

## **Telecommunication Spaces**

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**Revision History**

Standard	Effective Date	Email	Version	Contact	Phone
OIT-TS		<a href="mailto:strevena@csustan.edu">strevena@csustan.edu</a>	1.0	Stan Trevena	209.667.3137

**Part 1: General**

1. Section includes
  - a. Building Service Entrance Room
  - b. Equipment Room
  - c. Distribution Room

**Part 2: Specifications**

1. Building Service Entrance Room: The building service entrance space provides a location in which to terminate cables entering the building and interconnect them with internal building cables. In buildings without a dedicated equipment room, it also provides support for the electronic components utilized to distribute the telecommunication systems. It must provide sufficient room and structural additions to support the installation of a variety of cables, locations for splice cases and telephone cable circuit protectors, and possibly network interface devices
  - a. Location: The entrance room shall be located as close as possible to the point at which feeder conduits enter the building and to the equipment room/vertical backbone (riser) pathway. The area must be dry, not subject to flooding, and free of overhead water, steam, or drain pipes. Access to the room should be provided directly from a central hallway, not through another room. For buildings over 10,000 gross square feet, the building service entrance room must be a dedicated, enclosed room. For buildings less than 10,000 gross square feet, a mixed-use room that meets all other requirements may be utilized.

*Table 1*

Building Gross Floor Space	Entrance Room Floor Dimensions
5,000 to 9,000	5' x 7'
10,000 to 30,000	8' x 6'
31,000 to 50,000	10' x 6'
51,000, to 75,000	12' x 8'

Building Gross Floor Space	Entrance Room Floor Dimensions
76,000 to 125,000	12' x 10'
126,000 to 250,000	12' x 12'
250,000 to 500,000	12' x 16'
501,000 to 700,000	12' x 18'

- b. Size: In buildings smaller than 5,000 gross square feet, the telecommunications entrance space should be a minimum of four (4) feet by five (5) feet. In buildings from 5,000 to 10,000 square feet, the entrance space must be a minimum of five (5) feet by seven (7) feet. All space must be clear of other equipment, access points, or maintenance areas. In buildings larger than 10,000 square feet, Table 1 should be used.
- c. The entrance room or space must contain the following support items.
- i. All walls must be covered with 3/4 inch A-C plywood, painted with fire-retardant paint (not fire-retardant plywood unless required by local fire codes), mounted vertically starting 2" above the finished floor, and secured to the walls. All plywood panels must be mounted in contact with one another leaving no gaps between sheets.
  - ii. Sufficient overhead lights shall be installed to provide a minimum of 540-lux (50 foot candles) illumination measured 3 feet above the finished floor. These lights must be separately switched (within the room) and must be mounted a minimum of 8.5 feet above the finished floor.
  - iii. The door to the room must be a minimum of 36" wide by 80" high and must be equipped with a separate lock.
  - iv. An electrical ground (as defined by local codes) must be provided on a six-inch bus bar mounted six inches above the finished floor. This grounding bar should be connected to either building-steel (main building ground electrode), a separate concrete-encased electrode, or a buried ring ground with a 00 cooper wire using a short feed to actual ground. Note: The NEC stipulates that communications cable shields be grounded as close as possible to the entrance into the building (NEC Article 800-4).
  - v. A minimum of two 20 Amp, 110 volt ac quad electrical outlets, each on separate circuits, shall be installed in the entrance room. One of these dedicated circuits must be located six feet above the finished floor located behind the area designated for the equipment rack. In addition, the room shall be equipped with auxiliary duplex outlets placed 2" above the finished floor, at six-foot intervals around the perimeter walls. A maximum of four of the auxiliary outlets may occupy a single branch circuit.

- vi. All conduits entering the building from outside shall be plugged with reusable stoppers to eliminate the entrance of water or gases into the entrance room. All conduits leaving the entrance room for other portions of the building will be fire-stopped after the installation of cable.
  - vii. The entrance room must be equipped with a constant positive airflow sufficient to provide a minimum of two room changes an hour. If the building is not equipped with a separate equipment room and the service entrance is used for that function also, it must be equipped with a separately controlled HVAC capable of maintaining an office environment temperature. (See equipment room specifications for additional details.)
  - viii. The floor of the entrance room must be sealed concrete or must be tiled to reduce airborne contaminants. The floor structure should provide a minimum of 150 lbs. per square foot loading capability.
  - ix. No additional building facilities, electrical circuit breaker panels, alarms or energy management systems are allowed in this room.
2. Equipment Room: The equipment room is the space used to house telecommunications equipment intended to service users throughout the building. Typically, this includes a voice switching system, local area network switches, video distribution, system components, or other communications equipment. If the building design incorporates the entrance space with the equipment room, the space and support requirements for each function must be included in the final room design. If there are differences in specifications, such as the fire suppression system and HVAC requirements, the more stringent must be utilized.
- a. Location: The equipment room should be located near the service entrance room as well as the vertical backbone distribution pathways. The assigned space should be located where there is a possibility of future expansion and where access to the space from outside can be provided for large equipment (direct hallway access.) Locations, which might be subject to flooding, electrical interference, or other hazards, should be avoided.
  - b. Size: If projected equipment layouts are unavailable or if no special uses are defined for this space, the equipment room should be sized as follows: provide 0.75 square feet of equipment room space for every 100 square feet of workstation space. The minimum room size is 150 square feet. If the building is expected to support a large number of workstations (such as computer lab spaces) the room should be sized to provide one (1) square foot of equipment room space for every workstation. For example, a building expected to house 300 workstations should have an equipment room of 300 square feet. Where it is known that a specific telecommunications system will be utilized to service a building under design, a floor plan indicating equipment placement (including growth) should be prepared and compared with the projected room size. The final room sizing must also take into consideration issues such as the need for auxiliary power (UPS/batteries), the need for any of the systems to provide service to other buildings (a remote voice switching node may be used to serve not only the building under design but other buildings nearby), local requirements for a separate battery room, and any known special needs when determining actual floor space.
  - c. Space design: The specific components that should be designed into an average equipment room are:
    - i. The equipment room must provide an average floor loading of 150 lbs. per square foot. Specialized services, such as major UPS systems and batteries, may require

