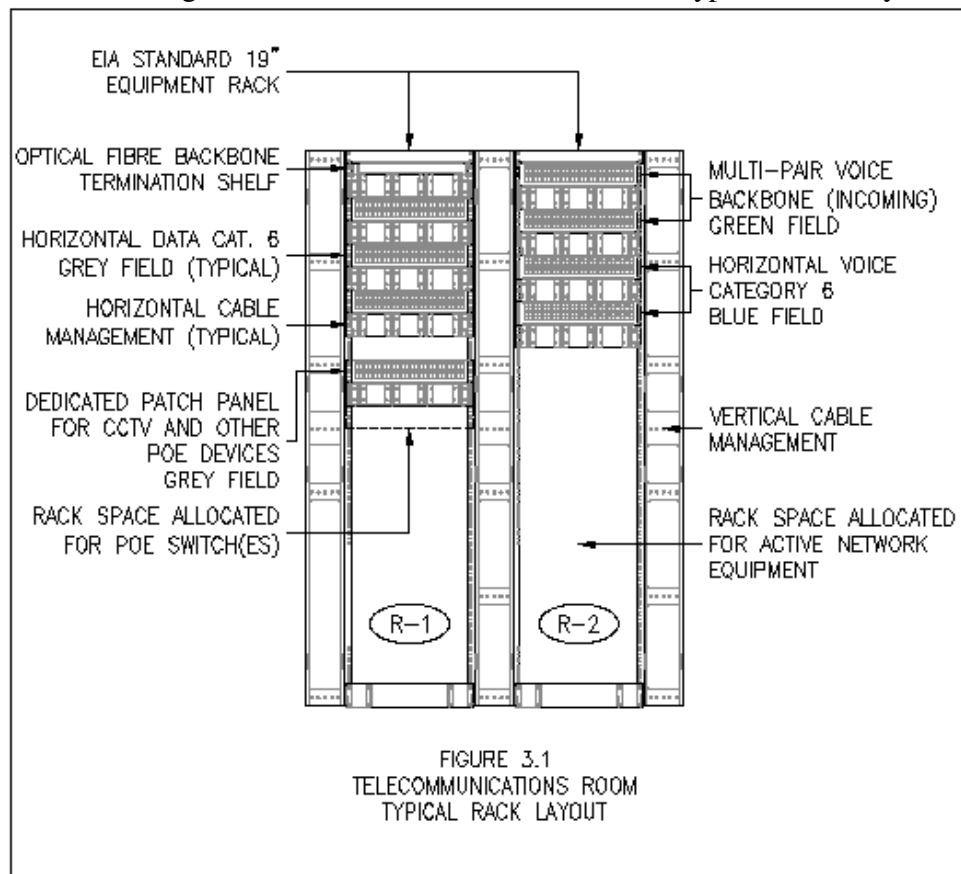
### 3.4 Work Area

- .1 Telecommunications Outlet Box:
  - .1 Each telecommunications outlet box shall be a minimum two gang, complete with one gang raised tile ring.
  - .2 Each telecommunications outlet box shall have an EMT conduit, minimum 21 mm (3/4"), stubbed up with a 90 degree bend into the accessible ceiling space of the same room and terminated with a bushing.
  - .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.
  - .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).
- .2 Telecommunications Outlet Connector:
  - .1 Each work area shall be served by a minimum of two augmented Category 6 cables terminated on eight-position connectors with T568A pin/pair assignments using insulation displacement connections (IDC).
  - .2 Telecommunications outlet connectors shall be colour coded as follows:
    - .1 Grey for data or Local Area Network (LAN) connections.
    - .2 White for voice or other telephony connections.
- .3 Optical Fibre Telecommunications Outlet Connector:
  - .1 Horizontal optical fibre cables shall be terminated on duplex 568SC connectors.

### 3.5 Telecommunications Room (TR)

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

- .2 Voice backbone cabling shall be terminated using two pairs per connector (pairs 1 and 2).
- .3 Connectors shall be colour coded as follows:
  - .1 White for data backbone cabling.
  - .2 Green for incoming voice backbone cabling.
  - .3 Grey for data horizontal cabling.
  - .4 Blue for voice horizontal cabling.
  - .5 Yellow for POE horizontal cabling.
- .2 Optical Fibre Terminations:
  - .1 Horizontal and backbone cabling shall be terminated on patch panels containing duplex 568SC connectors.
- .3 Equipment Rack Layouts:
  - .1 Loading of equipment racks within the telecommunications room shall be as indicated in Figure 3.1, "Telecommunications Room Typical Rack Layout".

