MORE TO CONSIDER

1. Telecommunications Infrastructure installed in a manner other than that shown in the Telecommunications Standards Document or otherwise approved in writing by ITS Telecommunications shall not be acceptable.

2. Use the AMP crimper/cutter tool when installing AMP Structured Cable.

3. When numbering, labeling or terminating Telecommunications Infrastructure always arrange all items in ascending numerical order.

4. Do not proceed with any telecommunications infrastructure installations without first reading the appropriate Division 27 Sections and Appendices.

5. Refer to Appendix B of the Cal Poly ITS Telecomm Telecommunications Standards Document for acceptable abbreviations when developing truncated cable identification nomenclature during testing.

6. Never plug Structured Cable directly into user equipment. Always use the correct Structured Cable "Demark".

7. Be sure to ask questions about anything that you are not sure of. If you do not ask questions it will be assumed that you understand the correct and expected methodology for performing all work. Work done incorrectly shall not be acceptable and shall be reworked at Contractor's expense.

8. The Cal Poly ITS Telecomm group is an entity separate from the Classroom Technology, though we are both part of Information Services, and report to the Chief Information Officer (CIO). Any work discussed in this document only relates to the ITS Telecomm portion of any project and our network support of Audio-Visual Cabling. Refer to Classroom Technologies' Standards Documents for information and direction regarding all other work in the area of Classroom Technology at http://www.mds.calpoly.edu .

9. When including RF technology in any project design, refer to the following documents for guidance:

Cal Poly University Airwaves Policy – http://www.netadmin.calpoly.edu/documentation/airwave_policy.pdf

Cal Poly University Two-Way Radio Frequency Coordination Standard – http://www.netadmin.calpoly.edu/documentation/Two_Way_Radio_Policy.pdf

Information Technology Resources Responsible Use Policy – http://security.calpoly.edu/policies/rup/

FCC Regulations – USC - Title 47 - part 90

Examples of Items Found in Appendix B

Figure 108: Two 4-port faceplates in the most common configurations found on campus. The upper label identifies the specific faceplate within a room. A number such as 204A-01 would mean, when entering room 204A, which is a room within room 204, starting on your left and going around the room, faceplate 204A-01 would be the first faceplate you should come to in that room. The lower label indicates the room number of the TR/ER that supports the jacks installed in the faceplate. The wiring connected to the rear of the connectors/jacks (see Figure #107) should have labels identifying which port they serve; "W" (upper left),"X" (upper right),"Y" (lower left) or "Z" (lower right).

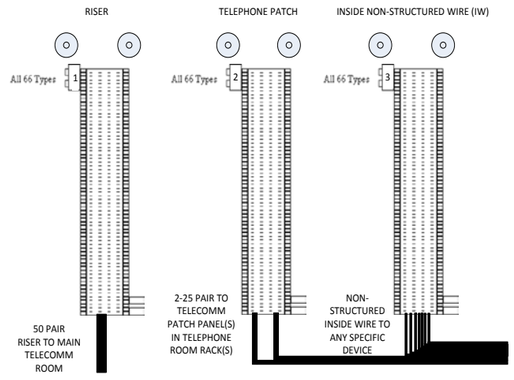


Figure 160: - Telecomm back board wiring methodology

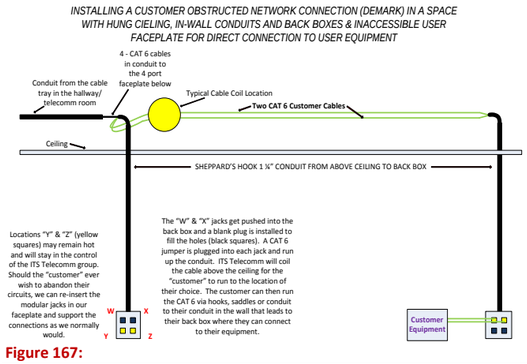


Figure 167:

Cal Poly ITS Telecommunications

"CHEAT SHEET"

