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## **SECTION 1. STATEMENT OF PURPOSE**

The Nova Scotia Government has developed a Structured Cabling Guideline. These guidelines form part of the Nova Scotia Transportation and Public Works (TPW), Document DC350 Design Requirements Manual and apply to all communications cabling installed in government leased or owned premises.

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.

This document supports a multi-product / multi-vendor environment whilst establishing performance and technical acceptance criteria.

## **SECTION 2. APPLICABLE SPECIFICATIONS AND STANDARDS**

The applicable industry specifications and standards are listed and described. Minimum compliance to the standards is required. Additions and exceptions to the listed specifications and standards are detailed within the Communications Cabling Requirements (Section 3) of this document. Additions, changes or exceptions are not permitted without the approval of TPW.

### **2.1 CAN/CSA Standards**

- 1) CAN/CSA C22.1-02 – Canadian Electrical Code.
- 2) CAN/CSA-T527-94 (Reaffirmed 1999) – Grounding and Bonding for Telecommunications in Commercial Buildings.
- 3) CAN/CSA-T528-93 (Reaffirmed 1997) – Design Guidelines for Administration of Telecommunications Infrastructure in Commercial Buildings.
- 4) CAN/CSA-T529-95 – Telecommunications Cabling Systems in Commercial Buildings.
- 5) CAN/CSA-T530-99 – Commercial Building Standards for Telecommunications Pathways and Spaces.

### **2.2 ANSI/TIA/EIA Standards**

- 1) ANSI/TIA/EIA-568-B.1 – Commercial Building Telecommunications Cabling.
- 2) ANSI/TIA/EIA-568-B.2.1 – Transmission Performance Specifications for 4-Pair 100 Ohm Category 6 Cabling.
- 3) ANSI/TIA/EIA-569-A – Commercial Building Standard for Telecommunications Pathways and Spaces.
- 3) ANSI/TIA/EIA-606 – The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
- 5) ANSI/TIA/EIA-607 – Commercial Building Grounding and Bonding Requirements for Telecommunications.
- 6) ANSI/TIA/EIA TSB-67 – Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems.

- 7) ANSI/TIA/EIA TSB-75 – Additional Horizontal Cabling Practices for Open Offices.
- 8) ANSI/TIA/EIA-568-B.3. Optical Fiber Cabling Components Standard.
- 9) ANSI/TIA/EIA-568-B.3-1. Optical Fiber Cabling Components Standard, Addendum 1—Additional Transmission Performance Specifications for 50/125  $\mu\text{m}$  Optical Fiber Cables.

### **2.3 BICSI Standards**

- 1) BICSI/TDMM – Telecommunications Distribution Methods Manual. (10th. Edition)
- 2) BICSI/TCIM - Telecommunications Cabling Installation Manual (3rd. Edition).

### **SECTION 3. COMMUNICATIONS CABLING REQUIREMENTS**

The CAN/CSA-T529-95, 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.

#### **3.1 Horizontal Distribution Cabling**

##### **3.1.1 General**

- 1) The horizontal cabling is the portion of the telecommunications cabling system that extends from the Telecommunications Room (TR) to the work area Telecommunications Outlet (TO).
- 2) The horizontal distribution cabling system includes the horizontal cables, the work area telecommunications outlet connections and all mechanical termination connections, patch cords and jumpers located in the telecommunications space.
- 3) The proximity of horizontal cabling to electrical facilities that generate Electromagnetic Interference (EMI) shall be considered in the design and installation of the telecommunications metallic cabling. The CAN/CSA-T530-99 and ANSI/TIA/EIA-569-A standards specify separation of horizontal cabling pathways and spaces from typical sources of EMI.
- 4) The horizontal distribution cabling shall be a physical star topology. All work area TO shall be connected to a horizontal cross-connect in the designated TR space. Each work area shall be served by a TR located on the same common floor.
- 5) Horizontal distribution cabling shall contain no more than one intermediate cross-connect or transition point.
- 6) The three types of cables recognized for use in horizontal cabling are:
  - 4-pair 100 ohm balanced twisted-pair Category 6 cable.
  - RG6/U coaxial cable (CCTV/CATV applications only)
  - 2 or more strands of 62.5/125 or 50/125  $\mu\text{m}$  multi-mode optical fiber cable.

##### **3.1.2 Copper Distribution Cabling (UTP)**

- 1) TPW requires minimum of two (2) balanced twisted-pair, 4-pair cables to be installed to each telecommunications outlet location within work area of  $10\text{m}^2$  ( $100\text{ft}^2$ ) minimum.
- 2) All termination equipment used in the horizontal distribution cabling system in the work area TO, intermediate cross-connect and the TR space shall be Insulation Displacement Connection (IDC) type approved for the media category and design application.

- 3) The maximum horizontal distance in cable length from the horizontal termination equipment connections in the TR space to the work area 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).
- 4) Horizontal distribution copper cabling shall provide additional cable slack at both ends to accommodate future cabling system changes. Although the exact amount of slack required depends on the size and layout of the connecting hardware of the TR and the work area, the recommended minimum amount of slack:
  - At the TR is 3 m (10 ft).
  - In the suspended ceiling for the telecommunications outlet is 1 m (3.28 ft).

Do not store slack in bundled loops. Cable loops have been shown to degrade cabling performance. Provide cable slack in an extended loop or in a figure-eight configuration to alleviate stress.
- 5) All horizontal distribution copper cabling shall be minimum Communications Metallic Riser (CMR) (FT-4) rated and specified **Category 6** 100 UTP cabling as required by the project design.
- 6) Horizontal Distribution UTP Cabling shall provide outer cable jacket colors assigned for Voice and Data applications as listed;
  - Voice cabling shall have BLUE outer jacket.
  - Data cabling shall have WHITE or GRAY outer jacket.
  - Special application cabling shall have YELLOW outer jacket.

### 3.1.3 Copper Distribution Cabling (Coaxial)

- 1) Horizontal distribution cabling lengths for CCTV and CATV systems shall be considered in their respective design criteria. All coaxial cabling shall be RG-6/U rated **CMR** (FT-4) minimum 2.2 MHz fundamental frequency.
- 2) All coaxial cable terminations shall be compression type F. Crimp type connectors shall **not** be used for termination of RG-6/U coaxial cable.

### 3.1.4 Optical Distribution Cabling

- 1) TPW requires that any optical fibre cabling incorporated in the horizontal distribution cabling system support the design and performance criteria as specified by CAN/CSA, TIA/EIA and BICSI. The following table is provided within the BICSI/TDMM and shall be referenced;

Table 5.21  
Optical fiber cable performance by type

Optical Fiber Type	Performance
50/125 $\mu\text{m}$ multimode	Minimum bandwidth of 500 and 500 MHz $\cdot$ km at 850 and 1300 nm, respectively
50/125 $\mu\text{m}$ 850 nm laser optimized multimode	Minimum bandwidth of 2000 and 500 MHz $\cdot$ km at 850 and 1300 nm, respectively
62.5/125 $\mu\text{m}$ multimode	Minimum bandwidth of 160 and 500 MHz $\cdot$ km at 850 and 1300 nm, respectively
NOTE: ISO/IEC 11801 Ed.2:2002 and other cabling standards specify the following:	
62.5/125 $\mu\text{m}$ multimode	Minimum bandwidth of 200 and 500 MHz $\cdot$ km at 850 and 1300 nm, respectively

- 2) All termination equipment used in optical fibre horizontal distribution cabling system in the work area TO, intermediate cross-connect and the TR space shall be ANSI/TIA/EIA 568SC type connector.

### 3.1.5 Distribution Cabling Pathways

- 1) Typical TPW requires distribution cabling to be installed via an Overhead Ceiling Distribution system.
- 2) TPW requires that all conduit incorporated in the horizontal distribution cabling system support the sizing criteria as specified by CAN/CSA, TIA/EIA and BICSI. The following table is provided within the BICSI/TDMM and shall be referenced;

Table 5.9  
Number of cables

Inside Diameter (mm)	Trade Size	Cable Outside Diameter mm (In)							
		3.3 (0.13)	4.6 (0.18)	5.6 (0.22)	6.1 (0.24)	7.4 (0.29)	7.9 (0.31)	9.4 (0.37)	13.5 (0.53)
16	1/2	1	1	0	0	0	0	0	0
21	3/4	6	5	4	3	2	2	1	0
27	1	8	8	7	6	3	3	2	1
35	1-1/4	16	14	12	10	6	4	3	1
41	1-1/2	20	18	16	15	7	6	4	2
53	2	30	26	22	20	14	12	7	4
63	2-1/2	45	40	36	30	17	14	12	6
78	3	70	60	50	40	20	20	17	7
91	3-1/2	—	—	—	—	—	—	22	12
103	4	—	—	—	—	—	—	30	14

NOTE: These conduit sizes are typical in the United States and Canada and may vary in other countries.

- 3) Metallic cable tray shall be installed from the designated TR space in corridor and common ceiling space and must be installed to meet CAN/CSA C22.1-02 requirements. Provide for 25% spare space after the installation is complete.
- 4) Do **not** allow horizontal pathways or cables to rest directly on or be supported by ceiling panels, support channels (T-bars), vertical supports, or other components of the suspended ceiling.
- 5) When sufficient space is available above the pathway, provide up to 150 mm (6 in) between the suspended ceiling and the cabling pathways.
- 6) Minimum 50mm (2 in) Electro-metallic Tubing (EMT) conduit shall be installed in a continuous run from the ceiling cable tray to the room being serviced by the communications cabling.
- 7) J-supports shall be used for communications cable only within work area location rooms (e.g. classroom) and installed at 1.2m to 1.5m (40 in to 60 in) center to adequately support and logically distribute the communications cable.
- 8) J-supports shall **not** be used in corridor or common area ceiling spaces.
- 9) Where their use has been approved, attach utility columns (pac poles) to the main ceiling support channels. The main ceiling support channels must be rigidly installed and braced to prevent both vertical and horizontal movement.



