

NORTH ORANGE COUNTY COMMUNITY COLLEGE DISTRICT
SECTION 27 02 00 – COMMUNICATION GENERAL REQUIREMENTS
SAMPLE SPECIFICATION

RELATED SECTIONS:

- 27 00 00 General Requirements
- 27 05 26 Grounding and Bonding
- 27 05 28 Pathways for Communication Systems
- 27 05 37 Fire Stopping for Communication Systems
- 27 10 00 Structured Cabling Testing
- 27 11 00 Communications Equipment Room Fittings
- 27 12 00 Communication Requirements for (RF) CATV System
- 27 13 00 Communications Copper Cable Backbone
- 27 13 23 ABF Fiber Optic Cabling
- 27 15 00 Communication Horizontal Cabling
- 27 16 00 Communication Connection Cords, Devices and Adapters

Part 1 – General

1.1 Summary

1.1.1 Contact Information:

1.1. Owner's Representative: **(INSERT INFORMATION)**

Name:

Company:

Address:

Phone: XXX-XXX-XXXX (C), XXX-XXX-XXXX (W)

E-Mail:

1.2. Structured Cabling Designer: **(INSERT INFORMATION)**

Name:

Company:

Address:

Phone: XXX-XXX-XXXX (C), XXX-XXX-XXXX (W)

E-Mail:

1.3. Telecommunications system shall include the following systems:

- (1) **SYSITMAX** Structured Cabling System (SCS) For Telecommunications Systems
- (2) Pathways for Telecommunications Systems
- (3) Grounding and Bonding System (GBS) For Telecommunications Systems
- (4) Firestopping for Telecommunications Systems

1.2 Additional Requirements

- 1.2.1 Integration: Responsibility for overall telecommunications system integration and coordination of work among trades, subcontractors, and suppliers shall rest with Contractor named in construction contract issued by North Orange County Community College District Representative. Work covered by this division of specifications shall be coordinated with related work indicated on drawings or specified elsewhere under project specifications. Work related to telecommunications system shall be performed

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under direct supervision of telecommunications system installer in a manner approved by product manufacturer.

- 1.2.2 Coordination of work: Contractor shall be responsible for coordination of work among project specification divisions and contractor/subcontractors involved in this project. This coordination of work includes following instructions provided the Construction Manager or General Contractor if project is managed by such.
- 1.2.3 General compliance requirements: Provide a complete and operable system in compliance with project drawings, specifications, referenced standards, applicable building codes, and Authority Having Jurisdiction (AHJ) requirements. Scope of this contract includes planning, design, materials, equipment, labor, configuration, programming, testing, startup and commissioning services, and documentation costs for complete and operable system that meets all requirements indicated on drawings or contained in specifications. Comply with all contract documents, specifications, drawings, manufacturer's instructions, and Owner and AHJ requirements. In case of conflict among applicable documents or standards, contractor shall notify owner's representative in writing of apparent conflict, and then comply with most stringent requirements unless otherwise directed in writing from owner's representative. Work includes all items required for complete system whether or not identified in specification or drawings.
- 1.2.4 Information about general construction and architectural features and finishes shall be derived from structural and architectural drawings and specifications only.
- 1.2.5 Items referred to in singular number in Contract Documents shall be provided in quantities necessary to complete work.
- 1.2.6 The Contractor shall be a SYSTIMAX certified Business Partner in good standing with CommScope, Inc. within the geographical region in which the campus resides (Southern California).
- 1.2.7 The Contractor shall be a Licensed Sumitomo FutureFlex partner with in the Southern California area.
- 1.2.8 Work related to telecommunications system shall be installed by an SCS manufacturers authorized or certified trained installer and supervised an SCS manufacturers authorized or certified SCS Engineer. Owner reserves the right to review and approves any personnel assigned to this project in a supervisory or managerial role.
- 1.2.9 SCS contractor shall have had at least 5 years of comparable experience with telecommunications projects. As part of the proposal, SCS installer shall submit at least three (3) comparable Project reference descriptions with reference contacts. Comparable projects shall equal or exceed size and complexity of work on drawings.

1.3 Related Documents and Drawings

- 1.3.1 General: The project drawings and general conditions of Contract shall apply to this section.
- 1.3.2 Coordination: Coordinate with work specified in other sections and divisions of specifications.
- 1.3.3 Reference: Codes and standards as referenced in Section 27 00 00 may define additional specifications or requirements not specifically called out within this division. However, contractor shall adhere to most stringent requirements as defined herein, or as defined by reference within section 27 00 00.

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- 1.3.4 Architectural and Engineering specifications may have additional conditions or requirements that affect the work defined by this division of specifications. Contractor shall be responsible for the coordination of all conditions and other trade requirements that may impact schedule, scope of work, work progress, or other factors that may affect the overall ability for contractor to execute the requirements of this division of specifications.
- 1.3.5 Contractor shall be a Licensed Sumitomo FutureFlex contractor as required by Section 27 13 23

1.4 Codes and Standards

- 1.4.1 General: All work, including but not limited to: cabling, pathways, support structures, wiring, equipment, installation and workmanship shall comply with the latest editions of the requirements of the Authority Having Jurisdiction (AHJ), National Electrical Code, National Electrical Safety Code, all applicable local rules and regulations, equipment manufacturer's instructions, and the National Electrical Contractors Association (NECA) Standard of Installation. In case of discrepancy or disagreement between the documents noted above, the Contractor shall satisfy the most stringent requirements.
- 1.4.2 The contractor shall follow the requirements of the Latest North Orange County Community College District **CABLING INFRASTRUCTURE STANDARDS** any conflict between the project specifications and standards shall be brought to the attention of the District Representative.
- 1.4.3 Other sections of this document contain References to Codes and Standards that are applicable to the section.