PREFACE:

The "Cheat Sheet" has been created for your convenience. It does not supplant the full Cal Poly Telecommunications Standards Document. Rather, it highlights the many specific areas in the IT/telecomm infrastructure construction/installation process that, in our experience, have proven to be misunderstood and have become chronic problems. Please be sure to read and understand all Division 27 sections, drawings and control documents that pertain to your project. Determining what project work shall be deemed complete and acceptable to the Cal Poly ITS Telecomm group shall be judged using all the documents that apply. Please know that we are here to help you successfully navigate through the many decisions that must be made when designing, constructing, managing and inspecting today's sophisticated infrastructure projects and facilities in light of the ever-changing array of applicable technologies.

PRINCIPLES OF TELECOMMUNICATIONS INFRASTRUCTURE DESIGN & IMPLEMENTATION:

Whether projects are as simple as individual "adds, moves and changes" or as complicated as an entirely new Student Housing Neighborhood, the ITS Telecomm group has been charged with assuring that the IT and Telecommunications infrastructure that is purchased and installed for Campus use is provided in a manner that delivers to the University, real long-term, cost-effective value. By establishing and memorializing the Cal Poly Telecommunications Infrastructure Standards in a succinct and complete document, we are able to provide clarity to University Personnel, Architects, Contractors, Project Managers and Inspectors as to the work product expected and required to meet the University's need for complete, flexible and supportable infrastructure in an ever-changing technological environment. The specific nature of the document is purposeful and in response to the increasing size and complexity of the Campus Telecommunications Infrastructure. It establishes all telecommunications infrastructure requirements in a way that can be serviced and updated, by a small group of highly trained individuals, at minimal cost to the University.

ITS Telecommunications has attempted to deal with every aspect of the campus telecommunications infrastructure in a sustainable manner. From the one-time efforts of design, construction and commissioning, to the multi-decade efforts of maintenance, support and modernization, the decisions memorialized in this document reflect a best value philosophy sculpted by many qualified individuals, representing decades of experience, who have been entrusted by the University to make the best choice decisions.

Technology infrastructure is dynamic and changes with discoveries. If it is determined that new and better solutions are available, we will make the appropriate changes to incorporate the new concepts or practices. As Cal Poly ITS Telecommunications is responsible for establishing and maintaining the best practices regarding the University's telecommunications infrastructure, Cal Poly ITS Telecommunications must be the final arbiters of what is appropriate and supportable.

http://afd.calpoly.edu/facilities/mapsplans/map/30x42_core.pdf - Campus Building Layout

http://afd.calpoly.edu/facilities/spacefacility/name_buildings.pdf - Building Names and Numbers

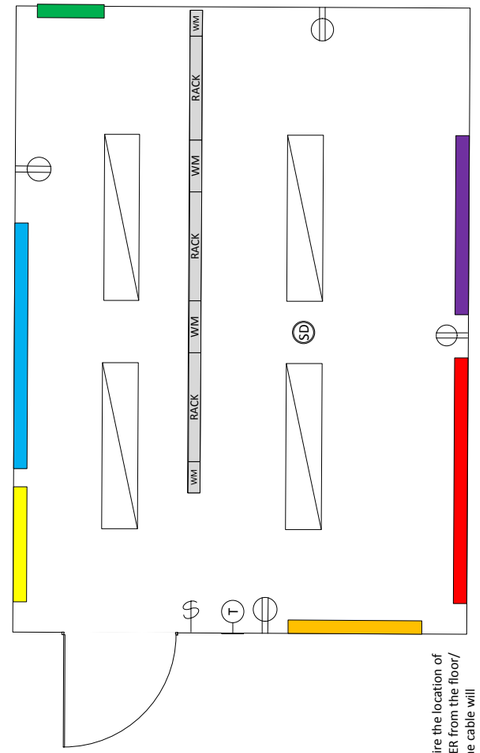
Contact the Cal Poly ITS Telecomm group before digging so we can identify any installed infrastructure at 765-7315

The following are 30 key requirements regarding Division 27 work that have proven to be misunderstood on previous projects. Please contact the Cal Poly ITS Telecomm group at **805-756-7315** or by email at telecommunications@calpoly.edu if you have any further questions relative to any Division 27 requirements.

