SECTION 17050
(27 10 01)
ELECTRICAL GENERAL PROVISONS

PURPOSE:

This Communications Design Specifications (CDS) document is intended for use by architects and engineers to design telecommunications pathways and spaces for new buildings and major renovation projects at Stanford University (SU). Use of this CDS will meet Stanford University's - Information Technology Services (SU-ITS) requirements for new buildings and major renovation projects (Stanford University Campus and School Of Medicine Buildings).

This CDS does not address design requirements for specialized communications buildings and rooms as follows:

- Buildings planned for use as Data Centers, Electronic Communication Hubs, Node Buildings, or other Building Automation Service Control Centers.

- In general use buildings, those rooms planned for use as server rooms, computer data rooms, audio / visual control rooms, security control rooms, etc.

RESPONSIBILITIES:

General

Depending on project scope, the responsibility for planning, designing, and construction of new buildings and major renovation projects will be project managed by the applicable capital planning and management group, i.e. SU - Capital Planning and Management (CP&M), School Of Medicine – Facilities Planning & Management, SU Residences – Housing Capital & Planned Projects.

A Project Team will outline the entire planning, design and construction process into nine Process Phases. Each phase of the process contains tasks, deliverables and approvals designated as Process Controls which ensure that the project is on track with the overall goals, budget and schedule, and that the various stakeholders are knowledgeable and able to make informed decisions. The Process Phases are as follows:

1. Scoping
2. Feasibility
3. Programming
4. Schematic Design
5. Design Development
6. Construction Documents
7. Construction
9. Closeout

Project Team

The Project Team is generally comprised of four distinct groups formed according to function and expertise, i.e. User Group, Consultant Group, Technical Group and Support Group. Each Group provides input, guidance and professional expertise throughout the design, construction and closeout phases of a project.

- Support Group: includes SU management and staff (primarily from the applicable capital planning & management group) and acts to bring the other groups together to authorize, organize and implement a capital project.

- User Group: comprises the faculty, staff, and students, and is organized to collectively speak to

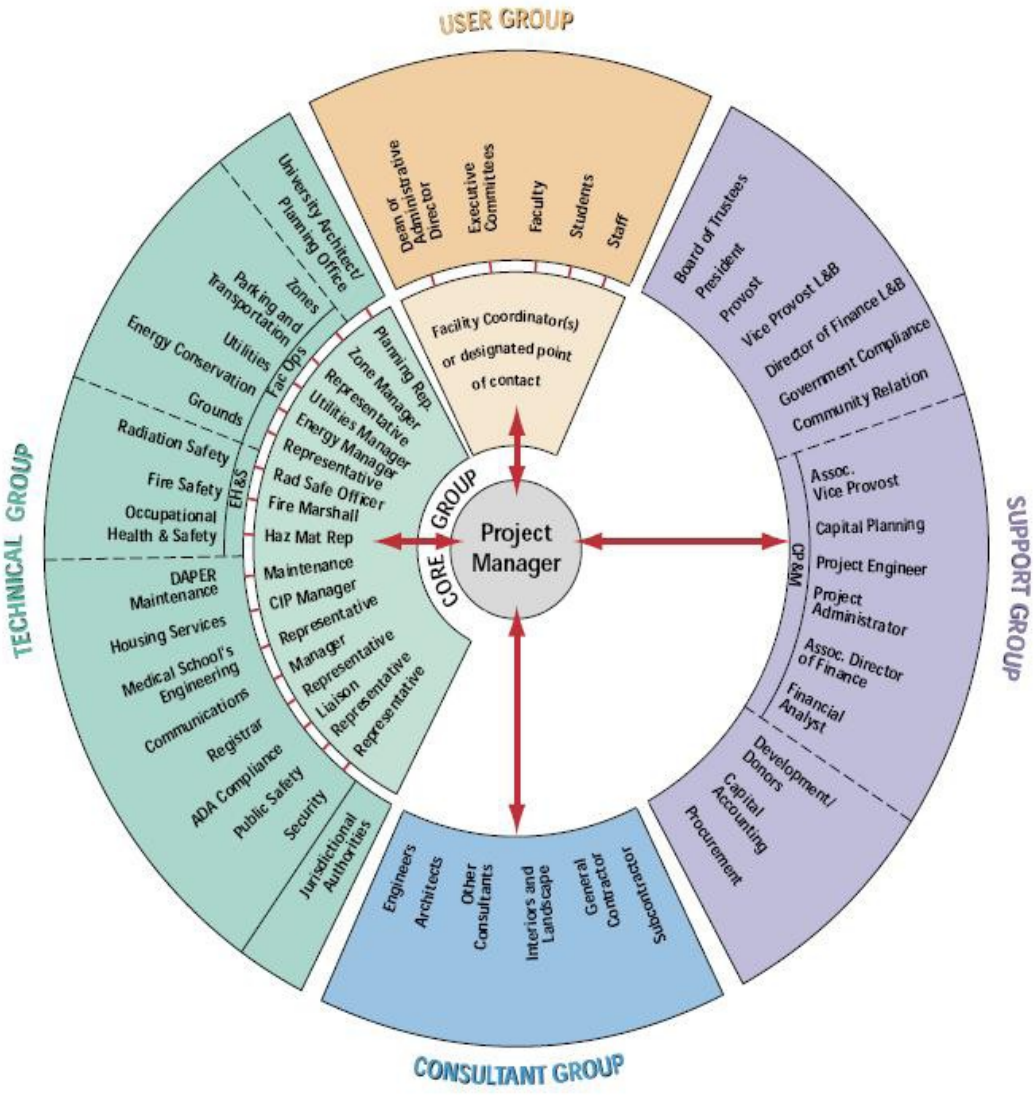
The Project Team through the Facility Coordinator, Department Head (Dean or Administrative Director), and sometimes an Executive Committee of designated Users.

