SECTION 271100 - COMMUNICATIONS EQUIPMENT ROOMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Appendix Drawings (Figures 1, 2, 3, 4, & 5)

1.2 SUMMARY

A. Section Includes:
   1. Communications Equipment Room Configuration
      a. Placement / Access
      b. Layout
      c. Security
   2. Communications Mounting Elements
      a. Backboards
      b. Equipment Racks and Cabinets
   3. Grounding

B. Related Requirements:
   1. Section 270536 "Cable Trays for Communications Systems" for cable trays and accessories.
   2. Section 271300 "Communications Backbone Cabling" for voice and data cabling associated with system panels and devices.
   3. Section 271500 "Communications Horizontal Cabling" for voice and data cabling associated with system panels and devices.
   4. Section 280513 "Conductors and Cables for Electronic Safety and Security" for voice and data cabling associated with system panels and devices.

1.3 DEFINITIONS


B. LAN: Local area network.

C. RCDD: Registered Communications Distribution Designer.

D. Telecommunications Room (TR): An enclosed architectural space for housing telecommunications equipment, cable terminations, and cross-connect cabling. For purposes of this document the TR will also be referred to as “Communications Equipment Room.”
E. Entrance Telecommunications Room (ETR): An enclosed architectural space for housing telecommunications equipment, cable terminations, and cross-connect cabling. This room is where outside communication services enter the building.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for equipment racks and cabinets.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For communications equipment room fittings. 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. Grounding: Indicate location of grounding bus bar and its mounting detail showing standoff insulators and wall mounting brackets.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified on staff.
   1. Layout Responsibility: Preparation of Shop Drawings shall be under the direct supervision of a RCDD and shall be coordinated thru LSU’s Information Technology Services department.
   2. Installation Supervision: Installation shall be under the direct supervision a qualified trained technician and who shall be present at all times when Work for this Section is performed at Project site.
   3. Field Inspector: Shall be currently registered by BICSI as RCDD to perform the on-site inspection.

PART 2 - PRODUCTS

2.1 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated or painted with two coats of nonconductive fire retardant paint, 3/4 by 48 by 96 inches. Comply with requirements for plywood backing panels specified in Section 061000 "Rough Carpentry." All backboards will be finished in a light color to increase illumination (even fire-resistant plywood shall be painted, but this paint does not need to be fire retardant). Comply with requirements in
Section 099123 "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

2.2 EQUIPMENT FRAMES

A. General Frame Requirements:
   1. Distribution Frames: Freestanding and wall-mounting, modular-aluminum steel units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.
   3. Panel mounting holes are to be #12-24 tapped on EIA universal spacing on both front and rear of rack.

B. Floor-Mounted Racks: Modular-type aluminum construction.
   1. Vertical and horizontal cable management channels, top and bottom cable troughs.
   2. Racks are to be brushed aluminum, seven (7') foot high, nineteen (19") inch rack space.
   3. The rack must be self-supporting with base suitable to floor mount.
   4. Must be equipped with a grounding lug.

C. Cable Management for Equipment Frames:
   1. Metal or plastic, with integral wire retaining fingers.
   2. Vertical cable management panels shall have front and rear channels, with covers.
   3. Provide horizontal crossover cable manager at the top and bottom of each relay rack, with a minimum height of two rack units each.

2.3 GROUNDING

A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.

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

C. Telecommunications Main Grounding Bus Bar (TMGB):
   1. Connectors: Mechanical type, cast silicon bronze, solderless compression type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
   2. Ground Bus Bar: Copper, minimum 1/4 inch thick by 4 inches wide with 9/32-inch holes spaced 1-1/8 inches apart.
   3. Stand-Off Insulators: Comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

D. Telecommunications Grounding Bus Bar (TGB):
   1. Connectors: Mechanical type, cast silicon bronze, solder less compression type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
2. Ground Bus Bar: Copper, minimum 1/4 inch thick by 4 inches wide with 9/32-inch holes spaced 1-1/8 inches apart.

3. Stand-Off Insulators: Comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

E. Bonding Conductor (BC):
   1. 6 AWG stranded conductor with a green jacket.

2.4 LABELING
   1. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers. Labels shall be made using a mechanical label maker. Permanent marker, ink pen, and/or pencil labels shall not be accepted. All labels shall be permanent; no hanging/paper tags.