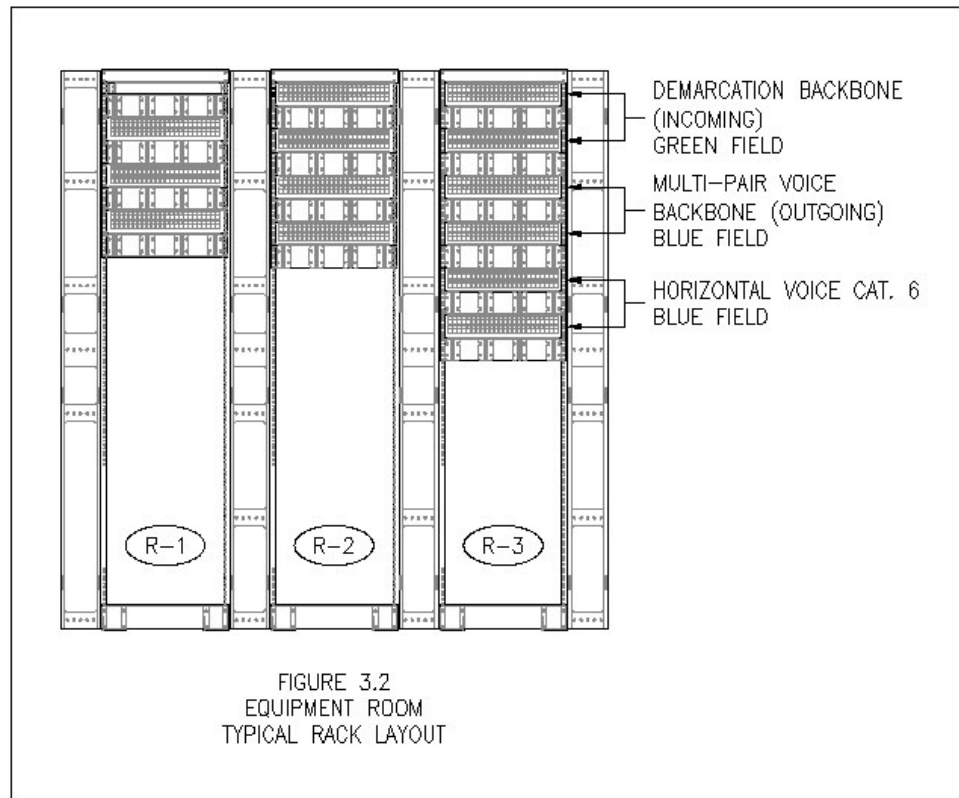


- .4 Telecommunications Room (TR) Layout:
  - .1 Equipment racks for voice and data shall be 480 mm (19") open frame type with holes tapped 10-32 at EIA standard spacing and a minimum capacity of 44U. Equipment racks shall be complete with vertical cable management on both sides and be of the same height as the rack.
  - .2 Open frame equipment racks shall be oriented to provide the following minimum clearances:
    - .1 1000 mm (39") at the front of the rack.
    - .2 1500 mm (59") from the vertical mounting rails at the rear of the rack.
    - .3 600 mm (39") from the vertical mounting rail at one side of the rack or continuous row of racks.
  - .3 Cable tray shall be installed around the perimeter of the telecommunications room to facilitate slack cable loops, sufficient cable support and organization.
  - .4 Cable tray shall be installed above all equipment racks, spanning across the perimeter cable tray, to facilitate cable support, cable drops and organization.
  - .5 Cable tray shall be ladder type or wire basket type.
  - .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.
  - .7 Equipment racks shall have 25% spare capacity.

### 3.6 Equipment Room (ER)

- .1 Copper Terminations:
  - .1 Horizontal and backbone cabling shall be terminated on patch panels containing eight-position connectors with T568A pin/pair assignments using displacement connections (IDC).
  - .2 Voice backbone cabling shall be terminated using two pairs per connector (pairs 1 and 2).
  - .3 Connectors shall be colour coded as follows:
    - .1 White for data backbone cabling.
    - .2 Green for incoming voice backbone cabling from the demarcation point.
    - .3 Blue for outgoing voice backbone cabling.
    - .4 Grey for data horizontal cabling.
    - .5 Blue for voice horizontal cabling.

