8.3 STRUCTURED CABLING SYSTEM

8.3.1 GENERAL

Section 7.1 "Electrical General Requirements" and Section 7.5, “Interior Wiring Systems” of Division 7 apply to this section with the addition and modifications specified herein.

8.3.1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

1. ASTM International (ASTM)

ASTM D 709	(2001; R2007) Laminated Thermosetting Materials

2. Electronic Industries Alliance (EIA)

EIA TIA/EIA-568-B.1	(2001; Addendum 2001, 2003, 2004 2007) Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements (ANSI/TIA/EIA-568-B.1)
EIA TIA/EIA-568-B.2	(2001) Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components (ANSI/TIA/EIA-568-B.2)
EIA TIA/EIA-569-A	(1998; Addenda 2000, 2001) Commercial Building Standards for Telecommunications Pathways and Spaces (ANSI/TIA/EIA-569-A)
EIA TIA/EIA-606-A	(2002) Administration Standard for the Telecommunications Infrastructure (ANSI/TIA/EIA-606)
EIA-310-D	(1992) Racks, Panels, and Associated Equipment
TIA J-STD-607-A	(2002) Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications

3. Institute of Electrical and Electronics Engineers (IEEE)

IEEE Std 100	(2000) The Authoritave Dictionary of IEEE Standards Terms

4. Insulated Cable Engineers Association (ICEA)

ICEA S-90-661	(2007) Category 3, 5, & 5e Individually Unshielded Twisted Pair Indoor Cable for Use in General Purpose and LAN Communications Wiring Systems

5. National Electrical Manufacturers Association (NEMA)

NEMA WC 63.1	(2000) Twisted Pair Premise Voice and Data Communications Cables

6. National Fire Protection Association (NFPA)

NFPA 70	(2007) National Electrical Code

7. Institute Of Integrated Electrical Engineer (IIEE)

PEC	(2002) Philippine Electrical Code

8. Philippine National Standard (PNS)

BS	(2002) Bureau of Standard

9. U.S. Federal Communications Commission (FCC)

FCC Part 68	Connection of Terminal Equipment to the Telephone Network (47 CFR 68)

10. Underwriters Laboratories (UL)

UL 1286	(1999; Rev thru Jul 2004) Office Furnishings
UL 1863	(2004) Communication Circuit Accessories
UL 444	(2002; Rev thru Sep 2006) Communications Cables
UL 467	(2007) Grounding and Bonding Equipment
UL 50	(2007) Enclosures for Electrical Equipment
UL 514C	(1996; Rev thru Mar 2007) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers

UL 969	(1995; Rev thru Dec 2006) Marking and Labeling Systems

8.3.1.2 SYSTEM DESCRIPTION

The building telecommunications cabling and pathway system shall include permanently installed horizontal cabling, horizontal pathways, service entrance facilities, conduit, and hardware for splicing, terminating, and interconnecting cabling necessary to transport telephone between equipment items in a building. The horizontal system shall be wired in a star topology from the telecommunications work area to the telephone terminal cabinet. Provide telecommunications pathway systems referenced herein as specified in Section 7.5, “Interior Wiring Systems”.

8.3.1.3 SUBMITTALS

The following shall be submitted.

1. Shop Drawings

   a. Telephone Terminal Cabinet

   b. Telecommunications drawings

2. Product Data

   a. Telecommunications cabling

   b. Telecommunications outlet/connector assemblies

3. Test Reports

   a. Telecommunications cabling testing

8.3.1.4 QUALITY ASSURANCE

1. Shop Drawings

   Submit shop drawings a minimum of 355 by 510 mm in size using a minimum scale of one mm per 100 mm. Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment

devices. Submittals shall include the nameplate data, size, and capacity.

8.3.1.5 DELIVERY AND STORAGE

Provide protection from weather, moisture, extreme heat and cold, dirt, dust, and other contaminants for telecommunications cabling and equipment placed in storage.

8.3.1.6 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

8.3.2 MATERIAL REQUIREMENTS

8.3.2.1 COMPONENTS

Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations, submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard. Provide a complete system of telecommunications cabling and pathway components using star topology. Provide support structures and pathways, complete with outlets, cables, connecting hardware and telecommunications cabinet. Cabling and interconnecting hardware and components for telecommunications systems shall be UL listed or third party independent testing laboratory certified, and shall comply with NFPA 70, PEC and conform to the requirements specified herein.

8.3.2.2 TELECOMMUNICATIONS PATHWAY

Provide telecommunications pathways in accordance with EIA TIA/EIA-569-A and as specified in Section 7.5, INTERIOR WIRING SYSTEM. Provide system furniture pathways in accordance with UL 1286.

8.3.2.3 TELECOMMUNICATIONS CABLING

Cabling shall be UL listed for the application and shall comply with EIA TIA/EIA-568-B.1, EIA TIA/EIA-568-B.2 and NFPA 70. Provide a labeling system for cabling as required by EIA TIA/EIA-606-A and UL 969. Ship cable in boxes bearing manufacture date for UTP in accordance with ICEA S-90-

661for all cable used on this project. Cabling manufactured more than 12 months prior to date of installation shall not be used.

1. Horizontal Cabling

Provide horizontal cable in compliance with NFPA 70, PEC and performance characteristics in accordance with EIA TIA/EIA-568-B.1.

a. Horizontal Copper

Provide horizontal copper cable in accordance with EIA TIA/EIA-568-B.2, UL 444, ICEA S-90-661 UTP (unshielded twisted pair), 100 ohm. Provide four each individually twisted pair, 22 AWG conductors, with thermoplastic jacket.

2. Work Area Cabling

a. Work Area Copper

Provide work area copper cable in accordance with EIA TIA/EIA-568-B.2, with thermoplastic jacket.

