

SECTION 271100
COMMUNICATIONS EQUIPMENT ROOMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Buildout / fit-up of communications equipment rooms.
- B. Base Bid Work
1. The work under this section includes materials, accessories, fasteners, etc., and the labor and associated services required to buildout / fit-up telecommunications equipment rooms, and includes coordination through the General Contractor with other trades. This specification lists major equipment but not every fastener, anchor, assembly hardware, support, brace, etc., required for a complete and professional installation.
 2. Submittals – pre-construction and closeout submittals
 3. Coordination Requirements and Final Layout
 - a. The contract drawings show basic room layouts and the minimum anticipated equipment. The layouts and equipment shown are neither final nor exhaustive. Undoubtedly, there will be more equipment, other building system equipment panels, etc., that will end up in telecom rooms. Therefore, it is imperative that an entity coordinate the final constructed layout of telecom rooms and placement of inevitable equipment and services that ultimately land in these rooms. The work of this section includes assuming responsibility for coordinating final layout for other equipment not necessarily identified in the contract drawings (or even known at this time, such as equipment panels for other systems) within telecom rooms as required for a complete and professional installation. Coordinate throughout the entire construction team regarding others' needs to house equipment (such as equipment panels and control panels – BMS, fire alarm, etc.) within telecom rooms. Determine the final layout for telecom rooms.
 - b. Electrical: Coordinate the power service with electrical contractor to ensure proper placement of lighting, sequencing of power service to rack bay, and other issues related to electrical trade.
 - c. Mechanical: Coordinate the cooling service with mechanical contractor to ensure proper placement of equipment, ducts, etc., and other issues related to mechanical trade.
 - d. Owner: Coordinate room-ready requirements and schedule with Owner (to allow Owner to plan and execute installation of OFOI telecommunications/network equipment).
 - e. Based on this coordination, determine final equipment locations and final layout per telecom room.
 4. Rack Bays:
 - a. Provide completely assembled equipment racks, including seismic anchoring of the racks to the building structure. Provide fasteners and parts required to complete the installation.
 - b. Provide vertical management sections as shown on the drawings.
 - c. Provide horizontal management panels as shown on the drawings.

- d. Provide non-seismic stiffeners (or “kickers”) at the end of each rack bay to the structure above or to overhead cable support as needed to mitigate sway and to stabilize the rack bay.
- e. Provide power strips as shown on the drawings.
- f. Provide bonding (also refer to 270526).
- 5. Overhead and Vertical Cable Support:
 - a. Provide overhead cable support system, trapeze and wall supports, anchoring (e.g., to the underside of the structure above), accessories, fasteners, etc., required for a complete installation.
 - b. Provide seismic bracing for the overhead cable support system, including layout, configuration, detailing, and seismic calculations.
 - c. Provide drop-out as shown on Drawings.
- 6. Cable, wire and patch cord management
- 7. Identification tags, plates and labeling
- 8. Warranty

C. Work Covered Under Other Sections

- 1. Plywood backboards
- 2. Bonding
- 3. Grounding busbars
- 4. Conduit and device boxes
- 5. Power service to and within the room, and power service to the racks
- 6. Cooling service to and within the room and controls
- 7. Lighting
- 8. Fire / life safety

D. Related Divisions and Sections

- 1. Consult other Divisions, determine the extent and character of related work, and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable system.
- 2. Drawings, general provisions of the Agreement, and Division 01 apply to this Section.
- 3. Comply with the Related Sections requirements of section 270000 “Basic Communications Requirements”
- 4. Refer to section 270526, “Communications Bonding”, for related work.
- 5. Seismic Calculation requirements of section 270000, Article 1.05, apply to this Section.

1.2 REFERENCES

- A. Comply with the References requirements of section 270000.
- B. In addition to those codes, standards, etc., listed in section 270000, comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
 - 1. EIA/ECA-310-E, “Cabinets, Racks, Panels, and Associated Equipment”

1.3 DEFINITIONS

- A. Definitions as described in section 270000 shall apply to this section.

