Date:    January 19, 2024


Re:    Addendum No. 5 to the Bidding Documents for Security and Access Control Upgrades at The Riverview Psychiatric Center


This ADDENDUM is issued to modify, explain or correct the Drawings and Specifications, and is hereby made a part of the Contract Documents.

NOTICE TO ALL BIDDERS: Please read the entire ADDENDUM for references to all aspects of the Work.  This ADDENDUM shall be binding upon the Contractor and he shall furnish and install labor and materials indicated to be furnished and installed by him herein even though such Work is not graphically mentioned in the Drawings and Specifications.


**I.    GENERAL:**

A.  **REVISE** the issue date for Addendum #4 to read 01-08-24. The issue date was incorrectly stated as 12-08-23.

**II.    QUESTIONS RECEIVED OF CONTRACTORS:**

A.  Per Addendum 01 Item B.6, quiet time shall be maintained between 7 PM and 7 AM. This would imply we cannot work overtime. If bidders are to work overtime, please provide an allowance all bidders should carry for Overtime to ensure equity among all bids.

   **AEI Response:** It is not the responsibility of the design engineer to dictate the amount of time to be allotted for overtime to complete the project. It shall fall upon the means and methods of the contractor to determine the size of crew and total work hours required to complete the project in accordance with the contract requirements. Additionally, as to quiet time, there is no such implication with overtime work. Non-quiet time hours account for 12 hrs per day, seven days per week.


A.   Will a 2 week extension on the proposal deadline be considered to allow time to complete the turn-key integration design.?

