

SECTION 27 15 00

~~~ PROJECT NOTE ~~~~~

ARCHITECT OF RECORD/ENGINEER OF RECORD IS RESPONSIBLE FOR REVIEWING THIS SPECIFICATION SECTION IN DETAIL FOR COORDINATION WITH THE PROJECT SCOPE OF WORK.

ALL "PROJECT NOTE" TEXT IS TO BE REMOVED FOLLOWING REVIEW OF THE CONTENT OF EACH NOTE BY THE ARCHITECT OF RECORD/ENGINEER OF RECORD.

EDIT THE DOCUMENT FOOTER TO INCLUDE THE PROJECT NAME AND NUMBER.

EDIT THE DOCUMENT HEADER TO INDICATE THE ARCHITECT OF RECORD PROJECT ISSUE" DATE. THE "CPS CONTROL" DATE SHOULD NOT BE EDITED.

ANY MODIFICATIONS TO THE TECHNICAL STANDARDS IN THIS SECTION - INCLUDING THE REMOVAL OR ADDITION OF MANUFACTURERS - MUST BE APPROVED BY CPS.

REQUESTS FOR MODIFICATION ARE TO BE SUBMITTED TO THE DESIGN MANAGER DURING THE DESIGN PHASE FOR REVIEW AND APPROVAL.

~~~ END OF PROJECT NOTE ~~~~~

DATA COMMUNICATIONS HORIZONTAL CABLING

~~~ PROJECT NOTE ~~~~~

UTILIZE THE TERM "IDF" ONLY FOR PROJECTS FEATURING A SEPERATE IDF ROOM.

~~~ END OF PROJECT NOTE ~~~~~

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Copper cable and terminations.
 - 1. Category 6 and Category 5e horizontal UTP cabling.
 - 2. Cable connecting hardware, patch panels, patch cords and cross-connects.
 - 3. HDMI cabling.
- B. Communications outlets.
 - 1. Telecommunications outlet/connectors.
- C. Communications grounding and bonding.
- D. Communications identification.

1.02 DEFINITIONS

- A. Refer to Section 27 05 03 - Communications General Requirements for definitions.

1.03 REFERENCE STANDARDS

- A. City of Chicago Building Code - Municipal Code of Chicago for the Building Industry; 2017.
- B. City of Chicago Electrical Code - National Electrical Code with Chicago Amendments; 2017.
- C. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment; Revision E, 2005.
- D. ICEA S-90-661 - Category 3, 5, & 5e Individually Unshielded Twisted Pair Indoor Cables (With or Without An Overall Shield) For Use in General Purpose and LAN Communications Wiring Systems Technical Requirements; 2012.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NECA/BICSI 568 - Standard for Installing Commercial Building Telecommunications Cabling; 2006.
- G. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set; 2016.
- H. TIA-568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards; Rev C, 2009 (with Addenda; 2016).
- I. TIA-569-D - Telecommunications Pathways and Spaces; Rev D, 2015.

- J. TIA-606-B - Administration Standard for Telecommunications Infrastructure; Rev B, 2012 (with Addenda; 2015).
- K. TIA-607-C - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; Rev C, 2015.
- L. TIA-968 - Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network; 2016.
- M. UL 1666 - Standard for Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts; Edition 5, 2007.
- N. UL 444 - Communications Cables; Current Edition, Including All Revisions.
- O. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.
- P. UL 1863 - Communications-Circuit Accessories; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Schedule a pre-installation conference for communications cabling installation with the ITS, Architect/Engineer of Record and Board's Representative.
 - 2. Coordinate layout and installation of telecommunications pathways and cabling with Board Representative's telecommunications and LAN equipment and service suppliers.
 - 3. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.
 - 4. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
 - 5. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 6. Notify Architect/Engineer of Record of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each type of product.
- B. Shop Drawings: Show compliance with requirements on schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
 - 1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format.
 - 2. Cabling administration drawings and printouts.
 - 3. Wiring diagrams to show typical wiring schematics, including the following:
 - a. Cross-connects.
 - b. Patch panels.
 - c. Patch cords.
 - 4. 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.
- D. Evidence of qualifications for installer.
- E. Test Plan: Complete and detailed plan, with list of test equipment, procedures for inspection and testing, and intended test date; submit at least 60 days prior to intended test date.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Comply with requirements of Section 27 05 03 - Communications General Requirements for installer qualifications as noted in "Quality Assurance" Article.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in City of Chicago Electrical Code, by a qualified testing agency, and marked for intended location and application.
- C. Comply with City of Chicago Building Code.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Section 27 05 03 - Communications General Requirements for delivery, storage and handling.

