

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Scope of Work
- B. Other Affected Trades
- C. Codes and Standards
- D. General Requirements and Conditions
- E. Telecommunication Contractor Qualifications
- F. Qualifications of Subcontractors
- G. Product Requirements
- H. Submittals
- I. Record Drawings
- J. Definitions

1.2 RELATED SECTIONS

- A. Contract Terms and Conditions
- B. Section 16715 - Telecommunications - Acceptance Testing
- C. Section 16720 - Telecommunications - Basic Materials and Methods
- D. Section 16721 – Telecommunication - Air Blown Fiber Basic Materials and Methods
- E. Section 16725 - Telecommunications - Cable
- F. Section 16730 - Telecommunications - Underground Structures
- G. Section 16740 - Telecommunications - Building (RF) MATV System
- H. Section 16760 - Telecommunications - Grounding and Bonding

1.3 SCOPE

- A. Scope of Work
 - (1) The scope of work includes the provision, installation, testing, and documentation of physical resources for the **NAME OF PROJECT HERE** Telecommunications

NAME OF PROJECT
PROJECT LOCATION

TELECOMMUNICATIONS GENERAL REQUIREMENTS
16710-1
XX% CONSTRUCTION DOCUMENTS – DATE HERE

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

Infrastructure Upgrade installation.

- (2) The Contractor will provide all labor, materials, tools, equipment, and permits necessary for the satisfactory and timely completion of the project.

The Contractor and District's representative shall jointly coordinate the implementation of the project. To that end a pre-installation meeting(s) will occur between the various trade representatives and the District representatives (including Communication Services) prior to the installation of any facilities (equipment, copper cable termination blocks, voice/data/video systems, electrical service, HVAC ducts/units, etc.) in communication rooms or in building spaces.

B. Statement of Work

- (1) The work includes, but is not limited to, the items outlined in the standards and indicated on the drawings, as well as all incidental items required to provide complete systems. The District, in agreement with the Contractor, will define the major portions of this work before construction is initiated.
- (2) The scope of work includes the provision, installation, testing, and documentation of physical resources for voice, data and video systems required by the construction documents.
- (3) The scope of work shall included the inter-building telecommunications pathways relocations, the installation of new manhole, pull boxes, fiber optic cables and copper cables as outlined in the contract drawings.

1.4 CODES AND STANDARDS

- A. All work shall be performed in compliance with the most restrictive of Municipal, State, and/or Federal Codes which may govern this work and shall conform to the following codes and standards:

- (1) National Fire Protection Association
- a. NFPA 70-1990 National Electric Code
 - b. NFPA 101 - Life Safety Code
 - c. NFPA 258 - Standard Test Method for Measuring Smoke Generated by Solid Materials
- (2) ANSI Standards
- a. ANSI C2-1981 National Electrical Safety Code
 - b. ANSI C80.3 Specification for Zinc-coated Electrical Metallic Tubing
 - c. ANSI/UL 797 Electrical Metallic Tubing
 - d. ANSI/ICEA S-83-596-1994 - Fiber Optic Premises Distribution Cable Technical Requirements
- (3) Electronics Industry Alliance/Telecommunications Industry Association (EIA/TIA)

