LONG BEACH CITY COLLEGE DISTRICT
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BID C1994B BUILDLING B POWER AND DATA UPGRADE PROJECT AT THE LIBERAL ARTS CAMPUS ADDENDUM NO. 2

May 21, 2019

This Addendum forms a part of the Contract Documents and modifies the original DSA approved bid documents. Acknowledge receipt of the Addendum on Section 1.2 of the Bid Proposal. Failure to do so may result in the bid being deemed non-responsive.

Note: It is the responsibility of all bidders to notify all subcontractors from whom they request bids and from whom they accept bids of all changes contained in this addendum.

ADDENDUM NO. 2 CONTENTS

I. ANSWERS TO PRE-BID INQUIRIES
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I. ANSWERS TO PRE-BID INQUIRIES

1. **Q:** Attachment G site map shows site limits and contractor lay down area constricted to the perimeter extent of Bldg. B. It also shows additional parking in Parking Lot M and calls for the General Contractor to provide a shuttle to and from the parking lot. Seeing that this project is centered around electrical and data work; will those trades be allowed to park next to Building B? Is the college going to enforce this shuttle requirement for this project?

   A: *We will allow a maximum of three (3) trucks to be parked in parking Lot I adjacent to Bldg. B. Trucks must be small enough to fit within a normal parking stall with no equipment or materials sticking out of the truck. Larger trucks and deliveries will need to be coordinated via the logistics plan that the Contractor submits for approval from the District prior to any workers entering the site. Temporary barricade or fencing may be required if vehicles are larger than the normal standard parking stall. Parking Lot I will not be used as a staging area to prep materials or equipment at any time. All other vehicles must be parked in Lot M, and workers will need to be shuttled to and from the site.*

2. **Q:** Attachment D Schedule of Milestones: these milestones are only in reference to the days allowed for the contractor to submit certifications, documents and submittals. What can we expect as a turnaround time form the college? Will these milestones be adjusted based on the turnaround from the college?

   A: *The Schedule of Milestones also shows the amount of Calendar Days for Substantial Completion and Final Completion. The submittal documents as noted on Milestone items 2 and 3 are for the*

Contractor to submit the initial submittal items that are critical to commencing this project. Submittal of such items shall be complete and will be rejected if not found to be complete. The review time for all submittals is noted on specification section 013300 – Submittal Procedures, sub-section 1.5-C., which states, "Coordinate preparation of Submittal Schedule with College Project Manager, allowing more than 21 days of review time for complicated or lengthy Submittals and less time than 21 days for those less complicated and less lengthy Submittals. Allow time for separate review by Architect/Engineer (A/E) of Record prior to submittal to review by College Project Manager." However, as this is a small project with a short schedule, the A/E, PM and District will work to expedite reviews. Contractor is to advise on long lead items and items that are critical to be received in a timely manner in order to procure.

3. **Q:** Section 271100.2.5, 2.7 and 2.8, identify location of Cisco Networking & Cabling Labs. Where is this located on the drawings.?

   A: *These sections relating to Cisco Networking was included in error and does not exist on this project. Please omit sub-sections:*
   - *2.5 VERTICAL CABLE MANAGEMENT (CISCO NETWORKING AND CABLING LABS)*
   - *2.7 POWER DISTRIBUTION UNIT (PDU) in Cisco NETWORKING Lab #QQ219*
   - *2.8 WALL MOUNTED PATCH CORD CABLE CADDY IN CISCO NETWORKING LAB #QQ219*

4. **Q:** Section 271500.2.4 and 2.7 refers to Internal Educational Network Cable in Cisco Networking and Cabling Labs and states this cabling is to be white in color. There is no information on Plan Sheets E301, E302 or E303 about how many of these white cables are to be installed, the locations where these cables are to be routed, or where the networking racks the cables are to terminate are to be located. Please furnish this information to bidders?

   A: *These sections relating to Cisco Networking were included in error and do not exist on this project. The specification section will be replaced in its entirety as part of this Addendum No. 2.*

5. **Q:** A location nearest Sector C2 of Plan Sheet E302 exhibits a symbol for Key Note 10 with an arrow pointing at a speaker symbol. There is also a "(TYP)" notation near the symbol, presumably meaning the depicted instruction is typical. Among other stated requirements Key Note 10 instructs the successful bidder to furnish two 48 port switches and fiber connectivity to an existing BDF switch. This specific location appears to be an error on the drawings as there is no provision for mounting these switches and no LAN cabling emanates from this location. Please affirm or issue correction as needed?