1.08 WARRANTY

- A. Comply with requirements of Section 27 05 03 - Communications General Requirements for system warranty and application assurance.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

- A. HORIZONTAL CABLING DESCRIPTION
 - 1. Horizontal cable and its connecting hardware provide the means of transporting signals between the communications outlet/connector and the horizontal cross-connect located in the Concentrator Enclosure, **[and]** the MDF, **[and/or the IDF]**. This cabling and its connecting hardware are called "permanent link," a term that is used in the testing protocols.
 - a. Bridged taps and splices shall not be installed in the horizontal cabling.
 - 2. The maximum allowable horizontal cable length is determined by the communications area serving that link, as follows:
 - a. For horizontal cabling served from a Concentrator Enclosure, the maximum allowable length is 141 feet (43 meters).
 - b. For horizontal cabling served directly from the MDF **[or from IDFs]**, the maximum allowable length is 295 feet (100 meters).
 - c. The maximum allowable lengths do not include an allowance for patch cords.
 - d. HDMI cabling from the teachers faceplate to the overhead projector shall be as short as possible.
- B. PERFORMANCE REQUIREMENTS
 - 1. General Performance: Horizontal cabling system shall comply with transmission standards in TIA-568 (SET), when tested according to test procedures of this standard.
- C. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
 - 1. Comply with TIA-568 (SET) (cabling) and TIA-569-D (pathways), latest editions (commercial standards).
 - 2. Provide fixed cables and pathways that comply with City of Chicago Building Code and TIA-607-C and are UL listed or third party independent testing laboratory certified.
 - 3. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.
 - 4. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.
- D. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.02 PATHWAYS

- A. General Requirements: Comply with TIA-569-D.
- 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. Use to train and manage communications cabling routed on plywood backboard.
 - 1. Support brackets with cable tie slots for fastening cable ties to brackets.

2. Lacing bars, spools, and D-rings.
 3. Hook and loop (Velcro) cable ties.
- C. Ladder Rack Runway: Comply with requirements of Section 27 11 16 - Communications Cabinets, Racks, and Enclosures.
1. Used for routing of communications cabling within MDF **[and IDFs]**.
- D. Conduit and Boxes: Comply with requirements in Sections 26 05 33.13 - Conduit for Electrical Systems, 26 05 33.16 - Boxes for Electrical Systems, and 26 05 33.23 - Surface Raceways for Electrical Systems. Flexible metal conduit shall not be used.

~~~ PROJECT NOTE ~~~~~

CPS ITS MANDATES LISTING AND CROSS-LISTING OF CABLE AND CONNECTIVITY COMPONENTS AS INDICATED IN THIS ARTICLE, IN ORDER TO PROVIDE FOR CONTINUITY OF PRODUCT SELECTION ACROSS PROJECTS AND EXTENDED SYSTEM WARRANTY PROVISIONS FOR CPS. DO NOT ALTER SELECTIONS WITHOUT WRITTEN APPROVAL FROM CPS ITS PERSONNEL.