   **AEI Response:** No, we do not feel that an extension is necessary and prefer to stay with the current bid date.

B.  Refer to attached table Attachment 1 for supplemental responses to bidder questions.


**III. CHANGES TO THE SPECIFICATIONS:**

A.  Add Specification 271300 Backbone Cabling in its entirety

B.  Add Specification 271500 Horizontal Cabling in its entirety


**IV. CHANGES TO THE DRAWINGS:**

**NONE**

END OF ADDENDUM #5

| Drawing Issue | Note | Drawing Location | Drawing Sheet | Question from Bidder |
|---|---|---|---|---|
| Addendum 1- Security and Access Control Upgrades- RPC.pdf | We will not be issuing an inventory of all existing devices. | Keynotes | E-101 & Other pages alike | Please provide a detailed inventory list of control panel breakout, quantties and other devices so we can accurately price the demolition of the existing system upon full utilization of the new system and develop the phasing plan required in E-101. |
| Addendum 1- Security and Access Control Upgrades- RPC.pdf | We do not have a camera schedule in exportable format. | Entire Page | E600 | Can a Camera Schedule report, in an exportable format (.CSV or .XLSX) be supplied for baseline design for integrators? |
| Addendum 1- Security and Access Control Upgrades- RPC.pdf | We do not have a schedule in exportable format. | Not Applicable | Not Applicable | Can an ACS Schedule of Card Readers, Wireless Locks, and Gateway units in an exportable format be supplied for baseline design for integrators? |
| 3305 IFB Specs DHHS RPC.pdf | There is a response format matrix for each clause. | 2.3 All subsections | 118 of 242 | What are these clauses, where are they, and do we need to include this in the baseline response? |
| 3305 IFB Specs DHHS RPC.pdf | If system licensing is required, the license to use the system shall allow usage in perpetuity. | 2.6 | 122 | Can these licenses be renewed year over year as part of the warranty period and does that qualify? |
| 3305 IFB Specs DHHS RPC.pdf | The ISMS must have an integrated card design program. Systems offering a separate card design program where card designs must be created in alternate drawing programs and imported are not acceptable. | 2.16.A | 135 | Is it assumed this will only be for the wireless locksets that are not PIV compliant? Is this version of Gallagher capable of this? Please ensure there is not an expectation of PIV readers in dual-frequency mode. |
| 3305 IFB Specs DHHS RPC.pdf | Class 5 Alarm System is not required | 2.19 | 142 | Why is this needed for a US system? It appears this is Gallagher specification that is only part of Australia/New Zealand (AS/NZ) requirements, how does it apply here? |
| 3310 IFB Specs DHHS RPC.pdf | There currently is no Car Parking Facility Management Integration. Head end shall have these capabilities if owner chooses to add in the future. | 2.32 | 161 | What is the current Car Parking Facility Management platform and how does Gallagher show "a real-time display to show the current occupancy of car parks?" |
| 3311 IFB Specs DHHS RPC.pdf | There currently is no Locker System Facility Management Integration. Head end shall have capability to add in the future. | 2.33 | 162 | What is the current Locker System Facility Management platform and how does it integrate into the ACS (hardware or software)? |
| 3312 IFB Specs DHHS RPC.pdf | Badges/readers non PIV.  Badges shall have the ability to be set up as non access or access | 2.35 | 163 | How is the Visitor Management piece going to work with PIV compliant readers? Per the standard, readers cannot work in dual mode. If it is merely registering a Visitor, that will not receive a credential, that can work. CIVI cards are also a possibility but again - Item 021 would be moot if this is the case. |
| 3312 IFB Specs DHHS RPC.pdf | Yes, a wireless hub may be used if meets specification requirements and approved upon product submital. | 2.38.G | 169 | Can IP Connected Wireless Hub be used over RS-485 (if supported), for best of breed on market and ACS compatibility? |
| 3312 IFB Specs DHHS RPC.pdf | Access Control Readers – Mifare Technology that will support legacy, non-PIV card technology | 2.42.A & B | 177 | We need clarification on the PIV requirements vs. the legacy, non-PIV card formats requested forward. Is there a clear expectation of readers that only read PIV and readers that only read legacy technologies (which could be supported by PIV cards potentially as well)? |
| 3312 IFB Specs DHHS RPC.pdf | Spec says 'where specified' and there are none specified. You can disregard since it has not been not specified. | 2.46 | 185 | Is the preferred manufacturer the Morpho Wave solution for this request or is there another manufacturer that needs to be considered? Spec keeps talking about these requirements, which is not PIV/FICAM compliant at all. |
| 3312 IFB Specs DHHS RPC.pdf | Non PIV controllers and readers | 2.46 | 185 | What is needed and expected for the overall system design? Is a PIV hardware-centric solution needed or a Commercial hardware-centric solution for the overall Gallagher solution? These designs have different hardware and software implications. Spec keeps talking about these requirements, which is not PIV/FICAM compliant at all. |
| 3315 IFB Specs DHHS RPC.pdf | Specification included in addenda 5 | 3.2 - all parts | 226 | Who is responsible for CAT6 and Fiber Optic cabling as needed for the Security Network backbone and per device connection requirements for this project? Is this work done by Division 27 contractor or Division 28 contractor and what additional information can be shared around Division 27 requirements and scope of work? Did not see Division 27 in our initial dataset. |