**NAME OF PROJECT
PROJECT LOCATION**

TELECOMMUNICATIONS GENERAL REQUIREMENTS
16710-2
XX% CONSTRUCTION DOCUMENTS – DATE HERE

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

- a. EIA/TIA 568A - Commercial Building Telecommunications Wiring Standard
 - b. EIA/TIA 569 - Commercial Building Standard for Telecommunications Pathways and Spaces
 - c. EIA/TIA TSB 67 - Transmission Performance Standards for Field Testing of Unshielded Twisted-Pair Cabling Systems
 - d. EIA/TIA TSB 72 - Centralized Optical Fiber Cabling Guidelines
 - e. EIA/TIA TSB 75 - Additional Horizontal Cabling Practices for Open Offices
 - f. EIA/TIA 606 - Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
 - g. EIA/TIA 607 - Commercial Building Grounding and Bonding Requirements for Telecommunications
 - h. EIA - 310-D - Cabinets, Racks, Panels, and Associated Equipment
 - i. EIA/TIA 526-14 - Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
 - j. EIA/TIA 455-57A - Optical Fiber End Preparation and Examination
 - k. EIA/TIA 455-59 - Measurement of Fiber Point Defects Using an OTDR
 - l. EIA/TIA 455-60 - Measurement of Fiber Cable Length Using an OTDR
 - m. EIA/TIA 455-61- Measurement of Fiber Cable Attenuation Using an OTDR
 - n. EIA/TIA 455-95 - Absolute Optical Power Test for Optical Fibers and Cables
 - o. EIA RS-458A Standard Optical Waveguide Fiber Material Classes and Preferred Sizes
 - p. EIA-472 Generic Specification for Optical Waveguide Fibers
 - q. EIA 232-C
- (4) Federal Communications Commission (FCC) Part 15 and Part 68
 - (5) Title 24 - State of California Code of Regulations
 - (6) 1994 Uniform Building Code and UBC Standards and 1995 California Amendments (1995 California Building Code, Part 2, Title 24)
 - (7) Occupational Safety and Health Act (OSHA) Standards
 - (8) City or County Electrical Code, as applicable
 - (9) IEEE Standards
 - a. IEEE 802.2
 - b. IEEE 802.3
 - (10) NEMA VE1 Cable Tray Systems

NAME OF PROJECT
PROJECT LOCATION

TELECOMMUNICATIONS GENERAL REQUIREMENTS
16710-3
XX% CONSTRUCTION DOCUMENTS – DATE HERE

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

- (11) Underwriters Laboratories Standards:
 - a. UL 497 Electrical Grounding and Bonding Equipment
 - b. UL 1479 Fire Tests of Through-Penetration Firestops
 - c. UL Building Materials Directory; Through-Penetration Firestops Systems, and Fill, Void or Cavity Materials
 - (12) The Uniform Mechanical Code
 - (13) ASTM Standards:
 - a. ASTM E 814 Methods of Fire Tests of Through-Penetration Fire Stops
 - b. ASTM E 136 Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C
 - (14) Rural Electrification Association (REA), Bulletin 345-63, REA Standards for Acceptance Tests and Measurements of Telephone Plant
 - (15) Americans With Disabilities Act (ADA)
 - (16) CommScope, Inc. practices in accordance with SYSTIMAX SCS Design & Installation Guidelines.
 - (17) California State District, Office of the Chancellor - Telecommunications Infrastructure Planning (TIP) Standards – Adopted July 2003, plus the most recently issued TIP updates
 - (18) North Orange County Community College District TELECOMMUNICATION INFRASTRUCTURE STANDARDS dated January 2007.
- B. Where reference is made to a requirement that exceeds minimum code requirements, the specification requirement shall take precedence. The Contractor and District representative shall jointly resolve any work that is in apparent conflict with applicable codes.
- C. When these standards call for materials or construction of better quality or larger sizes than required by the above-mentioned rules and regulations, the provisions of these standards shall take precedence.
- D. In accordance with these laws, rules, and regulations, the Contractor shall provide the following:
- (1) Any additional material and labor that may be required for compliance with these laws, rules, and regulations, even though the work is not mentioned in these particular standards.
 - (2) All permits required by any of the legally constituted public authorities for the installation or construction of the work.
 - (3) Any inspection or examinations required. Copies of certificates of all such inspections shall be delivered to the District representative.

NAME OF PROJECT
PROJECT LOCATION

TELECOMMUNICATIONS GENERAL REQUIREMENTS
16710-4
XX% CONSTRUCTION DOCUMENTS – DATE HERE

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

- (4) If any work is concealed without proper inspection and approval, the Contractor shall be responsible for all work required to open and restore the concealed areas, in addition to all required modifications.

1.5 GENERAL REQUIREMENTS AND CONDITIONS

A. Safety and Indemnity

- (1) The Contractor shall be solely and completely responsible for conditions of the job site, including safety of persons and property during performance of work.
- (2) The Contractor shall ensure that all personnel working in or anywhere on the site shall be provided a hard hat, safety shoes, a face shield or safety goggles, etc. for their protection.
- (3) If required by the campus, all personnel working in or anywhere on the site shall display a photo-ID designed by the campus or an approved equivalent.
- (4) The Contractor shall ensure that all personnel working in or anywhere on the site shall conform to the campus's regulations regarding confined space.
- (5) No act, service, drawing review, or construction observance by District representative or any other party employed by the campus is intended to include review or approval of adequacy of the Contractor's safety measures, in, on, or near the construction site.

