

## SECTION 27-11-00 COMMUNICATIONS EQUIPMENT ROOM FITTINGS

### PART 1 – GENERAL

#### 1.01 DESCRIPTION

- A. The work covered by this section of the Specifications includes all labor necessary to perform and complete such construction, all materials and equipment incorporated or to be incorporated in such construction and all services, facilities, tools and equipment necessary or used to perform and complete such construction. The work of this section shall include, but is not limited to, the following:
  - 1. Basic telecommunications room (TR/ER) requirements in accordance with relevant codes and best industry practices.

#### 1.02 QUALITY ASSURANCE

- A. Refer to Section 27-00-00 for general details.

#### 1.03 CODES, STANDARDS, AND GUIDELINES

- A. Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions and recommendations in Section 27-00-00.
- B. The Cal Poly ITS Telecomm group, Telecommunications Standards Document and the Labeling, Design and Syntax Standards in Appendix B.

#### 1.04 SUBMITTALS

- A. Refer to Section 27-00-00 for general details.
- B. Shop Drawings:
  - 1. None Required
- C. Submit Manufacturer's Cut Sheets for the following:
  - 2. Any products not specifically listed in the PRODUCTS section shall require a submittal of the manufacturer's cut sheets for approval by the Cal Polly ITS Telecomm group.

#### 1.05 IDENTIFICATION

- A. All electrical outlets/faceplates are to be labeled as to Panel and Circuit ID.
- B. Refer to Section 27-05-53 for general details.
- C. Refer to the Cal Poly Labeling, Design & Syntax Standard in Appendix B

#### 1.06 DEFINITIONS

- A. N/A

#### 1.07 WARRANTY

- A. Refer to Section 27-00-00 for general details.

## 1.08 TELECOMMUNICATIONS ROOM REQUIREMENTS

### A. Location

1. The length of horizontal cable from each (ER/TR) shall be a maximum of 290 cable feet.
2. The ideal placement of an ER/TR shall be such that all served outlet locations are within 150' of the room.
3. ERs/TRs shall be located as close as is practical to the center of the area being served.
4. ERs/TRs must be accessible from a public hallway or other common area.
5. ***In multi-floor buildings, each floor is to be served by a dedicated ER/TR located on that floor. The EF/ERs/TRs shall be stacked vertically in a 2 hour, fire rated shaft.***
6. TRs shall be located so they are not restricted by building components that limit expansion or access (e.g., elevators, core, outside walls, fixed building walls, mechanical and electrical equipment rooms).
7. ***EF/ERs/TRs shall be located so as not to be a flood threat. For example, locations that are below or adjacent to areas of potential water hazard (e.g., restrooms, kitchens, etc.) shall be avoided. Additionally, areas having floor drains shall be avoided.***
8. ERs/TRs shall be located away from sources of electromagnetic interference (e.g., electrical power supply transformers, motors, generators, X-Ray/MRI equipment and radio or radar transmitters).
9. ***EF/TRs/ERs shall be located and constructed such that manholes and other external "pull points/boxes" cannot channel water into the building regardless of the water level within.***

### B. Location (Building Entrance Facility (EF) Specific)

1. ***The EF should be nearest the point of entry for conduits entering from the underground.*** (See Fig. #136 & 137 in Appendix B)
2. Where possible the entrance cabling should be terminated on a bearing wall to reduce the possibility of relocating the termination space if the building is expanded or altered in the future.

### C. Doors & Access

1. ***ERs/TRs/EFs shall be located in a publicly accessible area (e.g., hallway) and their doors shall open outwards.***
2. ERs/TRs/EFs shall have keyed locks that open with the University Telecomm standard key or master for EFs/TRs/ERs/.
3. The door to the ERs/TRs/EFs shall be a minimum of 3 feet wide, opening fully (180 degrees on flat wall, 90 degrees in the corner).
4. When opening into an area containing outside contaminants, the door shall be sealed and provided with a door sweep.

### D. Size

1. ER/TR rooms shall be a minimum of 10' x 12'. ***(See Fig. #148 in Appendix B)***
2. ERs/TRs/EFs planned to serve more than 200 network connections shall be a minimum of 10' x 15'.
3. In ERs/TRs planned also to act as an EF, add 3' to the length of the room.
4. ***When establishing the size of EFs/TRs/ERs, consideration shall be given to the size of the***

*building, the floor space served, the occupant needs, the services deployed and future growth.*

E. Walls & Backboard

1. Each telecommunications space will have all walls covered from one foot above finished floor to 9' with  $\frac{3}{4}$  inch x 4-foot x 8-foot fire-rated plywood panels securely fastened to the wall framing members. The screw heads must be flush with the plywood face. The plywood is to be sanded smooth (not rough), void-free and painted with two coats white paint on out-facing side with the exception of the stamped area on the plywood indicating that it is fire-retardant which shall remain visible at all times. **(See Fig. #146 in Appendix B)**
2. EF/TR/ER walls shall extend from floor slab to ceiling deck with no drop ceilings. The minimum walls height shall be 9'-0".
3. Cables that are to be terminated on a backboard shall be routed on the ladder racking around the perimeter to a point directly above the termination hardware.
4. Conduit must not be routed across the backboards. It shall be enclosed within the wall.