- Consultant Group: includes design and construction professionals and consultants that have been contracted by the Support Group. This group implements the design and construction through input from the other three groups.

- Technical Group: comprised of a Core Group of Stanford personnel (and outside consultants or contractors they may hire) which is responsible for communicating relevant issues about scope, budget and schedule to their group's participants and to the other Core Group members. This group acts to consult and advise on each individual project to refine the project consistent with overall campus needs.

Project's Project Manager (Support Group)

- The Project Team for a new building or major renovation project is usually led by the Project's Project Manager (PPM) as shown in the following SU-Capital Planning & Management (CP&M) Project Diagram.



- The Project's Project Manager shall ensure that telecommunications design requirements are communicated to the four Project Team groups and the Core Group as applicable.

Building Client - Facility Coordinator (User Group)

The User Group (Building Client - Facility Coordinator) shall, with the help of the Project's Project Manager, identify the telecommunication media requirements for voice, data, and CATV services for the Project. The telecommunications requirements will be refined during subsequent Project Phases.

The User Group (Building Client - Facility Coordinator) shall work with the architect, engineers and the Information Technology Services Facility Engineer (ITSFE) to document the telecommunication media type requirements and telecommunication service outlet (TSO) locations for the Project

Architect and Engineers (Consultants Group)

The architect and engineers shall work with the User Group to determine the telecommunication media

type requirements and telecommunication service outlet (TSO) locations for the Project.

The architect and engineers shall utilize applicable Facility Design Guideline (FDG) documents to develop the telecommunication support structure design requirements. The relevant ITS Telecommunication FDG's are as follows:

- Section Number 17050.001, Communications Design Guidelines (Pathway & Spaces) – Architects & Engineers, Issue #4, dated 3/1/09.
- Section Number 17120.001, Telecommunication Rooms, Issue #1, dated 5/27/04.
- Section Number 17130.001, Interior Pathways, Issue #1, dated 10/31/03.
- Section Number 17140.001, Underground Pathways & Spaces, Issue #5, dated 9/1/04.
- Section Number 17920.100, Access Control Enterprise System – Card Access, Issue #1, dated 1/15/09.

Note: The telecommunications Facility Design Guidelines referenced above are available on the Stanford Design Guidelines website: http://www-facilities.stanford.edu/fdcs/. The applicable reference documents are listed under Division 17 Communications Services. The ITS reference drawings (CM-XX) are available on the same website under the "View FDG Drawings" tab.

The architect and engineers shall indicate, on the design drawings and in the design specifications, the location and specifications of the physical infrastructure required for a complete telecommunications cabling pathway and distribution system. The design specifications shall support current and future telecommunications needs for the building as follows:

- Physical pathways and support structures to support the campus backbone entrance cable systems to the building.
- Physical pathways and support structures to support horizontal, riser and distribution cable systems within the building.
- Conditioned telecommunication rooms - dedicated to telecommunications cabling and equipment.
- Telecommunications service outlets (TSO's) - to meet the building occupant's requirements.
- Access Control Doors – to meet SU Building Access/Security Policy requirements.

