

ADDENDUM NUMBER FIVE
TO THE CONTRACT DOCUMENTS FOR CONSTRUCTION OF
U. W. CLEMON ELEMENTARY SCHOOL
JEFFERSON COUNTY BOARD OF EDUCATION
JEFFCO ED PROJECT NUMBER 6463-13-19

This addendum forms a part of the Contract Documents and modifies the original Bidding Documents dated April 18, 2019.

Bidders shall acknowledge receipt of this Addendum on their Bid Proposal Form.

This Addendum consists of **1** page, and **1** specification section.

SPECIFICATIONS

- ITEM 1 SECTION 27 0000 COMMUNICATION SYSTEMS – STRUCTURED CABLING
Reissued section, noting the following revisions:
1. Delete line C and D under 1.04 ADMINISTRATIVE REQUIREMENTS.

- END OF ADDENDUM -

SECTION 27 0000
STRUCTURED CABLING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Communications system design requirements.
- B. Communications pathways.
- C. Copper cable and terminations.
- D. Fiber optic cable and interconnecting devices.
- E. Communications equipment room fittings.
- F. Communications outlets.
- G. Communications grounding and bonding.
- H. Communications identification.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
 - 1. Includes intersystem bonding termination.
 - 2. Includes bonding jumpers for bonding of communications systems and electrical system grounding.
- C. Section 26 0534 - Conduit.
- D. Section 26 0537 - Boxes.
- E. Section 26 0553 - Identification for Electrical Systems: Identification products.

1.03 REFERENCE STANDARDS

- A. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment; Electronic Industries Alliance/Electrical Components Association; Revision E, 2005.
- B. ICEA S-83-596 - Indoor Optical Fiber Cables; Insulated Cable Engineers Association; 2011 (ANSI/ICEA S-83-596).
- C. 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; Insulated Cable Engineers Association; 2012. (ANSI/ICEA S-90-661)
- D. NECA/BICSI 568 - Standard for Installing Building Telecommunications Cabling; National Electrical Contractors Association; 2006. (ANSI/NECA/BICSI 568)
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. TIA-455-21 - FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices; Telecommunications Industry Association; 2012.
- G. TIA-492AAAA-B - Detail Specification for 62.5-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers; Telecommunications Industry Association; Rev B, 2009.
- H. TIA-492AAAC-B - Detail Specification for 850-nm Laser-Optimized, 50-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers; Telecommunications Industry Association; 2009.
- I. TIA-492CAA - Detail Specification for Class IV Dispersion-Unshifted Single-Mode Optical Fibers; Telecommunications Industry Association; 1998 (R 2002).

- J. TIA-526-7 - OFSTP-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant; Telecommunications Industry Association; 2002.
- K. TIA-526-14 - OFSTP-14 - Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant; Telecommunications Industry Association; Rev B, 2010.
- L. TIA-568-C.1 - Commercial Building Telecommunications Cabling Standard; Telecommunications Industry Association; Rev C, 2009 (with Addenda; 2012).
- M. TIA-568-C.2 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components; Telecommunications Industry Association; Rev C, 2009.
- N. TIA-568-C.3 - Optical Fiber Cabling Components Standard; Telecommunications Industry Association; 2008 (with Addenda; 2011).
- O. TIA-569-C - Telecommunications Pathways and Spaces; Telecommunications Industry Association; Rev C, 2012 (with Addenda; 2013).
- P. TIA-598-C - Optical Fiber Cable Color Coding; Telecommunications Industry Association; Rev C, 2005.
- Q. TIA-606-B - Administration Standard for the Telecommunications Infrastructure; Telecommunications Industry Association; Rev B, 2012.
- R. TIA-607-B - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; Telecommunications Industry Association; Rev B, 2012 (with Addenda; 2013).
- S. UL 444 - Communications Cables; Current Edition, Including All Revisions.
- T. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.
- U. UL 1651 - Fiber Optic Cable; Current Edition, Including All Revisions.
- V. UL 1863 - Communications-Circuit Accessories; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider.
 - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
 - 3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Communications Service Provider representative.
- ~~C. The contractor shall include a \$200,000 allowance for switches and firewalls to be purchased and installed by the owner.~~
- ~~D. The contractor shall include an additional \$100,000 allowance for video equipment to be installed in racks and video software.~~

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- B. Shop Drawings: Show compliance with requirements on isometric 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).
- C. Evidence of qualifications for installer.