1.5 Codes

- 1.5.1 **Insulated Cable Engineers Association (ICEA)**
ANSI/ICEA S-80-576-2002, Category 1 & 2 Individually Unshielded Twisted-Pair Indoor Cables for Use in Communications Wiring Systems, 2002.
ANSI/ICEA S-84-608-2010, Telecommunications Cable, Filled Polyolefin Insulated Copper Conductor, 2010.
ANSI/ICEA S-90-661-2012, Category 3, 5, & 5e Individually Unshielded Twisted-Pair Indoor Cable for Use in General Purpose and LAN Communication Wiring Systems, 2012.
ICEA S-102-700-2004, ICEA Standard for Category 6 Individually Unshielded Twisted-Pair Indoor Cables for Use in LAN Communication Wiring Systems Technical Requirements, 2004
- 1.5.2 **National Fire Protection Association (NFPA)**
NFPA 70, National Electrical Code® (NEC®), 2014
NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces, 2012
NFPA 72, National Fire Alarm Code®, 2012
NFPA 75, Standard for the Protection of Electronic Computer/Data Processing Equipment, 2013
NFPA 76, Recommended Practice for the Fire Protection of Telecommunications Facilities, 2012

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NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems, 2012
NFPA 101, Life Safety Code®, 2012
NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials, 2006
NFPA 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, 2011
NFPA 780, Standard for the Installation of Lightning Protection Systems, 2011
NFPA 5000™, Building Construction and Safety Code, 2012

1.6 Reference Standards

1.6.1 Telecommunications Industry Association (TIA)

ANSI X3T9.5, Requirements for UTP at 100 Mbps, 1993
TIA TSB-125, Guidelines for Maintaining Optical Fiber Polarity Through Reverse-Pair Positioning, 2001
TIA TSB-140, Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems (2004)
TIA-526-7, Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant – OFSTP-7
T-526-14-A, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant – SFSTP-14
TIA-568-C.0, Generic Telecommunications Cabling for Customer Premises, 2012
TIA-568-C.1, Commercial Building Telecommunications Cabling Standard Part 1: General Requirements, 2012
ANSI/TIA-C.2, Commercial Building Telecommunications Cabling Standard—Part 2: Balanced Twisted Pair Cabling Components, 2010
ANSI/TIA-C.3, Optical Fiber Cabling Components Standard, 2011
TIA-569-B, Commercial Building Standards for Telecommunications Pathways and Spaces, 2004
ANSI/TIA-598-C, Optical Fiber Cable Color Coding, 2005
ANSI/TIA-604.2-A, FOCIS 2—Fiber Optic Connector Intermateability Standard, 2004
TIA-606, Administration Standard for Commercial Telecommunications Infrastructures, 2012
ANSI J-STD-607-A, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, 2002
ANSI/TIA-758-B, Customer-owned Outside Plant Telecommunications Infrastructure Standard, 2012
ANSI/TIA-854, A Full Duplex Ethernet Specification for 1000 Mb/s (1000BASE-TX) Operating over Category 6 Balanced Twisted-Pair Cabling, 2001
TIA-862, Building Automation Systems Cabling for Commercial Buildings, 2011
TIA-942, Telecommunications Infrastructure Standard for Data Centers, 2012
ANSI/NECA/BICSI 568-2006, Standard for Installing Telecommunications Systems, 2006
Category TSB-155, Guidelines for the Assessment and Mitigation of Installed 6 Cabling to Support 10GBASE-T, 2010

1.6.2 Other Reference Materials

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North Orange County Community College District Cabling Infrastructure Standards
ANSI/NECA/BICSI-568-2006, Standard, Installing Commercial Building
Telecommunications Cabling
Sumitomo SP F-04-008 – Tube Cable Installation Procedures
BICSI Outside Plant Design Reference Manual (COOSP), current edition.
BICSI Electronic Safety and Security Reference Manual (ESSDRM), current edition
BICSI Information Transport Systems Installation Methods Manual (ITSIM), current
edition
BICSI Network Design Reference Manual (NDRM), current edition
BICSI Telecommunications Distribution Methods Manual (TDMM), current edition
BICSI Wireless Design Reference Manual (WDRM), current edition
Institute of Electrical and Electronic Engineers (IEEE)
National Electrical Manufacturers Association (NEMA)
Underwriters Laboratories (UL) Cable Certification and Follow Up Program

1.6.3 Abbreviations, Acronyms and Definitions

1.6.3.1 Acronyms

ABF	Air Blown Fiber Optic System
ACD	Automatic Call Distribution
AFF	Above Finished Floor
AWG	American Wire Gauge
BICSI	Building Industry Consulting Services International
CAT5	Category 5 Copper Cable
CAT5e	Category 5e Copper Cable
CAT6	Category 6 Copper Cable
CAT6A	Category 6A Copper Cable
CDDI	Copper Distributed Data Interface
CMP	Communications Multipurpose Plenum: cable rating
CMR	Communications Multipurpose Riser: cable rating
EIA	Electronic Industries Association
ELFEXT	Equal-Level Far-End Crosstalk
FEXT	Far End Crosstalk
Gbps	Gigabits per second
HVAC	Heating, Ventilation, and Air Conditioning
IDF	Intermediate Distribution Frame - Termination frames, relay racks, and cable management
IEEE	The Institute of Electrical and Electronics Engineers
IM	Information Management
ISDN	Integrated Services Digital Network
LAN	Local Area Network
Mbps	Megabits per second
MDF	Main Distribution Frame, consisting of carrier entrance rooms and head-end
MMF	Multi-mode fiber optics, 50 or 62.5 micron laser optimized core
MUTOA	Multi-User Telecommunications Outlet Assembly

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NEXT	Near End Cross Talk
NRTL	Nationally Recognized Testing Laboratories
OSHA	Occupational Safety and Health Act
PBX	Private Branch Exchange: telephone switch
PDS	Premises Distribution Systems (See SCS.)
PoE	Power over Ethernet (IEEE 802.3af)
POP	Point of Presence
PSACR	Power Sum Attenuation-to-Crosstalk Ratio
PSAFEXT	Power Sum Alien Far-End Crosstalk
PSAELFEXT	Power Sum Alien Equal Level Far-End Crosstalk
PSANEXT	Power Sum Alien Near-End Crosstalk
PSELFEXT	Power Sum Equal Level Far-End Crosstalk
PSNEXT	Power Sum Near-End Crosstalk
SCC	Security Command Center
SCS	Structured Cabling System, or Structure Connectivity System; a complete cabling system
SFF	Small Form Factor
SMF	Single-mode fiber optics, 8.3 micron core
TC	Telecommunications Closet
TE	Telecommunications Enclosure
TEF	Telecommunications Entrance Facility
TIA	Telecommunications Industry Association
TR	Telecommunications Room
TO	Telecommunications Outlet
TWC	Time Warner Cable - Owner
UPS	Uninterruptible Power Supply
UTP	Unshielded Twisted Pair
VoIP	Voice over Internet Protocol
WAO	Work Area Outlet
WAN	Wide Area Network

1.6.4 Definitions

Backboard: generally refers to the A-C, fire-retardant, plywood sheeting lining the walls of the telecommunications facilities. Backboards may also refer to the entire wall-mounted assembly, including wire management and termination frames.