Information Technology Services (Technical Group):

The Information Technology Services' (ITS) Facility Engineering Group is responsible for planning, designing and maintaining the telecommunications infrastructure for all voice, data and video services for Stanford University.

Note: Network connectivity withstanding, Stanford ITS does not generally design or install facilities for Audio-Visual, CCTV, Security, Fire Alarm, Energy Management, server rooms, etc. These facilities are normally provided by the Client or the Project. By mutual agreement, Stanford ITS can provide end-to-end cable placement support for non-supported systems, if complete and detailed specifications are provided to the ITS Facility Engineering Group, e.g. copper, fiber, and coaxial cable types, sizes, splicing requirements, termination hardware requirements, etc. Stanford ITS does not currently have the skill sets required to design, activate, test, and turn-up these systems.

The ITS Department's responsibilities for new buildings renovation Projects are as follows:

- **Cabling and Equipment Design:** An Information Technology Services Facilities Engineer (ITSFE) is assigned to coordinate with the CP&M Project Team to direct the design of the telecommunications infrastructure. The ITSFE's design responsibilities are:
  - Review and provide applicable comments for schematic design drawings, design

development drawings, construction drawings, and submittals as the Project progresses thru Process Phases.

- Prepare various construction drawings and written specifications for the installation of cables to and within the building.
- Prepare, issue, and maintain the Telecommunication Service Outlet (TSO) "Bible Sheet" drawings that depict the TSO number, type and location for the building.
- Prepare a competitive Invitation For Bid (IFB) for submission to qualified cabling contractors (CC) who will subsequently provide and install the telecommunications cabling
  and equipment.
- Coordinate the IFB bid process and award with the SU Contracts and Procurement Department.
- Coordinate the project work and service provisioning tasks with other ITS Departments.

- **Cabling and Equipment Project Costs:** An Information Technology Services Service Consultant (ITSSC) will provide the CP&M Project Team with a cost estimate for telecommunication facilities for the project. The cost estimate includes voice, data, and video telecommunications facilities and network equipment. Rough Order Magnitude (ROM) costs for telecommunications will be provided during the Programming Phase. The telecommunications cost estimates will be refined during the Design Development and Construction Documents phases. The cost estimates will be broken down into the following budget categories:
  - Site preparation
  - Building Wiring & Infrastructure
  - Engineering & Project Management
  - Networking – Net to Jack
  - Service Activations / Surge (Voice/Video/Regional / Access Control / Alarms / Equipment
  - Project Phones / Monthly Services

- **Cabling Installation & Inspection:** An Information Technology Services Facility Engineer (ITSFE) will project manage the installation and inspection of the CC's work. The following are the ITSFE's responsibilities:
  - Project manage the CC's work and perform ongoing work inspections. The CC is responsible for the coordination of their work operations and schedule with the projects' General Contractor and their sub-contractors.
  - Attend the Owner / Architect / Contractor (OAC) meetings.
  - Provide ongoing coordination and support to the OAC team regarding all aspects of the telecommunications infrastructure and cabling work.

TELECOMMUNICATIONS INFRASTRUCTURE DESIGN CRITERIA

Major Components

The telecommunications infrastructure design for new buildings and renovation Projects consists of seven major components as follows:

- Building Entrance Conduits
- Building Entrance Facility Space
- Telecommunications Rooms
- Building Backbone Pathway Systems
- Horizontal Pathway Systems
- Telecommunication Service Outlets (TSO's)
- Access Control System – Doors

The communications infrastructure design standards have been formulated to be independent of cable plant details.

General Planning Considerations

The communications infrastructure design requirements can be reasonably determined before the number of actual spaces and telecommunication service outlets (TSO's) are known. This can be accomplished by using the net assignable square footage (NASF) of the building as a benchmark.

> Formula for Planning and Estimated Budgetary Purposes: Estimate the maximum number of TSO's that must be supported if all assignable space contained nothing but office space. Use 100 NASF as a standard office size for this calculation. The number of TSO's to be equal to the total building NASF divided by 100. These calculations are applicable at the initial programming phase and for budget purposes only.

The Architect and PM shall work with the Building Client – Facility Coordinator to determine the telecommunication media type requirements and telecommunication service outlet (TSO) locations for the Project, i.e. Category 6 (250 MHz), Category 6A (500 MHz), or Fiber-To-The-Desk (FTTD). The Project's Project Manager shall contact the ITSFE to request a preliminary ROM cost per NASF TSO.

