

SECTION 27 11 16

~~~ 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 ~~~~~

COMMUNICATIONS CABINETS, RACKS, AND ENCLOSURES

~~~ 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. Communications ladder rack.
- B. Communications equipment racks and enclosures.
- C. Wire management panels.
- D. Electrostatic discharge port kit.
- E. Accessories.
- F. Communications grounding and bonding.

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. ISO 9000 - Quality management systems -- Fundamentals and vocabulary; 2015.
- E. ISO 9001 - Quality management systems -- Requirements; 2015.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- G. NECA/BICSI 568 - Standard for Installing Commercial Building Telecommunications Cabling; 2006.
- H. NEMA VE 2 - Cable Tray Installation Guidelines; 2013, with Errata (2016).
- I. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set; 2016.
- J. TIA-569-D - Telecommunications Pathways and Spaces; Rev D, 2015.
- K. TIA-607-C - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; Rev C, 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.
 - 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/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 product. Include construction details, material descriptions, dimensions of individual components and profiles, elevations and finishes for equipment racks and cabinets. Include rated capacities, and furnished specialties and accessories.
- 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). Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Equipment Racks and Cabinets: Include workspace requirements and access for cable connections.
 - 3. Ladder rack layout, showing ladder rack route to scale, with relationship between the ladder rack 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 ladder rack.
 - c. Vertical elevation of ladder rack above the floor or bottom of ceiling structure.
 - d. Load calculations to show dead and live loads as not exceeding manufacturer's rating for ladder rack and its support elements.
- C. Evidence of qualifications for installer.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Comply with requirements indicated in Section 27 05 03 - Communications General Requirements Article "Quality Assurance", Paragraph "Installer Qualifications."
- B. Manufacturer Qualifications: Manufacturer must be ISO 9000 or ISO 9001 certified.
- C. Regulatory Requirements:
 - 1. Comply with the City of Chicago Building Code.
 - 2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the City of Chicago Electrical Code, by UL or another qualified testing agency, acceptable to the authorities having jurisdiction, and marked for intended location and application.
- D. Telecommunications Pathways and Spaces: Comply with TIA-569-D.
- E. Grounding: Comply with TIA-607-C.

1.07 DELIVERY, STORAGE, AND HANDLING

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

- B. Package and store ladder rack and runway components individually in accordance with manufacturer's recommendations.
- C. Store products in manufacturer's unopened packaging until ready for installation.
- D. Keep stored products clean and dry.

1.08 WARRANTY

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

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

- A. 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.

2.02 LADDER RACK

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - 1. Chatsworth Products, Inc.; www.chatsworth.com.
 - 2. Cooper B-Line, Inc.; a division of Cooper Industries; www.cooperindustries.com.
 - 3. Southwest Data Products; a division of Innovative Metal Industries; www.swdp.com.
 - 4. Hoffman, a brand of Pentair Technical Products; www.hoffmanonline.com.
- B. Fabrication: Ladder racks shall be fabricated from manufacturer's standard steel components, with rounded/eased edges and smooth surfaces.
 - 1. Sizes and Configurations: Ladder racks shall be nominally 12-inches wide, with a rung spacing of 6- to 12-inches on center, unless otherwise indicated in the Drawings.
 - 2. Standard Length: 9' - 11-1/2".
 - 3. Rungs and rails shall be nominally 1-inch by 1/2-inch or 3/8-inch tubular steel rungs, with rounded edges, welded to 1-1/2-inch or 2-inch longitudinal rails (stringers).
- C. Finish: Ladder racks shall receive manufacturer's standard baked powder coat (color: gray).
- D. Accessories:
 - 1. Fittings: Tees, crosses, risers, bends, elbows, wall mounting brackets, rack-to-runway brackets, corner and butt splice brackets, mounting clips and all other appurtenances and fittings as necessary to form a complete and functional runway system within MDF [**and IDF**].
 - 2. Bonding strap: Flexible tinned copper flat braid or No.#6 AWG insulated stranded copper conductor, minimum 8-inches long, with two-hole compression lugs and nuts/washers, to provide grounding connection between ladder rack runway segments.
 - 3. Supports: Comply with requirements of Section 26 05 29 - Hangers and Supports for Electrical Systems.
 - 4. Finish: Accessories shall be finished to match ladder rack.