## **3.2 Backbone Cabling**

### 3.2.1 General

- 1) The function of the intra-building backbone cabling system is to provide interconnections between telecommunication rooms (closets), equipment rooms and entrance facilities.
- 2) Backbone cabling consists of the backbone cables, intermediate and main cross-connect, IDC termination hardware (patch panels) and system patch cords or jumpers used in the Main Cross-connect (MC). Backbone cabling also includes inter-building or campus cabling systems.
- 3) The proximity of backbone cabling to electrical facilities that generate EMI shall be considered in the design and installation of the telecommunications metallic cabling. The CAN/CSA-T530-99 and ANSI/TIA/EIA-569-A standards specify separation of backbone cabling pathways and spaces from typical sources of EMI.
- 4) The backbone distribution cabling shall be a hierarchical star topology wherein horizontal cabling cross-connect shall connect directly to the main backbone cross-connect or backbone cabling intermediate cross-connect.
- 5) Backbone distribution cabling shall contain no more than one intermediate cross-connect or transition point.
- 6) The three types of cables recognized for use in backbone cabling are:
  - Multi-pair 100 ohm Category 3 twisted-pair cable
  - 4-pair 100 ohm balanced twisted-pair Category 6 cable.
  - RG-11 coaxial cable (CCTV/CATV applications only)
  - 2 or more strands of 62.5/125 or 50/125  $\mu\text{m}$  multi-mode optical fiber cable.

### 3.2.2 Voice Backbone Cabling (UTP)

- 1) All termination equipment used in the backbone distribution cabling system in the Intermediate Cross-connect (IC) and the MC shall be **IDC** type approved for the media category and design application.
- 2) The maximum distance in cable length from the horizontal cross-connect to the main cross-connect incorporating Category 3, 100 UTP cabling and connectivity is 800 meters (2624 feet) including a minimum of 1 intermediate cross-connect.
- 3) All backbone system copper cabling shall be minimum **CMR** (FT-4) rated and specified **Category 3** inside distribution type, 24 AWG multi-pair, Unshielded Twisted Pair (UTP).

### 3.2.3 Data Backbone Cabling (UTP)

- 1) All termination equipment used in the backbone distribution cabling system in the intermediate cross-connect and the Telecommunications Room (TR) space shall be **IDC** type approved for the media category and design application.

- 2) The maximum distance in cable length from the horizontal cross-connect to the main cross-connect incorporating Category 6, 100 UTP cabling and connectivity shall incorporate the 90 meter (295 feet) category criteria including a minimum of 1 intermediate cross-connect.
- 3) All backbone system copper cabling shall be minimum **CMR** (FT-4) rated and specified **Category 6**, 24/23 AWG multi-pair, Unshielded Twisted Pair (UTP) as required by the project design.

#### 3.2.4 Data Backbone Cabling (Optical Fibre)

- 1) All termination equipment used in the backbone distribution cabling system in the intermediate cross-connect and the TR space shall be EIA/TIA 568SC type approved for the media category and design application.
- 2) The maximum distance in cable length from the horizontal cross-connect to the main cross-connect incorporating **multimode optical cabling** and connectivity is **2000 meters** (6560 feet) including a minimum of 1 intermediate cross-connect.
- 3) The maximum distance in cable length from the horizontal cross-connect to the main cross-connect incorporating **singlemode optical cabling** and connectivity is **3000 meters** (9840 feet) including a minimum of 1 intermediate cross-connect.
- 4) All backbone system optical fibre cabling shall be minimum OFNR (FT-4) rated, 12 fibre strand and specified 62.5/125µm or 50/125µm or 9/125µm, as required by the project design.

#### 3.2.5 Backbone Cabling Pathways

- 1) Telecommunication Rooms, Equipment Rooms and Entrance Facilities shall provide entrance and egress via EMT and/or Non-metallic conduit (as per Canadian Electrical Code (CEC) requirement) or minimum 300mm (12in) cable tray or combination thereof.
- 2) Vertical backbone facilities connecting telecommunications spaces shall be via conduit or conduit sleeve.
- 3) Horizontal backbone facilities connecting telecommunications spaces shall be via conduit sleeve or minimum 300mm (12in) cable tray or combination thereof.
- 4) All backbone optical cable within the premise shall be installed inside 32mm (1-1/4in) inside diameter inner-duct. Inner-duct shall be orange in color and minimum FT-4 (riser) rated and complete with pull tape.
- 5) J-supports shall **not** be used for placement of communications backbone cabling.

### 3.3 Work Area

#### 3.3.1 General

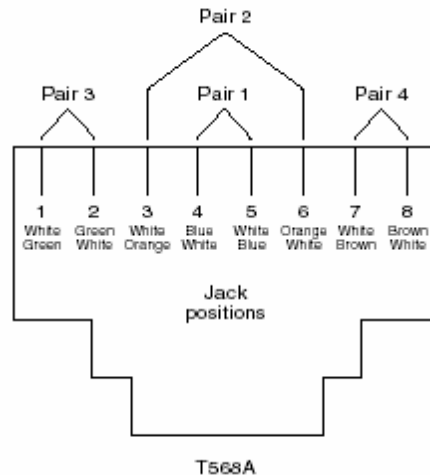
- 1) For the purposes of this guideline the work area components include the telecommunications outlet box, telecommunications outlet connector, work area cable or cord and work area station equipment.
- 2) The station equipment can be any one of a number of devices including but not limited to telephones, fax machines, data terminals and computers.

#### 3.3.2 Telecommunications Outlet Box

- 1) Horizontal distribution cabling shall service the TO with a minimum of 19mm EMT type conduit continuous from the outlet box to the accessible ceiling space.
- 2) Minimum 19mm EMT conduit shall bend 90° from the vertical line into the accessible ceiling space within the common room as the outlet location and shall be bushed to provide protection of horizontal distribution cabling.
- 3) Telecommunications outlet boxes shall be minimum dual gang, deep set complete with single gang raised tile ring. Plaster rings shall **not** be used at the TO.
- 4) Each occupant work area must have a minimum of one telecommunications outlet box.
- 5) The work area telecommunications outlet box should be located within 1 meter (3 feet) of an electrical outlet and installed at the same height if appropriate.
- 6) 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).

#### 3.3.3 Telecommunications Outlet Connector

- 1) Horizontal distribution cabling system TO locations at the work area shall be minimum **4 port** capacity.
- 2) TO cover-plates at the work area shall be **single-gang** brushed **stainless steel** type unless otherwise specified within the project design and approved by TPW.
- 3) TPW requires minimum of two (2) Category 6 balanced twisted-pair, 4-pair cable to be terminated to an 8-position, 8-contact (8P8C) modular jack at the work area.
- 4) TPW standard for color coding at the telecommunications outlet copper UTP connectors shall be specified as;
  - Color **gray** for outlet connectors designated for **data** or Local Area Network (LAN) connections.
  - Color **white** for outlet connectors designated for **voice** or other telephony connections.
- 5) TPW standard of acceptance for termination of UTP horizontal distribution cabling shall be ANSI/TIA/EIA 568-A (ISDN) pin assignment as shown;



### 3.3.4 Work Area Equipment Cords

- 1) TPW recognizes only work area cables required for data communications equipment (DCE) and data terminal equipment (DTE) as follows;
  - 1) Category 3 in ANSI/TIA/EIA-568-B.2, *Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components*.
  - 2) Category 6 in ANSI/TIA/EIA-568-B.2-1, *Transmission Performance Specifications for 4-Pair 100 Ohm Category 6 Cabling*.
- 2) When horizontal cabling must be adapted to accommodate specific user needs (e.g., installing a balun), make the adaptations outside (i.e., beyond) the telecommunications outlet/connector.
- 3) The maximum horizontal cable length of 90 m (295 ft) is based on a maximum length of 5 m (16 ft) of work area cable. The combined length of equipment cables, work area cords, and patch cords in the TR or ER must not exceed 10 m (33 ft), except when longer work area cables are permitted in conjunction with a Multi-User Telecommunication Outlet (MUTOA).

## **3.4 Telecommunications Room (TR)**

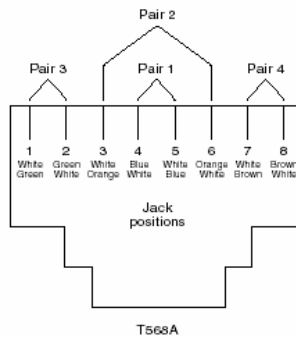
### 3.4.1 General

- 1) Telecommunications Rooms (TR) differ from Equipment Rooms (ER) and Entrance Facilities (EF) in that they are generally considered to be floor-serving or tenant-serving spaces that provide a connection point between backbone and horizontal infrastructures.
- 2) Telecommunications Rooms (TR) provide an environmentally suitable and secure area for installing:
  - Distribution and backbone cables.
  - Distribution and backbone cross-connects.

- Rack- and wall-mounted hardware.
- Telecommunications equipment.