- .2 Optical Fibre Terminations:
  - .1 Horizontal and backbone cabling shall be terminated on patch panels containing duplex 568SC connectors.
- .3 Equipment Rack Layouts:
  - .1 Loading of equipment racks within the equipment room shall be as indicated in Figure 3.2, "Equipment Room Typical Rack Layout".
- .4 ER Layout:
  - .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 on both sides and be of the same height as the rack.



- .2 Open frame equipment racks shall be oriented to provide the following minimum clearances:
  - .1 1000 mm (39") at the front of the rack.
  - .2 1500 mm (59") from the vertical mounting rails at the rear of the rack.
  - .3 600 mm (39") from the vertical mounting rail at one side of the rack or continuous row of racks.
- .3 Cable tray shall be installed around the perimeter of the equipment room to facilitate slack cable loops, sufficient cable support and organization.
- .4 Cable tray shall be installed above all equipment racks, spanning across the perimeter cable tray, to facilitate cable support, cable drops and organization.
- .5 Cable tray shall be ladder type or wire basket type.
- .6 Equipment racks shall have 25% spare capacity.

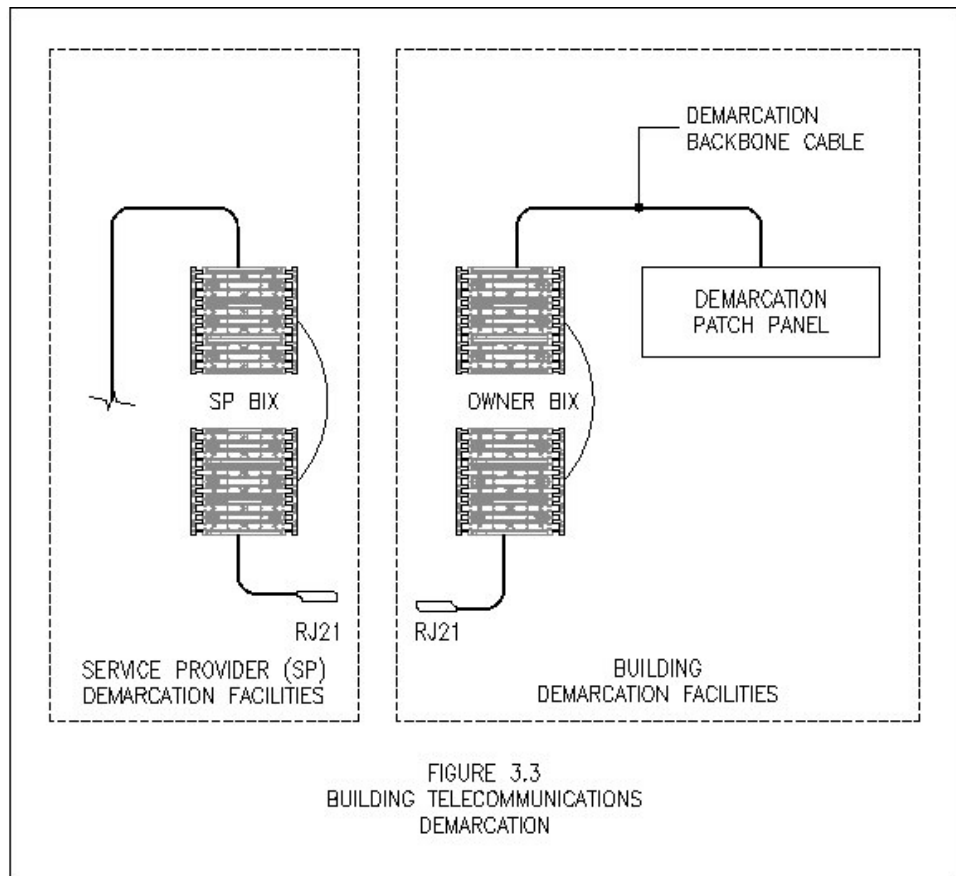
### 3.7 Entrance Facilities

- .1 Building Telecommunications Demarcation:
  - .1 The building telecommunications demarcation facilities shall include three basic components:
    - .1 Building cross-connect hardware.
    - .2 Demarcation backbone cable.
    - .3 Building demarcation termination hardware.
  - .2 Demarcation connectors shall be RJ21X female for the service provider and RJ21X male for the building.

- .3 The layout shall be as indicated in Figure 3.3, “Building Telecommunications Demarcation”.