2.03 CONCENTRATOR ENCLOSURE

- A. General: A factory-finished, wall-mounted metal enclosure used to house, secure and protect remotely located cross-connects, patching hardware, and other network equipment. Enclosures serve as the central points between stations in areas such as classrooms, computer labs, libraries, and administrative areas within the school.
 - 1. Color: Within existing schools, including additions and annexes to existing schools, the color of new concentrator enclosure(s), including enclosure conversions and extensions,

shall match the enclosures within the existing school (either gray or ivory). Within new schools, the color of concentrator enclosures shall be ivory.

- a. Field painting of concentrator enclosures is not allowed.
- B. Manufacturers and Products: Subject to compliance with requirements, provide one of the following:
 1. Hoffman Engineering Company; a division of Pentair Technical Products:
 - a. Part #165NC (Gray).
 - b. Part #183VU (Ivory).
 2. Southwest Data Products; a division of Innovative Metal Industries:
 - a. Part #100257. Color: Gray (G) or Ivory (I).
- C. Fabrication:
 1. General: Enclosure and door shall be fabricated of either steel.
 2. Enclosure shall be fabricated as one-piece construction, with all seams continuously welded and welds ground smooth that are exposed to view from the exterior following installation.
 3. Enclosure shall be fabricated to support a static weight load of not less than 100 pounds.
 - a. Size: 23 inches wide by 20 inches deep by 24 inches high.
 4. Enclosure shall be fabricated with louvers to allow for air circulation. Louvers shall be oriented downward to prevent dust from entering the enclosure.
 5. Door shall be fabricated as one-piece construction; side-swinging; side-hinged to operate through 120 degrees of motion; field-reversible handing; removable when in open position only; capable of being grounded, regardless of mounting; with cylinder lock and removable key, and tamper-resistant lift and turn latch. Provide six (6) copies of key to Board's Representative.
 6. Mounting rails shall be zinc plated and adjustable front to rear of cabinet on a strut track system.
 - a. Rails shall be compatible with EIA/ECA-310 standard 19-inch panel mounting, and shall utilize 5/8-inch - 5/8-inch - 1/2-inch alternating hole pattern with No.#10-32 pre-tapped holes.
 7. Buss Bar: Enclosure shall be supplied with 4-inch copper buss bar mounted under bottom interior strut. Buss bar shall be made from 1/4-inch thick, half hard copper bar, drilled and tapped with No.#10-32 holes in five (5) places, minimum.
- D. Finish: Enclosure body and door shall be pretreated with a conversion coating and receive the manufacturer's standard thermosetting polyester power coat finish, with cured-film thickness of not less than 1.5 mils.

~~~ PROJECT NOTE ~~~~~
RETAIN THIS ARTICLE WHEN PROJECT REQUIRES RETROFIT CONVERSION OF EXISTING CONCENTRATOR ENCLOSURE(S) WITHIN AN EXISTING FACILITY. COORDINATE WITH ITS TO IDENTIFY IF THIS REQUIREMENT EXISTS AT SUBJECT PROJECT.
~~~ END OF PROJECT NOTE ~~~~~

2.04 CONCENTRATOR ENCLOSURE CONVERSION

- A. General: The concentrator enclosure conversion shall utilize a new enclosure as a mounting extension over an existing 8-inch by 18-inch by 18-inch enclosure.
 1. Color: Comply with requirements indicated in Article "Concentrator Enclosure," above.
- B. Manufacturer: Subject to compliance with requirements, provide products by the following manufacturer:
 1. Southwest Data Products:
 - a. Part # 100257 SWE-CPS-X (**[G] Gray** or **[I] Ivory**).
 - b. Comply with requirements indicated in Article "Concentrator Enclosure," above.
 2. Hoffman Engineering Company:
 - a. Part # 183VU (Ivory).