1. The Fire Rating Stamp shall remain visible on all plywood backboards at all times.
2. Install mule tape or pull cord in all conduits, including conduits with cabling installed.
3. There are two methods of providing connectivity to customer owned/non-ITS Telecomm owned, network-based equipment. (To establish the correct "DEMARK" **See Fig. #166 & #167 in Appendix B**)
4. The EF/TR/ER door shall open outward into a public space.
5. Conduits that cause water to enter a telecommunications space shall be immediately repaired or replaced.
6. Racks shall always be installed in straight rows.
7. There shall be a 3-foot working clearance in front and behind the furthest extending equipment in a rack to allow technicians the ability to work on the communications equipment mounted in the racks (National Electrical Code, Section 110-26).
8. All telecommunications spaces shall be provided with dedicated refrigerated air conditioning providing positive pressure and air flow. Temperature control shall be maintained independently for each space and run continuously, 24 hours a day, 365 days a year.
9. Each equipment rack shall include vertical wire management on both sides of every rack. **(See Fig. #128 & #148 in Appendix B)**
10. All equipment, racks, metal conduit, cable tray and cable shields shall be properly bonded to the TMGB or a Telecommunications Grounding Busbar (TGB) as appropriate. **(See Fig. #140 & #141 in Appendix B)**
11. Inside structured cables (including ground wires) must be labeled on each end with labels that are 1" wide, white, machine generated with black lettering. No hand written labels allowed. **(See Fig. #107 in Appendix B)**
12. A typical telecom room shall include at least two 8' light fixture rows, placed parallel to the racks to illuminate the wall wiring as well as the front and back of all equipment in the racks.
13. In multi-floor buildings the EFs/TRs/ERs shall be stacked vertically in a fire rated shaft.
14. Provide a separate power panel in all communications facilities with planned equipment installations.
15. Electrical panels serving TRs/ERs shall be included in all generator power back-up schemes.
16. Shared use of telecommunication spaces and pathways with other building facilities shall not be allowed.
17. Non-telecommunications supporting materials shall not be located in, or pass through, the EF/TR/ER.
18. No cable hangers (J-Hooks, Bridle Rings, Bat Wings, Etc.) shall be allowed unless approved in advance.
19. There shall be no more than two 90-degree bends (or combination of bends equaling 180 degrees) between pull points or pull boxes.
20. Conduit runs shall contain no continuous sections longer than 100 ft. without a pull box.
21. When cable tray meets a penetrated wall, the number and size of the penetrations shall approximate the capacity of the tray feeding them.
22. Telecommunications faceplate back boxes shall never be daisy-chained or mounted back-to-back using a common feeder conduit. **(See Fig. #158 in Appendix B)**
23. Install Telecomm backboard wiring per campus standard. **(See Fig. #159 in Appendix B)**
24. All copper runs shall require a service loop to allow for the future relocation or splicing of cable if necessary.
25. A minimum of 30 feet of cable, forming the service loop, shall be provided at each end of a fiber riser cable.
26. The cabling, including the horizontal cross-connect in the TR/ER, and the interconnecting cable going to the voice/data/video equipment/patch panels shall not to exceed 290 feet in length. **(See Fig. #160)**
27. Terminate all Structured Cabling on rack mounted patch panels using the EIA/TIA **568A** Termination Standard.
28. For every Wireless Access Point (WAP), provide a single 1 ¼" conduit homerun directly to a communications space or cable tray. At minimum, two (2) terminated CAT 6 cables shall be provided at each location.
29. The minimum size conduit installed for telecommunications purposes shall be 1 ¼".
30. Refer to the Appendix B in the ***Cal Poly Telecommunications Standards Document*** for details, drawings and photographs describing the acceptable labeling, design and syntax standards that shall be used when providing telecommunications infrastructure on the Cal Poly Campus.