   A: *Keynote 10 pointing at the speaker symbol is in error. Keynote for the speaker should be keynote #11 to match what is shown on sheet E301 and E303, and is typical for all speaker symbols shown on the plan. Also see Addendum No. 1, Pre-Bid Inquiry #3 that clarifies AV device scope of work.*

6. **Q:** Section 271500 refers to manufacturer part numbers that are no longer valid. What are the current part numbers for items being required by the college?

   A: *See updated specification section 271500 for updated Commscope Uniprise product information and requirements. In addition, see updated sub-section 2.3.-A. For existing buildings, the District will accept use of CAT 6 or CAT 5E, and all related equipment/ components.*

II. CHANGES TO SPECIFICATIONS

1. 271500 Communications Horizontal Cabling, dated May 21, 2019 – *Addendum 2.*
   - Replace specification section 271500 in its entirety with the attached Addendum No. 2 spec section.

III. ATTACHMENTS

1. Addendum 2 Specifications: 271500.

*****END OF ADDENDUM NO. 2*****

LONG BEACH COMMUNITY COLLEGE DISTRICT

Alan Moloney, Deputy Director
Purchasing & Contracts Management

5-21-19
Date

SECTION 271500 - COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. UTP cabling.
2. 50/125-micrometer, optical fiber cabling.
3. Multiuser telecommunications outlet assemblies.
4. Cable connecting hardware, patch panels, and cross-connects.
5. Telecommunications outlet/connectors.
6. Cabling system identification products.
7. Cable management system.
8. Client's (Structured Cabling System) SCS

B. Related Requirements:

1. Section 271300 "Communications Backbone Cabling" for voice and data cabling associated with system panels and devices.
2. Section 271100 – Communications Equipment Room Fittings

1.3 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.

C. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

D. EMI: Electromagnetic interference.

E. IDC: Insulation displacement connector.

F. LAN: Local area network.

G. MUTOA: Multiuser telecommunications outlet assembly, a grouping in one location of several telecommunications outlet/connectors.

H. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.

I. RCDD: Registered Communications Distribution Designer.

J. UTP: Unshielded twisted pair.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate layout and installation of telecommunications cabling with Owner's telecommunications and LAN equipment and service suppliers.

B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For copper, fiber and coaxial cable, include the following installation data for each type used:

a. Nominal OD.
b. Minimum bending radius.
c. Maximum pulling tension.

B. Shop Drawings:

1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
3. Cabling administration drawings and printouts.
4. Wiring diagrams to show typical wiring schematics, including the following:

a. Cross-connects.
b. Patch panels.
c. Patch cords.

5. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.

C. Samples: For workstation outlets, jacks, jack assemblies, in specified finish, one for each size and outlet configuration and faceplates for color selection and evaluation of technical features.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.

B. Source quality-control reports.

C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For splices and connectors to include in maintenance manuals.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Patch-Panel Units: One of each type.
2. Connecting Blocks: One of each type.
3. Device Plates: One of each type.
4. Multiuser Telecommunications Outlet Assemblies: One of each type.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings and Cabling Administration Drawings, Cabling Administration Drawings, and field testing program development by an RCDD.
2. Installation Supervision: Installation shall be under the direct supervision of a Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

B. Testing Agency Qualifications: An NRTL.

1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.

1. Test optical fiber cables to determine the continuity of the strand end to end. Use optical fiber flashlight.
2. Test optical fiber cables while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; including the loss value of each. Retain test data and include the record in maintenance data.
3. Test each pair of UTP cable for open and short circuits.

PART 2 - PRODUCTS

2.1 HORIZONTAL CABLING DESCRIPTION

A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called a "permanent link," a term that is used in the testing protocols.

1. TIA/EIA-568-B.1 requires that a minimum of two telecommunications outlet/connectors be installed for each work area.
2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
3. Bridged taps and splices shall not be installed in the horizontal cabling.
4. Splitters shall not be installed as part of the optical fiber cabling.

B. A work area is approximately 100 sq. ft. and includes the components that extend from the telecommunications outlet/connectors to the station equipment.

C. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

D. The Contractor shall install materials and equipment as part of the CommScope Uniprise® and Corning LANscape® Solutions. Various sections of this specification pertain to specific products and/or installation requirements that must conform to the warranty requirements of these structured cabling systems.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1 and TIA/EIA-568-B.2 when tested according to test procedures of this standard.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Grounding: Comply with ANSI/TIA-607-B.

2.3 COPPER STATION CABLE

A. Manufacturers:

1. CommScope Uniprise®
~~a. New Building or complete wiring renovation~~
~~Item Part#~~

- ~~CS44P ETL Verified Category 6A U/UTP Cable, plenum, blue jacket, 4 pair count, 1000 ft (305 m) length CommPak~~
- ~~Video Surveillance CS44P ETL Verified Category 6A U/UTP Cable, plenum, violet jacket, 4 pair count, 1000 ft (305 m) length CommPak~~

b. Existing buildings with CAT 6 or CAT 5E
Item Part#

- CS37P ETL Verified Category 6 U/UTP Cable, plenum, blue jacket, 4 pair count, 1000 ft (305 m) length CommPak
- Video Surveillance CS37P ETL Verified Category 6 U/UTP Cable, plenum, violet jacket, 4 pair count, 1000 ft (305 m) length CommPak

B. Description: Four unshielded twisted pair, solid annealed bare copper conductors insulated with FEP and covered with a flame retardant PVC jacket.

1. Comply with ICEA S-90-661 for mechanical properties.
2. Comply with TIA/EIA-568-B.1 for performance specifications.
3. Comply with TIA/EIA-568-B.2, Category 6A
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 910 and NFPA 70 for the following types:

   a. Communications, General Purpose: Type CMP
   b. Communications, Plenum Rated: Type CMP complying with NFPA 262.
   c. Communications, Riser Rated: Type CMP, complying with UL 1666.
   d. Communications, Limited Purpose: Type CMP.

5. All copper station cable shall be Category 6A, Plenum rated.
6. Station cables shall have a color jacket of blue.
7. Video surveillance cables shall have a color jacket of violet.

2.4 COPPER CABLE TERMINATION BLOCKS

A. Manufacturers:

1. CommScope Uniprise® (College Standard)

B. Materials:

1. Terminate Category 6, station cables designated for non-switched voice services (Non-VOIP) on 10-Pair Series 2 termination blocks. Termination blocks shall be wall mounted adjacent to copper entrance cable, protected terminal with wire management system between terminals.
2. Mount blocks to a Type 85 back mount frame. Blocks shall have transparent label holders.

2.5 DATA NETWORK PATCH PANELS

A. Materials
1. Data jack patch panels shall be rated Category 6A and covered under the CommScope Uniprise® structured cabling system extended warranty.
2. Each telecom room shall be equipped with a minimum of one, rack mounted, data patch panels in the same rack unless otherwise noted on the drawings. The patch panels shall include the following requirements.

a. 19 inch rack mounting.
b. Wired to T 568 B wiring scheme.
c. UL certified.
d. Equipped with wire retention clips as specified in the CommScope Uniprise® cabling program.
e. At least one 48 port modular M type patch panel shall be for terminating blue data cables. The size of this patch panel shall be 48 port to accommodate the blue data cables. Provide additional 24 or 48 port patch panels as required. Each port shall be color coded blue.
f. CommScope Uniprise® Part #s:

- Uniprise Solutions – 24 Port Modular Patch Panel – M2400-1U-GS – 760118323
- Uniprise Solutions – 48 Port Modular Patch Panel – M4800-1U-GS – 760105429
- Cable Management Bar – 360-RCM-RM (**Required for Modular Patch Panel**) 760104737
- 1 Pack M20 Dust Cover for M-Series Faceplates and Outlets, Black - M20AP-003 - 107065583

B. Manufacturer: CommScope Uniprise® (College Standard)

2.6 FIBER TERMINAL UNITS

A. Materials

1. The fiber optic terminals/patch panels shall utilize Corning Cable Systems Closet Connector Housings (CCH).
2. Each CCH shall have the following specifications:

a. Suitable for installation in EIA 19” mounting frame.
b. Provide cross-connect, inter-connect, and splicing capabilities and contain the proper troughs for supporting and routing the fiber cables/jumpers.
c. Consist of a modular enclosure with retainer rings in the slack storage section to limit the bending radius of fibers.
d. Equipped with a “window” section to insert connector panels for mounting of connectorized fibers (LC, duplex, style couplers and connectors).
e. Provide terminating cabability of couplers, in the quantity noted on the contract drawings in panels of 6 or 12 respectively.
f. Corning Cable Systems Unicam LC connectors for 50 µm multimode fiber with ceramic ferrule and Unicam LC with ceramic ferrule for singlemode fibers. The connectors shall have composite couplers in all patch bays that meet or exceed the following specifications:

1) Unicam LC Connectors (Singlemode) - Part Number: 95-200-99
2) Unicam LC Connectors (Multimode) - Part Number: 95-050-99-X (50µm Laser Optimized multimode fiber)
3) Interconnect Compatibility: Compatibility with FOICS 10 for LC junior version
4) Operating Temperature: ≤ 0.3db change -40º to 140ºF (-40º to 60ºC) in 21 cycles
5) Insertion Loss:
Multimode: 0.2dB average, 0.5 dB max. for laser-optimized multimode fiber
Singlemode: 0.3dB average, 0.77 dB max.
6) Durability: < or = .2 dB change, 500 remateings, FOTP-21

7) Tensile Strength: 10 lb < or + .2dB change, on jacketed cable; 0.5 lb < or = .2dB change on 900µm cable, FOTP-6
8) Reflectance: ≤ -50dB (+18° to +-26°C)
9) Nominal fiber OD: 125 uM
10) Housing Color Code:
Single-mode: Ceramic ferrule blue housing
Multimode: Ceramic ferrule black housing
11) Boot Color:
Single-mode: Blue
Multimode: Aqua
12) A common panel shall be used to terminate singlemode and multimode optical fibers.

B. Manufacturer: Corning Cable Closet Connector Housings (CCH-02U), (College Standard)

2.7 TELECOMMUNICATIONS OUTLET/CONNECTORS

A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-B.1.

B. Materials:

1. Metal outlet boxes shall be installed as receptacles for the information outlets in the following locations: new interior wall construction, exterior locations, locations with special vapor proof or explosion proof applications, and floor mounted outlets. Outlet boxes shall be galvanized steel. Boxes installed in any exterior location where exposed to rain or moisture laden atmosphere shall be cast screw hub type with gaskets and weatherproof covers. Boxes for vapor proof or explosion proof applications shall be designed specifically for such use.
2. In new wall construction, each box shall be flush mounted, ***two gang***, metal box. If the outlet is designated for four or less cables, provide a single gang mud ring. If the outlet is designated for more than four cables and less than nine cables, provide a two gang mud ring. Each box shall be equipped with a 1-¼" conduit stubbed into the ceiling area and equipped with a 12 inch radial bend angled toward cable tray or wire pathway. If cable trays are used as horizontal raceways, the 1-¼" conduit will be extended to the top of the cable tray.
3. Standard Data Outlet

a. The standard data outlet will be used for all data applications as well as voice services that use VOIP technology over the data network.
b. The standard data outlet shall consist of two (2) Category 6A four-pair cables, each terminated on a separate Category 6A rated RJ45 8-position jack following T-568 B wiring standards.
c. Category 6A copper data cables will be blue in color and terminated on the blue jacks mounted in the outlet. Category 6A copper video surveillance cables will be violet in color and terminated on the violet jacks mounted in the outlet. The other end of the cables will be terminated with matching jacks and mounted into a Uniprise Type M modular patch panel in the telecom room.
d. Provide CommScope Uniprise® outlets with the following part numbers:
Item Part #

- Data Jack – Uniprise Solutions CAT 6A – Blue – M-Series – UNJ10G-BL – 760150011

- Video Surveillance Jack – Uniprise Solutions CAT 6A – Violet – M-Series – UNJ10G-VL - 760150029
- M20 Dust Cover for M-Series Faceplates and Outlets, White - M20AP-262 - 107067928

e. The modular jacks shall be rated for Category 6A performance in the configuration installed.
f. The faceplate will be clearly labeled with outlet number, and each jack will be labeled with jack number. All labels will be typed or preprinted and shall be securely affixed to the faceplate.
g. Dust covers shall be placed in the vacant slots and the color of the dust covers the same as the faceplates.
h. Manufacturer: CommScope Uniprise® (College Standard)