- b. Part # 165NC (Gray).
- c. Comply with requirements indicated in Article "Concentrator Enclosure," above.

~~~ PROJECT NOTE ~~~~~

RETAIN ARTICLE WHERE PROJECT REQUIRES ADDITION OF AN ENCLOSURE SLEEVE TO AN EXISTING CONCENTRATOR ENCLOSURE IN AN EXISTING FACILITY. COORDINATE WITH ITS TO IDENTIFY IF THIS REQUIREMENT EXISTS AT SUBJECT PROJECT.

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

2.05 CONCENTRATOR ENCLOSURE SLEEVE EXTENSION

- A. General: Enclosure sleeve shall accommodate the depth of the CPS Cisco network switches, where existing switches are to be replaced, or where conduit or cabling obstructs the center section of the concentrator enclosure.
 - 1. Color: Comply with requirements indicated in Article "Concentrator Enclosure," above.
- B. Manufacturer: Subject to compliance with requirements, provide the following:
 - 1. Southwest Data Products; part no. SWE100257-EXT.

2.06 COMMUNICATIONS FLOOR-MOUNTED RACK

- A. General: Racks shall be freestanding units designed for support of communications hardware and electronics in MDF **[and IDF]**. All racks shall be UL-listed.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - 1. Cooper B-Line, Inc.; a division of Cooper Industries; www.cooperindustries.com.
 - 2. Chatsworth Products, Inc.; www.chatsworth.com.
 - 3. Homaco, Inc., an Ortronics/Legrand company; www.legrand.us.
 - 4. Hubbell Inc., Hubbell Premise Wiring; www.hubbell-rtb.com.
 - 5. Southwest Data Products; a division of Innovative Metal Industries; www.swdp.com.
 - 6. Hoffman, a brand of Pentair Technical Products; www.hoffmanonline.com.
- C. Floor-Mounted Rack (2-Post):
 - 1. Dimensions: 84-inches tall with a 15-inch base depth.
 - 2. Static weight capacity: 750 lbs., minimum.
 - 3. Aluminum construction.
- D. Floor-Mounted Rack (4-Post) Digital Video System:
 - 1. Dimensions: 84-inches tall with a 26-inch base depth.
 - 2. Static weight capacity: 1000 lbs., minimum.
 - 3. Steel construction
- E. Fabrication: Racks shall be fabricated from modular-steel or -aluminum, as noted above, with bases pre-drilled for securing rack to the floor.
 - 1. Rack width shall be compatible with EIA/ECA-310 standard, 19-inch panel mounting, utilizing 5/8-inch - 5/8-inch - 1/2-inch alternating hole pattern with No.#12-24 pre-tapped holes.
 - 2. Racks shall have U-shaped vertical channels, of EIA/ECA-310 compliant thickness, that provide 45 rack spaces on both front and rear, and that have a universal side-drilling pattern to allow racks to be bolted together or for attachment of accessories.
- F. Finish: Racks shall receive manufacturer's standard baked-polyester powder coat (color: black) or clear mill finish. Where new racks are provided in an existing MDF, they shall be finished to match the existing racks installed in the MDF.
- G. Accessories: All racks shall be provided with:
 - 1. No.#12-24 mounting screws, with not less than 24 screws per rack.
 - 2. Ground lug and No.#6 AWG, not less than 12-inches in length.
 - 3. Clips for securing equipment to rack is not allowed.

2.07 WIRE MANAGEMENT PANELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - 1. Cooper B-Line, Inc.; a division of Cooper Industries; www.cooperindustries.com.
 - 2. Chatsworth Products, Inc.; www.chatsworth.com.
 - 3. Homaco, Inc., an Ortronics/Legrand company; www.legrand.us.
 - 4. Hubbell Premise Wiring, Hubbell Inc.; www.hubbell-rtb.com.
 - 5. Southwest Data Products; a division of Innovative Metal Industries; www.swdp.com.
 - 6. Hoffman, a brand of Pentair Technical Products; www.hoffmanonline.com.
- B. Wire Management Panels - Vertical: Double-sided vertical panels, fabricated of steel or aluminum, mounted to side of communications floor-mounted racks, and providing for front and rear management of horizontal and backbone cable in-feeds and equipment patch cords.
 - 1. Panels shall be "open-ring" style, consisting of a series of metal rings without overall covers, utilizing lockable latches or integral fingers to retain cables on both front and rear of panel.
 - a. Plastic "routing" rings or "covered-slotted duct" management panel styles are not permitted.
 - 2. Dimensions: 45 rack-units high; minimum 6-inch width by minimum 12-inch overall depth, with a maximum spacing of 12-inches between latches or fingers.
 - 3. Panel to feature front/rear pass through ports every 24-inches, minimum.
 - 4. Panels to feature rolled edges or edge guards to protect cables from damage.
 - 5. Finish: Manufacturer's standard clear mill finish or baked powder-coat (color: black).
 - 6. A vertical management section shall be provided for each individual rack. Coordinate quantity and location of electrical surface raceway for power receptacles. If more than one rack is installed in a row, a single vertical management section may be used to adjoin two racks.
- C. Horizontal wire management panels: Double-sided, steel or aluminum, horizontal channels mounted to vertical rails of communications floor-mounted racks or concentrator enclosures, providing for front and rear management of horizontal cable in-feeds and equipment patch cords.
 - 1. Panels must be "open-ring" style, consisting of a series of metal rings, without an overall cover. Plastic "routing" rings or "covered-slotted duct" management panel styles are not permitted.