2.7 LADDER TRAY:
   1. Tray is to be constructed of brushed aluminum, at least 12” wide and at least 2” high.
   2. Tray must be installed with the proper mounting hardware to securely fasten the tray to the walls and the top of the Floor-Mounted Racks.
   3. Must be equipped with the proper grounding lugs to assure proper grounding and bonding of the tray.
   4. The ladder tray should be selected to support the amount of cable at a 50 percent fill ratio per ANSI/TIA/EIA 569-A.

PART 3 - EXECUTION

3.1 General Communications Equipment Room Requirements:

A. LAYOUT: Room configuration will be laid out in accordance with the Appendix figures 1 thru 5. If any changes are needed to the basic flow and layout of the rooms, then the contractor’s RCDD shall coordinate those changes through LSU’s ITS department.

B. USAGE: Because of LSU Systems Security Policies ALL Telecommunications rooms shall be free of electrical distribution panels, inverters, air handlers, sinks, wash basins, plumbing, janitorial storage areas and other equipment. **Telecommunications rooms shall contain communications equipment only.** No Telecommunications Room shall be used as a pass thru for any other building services (ie. water, gas, exhaust vents, etc.)

C. SIZE: Telecommunication Rooms (TR) shall be sized according to the usable floor space that will be served from that room. These are minimum sizes for TRs and the use of the TR should be considered when determining size. All TRs shall have a minimum ceiling height of 8 1/2’ above finished floor. Entrance TRs service usable floor space in addition to servicing other TRs and housing special equipment to terminate entrance cables; therefore, the size of the room should be increased by 2ft in both directions (i.e. increase 10ft x 8ft to 12ft x 10ft).
Servicing Area: TR Dimensions:
5,000ft² or less 10ft x 8ft
5,000ft² to 8,000ft² 10ft x 9ft
8,000ft² to 10,000ft² 10ft x 10ft

*If more than 10,000ft² of floor space is to be serviced from one TR then consider a second TR or get approval and dimensions from LSU’s Information Technology Services-Networking and Infrastructure.

D. **POSITIONING:** Each floor shall contain a telecommunications room. Telecommunications rooms shall be stacked vertically wherever possible. In general, telecommunications rooms should be placed centrally in the building. Central location of telecommunications rooms reduces the length of cable to each workstation. If there will be more than one telecommunications room per floor, then they shall be equally distributed away from possible sources of electromagnetic interference such as electric motors or transmitters.

E. **DISTANCES:** Telecommunications Rooms (TR’s) shall be located such that the length of the cable installed from the TR to all station terminations served by that room is less than two-hundred-ninety-five feet (295’). If that distance will be exceeded, then a second TR must be located on the same floor. The distance between TR and TR shall not exceed three-hundred-fifty feet (350’).

F. **ELECTRICAL SERVICE:** Telecommunications rooms shall contain one double duplex 120V 20A non-switched receptacle for each 6 feet of wall space. Each receptacle shall be wired to an individual 20A breaker and the breaker panel shall be clearly marked with the word “COMMUNICATIONS”, the telecommunications room number and the receptacle number. Receptacles should be evenly placed around the telecommunications room, eighteen inches (18”) AFF (above finished floor), in accordance with NEC specifications and/or local fire codes. Regardless of TR size a room shall have no less than 2 separate double duplex 120V 20A non-switched receptacle. The Entrance Telecommunications Room shall also contain one 208V 20A non-switched receptacle with a L620 type receptacle, located on wall behind the floor mounted equipment rack. This circuit shall be connected to emergency generator for the building if one exists. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

G. **HVAC:** Telecommunications rooms will house active electronic components. These rooms must maintain certain environmental conditions. Equip all telecommunications rooms to provide an appropriate atmosphere for these components on a year round basis. Maintain positive pressure within these spaces with a minimum of one air change per hour. Connect emergency power to HVAC systems that serves the Telecommunications Room.