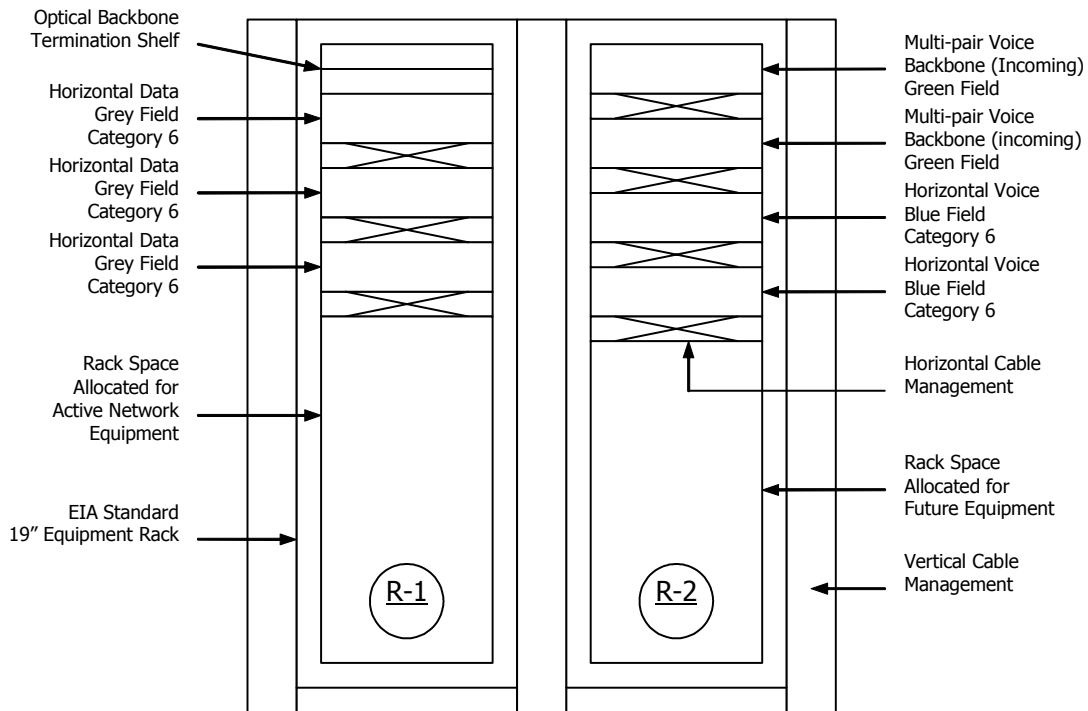
### 3.4.2 TR Terminations

- 1) Horizontal distribution and backbone cabling system termination panels within the TR space shall be maximum **48 port** capacity.
- 2) TR patch panels shall occupy a maximum of **2U** rack space per individual panel.
- 3) TPW standard for color coding at the TR copper UTP termination panels shall be specified as:
  - Color **white** for UTP data backbone cabling
  - Color **green** for **incoming** UTP voice backbone cabling
  - Color **grey** UTP data horizontal distribution cabling
  - Color **blue** UTP voice horizontal distribution cabling
- 4) TPW standard of acceptance for termination of UTP horizontal distribution cabling shall be ANSI/TIA/EIA 568-A pin assignment as shown;



- 5) TPW standard of acceptance for termination of UTP data backbone cabling shall be ANSI/TIA/EIA 568-A pin assignment as shown.
- 6) TPW standard of acceptance for termination of UTP voice backbone cabling shall be ANSI/TIA/EIA 568-A pin assignment using only two pair (position 1 and position 2) per port
- 7) TPW standard of acceptance for termination of optical backbone cabling shall be ANSI/TIA/EIA 568SC connector.
- 8) Loading of all Telecommunications Distribution System rack mounted termination hardware within the TR shall be assigned as shown;

### Telecommunications Room – Typical Rack Layout



### 3.4.3 Telecommunications Room (TR) Sizing

- 1) Every building is served by at least one TR, with a minimum of one TR per floor. A TR may be an enclosed architectural space serving multiple tenants or an enclosed space serving only one tenant. There is no maximum number of TR that may be provided within a building.
- 2) TPW recognizes and supports the design criteria for TR sizes as specified by CAN/CSA, TIA/EIA and BICSI. The following table is provided within the BICSI/TDMM and shall be referenced;

**Table 7.3**

**Size requirements**

If the Serving Area Is...	Then the Interior Dimensions of the Room Must Be at Least...
500 m <sup>2</sup> (5000 ft <sup>2</sup> ) or less	3.0 m x 2.4 m (10 ft x 8 ft). (See note below.)
Larger than 500 m <sup>2</sup> and less than or equal to 800 m <sup>2</sup> (>5000 ft <sup>2</sup> to 8000 ft <sup>2</sup> )	3.0 m x 2.7 m (10 ft x 9 ft).
Larger than 800 m <sup>2</sup> and less than or equal to 1000 m <sup>2</sup> (>8000 ft <sup>2</sup> to 10,000 ft <sup>2</sup> )	3.0 m x 3.4 m (10 ft x 11 ft).

**NOTES:** ANSI/TIA/EIA-569-B recommends a minimum TR size of 3.0 m x 2.1 m (10 ft x 7 ft). The size of 3.0 m x 2.4 m (10 ft x 8 ft) is specified here to allow a center rack configuration (see Figure 7.1).

Common TRs serving up to 2000 m<sup>2</sup> (20,000 ft<sup>2</sup>) should be 6 m<sup>2</sup> (80 ft<sup>2</sup>). When the area served exceeds 2000 m<sup>2</sup> (20,000 ft<sup>2</sup>), consider providing more than one common TR.

BICSI/TDMM 10TH. EDITION

- TPW recognizes and supports the design criteria for Telecommunications spaces within smaller buildings and facilities as specified by CAN/CSA, TIA/EIA and BICSI. The following table is provided within the BICSI/TDMM and shall be referenced;

**Table 7.4**

**Smaller buildings**

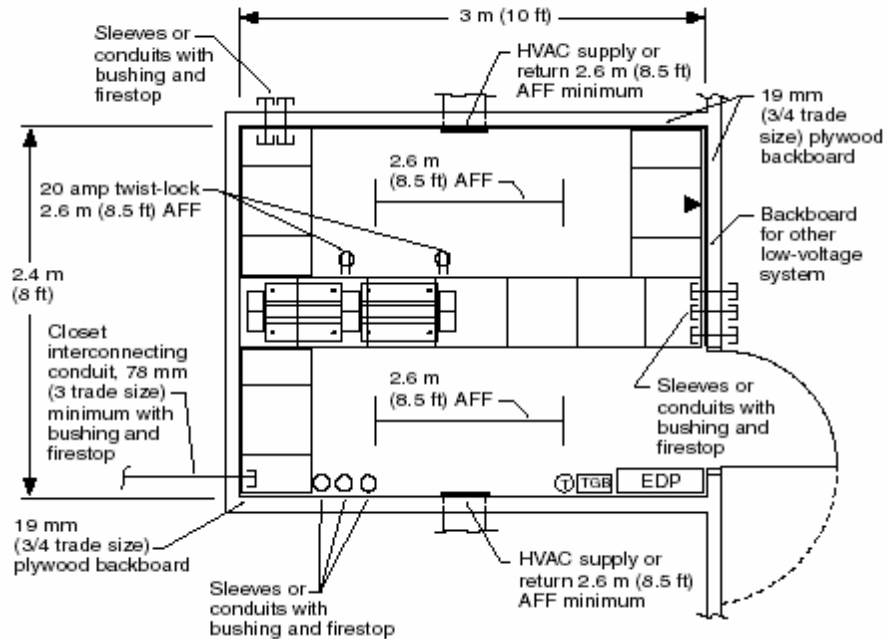
If the Building Is Smaller Than...	It May Be Served By...
500 m <sup>2</sup> (5000 ft <sup>2</sup> )	Shallow rooms (see Figure 7.6).
100 m <sup>2</sup> (1000 ft <sup>2</sup> )	<ul style="list-style-type: none"> <li>• Wall cabinets.</li> <li>• Self-contained cabinets.</li> <li>• Enclosed cabinets.</li> </ul>

**3.4.4 Telecommunications Room (TR) Layout**

- All equipment racks located within the TR shall be EIA standard spacing #10/32 tapped, 19 inch mounting rails and minimum 44U rack space. Equipment racks shall be complete with vertical cable management on both rack sides and of the same vertical height as the rack.
- TPW requires that equipment racks shall be oriented within the TR to provide minimum **1.5 meters** (5.0 feet) working clearance to the rear from the vertical rails and minimum **1.0 meter** (3.28 feet) working clearance to the front and a minimum of one side from the vertical rails.
- TPW requires TR have cable tray installed as a continuous ring along exterior walls to facilitate slack cable loops, sufficient cable support and organization.
- TPW requires TR have cable tray installed above all equipment racks and/or bays to facilitate cable drop, cable support and organization.