~~~ **PROJECT NOTE** ~~~~~  
*COORDINATE WIRE MANAGEMENT SIZES AND POSITIONS SHOWN IN THE DRAWINGS.*  
~~~ **END OF PROJECT NOTE** ~~~~~

- 2. Panel must have a minimum of four (4) rings across front and rear. Rings shall be minimum 3-inches deep.
- 3. Height: As indicated.
- 4. Provide horizontal wire management panels above and below all horizontal cable patch panels and other termination housings.
- 5. Provide horizontal wire management panels above and below open rack units dedicated to future network electronics.
- 6. Finish: Manufacturer's standard baked powder-coat; color: black.

2.08 ELECTROSTATIC DISCHARGE PORT KIT

- A. Manufacturer and Product: Subject to compliance with requirements, provide the following:
 - 1. Panduit Corporation; part no. RGESD-1.
- B. Kit: One-hole barrel lug, angled at 45-degrees, permanently marked with protective earth (ground) symbol, designed to accommodate a 4mm ESD wrist strap plug. Kit shall include an antioxidant compound, and one No.#12-24 by 1/2-inch thread-forming screw.

2.09 ACCESSORIES

- A. Backing Panels: Refer to Section 06 10 00 - Rough Carpentry.

2.10 GROUNDING AND BONDING COMPONENTS

- A. Comply with TIA-607-C.

PART 3 EXECUTION

*~~~ PROJECT NOTE ~~~~~
RETAIN THIS ARTICLE FOR EXISTING BUILDINGS.
~~~ END OF PROJECT NOTE ~~~~~*