B. Quality Assurance

- (1) The standards contained herein are set forth as the minimum acceptable requirements of the Contractor's Quality Assurance program. The Contractor is responsible for executing any other Quality Assurance measures necessary to ensure complete and fully functioning systems within the scope of this project.
- (2) The Contractor shall ensure that all design, workmanship, materials employed, required equipment, and the manner and method of installation conform to accepted practices. Where specific standards do not apply, the more stringent of industry publications, NOCCCD and campus policies and manufacturer's guidelines.
- (3) The Contractor shall also ensure that each piece of equipment is in satisfactory working condition.
- (4) The Contractor shall certify that the cable manufacturers have carried out the quality assurance tests and procedures as specified herein. An ISO9001 Certified Manufacturer must manufacture all cable.
- (5) The Contractor is responsible for ensuring that the cable packaging for shipping/storage purposes meets or exceeds the following requirements:
 - a. One continuous length of cable per shipping reel/container.
 - b. Reels must be wooden or steel, sturdy, lagged, and shall have thermal protection jackets applied prior to lagging.

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

- c. Each reel/container shall be individually identified and marked with the length of the cable it contains. Said marking shall withstand weather and shipping conditions and remain readable.
 - d. For fiber optic cable, results of the 100% Attenuation Tests conducted at the factory shall accompany each reel.
 - e. Cable shall be packed in a manner that facilitates the pre-installation tests to be conducted while the cable is still on the reel (i.e., both ends of the cable must be accessible while protected from moisture).
 - f. The Quality Assurance Plan employed shall include on-reel testing of fiber and UTP, including, but not limited to, OTDR, power loss, attenuation, etc. (as applicable for given cable media).
- C. Manufacturer's Literature: Where these standards call for an installation to be made in accordance with the manufacturer's recommendations, a copy of such recommendations shall always be kept on the job site and shall be available to District representative.
- D. Acceptance of Project
- (1) NOCCCD and the Contractor shall accept the project as complete based on the following criteria:
 - a. Before executing any performance testing, the Contractor shall present a test plan to the District representative for their approval.
 - b. The Contractor has completed all testing and delivered copies of all test results to the District representative.
 - c. All test results have been examined and approved by the Contractor and District representative.
 - d. Copies of all documentation required by this section have been delivered to District representative.
 - e. All punch list items are completed to the satisfaction of the District representative.
 - f. SYSTIMAX Certification Certificates are provided by the Contractor to the District representative.
 - (2) Following completion and/or compliance with the requirements listed above, the Contractor shall issue a Notice of Completion confirming that the project is complete. A 45-day acceptance period shall begin immediately following the issuance of the Notice of Completion.
 - (3) Minor failures shall be responded to at the District discretion or within one business day.
- E. Guarantee and Warranties
- (1) The installed structured wiring system (including both inter- and intra-building subsystems utilizing copper and fiber optic cabling) shall be a Commscope, Inc. SYSTIMAX Structured Cabling System, certified for a 20-year period.