| Document | Specification/Response | Section | Page | Question |
|---|---|---|---|---|
| 3315 IFB Specs DHHS RPC.pdf | Specification included in addenda 5 | 3.2 - all parts | 226 | Is existing network infrastructure expected to run the new ACS and VMS systems currently in production while a new ACS/VMS backbone is installed and built. Or the expectation is that we will use the existing cabling in place where possible and current system downtime is acceptable? Did not see Division 27 in our initial dataset. |
| 3312 IFB Specs DHHS RPC.pdf | Six minimum concurrent workstations. 2 workstations shall be completely new workstations.  4 workstations shall be existing workstations that the contractor shall provide new software, integration, and programming for.  Owner to supply computer hardware for the 2 new workstations.  Provide new Monitors by contractor with minimum of 4 monitors per workstation.  Contractor shall supply all software, installations, and connections for all new and existing workstations listed above.  The Avigilon system does not require separate workstations. Include installation of the Avigilon system on 15 computers at the facility. | General | | How many Gallagher ACS admin/user workstations are needed and who is responsible for supplying the workstation hardware and connected devices? How many fully functioning badging stations are needed for this site as well (printers included)? How many Avigilon workstations are needed? |
| 3312 IFB Specs DHHS RPC.pdf | Cameras must be 15fps at full resolution constant record. | General | | Please supply the camera configuration specifications for all cameras to include Frames per Second, resolution needed, motion/continuous recording, hours of motion per day expected, and number of days of retention needed? |
| 3312 IFB Specs DHHS RPC.pdf | This has been desgined with AINVRs by Avigilon, not third party server manufacturers | General | | Are Avigilon NVR Servers required or can 3rd party NVR hardware be leveraged with the Avigilon ACC platform installed on them? |
| 3313 IFB Specs DHHS RPC.pdf | The model and spec from E-600 should be used as a minimum baseline.  Contractor shall complete calculations to confirm capability based on total project needs with spare capacity requirements added in. | General | | Some documents seem to state that the security integrator is to do the calculation for NVR requirements. However, there are the NVR part numbers stated on Page E600 forward for all NVR and VMS storage needs. Please confirm if we are to use these numbers or complete our own calculations. |
| 3312 IFB Specs DHHS RPC.pdf | Provide new UPS's :One hour minimum for all switches, servers, and workstations. Most of the facility is on generator backup and will not require extended UPS | General | | What is the UPS Requirements and run time expected for NVR/VMS before building backup power takes over control? |
| 3312 IFB Specs DHHS RPC.pdf | Failover licensing and hardware should cover any given server going offline and recording to the next available. | General | | Is any Failover and Redundancy of NVR/VMS hardware and software features expected at the per NVR level in the event of NVR device failure? |
| 3312 IFB Specs DHHS RPC.pdf | 1000 Cards. It is expected everyone will be re-issued credentials as part of this changeover | General | | Are any MiFare Cards needed in addition to current stock on hand? |
| 3313 IFB Specs DHHS RPC.pdf | It is expected the winning integrator will handle an export and import into the Gallagher Command Centre software | General | | Is a migration of current cardholders from the legacy ACS system into the Gallagher solution expected? If not, who is expected to perform the re-enrollment of all cardholders in the current system? Please provide a current cardholder count for this task if to be performed by the integrator. |
| 3314 IFB Specs DHHS RPC.pdf | One year parts and labor warranty. Service agreement to be negoatiated with RPC | General | | What is the support agreement expectations for the warranty agreements in place? Is this is a break-fix only or should software upgrades, preventative maintenance (quarterly/yearly), and other tasks such as firmware upgrades and camera cleaning need to be included? |
| 3313 IFB Specs DHHS RPC.pdf | Remote access shall be built into the system. | General | | For Installation, bring live processes, and service after the install - is remote access to both systems available? |
| 3313 IFB Specs DHHS RPC.pdf | Door controllers and readers do not need to be anti-ligature. Only cameras inside seclusion rooms are of concern, but will be ceiling mounted fisheye cameras. No accessible pipe or boxes should be mounted in these rooms, but cabling should be run above ceiling and run directly into the cameras. | General | | What requirements are needed for anti-ligature requirements for doors, cameras, and other devices for this project? |
| 3313 IFB Specs DHHS RPC.pdf | These dates were issued and updated by addenda. | General | | What is the period of performance for onsite installation, final configuration, and final testing/acceptance for this project scope? |
| | Existing door position, electric locks, and request to exit devices expected to remain with only readers,controllers, and head end being replaced. The existing Com-tec PLC controllers shall be removed and the specified new access control system shall be provided.  Existing wiring may be used where possible. | General | | What are the details of the current Control Panel breakout, quantities, and others devices? We will need an inventory sheet to understand a value-engineered approach to adding to existing hardware in production. What is expected to be reused at each door? |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All equipment rooms for this project are shown on the plans. Contractor shall create network layouts for all new servers, switches, etc for each new system tand submit to owner for review. It is preferred that existing equipment rooms be used where possible. If cable runs will exceed maximum length limits, then existing IT rooms can be used as required and connected via fiber backbone. Refer to specification for backbone cabling. | General | | Equipment rooms and Data head end | | | | | | | | | | | | | | | | | | | | | |
| Yes, existing elevators are controlled by existing system. Provide new card readers as shown on plans. | General | | Are the 4 existing elevators controlled by the existing system? | | | | | | | | | | | | | | | | | | | | | |
| Existing locks are not detention type. | | | Are existing locks detention type? | | | | | | | | | | | | | | | | | | | | | |
| The electrified fence was removed from the specifications in previous addenda. Fence detector/sensors to be added to existing non- electrified fence were added by addenda. | | | Clarification needed on electrified fence that was removed by addenda | | | | | | | | | | | | | | | | | | | | | |
| For new devices such as gateways that need 120 volt power, provide wiring and connection to nearest spare electrical panel. In control rooms and equpment rooms, ifthere are existing spare receptacles, those can be utilized. | | | 120 volt power requirements | | | | | | | | | | | | | | | | | | | | | |
| It is expected that all Camera cabling will be new. Existing cabling runs from each camera to the room behind the central control room now. If they contractor finds any cabling that can be rerouted to the new servers and meet the current project requirements as well as length limits, it may be reused. | | | Existing Camera cabling | | | | | | | | | | | | | | | | | | | | | |
| All equipment and devices that are disconnected and become unused as a result of this project shall be removed in their entirety. This includes but is not limited to: equipment, devices, cabling, etc. | | | Removals of existing items | | | | | | | | | | | | | | | | | | | | | |