### 3.8 Field Testing

- .1 UTP Horizontal Cable Testing:
  - .1 Cables shall be tested in accordance with the latest approved testing procedures.
- .2 UTP Backbone Cable Testing:
  - .1 Field testing acceptance parameters for Category 3 backbone cabling shall be:
    - .1 Wire map.
    - .2 Length.
  - .2 Field testing acceptance parameters for augmented Category 6 backbone cabling shall be the same as for the permanent link.



- .3 Optical Fibre Cable Testing:
  - .1 Multimode cables shall be tested using Method B of TIA-526-14-A.
  - .2 Singlemode cables shall be tested using Method A.1 of TIA-526-7.

## Section 4 Consultant Services Requirements

### 4.1 Basic Elements

- .1 The CAN/CSA, ANSI/TIA/EIA and BICSI standards as listed in Section 2 of this document define the basic elements of the telecommunications cabling system structure. Design consultants providing services to the Province of Nova Scotia shall prepare contract documents as detailed within this section.

### 4.2 General Requirements

- .1 Consultants shall submit the following for telecommunications infrastructure projects:
  - .1 Technical specifications.
  - .2 Telecommunications drawings.

### 4.3 Technical Specifications

- .1 Document Requirements:
  - .1 Consultants shall produce a complete tender document sub-section “Telecommunications Distribution System” within the electrical specifications.
  - .2 The telecommunications distribution system document shall be formatted in three parts:
    - .1 Part 1 - General.
    - .2 Part 2 - Products.
    - .3 Part 3 - Execution.
- .2 Part 1 - General:
  - .1 This portion identifies the overall general requirements of the project in reference to the provisioning or telecommunications infrastructure.
  - .2 This section shall provide telecommunications technical specifications within the following sub-sections as required by the project:
    - .1 Summary.
    - .2 References (identified in Section 2 of this document).
    - .3 Permits, fees and certificates of approval.
    - .4 System description.
    - .5 Submittals.

- .6 Quality assurance.
  - .7 Warranty requirements.
  - .8 Delivery, storage and handling.
  - .9 Sequence and scheduling.
  - .10 Use of site.
  - .11 Continuity of services.
- .3 Part 2 - Products:
- .1 This portion identifies general requirements of the individual components incorporated in the provisioning of telecommunications infrastructure.
  - .2 This section shall provide telecommunications technical specifications within the following sub-sections as required by the project:
    - .1 Acceptable manufacturers.
    - .2 Fabrication.
    - .3 Suitability.
    - .4 Voice/data building backbone cable (including optical backbone cabling as required).
    - .5 Voice horizontal distribution cable.
    - .6 Data horizontal distribution cable.
    - .7 Optical fibre horizontal distribution cable (as required).
    - .8 Campus backbone cable (campus (inter-building) applications).
    - .9 Service provider entrance facilities.
    - .10 Voice/data/optical fibre work area outlets.
    - .11 Termination Blocks.
    - .12 Patch panels.
    - .13 Optical fibre patch panels.
    - .14 Patch cords and jumper cables.
    - .15 Equipment racks and cabinets.
    - .16 Building entrance protectors (campus backbone cabling).
    - .17 Spare parts.
- .4 Part 3 - Execution:
- .1 This portion identifies construction and installation requirements for system vendors when provisioning telecommunications infrastructure.
  - .2 This section shall provide telecommunications technical specifications within the following sub-sections as required by the project:
    - .1 Site survey.
    - .2 Handling of materials.

- .3 Protection of Owner's facilities.
- .4 Installation.
- .5 Grounding and Bonding.
- .6 Labelling and administration.
- .7 Testing and certification.
- .8 Field quality control.
- .9 Customer/Owner orientation and training.
- .10 Project documentation.

#### 4.4 Telecommunications Drawings

- .1 Drawing File Requirements:
  - .1 Consultants shall produce contract document drawings and details within the electrical drawings.
  - .2 Consultants shall make drawing files available to the successful project vendor in AutoCAD (.dwg file format) to assist with vendor compliance requirements.
  - .3 AutoCAD generated drawing files shall be produced to address the following requirements:
    - .1 Floor plan drawings.
    - .2 Telecommunications distribution system details.
    - .3 Telecommunications space - rack details.
    - .4 Telecommunications space - floor layout.
    - .5 Telecommunications backbone system.
- .2 Floor Plan Drawings:
  - .1 Floor plan drawings shall indicate the location of the following telecommunications cabling system components:
    - .1 Work area outlet location.
    - .2 Telecommunications outlet type (icon specified).
    - .3 Telecommunications outlet configuration (icon specified).
    - .4 Serving telecommunications space location.
    - .5 Special requirements/considerations notes.
- .3 Telecommunications Distribution System Details:
  - .1 System detail drawings shall provide additional information required for telecommunications cabling system components including:
    - .1 Outlet icon details and descriptions.
    - .2 Special application details.