~~~ END OF PROJECT NOTE ~~~~~

2.03 CATEGORY 6 UTP CABLE AND CONNECTING HARDWARE

- A. Category 6 UTP: Manufacturers of Cable: Subject to compliance with requirements, provide products by one of the following manufacturers:
1. Belden, Data Twist 4800; www.belden.com.
 2. Berk-Tek; a Nexans company, Lanmark-2000 series; www.berktek.us.
 3. General Cable Technologies Corporation, GenSPEED 6500 Premium; www.generalcable.com.
 4. Mohawk; a Division of Belden CDT, GigaLAN series; www.mohwak-cable.com.
 5. Superior Essex Inc., NextGain series; www.spsx.com.
- B. Category 6 UTP: Manufacturers of Connecting Hardware and Patch Cords: Subject to compliance with requirements, provide products by one of the following manufacturers:
1. Belden, Key Connect Cat6E; www.belden.com.
 2. Hubbell Inc., Hubbell Premise Wiring, NEXTSPEED series components; www.hubbell.com/hubbellpremisewiring/en/.
 3. Leviton Manufacturing Co., Inc., Leviton Voice & Data Division, Extreme 6+ series components; www.leviton.com.
 4. Ortronics Inc., Clarity6 series components; www.ortronics.com.
 5. Panduit Corporation, NetGen Solution; www.panduit.com.
- C. Cross-Listing: Cross listed solutions shall be selected and installed so as to provide the Board with warranty complying with requirements of Section 27 05 03 - Communications General Requirements for system warranty and application assurance. Manufacturers of Cable and Manufacturers of Connecting Hardware and Patch Cords must be selected and utilized together on project as follows:
1. Belden with:
 - a. Belden Key Connect CAT6E.
 2. Berk-Tek with:
 - a. Leviton, Extreme 6+ Series.
 3. General Cable Technologies Corp. with:
 - a. Panduit Corp.: NetGen Solution.
 - b. Hubbell Premise Wiring NEXTSPEED Solution.
 4. Mohawk with:
 - a. Hubbell Premise Wiring NEXTSPEED solution.
 5. Superior Essex Inc. Nextgain 5400 with:
 - a. Ortronics Clarity 6 Series.
- D. Category 6 UTP: Cable Description: 100-ohm, 4-pair UTP, minimum 23AWG, covered with a thermoplastic jacket.

1. Comply with ICEA S-90-661 for mechanical properties.
2. Comply with TIA-568-C.2 for performance specifications.
3. Comply with TIA-568-C.2, Category 6.
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and City of Chicago Electrical Code for the following types:
 - a. Communications, Riser Rated: Type CMR, complying with UL 1666.
5. Jacket color: Coordinated with system application as follows:
 - a. Data/Wireless UTP system: Blue.
 - b. Kronos Attendance UTP system: Green.
 - c. CCTV system: Purple.

~~~ **PROJECT NOTE** ~~~~~  
**RETAIN BELOW IF PROJECT UTILIZES CABLES IN PLENUM SPACE.**  
~~~ **END OF PROJECT NOTE** ~~~~~

6. Cables shall be suitable for installation in a plenum application.
- E. Category 6 UTP: General Requirements for Cable Connecting Hardware:
1. Comply with TIA-568-C.2, Category 6.
 2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
 3. Wire to TIA/EIA T568B pin configuration.
- F. Category 6 UTP: Patch Panel: Modular panel housing multiple-numbered units with integral front 8-position RJ45 modular opening and rear IDC-type connectors for each port, used for permanent termination of pair groups of installed cables.
1. Number of Ports: **[24] [48]**, as indicated in Contract Drawings.
 2. Capacity: Provide quantity of panels sufficient for number of cables to be terminated plus 25 percent spare.
 3. Mounting: Rack-mount, complying with EIA/ECA-310 standard for 19-inch width.
 4. Identification: Permanently imprinted sequentially numbered identification of ports, and clear space above ports for an administrative labeling system to accommodate machine-labeled identification of individual jack ports.
 5. Horizontal cable termination on rear of panel. Provide incoming cable strain relief and routing guides on back of panel.
 6. Patch Panel ports shall utilize 110 punch down termination on back panel and include retention cap for reach port.
 7. Patch Panels shall be constructed of high strength steel with black powder finish.
 8. Color: Black.
- G. Category 6 UTP: Jacks and Jack Assemblies: Modular, color-coded, non-keyed eight-position modular receptacle units with integral IDC-type terminals.
1. Wiring: Shall have universal termination and color-coded indication for wiring to TIA/EIA T568B pin configuration.
 2. Color: Front face of jack shall be colored. Use of a color-coded icon insert on a neutral-color jack shall not be acceptable. Color coordinated with system application as follows:
 - a. Data/Wireless UTP system: Orange.
 - b. Kronos Attendance UTP system: Green.
 - c. CCTV system: Purple.
 3. Jack Modules shall comply with TIA-568-C.2.
 4. Jack Modules shall be capable of being re-terminated.
 5. Jack Modules shall be available in non-keyed format.
 6. Reference Contract Drawings for typical arrangement of jacks at work area faceplate.
- H. Category 6 UTP: Patch Cords: Factory-made, four-pair cables terminated with eight-position modular plug at each end. Board to provide all patch cords, information below is for reference only.
1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance.