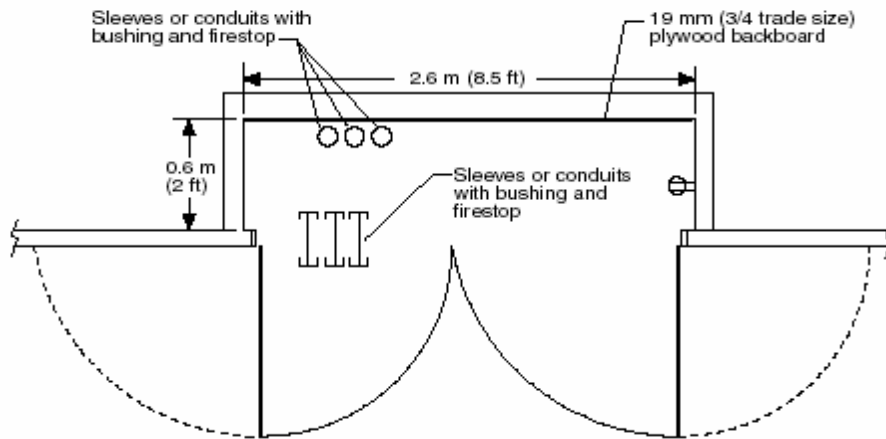
- 5) TPW recognizes and supports the design criteria for TR as specified by CAN/CSA, TIA/EIA and BICSI. The following figure is provided within the BICSI/TDMM and shall be referenced;

Figure 7.1  
Typical telecommunications room layout



- 6) TPW recognizes and supports the design criteria for telecommunications shallow rooms as specified by CAN/CSA, TIA/EIA and BICSI. The following figure is provided within the BICSI/TDMM and shall be referenced;

Figure 7.6  
Typical layout for a shallow room





## **3.5 Main Telecommunications Room (MTR)**

### 3.5.1 General

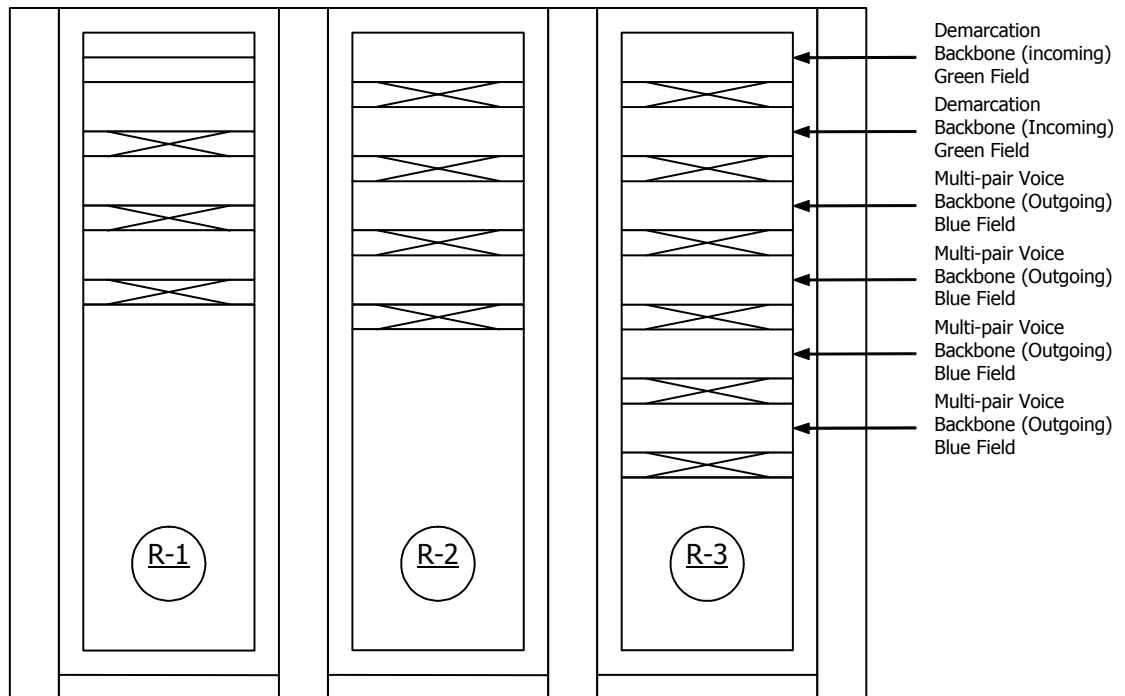
- 1) A Main Telecommunications Room (MTR) is a room that provides space and maintains a suitable operating environment for large telecommunications and/or computer equipment. An MTR differs from a TR in that they are generally considered to serve a building, a campus, a tenant, or a service provider (SP), whereas TR serve a single floor area of a building.
- 2) The MTR provides the consolidation point for intra-building backbone cabling and pathways and also the connection point for inter-building backbone cabling and pathways for that building of a campus backbone cabling system.
- 3) The MTR may also serve as a TR for that floor within a building.
- 4) An MTR provides an environmentally suitable and secure area for installing:
  - Backbone and distribution cables.
  - Backbone and distribution cross-connects.
  - Rack- and wall-mounted hardware.
  - Telecommunications equipment.
  - Workspace for telecom and network personnel.
  - Owner demarcation point.
  - Service provider (SP) entrance facilities (optional).
  - Service provider demarcation point (optional).

### 3.5.2 MTR Terminations

- 1) Backbone and horizontal distribution cabling system termination panels within the main TR/ER space shall be maximum **48 port** capacity.
- 2) MTR/ER patch panels shall occupy a maximum of **2U** rack space per individual panel.
- 3) TPW standard for color coding at the Main Telecommunications Room (MTR) copper UTP termination panels shall be specified as:
  - Color white for UTP data backbone cabling
  - Color **green** for UTP **incoming** voice backbone cabling from the owner demarcation point.
  - Color **blue** UTP **outgoing** voice backbone cabling
  - Color **grey** UTP data distribution cabling
  - Color **blue** UTP voice distribution cabling
- 4) TPW standard of acceptance for termination of UTP horizontal distribution cabling shall be ANSI/TIA/EIA 568-A pin assignment.
- 5) TPW standard of acceptance for termination of UTP data backbone cabling shall be ANSI/TIA/EIA 568-A pin assignment.
- 6) TPW standard of acceptance for termination of UTP voice backbone cabling shall be ANSI/TIA/EIA 568-A pin assignment using only two pair (position 1

- and position 2) per port.
- 7) TPW standard of acceptance for termination of optical backbone cabling shall be ANSI/TIA/EIA 568SC connector.
  - 8) Loading of all Telecommunications Distribution System rack mounted building backbone termination hardware within the MTR shall be assigned as shown;

Main Telecommunications Room – Typical Rack R-3 Layout



### 3.5.3 MTR Sizing

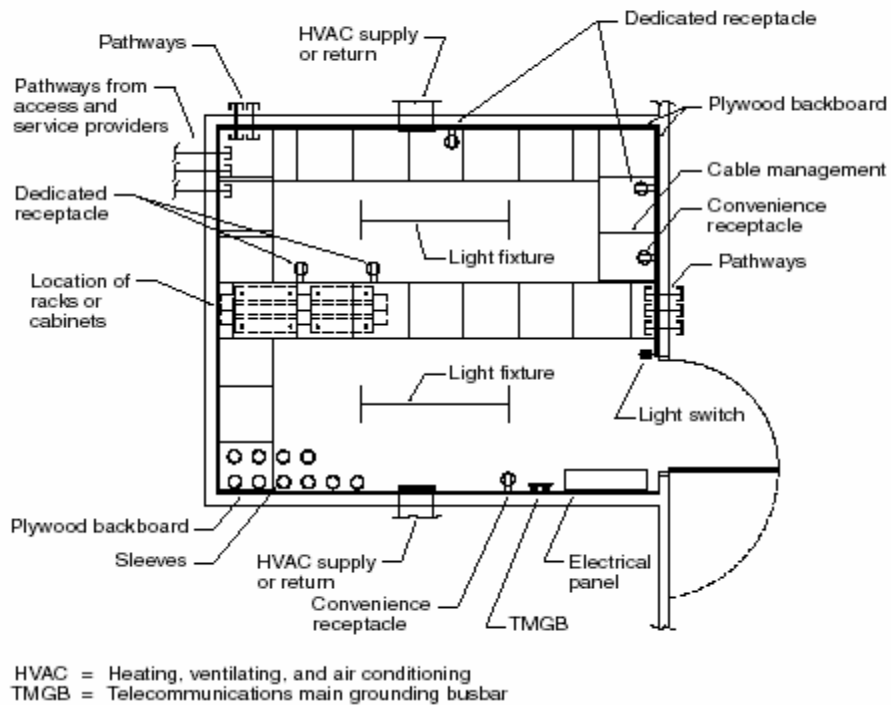
- 1) TPW recognizes and supports the design criteria for MTR/ER sizes as specified by CAN/CSA, TIA/EIA and BICSI. The minimum size requirement for an equipment room shall be 14 m<sup>2</sup> (150 ft<sup>2</sup>).

### 3.5.4 MTR/ER Layout

- 1) All equipment racks located within the MTR shall be EIA standard spacing #10/32 tapped, 19 inch mounting rails and minimum 44U rack space. Equipment racks shall be complete with vertical cable management on both rack sides and of the same vertical height as the rack.
- 2) TPW requires that equipment racks shall be oriented within the MTR to provide minimum **1.5 meters** (5.0 feet) working clearance to the rear, front and at minimum one side from the vertical rails.