### 3.01 COMMUNICATIONS DEMOLITION

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

*~~~ PROJECT NOTE ~~~~~  
RETAIN ARTICLE FOR PROJECTS IN AN EXISTING FACILITY.  
~~~ END OF PROJECT NOTE ~~~~~*

3.02 PREPARATION – EXISTING FACILITY

- A. Prohibit access to the area where the work is to be performed to prevent any unauthorized access to Board infrastructure equipment or components.
- B. Clean area of work of all obstructions including Board property (i.e. desks, chairs, etc.) to protect the items from damage. Provide protective covers acceptable to the Board's Representative. The Contractor is responsible for any and all damage to Board property due to the negligence of the Contractor's employees.
- C. Clean the walls and floor where the equipment racks, frames, enclosures or other equipment is to be installed.
- D. Prior to installation in existing Schools, the Contractor must verify and receive approval from the School Principal, the Board's Representative, and the CPS Office of Technology Services' Senior Infrastructure Manager regarding the location of all racks and enclosures.

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. Comply with NECA 1.
- C. Install all communications hardware components in accordance with the manufacturer's written instructions, and the plan, elevation, and layout information shown in the Drawings.
- D. Coordinate the installation of communications cabinets, racks, and enclosures with the installation of the communications pathways and cabling to eliminate any damage to cables, or any other installed communications components or equipment.
- E. Existing Installations: Contractor shall field verify existing site conditions prior to submitting Bid and shall include all costs associated with retrofit of existing concentrator enclosure in their Bid.

3.04 INSTALLATION OF LADDER RACK

- A. Comply with NEMA VE 2 and TIA-569-D.
- B. Ladder racks shall not penetrate fire-rated wall or floor assemblies.
- C. Install at elevation, and in configuration, indicated. Support overhead ladder racks at not more than 5-foot intervals with 3/4-inch threaded rods. Below ladder rack the threaded rods shall be cut and filed clean with no more than three threads showing below the nut. Provide supports at each connection or intersection point. Where ladder rack meets wall, provide a wall-mounted bracket to support and secure the ladder rack.

- D. Do not fasten ladder rack assemblies to, or support rack assemblies from, pipes, ducts, mechanical equipment, or electrical conduit.
- E. Provide minimum 1-foot clearance above, and sufficient work space around, the ladder rack to access the ladder rack and allow the addition or removal of cable without requiring the removal of any section of ladder rack or installed supports.
- F. Ladder rack system shall be installed so not to obstruct access to any new or existing equipment, or to infringe on any clearances required by the authorities having jurisdiction.

3.05 INSTALLATION OF EQUIPMENT RACKS AND ENCLOSURES

- A. Install racks perfectly plumb and perpendicular to the base, level, and true to line.
 - 1. Secure to floor with lag bolts or masonry anchors, and washers, appropriate to application and flooring condition. Secure at all four corners of rack base.
 - a. The use of a Tapcon, or similar, masonry screw with washer is not acceptable.
 - 2. Secure each communications floor-mounted rack to overhead ladder rack using rack-to-runway mounting plates, brackets, j-bolts, nuts/washers, and other fasteners required or recommended by the manufacturer, to ensure the rack is securely positioned.
- B. Wire Management Panels: Secure to communication relay racks.
- C. Concentrator Enclosure: Provide enclosure for use as an ACE, LCE, and/or QCE as indicated in the Drawings. Securely mount to wall using manufacturer's recommended fasteners and anchors to support load indicated.
 - 1. Orientation: Enclosure louvers shall face downward only. Enclosures mounted with the louvers facing up must be reinstalled, or replaced with new enclosures, by the Contractor at the Contractor's expense.
 - 2. Mounting position: Locate enclosure a minimum distance of six (6) inches from adjacent walls, to permit proper operation of the door. The door shall not rub ceilings, fixtures, or walls anywhere within its swing.
 - 3. Mounting height:
 - a. For ceiling heights of eight feet (8'-0") to nine feet-six inches (9'-6"), install enclosure with 1-inch of clearance between the ceiling and enclosure door.
 - b. For ceiling heights of nine feet-seven inches (9'-7") and above, install enclosure at nine feet-five inches (9'-5") to the top of the door.
 - 4. Coordinate installation of conduit and surface raceway to enclosure to be as close as possible to the back of the enclosure, with conduit entering the enclosure behind the adjustable mounting rails. No conduit is to be installed down through the center area of the enclosure.