Heat load – $\frac{1}{2}$ Ton or 6000 BTU

Caution: Connection to the building HVAC system usually does not provide proper environmental control year round due to the use of this system for heating during the winter. The Telecommunications Room cannot tolerate any heat.
H. **LIGHTING:** All telecommunications rooms must be 500 lux (50 foot candles) at a distance of three feet (3’) above the finished floor. This lighting must be achieved using long lasting fluorescent lamps. Ceiling lights must be fused on a separate breaker and be provided with a switch located immediately inside the access door to each room.

I. **WALL AND FLOOR PREPARATION:** All telecommunications room (TR) walls must be completely covered with Backboards. The Backboards will cover from the finished floor to a height of eight feet (8’) or to the ceiling, whichever is lower. Due to dusting characteristics of concrete, all such interior surfaces should be painted or tiled and finished in a light color to increase illumination. Paint should be free from turpentine. Telecommunications rooms will not be carpeted. There should be a minimum floor load rating of 2.4 kPa (50lb/ft sq).

J. **ROOM ACCESS:** Door access to the Telecommunication rooms shall be accessible via main hallways and common areas. No TR shall be located such that a technician has to gain access through a secured area or potentially secured area. All Telecommunication rooms shall be keyed with the LSU Facility Services “Best GM201” key.

3.2 **ENTRANCE FACILITIES**

A. Comply with requirements in Section 270528 "Pathways for Communications Systems" for materials and installation requirements for pathways.

3.3 **INSTALLATION**

A. Comply with NECA 1.

B. Comply with BICSI TDMM for layout and installation of communications equipment rooms.

C. Coordinate layout of all Telecommunication Rooms with the LSU Information Technology Services department.

D. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

E. The Entrance Telecommunications Room must be equipped with two (2) 19” aluminum relay racks which are anchored to the floor and are supported from the wall with a 12” ladder tray. The tray will be used to support the racks and also to transition communication cables to the rack. No cables will free span from the wall to the rack. This room must be equipped with a Telecommunications Main Grounding Busbar (TMGB) that will be bonded to main building electrical ground, the building protectors for the telephone entrance cable, and the relay racks. All bonding in this room must be accomplished using a #6 AWG stranded copper conductor with a green jacket. The CATV area must contain enough hinged wall brackets for the amount of panels needed. The entrance TR will be laid out in the manner listed in Appendix A figure 1.

F. The Telecommunication Rooms (TR) must be equipped with one (1) 19” aluminum relay rack which is anchored to the ground and supported from the wall with a 12” ladder tray. The tray will be used to support the racks and also to transition the cables to the rack. No cables will free span from the wall to the rack. This room must contain a Telecommunications Grounding
Busbar (TGB) which is bonded to the nearest TR or Entrance TR and to the relay rack. All walls must be lined with ¾” AC grade plywood which is fire retardant or painted with two coats of fire retardant paint. All bonding in this room must be accomplished using a #6 AWG stranded copper conductor with a green jacket. The CATV area must contain enough hinged wall brackets for the amount of panels needed. The TR will be laid out in the manner listed in Appendix A figure 2.

3.4 SLEEVE AND SLEEVE SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 270544 "Sleeves and Sleeve Seals for Communications Pathways and Cabling."

3.5 FIRESTOPPING

A. Comply with requirements in Section 078413 "Penetration Firestopping."
B. Comply with TIA-569-B, Annex A, "Firestopping."
C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.6 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
B. Comply with requirements in Section 260526 "Grounding and Bonding For Electrical Systems"
C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 6 AWG Grounding Electrode Conductor from grounding bus bar to suitable electrical building ground.
D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment Bonding Conductor (BC).
E. The Entrance TR (Telecommunications Room) must be equipped with a TMGB (Telecommunications Main Grounding Bus bar) which is grounded to the main electrical service ground for that building, at a single point only (Figure 7) using a Grounding Electrode Conductor. The TMGB shall NOT be grounded to electrical conduits, power distribution box grounds or neutral busses.

In the Entrance TR all of the following must be bonded with a BC back to the TMGB:
1. The vault splice closure for the entrance telephone cable
2. The telephone building protectors
3. All metallic conduits
4. All data relay racks
F. All other TRs must be equipped with a TGB (Telecommunications Grounding Bus bar) which are bonded to the nearest TR or Entrance TR (Figure 8). The BC (Bonding Conductor) shall consist of at minimum, a green insulated, #6 AWG stranded copper conductor which shall interconnect all equipment rooms.