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

- a. 20-Year Extended Product Warranty - The 20 Year Extended Product Warranty shall ensure against product defects, that all approved cabling components exceed the specifications of TIA/EIA 568A and ISO/IEC IS 11801, exceed the attenuation and NEXT requirements of TIA/EIA TSB 67 and ISO/IEC IS 11801 for cabling links/channels, that the installation will exceed the loss and bandwidth requirements of TIA/EIA TSB 67 and ISO/IEC IS 11801 for fiber links/channels, for a twenty (20) year period. The warranty shall apply to all passive SCS components.
 - b. The 20-Year Extended Product Warranty shall cover the replacement or repair of defective product(s) and labor for the replacement or repair of such defective product(s) for a twenty (20) year period.
 - c. 20-Year Application Assurance - The 20-Year Application Assurance shall cover the failure of the wiring system to support the application which it was designed to support, as well as additional application(s) introduced in the future, up to 622Mbps parallel transmission schemes, by recognized standards or user forums that use the TIA/EIA 568A or ISO/IEC IS 11801 component and link/channel specifications for cabling, for a twenty (20) year period.
 - d. The warranty information for the video system(s) is covered in Section 16740 subsection 1.10.
- (2) 20 year future-flex warranty on the air blown tube cable and fiber optic cables from Sumitomo. Warranty to include all materials and labor.
 - (3) Acceptable proposed Systems will be covered by a two-part certification program provided by a single manufacturer and that manufacturer's certified vendor. The first part is an assurance that the certified system will support the applications for which it is designed (including certified Category 5e) during the lifetime of the certified system. The second portion of the certification is a twenty-year warranty provided by the manufacturer and the vendor on all products within the system (i.e., cords, telecommunications outlet/connectors, cables, cross-connects, and baluns). Manufacturer shall administer a follow up program through the vendor to provide support and service to the District.
 - (4) The Contractor shall be responsible for correcting any problems and malfunctions that are warranty-related for the entire warranty period.
 - (5) Copies of any extended material warranties shall be passed through to the District representative.
 - (6) During the installation and up to the date of final acceptance, the Contractor shall protect all finished and unfinished work against damage and loss. In the event of such damage or loss, the Contractor shall replace or repair such work at no cost to the District or any other Trade Partnership working on the project.

F. Schedule

- (1) The Contractor shall submit, prior to project start, a time line for the project,

**NAME OF PROJECT
PROJECT LOCATION**

**TELECOMMUNICATIONS GENERAL REQUIREMENTS
16710-7
XX% CONSTRUCTION DOCUMENTS – DATE HERE**

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

showing all major dependencies and interactions with other trades. The schedule shall:

- a. Identify any and all disruption to existing services and/or service shutdowns on the schedule.
 - b. Identify specifically the anticipated completion date for the project. These completion dates shall be designated as milestones on the schedule.
- (2) The Contractor shall not take any facility out of service during the District normal hours of operation without agreement from the campus. Any out-of-service activity shall be requested in writing and be coordinated two weeks in advance. The activity should generally be scheduled after hours.
- (3) The Contractor shall make updates to the time line and shall provide a weekly written status report to the District representative.
- a. Each status report shall include details of project progress and shall describe any special incidents, activities, circumstances, or interruptions of workflow.
 - b. The status reports shall specifically itemize areas that shall be affected by project activities planned for the succeeding week.

1.6 TELECOMMUNICATIONS CONTRACTOR QUALIFICATIONS

Systemax Contractor Qualifications: (voice and data)

- A. To ensure that the quality of the work performed meets the standards of the District and the standards that have been established since the earthquake, the following items identify requirements of the Contractor in order to bid this project.
 - (1) The Contractor must be a SYSTIMAX certified Business Partner in good standing with CommScope, Inc. within the geographical region in which the campus resides (Southern California).
- B. To qualify for the bid, the District representative, its communications consultant, its construction management firm, and Commscope Inc. (only to appropriate systems) must evaluate the quality of work to ensure that our standards can be met.
- C. The Contractor must hold a valid State of California Contractor's license with the proper telecommunications classifications.
- D. The Contractor must have a SYSTIMAX-certified installer/foreman on-site throughout the cabling project that holds a current SYSTIMAX Installation & Maintenance designation.
- E. The Contractor must have a SYSTIMAX-certified person within its organization that holds a current SYSTIMAX Design & Engineering Designation.
- F. The Contractor that installs the voice and data systems is the main telecommunications contractor and as such will oversee all aspects to the telecommunications project including voice, data, and video networks utilizing copper, fiber optics and coaxial cabling. If the main telecommunications contractor is not qualified to install the video

**NAME OF PROJECT
PROJECT LOCATION**

**TELECOMMUNICATIONS GENERAL REQUIREMENTS
16710-8
XX% CONSTRUCTION DOCUMENTS – DATE HERE**

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

system(s), then qualified subcontractors must be provided for that portion of the total telecommunications project. (See video contractor qualification below.)

Video Contractor Qualifications:

- A. To ensure that the quality of the work performed meets the standards of the District and the standards that have been established by (TIP), the following items identify requirements of the Contractor in order to bid this project.
- B. To qualify for the bid, the District representative, its communications consultant, and its construction management firm must evaluate the quality of work to ensure that our standards can be met.
- C. The Contractor must hold a valid State of California Contractor's license with the proper telecommunications classifications.