Building Distribution Frame (BDF): The BDF is the location within a building where the entire inside cable and fiber optic plant originates. The entire cable and fiber optic entrance facilities also terminate here. Part of the Horizontal Distribution System may originate here as well.

It may include: the physical location, enclosure, wire and copper cable management hardware, fiber and management hardware, termination hardware, distribution hardware, protection hardware, active electronic components, and equipment racks.

EIA/TIA-569 "Commercial Building Standard for **Telecommunications Pathways and Spaces:** refers to the room housing the BDF as the Equipment Room. Throughout this specification, BDF and Telecommunications Equipment Room are equivalent.

(RF)MATV System: a Bi-directional capable of two way transmission of audio, and

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video signals.

CATV: Cable Antenna Television system.

Cable Plant: Cable, conduit raceways, vaults, junction/pull boxes, rooms, racks, equipment, patch bays/blocks, and other infrastructure required to provide physical, electrical, optical connectivity between buildings on the Campus.

Cable Rack: Hardware designed and manufactured for horizontal pathway distribution of cable and inside wiring inside the MDF, BDF, or IDF rooms.

Cable Tray: Hardware designed and manufactured for horizontal pathway distribution of cable and inside wire from the MDF, BDF, or IDF to the Information Outlet access point.

Copper Entrance Cable: Copper Cable that joins the District backbone infrastructure at its connecting point to the buildings BDF.

Designation Strips: Paper or plastic strips, usually contained in a clear or color tinted plastic carrier, designated for insertion into a termination frame. Designation strips are usually imprinted with the adjacent terminal number and are used to aid in locating a specific pair, group of pairs, or information outlet inserted into the termination frame, or for the purpose of delineating a termination field.

Entrance Conduit: Conduit that connects the District underground infrastructure with the building's BDF.

Fiber Entrance Cable: Fiber Optic cable that joins the District backbone infrastructure at its connecting point to the building's BDF.

Information Outlet: An integral assembly containing one of the following:

Three, 4 pair Category 5e telephone jacks that can be used for various services (voice, data, network, etc.); (Insert Jack Colors Here)..

Two, 4 pair Category 5e telephone jacks (Insert Jack Colors Here).

Two, 4 pair Category 5e telephone jacks (Insert Jack Colors Here).and 1 coaxial cable jack.

One, 4 pair Category 5e telephone wall jack.

All jacks shall be mounted in dual gang standard electrical outlet box. A mounting frame and blank dust cover(s) are provided for the unused position. The assembly includes the faceplate, modular mounting frame, jacks, and dust cover/blank. Dual gang outlet boxes will contain a second modular mounting frame equipped with dust cover/blanks instead of jacks and will be covered. Each colored jack will be served by a different colored cable.

Inside Plant (ISP): Communications system inside a building (wire, cable equipment and racks, information outlets, etc.).

Intermediate Distribution Frame (IDF): The IDF is the location in a building where a transition between the Riser System and the Horizontal Distribution System occurs. It may include: the physical location, enclosure, wire and cable management hardware, fiber and management hardware, active electronic components, termination hardware, and equipment racks. EIA/TIA-569, "Commercial Building Standards for Telecommunications Pathways and Spaces" refers to the IDF as the Telecommunications Closet. Throughout this specification IDF and Telecommunications Room are equivalent.

LAN: Local Area Network.

Commscope – SYSTIMAX: Structured Connectivity Solutions (SCS): SCS is a structured information system for copper, fiber optic and wireless solutions for inter and intra-building telecommunications by Commscope, Inc.

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Sumitomo FutureFlex: The manufacture and authorized/licensed FutureFLEX contractor to supply equipment, materials, labor, and services for the air blown fiber telecommunications distribution system.

Main Distribution Frame (MDF): The MDF is the facility where the entire outside cable and fiber optic plant originates. It may include the physical location, enclosure, wire, fiber and copper cable hardware, protection, active electronic components, equipment frames, and racks. The Telecommunications Switching Center and/or Computer Center may vary by campus.

MPOE: Minimum Point of Entry, Utility Partnerships/Alternate Carrier, located within the MDF.

Management Hardware

Fiber Management: Hardware designed and manufactured for the purpose of keeping fiber patch cords neat and orderly. Most termination frame manufacturers provide fiber management components designed to work in conjunction with their termination frames. Fiber management may also refer to other types of hardware for the purpose of securing fiber optic cable to the building.

Wire Management (Copper, Data Network): Hardware designed and manufactured for the purpose of keeping cross-connect wire and patch cables neat and orderly. Most termination frame manufacturers provide wire management components designed to work in conjunction with their termination frames. Wire management may also refer to other types of hardware for the purpose of securing wire and cable to the building.

Outside Plant (OSP): Communications system outside of the buildings (typically underground conduit and vaults, exterior/underground rated wire and cable, etc.).

Riser Cable: High volume cable (copper) that connects the BDF with the IDF or backboards located on the same or different floors.

Riser Conduit: Conduit that connects the BDF to the IDF or backboards located on the same or different floors.

Riser Fiber Cable: Fiber Optic Cables that connects the BDF with IDF or backboards located on the same or different floors.

SPOE: Secondary Point of Entry, Utility/Alternate Carrier Partnership in buildings other than the MDF.

Station Wire: Three (different colored) - 4 pair, unshielded, twisted pair, Category 5e wire that connects the information outlet to the BDF or IDF.

Category 5e (Cat 5e) / Class D – A category/class of transmission performance that specifies electrical properties up to 155.5 MHz. Capable of supporting copper-based, four-pair Gigabit Ethernet (IEEE 802.3ab 1000BASE-T) applications. Category 5e is defined in TIA/EIA 568B.2 standard. Class D is defined in the ISO 11801 standard.

Category 6 (Cat 6) / Class E – A category/class of transmission performance that specifies electrical properties up to 250 MHz. Refer to the TIA/EIA 568B family of standards for more information on Category 6 and ISO/IEC 11801 for more information on Class E requirements. Also refer to CENELEC EN50173.

Category 6A (Cat 6A) / Class EA– A category/class of transmission performance that specifies electrical properties up to 500 MHz and capable of supporting data applications operating at 10Gbps. Refer to the TIA/EIA 568B family of standards for more information on Category 6 and ISO/IEC 11801 for more information on Class EA requirements.

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Telecommunications Ground: An electrical ground (as defined by local codes) usually the main building ground electrode extended by a continuous AWG "0" wire to ground bus bars in the BDF, IDF, and roof telecommunications terminal point.