- a. Patch cords shall have latch guards to protect against snagging.
- b. Jack Modules shall comply with TIA-568-C.2.
2. Patch Cord plug modules shall comply with TIA-968 requirements. Patch cords shall be of same manufacturer and consistent with components and performance level of cross-listed solutions indicated in this Article.
3. Color: Coordinate with UTP cable color per system application:
 - a. Data/Wireless UTP system: Blue.
 - b. Kronos Attendance UTP system: Green.
4. Quantity to be Board provided:
 - a. Work Area: Provide one (1) 6-ft patch cord for each Category 6 UTP outlet installed per system application.
 - b. Equipment End:
 - 1) Data Racks:
 - (a) Provide one (1) 5-ft patch cord for one-half (fifty-percent) of the total number of Category 6 UTP outlets installed per system application.
 - (b) Provide one (1) 7-ft patch cord for one-half (fifty-percent) of the total number of Category 6 UTP outlets installed per system application.
 - 2) Concentrator Enclosures:
 - (a) Provide one (1) 1-ft patch cord for each Category 6 UTP outlets installed per system application.

~~~ PROJECT NOTE ~~~~~

CPS ITS MANDATES LISTING AND CROSS-LISTING OF CABLE AND CONNECTIVITY COMPONENTS AS INDICATED IN THIS ARTICLE, IN ORDER TO PROVIDE FOR CONTINUITY OF PRODUCT SELECTION ACROSS PROJECTS AND EXTENDED SYSTEM WARRANTY PROVISIONS FOR CPS. DO NOT ALTER SELECTIONS WITHOUT WRITTEN APPROVAL FROM CPS ITS PERSONNEL.

~~~ END OF PROJECT NOTE ~~~~~

2.04 CATEGORY 5E UTP CABLE AND CONNECTING HARDWARE

- A. Category 5e UTP: Manufacturers of Cable: Subject to compliance with requirements, provide products by one of the following manufacturers:
 1. Belden, DataTwist 1200; www.belden.com.
 2. Berk-Tek; a Nexans company, LANmark-350 series; www.berktek.us.
 3. General Cable Technologies Corporation, GenSPEED 5500 series; www.generalcable.com.
 4. Mohawk; a Division of Belden CDT, MegaLAN 400 series; www.mohawk-cable.com.
 5. Superior Essex Inc., Cobra 5e series; www.spsx.com.
- B. Category 5e UTP: Manufacturers of Connecting Hardware and Patch Cords: Subject to compliance with requirements, provide products by one of the following manufacturers:
 1. Belden, Key Connect 5e; www.belden.com.
 2. Hubbell Inc., Hubbell Premise Wiring, SPEEDGAIN series components; www.hubbell-wiring.com.
 3. Leviton Manufacturing Co., Inc., Leviton Voice & Data Division, GigaMAX 5e+ series components; www.leviton.com.
 4. Ortronics Inc., Clarity5e series components; www.ortronics.com.
 5. Panduit Corporation, NetGen Solution; www.panduit.com.
- C. Category 5e UTP: Cross-Listing: Cross listed solutions shall be selected and installed so as to provide the Board with warranty complying with requirements of Section 27 05 03 - Communications General Requirements for system warranty and application assurance. Manufacturers of Cable and Manufacturers of Connecting Hardware and Patch Cords must be selected and utilized together on project as follows:
 1. Belden with:
 - a. Belden Giga Key Connect 5e.