SECTION 271300 - BACKBONE 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.      Pathways.
         2.      Cable connecting hardware, patch panels, and cross-connects.
         3.      Cabling identification products.

   B.    Provide fiber backbone as required to connect servers, switches, etc which shall be located in
         existing equipment or IT rooms.

   C.    Contractor shall review building layout and design a layout for the data networks that are
         needed for the access control, video surveillance and Duress systems. Proposed Equipment
         locations in existing equipment or IT rooms shall be reviewed with owner for approval.
         Locations shall be selected to keep Category 6 horizontal cabling runs to 295 feet or less.



1.3      DEFINITIONS

   A.    BICSI:  Building Industry Consulting Service International.

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

   C.    EMI:  Electromagnetic interference.

   D.    IDC:  Insulation displacement connector.

   E.    LAN:  Local area network.

   F.    RCDD:  Registered Communications Distribution Designer.

   G.    UTP:  Unshielded twisted pair.

1.4     BACKBONE CABLING DESCRIPTION

    A.     Backbone cabling system shall provide interconnections between communications equipment rooms. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.

    B.     Backbone cabling cross-connects may be located in communications equipment rooms. Bridged taps and splitters shall not be used as part of backbone cabling.


1.5     PERFORMANCE REQUIREMENTS

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


1.6     SUBMITTALS

    A.     Product Data:  For each type of product indicated.

    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.
        6.     Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements.  Include the following:

            a.     Vertical and horizontal offsets and transitions.
            b.     Clearances for access above and to side of cable trays.
            c.     Vertical elevation of cable trays above the floor or bottom of ceiling structure.
            d.     Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.

    C.     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.

1.7     QUALITY ASSURANCE

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

B.     Surface-Burning Characteristics:  As determined by testing identical products according to ASTM E 84 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:  50 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.     Telecommunications Pathways and Spaces:  Comply with TIA/EIA-569-A.

E.     Grounding:  Comply with ANSI-J-STD-607-A.

1.8     DELIVERY, STORAGE, AND HANDLING

A.     Test cables upon receipt at Project site.

1.     Test optical fiber cable to determine the continuity of the strand end to end.

2.     Test optical fiber cable 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.

1.9     PROJECT CONDITIONS

A.     Environmental Limitations:  Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.10     COORDINATION

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

1.11    SOFTWARE SERVICE AGREEMENT

A.    Technical Support:  Beginning with Substantial Completion, provide software support for 2 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.

1.12    EXTRA MATERIALS

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.

PART 2 - PRODUCTS

2.1    PATHWAYS

A.    General Requirements:  Fiber backbone shall be installed in plenum rated innerduct which is concealed in walls or above ceilings in finished spaces and spaces subject to patient occupancy.

2.2    850 NANOMETER LASER-OPTIMIZED, 50/125 MICROMETER, MULTIMODE OPTICAL FIBER CABLE (OM3)

A.    Description: Multimode, 50/125-micrometer, 12-fiber, nonconductive, tight buffer, optical fiber cable. Minimum 10GB/s transmission.

B.    Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   1.    Belden CDT Networking Division/NORDX.
   2.    CommScope, Inc.
   3.    Corning Cable Systems.