Termination Fields

Copper, Data, Network Termination Fields: A group of termination frames clustered together to provide terminations for specific cable or inside wiring groups, where all of the cable or wiring in the group is used for a single purpose, constitutes a copper, data, or network termination field. The extent of a specific field, located in a group of fields, may be distinguished by a physical separation between the frames forming the field, by uniquely colored designation strips, or by a series of terminal numbers.

Fiber Optic Termination Fields: A group of termination frames clustered together to provide terminations for fiber optic cable fibers, where all of the cable fibers are used for a single purpose, constitutes a fiber termination field.

Network Termination Frame: Devices designed and manufactured for the purpose of terminating copper cable pairs from the active data electronic hardware. These devices generally utilize insulation displacement connections and usually require special tools to make the terminations. Throughout this specification, the terms Network Termination Frame and Network Wiring Block are equivalent.

District representative: This is a generic term meant to cover campus staff from Facilities Planning, NOCCCD's IS and Academic Computer Technologies (ACT) department and from the campuses construction management firm. Changes to the Communication Specifications, communication room layouts, etc. must be approved by a representative of NOCCCD's IS and Academic Computer Technologies (ACT) department.

1.7 Project Drawings

- 1.7.1 General Drawing Specifications: Detail and elevation drawings D size (24" x 36") with a minimum scale of 1/4" = 1'0" or larger. ER, TR and other enlarged detail floor plan drawings shall be D size (24" x 36") with a minimum scale of 1/4" = 1'0" or larger. Building composite floor plan drawings shall be D size (24" x 36") with a minimum scale of 1/8" = 1' 0".
- 1.7.2 Building composite floor plans: Provide building floor plans showing outlet locations and jack configuration, types of jacks, run distance for each jack cable, and cable routing/locations. Identify TO's that, according to location and available pathway systems, require cable length greater than allowed by standards. Recommend alternatives for Owners Representative's consideration.
- 1.7.3 Telecommunications space plans/elevations: Include enlarged floor plans of TRs indicating layout of equipment and devices, including receptacles and grounding provisions. Submit detailed plan views and elevations of telecommunications spaces showing racks, termination blocks, and cable paths.
- 1.7.4 Logical Drawings: Provide logical riser or schematic drawings for all systems. Include schematic symbol key.

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1.8 Substitutions

- 1.8.1 Substitution requests: Substitution requests will be considered only if submitted to Owner's Representative not less than 7 working days prior to project bid date. Acceptance or rejection of proposed substitution is at Owner's Representatives sole discretion. No exceptions. Requests for substitutions shall be considered *not approved* unless approval is issued in writing by Owner's Representative.
- 1.8.2 Rejection: For equipment, cabling, wiring, materials, and all other products indicated or specified as *no substitutions* or *no alternates*, Owner does not expect nor desire requests for substitutions and alternate products other than those specified. Owner reserves right for Owner's Representative to reject proposed substitution requests and submissions of alternates without review or justification.

1.9 Pre-Installation Meeting

- 1.9.1 General: After award, convene a pre-installation meeting at least 14 calendar days prior to commencing SCS and related work. The meeting must be scheduled at least 14 days in advance. Require attendance of parties directly affecting work of this section, including other trades and utilities if necessary. Review conditions of operations, procedures and coordination with related work.
- 1.9.2 Agenda: Comply with following agenda specifications:
- 1.9.3 Tour, inspect, and discuss building conditions relating to telecommunications system cabling and equipment, coordination with Telephone Utility Company, Owner's telecommunications system requirements, and coordination with existing conditions and other work in contract.
- 1.9.4 Review exact location of each item within building construction, casework, and fixtures, and their requirements.
- 1.9.5 Review required submittals, both completed and yet to be completed.
- 1.9.6 Review drawings and specifications.
- 1.9.7 Review proposed equipment, cabling, and related work.
- 1.9.8 Review and finalize construction schedule related to telecommunications system and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
- 1.9.9 Review required inspections and testing.
- 1.9.10 Review cable routing and support provisions.

Part II – Products

2.0 Warranty

2.1 Contractors Warranty

- 2.1.1 General requirements: Comply with additional requirements in contract general requirements and extended warranties required in other specification sections. Refer to all other Division 27 sections for specific additional warranty requirements that exceed or are in addition to those of this section.

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- 2.1.2 Contractor warranty: Provide all services, materials and equipment necessary for successful operation of entire telecommunications system and SCS system for a period of one year after system acceptance. Scope of warranty includes all equipment, devices, wiring, accessories, software, hardware, installation, programming, and configuration required to maintain a complete and operable system. Provide manufacturer's published recommended preventative maintenance procedures during warranty period. This shall apply to all items except those specifically excluded, or items wherein a longer period of service and warranty is specified or indicated. All warranties shall be effective for one year, minimum, from date Certificate of Final Acceptance is issued. Use of systems provided under this section for temporary services and facilities shall not constitute final acceptance of work nor beneficial use by Owner and shall not institute warranty period. The warranty shall cover repair or replacement of defective materials, equipment, workmanship, and installation that may be incurred during this period. Warranty work is to be done promptly and to Owner's satisfaction. In addition, warranty shall cover correction of damage caused in making necessary repairs and replacements under warranty. Additional warranty responsibilities are:
- 2.1.3 Obtain written equipment and material warranties offered in manufacturer's published data without exclusion or limitation, in Owner's designated name. Replace material and equipment that require excessive service during guarantee period as determined by Owner.
- 2.1.4 Provide 2-business day service beginning on date of Substantial Completion and lasting until termination of warranty period. Service shall be at no cost to Owner. Service can be provided by installing contractor or by a separate service organization. Choice of service organization shall be subject to Owner's approval. Submit name and a phone number that will be answered on a 24-hour basis each day of week, for duration of service.
- 2.1.5 Submit copies of equipment and material warranties to Owner before final acceptance.
- 2.1.6 At end of warranty period, transfer manufacturers' equipment and material warranties still in force to Owner.
- 2.1.7 If warranty work problems cannot be corrected immediately to Owner's satisfaction, advise Owner in writing, describing efforts to correct situation, and provide analysis of cause for problem. If necessary to resolve problem, provide at no cost services of manufacturer's engineering and technical staff at site in a timely manner to analyze warranty issues, and develop recommendations for correction, for review and approval by Owner.
- 2.1.8 Owner's rights: This section shall not be interpreted to limit Owner's rights under applicable codes and under this Contract.
- 2.1.9 Pathways Material and Installation warranty: Provide all services, materials and equipment necessary to warrant the installation and performance of all pathway materials for a period of one year after beneficial use. Scope of warranty includes all equipment, devices, installation and other work required to maintain a complete and operable system. Provide manufacturers published recommended preventative maintenance procedures during warranty period.
- 2.1.10 Grounding and Bonding Material and Installation warranty: Provide all services, materials and equipment necessary for successful operation of GBS for a period of one year after beneficial use. Scope of warranty includes all equipment, devices, installation and other work required to maintain a complete and operable system. Provide

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manufacturers published recommended preventative maintenance procedures during warranty period.