2. Berk-Tek with:
 - a. Leviton, GigaMax5e+ Series.
 3. General Cable Technologies Corp. with:
 - a. Panduit Corp.: NetGen Solution.
 - b. Hubbell Premise SPEEDGAIN Solution.
 4. Mohawk with:
 - a. Hubbell Premise SPEEDGAIN solution.
 5. Superior Essex Inc. with:
 - a. Ortronics Clarity 5e+ solution.
 6. TE Connectivity 520 Series.
- D. Category 5e UTP: Description: 100-ohm, 4-pair UTP, minimum 24AWG, covered with a thermoplastic jacket.
1. Comply with ICEA S-90-661 for mechanical properties.
 2. Comply with TIA-568-C.2 for performance specifications.
 3. Comply with TIA-568-C.2, Category 5e.
 4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and City of Chicago Electrical Code for the following types:
 5. Communications, Riser Rated: Type CMR, complying with UL 1666. Jacket color: Coordinated with system application as follows:
 - a. Voice UTP system: Yellow.
 - b. Intercom/Admin UTP system: Gray.

~~~ PROJECT NOTE ~~~
RETAIN BELOW IF PROJECT UTILIZES CABLES IN PLENUM SPACE.
~~~ END OF PROJECT NOTE ~~~

6. Cables shall be suitable for installation in a plenum application.
- E. Category 5e UTP: General Requirements for Cable Connecting Hardware:
1. Comply with TIA-568-C.2, Category 5e.
 2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
 3. Wire to TIA/EIA T568B pin configuration.
- F. Category 5e UTP: Patch Panel: Modular panel housing multiple-numbered units with integral front 8-position RJ45 modular opening and rear IDC-type connectors for each port, used for permanent termination of pair groups of installed cables.
1. Number of Ports: **[24] [48]**, as indicated in Contract Drawings.
 2. Capacity: Provide quantity of panels sufficient for number of cables to be terminated plus 25 percent spare.
 3. Mounting: Rack-mount, complying with EIA/ECA-310 standard for 19-inch width.
 4. Identification: Permanently imprinted sequentially numbered identification of ports, and clear space above ports for an administrative labeling system to accommodate machine-labeled identification of individual jack ports.
 5. Horizontal cable termination on rear of panel. Provide incoming cable strain relief and routing guides on back of panel.
 6. Patch Panel ports shall utilize 110 punch down termination on back panel and include retention cap for each port.
 7. Patch Panels shall be constructed of high strength steel with black powder finish.
 8. Color: Black.

~~~ PROJECT NOTE ~~~
110 BLOCKS USED FOR VOICE CAT5E CABLE TERMINATIONS ON MDF/IDF BACKBOARDS AT ALL NEW AND EXISTING FACILITIES (EVEN IF LEGACY CABLING TERMINATED TO 66-TYPE BLOCKS). COORDINATE QUANTITY AND SIZE WITH CONTRACT DRAWINGS.
~~~ END OF PROJECT NOTE ~~~