- 3) TPW requires MTR rooms have cable tray installed as a continuous ring along exterior walls to facilitate slack cable loops, sufficient cable support and organization.
- 4) TPW requires MTR rooms have cable tray installed above all equipment racks and/or bays to facilitate cable drop, cable support and organization.
- 5) TPW recognizes and supports the design criteria for MTR as specified by CAN/CSA, TIA/EIA and BICSI. The following figure is provided within the BICSI/TDMM and shall be referenced;

Figure 8.2  
Common equipment room



### **3.6 Entrance Facilities**

#### 3.6.1 General

- 1) Telecommunications entrance facilities must enter and terminate in the most suitable location needed to serve the occupants of a building. This service entrance includes the following:
  - The path that these facilities follow on private property.
  - The entrance point to the building.
  - The termination point.
- 2) The type and location of the entrance depend upon the:
  - Type of facility being used.

- Path the facility follows.
  - Building architecture.
  - Aesthetics.
- 3) Service entrances may be required for connections to:
- The Service Provider (SP).
  - Campus distribution (local area network (LAN), private branch exchange (PBX), etc.).
  - An inter-exchange common carrier (IXC).
  - A central station system for fire or burglar alarms.
  - A community antenna television (CATV) network.
  - A closed circuit television (CCTV) network.

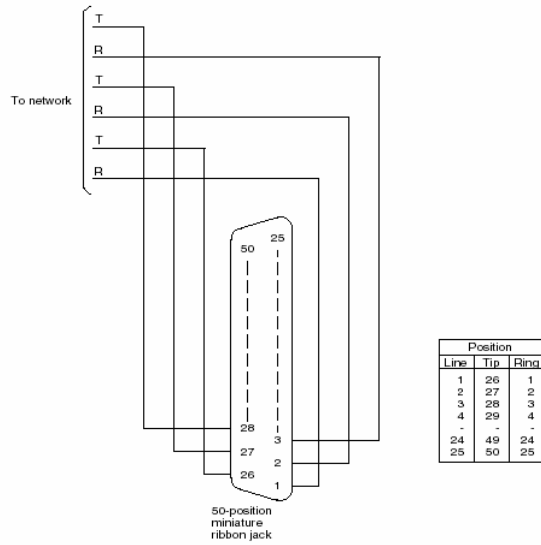
### 3.6.2 Entrance Cables

- 1) Outside plant (OSP) cables are typically unlisted because of the sheath material and filling compounds used within the cables and shall be exposed within the premise for a maximum of 15 m (50 ft) from the building entrance.
- 2) OSP entrance cables may only extend beyond 15 meters provided they are enclosed in minimum EMT type conduit.
- 3) Building Entrance Terminals (BET) must provide voltage and current protection, disconnect and fusible link.
- 4) The protection facilities must comply with CAN/CSA specification C22.2, No. 226-92, "Protectors in Telecommunication Networks," including the high-voltage fault test.

### 3.6.3 Telecommunications Demarcation

- 1) TPW requires telecommunications Service Providers (SP) to provide a demarcation point between service provider and owner system liability.
- 2) TPW standard SP connector configuration shall be 50 pin RJ-21 male connector.
- 3) TPW standard demarcation connector configuration shall be 50 pin RJ-21 connector as shown SP shall be female whilst Building/Customer shall be male;

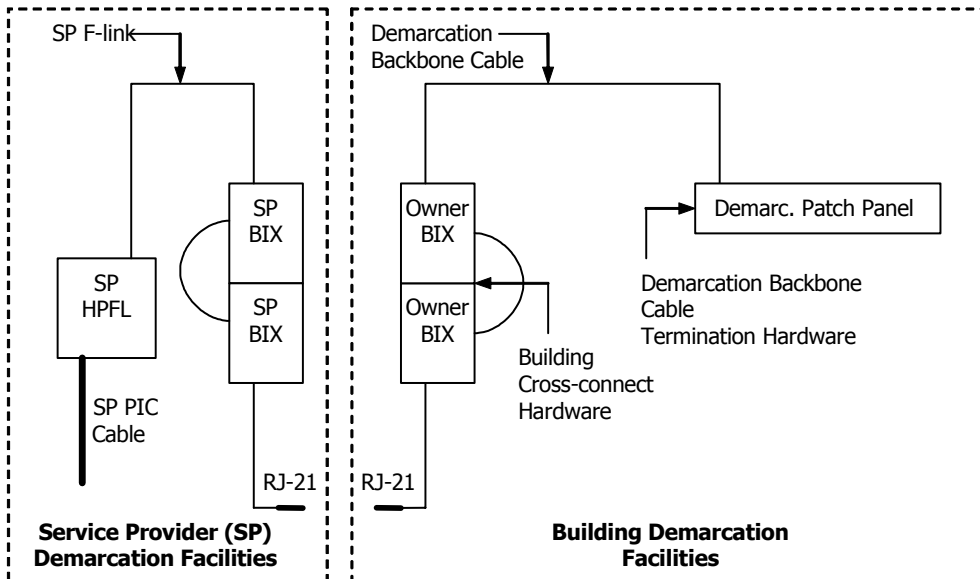
Figure 9.21  
RJ-21X jack configuration



### 3.6.4 Building Telecommunications Demarcation

1) The building telecommunications demarcation facilities shall include three basic components;

- Building cross-connect hardware.
- Demarcation backbone cable
- Building demarcation termination hardware.



## 3.7 Field Testing

### 3.7.1 General

- 1) TPW requirements in this section address field testing criteria for balanced twisted-pair, fibre optic cabling, coaxial and multi-pair cabling only.
- 2) Balanced twisted-pair test requirements are defined in:
  - ANSI/TIA/EIA-568-B.1
  - ANSI/TIA/EIA-568-B.2
- 3) Testing optical fiber cabling systems is specified in:
  - ANSI/TIA/EIA-568-B.1.
  - ANSI/TIA/EIA-568-B.3.
  - TIA/EIA TSB-140.
  - ANSI/TIA/EIA-526-14-A OFSTP 14A—*Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant.*
  - ANSI/TIA/EIA-526-7 OFSTP 7—*Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant.*

### 3.7.2 Balanced Twisted-Pair Cable Testing

- 1) ANSI/TIA/EIA-568-B.1 defines two configurations for field testing horizontal Category 6 balanced twisted-pair cabling, “Channel Link” and “Permanent Link” as shown;

Figure 12.9  
Channel

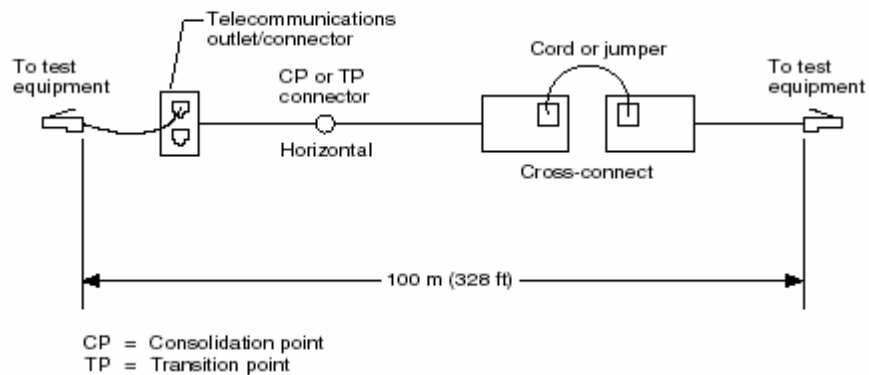
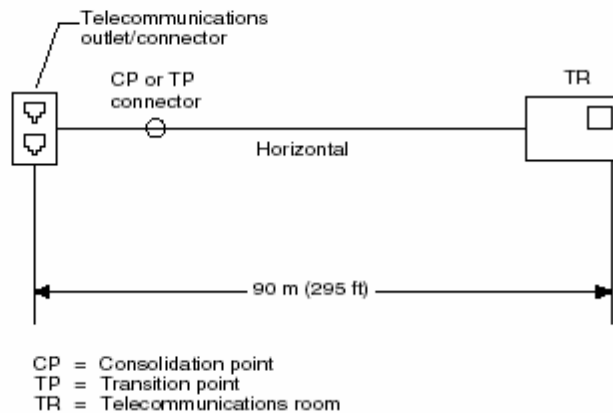


Figure 12.10  
Permanent link



- 2) TPW requires that testing procedures used are applicable to the horizontal cabling configuration to meet field test compliance. Consolidation / Transition points are optional interface points as specified and permitted under CAN/CSA and ANSI/TIA/EIA specifications and are considered a seamless link for acceptance testing.
- 3) The field testing acceptance parameters for balanced twisted-pair cabling are:
  - Wire map (continuity).
  - Length.
  - Insertion loss.
  - NEXT loss.
  - ELFEXT.
  - Propagation delay and delay skew.
  - Return loss.
  - Power sum near-end crosstalk (PSNEXT) loss.
  - Power sum equal level far-end crosstalk (PSELFEXT).
- 4) Level III field test instruments are required for measurements up to Category 6 and Class E cabling.
- 5) TPW requires acceptance testing results to be documented and provided as compliance with the System Administration Requirements section of this document.

### 3.7.3 UTP Backbone Cable Testing

- 1) TPW requires Backbone cabling involving lengths within the performance and acceptance requirements to be tested for length, opens and shorts of all pairs terminated within the cable sheath.
- 2) For Category 6, UTP backbone lengths and channels that do not exceed the length limits for horizontal cables, the test parameters for horizontal cabling **must** be used.

- 3) TPW requires acceptance testing results to be documented and provided as compliance with the System Administration Requirements section of this document.