- 2.1.11 Firestopping Material and Installation warranty: Provide all services, materials and equipment necessary to warrant the performance of all Firestopping material for a period of one year after beneficial use, or longer if required by the local AHJ. Scope of warranty includes all equipment, devices, installation and other work required to maintain a complete and operable system. Provide manufacturers published recommended preventative maintenance procedures during warranty period.

2.2 SCS Manufacturers Extended Warranty (CommScope – Systimax)

- 2.2.1 SCS Systems will be covered by a two-part certification program provided by a single manufacturer and that manufacturer's certified vendor. Manufacturer shall administer a follow on program through the Vendor to provide support and service to the purchaser. The first part is an assurance program, which provides that the certified system will support the applications for which it is designed, during the **20-year warranty** of the certified system.
- 2.2.2 The second portion of the certification is a **20-year warranty** provided by the manufacturer and the vendor on all products within the system (cords, telecommunications outlet/connectors, cables, cross-connects, patch panels, etc.).
- 2.2.3 In the event that the certified system ceases to support the certified application(s), whether at the time of cutover, during normal use or when upgrading, the manufacturer and vendor shall commit to promptly implement corrective action.
- 2.2.4 Documentation proving the cabling system's compliance to the End-to-End Link Performance recommendations, as listed in ANSI/TIA/EIA-568-C shall be provided by the Vendor prior to the structured cabling system being installed.
- 2.2.5 The cabling system must conform to the current issue of industry standard ANSI/TIA/EIA-568. All performance requirements of this document must be followed. As well, workmanship and installation methods used shall be equal to or better than that found in the BICSI (Building Industry Consulting Service International) ITSIM manual.
- 2.2.6 Purchaser demands strict adherence to the performance specifications listed in ANSI/TIA/EIA-568-C series standards.
- 2.2.7 Manufacturer shall maintain ISO Quality Control registration for the facilities that manufacturer the product used in this cabling system.

2.3 Sumitomo FurtureFlex Air Blown Fiber Warranty

- 2.3.1 25-Year **Extended Warranty** (SEL warrants the FutureFLEX products to be free of defects in material and workmanship for a period of twenty five (25) years from the date of shipment.) The following is a list of required items that must be submitted for application for this warranty:
- 2.3.2 Complete the Warranty registration Form on the FutureFLEX website and submit to SEL. Testing data for the Obstruction and Pressure Test for each tube and tube cable in the system. Sample Test Data Sheets are available on the website.
- 2.3.3 Original handwritten test results from the field are required; typed results are not acceptable.

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- 2.3.4 Electronic copies of OTDR or Power Meter readings with viewing software and fiber spans identified per As-Built Drawing.
- 2.3.5 Bi-Directional measurements are required at the highest wavelength. All software required to run or view the test data must accompany the application.
- 2.3.6 Copies of as built drawings must be submitted to SEL via electronic or hard copy to SEL. (Drawings must be in AutoCAD or Visio)
- 2.3.7 Submit copies of purchase invoices for the FutureFLEX products used in the installation. (Hard copies only)
- 2.3.8 At notice to proceed, submit the most current copy of the FutureFLEX® certificate of registration and the warranty terms and conditions that apply to the FutureFLEX® solution.
- 2.3.9 Submit a statement, at notice to proceed, of any Contractor warranties in addition to the manufacturer’s stated and supplied warranties. Submit at closeout signed copies of the Contractor provided warranties that are in addition to manufacturer’s stated and supplied warranties.

Part III - Execution

3.1 Requirements

- 3.1.1 General: Sequence, coordinate, and integrate various elements of telecommunications system, materials, and equipment. Comply with following requirements as a minimum.
- 3.1.2 Coordinate systems, equipment, and materials installation with other building components.
- 3.1.3 Verify all dimensions by field measurements.
- 3.1.4 Arrange for chases, slots, and openings in other building components during progress of construction, to allow for wiring, cabling, and equipment installations.
- 3.1.5 Coordinate installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
- 3.1.6 Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of Work. Give particular attention to large equipment requiring positioning prior to closing in building.
- 3.1.7 Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide maximum headroom and access for service and maintenance as possible.
- 3.1.8 Coordinate connection of materials, equipment, and systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
- 3.1.9 Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by Contract Documents, recognizing that portions of Work are shown only in diagrammatic form. In case of conflict among individual system requirements, request direction in writing from Owner’s Representative.

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- 3.1.10 Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed in both exposed and un-exposed spaces.
- 3.1.11 Install cabling, wiring, and equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
- 3.1.12 Provide access panel or doors where units are concealed behind finished surfaces.
- 3.1.13 Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
- 3.1.14 Comply with all requirements and work indicated on drawings.
- 3.1.15 Avoid interference with structure and with work or other trades, preserving adequate headroom and clearing doors and passageways to satisfaction of Owner and according to code requirements.
- 3.1.16 Install equipment and cabling/wiring so as to properly distribute equipment loads on building structural members provided for equipment support under other Sections. Roof-mounted equipment shall be installed and supported on structural steel or roof curbs as appropriate.
- 3.1.17 Provide suspended platforms, strap hangers, brackets, shelves, stands or legs as necessary for floor, wall and ceiling mounting of equipment as required.
- 3.1.18 Provide steel supports and hardware for proper installation of hangers, anchors, guides, and other support hardware.
- 3.1.19 Obtain and analyze catalog data, weights, and other pertinent data required for proper coordination of equipment support provisions and installation.
- 3.1.20 Structural steel and hardware shall conform to ASTM standard specifications. Use of steel and hardware shall conform to requirements of AISC *Code of Practice*: Section Five.
- 3.1.21 Verify site conditions and dimensions of equipment to ensure access for proper installation of equipment without disassembly that would void warranty.