- G. Category 5e UTP: 110A Termination Block: 110-style frame assembly, with legs, used for termination of all horizontal UTP cabling for voice communications.
 - 1. Be constructed of flame-retardant thermoplastic, with strips for terminating a series of individual four-pair cable conductors, with legs for offset mounting.
 - 2. Have access openings for rear to front cable routing to the point of termination.
 - 3. Size: Standard 100-pair or 300-pair footprint.
 - 4. Capacity: Adjust quantity of blocks based on number of cables to be terminated plus 25 percent spare.
 - 5. Field-terminate, utilizing C4 clips terminated over all horizontal pairs so as to facilitate future cross connection and/or inter connection using cross-connect wire.
 - 6. Accommodate termination of wire sizes: Solid No. 22-26 AWG.
 - 7. Listed UL 1863.
- H. Category 5e UTP: 110A Jumper Trough: 110-system trough, with mounting legs, for management of cross connect jumper pairs routed between 110 termination blocks.
 - 1. Be constructed of flame-retardant thermoplastic.
 - 2. Have access openings to permit cable routing between points of termination.
 - 3. Width: To match 110 Termination Block.
 - 4. Provide above and below each 110 Termination Block. Provide with mounting legs.
 - 5. Provide finger design to maintain proper bend radius.
- I. Category 5e UTP: Jacks and Jack Assemblies: Modular, color-coded, non-keyed eight-position modular receptacle units with integral IDC-type terminals.
 - 1. Wiring: Color-coded indication for wiring to TIA/EIA T568B pin configuration.
 - 2. Color: Front face of jack shall be colored. Use of a color-coded icon insert on a neutral-color jack shall not be acceptable. Color coordinated with system application as follows:
 - a. Voice UTP system: White.
 - b. Aiphone Master Station: Yellow.
 - c. Intercom/Admin UTP system: Grey.
 - 3. Jack Modules shall comply with TIA-568-C.2.
 - 4. Jack Modules shall be capable of being re-terminated.
 - 5. Jack Modules shall be available in non-keyed format.
 - 6. Reference Contract Drawings for typical arrangement of jacks at work area faceplate.

2.05 HDMI CABLING AND CONNECTING HARDWARE

- A. HDMI connectivity from the teacher station to the overhead projector can be accomplished using two faceplates on both ends with a continuous HDMI cable or a HDMI Video Extender wall plate / Category 6 cable solution. It is acceptable to utilize either solution.
- B. The HDMI cable that extends from the teachers station or faceplate shall be routed up to the overhead projector faceplate mounted in the ceiling. The HDMI cable shall be a continuous cable from faceplate to faceplate. The solution is to have a faceplate at both ends of the HDMI cable. A Board Authorize Representative shall provide HDMI patch cables at both the teachers station and the overhead projector.
 - 1. HDMI high resolution cable (xx is the required length) shall not be utilized for distances over 40-feet.
 - a. Extron - 26-650-xx.
 - b. Crestron - CBL-HD- 30 - used with MP-WP152-W.
 - c. Liberty - E-HDSEM-M-xx.
 - d. Hubbell - HDH-30-BK.
 - e. Leviton wall plate 41647-00W (White wall plate).
 - 2. HDMI Video Extender Wall Plate to Wall Plate Solution. A "Source" wall plate is used at the teacher location and a "Display" wall plate is located at the projector location. Female connector are on front of each wall plate which are able to accept HDMI Patch cables.
 - a. Crestron - HD-EXT4 powered solution.
 - b. Extron - DTP HDMI 230 D Rx and DTP HDMI 230 D Tx over shielded UTP.
 - c. Leviton HDMI insert, feed through 41647-00W.

- d. Hubbell HDMI High Definition powered wall plate Video Extender Decorator White - ISFH110W to be used with the Decorator Wall plate White - NP26W. Note: The Crestron, Extron & Hubbell solutions require an electrical outlet next to the "Source" wall plate for power.
- C. Outlet boxes shall be 5-inch width, 5-inch height, by 2-7/8 inches deep, fitted with single- or double-gang trim plates to accommodate single- or double-gang communications faceplates as coordinated with Contract Drawings and outlet configuration.
 - 1. STEEL CITY 5 Square Telecommunication Boxes; www.tnb.com.

2.06 COMMUNICATIONS OUTLETS

- A. Outlet Boxes: Comply with Section 26 05 33.16 - Boxes for Electrical Systems.
 - 1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.

~~~ PROJECT NOTE ~~~
COORDINATE FACEPLATE MATERIAL AND COLOR SELECTION WITH ARCHITECT/ENGINEER OF RECORD. RETAIN ONE OF FIRST TWO SUBPARAGRAPHS BELOW, OR RETAIN BOTH AS REQUIRED TO MATCH SECTION 26 27 23. COORDINATE WITH ITS REFERENCE DRAWINGS FOR STRUCTURED CABLING.