C.    Standards:

   1.    Comply with ICEA S-83-596 for mechanical properties.
   2.    Comply with TIA-568-C.3 for performance specifications.
   3.    Comply with TIA-492AAAC for detailed specifications.

D.    Maximum Attenuation:  3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.

E.    Minimum Overfilled Modal Bandwidth-length Product: 1500 MHz-km at 850 nm; 500 MHz-km at 1300 nm.

F.    Minimum Effective Modal Bandwidth-length Product: 2000 MHz-km at 850 nm.

G.    Jacket:

   1.    Jacket Color:  Aqua.
   2.    Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
   3.    Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

H.    Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:

   1.    Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262; Type OFNP in listed plenum communications raceway; or Type OFNP, or Type OFNR in metallic conduit.
   2.    Riser Rated, Nonconductive: Type OFNP, or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."

2.3    OPTICAL FIBER CABLE HARDWARE

A.    Cross-Connects and Patch Panels:  Modular panels housing multiple-numbered, duplex cable connectors.

   1.    Number of Connectors per Field:  One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.

B.    Patch Cords:  Factory-made, dual-fiber cables in 36-inch (900-mm) lengths.

C.    Cable Connecting Hardware:

   1.    Comply with Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA/EIA-604-2, TIA/EIA-604-3-A, and TIA/EIA-604-12.  Comply with TIA/EIA-568-B.3.
   2.    Quick-connect, simplex and duplex, Type SC connectors.  Insertion loss not more than 0.75 dB.
   3.    Type SFF connectors may be used in termination racks, panels, and equipment packages.

2.4    GROUNDING

A.    Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems." for grounding conductors and connectors.

B.      Comply with ANSI-J-STD-607-A.

2.5      IDENTIFICATION PRODUCTS

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

2.6      SOURCE QUALITY CONTROL

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

B.      Factory test 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/EIA-526-14-A and TIA/EIA-568-B.3.

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

F.      Prepare test and inspection reports.

PART 3 - EXECUTION

3.1      WIRING METHODS

A.      Wiring within Enclosures:  Bundle, lace, and train cables within enclosures.  Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.  Provide and use lacing bars and distribution spools.

3.2      INSTALLATION OF PATHWAYS

A.      Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.

B.      Install manufactured conduit sweeps and long-radius elbows whenever possible.

C.      Pathway Installation in Communications/ Equipment Rooms:

1.      Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
2.      Install cable trays to route cables if conduits cannot be located in these positions.
3.      Secure conduits to backboard when entering room from overhead.

4.   Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

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.   All terminations for voice and data shall be by owner.  Provide terminations for all CATV outlets.  Terminate all conductors; no cable shall contain unterminated elements.  Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
5.   Cables may not be spliced.  Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
6.   Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
7.   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.  Use lacing bars and distribution spools.
8.   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.
9.   Cold-Weather Installation:  Bring cable to room temperature before dereeling.  Heat lamps shall not be used for heating.
10.  In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
11.  Pulling Cable:  Comply with BICSI ITSIM, Ch. 4, "Pulling Cable."  Monitor cable pull tensions.

C.   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.

D.   Separation from EMI Sources:

1.   Comply with BICSI TDMM and TIA/EIA-569-A recommendations 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 (127 mm).

      b.      Electrical Equipment Rating between 2 and 5 kVA:  A minimum of 12 inches (300 mm).

      c.      Electrical Equipment Rating More Than 5 kVA:  A minimum of 24 inches (610 mm).

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 (64 mm).

      b.      Electrical Equipment Rating between 2 and 5 kVA:  A minimum of 6 inches (150 mm).

      c.      Electrical Equipment Rating More Than 5 kVA:  A minimum of 12 inches (300 mm).

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 (76 mm).

      c.      Electrical Equipment Rating More Than 5 kVA:  A minimum of 6 inches (150 mm).

5.      Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger:  A minimum of 48 inches (1200 mm).

6.      Separation between Communications Cables and Fluorescent Fixtures:  A minimum of 5 inches (127 mm).

## 3.4    FIRESTOPPING

A.    Comply with requirements in TIA/EIA-569-A, Annex A, "Firestopping."

B.    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-J-STD-607-A.

C.    Locate grounding bus bar to minimize the length of bonding conductors.  Fasten to wall allowing at least 2-inch (50-mm) 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.
   1.    Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.