3.2 Completeness of Work

- 3.2.1 Complete and usable work: The contractor is responsible for providing complete and usable work according to contract documents. All materials and equipment shall be provided with all accessories and additional work required for field conditions, as well as additional work and accessories required for complete, usable, and fully functional construction and systems, even if not explicitly specified or indicated. Telecommunications system in this Contract shall be provided as complete and operable systems in full compliance with requirements on drawings and specification requirements. Drawings are diagrammatic and specifications are performance-based, and Contractor shall provide all work required to comply with drawings and specifications, even if not explicitly indicated or specified. Contractor shall be responsible for coordinating installation of electrical systems with all field conditions and work of other trades. Minimum clearances and work required for compliance with NFPA 70, *National Electrical Code*® (*NEC*®), and manufacturer's instructions shall be provided. Comply with additional requirements indicated for access and clearances. Contractor shall verify all field conditions and dimensions that affect selection and provision of materials and equipment, and shall provide any disassembly, reassembly, relocation, demolition, cutting and patching required to provide work specified or

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indicated, including relocation and reinstallation of existing wiring and equipment. Contractor shall protect from damage resulting from Contractor's operations existing facility, equipment, and wiring. Extra charges for completion and contract time extension will not be allowed because of field conditions or additional work required for complete and usable construction and systems. Comply with additional requirements indicated for access and clearances.

- 3.2.1 Drawings and specifications form complementary requirements; provide work specified and not shown, and work shown and not specified as though explicitly required by both. Except where explicitly modified by a specific notation to contrary, it shall be understood that indication or description of any item, in drawings or specifications or both, carries with it instruction to furnish and install item, provided complete.
- 3.2.2 Terms: As used in this specification, *provide* means *furnish and install*. *Furnish* means "to purchase and deliver to project site complete with every necessary appurtenance and support," and *install* means "to unload at delivery point at site and perform every operation necessary to establish secure mounting and correct operation at proper location in project."
- 3.2.3 Authority approvals: Give notices, file plans, obtain permits and licenses, pay fees, and obtain necessary approvals from authorities that have jurisdiction as required to perform work according to all legal requirements and with Specifications, Drawings, Addenda and Change Orders, all of which are part of Contract Documents.
- 3.2.4 Supplementary items: Provide supplementary or miscellaneous items, appurtenances, devices and materials necessary for a sound, secure and complete installation. Examine project drawings and other Sections of specifications for requirements that affect work of this section. Completely coordinate work of this section with work of other Sections and provide a complete and fully functional installation. Refer to all other drawings and other specifications sections that indicate types of construction in which work shall be installed and work of other sections with which work of this section must be coordinated
- 3.2.5 Quantities: Items referred to in singular number in Contract Documents shall be provided in quantities necessary to complete work.

3.3 Project Conditions

- 3.3.1 Field verification: Carefully verify location, use and status of all material, equipment, and utilities that are specified, indicated, or deemed necessary for removal. Verify that all materials, equipment, and utilities to be removed are completely inactive and will not be required or in use after completion of project. Replace with equivalent any material, equipment and utilities that were removed by Contractor that are required to be left in place.
- 3.3.1 Existing utilities: As applicable, do not interrupt utilities serving facilities occupied by Owner or others unless permitted under following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
- 3.3.2 Notify owner in writing at least 14 days in advance of proposed utility interruptions. Do not proceed with utility interruptions without Owner's written permission.

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3.4 Equipment installation:

- 3.4.1 Determine suitable path for moving unit substation into place; consider Project conditions.
- 3.4.2 Verify clearance requirements and locate equipment to meet installation tolerances.
- 3.4.3 Revise locations and elevations from those indicated to those required to suit Project.

3.5 Delivery Storage and Handling

- 3.5.1 General: Contractor shall be responsible for the deliveries, storing and handling of all materials relative to the SCS systems, including materials supplied by others that are part of the SCS installation contract. Material shall be stored and protected according to manufacturer's instructions. Contractor shall be responsible for the security of all material during installation. For all material provided by contractor, or delivered to contractor on site, contractor assumes full responsibility and liability for any material shortages, damage or loss due to storage and handling methods.

3.6 Permits and Inspections

- 3.6.1 General: All telecommunications systems shall meet or exceed the latest requirements of all national, state, county, municipal, and other authorities exercising jurisdiction over the telecommunications systems and the Project.
- 3.6.2 Contractor shall obtain and pay for all licenses, permits, and inspection fees required by local agencies and/or other agencies having jurisdiction.
- 3.6.3 Contractor agrees to furnish any additional labor or material required to comply with all local and other agencies having jurisdiction at no additional cost.
- 3.6.4 Contractor shall obtain certificates of inspection and approval from all authorities having jurisdiction, and forward copies of same to Owner's Representative prior to request for Project acceptance inspections, final completion inspections, substantial completion inspections, and acceptance testing/demonstrations.
- 3.6.5 All required permits and inspection certificates shall be made available at the completion of the telecommunications system installation and commissioning.
- 3.6.6 Any portion of the telecommunications work which is not subject to the requirements of an electric code published by a specific AHJ shall be governed by the National Electrical Code and other applicable sections of the *National Fire Code*, as published by the National Fire Protection Association (NFPA).
- 3.6.7 Installation procedures, methods and conditions shall comply with the latest requirements of the Federal Occupational Safety and Health Administration (OSHA).

3.7 Examination

- 3.7.1 General: Prior to submitting a proposal, Contractor shall examine site, review Project drawings and specifications, and determine exact extent of work required. Contractor shall include in their proposals all materials, labor, and equipment required to complete required work indicated. Work that is necessary to obtain complete and usable Project as specified herein shall be included in Contractor's proposal, even if not indicated or specified.

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- 3.7.2 Bidders' questions: Should bidders have questions as to intent of drawings and specifications, quality of materials to be used, and work to be performed, questions shall be submitted in writing to Owner's Representative in manner dictated by Owner's Representative. All answers and clarifications to drawings and specifications will be issued in writing.
- 3.7.3 Extra payment will not be allowed for claims for due to unfamiliarity with work to be performed by other trades, existing conditions at job site, local or state laws and codes, and alterations due to field conditions.