Broadband Communications Engineer

- A. The Contractor shall provide or subcontract with a qualified Broadband Communications Engineer to provide supervision of the installation, activation, balancing, and proof of performance testing of the Bi-directional (RF) MATV System.
- B. The Contractor's Broadband Communications Engineer shall be on-site for progress meetings, as scheduled by the California State District, Northridge, Construction Coordinator.
- C. The Contractor's Broadband Communications Engineer shall provide, full time, on site supervision of all installation, activation, balancing, and proof of performance testing associated with the Bi-directional (RF) MATV System.
- D. The Contractor's Broadband Communications Engineer shall provide direction in the final selection of all Bi-directional (RF) MATV System components and their final placement.

Broadband Communications Technician

- A. The Contractor shall provide or subcontract with a qualified Broadband Communications Technician for the installation, activation, balancing, and proof of performance testing of the (RF) MATV System.

Complete (RF) MATV System

- A. The Contractor is responsible for the installation, activation, balancing, and proof of performance testing of the (RF) MATV System to ensure the completed system function as outlined in the contract documents, as specified by North Orange Community College District, and as recommended by the NCTA.

1.7 QUALIFICATIONS OF SUBCONTRACTORS

- A. All subcontractors employed by the Contractor shall have a minimum of 5 years' experience in satisfactory completion of jobs of similar scope and amount.

**NAME OF PROJECT
PROJECT LOCATION**

**TELECOMMUNICATIONS GENERAL REQUIREMENTS
16710-9
XX% CONSTRUCTION DOCUMENTS – DATE HERE**

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

- B. The Contractor shall compile detailed information relating to similar work involving Category 5e cabling and optical fiber completed by all subcontractors during the previous twelve months. This information shall include corporate references sufficient to enable the District representative to evaluate and agree to the subcontractors' responsibility, experience, and capacity to perform the work.
- C. 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 **must be certified by Commscope Inc., as a authorized SYSTIMAX Structured Cabling System Business Partner** for the installation, termination, splicing, and testing of copper cables, fiber optic cable, riser cable, and inside wiring. The same regional certification statement for contractors applies to subcontractors. This requirement ensures integration into, support, maintenance, and warrantee by the Contractor of the District existing telecommunications infrastructure. The appropriate subcontractor's license for underground construction and conduit installation is also required.
- D. An on-site Contractor superintendent must be available at all times. District representatives must be able to contact said person either in person, by telephone, or by pager.

1.8 PRODUCT REQUIREMENTS

- A. General Information
 - (1) This section identifies the minimum standards for product quality acceptable to NOCCCD by designating a manufacturer's trade or brand name and catalog or model number and by describing attributes, performance, or other standards.
 - (2) Where applicable, Commscope, Inc. products are specified as the standard for quality and performance of products to be used in this installation.
 - (3) For products described only by attributes, performance, or standards, the Contractor shall develop a Product Submittal in accordance with the requirements set forth herein and review it with District representative.
 - (4) Such phrases as "or equal," "or equivalent," and "or acceptable substitute" indicate that an equivalent product may be proposed as a substitute for that which is specified. The proposed substitution must meet or exceed the attributes, performance, or other standards of the specified product and must be approved by District representative.
 - (5) Failure of the Contractor to submit proposed substitutions for approval in the manner described above shall be sufficient cause for disapproval by the District of any substitutions otherwise proposed.
 - (6) Physical samples may be required. If tests for the determination of equality and utility are required by the District, they shall be made by a testing laboratory, with the acceptance of the test procedure first given by District representative, at the expense of the Contractor.

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

B. Quality of Materials

- (1) All materials and equipment supplied by the Contractor shall be new, manufactured within one (1) year prior to installation, and shall meet or exceed the latest published standards of the manufacturer. All material shall be acceptable to and approved by the District representatives as meeting these standards.
- (2) All communications materials used on this project shall conform, where applicable, to the following standards, unless otherwise noted:
 - a. NEMA - National Electrical Manufacturers Association
 - b. ANSI - American National Standards Institute
 - c. UL - Underwriters Laboratories, Inc.
 - d. The latest IEEE and EIA/TIA 568 standards
 - e. FCC and NCTA Coaxial Cable Television Standards
- (3) Communications systems materials and equipment shall be FCC Type-accepted and certified as such by supplier.
- (4) No material employed shall present environmental or toxicological hazards as defined by current industry standards. All materials shall comply with CAL OSHA and EPA standards or applicable federal or state laws or regulations.
- (5) The equipment, apparatus, and material for fiber optic equipment and apparatus shall conform to existing CAL OSHA health and safety laws. The equipment and apparatus shall have provision for application of safety labels such as LASER identification or warning labels as required by system considerations.