4. Other Data Outlets

a. Other data outlets shall consist of one to six RJ45 8-wire modular jacks wired as per EIA/TIA 568B in a white outlet faceplate. The number of terminated cables at each outlet shall be according to floor plan drawings. Jacks shall be blue in color.
b. Data outlets with one to four cables shall have 4 port faceplates and data outlets with five to six cables shall have 6 port faceplates.
c. Provide data outlets with the following part numbers:
Item Part #

- 1 Port Faceplate – Uniprise Solutions – M-Series – White – M10L-262 - 108258427
- 2 Port Faceplate – Uniprise Solutions – M-Series – White – M12L-262 - 108168469
- 3 Port Faceplate – Uniprise Solutions – M-Series – White – M13L-262 - 108168501
- 4 Port Faceplate – Uniprise Solutions – M-Series – White – M14L-262 - 108168543
- 6 Port Faceplate – Uniprise Solutions – M-Series – White – M16L-262 - 108168584
- 1 Pack M20 Dust Cover for M-Series Faceplates and Outlets, White - M20AP-262 - 107067928

d. The modular jacks shall be rated for Category 6A performance in the configuration installed.
e. The faceplate will be clearly labeled with outlet number, and each jack will be labeled with jack number. All labels will be typed or preprinted and shall be securely affixed to the faceplate.
f. Dust covers shall be placed in the vacant slots and the color of the dust covers the same as the faceplates.
g. Category 6A copper data cables will be blue in color and terminated on the blue jacks mounted in the outlet. Category 6A copper video surveillance cables will be violet in color and terminated on the violet jacks mounted in the outlet. The other end of the cables will be terminated with matching jacks and mounted into a Uniprise Type M modular patch panel in the telecom room. See paragraph 2.5, A2f for data patch panel.
h. Data outlets with one or two cables for projectors and wireless access points shall be mounted flush to the finished ceiling.
i. Manufacturer: CommScope Uniprise® (College Standard)

5. Surface Mounted Data Outlets (Instruction Sheet)

a. Surface mounted data outlets shall consist of one to six RJ45 8-wire modular jacks wired as per EIA/TIA 568B in a white outlet faceplate. The number of terminated cables at each outlet shall be according to floor plan drawings. Jacks shall be blue in color.
b. Provide data outlets with the following part numbers:
Item Part #

- 1 Port Surface Mount Box – Uniprise Solutions – M-Series – White – M101SMB-B-262 – 107984015
- 2 Port Surface Mount Box – Uniprise Solutions – M-Series – White – M102SMB-B-262 – 107984056
- 4 Port Surface Mount Box – Uniprise Solutions – M-Series – White – M104SMB-B-262 – 107952459
- 6 Port Surface Mount Box – Uniprise Solutions – M-Series – White – M106SMB-B-262 – 107431538
- 1 Pack M20 Dust Cover for M-Series Faceplates and Outlets, White - M20AP-262 - 107067928

c. The modular jacks shall be rated for Category 6A performance in the configuration installed.
d. The faceplate will be clearly labeled with outlet number, and each jack will be labeled with jack number. All labels will be typed or preprinted and shall be securely affixed to the faceplate.
e. Dust covers shall be placed in the vacant slots and the color of the dust covers the same as the faceplates.
f. Category 6A copper data cables will be blue in color and terminated on the blue jacks mounted in the outlet. Category 6A copper video surveillance cables will be violet in color and terminated on the violet jacks mounted in the outlet. The other end of the cables will be terminated with matching jacks and mounted into a Uniprise Type M modular patch panel in the telecom room. See paragraph 2.5, A2f for data patch panel.
g. Data outlets with one or two cables for projectors and wireless access points shall be mounted 6 to 12 inches above the dropped ceiling.
h. Manufacturer: CommScope Uniprise® (College Standard)

2.8 FACEPLATES

A. Materials

1. Provide CommScope Uniprise® flush, wall-mounted faceplate to house work area jacks. The faceplate shall fit over a standard NEMA electrical box fitted with a plaster ring cover and shall be office white in color.
2. Provide blanking inserts in all unused faceplate ports. The blanking inserts shall be the same color as the faceplates.

B. Manufacturer: CommScope Uniprise®

2.9 GROUNDING

A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.

B. Comply with ANSI/TIA-607-B.

2.10 IDENTIFICATION PRODUCTS

A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

B. Comply with requirements in Section 260553 "Identification for Electrical Systems."

2.11 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.

B. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.

C. Factory test UTP cables according to TIA/EIA-568-B.2.

D. Factory test multimode optical fiber cables according to TIA-526-14-A and TIA/EIA-568-B.3.

E. Factory-sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response, or attenuation over frequency, of a cable by generating a voltage whose frequency is varied through the specified frequency range and graphing the results.

F. Cable will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.2 WIRING METHODS

A. Install cables in pathways and cable trays except within consoles, cabinets, desks, and counters. Conceal pathways and cables in all areas.

1. Install plenum cable in environmental air spaces, including plenum ceilings.
2. Comply with requirements in Section 270528 "Pathways for Communications Systems."
3. Comply with requirements in Section 270536 "Cable Trays for Communications Systems."

B. Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

C. Wiring within Enclosures:

1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
2. Install lacing bars and distribution spools.
3. Install conductors parallel with or at right angles to sides and back of enclosure.

3.3 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA/EIA-568-B.1.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. MUTOA shall not be used as a cross-connect point.
5. Consolidation points may be used only for making a direct connection to telecommunications outlet/connectors:

    a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
    b. Locate consolidation points for UTP at least 49 feet from communications equipment room.

6. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
7. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
8. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
9. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
10. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
12. In the communications equipment room, install a 10-foot long service loop on each end of cable.
13. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:

1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 1/2 inch from the point of termination to maintain cable geometry.

D. Optical Fiber Cable Installation:

1. Comply with TIA/EIA-568-B.3.
2. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

E. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.

3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

F. Installation of Cable Routed Exposed under Raised Floors:

1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Coil cable 6 feet long not less than 12 inches in diameter below each feed point.

G. Outdoor Coaxial Cable Installation:
1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
2. Attach antenna lead-in cable to support structure at intervals not exceeding 36 inches.

H. Group connecting hardware for cables into separate logical fields.

I. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-B for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:

a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:

a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.

5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.4 FIRESTOPPING

A. Comply with requirements in Section 078413 "Penetration Firestopping."

B. Comply with TIA-569-B, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.5 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with ANSI/TIA-607-B.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.6 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

1. Administration Class: 1 through 4**.**
2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.

B. Using cable management system software specified in Part 2, develop Cabling Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation. At completion, cable and asset management software shall reflect as-built conditions.

C. Comply with requirements in Section 099123 "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

D. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2, Class 3 and Class 4 level of administration**,** including optional identification requirements of this standard.

E. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

F. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, and entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.

G. Cable and Wire Identification:

1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

    a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
    b. Label each unit and field within distribution racks and frames.

5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
6. Uniquely identify and label work area cables extending from the MUTOA to the work area. These cables may not exceed the length stated on the MUTOA label.

H. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.

1. Cables use flexible vinyl or polyester that flex as cables are bent.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
2. Visually confirm Specified Category Performance marking of outlets, cover plates, outlet/connectors, and patch panels.
3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
4. Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.

    a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

5. Optical Fiber Cable Tests:

    a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
    b. Link End-to-End Attenuation Tests:

        1) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA-526-14-A, Method B, One Reference Jumper.
        2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.

6. UTP Performance Tests:

    a. Test for each outlet and MUTOA. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:

        1) Wire map.
        2) Length (physical vs. electrical, and length requirements).
        3) Insertion loss.
        4) Near-end crosstalk (NEXT) loss.
        5) Power sum near-end crosstalk (PSNEXT) loss.
        6) Equal-level far-end crosstalk (ELFEXT).
        7) Power sum equal-level far-end crosstalk (PSELFEXT).
        8) Return loss.
        9) Propagation delay.
        10) Delay skew.

7. Optical Fiber Cable Performance Tests: Perform optical fiber end-to-end link tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.3.
8. Coaxial Cable Tests: Conduct tests according to LBCC and SCTE standards and best practices.
9. Final Verification Tests: Perform verification tests for UTP **and optical fiber** systems after the complete communications cabling and workstation outlet/connectors are installed.

    a. Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.
    b. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.

D. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

E. End-to-end cabling will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.8 SOFTWARE SERVICE AGREEMENT

A. Technical Support: Beginning with Substantial Completion, provide software support for two years.

B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.

1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

3.9 DEMONSTRATION

A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets.

END OF SECTION 271500