Structured Building Cabling System – Support Structure Sizing Impacts

As of March 2009, SU-IT's baseline standard for Structured Building Cabling Systems installed in new buildings or major building remodel projects is as follows:

- Category 6 Universal Twisted Pair (UTP) cable containing 4-pair, 23 AWG copper cable. The transmission rate for Category 6 UTP cable is 1 Gigabit per second (1 GBs) at 250 MegaHertz (250 MHz) bandwidth to 295 cable feet. The nominal outside diameter measurement of a typical Category 6 (1 GBs @ 250 MHz bandwidth), plenum-rated cable is .23 inches (0.0415 cross sectional area).

  Note: The cross-sectional area of Category 6 (1 GBs @ 250 MHz) is 1.2 times the size of Category 5e plenum-rated cable. The larger cable size marginally increases the size and/or number of virtually all cable support structures and pathways including Telecommunications Rooms, two-post equipment racks, cable management hardware, cable trays, conduits, outlet boxes, etc.

- Category 5e Universal Twisted Pair (UTP) cable, containing 4-pair, 24 AWG copper cable, will continue to be used for moves, adds, and changes (MAC) work in existing buildings cabled with an embedded Category 5e structured cabling system. The transmission rate for Categor 5e UTP cable is 1 Gigabit per second (1 GBs) at 100 MegaHertz (100 MHz) bandwidth to 295 cable feet. The nominal outside diameter measurement of a typical Category 5e (1 GBs @ 100 MHz bandwidth), plenum-rated cable is .21 inches (0.0346 cross-sectional area). Upon Building Client - Facility Coordinator request and Project funding, SU-ITS will provide, install and support a Category 6A Structured Building Cabling System as follows:

- Category 6A Universal Twisted Pair (UTP) cable containing 4-pair, 23 AWG copper cable. The transmission rate for Category 6A UTP cable is 10 Gigabits per second (10 GBs) at 500 MegaHertz (500 MHz) bandwidth to 295 cable feet. The nominal outside diameter measurement of a typical Category 6A (500 MHz), plenum-rated cable is .31 inches (0.0754 cross-sectional area). This example is a Systimax 2091 UTP cable.

  NOTE: The cross-sectional area of Category 6A (500 MHz) cable is 2.2 times the size of Category 5e cable. The larger cable size significantly increases the size and/or number of

virtually all cable support structures and pathways including Telecommunications Rooms, two-post equipment racks, cable management hardware, cable trays, conduits, outlet boxes, etc.

Upon Building Client - Facility Coordinator request and Project funding, ITS will provide, install and support a Fiber-To-The Desk (FTTD) technology consisting of 50.0 micron multi-mode fiber cable media.

Abandoned Cable Removals (Major Renovation Project)

The National Electric Code (NEC) 2002 requires the removal of abandoned cable in buildings. Abandoned cable is defined as ***"Installed cable that is not terminated at equipment and not identified for future use with a tag."*** The following are the applicable NEC Code Sections:

- Ⅱ Ⅱ640.3 (A) Spread of Fire or Products of Combustion. The accessible portion of abandoned audio distribution cables shall not be permitted to remain.
- 7`25.3 (B) Spread of Fire or Products of Combustion. The accessible portion of abandoned Class 2, Class 3, and PLTC cables shall not be permitted to remain.
- 760.3 (A) Spread of Fire or Products of Combustion. The accessible portion of abandoned fire alarm cables shall not be permitted to remain.
- 770.3 (A) Spread of Fire or Products of Combustion. The accessible portion of abandoned optical fiber cables shall not be permitted to remain.
- 800.52 (B) Spread of Fire or Products of Combustion. The accessible portion of abandoned communications cables shall not be permitted to remain.
- 820.3 Spread of Fire or Products of Combustion. The accessible portion of abandoned coaxial cables shall not be permitted to remain.
- 830 (A) Spread of Fire or Products of Combustion. The accessible portion of abandoned network powered broadband communication cables shall not be permitted to remain.

Following the publication of the 2002 NEC, the NFPA updated standards correlating with the NEC to issue similar provisions for the removal of abandoned cable.

By nature, codes are mandatory and have the force of law available for compliance. Failure to comply with codes requiring the removal of abandoned cable can result in fines and the withholding of Certificates of Occupancy. Failure to comply may also result in liability in the event of a building fire.

Note: On renovation projects, the Architect and the ITSFE shall jointly perform a field survey to determine the status of existing communication cables. Unless otherwise specified in writing by the applicable Project's Project Manager, the project shall provide for the identification, removal and disposal of existing and/or abandoned cables on all renovation projects.