#### 3.7.4 Coaxial Cable Testing

- 1) TPW requires performance testing on all coaxial cabling used in broadband applications such as CATV and CCTV.
- 2) Coaxial cable is a low-impedance media, 50 or 75 ohm, with a single transmission path. The most often-performed tests are:
  - DC loop resistance.
  - Impedance.
  - Length.
  - TDR.
  - Attenuation.
  - Noise.
- 3) The required tests and acceptance depend on the application and the system design requirements.
- 4) TPW requires acceptance testing results to be documented and provided as compliance with the System Administration Requirements section of this document.

#### 3.7.5 Optical Fibre Cable Testing

- 1) The BICSI/TDMM recognizes three (3) basic segments of optical fibre cabling;
  - Inter-building backbone (campus backbone cabling).
  - Intra-building backbone (building backbone cabling).
  - Horizontal and centralized cabling
- 2) TPW requires that attenuation testing (acceptance testing) be measure at both applicable wavelengths and bi-directionally.
- 3) Multimode backbone links are to be tested at 850 nm and 1300 nm in accordance with ANSI/TIA/EIA-526-14-A, Method B, using one reference jumper.
- 4) Singlemode backbone links are to be tested at 1310 nm and 1550 nm in accordance with ANSI/TIA/EIA-526-7, Method A.1, using one reference jumper.
- 5) The maximum allowable attenuation for either a horizontal 50/125  $\mu\text{m}$  or 62.5/125  $\mu\text{m}$  multimode link is 2.0 dB. This value is based on the loss of two mated connector pairs (one pair at the telecommunications outlet/connector and one pair at the TR) plus 90 m (295 ft) of optical fiber cable.
- 6) The maximum allowable attenuation for open office cabling, implemented with a Consolidation Point (CP) is 2.75 dB when testing between the horizontal cross-connect and the telecommunications outlet/connector. For open office cabling implemented with a MUTOA, the maximum attenuation is 2.0 dB.



- 7) Because backbone length and the potential number of splices vary depending on site conditions, an attenuation equation is used to determine acceptance values based on standard component requirements at each applicable wavelength.
- 8) TPW establishes acceptable link attenuation budget calculated as:
  - Link attenuation budget = Cable attenuation + connector attenuation + splice attenuation.
  - Cable attenuation (dB) = Attenuation coefficient (dB/km) x length (km)
- 9) TPW recognizes and supports the application design requirements of optical cabling as specified by CAN/CSA, TIA/EIA and BICSI. The following table is provided within the BICSI/TDMM and shall be referenced;

*Table 12.5  
Supportable distances and channel insertion loss for optical fiber applications by optical fiber type*

Application	Wavelength (nm)	Maximum Supportable Distance <sup>2</sup> (m)			Maximum Channel Insertion Loss <sup>2</sup> (dB)			
		62.5/125 $\mu$ m	50/125 $\mu$ m	Single-mode <sup>7</sup>	62.5/125 $\mu$ m	50/125 $\mu$ m <sup>1</sup>	Single-mode <sup>7</sup>	
10BASE-FL (Ethernet)	850	2000	2000	NST	12.5	7.8	NST	
Token Ring 4/16	850	2000	2000	NST	13.0	8.3	NST	
Demand Priority <sup>3</sup> (100VG-AnyLAN)	1300	2000	2000	NST	7.0	2.3	NST	
	850	500	500	—	7.5	2.8	—	
100BASE-FX (Fast Ethernet)	1300	2000	2000	NST	11.0	6.3	NST	
FDDI (Low Cost)	1300	500	500	NST	7.0	2.3	NST	
FDDI (Original)	1300	2000	2000	40 000	11.0	6.3	10.0 to 32.0	
ATM	52	1300	3000	3000	15 000	10.0	5.3	7.0 to 12.0
	155	1300	2000	2000	15 000	10.0	5.3	7.0 to 12.0
	155 <sup>8</sup>	850	1000	1000	—	7.2	7.2	—
	622	1300	500	500	15 000	6.0	1.3	7.0 to 12.0
	622 <sup>8</sup>	850	300	300	—	4.0	4.0	—
Fibre Channel	266	1300	1500	1500	10 000	6.0	5.5	6.0 to 14.0
	266 <sup>8</sup>	850	700	2000	—	12.0	12.0	—
	1062 <sup>8</sup>	850	300 <sup>4</sup>	500	—	4.0	4.0	—
	1062	1300	—	—	10 000	—	—	6.0 to 14.0

- 10) TPW requires acceptance testing results to be documented and provided for compliance of this section as per the requirements within this document *Section 6 Project Documentation*.

### 3.8 System Administration

#### 3.8.1 General

- 1) Four (4) classes of administration are specified within the ANSI/EIA/TIA-606-A standard to accommodate diverse degrees of complexity present in telecommunications infrastructure.
- 2) TPW requirements for system administration are **Class 2**.
- 3) Class 2 administration provides for the telecommunications infrastructure administration needs within a single building.
- 4) A unique identifier is associated with each element of the telecommunications infrastructure to be administered.
- 5) All components of the telecommunications administration system shall be designed and installed to last the intended life (**20 year warranty period min.**) of the telecommunications system installed.
- 6) TPW recognizes and supports the administration classification criteria as specified by CAN/CSA, TIA/EIA and BICSI. The following table is provided within the BICSI/TDMM and shall be referenced;

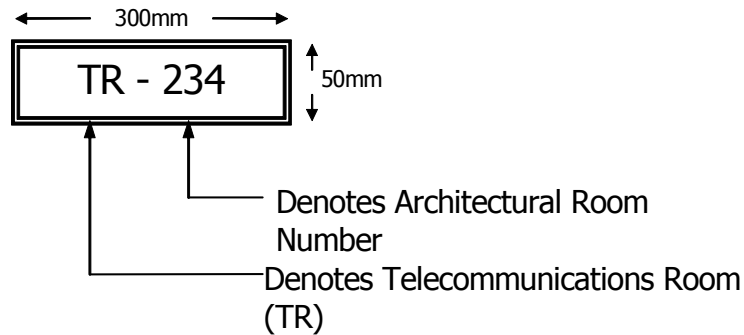
*Table 14.1  
Required Identifiers by class*

Description of Identifier	Class of Administration			
	1	2	3	4
Telecommunications space	X	X	X	X
Horizontal link	X	X	X	X
Telecommunications main grounding busbar (TMGB)	X	X	X	X
Telecommunications grounding busbar (TGB)	X	X	X	X
Intrabuilding backbone cable		X	X	X
Intrabuilding backbone pair or strand		X	X	X
Frestop location		X	X	X
Interbuilding backbone cable			X	X
Interbuilding backbone pair or strand			X	X
Building			X	X
Campus or site				X

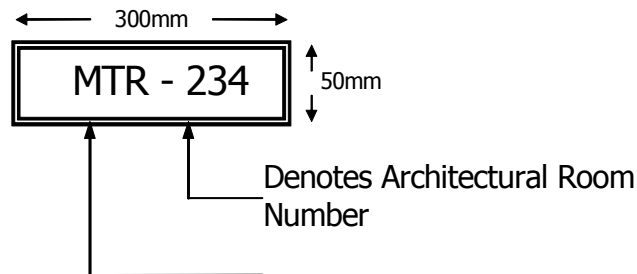
#### 3.8.2 Telecommunications Spaces

- 1) All telecommunications spaces within a building shall be uniquely identified as part of a complete administration system.

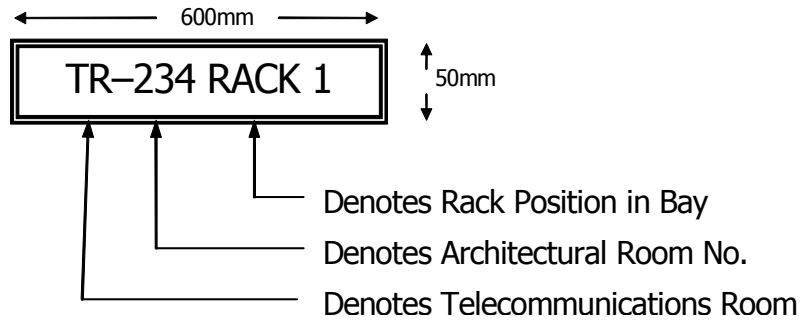
- 2) The TR is typically assigned a room designation by the architectural design and that assigned number shall be used within the administration system identifier as shown and shall be a “lamicoid” type plate minimum (50mm H) X (300mm L) secured to the exterior of the door entering that space.



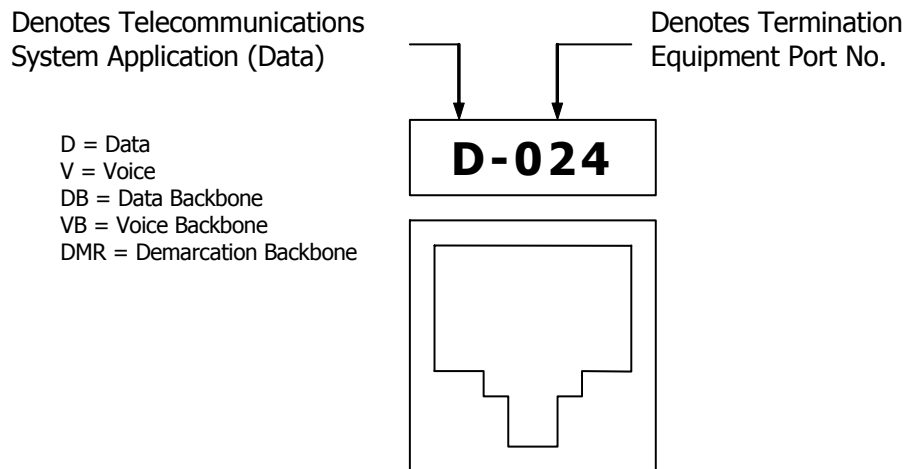
- 3) The ER or MTR is typically assigned a room designation by the architectural design and that assigned number shall be used within the administration system identifier as shown and shall be a “lamicoid” type plate minimum (50mm H) X (300mm L) secured to the exterior of the door entering that space.