- .3 Special installation requirements.
- .4 Architectural details (as required).
  
- .4 Telecommunications Space - Rack Details:
  - .1 Rack detail drawings shall provide rack elevations for each telecommunications space within the entire project scope.
  - .2 Rack elevation drawings shall provide detailed information for all telecommunications distribution system components within the Telecommunications Room(s) (TR) and Equipment Room (ER) including:
    - .1 Equipment rack/cabinet dimensions and requirements.
    - .2 Equipment rack/cabinet quantities.
    - .3 Termination hardware and loading requirements for:
      - .1 Quantity.
      - .2 Placement.
      - .3 Category requirement.
      - .4 Port count.
      - .5 System application (e.g. horizontal or backbone).
    - .4 Additional hardware requirements (e.g. horizontal managers, power bars or UPS).
  
- .5 Telecommunications Space - Floor Layout:
  - .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.
  - .2 Floor layout drawings shall provide detailed information for all telecommunications infrastructure components within the TR and ER including:
    - .1 Equipment rack/cabinet location and orientation.
    - .2 Horizontal pathway requirements, location and orientation.
    - .3 Backbone pathway requirements, location and orientation.
    - .4 Telecommunications system requirements, location and orientation (e.g. voice and data telecommunications outlet).
    - .5 Associated electrical distribution system requirements, location and orientation.
    - .6 Dimensional and work clearance information.

- .6 Telecommunications Backbone System (Riser Diagram):
  - .1 Telecommunications backbone system drawings shall be single-line type drawings to indicate quantity requirements and associated pathway assignments for all building and campus backbone cabling.
  - .2 Backbone system drawings shall provide detailed information for all telecommunications backbone cabling within and between the TR and ER including:
    - .1 Backbone cable type and requirements.
    - .2 Backbone cable quantity.
    - .3 Telecommunications systems application.
    - .4 Pathway assignment.
    - .5 Termination hardware type and location.

## Section 5 Vendor Requirements

### 5.1 Basic Elements

- .1 The CAN/CSA, ANSI/TIA/EIA and BICSI standards as listed in Section 2 of this document define the basic elements of the telecommunications cabling system 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

- .1 General:
  - .1 Vendor firms providing services to the Province of Nova Scotia shall comply with Section 3 of this document.
  - .2 Qualified vendors shall provide technical field services in compliance with labour standards (e.g. Communications Cabling Specialist (CCS)).
  - .3 Vendors shall comply with all applicable Nova Scotia Workers Compensation requirements.
  - .4 Vendors shall maintain current Nova Scotia Construction Safety Association (NSCSA) compliant status.
  - .5 Qualified vendors shall maintain current Building Industry Constructions Services International (BICSI) membership.
  - .6 Qualified vendors shall maintain manufacturer recognition as a certified installation contractor for the telecommunications product solution being implemented.

### 5.3 Certification and Testing

- .1 General:
  - .1 Vendors providing services to the Province of Nova Scotia shall provide Product Manufacturer's Application Warranty for a minimum of twenty years.
  - .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.

## Section 6 Project Documentation

### 6.1 Basic Elements

- .1 The CAN/CSA, ANSI/TIA/EIA and BICSI standards as listed in Section 2 of this document define the basic elements of the telecommunications cabling system 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

- .1 General:
  - .1 Vendors shall prepare record drawings in both hard copy and CDROM format as part of compliance with this requirement.
  - .2 Drawings in AutoCAD .dwg file format shall be provided to the vendor by the consulting services provider for the compliance of this section.
  - .3 Record drawings shall provide the following information:
    - .1 All work area telecommunications outlet locations as constructed.
    - .2 Project administration system identifiers for telecommunications outlets.
    - .3 Project administration system identifiers for telecommunication spaces (TR and ER).
  - .4 Hard copy format record drawings shall be provided in two complete sets as defined:
    - .1 One complete floor plan drawing set black and white (colour optional).
    - .2 One complete floor plant drawing set black and white (colour optional) laminated (encapsulated) to be placed in all associated telecommunications spaces).

### 6.3 Test Results

- .1 Vendors shall provide test results in CDROM format as part of compliance with this requirement.

## 6.4 Manufacturer's Warranty

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