TELECOMMUNICATION CODES AND STANDARDS

Codes pertaining to building, electrical, fire, and safety must be adhered to. National Electrical Code (NEC) and NFPA 70 compliance is mandatory.

Telecommunications Standards are voluntarily adopted in the United States and represent industry consensus on requirements and best practices. The benefit of standards is the interoperability of components and systems, by multiple manufacturers, and the interoperability of local, national and

international networks. The Stanford telecommunication infrastructure requirements are based on ANSI/EIA/TIA standards such as:

- 568-B: Commercial Building Telecommunications Cabling Standard
- 569-B: Commercial Building Standards for Telecommunications Pathways and Spaces
- 606-A: Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
- 607-A: Commercial Building Grounding and Bonding Requirements for Telecommunications
- 758: Customer Owned Outside Plant Telecommunications Cabling
- Building Industry Consulting Services International, Inc. (BICSI): Telecommunications Distribution Methods Manual (TDMM), Outside Plant Design Reference Manual, Wireless Design Reference Manual, etc.

BUILDING ENTRANCE CONDUIT:

General:

ITS will specify the required number of 4" diameter entrance conduits, the recommended stub-out location to connect to the SU conduit system, and if required, the size and location of new on-site vaults or pull boxes.

- New buildings shall connect to the SU underground telecommunications conduit system.
- The Project shall install entrance conduits from a designated exterior conduit stub out point, to and through the building wall, to the Entrance Facility Room (EFR) or Main Telecommunications Room (MTR) inside the building.
- The Project may need to install a vault or pull box, on the exterior building site, to meet slope or distance requirements from the underground telecommunications conduit system.
- ITS will be responsible for extending the conduits, from the new exterior-building conduit stub-out point or new vault/pull box, to the existing underground telecommunications conduit system.
- For service security reasons, certain buildings may require "loop diversity" or dual building entrance facilities (separate). If required, the number of entrance conduits will be duplicated in each separate entrance.
- For detailed exterior pathway specifications: See Division 17: Communications Services, Section Number 17140 http://www-facilities.stanford.edu/fdcs/.

Size:

- A minimum of two (2) four inch (4" diameter), to a maximum of six (6) four inch (4" diameter) entrance conduits, shall be placed by the Project (ITSFE will specify the required number).

Depth - Exterior Conduit:

- The depth of the exterior building conduit shall be a minimum 24" cover. Concrete encase all conduit that has less than 24" of cover.
- Underground conduit shall be installed with an upward slope from the exterior communications vault or pull box to prevent water draining into the building (1% grade).

Material:

- Exterior Underground Conduit (Vault/Service Box To Building Foundation Wall): 4” diameter PVC Schedule 40 type lateral conduit(s) shall be installed underground from the serving ITS vault or pull box, located outside the building, to the rigid metallic conduit(s) stubbed out a minimum of 24” from the exterior building entrance wall

- Building Foundation Wall: Conduit penetrations of foundations, footings or outside walls shall be made with rigid metallic conduit stubbed out a minimum of 24” from the exterior building wall and a minimum of 6” from the interior building wall. Threaded couplings shall be used and all joints shall be made tight. Running threads are not acceptable.

- Interior Building Conduit: Rigid metallic conduit shall be used from the interior building entrance wall penetration to the Entrance Facility Space (EFS) or Main Telecommunications Room (MTR).

  Note: National Electrical Code (NEC) Section 800-50 limits exposed non-rated outside plant cables to a maximum 50 sheath feet within the building. If the 50’ rule will be exceeded, rigid metallic entrance conduit must be (1) continuous to an Entrance Facility Space (EFS) where non-rated outside plant cable can be transition spliced to rated cable or (2) continuous to the Main Telecommunications Room (MTR).

- If the underground entrance conduits terminate in the basement, equip each conduit with a Tyco Electronics Corporation-CEV Entrance Seal (www.tycoelectronics.com). A drain pipe shall be installed from each valve equipped entrance seal’s drain fitting to a floor drain. See Figure #1.

  FIGURE #1 (Tyco Electronics Corporation-CEV Entrance Seal)

Duct Plugs:

- All entrance conduits shall be plugged at both ends with expandable type duct plugs (exterior vault and building entrance).