- D. 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.
- E. Field Test Reports.
- F. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
 - 1. Record actual locations of outlet boxes and distribution frames.
 - 2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
 - 3. Identify distribution frames and equipment rooms by room number on contract drawings.

1.06 QUALITY ASSURANCE

- A. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- B. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.
- C. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
 - 1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
 - 2. Supervisors and installers factory certified by manufacturers of products to be installed.
 - 3. Employing BICSI Registered Cabling Installation Technicians (RCIT) for supervision of all work.
- D. Products: Listed, classified, and labeled as suitable for the purpose intended.
- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep stored products clean and dry.

1.08 WARRANTY

- A. Correct defective Work within a 2 year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cabling and Equipment:
 - 1. 3M Communications Technologies
 - 2. METZ CONNECT USA Inc; P|Cabling Products
 - 3. Siemon Company
 - 4. TE Connectivity:

2.02 SYSTEM DESIGN

- A. Phone system hardware shall be Voice Over IP system by owner. Provide backboxes and conduit back to nearest accessible corridor. Provide cabling for all phone/data points back to specified telephone backboard.
- B. Data system shall consist of telephone/data rooms with server racks, patch panels, and three foot patch cables from patch panel to switch. Switches and servers will be provided by owner.

Provide cabling for all phone/data points back to specified telephone backboard. Terminations and testing are all by contractor.

- C. Speaker/clock combinations will be provided in each classroom with talkback feature. Hardware provided by allowance from owner. Provide cabling connection back to specified telephone backboard. Intercom buttons at classroom entrances shall be connected to system.
- D. Intercom at front door to communicate with Receptionist shall be AI phone with intercom, conduit, wiring, power supply all provided and installed by contractor.
- E. Cameras are provided by owner and installation, cabling, sleeves through exterior walls and raceways are all by contractor.

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 (cabling) and TIA-569 (pathways), latest editions (commercial standards).
 - 2. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 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 (0 to 60 degrees C) 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.
- B. System Description:
- 1. Backbones - Within Building: Fiber optic, number of strands as indicated.
 - 2. Offices and Work Areas: Provide minimum of one voice outlet and one data outlet in each work area or as noted on plans.
 - 3. Provide additional outlets where indicated on drawings.
- C. Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.
- 1. Locate main distribution frame as indicated on the drawings.
 - 2. Capacity: As required to terminate all cables required by design criteria plus minimum 25 percent spare space.
- D. Intermediate Distribution Frames (IDF): Support structures for terminating horizontal cables that extend to telecommunications outlets.
- 1. Locate intermediate distribution frames as indicated on the drawings.
- E. Backbone Cabling: Cabling, pathways, and terminal hardware connecting intermediate distribution frames (IDF's) with main distribution frame (MDF), wired in star topology with main distribution frame at center hub of star.
- F. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.03 PATHWAYS

- A. Conduit: As specified in Section 16110; provide pull cords in all conduit.

2.04 GROUNDING AND BONDING COMPONENTS

- A. Comply with TIA-607.

2.05 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606.

2.06 SOURCE QUALITY CONTROL

- A. Factory test cables according to TIA-568.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Comply with latest editions and addenda of TIA-568 (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), NECA/BICSI 568, NFPA 70, and SYSTEM DESIGN as specified in PART 2.
- B. Comply with Communication Service Provider requirements.
- C. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.
- D. Install firestopping to preserve fire resistance rating of partitions and other elements.