B.    See Division 27 Section "Communications Horizontal Cabling" for additional identification requirements.  See Evaluations for discussion about TIA/EIA standard as it applies to this Section.Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration including optional identification requirements of this standard.

C.    Comply with requirements in Division 27 Section "Communications Horizontal Cabling" for cable and asset management software.

D.    Cable Schedule:  Install in a 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.

E.    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, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.

F.    Cable and Wire Identification:

   1.    Label each cable within 4 inches (100 mm) 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 (4.5 m).
   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 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.

G.    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, for the following:

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

3.7    FIELD QUALITY CONTROL

A.    Perform tests and inspections.

B.    Tests and Inspections:

1.    Visually inspect optical fiber 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 inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

3.    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/EIA-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.

C.    Data for each measurement shall be documented.  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.

D.    Remove and replace cabling where test results indicate that they do not comply with specified requirements.

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

F.      Prepare test and inspection reports.


END OF SECTION 271300

SECTION 271500 - 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.    Pathways.
2.    UTP cabling.
3.    Cable connecting hardware, patch panels, and cross-connects.
4.    Telecommunications outlet/connectors.
5.    Cabling system identification products.
6.    Cable management system.

B.    Related Sections:

1.    Division 27 Section "Backbone Cabling" for voice and data cabling associated with system panels and devices.

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

H.    RCDD:  Registered Communications Distribution Designer.

I.     UTP:  Unshielded twisted pair.


1.4     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 "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 that 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.

B.     The maximum allowable horizontal cable length is 295 feet (90 m).  This maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) to the end user equipment.  The maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) in the horizontal cross-connect.

C.     For POE data runs over 295 feet, provide POE extenders.  120 volt power shall be wired and provided from nearest spare 120 volt circuit.


1.5     PERFORMANCE REQUIREMENTS

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


1.6     SUBMITTALS

A.     Product Data:  For each type of product indicated.

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

D.      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.


1.7      QUALITY ASSURANCE

A.      Surface-Burning Characteristics:   As determined by testing identical products according to ASTM E 84 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:   50 or less.

B.      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.

C.      Telecommunications Pathways and Spaces:   Comply with TIA/EIA-569-A.

D.      Grounding:   Comply with ANSI-J-STD-607-A.


1.8      PROJECT CONDITIONS

A.      Environmental Limitations:   Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining

ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B.   All cabling shall be concealed in walls and above ceilings in finished spaces and areas subject to patient occupancy.

1.9   COORDINATION

A.   Coordinate layout and installation of telecommunications pathways and 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.

1.10   SOFTWARE SERVICE AGREEMENT

A.   Technical Support:  Beginning with Substantial Completion, provide software support for 2 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.

1.11   EXTRA MATERIALS

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.

PART 2 - PRODUCTS

2.1   PATHWAYS

A.   General Requirements:  Comply with TIA/EIA-569-A.

B.   Cable Support:  NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.

        1.      Support brackets with cable tie slots for fastening cable ties to brackets.

        2.      Lacing bars, spools, J-hooks, and D-rings.

        3.      Straps and other devices.

C.     Conduit and Boxes:  Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems".

        1.      Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

## 2.2      UTP CABLE

A.     Description:  100-ohm, 4-pair UTP, formed into 25-pair, binder groups covered with a blue thermoplastic 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 6

        4.      Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:

                a.      Communications, Plenum Rated:  Type CMP complying with NFPA 262.

                b.      Communications, Riser Rated:  Type CMR, complying with UL 1666.

                c.      Multipurpose, Plenum Rated:  Type MPP, complying with NFPA 262.

                d.      Multipurpose, Riser Rated:  Type MPR, complying with UL 1666.

## 2.3      UTP CABLE HARDWARE

A.     General Requirements for Cable Connecting Hardware:  Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools.  Cables shall be terminated with connecting hardware of same category or higher.

B.     Connecting Blocks:  110-style IDC for Category 6.  Provide blocks for the number of cables terminated on the block, plus 25 percent spare.  Integral with connector bodies, including plugs and jacks where indicated.