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



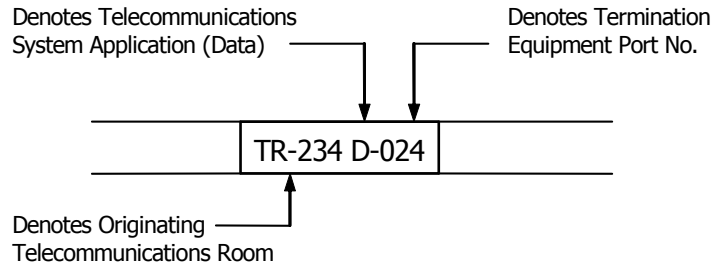
- 5) All telecommunications termination hardware within the telecommunications space requires a unique component identifier as part of the administration system. Identifiers must be self adhesive thermal transfer type as shown and placed appropriately to indicate all ports.



### 3.8.3 Horizontal Distribution System

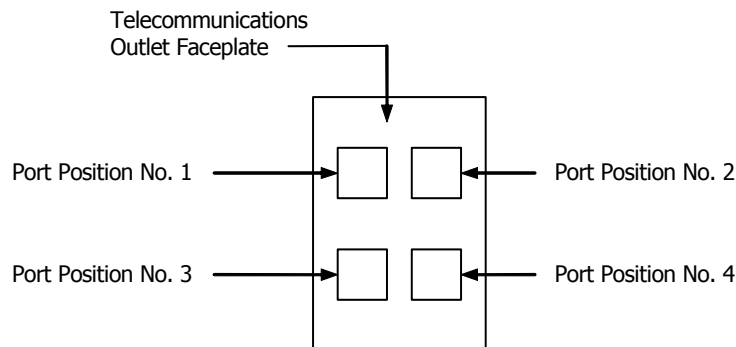
- 1) For the purposes of system administration the horizontal distribution system shall include all horizontal system cabling only. All associated termination hardware located within the telecommunications space are addressed in section 3.8.2 and work area administration is addressed in section 3.8.4 of this document.
- 2) All horizontal cabling shall be uniquely identified with a wrap type self-laminating adhesive label with mechanically generated (not hand written) identifier.

- 3) Horizontal cable identifiers shall denote basic telecommunications system application and originating telecommunications space termination equipment port as shown;

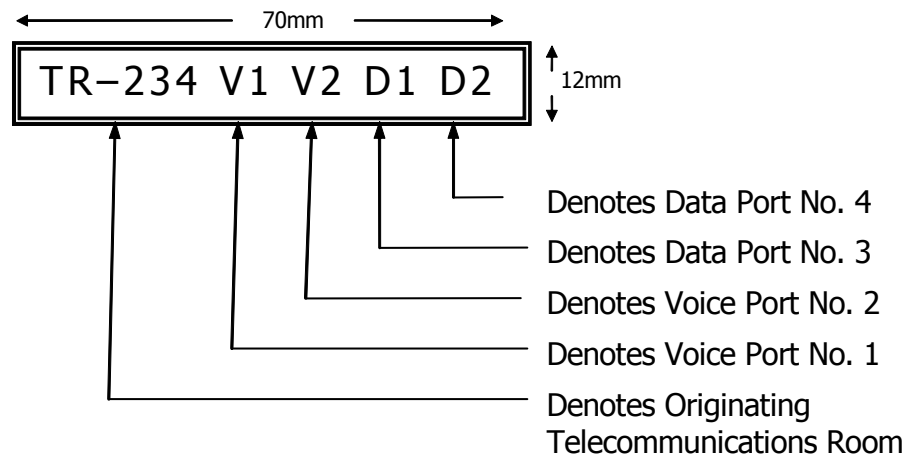


### 3.8.4 Work Area

- 1) For the purposes of system administration the work area shall include the telecommunications outlet faceplate and all outlet termination hardware.
- 2) All telecommunications outlet faceplates shall be standard four port configuration with port assignments as shown.

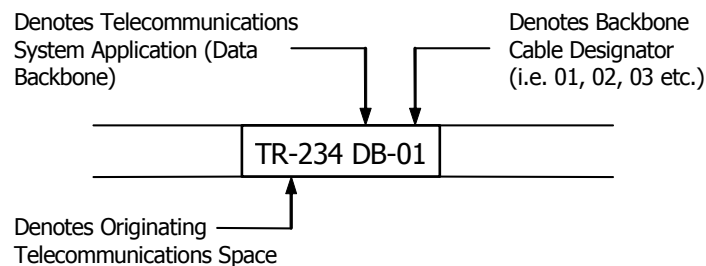


- 3) All Telecommunications Outlet (TO) locations require a unique component identifier as part of the administration system by a “lamicoid” type etched vinyl nameplate, minimum (120mm H) X (70mm L) and secured to the wall-space centered and above (min. 12mm) the telecommunications outlet faceplate.
- 4) Telecommunications work area outlet identifiers **must** denote basic telecommunications system application, originating telecommunications space and termination equipment port as shown;



### 3.8.5 Backbone System

- 1) For the purposes of system administration the backbone system shall include all backbone system cabling only. All administration system requirements for associated termination hardware located within the telecommunications spaces are addressed in section 3.8.2.
- 2) As described in Section 3.2 of this document, backbone cabling is installed between telecommunications spaces within the building or campus.
- 3) All backbone system cabling shall be uniquely identified with a wrap type self-laminating adhesive label with mechanically generated (not hand written) identifier.
- 4) Backbone cable identifiers shall denote basic telecommunications system application and originating telecommunications space as shown;



3.8.6 Telecommunications Demarcation Facilities

- 1) For the purposes of system administration, the telecommunications demarcation facilities shall include three basic components;
  - Building cross-connect hardware.
  - Building demarcation backbone cable
  - Building demarcation termination hardware.
- 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;

Building Demarcation Backbone  
(2 Pair / Port)

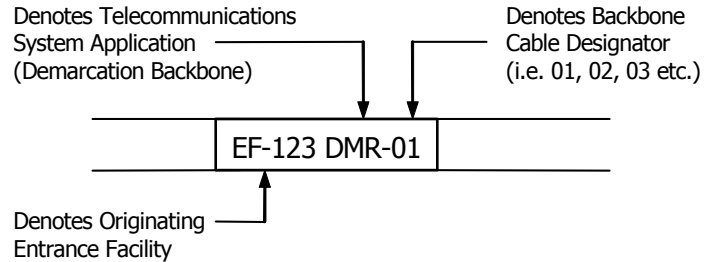
<b>P01</b>	<b>P02</b>	<b>P03</b>	<b>P04</b>	<b>P05</b>	<b>P06</b>	<b>P07</b>	<b>P08</b>	<b>P09</b>	<b>P10</b>	<b>P11</b>	<b>P12</b>
<b>P13</b>	<b>P14</b>	<b>P15</b>	<b>P16</b>	<b>P17</b>	<b>P18</b>	<b>P19</b>	<b>P20</b>	<b>P21</b>	<b>P22</b>	<b>P23</b>	<b>P24</b>

Building / Owner RJ-21 Pigtail

<b>01</b>	<b>02</b>	<b>03</b>	<b>04</b>	<b>05</b>	<b>06</b>	<b>07</b>	<b>08</b>	<b>09</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b>
<b>26</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>	<b>31</b>	<b>32</b>	<b>33</b>	<b>34</b>	<b>35</b>	<b>36</b>	<b>37</b>	<b>38</b>	<b>39</b>	<b>40</b>	<b>41</b>	<b>42</b>	<b>43</b>	<b>44</b>	<b>45</b>	<b>46</b>	<b>47</b>	<b>48</b>	<b>49</b>	<b>50</b>

- 3) All administration system requirements for associated termination hardware located within the telecommunications spaces are addressed in section 3.8.2.
- 4) As described in Section 3.6.4 of this document, building demarcation facilities are installed between the service provider entrance facilities and the building backbone termination hardware.
- 5) All telecommunications demarcation backbone cabling shall be uniquely identified with a wrap type self-laminating adhesive label with mechanically generated (**not hand written**) identifier.

- 6) All telecommunications demarcation backbone cable identifiers shall denote basic telecommunications system application and originating telecommunications space as shown;



#### **SECTION 4. CONSULTANT SERVICES REQUIREMENTS**

The CAN/CSA, ANSI/TIA/EIA, BICSI and ISO/IEC specifications and standards as listed in Section 2. “Applicable Specifications and Standards” define the basic elements of the telecommunications cabling system structure. TPW requires design consultants providing services to the Province of Nova Scotia to prepare contract documents as detailed within this section.

##### **4.1 General Requirements**

###### 4.1.1 General

- 1) TPW requires consultants providing services to the province to comply with all parameters of the Requirements Guideline document when considering telecommunications infrastructure in two basic categories;
  - Technical Specifications
  - Telecommunications Drawings

##### **4.2 Technical Specification**

###### 4.2.1 Document Requirements

- 1) Consultants must produce a complete Tender Document sub-section “Telecommunications Distribution System” within the electrical specifications.
- 2) The Telecommunications Distribution System document shall incorporate the BICSI Technical Specifications document format as recognized by TPW.