3.02 INSTALLATION OF PATHWAYS

- A. Install pathways with the following minimum clearances:
 - 1. 48 inches (1220 mm) from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
 - 2. 12 inches (300 mm) from power conduits and cables and panelboards.
 - 3. 5 inches (125 mm) from fluorescent and high frequency lighting fixtures.
 - 4. 6 inches (150 mm) from flues, hot water pipes, and steam pipes.
- B. Conduit, in Addition to Requirements of Section 16110:
 - 1. Arrange conduit to provide no more than the equivalent of two 90 degree bend(s) between pull points.
 - 2. Conduit Bends: Inside radius not less than 10 times conduit internal diameter.
 - 3. Arrange conduit to provide no more than 100 feet (30 m) between pull points.
 - 4. Do not use conduit bodies.
- C. Outlet Boxes:
 - 1. Coordinate locations of outlet boxes provided under Section 16130 as required for installation of telecommunications outlets provided under this section.
 - a. Mounting Heights: Unless otherwise indicated, as follows:
 - 1) Telephone and Data Outlets: 18 inches (450 mm) above finished floor.
 - 2) Telephone Outlets for Side-Reach Wall-Mounted Telephones: 54 inches (1.4 m) above finished floor to top of telephone.
 - 3) Telephone Outlets for Forward-Reach Wall-Mounted Telephones: 48 inches (1.2 m) above finished floor to top of telephone.
 - b. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - c. Provide minimum of 24 inches (600 mm) horizontal separation between flush mounted outlet boxes installed on opposite sides of fire rated walls.
 - d. Unless otherwise indicated, provide separate outlet boxes for line voltage and low voltage devices.
 - e. Locate outlet boxes so that wall plate does not span different building finishes.
 - f. Locate outlet boxes so that wall plate does not cross masonry joints.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

- A. Cabling:
 - 1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
 - 2. Do not over-cinch or crush cables.
 - 3. Do not exceed manufacturer's recommended cable pull tension.
 - 4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.
- B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
 - 1. At Distribution Frames: 120 inches (3000 mm).
 - 2. At Outlets - Copper: 12 inches (305 mm).

3. At Outlets - Optical Fiber: 39 inches (1000 mm).
- C. Copper Cabling:
 1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch (12 mm) from point of termination.
 2. For 4-pair cables in conduit, do not exceed 25 pounds (110 N) pull tension.
 3. Use T568B wiring configuration.
- D. Fiber Optic Cabling:
 1. Prepare for pulling by cutting outer jacket for 10 inches (250 mm) from end, leaving strength members exposed. Twist strength members together and attach to pulling eye.
 2. Support vertical cable at intervals as recommended by manufacturer.
- E. Wall-Mounted Racks and Enclosures:
 1. Install to plywood backboards only, unless otherwise indicated.
 2. Mount so height of topmost panel does not exceed 78 inches (1980 mm) above floor.
- F. Floor-Mounted Racks and Enclosures: Permanently anchor to floor in accordance with manufacturer's recommendations.
- G. Identification:
 1. Use wire and cable markers to identify cables at each end.
 2. Use manufacturer-furnished label inserts, identification labels, or engraved wallplate to identify each jack at communications outlets with unique identifier.
 3. Use identification nameplate to identify cross-connection equipment, equipment racks, and cabinets.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Comply with inspection and testing requirements of specified installation standards.
- C. Visual Inspection:
 1. Inspect cable jackets for certification markings.
 2. Inspect cable terminations for color coded labels of proper type.
 3. Inspect outlet plates and patch panels for complete labels.
- D. Testing - Copper Cabling and Associated Equipment:
 1. Test backbone cables after termination but before cross-connection.
 2. Test backbone cables for DC loop resistance, shorts, opens, intermittent faults, and polarity between connectors and between conductors and shield, if cable has overall shield.
 3. Test operation of shorting bars in connection blocks.
 4. Category 5e and Above Backbone: Perform near end cross talk (NEXT) and attenuation tests.
- E. Testing - Fiber Optic Cabling:
 1. Backbone: Perform optical fiber end-to-end attenuation test using an optical time domain reflectometer (OTDR) and manufacturer's recommended test procedures; perform verification acceptance tests and factory reel tests.
 2. Multimode Backbone: Perform tests in accordance with TIA-526-14 Method B.
 3. Single Mode Backbone: Perform tests in accordance with TIA-526-7 Method B.
 4. Links: Perform optical fiber end-to-end attenuation tests and field reel tests.
- F. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

3.06 Wi-Fi Access Points

- A. Provide wifi access points for complete building coverage:

- B. Comply with inspection and testing requirements of specified installation standards.