C. Materials Delivery and Storage

- (1) Costs of all shipping to the site, inside handling, and all unusual storage requirements shall be borne by the Contractor.
- (2) The Contractor shall make appropriate arrangements and coordinate with authorized personnel at the site for the proper acceptance, handling, protection, and storage of materials so delivered.

1.9 SUBMITTALS

A. Shop Drawings and Supplemental Data

- (1) Copies of shop drawings and supplemental data shall normally be provided for the District review. Shop drawings shall be submitted for all communications equipment, cabling, and structure pertaining to the job (distribution frames, conduit, wire, fiber optic cable, optical terminations, splices, etc.).
- (2) Design submittals (reflecting field conditions, actual cable lengths, equipment elevations, and performance expectations) shall be prepared for each system included in the project scope and reviewed with District representative.

NAME OF PROJECT
PROJECT LOCATION

TELECOMMUNICATIONS GENERAL REQUIREMENTS
16710-11
XX% CONSTRUCTION DOCUMENTS – DATE HERE

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

- (3) Copies of final shop drawings and supplemental data, where called for, shall be submitted to the District representative. Final corrected copies of schedules and shop drawings or supplemental data shall be as follows (exceptions shall be noted in Specification Sections):
- a. One (1) for the Campus Master Plan Architect's files, if applicable
 - b. One (1) for the Telecommunications Master Plan Engineer's files, if applicable
 - c. Two (2) for the District (Facilities Planning and IS Network Administration)
 - d. One (1) for the Contractor's job files, and such additional copies as the Contractor may desire for its own office files and/or for distribution to subcontractors or vendors.
- (4) The shop drawings and supplemental data called for shall be submitted as the instruments of the Contractor, even though they may have been prepared by a subcontractor, supplier, dealer, manufacturer, or by any other person, firm, or organization. Prior to submission, the Contractor shall undertake its own review and stamp with its acceptance, then submit to District representative for their review.
- By accepting and submitting shop drawings and supplemental data, the Contractor represents that the Contractor has determined and verified all field measurements, the physical construction, the quality of materials, the applicability of catalog numbers, and similar data, or will do so, and that the contractor has checked and coordinated each shop drawing with the requirements of the field conditions. Conflicts between trades shall be resolved by the Contractor in the shop drawings, if possible, but in any event prior to the actual construction.
- (5) All shop drawings shall be drawn accurately on paper suitable for duplicate copying by black, blue line printing processes or Xerox.
- (6) Supplemental data shall include information as noted in the specification paragraphs requiring them.
- (7) District representative will review shop drawings and supplemental data submitted by the Contractor only for general design conformance with the concept of the project and compliance with the information given in the Contract Documents.
- (8) Shop drawings, if requested shall be submitted to and favorably reviewed by District representative before being used by the Contractor on the job.
- (9) Shop drawings delineation: The shop drawings shall be drawn to scale and shall be completely dimensioned, giving the plan together with such sections as are necessary to clearly show construction detail.
- (10) Responsibility
- (a) These shop drawings and all supporting data, catalogs, etc., shall be prepared by the Contractor or its suppliers, but shall be submitted as the

SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS

instruments of the Contractor. Therefore, the Contractor shall check the drawings of its suppliers as well as its own drawings before submission.