C.     Cross-Connect:  Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.

        1.      Number of Terminals per Field:  One for each conductor in assigned cables.

D.     Patch Panel:  Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

        1.      Number of Jacks per Field:  One for each four-pair UTP cable  in project.

E.  Jacks and Jack Assemblies:  flush outlets, Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.

F.  Patch Cords:  Factory-made, four-pair cables in 36 inch  lengths; terminated with eight-position modular plug at each end.

1.  Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance.  Patch cords shall have latch guards to protect against snagging.
2.  Patch cords shall have color-coded boots for circuit identification.

2.4     GROUNDING

A.  Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.

B.  Comply with ANSI-J-STD-607-A.

2.5     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 Division 26 Section "Identification for Electrical Systems."

2.6     SOURCE QUALITY CONTROL

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

B.  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.

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

D.  Prepare test and inspection reports.

2.7     Wall plates shall be as specified in Section 262726 "Wiring Devices".

PART 3 - EXECUTION

3.1     WIRING METHODS

A.  Wiring Method:  Conceal conductors and cables in accessible ceilings, walls, and floors where possible.  Provide a minmum ¾" conduit( unless otherwise noted) from outlet location in wall

to 6' above nearest accessible ceiling. Wiring shall be run in conduit when run in rooms without ceilings, above inaccessible ceilings or spaces and when cabling passes through walls.

B.    Wiring within Enclosures:  Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.  Provide and use lacing bars and distribution spools.

## 3.2    INSTALLATION OF PATHWAYS

A.    Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.

B.    Install manufactured conduit sweeps and long-radius elbows whenever possible.

C.    Pathway Installation in Communications Equipment Rooms:

1.    Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
2.    Secure conduits to backboard when entering room from overhead.
3.    Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

## 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.    Terminate all conductors for cabling where Division 27 or 28 are responsible for the terminations; no cable shall contain un-terminated elements.  Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
5.    Cables may not be spliced.  Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
6.    Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
7.    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.
8.    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.

    9.      Cold-Weather Installation:  Bring cable to room temperature before dereeling.  Heat lamps shall not be used for heating.

    10.    In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.

    11.    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 (12 mm) from the point of termination to maintain cable geometry.

D.    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 (200 mm) above ceilings by cable supports not more than 60 inches (1524 mm) apart.

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

    4.      (915 mm).

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

F.    Separation from EMI Sources:

    1.      Comply with BICSI TDMM and TIA/EIA-569-A 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 (127 mm).

        b.    Electrical Equipment Rating between 2 and 5 kVA:  A minimum of 12 inches (300 mm).

        c.    Electrical Equipment Rating More Than 5 kVA:  A minimum of 24 inches (610 mm).

    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 (64 mm).

        b.    Electrical Equipment Rating between 2 and 5 kVA:  A minimum of 6 inches (150 mm).

        c.    Electrical Equipment Rating More Than 5 kVA:  A minimum of 12 inches (300 mm).

    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 (76 mm).
        c.    Electrical Equipment Rating More Than 5 kVA:  A minimum of 6 inches (150 mm).

    5.    Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger:  A minimum of 48 inches (1200 mm).
    6.    Separation between Communications Cables and Fluorescent Fixtures:  A minimum of 5 inches (127 mm).

## 3.4    FIRESTOPPING

A.    Provide firestopping and Comply with TIA/EIA-569-A, Annex A, "Firestopping."

B.    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-J-STD-607-A.

C.    Locate grounding bus bar to minimize the length of bonding conductors.  Fasten to wall allowing at least 2-inch (50-mm) 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 Division 26 Section "Identification for Electrical Systems."

    1.    Color-code cross-connect fields.  Apply colors to voice and data service backboards, connections, covers, and labels.
    2.    Data cabling shall be blue.
    3.    Voice and speaker cabling shall be white.

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.   Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration

D.   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.

E.   Cable and Wire Identification:

1.   Label each cable within 4 inches (100 mm) 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 (4.5 m).
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.

F.   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.   Perform tests and inspections.

B.   Tests and Inspections:

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 Category 6 marking of connectors and patch panels.
3.  Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

C.  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.

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

E.  Prepare test and inspection reports.

END OF SECTION 271500