3.07 Card Reader System

- A. Provide access control system
- B. Comply with inspection and testing requirements of specified installation standards

1.2 SUMMARY

- A. This section refers to new work and work that will be performed to modify existing systems.
The Security Contractor shall provide all equipment, materials, labor, and services necessary to furnish, install, connect, activate, and test a complete Access Control and Monitoring System. All materials, equipment fabrication, installation, and tests shall conform to applicable Codes and authorities having jurisdiction. Access Control and Monitoring System shall include, but is not limited to, the following:
 - 1. Provide a complete Access Control and Monitoring System. A complete system is defined as all conduit, raceways, junction boxes, cables, card readers, controllers, alarm

contacts, and programming needed to achieve a complete and functional system connected to the existing University central system.

2. Work includes adding system panels, card readers, and associated access control devices in locations identified on Drawings.
3. Provide all 120VAC power wiring and low-voltage work to the system and all necessary components.
4. Establish system communication with the Access Control System Server and panels via the Owner's LAN/WAN network.
5. Provide system administrative support throughout the installation process to meet the specific needs of the project scope of work.
6. Furnish and any install required interface relays, materials, and cabling to the fire alarm control panel.
7. Coordinate with the Owner's Representative to provide installation, testing, adjustment, and initial programming for all equipment.
8. Provide written documentation and instructions for system as installed.

1.3 QUALITY ASSURANCE

- A. Pre-programming conference: Prior to programming new doors in Owner's existing access control systems, conduct conference at Project Site to be attended by Owner's Representative, security contractor, Architect, and representatives from Owner's key office.

PART 2 - PRODUCTS

2.1 ACCESS CONTROL PRODUCTS

- A. System Specifications

2.2 ACCESS CONTROL EQUIPMENT

- A. Access Control panels shall include, at a minimum, the following:
 1. I/O boards, and power supplies for DC locks with battery back-up sufficient to maintain full operation of monitoring junctions for a minimum of 4 hours, plus a minimum of 25 lock activations in the event of power failure.
 2. Interfacing relays between Access Controller Panel (ACP) out- puts and locks being controlled.
 3. Sufficient input boards to accept all monitored points on the Access Control System and sufficient output boards to accept all outputs on the Access Control System. All input and out- put boards shall include 20% extra points for future connections to the system.
 4. Reed tamper switches.
 5. Output contacts that open on AC power failure and low battery conditions from power supplies. Low battery monitoring must be unique to each power supply.
- B. Card Readers
 1. Provide one reader at each new card reader access control door opening noted on the Drawings:
- E. Request-to-Exit (RTE) Motion Sensors
 1. Request to exit motion sensors: Light gray or black color to match adjacent finishes.

2. Relay output will be connected to the RM/Reader input number.
 3. Power for RTE from the power supply at the panel.
 4. Mount device on ceiling or door frame. Exact location will depend on existing conditions and the required coverage area. Unless noted otherwise on Drawings, conceal wireways and junction box.
- F. Power Supplies and accessories
1. Power supplies at panel assembly:
 - a. Lock / heater power: Provide 24VDC power supplies for all electrically controlled door locks and reader heating elements. (Lock power will be wired back to the power source at the panel. Do not use the RM/Reader output relay for the electric locking device. Power supplies shall permit simultaneous continuous-duty activation of all door locks and reader heating elements, with an additional minimum 30% capacity on each supply. Provide battery back-up sufficient for 25 activations for all DC locks. A single power supply may be used for two doors when the power supply is located near both doors.