- B. In addition to the “Definitions” of section 270000, the following list of terms as used in this specification defined as follows:
1. “BDF”: Building Distribution Facility
 2. “IDF”: Intermediate Distribution Facility
 3. “EF”: Entrance Facility – applicable to telecom utilities, as defined in Public Utilities Commission regulations
 4. “UPS”: Uninterruptible Power Supply – a system that provides conditioned power with batteries acting as a continuous power source for equipment during a utility power interruption

1.4 SYSTEM DESCRIPTION

- A. General: Communications rooms shall fall into one of the following space titles:
1. Entrance Facility
 2. Building Distribution Facility
 3. Intermediate Distribution Facility (IDF)
- B. Telecommunications rooms shall fall into one of the following space titles and functions:
1. Entrance Facility will serve the following functions:
 - a. House the MPOE for telecommunications utility/ies (e.g., AT&T)
 - b. House telecom utility’s termination fields and interface between telecom utility’s facilities and premises facilities
 2. Building Distribution Facility (BDF) will serve the following functions:
 - a. House interbuilding twisted pair and fiber optic backbone cabling to IDFs within the same building
 - b. House voice backbone crossconnect field and data backbone crossconnect field
 - c. House network equipment (i.e. distribution switches) serving the same building
 - d. House horizontal termination field, both voice and data, of devices served from this room (refer to floor plans for area served)
 - e. House network equipment (i.e. access switch) serving users of the room’s service area
 3. Intermediate Distribution Facility (IDF) will serve the following functions:
 - a. House intrabuilding twisted pair and fiber optic backbone cabling from BDF
 - b. House horizontal termination field – both voice and data – of outlets served from this room (refer to floor plans for area served)
 - c. House network equipment (i.e. access switch) serving users of the room’s service area
- C. Clearances: Refer to the drawings for minimum clearances associated with racks, rack bays, and IT cabinets. If not explicitly shown, apply the following minimum clearances.
1. 2-Channel Equipment Racks:
 - a. Front: 40" clearance from channel’s front mounting flange
 - b. Back: 57" clearance from channel’s back mounting flange
 - c. End: 42" clearance between the wall or any protrusions and the closest portion of the rack bay (such as the vertical cabling section)

1.5 SUBMITTALS

- A. Submittals of this section shall comply with the “Submittal” requirements of section 270000.
- B. Quantity: Furnish quantities of each submittal as noted in section 270000.

- C. Submittal Requirements at Start of Construction:
 - 1. Product Data Submittal
 - 2. Shop Drawings Submittal: Consisting of any proposed changes to room plans.
- D. Submittal Requirements at Closeout:
 - 1. As-Built drawings; showing room layouts (floor layouts, overhead layouts), rack elevations, and other information pertinent to the built conditions
 - 2. O&M Manual, containing the final approved products and maintenance instructions
- E. Substitutions
 - 1. Requests for substitutions shall conform to the general requirements and procedure outlined in section 270000.

1.6 QUALITY ASSURANCE

- A. Comply with "Quality Assurance" requirements of section 270000.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with "Delivery, Storage and Handling" requirements of section 270000.

1.8 WARRANTY

- A. Warrant work and products described within this section for a period of 1 year. Correct deficiencies within 24 hours of notification.

PART 2 - PRODUCTS

2.1 EQUIPMENT RACK – 2-CHANNEL TYPE

- A. Application: Suitable for the support of termination apparatus, cable and cord management apparatus, network equipment, and other similar equipment, within a telecommunications room.
- B. Material: High strength, lightweight 6061-T6 aluminum, extrusion construction.
- C. Channel:
 - 1. Size: 3" deep, with flanges on each side ("double sided")
 - 2. Flange: 1.265" wide by 0.25" thick, with mounting holes
 - 3. Mounting Holes: Threaded, spaced at 5/8" - 5/8" - 1/2", compatible with EIA/ECA-310-E
 - 4. Threading: #12-24 rolled, compatible with EIA/ECA-310-E
 - 5. RMU Markings: The RMU markings shall be permanently stamped on the 'outside' of both flanges on both channels.
- D. Assembled Rack: Assembled rack shall feature 2 mounting channels, and shall be 7'-0" high (overall) by 19" mounting width (20.25" wide overall), and shall contain 45 EIA mounting spaces (1.75")

- E. Load Rating: 1,000 lbs when evenly distributed for the height of the rack (The rack's load bearing capacity shall be certified.)
- F. Finish: Black, powder coat
- G. Compliances: The rack shall be UL listed.
- H. Manufacturers, or equal:
 - 1. B-Line (Eaton)
 - a. #SB556084XUFB; 2-channel rack, 7'-0"H (45U) x 19"Mnt, black

2.2 BASE GUSSET, FOR 2-CHANNEL EQUIPMENT RACK

- A. Application: Gusset kit for stiffening and stabilization of critical joints at the base of an equipment rack.
- B. Manufacturers, or equal:
 - 1. B-Line (Eaton)
 - a. #SB556 GUSSET KIT FB; gusset kit, black