~~~ END OF PROJECT NOTE ~~~

- B. Wall Plates:
 - 1. Comply with system design standards and UL 514C.
 - 2. Accepts modular jacks/inserts.
 - 3. **[Two] [Four] [Six]** port-connector assemblies mounted in **[single] [multigang]** faceplate. Coordinate with Contract Drawings.
 - a. Plastic Faceplate: High-impact plastic. Coordinate color with Section 26 27 26 - Wiring Devices.
 - b. Metal Faceplate: Stainless steel, complying with requirements in Section 26 27 26 - Wiring Devices.
 - c. Coordinate color and finish selection with Architect/Engineer of Record.
 - d. For use with snap-in jacks accommodating any combination of UTP, optical fiber, and coaxial work area cords. Jacks shall snap firmly into faceplate frame and be flush with outer plate surface.
 - e. Provide color-matched snap-in blank insets to fill all unused openings.
 - f. Legend: Snap-in, clear-label covers and machine-printed paper inserts.

2.07 GROUNDING AND BONDING COMPONENTS

- A. Comply with TIA-607-C.

2.08 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606-B.

PART 3 EXECUTION

~~~ PROJECT NOTE ~~~
INCLUDE THE FOLLOWING FOR EXISTING BUILDINGS; DELETE FOR NEW CONSTRUCTION.
~~~ END OF PROJECT NOTE ~~~

3.01 COMMUNICATIONS DEMOLITION

- A. Comply with requirements of Section 27 05 03 - Communications General Requirements for demolition of communications systems.

3.02 APPLICATION OF MEDIA

- A. Horizontal Cabling for CCTV UTP Service: Use Category 6 UTP cable and connecting hardware.

- B. Horizontal Cabling for Data and Wireless Service: Use Category 6 UTP cable and connecting hardware.
- C. Horizontal Cabling for Kronos Attendance Service: Use Category 6 UTP cable and connecting hardware.
- D. Horizontal Cabling for Intercom/Admin Service: Use Category 5e UTP cable and connecting hardware
- E. Horizontal Cabling for Voice Service: Use Category 5e UTP cable and connecting hardware.
- F. Horizontal Cabling for Aiphone Service: Use Category 5e UTP cable and connecting hardware.

3.03 INSTALLATION - GENERAL

- A. Comply with latest editions and addenda of TIA-568 (SET) (cabling), TIA-569-D (pathways), TIA-607-C (grounding and bonding), NECA/BICSI 568, City of Chicago Electrical Code, and SYSTEM DESIGN as specified in PART 2.
- B. Grounding and Bonding: Perform in accordance with TIA-607-C and City of Chicago Electrical Code.

3.04 WIRING METHODS AND INSTALLATION OF PATHWAYS

- A. Wiring Method: Install cables in raceways. Conceal raceway except in unfinished spaces.
 - 1. Comply with requirements for raceways and boxes and their installation specified in Sections 26 05 33.13 - Conduit for Electrical Systems, 26 05 33.16 - Boxes for Electrical Systems, and 26 05 33.23 - Surface Raceways for Electrical Systems.
 - 2. Comply with TIA-569-D for pull-box sizing and length of conduit and number of bends between pull points.

~~~ PROJECT NOTE ~~~~~
RETAIN PARAGRAPH IF PROJECT UTILIZES WIRE BASKET TRAY IN PLENUM SPACES.
~~~ END OF PROJECT NOTE ~~~~~

- B. Wiring Method: Install cables in wire basket tray. Conceal raceway except in unfinished spaces.
 - 1. Comply with requirements of wire basket ray and their installation specified in Section 27 05 38 - Cable Trays for Structured Cabling Systems.
 - 2. The number of horizontal cables placed in a cable support or pathway shall be limited to a number of cables that will not alter geometric shape of the cables. Under no circumstances should cables in the horizontal pathways be bundled. This is to minimize "alien" cross-talk.

~~~ PROJECT NOTE ~~~~~
RETAIN PARAGRAPH IF PROJECT UTILIZES J-HOOKS IN PLENUM SPACES.
~~~ END OF PROJECT NOTE ~~~~~