F. Floors

1. **Communications room floors shall be sealed and tiled with anti-static tile.**
2. ERs/TRs shall be located on floor areas designed with a minimum floor loading of 50 lbs/ft<sup>2</sup>).

G. Ceiling

1. The minimum ceiling height is 9 feet above the finished floor.
2. For EFs/TRs/ERs with a ceiling distribution system, the ceiling should be open (No false/suspended ceilings) so that there is easy access to the conduit, raceways, cables, etc. entering the room.

H. Conduit

1. **Conduits that protrude through the floor of EFs/TRs/ERs shall extend 3-inches (minimum) above the finished floor.**
2. **Conduits entering the EFs/TRs/ERs through the floor shall enter no further than 3" from a wall.**
3. One 4" trade size conduit (minimum) is required (specifically for riser cable) per 50,000 sq. ft. of usable floor space served by that backbone/riser system, plus two spares for a minimum of three conduits per EF/TR/ER.
4. One conduit serving each EF/TR/ER shall have four (4) - 1  $\frac{1}{4}$ " HDPE innerduct runs installed within for fiber optic cable. The innerduct shall be plenum rated when inside the building envelope. All innerduct installations shall house a preinstalled pull tape. See Section 27-05-33 for more details.
5. Install mule tape or pull cord in all conduits regardless of percentage fill. **(See Fig. #138 in Appendix B)**

I. Environmental Service

1. HVAC shall be provided by use of a ducted system, when components are placed outside the ER/TR.
2. **HVAC shall be included in all ERs/TRs to maintain equipment reliability and longevity and to reduce the number of man-hours of maintenance required annually. The HVAC system shall be continuous (24 hours per day and 365 days per year).**
3. Temperature: 60-degrees to 85-degrees Fahrenheit

4. Humidity (non-condensing): 30-percent to 60-percent
  5. A positive air pressure shall be maintained with a minimum of four air changes per hour.
  6. The ER/TR shall be protected from contaminants and pollutants that could affect electronic equipment.
- J. Fire Detection /Protection
1. **All EFs/TRs/ERs shall be provided with a portable CO2 fire extinguisher with current certification.**
  2. All EFs/TRs/ERs shall be provided with a smoke or heat detector tied into the building's fire alarm system.
  3. **Unless required by the AHJ, water charged fire sprinklers shall not to be placed in EFs/TRs/ERs.**
- K. Firestop & Duct Sealing
1. Any conduits that enter an ER/TR/EF from the exterior of the building shall be sealed at both ends (to prevent vapor from entering) with a product specifically UL listed for that application. **(See Fig. #136 & 137 in Appendix B)**
  2. Also refer to Section 27-05-43 for additional detail.
  3. All firewall penetrations into EFs/TRs/ERs shall be sleeved and Firestop applied. All Firestopping shall match the specific fire rating of the wall. Products used shall be reusable/re-enterable to allow for additional cabling and maintenance.
  4. Also refer to Section 27-05-37 for additional detail.
- L. Lighting
1. Install T-8 fluorescent lighting a minimum equivalent of 500 lux (50 foot-candles) measured 1 m (3-feet) above the finished floor at the front and rear of the rack equipment to be installed.
  2. Light switches shall be located for easy access upon entry, and shall not to be motion sensitive.
  3. Light fixtures shall be mounted 9' feet above the finished floor and caged or use sheathed lamps for shatter protection.
  4. At least one fixture shall be on emergency or battery power.
  5. Light ballast shall not be within 1' of telecommunications cable, and the light fixture itself shall not be within 5". This is typically an issue around the telecom ladder racking and cable trays used to route telecom cable.
  6. A typical EF/TR/ER shall include at least two 8' light rows placed parallel to the racks to illuminate the backboards and equipment. (4 - 4' light fixtures in 2 rows may be used) **(See Fig. #148 in Appendix B)**
- M. Electrical
1. Communications Equipment circuits in initially unpopulated rooms:
    - a. TRs/ERs shall provide a minimum of four (4) dedicated, protected, non-switched 3-wire 120 volt, 20 amp, NEMA 20R duplex electrical outlets, **in locations approved by the Cal Poly ITS Telecomm group**, each on separate branch circuits. Each outlet is to be placed in its own back box. **Label all outlet faceplates and power panel breaker locations.** (See section 25-05-53 for more detail)