- (b) In particular, the Contractor shall ascertain that the drawings meet all requirements of the drawings and standards and also confirm to the structural and space conditions.
 - (c) Each shop drawing submitted for the District representative approval shall bear a stamp certifying that it has been checked by the Contractor in accordance with the standards. If such shop drawings show variations from Contract Documents, whether because of standard shop practice or other reasons, the Contractor shall make special mention thereof in the letter transmittal.
 - (d) The Contractor shall be fully responsible for observing the need for and making any changes in the arrangement of piping, connections, wiring, manor of installation etc. that may be required by the proposed equipment, both as pertains to its own work and any work affected under other parts, headings, or divisions of Drawings and Standards.
- (11) Identification: Shop drawings shall be entitled with the name of the project on each sheet and shall otherwise be identified by listing the particular division, section, article or reference of the work to which they pertain. Different items shall be submitted on separate sheets, and all submittals shall be numbered serially.
- (12) Manner: The Contractor shall furnish for District representative approval separate submittal sheets for each specialty item in the following manner:
- (a) Catalog cuts shall be photocopied or reproduced in some other acceptable manner and submitted five (5) copies on one side only of an 8 1/2" x 11" sheet, noting only the items in question, together with the descriptive (specification) data. Drawings shall be submitted in ozalid transparency form.
 - (b) Each sheet shall be identified with the division, section, article or reference in the Contract Documents that covers the item submitted for approval.
 - (c) Each sheet shall be identified with the project name.
 - (d) Each sheet shall bear the Contractor's stamp and signature of approval.

1.10 RECORD DOCUMENTATION

- A. The Contractor shall keep one set of drawings on site to continually maintain an accurate record of the as-constructed work.
- B. All as-built documentation, including red-line as-builts of construction documents, shall be provided in AutoCad, Version 14 or greater.
- C. The marked-up drawings shall accurately indicate location of equipment, pull-boxes, conduits, cable types and labeling.
- D. All cabling placed must be entered into electronic database (Excel) approved by the District representative. The District representative shall provide the format and details to

NAME OF PROJECT
PROJECT LOCATION

TELECOMMUNICATIONS GENERAL REQUIREMENTS
16710-13
XX% CONSTRUCTION DOCUMENTS – DATE HERE

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

the Contractor, including cable number, count scheme, and terminal designations. The completed database file is to be presented to the District representative before the completion of the project in order for the District to establish assignment records.

- E. Room schedule requirements shall be reflected on the Contract Documents.
- F. Within 30 days of completing work, the Contractor shall submit five (5) copies of as-built drawings to the District representative. In addition, the Contractor shall provide an electronic copy of the as-built drawings in a format specified by the District.

1.11 DEFINITIONS

- **Backboard:** 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.

- **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.

NAME OF PROJECT
PROJECT LOCATION

TELECOMMUNICATIONS GENERAL REQUIREMENTS
16710-14
XX% CONSTRUCTION DOCUMENTS – DATE HERE

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

- **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:
 - (a) Three, 4 pair Category 6 telephone jacks that can be used for various services (voice, data, network, etc.); one is ivory, another is gray, and the third is orange.
 - (b) Two, 4 pair Category 6 telephone jacks (one ivory, one orange) and 1 fiber optic jack.
 - (c) Two, 4 pair Category 6 telephone jacks (one ivory, one orange) and 1 coaxial cable jack.
 - (d) One, 4 pair Category 6 telephone wall jack.
 - (e) 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..
- **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**

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

- (1) **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.
 - (2) **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 6 wire that connects the information outlet to the BDF or IDF.
 - **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**
 - (1) **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.
 - (2) **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.

**SECTION 16710
TELECOMMUNICATIONS GENERAL REQUIREMENTS**

- **Termination Frames**
 - (1) **Copper Termination Frames:** Devices designed and manufactured for the purpose of terminating large numbers of copper cable or station wire pairs. These devices generally utilize insulation displacement connections and usually require special tools to make the terminations. Throughout this specification, the terms Copper Termination Frame and Wiring Block are equivalent.
 - (2) **Data 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 Data Termination Frame and Wiring Block are equivalent.
 - (3) **Fiber Termination Frames:** Devices designed and manufactured for the purpose of terminating fiber optic cable fibers into either "ST" connector fields for multimode optics and "LC" connector fields for singlemode fiber optics.
 - (4) **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.

PART 2 - MATERIALS

Not used

PART 3 - EXECUTION

Not used

END OF SECTION

**NAME OF PROJECT
PROJECT LOCATION**

TELECOMMUNICATIONS GENERAL REQUIREMENTS
16710-17
XX% CONSTRUCTION DOCUMENTS – DATE HERE