2.3 VERTICAL MANAGEMENT SECTIONS

- A. Application: Suitable for cable routing, cord routing, and cord slack storage vertically within a rack bay.
- B. The vertical management section shall be <double-sided> <single-sided> (i.e., the management section having covered cable guides on the front and flip-retainers on the rear).
- C. Size & Capacity: <Refer to the drawings for sizes and configurations. 7'-0" high by 6"12" wide, with 5-1/3" deep (minimum) cable storage capacity in back and 6" deep (minimum) cord storage capacity in front.
- D. Mounting: The vertical management section having matching bolt holes for attachment to the rack.
- E. Color: black (guides and cover).
- F. Manufacturers, or equal:
 - 1. B-Line (Eaton) RCM+ Series vertical management sections
 - a. #SB86086D084FB; vertical management section, 7'-0"H x 6"W, double sided, black
 - b. #SB860812D084FB; vertical management section, 7'-0"H x 12"W, double sided, black

2.4 HORIZONTAL MANAGEMENT PANEL

- A. Application: Suitable for installation into equipment rack for horizontal cord management. The horizontal management panel shall match (and fully integrate with) the vertical management sections.

- B. The horizontal management panel shall be double-sided.
- C. Size: 1U or 2U high (refer to drawings) by 19" mounting.
- D. Color: black (guides and cover).
- E. Manufacturers, or equal:
 - 1. B-Line (Eaton) RCM+ Series management panels
 - a. black
 - b. #SB87019D1FB; horizontal management panel, double sided, standard fingers, 1U, black
 - c. #SB87019D2FB; horizontal management panel, double sided, standard fingers, 2U, black

2.5 LABEL PLATES

- A. Application: Suitable to affix onto top angle of equipment rack or onto the top front of a frame/cabinet.
- B. Label plate shall be engrave-able stock melamine plastic laminate substrate.
- C. Size (example): 1"H x 6"L x 1/16"T.
- D. Color: Black.
- E. Lettering shall be white, engraved, 1/2" high.

2.6 CABLE RUNWAY

- A. Application: Suitable for the support and management of telecommunications (and other low voltage) cables, either overhead or vertically on a wall, within telecommunications rooms.
- B. Straight Sections and Fittings:
 - 1. Construction: Straight sections and fittings shall be constructed of two longitudinal side elements – “stringer”, with elements periodically crossing between stringers – “rung”. Straight sections shall be manufactured in 9'-11 1/2" lengths with rungs spaced 12" on center, and welded to stringers.
 - 2. Material - stringer and rung: rectangular steel tube, 1-1/2" x 3/8" x 0.65" wall thickness
- C. Compliances: Cable runway shall be UL listed.
- D. Manufacturers, or equal:
 - 1. B-Line (Eaton) “Tubular Stringer (Boxed)” series
 - a. #SB17U12BFB; cable runway, straight section, 12"W, black
 - b. #SB17U18BFB; cable runway, straight section, 18"W, black
 - c. #SB17U24BFB; cable runway, straight section, 24"W, black
 - d. #SB17HRB12FB; cable runway horizontal sweep/90-degree fitting, 12"W, black
 - e. #SB17HRB18FB; cable runway horizontal sweep/90-degree fitting, 18"W, black
 - f. #SB17HRB24FB; cable runway horizontal sweep/90-degree fitting, 24"W, black
 - g. #SB17VRB12FB; cable runway vertical sweep/90-degree fitting, 12"W, black
 - h. #SB17VRB18FB; cable runway vertical sweep/90-degree fitting, 18"W, black

- i. #SB17VRB24FB; cable runway vertical sweep/90-degree fitting, 24"W, black
- 2. B-Line (Eaton) Installation Accessories
 - a. #SB211312KFB; wall angle support kit – for 12"W runway, black powder coat
 - b. #SB211318KFB; wall angle support kit – for 18"W runway, black powder coat
 - c. #SB211324KFB; wall angle support kit – for 24"W runway, black powder coat
 - d. #SB21312KFB; wall triangle support kit – for 12"W runway, black powder coat
 - e. #SB21318KFB; wall triangle support kit – for 18"W runway, black powder coat
 - f. #SB21B; end cap – neoprene, or #SB110A1B; end cap – PVC
 - g. #SB213312FB; rack-to-runway attachment kit – for 9" or 12"W runway, black powder coat
 - h. #SB213318FB; rack-to-runway attachment kit – for 18"W runway, black powder coat
 - i. #SB213324FB; rack-to-runway attachment kit, for 24"W runway, black powder coat
- 3. B-Line (Eaton) Cable/Cord Management Accessories
 - a. #SB212912UFB; rung drop out kit, 10"W cable runway, black powder coat
 - b. #SB212918UFB; rung drop out kit, 16"W, black powder coat
 - c. #SB212924UFB; rung drop out kit, 22"W, black powder coat

2.7 HORIZONTAL POWER STRIPS – RACK MOUNTED

- A. Finish: Black, powder coat
- B. Compliances: The horizontal power strip shall be UL listed.
- C. Manufacturer, or equal:
 - 1. Leviton
 - a. #5500-192: 1RU, 120V, (2) 5-20 outputs on front, (10) 5-20 outputs on rear, (1) 5-20 input.