In all TRs the following must be bonded with a BC back to the TGB:
1. All metallic conduits
2. All data relay racks

3.7 IDENTIFICATION

A. LSU deploys its own labeling scheme. All cabling and terminations shall be labeled as follows:
1. General infrastructure labeling:
   Permanently label all terminal strips, junction boxes, pull points and conduit runs as per telephone industry standards and these specifications.
   a. Room Numbers: Only room numbers specifically provided and/or approved by the LSU Office of Campus Planning shall be used for labeling; labels utilizing room numbers provided solely by the architect shall not be used.
   b. Equipment racks: Label equipment racks, naming the leftmost unit “Rack 1,” and incrementally increasing the number by 1 as you move to the right.
   c. Patch Panels: Label the patch panels - by row of 24 - in each rack, naming the uppermost unit “1,” and incrementally increasing the number by 1 as you move to the bottom. Note: Do not number the individual patch panels; Do number the individual rows.
   d. Faceplates: Phone/data outlet faceplates shall be labeled. The faceplate labels shall be placed at the top of each faceplate, and shall consist of the official room number of the wiring closet serving the outlet, followed by a colon, followed by the number of the faceplate which contains the far-end jack, followed by the jack position on the faceplate. For example, faceplate 1 served from closet 1023 would have the following label: 1023:1.

   Faceplate numbers shall be assigned sequentially in a room, starting at the first outlet to the left of the leftmost entrance with “1”, and increasing the count incrementally (by 1) in a clockwise direction around the room.

2. Equipment room terminations: All Cables and All termination fields shall be labeled.
   a. Data outlets: Each data jack shall be labeled. Labels shall be affixed to the patch panel at a point adjacent to the jack being labeled, and include the official far-end room number – no hyphens - followed by a colon, followed by the number of the faceplate which contains the far-end jack. Example: 1103B:2
   b. Phone cable terminations: Phone cable terminations shall be labeled. The 66-block shall be labeled with the official far-end room number – no hyphens – followed by a colon, followed by the number of the faceplate which contains the far-end jack, followed by the jack position on the faceplate. For
example, a cable serving Room 1103-B, Faceplate 2, Voice Jack Position A, would be labeled “1103B:2A”.

c. **Feeder cables:** All cables that feed other communications closets shall be labeled/tagged as to the location of other end of that particular cable. The patch panels or punch downs where that cable is terminated shall also be labeled in the same manner (label cable and termination field).

d. **Horizontal Distribution Cables:** Each cable entering the equipment room shall be marked with the room number, outlet number and jack position number that represents the location of the other end of the cable.

3. **Documentation (Data Cable Labels Only):**

   The contractor shall provide the LSU Information Technology Services-networking and Infrastructure with both a printed and a software media copy of a Microsoft Excel, Corel, Quattro-Pro, or Lotus 1-2-3 spreadsheet which documents the installation of data cable labels. The spreadsheet shall contain, at a minimum, information on the labeling on each end of every data cable termination installed in every equipment closet. The format shall be such that each entry for a closet termination shall have in the adjacent column and on the same row, an entry for the work station end of the cable. Label documentation shall be formatted as follows:

   a. For the closet end, the column entries shall contain the Official 3 or 4 character LSU Building Abbreviation followed by a hyphen, followed by the Official closet room number - without any hyphens – followed by the Rack Number and a hyphen, the Patch Panel Row Number and a hyphen, and the Patch Panel Row Position Number. For example, for a jack located in CEBA equipment closet E-3106-C-1, Rack 1, Patch Panel Row 2, Patch Panel Row Position Number 23, the column entry would read “CEBA-E3106C1-1-2-23”.

   b. The documentation for the work station end of that cable would be placed on the same row in the next column, and would be an exact copy of the label installed in the equipment room rack for that cable. An example, from Section 3.5.B.1 (above) would be “1103B:2”.

B. Comply with requirements in Section 099123 "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

C. Labels shall be preprinted or computer-printed type.

END OF SECTION 271100