~~~ PROJECT NOTE ~~~~~
RETAIN PARAGRAPH AND SUBPARAGRAPHS BELOW FOR PROJECTS IN EXITING FACILITY
WHERE EXISTING CONCENTRATOR ENCLOSURE(S) REQUIRES A RETROFIT CONVERSION.
~~~ END OF PROJECT NOTE ~~~~~

- D. Concentrator Enclosure Conversion: Utilize a new concentrator enclosure as a mounting extension to fit over an existing enclosure cabinet. Securely mount to wall using proper fasteners and anchors for substrate encountered and to support load indicated.
 - 1. The mounting extension shall be notched in field to allow conduits and/or surface raceway entering the existing enclosure to remain in place. Field verify positions and sizes needed and notch the mounting extension in a professional, workmanlike manner without excessive gaps between the existing conduit or surface raceway and the mounting extension. Provide edge grommets around all notched openings.
 - 2. Trim the cover of existing surface raceway entering the mounting extension so as to allow removal of the cover. Trim cover tight to mounting extension with minimal gaps.
 - 3. At completion of conversion, notify Board's Representative to request inspection. Upon inspection of conversion Board's Representative, if determination is made that installation is not in compliance with requirements or has been improperly installed, the Contractor

shall correct the installation, at Contractor's expense, to the satisfaction of the Board's Representative.

~~~ PROJECT NOTE ~~~~~
RETAIN PARAGRAPH AND SUBPARAGRAPHS BELOW FOR PROJECTS IN EXITING FACILITY WHERE EXISTING CONCENTRATOR ENCLOSURE(S) REQUIRES A SLEEVE EXTENSION.
~~~ END OF PROJECT NOTE ~~~~~

- E. Concentrator Enclosure Sleeve Extension: Provide a sleeve extension to replace door of existing enclosure cabinet.
 - 1. Securely install the sleeve extension onto existing concentrator enclosure, in accordance with manufacturer's written instructions and recommendations.
 - 2. Transfer all documentation (cable schedules, photographs, etc.) over and securely affix to new door.
- F. Backing Panels: Install backing panels in accordance with Section 06 10 00 - Rough Carpentry at elevation and wall location(s) indicated in the Drawings. Where indicated to be painted, visibility of fire-rating mark shall be maintained for subsequent inspection by authority having jurisdiction. Following inspection, fire-rating mark shall be painted to match adjacent surfaces.

3.06 FIRESTOPPING

- A. Comply with requirements in Section 07 84 00 - Firestopping.

3.07 GROUNDING

- A. Comply with TIA-607-C.
- B. Bond each segment of ladder rack runway using bonding straps. Ladder rack connection fittings are not allowed.
- C. Bond metallic equipment to the communications grounding bus bar in MDF[or IDF], using not smaller than No.#6 AWG equipment grounding conductor.
 - 1. Ground ladder rack system to communications grounding bus bar.
 - 2. Ground each floor-mounted rack to communications grounding bus bar. Bonding to overhead ladder rack is not allowed.
 - 3. Ground each concentrator enclosure to communications grounding bus bar. At enclosure, terminate equipment grounding conductor to grounding bus bar located within enclosure.
- D. ESD Port Kit: Install ESD port kit on communications mounting elements as follows:
 - 1. Floor-Mounted Racks: Mount a kit directly to both the front and the rear sides of the right vertical mounting rail of the center most rack in MDF **[and the center most rack in IDF]**, at 48-inches above floor, using thread-forming screw and antioxidant compound. Coordinate exact location with Board's Authorize Representative.
 - 2. Concentrator Enclosure: Mount directly to front side of right vertical mounting rail of enclosure using thread-forming screw and antioxidant compound. Provide one for each enclosure installed as part of project **[and one for each existing enclosure retrofit as part of project where not previously installed]**.
- E. Comply with requirements of Section 26 05 26 - Grounding and Bonding for Electrical Systems for equipment bonding conductors.

3.08 IDENTIFICATION

- A. Comply with requirements in Section 27 05 53 - Identification for Communication Systems.
- B. Comply with requirements in Section 06 10 00 - Rough Carpentry and Section 09 91 05 - Renovation Painting for painting backing panels.

3.09 CLEANING

- A. Comply with requirements of Section 27 05 03 - Communications General Requirements for cleaning.
- B. Clean interior and exterior of concentrator enclosures.

~~~ 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 11 16