Bends & Sweeps:

- Entrance conduits, from the exterior vault to the EFR or MTR, shall be installed with no more than two (2) 90 degree bends without some form of breakout (e.g. pull box, vault, etc). The minimum inside radius of entrance conduit bends shall not be less than 60". The ITSFE will specify long sweep bends greater than 60" radius if large size copper cables are planned for placement. **All bends and sweeps shall be concrete encased.**

Grounding:

- A grounding bushing shall be installed on the interior end of metal conduit. The ends of the metallic entrance conduits must be grounded to the building ground system with a minimum #6 AWG grounding conductor.

Mandreling, Pull Tapes, Plugging

- All conduits must be mandreled after installation. A minimum bend radius of radius 60" or larger shall pass a 3-5/8" x 12" length mandrel.

- Conduits shall be installed with a 3/4" – 2500 lbs tensile strength polyester woven pre-lubed measuring and pull tape (flat design with footage measurement, e.g. Neptco Part No. WP2500P). The wall-to-wall "as-built" footage lengths shall be provided to the ITSFE.

- All conduits shall be plugged upon completion of mandreling using compression type ducts plugs in the vault/pull-box/stub-out and the EFS or MTR.

Building Entry Boxes

- The ITSFE must pre-approve the use of building entry boxes. The number of entrance conduits, the size of and number of building entrance cables, and the bend cable bending radius requirements, will limit the use of building entry boxes.

- If pre-approved for use, exterior wall-mounted building entry pull box shall be:
  1. NEMA rated for exterior use.
  2. Eighteen (18) gauge, galvanized steel, waterproof boxes with gasket, and screw down covers (Hoffman or approved equivalent).
  3. Galvanized mounting hardware shall be used to securely anchor the boxes to the exterior wall. Adequate provisions shall be taken to prevent dielectric action between dissimilar metals.
  4. Building entry boxes shall be painted as follows:

- First coat: Zinc dust – zinc oxide primer house and trim paint.
- Second coat: Type and color to match existing building walls and/or trim where applicable.

BUILDING ENTRANCE FACILITY SPACE (IF REQUIRED)

General:

An Entrance Facility Space (EFS) is a place to transition splice a non-rated outside plant cable to a rated building cable (CMR, CMP). National Electrical Code (NEC) Section 800-50 limits exposed non-rated outside plant cables to 50 sheath feet inside the building.

- An EFS is required, within 50 feet of the entrance conduit's building wall penetration, if more than 50 sheath feet of non-rated outside plant entrance cable will be exposed before its end termination in the MTR.

- An EFS is not required if the non-rated outside plant cable is installed in continuous rigid or intermediate metallic conduit, without pull box(s), to a point within 50 feet of the cable's termination in the MTR. The continuous conduit section shall not contain more than 2-90 degree bends, from the exterior vault or pull box, to the end of the interior conduit.

Location:

- Within 50 feet of the entrance conduits building wall penetration.
- On a bearing wall.
- Physically protected if exposed to vehicles or moving equipment.
- Continuously accessible thru a common public corridor or outside door.
- Located at a standard working height (Workers are not required to use a ladder or scaffold).
- Free from moisture, severe temperature conditions or flooding.

Size:

- Size is based on the square footage of the building and the corresponding number of 4" minimum diameter entrance conduits terminated in the space (four to twelve, in and out total).

- The following horizontal space is require on the back wall of the EFS to mount cables and cable splice closures

To 20,000 sq. ft. (4-4" conduits, 2 in +2 out)	42" (1 row)
20,001 - 40,000 sq. ft. (6-4" conduits, 3 in +3 out)	60" (1 row)
40,001 - 60,000 sq. ft. (8-4" conduits, 4 in +4 out)	60" (2 row)
60,001 - 80,000 sq. ft. (10-4" conduits, 5 in +5 out)	60" (2 row)
80,001 - 100,000 sq. ft. (12-4" conduits, 6 in +6 out)	60" (2 row)

- A clear work area of 48" (1 row) to 60" (2 rows) is required in front of the back wall, plywood mounting surface to accommodate cable splicing operations and splice enclosures (yields 36" of clear work space).

- Entrance conduits shall penetrate 4" above finish floor level or wall entrance or enough to permit installation of a grounding bushing.

Walls:

- Extend from the finished floor to the structural ceiling.

- Paint all walls in a light color (white) to enhance room lighting (2 coats).