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with the "Execution" requirements of section 270000.

3.2 EXAMINATION AND PREPARATION

- A. Prior to installation, verify rooms are suitable for the construction scope of this section. Schedule work to prevent damage caused by other trades during their construction.
- B. Prepare surfaces, such as floors, for permanent installation of products, such as racks.

3.3 INSTALLATION

A. Equipment Rack Bays

1. Equipment Racks
 - a. Pre-Installation:
 - 1) Layout the racks within telecom rooms, and mark the floor where racks will be installed. Obtain written approval from either the Engineer or Owner prior to proceeding with the rack bay installation.
 - 2) The layout shall include the correct amount of space between each rack for proper installation (according to manufacturer's written instructions) of the vertical management sections.
 - 3) The layout shall satisfy the clearance requirements under "System Description".
 - b. Anchoring
 - 1) Use anchors and methods of the approved seismic submittal.
 - 2) Drill the structure using means approved for this project.
 - 3) As required, scan the structural floor to identify reinforcing bar and other elements that cannot be interrupted using means approved for this project (e.g., X-ray).
 - 4) Anchor racks to the structural floor at four points.
 - c. Seismic Bracing: As required for seismic bracing (determined during pre-construction seismic detailing and calculations), provide bracing to the structure using approved means and fasteners/anchors.
 - d. Leave no fastener loose and un-torqued.
 - e. Bonding: Bond rack bays to approved ground using approved means, configurations and products. Also refer to section 270526 for additional information on bonding.
 - f. Sway Mitigation: As directed by the Owner, install a brace ("kicker") from the rack bay to the structure above or to overhead cable support as needed to mitigate sway and to stabilize the rack bay.
2. Vertical Management Sections
 - a. Bolt vertical management sections to the equipment racks at the points designed by the manufacturer and per the manufacturer's installation instructions.
 - b. Leave no fastener loose and un-torqued.
3. Horizontal Management Panels
 - a. Install horizontal management panels as required.
 - b. Leave no fastener loose and un-torqued.
4. Accessories
 - a. Furnish 1 bag of rack mounting screws per room. Attach the screws directly to the rack (visible for the punch walk).

B. Overhead Cable Support

1. Install support apparatus (e.g., brackets and threaded rod with strut) for overhead cable management system. Install the system per the manufacturer's instructions and hung from overhead or braced to the wall using appropriate fasteners.
2. Install parts required for complete installation (e.g., mounting brackets, splice kits, hardware, etc.).
3. Tolerances
 - a. Install overhead cable support as shown on the drawings.
4. Interface with Other Work: Coordinate the installation of the overhead cable support with other trades. Trapeze supports and hanger rods ("all-thread"), for example, may be shared to lower overall construction cost.

- C. Vertical Cable Support
 - 1. Install cable runway installed vertically for use to support cables routing vertically within telecommunications rooms at the locations as shown on the drawings.
 - 2. Install parts required for complete installation (e.g., vertical mounting brackets, bolts, etc.).
 - 3. When using cable runway, install the runway such that the rungs are facing outward (the greater distance from the rung to the stringer edge is facing inward).
- D. Horizontal Power Strips
 - 1. Install horizontal power strips as shown on the drawings. If not explicitly shown, coordinate the installation height with the Owner / Owner's Representative. Install fasteners and parts required to complete the installation.
 - 2. Route the input cord within designated cable management and install cord fasteners to prevent movement of the input cord. Plug the input cord into the receptacle designated by the Owner / Owner's Representative.

3.4 LABELING

- A. General Requirements: Labeling and identifier assignment shall conform to the TIA-606 standard and as approved by Owner before installation.
- B. Equipment Rack Label Requirements: Provide two label plates per rack. Permanently affix label plate as shown on the drawings or (if not shown) centered on the rack's front top angle and back top angle
- C. Identifier Assignment
 - 1. Equipment Racks
 - a. First field: the BDF/IDF room's identifier; for example: "AD1.1".
 - b. Second field: the rack number (sequential numeral); for example: "R01".
 - c. Example; "AD1.1-R01"

3.5 FINAL INSPECTION AND CERTIFICATION

- A. Punch the work of this section compliant to the requirements of section 270000.
- B. Comply with system acceptance and certification requirements of section 270000.

END OF SECTION

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