- b. Access control panel power: Provide battery backed power supply.
- c. Reader heat: Provide low-voltage power supplies for all reader heating elements.
Provide Class 2 Energy- Limiting Plug-in type transformer with internal slow-blow fuse and UL Listing.
 - 1) Hammond BPE2E, or approved equivalent.
 - 2. Power Supplies at EL-type doors:
 - a. Provide manufacturer's standard battery backed power supply for EL-type exit device used.
 - b. Locate power supply in accessible location, concealed from view within manufacturer's recommended distance.
 - c. In locations where two EL-type devices are within close proximity, provide single power supply to serve both doors.
 - d. Coordinate location with requirements of Division 08 for Doors.
 - 3. Accessories: If necessary, provide interfacing relays between Access Control Panel (ACP) and electric locks being controlled.

PART 3 - EXECUTION

3.2 PROGRAMMING

- A. Meet with Owner representatives and submit proposed labels for all input and output points for review and comment. Software labels shall be consistent between various integrated systems.
- B. Program automatic door unlock, time specifications, and access levels as directed by the Owner.

3.3 INSTALLATION

- A. All electrical power work, conduit work, and wire pulling shall be by licensed electricians.
- B. Provide all wiring in conduit in accordance with Manufacturer's instructions.
- C. Method and routing of any exposed raceways or wiring shall be approved by the owner prior to installation.
- D. Wiring shall be grouped and harnessed to facilitate access to all equipment, as well as maintenance and replacement of equipment.
- E. All cable shall be labeled at origin and termination, referencing to a master legend schedule shown on submittal drawings. Labeling and any splice locations shall be noted on Record Drawings.
- F. Provide 120V receptacle outlets dedicated to the reader heating elements.

3.4 WIRE AND CABLE PRODUCTS

- A. Wire and Cable Specifications
 - 1. Security Contractor shall follow the manufacturers' recommendation for cabling or the minimum requirements of the Specifications, whichever provides for the most stringent requirements.
 - 2. Cables are to be shielded as necessary to preclude any outside noise or interference from entering the cable and degrading system performance. All cables shall be UL Listed, and appropriate for the application.
 - 3. Coordinate with the Owner's IT department connections to off-site monitoring.

4. Cables run underground, under slab, or in slab shall be installed in conduit and rated for direct-burial application. Cables exposed to weather shall be rated for that use.
5. Mixing of low-voltage cables with telephone/data cables is not permitted.
6. All cables shall be run in unbroken lengths of 1,000 feet or less. No coaxial or power cables less than 1,000 feet shall be spliced. When cable cannot be run in unbroken lengths due to cable spool limitations, coax splices shall be made in junction boxes with crimp-type BNC connectors, power cable splices shall be made using solder and tape. For coaxial cable, the center conductor tip shall be a crimp-on style; the ferrule shall be a hexagonal crimp with a minimum ferrule length of 3/8 inch. All splices and junction boxes shall be clearly marked on the "As-Built" Record Drawings.
7. The use of all screw type connectors i.e. snap caps, wire nuts, and the "twist and tape" method are prohibited.
8. All 24VAC power cabling shall be of stranded construction. Terminal strips and fork spade lugs shall be utilized for all terminations.
9. Wiring shall be grouped, bundled, harnessed, and dressed neatly to facilitate access to all equipment, as well as maintenance and replacement of equipment.
10. All cable shall be labeled at origin and termination, referencing to a master legend schedule as shown on "As-Built" Record Drawings. Labeling and any splice locations shall be noted on "As-Built" Record Drawings. All labels shall be done using machine generated cable tags in the "flagged" position. Hand written labels are not acceptable.

3.5 COMMISSIONING

- A. Perform Commissioning activities per Related Sections above.

3.6 TRAINING

- A. Provide a qualified service technician from the Manufacturer's staff to provide training.
 - B. Train Owner's maintenance personnel on equipment operation, start-up and shutdown, trouble-shooting, servicing and preventative maintenance procedures. Review the data contained in the Operating and Maintenance Manuals with Owner's personnel. Training shall occur separate from startup activities.
1. Provide 2 hours of training minimum.

END OF SECTION