- 3) The Telecommunications Distribution System document shall provide provisioning and implementation requirements and be formatted in three (3) Parts.
  - PART 1 – GENERAL
  - PART 2 – PRODUCTS
  - PART 3 – EXECUTION

#### 4.2.2 Part 1 – General

- 1) This portion identifies the overall general requirements of the project in reference to the provisioning of telecommunications infrastructure.
- 2) This section shall provide telecommunications technical specifications within the following sub-sections as required by the project;
  - Summary
  - References (identified in Section 2 of this document)
  - Permits, Fees and Certificates of Approval
  - System Description
  - Submittals
  - Quality Assurance
  - Warranty Requirements
  - Delivery, Storage and Handling
  - Sequence and Scheduling
  - Use of Site
  - Continuity of Services

#### 4.2.3 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;
  - Acceptable Manufacturers
  - Fabrication
  - Suitability
  - Voice/Data Building Backbone Cable (including optical backbone cabling as required)
  - Voice Horizontal Distribution Cable
  - Data Horizontal Distribution Cable
  - Optical Fibre Horizontal Distribution Cable (as required)
  - Campus Backbone Cable (campus [inter-building] applications)
  - Service Provider Entrance Facilities (reference Section 3.6.3 Building Telecommunications Demarcation of this document)

- Voice/Data/Optical Fibre Work Area Outlets
- Termination Blocks
- Patch Panels
- Optical Fibre Patch Panels
- Optical Fibre Connectors
- Patch Cords and Jumper Cables
- Equipment Racks and Cabinets
- Building Entrance Protectors (campus backbone cabling)
- Service Provider Entrance Protectors (service provider cables)
- Spare Parts

#### 4.2.4 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;
  - Site Survey
  - Handling of Materials
  - Protection of Owner’s Facilities
  - Installation
  - Grounding and Bonding
  - Labeling & Administration
  - Testing and Certification
  - Field Quality Control (including RCDD project manager requirement)
  - Customer/Owner Orientation and Training
  - Project Documentation

### **4.3 Telecommunications Drawings**

#### 4.3.1 Drawing File Requirements

- 1) Consultants must produce contract document drawings and details within the existing project requirements drawings.
- 2) Consultants shall make drawing files available to the successful project vendor in AutoCAD (.dwg file format) to assist with vendor compliance requirements *Section 5. Vendor Requirements*.

- 3) AutoCAD generated drawing files shall be produced to address the following requirements;
  - Floor No./Section Telecommunications Distribution System
  - Telecommunications Distribution System Details
  - Telecommunications Space - Rack Details
  - Telecommunications Space - Floor Layout
  - Telecommunications Backbone System

#### 4.3.2 Floor Plan Drawings

- 1) Floor plan drawings shall indicate the location of the following telecommunications cabling system components;
  - Work area outlet location
  - Telecommunications outlet type (icon specified)
  - Telecommunications outlet configuration (icon specified)
  - Serving telecommunications space location
  - Special requirements/considerations notes

#### 4.3.3 Telecommunications Distribution System Details

- 1) System detail drawings shall provide additional information required for telecommunications cabling system components including;
  - Outlet icon details and descriptions
  - Special application details
  - Special installation requirements
  - Architectural details (as required)
  - Other detail drawings

#### 4.3.4 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 Main Telecommunications/Equipment Room (MTR/ER) including;
  - Equipment Rack/Cabinet dimensions and requirements
  - Equipment Rack/Cabinet quantities
  - Termination hardware and loading requirements for
    - Quantity
    - Placement
    - Category requirement
    - Port count
    - System application (e.g. horizontal or backbone)

- Additional hardware requirements (e.g. horizontal managers, power bars or UPS)

#### 4.3.5 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 MTR/ER including;
  - Equipment Rack/Cabinet location and orientation
  - Horizontal Pathway requirements, location and orientation
  - Backbone Pathway requirements, location and orientation
  - Telecommunications system requirements, location and orientation (e.g. voice and data telecommunications outlet)
  - Associated electrical distribution system requirements, location and orientation.
  - Dimensional and work clearance information
  - Other architectural considerations

#### 4.3.6 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 MTR/ER including;
  - Backbone cable type and requirements
  - Backbone cable quantity
  - Telecommunications system application
  - Pathway assignment
  - Termination hardware type and location
  - Special considerations

### **SECTION 5.                   VENDOR REQUIREMENTS**

The CAN/CSA, ANSI/TIA/EIA, BICSI and ISO/IEC specifications and standards as listed in Section 2. “Applicable Specifications and Standards” define the basic elements of the telecommunications cabling system structure. TPW requires vendor firms providing services to the Province of Nova Scotia to comply with the qualification criteria as detailed within this section.

## **5.1 Vendor Qualifications**

### 5.1.1 General

- 1) TPW requires vendor firms providing services to the province to comply with the requirements within this document *Section 3. Communications Cabling Requirements* when provisioning telecommunications infrastructure.
- 2) Qualified vendors shall provide technical field services in compliance with labor 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 Constructors Services International (BICSI) membership.
- 6) Qualified vendors shall maintain **manufacturer recognition** as a **certified installation contractor** for the telecommunications product solution being implemented.

## **5.2 RCDD Project Manager**

### 5.2.1 General

- 1) The successful Telecommunications 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.
- 2) The RCDD shall maintain responsibility for the following;
  - Review and accept the Telecommunications Distribution System materials, hardware and related components proposed. Review the proposed pathways and spaces and accept the size and location of all Telecommunications Spaces (TS). Notify the Consultant of any issues or concerns related to CAN/CSA, IEE and TIE/EIA specification compliance.
  - Review and approve Telecommunications Distribution System material shop drawings prior to submission to the Consultant.
  - Attend regularly scheduled project construction and job meetings as requested by the project Consultant.
  - Ensure system installation practices and procedures comply with all applicable CAN/CSA, IEE and TIE/EIA specifications and procedures.
  - Provide regular project status reports and updates as requested by the project Consultant.

- Observe testing and certification procedures and provide manufacturers assurance and warranty.
- Review and approve all project as-built documentation including drawings, test reports, details and provide current RCDD seal on all.

### **5.3 Certification and Testing**

#### 4.2.1 General

- 1) Vendors providing services to the Province of Nova Scotia shall reference and comply with all requirements for telecommunications system certification and testing as specified in this document *Section 3. Communications Cabling Requirements*.
- 2) Vendors providing services to the Province of Nova Scotia shall provide Product Manufacturer's Application Warranty for a minimum of Twenty (20) Years.
- 3) Qualified vendors as specified within this document *Section 5.2 RCDD Project Manager* shall provide **RCDD Letter of Certification** for the complete Telecommunications Cabling System as facilitated for the project.
- 4) Certification and testing documentation shall be provided as a complete part of the Project Documentation requirements as specified within this document *Section 5.4 Project Documentation*.

### **5.4 Project Documentation**

#### 5.4.1 General

- 1) Vendors providing services to the Province of Nova Scotia shall reference and comply with all requirements for telecommunications system project documentation as specified within this document *Section 6. Project Documentation*.

## **SECTION 6. PROJECT DOCUMENTATION**

The CAN/CSA, ANSI/TIA/EIA, BICSI and ISO/IEC specifications and standards as listed in Section 2. “Applicable Specifications and Standards” define the basic elements of the telecommunications cabling system structure. TPW requires vendor firms providing services to the Province of Nova Scotia to prepare and submit Project Documentation as detailed within this section.

### **6.1 As-built Drawings**

#### 6.1.1 General

- 2) Vendors shall provide record drawings in both hard copy and CDROM format as part of compliance with this requirement.
- 3) Record drawings in AutoCAD .dwg file format shall be provided to the vendor by the Consulting Services Provider for the compliance of this section.
- 4) Record drawings shall provide the following information;
  - All work area telecommunications outlet locations as constructed.
  - Project administration system identifiers for telecommunications outlets as specified within this document.
  - Project administration system identifiers for telecommunications spaces (TR and MTR) as specified within this document *Section 3.8 System Administration*.
- 5) Hard copy format record drawings shall be provided in “C” size drawings in two (2) complete sets as defined;
  - One complete floor plan drawing set black and white (color optional)
  - One complete floor plan drawing set black and white (color optional) laminated (encapsulated) to be placed in all associated telecommunications spaces)
- 6) Laminated hard copy record drawings may be provided in sections (C size sheet) related to the telecommunications space servicing a specific floor section or area.

### **6.2 Test Results**

#### 6.2.1 General

- 1) Vendors shall provide Test Results in CDROM format as part of compliance with this requirement.
- 2) Test result shall be provided for compliance of this section as per the requirements within this document.

### **6.3 Manufacturers Warranty**

#### 6.3.1 General

- 1) Vendors shall provide a manufacturer generated and supported **Product Warranty** and **Application Assurance** certificates upon completion of installation and acceptance by TPW.
- 2) Product Warranty and Application Assurance shall provide coverage of materials and labour for a minimum of **Twenty (20) Years** from date of installation and acceptance regardless of installing agent/vendor status.

### **6.4 RCDD Project Certification**

#### 6.4.1 General

- 1) Vendors shall provide RCDD Project Certificate in hard copy format as part of compliance with this requirement.
- 2) The RCDD certification shall be provided for compliance of this section as per the requirements within this document.