- Line all walls with Trade Size void free, 3/4-inch AC-grade plywood, 8 feet high.
- Plywood shall be mounted vertically starting at 18-inches above the finished floor to a height of 9-feet, 6-inches.
- Plywood shall be securely fastened to the wall-framing members. Wall anchors shall be flush to the plywood surfaces as to not obstruct the mounting of cabling hardware. The walls shall be capable of supporting attached equipment.
- Plywood sheets shall be either:
    1. Fire Rated by the manufacturer and painted with two coats of white paint. At least one (1) Manufacturer's Fire-Rated stamp shall be visible per sheet or partial sheet of plywood when painting is complete.
    2. AC-grade painted with two coats of white Fire-Retardant paint. The plywood shall be painted on all exposed surfaces (six sides).

Doors:

- Open 180 degrees outward unless restricted by building code.
- Minimum 36" wide opening and 80" high with no doorsills.
- Locate door to the middle of the back wall space.
- Equip with an ITS controlled Access Control System lock.

Floors:

- Carpet is not permitted.
- Floors shall be treated and sealed to eliminate dust and facilitate dust removal.
- The rating for distributed floor loading must be greater than 50-lbs/sq. ft.

Ceiling:

- Drop ceiling or suspended ceiling is not permitted in telecommunications rooms and spaces.
- Minimum acceptable ceiling height is 8.0'. It should be unobstructed to provide space over cable and cable splices to readily access the cable pathway structure to the MTR (conduit, cable tray, etc.).
- Sprinkler heads must be provided with cages to prevent accidental operations. They must be as high as possible to avoid accidental operation from cable pulling activities.

Electrical Power:

- Install one 120VAC/20AMP duplex outlet (L5-20R) off the plywood backboard for testing and maintenance purposes. The outlet should be mounted 12 inches from the finished floor and can be on a shared branch circuit.

Lighting:

- Lighting must have uniform intensity of 50-foot candles when measured 3 feet from the finished floor.

Grounding:

- Install a Telecommunications Grounding Bus bar (TGB), a pre-drilled copper bus bar with holes

for use with standard-sized lugs, having minimum dimensions of .25" thick by 2" wide by minimum12" length.

The TGB must be bonded to (1) the electrical panel, for that floor of the building, and (2) a separate bonding connection to building steel. The ground conductor shall be a copper conductor sized at 2 kcmil AWG per linear foot of conductor length (minimum #6 AWG up to a maximum size of 3/0 AWG).

Cable Pulling Iron / Eye:

- Install a steel anchor pulling iron or eye (7/8" diameter mild steel) in the ceiling or upper wall area and floor to provide a pull point to place large copper entrance cables (embed in concrete or weld to support steel). The pulling iron/eye shall support a maximum cable pulling tension of 16,000 lbs.

TELECOMMUNICATION ROOMS

General:

All buildings will have one Main Telecommunication Room (MTR) which serves the common communication requirements of the entire building, i.e. voice, data, CATV, wireless, access control and building automation system. The MTR may also support floor serving communications cabling terminations to TSO's within 295 cable feet of the MTR.

In addition to the MTR, the building may have one or more Telecommunications Rooms (TR's). A TR differs from the MTR as they are floor serving spaces only. A TR may serve floor space on the same floor as the MTR or on individual floors above or below the MTR.

To maintain security of SU's voice and data network systems, MTR's and TR's shall not house Building Automated Systems (BAS) control equipment not maintained by Stanford ITS. BAS includes Energy Management Control Systems equipment, Fire Alarm Control equipment, Security Control equipment, etc.

ITS shall provide network connectivity from the MTR and TR's to the various BAS control equipment systems via horizontal cabling to a TSO at or in the respective control equipment.

Room Types:

- Main Telecommunication Room (MTR): There shall be one MTR that serves an entire building.
  - The MTR is the inter-connection point between the campus backbone cables entering the building, and building backbone cables to other TR's or horizontal cabling to TSO's.
  - The MTR houses active network equipment, copper cross-connect facilities, fiber termination patch panel, and TSO termination patch panel mounted on equipment racks.
  - Building entrance and building backbone cables will be wall-mounted (110 wiring blocks and cross-connection fields).
  - Access Control and CATV equipment will be wall-mounted.
  - The MTR will also serve as a TR for those TSO's located on the same floor (within 295 cable feet).
  - The MTR must be designed to accommodate both current and future applications and technologies.

- Telecommunications Rooms (TR's): In addition to the MTR, a building may have one or more TR's to serve floor space on the same floor as the MTR or on floors above or below the MTR.

  - The TR is a floor-serving space that provides an inter-connection point between the building backbone infrastructure (from the MTR) and the horizontal distribution infrastructures (to the TSO).