- b. In each ER/TR provide a single dedicated, protected, non-switched 4-wire 125/250 VAC, 30 amp, NEMA L14-30R electrical outlet, **in a location approved by the Cal Poly ITS Telecomm group. Label all outlet faceplates and power panel breaker locations.** (See section 25-05-53 for more detail)
2. Convenience outlets (tools, test sets, etc.)
  - a. Provide 1 separately protected 3-wire, 120 volt, 20 amp, non-switched circuit, wired to one duplex, NEMA 20R, outlet on each wall. Mount the outlets, inset in the plywood backboards, at normal outlet height, and placed no more than 12' apart, around perimeter walls. Convenience outlets shall also be identified and labeled. **(See Fig. #148 in Appendix B)**
3. Conduit for electrical circuits shall not be run on top of plywood backboards. Route all conduits around or behind the backboard (inside the wall).
4. Distribution Panels
  - a. TRs/ERs shall contain their own electrical panel for circuits specific to the outlets and equipment within that room. **(See Fig. #149 in Appendix B)**
  - b. Distribution panels that serve TRs/ERs shall be dedicated for that purpose only.
  - c. The electrical panel serving EFs/TRs/ERs shall be grounded to that facility's TMGB or TGB.
- N. Shared Use
  1. Shared use of any EF/TR/ER with other building facilities shall not be allowed.
  2. Telecommunications spaces shall be dedicated to the telecommunications function and their related support facilities, and shall not contain unrelated equipment.
  3. **EFs/TRs/ERs shall not be shared with building or custodial services, security systems, fire alarm systems, card access systems, servers, non-telecom electrical panels, or other building systems.**

## PART 2 – PRODUCTS

### 2.01 PRODUCT CONSISTENCY

- A. Product Consistency: Any given item of equipment or material shall be the product of one manufacturer throughout the facility. Multiple manufacturers of any one item shall not be permitted.

### 2.02 PLYWOOD BACKBOARD

- A. Shall be 4' x 8' x 3/4" A/C, fire rated plywood with appropriate stamp affixed. The stamp is to remain visible at all times. **(See Fig. #146 in Appendix B)**
- B. Shall be painted with white (light colored), acrylic, interior, fire-retardant paint on all sides and edges.

### 2.03 DUCT SEAL (CONDUITS POPULATED WITH CABLING)

- A. Shall be used only where a fire rated assembly is not required.
- B. Shall be of Asbestos Free, easily formable clay. **(See Fig. #136 in Appendix B)**
- C. Shall not dry hard and shall be re-enterable/reusable.
- D. Shall be Resistant to water, alcohols, solvents & fuels
- E. Shall be non-corrosive to metals or plastics and a non-irritant to skin.
- F. Approved Manufacturer: Gardner Bender or approved Cal Poly ITS Telecomm group equal

#### 2.04 DUCT SEAL (UNPOPULATED CONDUITS)

- A. Shall be used only where a fire rated assembly is not required.
- B. Shall be removable and reusable compression type fitting/plug.
- C. Shall be corrosion proof, water-tight and gas-tight.
- D. Shall be equipped with a rear side pull rope tiedown
- E. Approver Manufacturer: Osburn Associates Inc, Cherne Industries, Inc. or approved Cal Poly ITS Telecomm group equal. **(See Fig. #137 in Appendix B)**

### PART 3 – EXECUTION

#### 3.01 GENERAL

- A. Refer, as appropriate, to other Division 27 specifications for specific execution instructions.

#### 3.02 QUANTITIES

- A. Quantities of system elements shown on the drawings are illustrative only and are meant to indicate the general configuration of the work. The Contractor shall be responsible for providing the correct quantities of materials to construct a system that meets the intent of these Specifications and the relevant codes.

#### 3.03 INSTALLATION

- B. A. Follow manufacturer's complete instructions for installation and configuration of all products used.

#### 3.04 GROUNDING & BONDING

- A. All EFs/TRs/ERs shall be provided with a telecommunication grounding busbar (TGB). **(See Fig. #140 & 164)**
- B. All equipment, racks, metal conduit, cable tray and cable shields shall be properly bonded to the TMGB or telecommunications grounding busbar (TGB) as appropriate.
- C. The electrical panel serving an EF/TR/ER shall be grounded to that facility's TGB.
- D. All metallic conduits entering or exiting the EF/TR/ER shall be bonded to the TGB with a minimum #6AWG copper wire.
- E. Refer to Section 27-05-26 for additional details.

#### 3.05 TESTING

- A. Devices shall be tested as part of the required system testing for the cabling they support.

#### 3.06 ACCEPTANCE

- A. Once the installation and testing has been completed and the Cal Poly ITS Telecomm group representative is satisfied that all work is in accordance with the Contract Documents, the ITS Telecomm group representative shall notify the Contractor and/or Cal Poly Project Manager in writing or via email.

**3.07 RECORD (AS-BUILT) DRAWINGS**

- A. None Required

END OF SECTION

DOCUMENT VERSION CONTROL

| REVISION | DATE       | AUTHOR  | REASON                       |
|----------|------------|---------|------------------------------|
| 1        | 02/20/2014 | R. VOLK | INITIAL DOCUMENT DEVELOPMENT |
|          | 02/20/2014 | DW & MH | PRIMARY REVIEW COMPLETE      |
| 2        | 05/28/2015 | DW      | 108.E.1 page 3               |