floor loading of over 400 lbs per square foot over a specified area and must be coordinated between university and architectural staff. The floor must be sealed concrete or must be tiled with anti-static tile to reduce airborne contaminants. If raised flooring is used, it must be crossed braced, and drilled anchors must be utilized to fix the pedestals to the structure's floor. This is required in order to permit the installation of equipment cabinets and racks up to eight feet tall while limiting the potential for damage during a seismic event. The raised floor must also be designed to support a minimum load of 150 lbs. per square foot.

- ii. The equipment room shall be situated to reduce the potential for electromagnetic interference to 3.0 V/m throughout the frequency spectrum. Consideration should be given to not locating the equipment room near power supply transformers, motors and generators, x-ray equipment, and radio transmitters.
- iii. Outward swinging entrance doors must be a minimum of 36 inches wide by 8 feet tall. Consideration should be given to utilizing double doors (opening out) on larger size rooms.
- iv. Sufficient heating, ventilating, and air conditioning (HVAC) sensors and control equipment must be installed to provide a constant environment for this space. Unless specific requirements otherwise dictate, the room environment should approximate an office and designers should assume a 15,000 to 17,000 BTU room load. The maximum change in temperature must not vary more than 8 degrees (F), and humidity should not vary more than 20 percent. The design target is a continuous operating temperature between 64 and 75 degrees with 20 to 80 percent relative humidity. Air should be ducted into the room with all serviceable components mounted outside.
- v. The equipment housed in this space will continue to generate heat 24 hours a day, 365 days a year regardless of usage, and the room must be equipped with additional air handling equipment in order to maintain the environment in the event the main building system is shut down. If this room is to house a campus communications hub, the room air handling system should be linked to the building's emergency power source as a further backup.
- vi. This room should be equipped with a pre-action fire suppression system with high temperature thermal links and cage enclosed heads. A system control link should be provided in order to cut power to the equipment in the event water is discharged from the system. Drainage must be provided to limit the potential of flooding.
- vii. Lighting shall be installed to provide a minimum of 50-foot candles illumination measured 3 feet above the finished floor. Light fixtures should be mounted a minimum of 8.5 feet above the floor and should be located in the middle of aisles between frames or cabinets. Equipment rooms should be equipped with emergency backup lighting sufficient to allow a technician to service the system during, a power failure.
- viii. A minimum of four 20 Amp, 110 volt ac dual-gang electrical outlets, each on separate circuits, shall be installed in the equipment room. One of these dedicated circuits must be located six feet above the finished floor located behind the area designated for the equipment rack. In addition, the room shall be equipped with auxiliary duplex outlets placed 2" above the finished floor, at six-foot intervals around the perimeter walls. A maximum of four of the auxiliary outlets may occupy a single branch circuit.