  - The TR houses active network equipment, copper cross-connect facilities, fiber termination patch panel, and TSO termination patch panel mounted on equipment racks

  - Building backbone cables and horizontal distribution cable will be equipment rack mounted.

  - Access Control and CATV equipment will be wall-mounted.

  - The TR must be designed to accommodate both current and future applications and technologies.

Location:

- Locate on the ground floor or in the basement of the building served.

- If located in a basement or below water level, a floor drain and/or sump pump shall be provided within the room if risk of water egress exists.

- The best location for the MTR/TR, and other floor serving TR's, is the central core area of the building so that no individual horizontal distribution cable run, from the MTR/TR to the TSO, exceeds the 295 cable feet limitation. If this is not possible, then more than one TR is required on the floor.

- The MTR should be vertically aligned or stacked with TR's on the floors above/below.

- Locate on a bearing wall to reduce the possibility of future room relocation.

- The MTR and TR's must be door accessible from a hallway or other common public area. They must not be located inside office spaces, classrooms, or auditoria.

- The MTR and TR's must be dedicated to telecommunications facilities use only. They may not contain electrical and mechanical equipment; fire alarm panels, energy management control panels, security control panes, slop sinks for janitors, etc.

- The MTR/TR should not be located in or near the following:
  - Below or adjacent to areas that may pose a potential water hazard (e.g. restrooms, kitchens).

  - Near electrical power supply transformers, elevator or pump motors, generators, X-ray equipment, radio transmitters, induction heating devices and any other potential source of electromagnetic interference (EMI) and radio frequency interference (RFI).

  - Near equipment that can cause electromagnetic Interference (EMI). Electrical feeders and branch circuits of noisy equipment must be kept away from sensitive equipment and its associated circuits.

  - Near sources of mechanical vibration that could be conveyed to the room via the building

structure.

- Near equipment not related to the support of the telecommunications function (e.g. sprinkler, steam, chilled water, supply and waste piping, ductwork, pneumatic tubing, etc) shall not be installed in, pass through, pass overhead or enter the telecommunications space.

- With water or drain pipes (to include overhead piping of any type) not directly required in support of the equipment within the room. Drain (drip) pans with an appropriate drain shall be placed beneath each pipe, if required. Pipes for sprinkler heads located within the room shall not be located directly above electronic equipment racks and/or cabinets.

- Any place that may be subject to water or steam infiltration, humidity from nearby water or steam, heat, and any other corrosive atmospheric or environmental conditions.

- Share space in electrical closets, boiler rooms, washrooms, janitorial closets, and storage rooms.

- Acoustic noise levels in the MTR/TR must be maintained at a minimum level by locating noise-generating equipment outside the MTR/TR.

Size:

The MTR/TR shall provide enough space for all planned cable, cable terminations, electronic equipment, environmental control equipment, power distribution/conditioners, and uninterrupted power supply systems required to serve the telecommunications equipment.

The size of an MTR/TR depends upon the following:

- The planned building use and space usage within the building.

- Total net assignable square footage (NASF) of the building and/or floor space served.

- For planning purposes, the number of TSO's terminated shall be based on one 4-port TSO per 100 sq. ft. of net assignable floor space.

- The technology media type (Category 6 copper, Category 6A copper, Fiber-To-The-Desk, etc.).

- The number of building entrance conduits and/or building backbone conduits.

- Building entrance and backbone cable terminations (on-wall).

- Number of equipment racks/cabinets and vertical cable managers.

- Quantity of common equipment installed, e.g. switches, routers, uninterruptible power supplies, CATV, access control system, etc.

- Access to the equipment for maintenance and administration and for equipment changes with minimal or no service disruptions. (Front, rear, sides).

- The maximum allowable distance for a horizontal distribution cable is 295 cable feet as measured from the floor serving MTR/TR patch panel termination to the most distant TSO. This measurement shall consider the following design criteria:

- The support structure pathways (cable trays, conduit, J-Hooks) for horizontal distribution cables shall be run parallel to building lines. Main backbone cable trays should be installed in hallways. Branch backbone support pathways (cable tray, conduit, or J-Hooks) shall be placed at right angles from the main cable tray to the TSO location.

- Allow for a minimum of 30 cable feet inside the MTR/TR for cable routing and termination.

- Allow for a minimum of 15 cable feet from the ceiling support structure pathway down to the wall-mounted TSO outlet for routing and termination.

- Figure #2 below reflects the 295 cable feet limitation.

FIGURE #2: 295 CABLE FEET LIMITATION