3.8 Additional Costs

- 3.8.1 General: Project acceptance inspections, final completion inspections, substantial completion inspections, and acceptance testing/demonstrations shall be conducted after verification of system operation and completeness by Contractor.
- 3.8.2 Inspections and testing: For Project acceptance inspections, final completion inspections, substantial completion inspections, and/or testing/demonstrations that require more than one site visit by Owner's Representative or Architect/Engineer to verify Project compliance for same material or equipment, Owner reserves right to obtain compensation from Contractor to defray cost of additional site visits that result from Project construction or testing deficiencies/incompleteness, incorrect information, or non-compliance with Project provisions. Owner's Representative will notify Contractor of hourly rates and travel expenses for additional site visits, and will issue an invoice to Contractor for additional site visits. Payment of additional site visit costs by Contractor is required within 30 days of invoicing. Owner reserves right to deduct additional costs defined herein that are indicated on past due invoices from Project amount due Contractor.
- 3.8.3 Exclusions: Contractor shall not be eligible for extensions of Project schedule or additional charges resulting from additional site visits that result from Project construction or testing deficiencies/incompleteness, incorrect information, or non-compliance with Project provisions.

3.9 General Equipment Installation

- 3.9.1 General: Install equipment according to manufacturer's written instructions. Install equipment level and plumb. Install wiring and cabling between equipment and all related devices.
- 3.9.2 Mounting: If neither the Owner's Instructions nor the individual section call out the required hardware mounting, use the following.
 - 3.9.2.1 For equipment at walls, bolt units to wall or mount on structural steel channel strut bolted to wall.
 - 3.9.2.2 For equipment not at walls, provide freestanding racks fabricated of structural steel members and slotted structural steel channel strut.
 - 3.9.2.3 Use feet consisting of 0.25 inch thick steel plates, 6 square inch, bolted to floor.
 - 3.9.2.4 Use feet for welded attachment of vertical posts not over 3 feet on center.
 - 3.9.2.5 Connect posts with horizontal U channel steel strut and bolt control equipment to channels.

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- 3.9.3 Cleaning: Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish. Clean devices internally using methods and materials as recommended by manufacturer.
- 3.9.4 Connections: Tighten wiring connectors, terminals, bus joints, and mountings, to include lugs, screws and bolts according to equipment manufacturer's published torque tightening values for equipment connectors. In absence of published connection or terminal torque values, comply with torque values specified in UL 486A and UL 486B.

3.10 Cutting and Patching

- 3.10.1 General: Perform cutting and patching according to contract general requirements. In addition, following requirements apply:
 - 3.10.1.1 Perform cutting, fitting, and patching of electrical equipment and materials required to uncover existing infrastructure in order to provide access for correction of improperly installed existing or new Work.
 - 3.10.1.2 Remove and replace defective Work.
 - 3.10.1.3 Remove and replace Work not conforming to requirements of Contract Documents.
 - 3.10.1.4 Remove samples of installed Work as specified for testing.
- 3.10.2 Install equipment and materials in existing structures.
- 3.10.3 Demolition and removal: Cut, remove, and legally dispose of selected equipment, components, and materials as indicated, including but not limited to removal of material, equipment, devices, and other items indicated to be removed and items made obsolete by new Work. Provide and maintain temporary partitions or dust barriers adequate to prevent spread of dust and dirt to adjacent areas.
- 3.10.4 Protection of work: Protect structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed. During cutting and patching operations, protect adjacent installations. Patch finished surfaces and building components using new materials specified for original installation and experienced Installers.

3.11 Penetrations and Sleeves

- 3.11.1 General: Coordinate work with other sections. SCS Installation Contractor shall be responsible for the provision of cabling sleeves and conduits unless specifically provided by the Electrical Contractor. SCS Installation Contractor shall coordinate with Electrical Contractor to determine exact requirements.
- 3.11.2 When required, set sleeves in forms before concrete is poured. Provide core drilling as necessary if walls are poured or otherwise constructed without sleeves and wall penetration is required. Do not penetrate structural members. Provide sleeves and packing materials at all penetrations of foundations, walls, slabs (except on-grade), partitions, and floors.
- 3.11.3 Sleeves shall meet requirements of pertinent specifications. Lay out penetration and sleeve openings in advance, to permit provision in work. Set sleeves and conduit in forms before concrete is poured.
- 3.11.4 Provide remedial work where sleeves and conduits are omitted or improperly placed.
- 3.11.5 Sleeve fill: Sleeves that penetrate outside walls, basement slabs, footings, and beams shall be waterproof.

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- 3.11.5.1 Fill slots, sleeves and other openings in floors or walls if not used.
- 3.11.5.2 Fill spaces in openings after installation of conduit or cable.
- 3.11.5.3 Fill for floor penetrations shall prevent passage of water, smoke, fire, and fumes.
- 3.11.5.4 Fill shall be fire resistant in fire floors and walls, and shall prevent passage of air, smoke and fumes. See section 27 06 37 - Firestopping for Telecommunications Systems.
- 3.11.5.5 Sleeves through floors shall be watertight and shall extend 2 inches above floor surface.
- 3.11.5.6 Where raceways passing through openings are exposed in finished rooms, finishes of filling materials shall match and be flush with adjoining floor, ceiling, and wall finishes.
- 3.11.6 Conduit sleeves: Annular space between conduit and sleeve shall be at least 1/4 inch. Sleeves shall not be provided for slabs-on-grade unless specified or indicated otherwise. For sleeves through rated fire walls and smoke partitions, comply with requirements for firestopping. See section 27 06 37 - Firestopping for Telecommunications Systems.
- 3.11.7 Supports: Do not support piping risers or conduit on sleeves.
- 3.11.8 Future use: Identify unused sleeves and slots for future installation.

3.12 Core Drilling

- 3.12.1 General: Core drilling shall be avoided where possible. Where core drilling is unavoidable, locate all required openings prior to coring.
- 3.12.2 Coordinate openings with other trades and utilities, and prevent damage to structural reinforcement.
- 3.12.3 Thoroughly investigate existing conditions in vicinity of required opening prior to coring, including an x-ray of floor if deemed necessary by competent personnel.
- 3.12.4 Set sleeves prior to installation of structure for passage of pipes, conduit, ducts, etc.
- 3.12.5 Protect all areas from damage.

3.13 Cleaning

- 3.13.1 Contractor is responsible for cleanup of debris on a daily basis. Cost of cleanup is the responsibility of the Contractor. During progress of work, remove equipment and unused material. Put building and premises in neat and clean condition. Perform cleaning and washing required to provide acceptable appearance and operation of equipment to satisfaction of Owner's Representative.
- 3.13.2 After completion of Project, clean exterior surface of all equipment, including concrete residue, dirt, and paint residue. Final cleaning shall be performed prior to Project acceptance by Owner's Representative.