- C. Wiring Method: Install above ceiling utilizing minimum 2 inch j-hooks independently attached to deck above. Route at right angles to termination point.
- D. Wiring within Enclosures: Bundle, lace, and train cables to terminal points without exceeding manufacturer's limitations on bending radii. Provide service loop per requirements of this Section. Provide and use lacing bars and distribution spools.
- E. Wiring within MDF **[and IDFs]**: Bundle, lace, and train cables to terminal points without exceeding manufacturer's limitations on bending radii. Provide service loop per requirements of this Section. Utilize overhead ladder rack runway for cable routing within room(s). Provide and use lacing bars and distribution spools for wire routing and management on plywood backboard.
- F. Comply with requirements for ladder rack runway, cabinets, and racks specified in Section 27 11 16 - Communications Cabinets, Racks, and Enclosures. Drawings indicate general arrangement of pathways and fittings.

3.05 INSTALLATION OF CABLING

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
 - 1. Comply with TIA-568 (SET).
 - 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
 - 3. Install 110-style IDC termination hardware unless otherwise indicated.
 - 4. Terminate 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 not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals. Do not over-cinch or crush cables.
 - 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 4X cable diameter. Install lacing bars and distribution spools.
 - 8. Hook and loop (Velcro)-style cable ties shall be used to bundle and secure exposed cables in the concentrator enclosures and MDF/IDF rooms. Use of plastic cable ties is not permitted.
 - 9. 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.
 - 10. Cold-Weather Installation: Bring cable to room temperature before de-reeling. Heat lamps shall not be used for heating.
 - 11. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions, and do not exceed manufacturer's recommended cable pull tension.
 - a. When installing in conduit, use only lubricant approved by cable manufacturer and do not chafe or damage outer jacket.
 - 12. Service Loops: Provide the following minimum extra length of cable, dressed and routed neatly:
 - a. At MDF/IDF frames: 60 inches, neatly installed in vertical wire manager or accommodated by additional routing around overhead ladder rack runway.
 - b. At Concentrator Enclosures - Terminated Cables: 24 inches, neatly looped inside housing
 - c. At Concentrator Enclosures - Pass-through Cabling: 24 inches, neatly installed inside housing for horizontal UTP cables that pass through enclosure.
 - d. At Surface Raceway Outlets - Copper: 12 inches, neatly installed in surface raceway channel.
- C. UTP Cable Installation:
 - 1. Comply with TIA-568-C.2.
 - 2. Maintain pair twists as close as possible to point of termination, but do not untwist UTP cables more than 1/8 (.125) inch from the point of termination to maintain cable geometry.
 - 3. Concentrator Enclosures: No cabling is to be routed down through the center area of the enclosure so as to inhibit the installation of network electronics.
 - 4. MDF/IDF: Install and route cabling on overhead ladder rack runway and within horizontal and vertical cable guides to terminating hardware.
- D. Group connecting hardware for cables into separate logical fields.
- E. Separation from EMI Sources: Comply with requirements of Section 27 05 03 - Communications General Requirements.

3.06 FIRESTOPPING

- A. Comply with requirements in Section 07 84 00 - Firestopping.
- B. Comply with TIA-569-D, Annex A, "Firestopping."

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

3.07 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. Comply with TIA-607-C.

3.08 IDENTIFICATION

- A. Comply with requirements in Section 27 05 53 - Identification for Communication Systems.

3.09 CLEANING

- A. Comply with requirements of Division 27 05 03 - Communications General Requirements for cleaning.

~~~ PROJECT NOTE ~~~~~
ALL TESTING AND VERIFICATION REQUIREMENTS ARE DEFINED IN RELATED DIVISION 27 SECTION NOTED BELOW.
~~~ END OF PROJECT NOTE ~~~~~

3.10 COMMISSIONING AND DEMONSTRATION

- A. Comply with requirements in Section 27 08 00 - Commissioning of Communications for performance tests, inspections, correction of deficiencies, and preparation of test and inspection reports.

END OF SECTION 27 15 00