- ix. If the room is expected to house a voice switching system or other major switching equipment, a separate 240-volt electrical supply circuit should be provided and terminated in its own panel. If the building is to be equipped with an emergency power generator, the panel serving the equipment room should be linked to the emergency supply point.
  - x. An isolated electrical ground (as defined by Article 250-74 of the NEC) must be provided on a six inch bus bar mounted six inches above the finished floor. This grounding bar should be connected to either building-steel (main building, ground electrode), power service ground, a separate concrete-encased electrode, or a buried ring ground with a 00 copper wire.
  - xi. The equipment room must not be equipped with a drop tile or other false ceiling.
  - xii. If batteries are to be used, the type specified must be verified as suitable with local codes. Additional ventilation, acid dams, and floor load bracing may be required. Local codes or campus needs may require batteries to be housed in a separate room adjacent to the equipment room.
  - xiii. All walls must be covered with 3/4 inch A-C plywood, painted with fire-retardant paint (not fire-retardant plywood unless required by design code), mounted vertically starting 6" above the finished floor, and secured to the walls. All plywood panels must be mounted in contact with one another leaving no gaps between sheets.
  - xiv. No additional building facilities, electrical circuit breaker panels, alarms or energy management systems are allowed in this room.
3. Distribution Room: The telecommunications distribution room on each floor serves not only as part of the vertical pathway system on a multi-story building, but it also must support all station cabling and cross-connects, electronics, and specialized distribution equipment such as local area network switches and fiber optic multiplexers. It is extremely important for this room to be designed with the understanding of the role telecommunications provide in today's educational institutions. These rooms will have frequent access by technicians installing and maintaining various network services and must be sized and equipped to meet this demanding role.
- a. Location: As one of the primary focal points for all communication services, the distribution room must be designed as an integral part of the overall building. It cannot be 'fit in' wherever there is room left over after all other spaces have been defined; it must be identified as a fixed location similar to an elevator, mechanical shaft, or electrical room. These rooms must be located near the center of the area they will serve, must be stacked one above the other in multi-story buildings, and must be sized to accommodate the University's needs. Access to these rooms should be directly from hallways, not through classrooms, offices, or mechanical spaces.
    - i. Each floor distribution room should be centrally located within the building and must be stacked one above the other in multi-floor buildings.
    - ii. The distribution room must be located within 290 cable feet of the farthest outlet location and should be designed to provide an average distance of 150 feet. Cable feet distance is defined as the total distance of the route the actual station cable must follow, both horizontally and vertically, between the distribution room and the outlet location. An additional room is required if this distance is exceeded.

- iii. Provide an additional room if the floor area to be served exceeds 20,000 square feet. If a multi-story building requires two or more rooms on every floor, each series of rooms must be stacked one above the other.
  - iv. These rooms must be dedicated to the exclusive use of telecommunications equipment to provide proper environment and security. They cannot occupy partial spaces within mechanical or electrical rooms.
  - v. Multiple rooms located on the same floor must be interconnected with conduits.
  - vi. An additional room may be required to meet the needs of a high-density usage area, such as a large floor that serves both administrative offices and computer labs. Assume a density increase of 3-to-1 when comparing computer lab users to administrative users.
- b. Size: The distribution room(s) serving an individual floor must be of sufficient size to support an extensive list of voice, data, and video equipment. This room must be dedicated to telecommunications and must be at least five (5) feet by eight (8) feet in size. Table 2 identifies the required room size for various gross square footages.

Table 2

Floor Area Served (square feet)	Distribution Room Size
Up to 5,000	5' x 8'
Up to 10,000	6' x 9'
Up to 20,000	8' x 12'

- c. Space design: The specific components that should be designed into an average distribution room are defined below.
- i. The distribution room shall be provided a floor with a loading capacity of 100 lbs. per square foot. The floor must be sealed concrete or must be covered with anti-static tile to reduce airborne contaminants.
  - ii. The distribution room shall be situated to reduce the potential for electromagnetic interference to 3.0 V/m throughout the frequency spectrum. Distribution rooms should not be located near power supply transformers, motors and generators, x-ray equipment, and radio transmitters.
  - iii. Entrance doors must be a minimum of 36 inches wide by 7 feet tall and must open outward.
  - iv. Sufficient heating, ventilating, and air conditioning (HVAC) sensors and control equipment must be installed to provide a constant environment for this space. Unless specific requirements otherwise dictate, the room environment should approximate an office and the engineer should assume a 3,500 BTU load from installed equipment. In addition, a passive heat exchange must be designed into

the space to reduce overheating of equipment during times of building HVAC shutdown.

- v. No additional building facilities, electrical circuit breaker panels, alarms or energy management systems are allowed in this room.
- vi. Lighting shall be installed to provide a minimum of 50-foot candles illumination measured 3 feet above the finished floor. Light fixtures should be mounted a minimum of 8.5 feet above the floor.
- vii. A minimum of two 20 Amp, 110 volt ac quad electrical outlets, each on separate circuits (individual branch circuits), shall be installed in each distribution room. One of these dedicated circuits must be located six feet above the finished floor located behind the area designated for the equipment rack. In addition, the room shall be equipped with auxiliary duplex outlets placed 6" above the finished floor, at six-foot intervals around the perimeter walls.
- viii. An isolated electrical ground (as defined by Article 250-74 of the NEC) must be provided on a four inch bus bar mounted six inches above the finished floor near, but not behind, the riser conduit. This grounding bar should be connected to either building-steel (main building ground electrode), a separate concrete-encased electrode, or a buried ring ground with a #00 copper wire and must be common to all distribution rooms and the equipment room.
- ix. The distribution room must not be equipped with a drop tile or other false ceiling.
- x. All walls must be covered with 3/4 inch A-C plywood, painted with fire-retardant paint (not fire-retardant plywood unless required by local design codes), mounted vertically starting 2" above the finished floor, and secured to the walls. All plywood panels must be mounted in contact with one another leaving no gaps between sheets.