3.14 Access and Access Panels

- 3.14.1 General: Provide access to materials and equipment that require inspection, replacement, repair or service. Provide access panels and/or doors as required to allow service of all equipment components. Provide access panels where items installed require access and are concealed in floor, wall, furred space or above ceiling. Ceilings

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consisting of lay-in or removable splined tiles do not require access panels. Locations of equipment requiring access shall be noted on record drawings. Access panels shall have same fire rating classification as surface penetrated.

- 3.14.2 Coordination: Coordinate and prepare a location, size, and function schedule of access panels required to fully service equipment and deliver to Owner.
- 3.14.3 Construction: Panels shall be at least 12 inches by 12 inches, and located to provide optimum access to equipment for maintenance and servicing. Verify access panel locations and construction with Owner's Representative.

3.15 Startup and Operational Testing

- 3.15.1 General: Owner maintains right to have access to entire project site to prepare facility for occupancy and operation. Completion of startup and field testing shall be accomplished as a prerequisite for substantial completion.
- 3.15.2 Operate and maintain systems and equipment until final acceptance by Owner.
- 3.15.3 All guarantees and warranties shall not begin until final acceptance of systems and equipment by Owner. Acceptance requires, at a minimum, complete systems startup and testing.

3.16 Special Responsibilities and Information

- 3.16.1 Coordination of information: Cooperate and coordinate with work of other sections in executing work of this section. Perform work such that progress of entire project, including work of other sections, shall not be interfered with or delayed. Provide information as requested on items furnished under this section, which shall be installed under other sections. Obtain detailed installation information from manufacturers of equipment provided under this section.
- 3.16.2 Information gathering: Obtain final rough-in dimensions or other information as needed for complete installation of items furnished under other sections or by Owner. Keep fully informed as to shape, size and position of openings required for material or equipment to be provided under this and other sections. Give full information so that openings required by work of this section may be coordinated with other work and other openings and may be provided for in advance. In case of failure to provide sufficient information in proper time, provide cutting and patching or have same done, at no expense to Owner.
- 3.16.3 Housekeeping pads: Provide information as requested as to sizes, number and locations of concrete housekeeping pads necessary for floor mounted equipment.
- 3.16.4 Maintenance of equipment and systems: Maintain equipment and systems until Final Acceptance. Ensure adequate protection of equipment and material during delivery, storage, installation and shutdown and during delays pending final test of systems and equipment because of seasonal conditions.
- 3.16.5 Use of premises: Use of premises shall be restricted as directed by Owner's Representative and as required below:
- 3.16.6 Cleaning and rubbish removal: Remove and dispose of dirt and debris, and keep premises clean. During progress of work, remove equipment and unused material. Put building and premises in neat and clean condition, and do cleaning and washing

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required to provide acceptable appearance and operation of equipment, to satisfaction of Owner's Representative.

- 3.16.7 Rubbish Removal: Provide for the removal from the site of all spoils, debris, boxes, packaging, crates, and trash generated from the work.
- 3.16.8 Storage: Store materials maintaining an orderly, clean appearance. If stored on site in open or unprotected areas, all equipment and material shall be kept off ground by means of pallets or racks, and covered with tarpaulins.
- 3.16.9 Protection of fireproofing: Clips, hangers, clamps, supports and other attachments to surfaces to be fireproofed shall be installed, if possible, prior to start of spray fire proofing work. Conduits and other items that would interfere with proper application of fireproofing shall be installed after completion of spray fire proofing work. Patching and repairing of fireproofing due to cutting or damaging to fireproofing during course of work specified under this section shall be performed by installer of fireproofing and paid for by section responsible for damage and shall not constitute grounds for an extra to Owner.
- 3.16.10 Temporary utilities: Refer to contract general requirements regarding requirements.
- 3.16.11 Movement of materials: Unload materials and equipment delivered to site. Pay costs for rigging, hoisting, lowering and moving equipment on and around site, in building or on roof.

3.17 Division of Work

- 3.17.1 General: Division of work responsibility matrix at the end of this section is for Contractor's reference to clarify roles of various manufacturers, installers, subcontractors, and trades involved in telecommunications system Project. Contractor holding contract with Owner is responsible for coordinating work of all subcontractors to provide a complete and usable Project complying with contract provisions of Project documents. Failure to coordinate work by subcontractors and suppliers will not be considered justification for additional compensation or extension of schedule.
- 3.17.2 Each subcontractor employed by the Contractor to perform telecommunications work on a NOCCCD project shall possess a C-7 (formerly C-61) Limited Specialty License for Telecommunications and shall be certified by CommScope Inc., as an authorized **SYSTIMAX Structured Cabling System Business Partner** for the installation, termination, splicing, and testing of copper cables, copper riser cable, and inside wiring. For the fiber optic cables the contractor shall be an **authorized/licensed Sumitomo FutureFlex** supplier. The same regional certification statement for contractors applies to subcontractors. This requirement ensures integration into, support, maintenance, and warranty by the Contractor of the District existing telecommunications infrastructure. The appropriate subcontractor's license for underground construction and conduit installation is also required.

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3.17.3 Chart:

Spec. section	System	Division of work responsibility chart				Remarks
		Gen	Elec	Mec	Telecom	
25 xx xx	Building Automation System (BAS)	1	C	C	C	BAS low voltage cabling by Division 15 uses telcom cable tray.
21 xx xx	Fire Detection And Alarm System (FDAS)	1	C	C	C	Completely separate cabling system and raceways by Division 16
26 xx xx	Electrical wiring (line voltage)	1	2,W	C	C	Completely separate cabling system and raceways by Division 16
26 xx xx	Poke-through fittings and floor boxes	1	2, E	C	C	Telcom to provide data jacks and A-V connectors
26 xx xx	Cable tray	1	2, E	C	C	Comply with Section 27 05 28
26 xx xx	Electrical raceways	1	2, E	C	C	Comply with Section 27 05 28
27 02 00	General requirements for telecommunications system	2	C	C	1	
27 10 00	Structured Cabling System (SCS) for telecommunications systems		C	C	1, E, W	
27 05 28	Pathways for telecommunications systems	1	2, P	C	1	
27 05 26	Grounding and Bonding System (GBS) for telecommunications systems	1	2, G	C	1	
27 05 37	Firestopping for telecommunications systems		2, FP	C	1, FC	

- 1 = primary contractual responsibility
- 2 = secondary responsibility
- 3 = tertiary responsibility
- C = coordination of work responsibility
- E = provision of specified equipment and devices
- W = provision of specified system wiring/cabling
- P = provision of specified system pathways/conduits
- S = provision of specified system spaces
- FP = provision of specified firestopping for pathways
- FC = provision of specified firestopping for cabling

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