8.3.2.4 TELECOMMUNICATIONS SPACES

Provide connecting hardware and termination equipment in the telecommunications entrance facility and telecommunication equipment room to facilitate installation as shown on design drawings for terminating and cross-connecting permanent cabling. Provide telecommunications interconnecting hardware color coding in accordance with EIA TIA/EIA-606-A.

1. Backboards

Provide void-free, interior grade plywood 20 mm (3/4 inch) thick. Backboards shall be fire rated.

8.3.2.5 TELECOMMUNICATIONS OUTLET/CONNECTOR ASSEMBLIES

1. Outlet/Connector Copper

Outlet/connectors shall comply with FCC Part 68EIA TIA/EIA-568-B.1, and EIA TIA/EIA-568-B.2. UTP outlet/connectors shall be UL 1863 listed, non-keyed, 8-pin modular, constructed of high impact rated thermoplastic housing and shall be third party verified and shall comply with EIA TIA/EIA-568-B.2 Outlet/connectors provided for UTP cabling shall meet or exceed the requirements for the cable provided. Each outlet/connector shall be wired as indicated.

2. Cover Plates

Telecommunications cover plates shall comply with UL 514C, and EIA TIA/EIA-568-B.1, EIA TIA/EIA-568-B.2, flush design constructed of high impact thermoplastic material ivory in color to match color of receptacle/switch cover plates specified in Section 7.5, “Interior Wiring Systems”.

8.3.2.6 TERMINAL CABINET

Construct of zinc-coated sheet steel, 900 by 600 by 150 mm deep. Trim shall be fitted with hinged door and locking latch. Doors shall be maximum size openings to box interiors. Boxes shall be provided with 16 mm backboard with two-coat varnish finish. Match trim, hardware, doors, and finishes with panelboards. Provide label and identification systems for telecommunications wiring and components consistent with EIA TIA/EIA-606-A.

8.3.2.7 GROUNDING AND BONDING PRODUCTS

Provide in accordance with UL 467, TIA J-STD-607-A, and NFPA 70. Components shall be identified as required by EIA TIA/EIA-606-A. Provide ground rods, bonding conductors, and grounding busbars as specified in Section 7.5, “Interior Wiring Systems”.

8.3.3 EXECUTION

8.3.3.1 INSTALLATION

Install telecommunications cabling and pathway systems, including the horizontal cable, pathway systems, telecommunications outlet/connector assemblies, and associated hardware in accordance with EIA TIA/EIA-568-B.1, EIA TIA/EIA-568-B.2, NFPA 70, and UL standards as applicable. Provide cabling in a star topology network. Pathways and outlet boxes shall be installed as specified in Section 7.5, “Interior Wiring Systems”. Install telecommunications cabling with copper media in accordance with the following criteria to avoid potential electromagnetic interference between power and telecommunications equipment.

1. Cabling

Install telecommunications cabling system as detailed in EIA TIA/EIA-568-B.1. Provide service loop on each end of the cable, 3 m in the telecommunications room, and 300 mm in the work area outlet. Do not exceed manufacturers' cable pull tensions for copper and optical fiber cables. For UTP cable, bend radii shall not be less than four times the

cable diameter. Cables shall be terminated; no cable shall contain unterminated elements. Cables shall not be spliced.

a. Horizontal Cabling

Install horizontal cabling as indicated on drawings between the TTC and the telecommunications outlet assemblies at workstations.

2. Pathway Installations

Provide in accordance with EIA TIA/EIA-569-A and NFPA 70. Provide building pathway as specified in Section 7.5, “Interior Wiring Systems”.

3. Service Entrance Conduit, Underground

Provide service entrance underground as specified in Section 7.5, “Interior Wiring Systems”.

4. Work Area Outlets

a. Terminations

Terminate UTP cable in accordance with EIA TIA/EIA-568-B.1, EIA TIA/EIA-568-B.2 and wiring configuration as specified.

b. Cover Plates

As a minimum, each outlet/connector shall be labeled as to its function and a unique number to identify cable link in accordance with the paragraph LABELING in this section.

c. Cables

Unshielded twisted pair cables shall have a minimum of 300 mm of slack cable loosely coiled into the telecommunications outlet boxes. Minimum manufacturer's bend radius for each type of cable shall not be exceeded.

d. Pull Cords

Pull cords shall be installed in conduit serving telecommunications outlets that do not have cable installed.

5. Connector Blocks

Connector blocks shall be cabinet mounted in orderly rows and columns. Adequate vertical and horizontal wire routing areas shall be

provided between groups of blocks. Install in accordance with industry standard wire routing guides in accordance with EIA TIA/EIA-569-A.

6. Grounding and Bonding

Provide in accordance with TIA J-STD-607-A, NFPA 70 and as specified in Section 7.5, “Interior Wiring Systems”.

8.3.3.2 LABELING

1. Labels

Provide labeling in accordance with EIA TIA/EIA-606-A. Handwritten labeling is unacceptable.

2. Cable

Cables shall be labeled using color labels on both ends with identifiers in accordance with EIA TIA/EIA-606-A.

3. Termination Hardware

Workstation outlets connections shall be labeled using color coded labels with identifiers in accordance with EIA TIA/EIA-606-A.

8.3.3.3 TESTING

1. Telecommunications Cabling Testing

Perform telecommunications cabling inspection, verification, and performance tests in accordance with EIA TIA/EIA-568-B.1

8.3.4 MEASUREMENT AND PAYMENT

The payment for the structured cabling system equipment to be paid for shall be made in lump sum basis as listed in the Bill of quantities complete, tested and accepted by the Engineer. Payment shall constitute full compensation for all labor, materials, tools and equipment and other incidentals necessary for the successful operation of the whole structured cabling system.