Note: All Figure #s mentioned above can be found in Appendix B of the Telecommunications Standards Document at http://www.telecommunications.calpoly.edu.

Telecomm Room Design Considerations and Requirements



NOTES:

1. Be sure that the equipment compliment for the room is defined so that 3' of clearance can be provided in front and behind the farthest protruding rack mounted equipment.
2. The door must be a minimum of 3' wide and open into a public space (not a living, storage, office or classroom space).
3. Leave a minimum 2" gap between the wall and the first rack (for future cabling).
4. One light fixture (minimum) shall be battery/emergency power backed-up.
5. Power distribution for rack-mounted equipment shall be attached to the ladder racking above the rack (see Figure 133 in Appendix B)

This is the area of the ER/TR that is best suited to house the required telephone protectors. This would be the location where incoming OSP (Outside Plant Cable) is terminated before becoming inside, riser UTP (Unshielded Twisted Pair able) used for voice/telephone connectivity within a structure. The protector provides protection against short circuits, voltage spikes and other anomalies that could cause damage to the sensitive electronics that handle today's heavy telephone traffic.

This is the area of the ER/TR that is best suited to house the required "66 block", telephone punch block field. Wiring coming from the protectors mounted nearby, must be punched down on blocks to mate with wiring that comes from the telecomm patch panels in the equipment racks. Once the phone signal is available at a jack on the patch panel, it can, via a short patch cable, be connected to the structured (CAT 6) patch panel cabling that finally routes the signal to the modular jack on the faceplate in the room where the phone is located.

This is the area of the ER/TR that is best suited to locate the required Telecomm Grounding Busbar (TGB). The busbar assembly is a UL listed assembly to which all telecom, data and CATV equipment and pathways must be connected and which is connected to the Main Telecomm Grounding Busbar (TMGB) in the ER. Bonding together all equipment and pathways creates an entire system at the same ground potential, thereby reducing the possibility of "noise" or ground potential differences that can cause a system to fail or work incorrectly.

This is the area of the ER/TR that is best suited to house CATV equipment and components if required. CATV is provided to a project or building on fiber optic cable. If multiple buildings are involved, the CATV signal will arrive from the "head end" on fiber to an optical splitter where it will be split and forwarded on by fiber to a "fiber node" in the building it will serve. The node converts the information from fiber optic to copper coax cable. In the ER/TR the building's copper based signal is then run through a series of splitters and taps to finally provide the signal that arrives at the "F" connector in the room where TV viewing is desired.

This is the area of the EF/TR/ER that we require the location of conduits (with bushings) entering the EF/TR/ER from the floor/ slab. OSP/UTP (CAT 3 twisted-pair) telephone cable will typically be connected/spliced, within a splice case, to ARMM, plenum rated, wiring for distribution throughout the building. The conduits shall enter the room within 3" of the associated wall. As the OSP cabling could be terminated on a protector or spliced and run within the building to the ER, submit shop drawings to the ITS Telecomm group in advance showing the proposed method of CAT 3 cable distribution for approval.

This is the area of the TR/ER that is best suited to house the required electrical power distribution panel that controls all circuits housed within the EF/TR/ER. Never install the panel in the middle of a wall as it will waste too much space. Breakers for the AC unit that cools the room must also be housed in this panel. A close association of the power panel to the entry door allows for easier resetting of a breaker by an electrician, with or without room lighting available.

The Design, Construction and Approval Process

When a construction or remodeling project is deemed necessary and the planning process begins, the ITS Telecomm group should be contacted and your communications needs discussed. The CSU System, through the Cal Poly ITS Telecomm group, has the desire and obligation to help you plan for your current and future needs as they pertain to Telecommunications Systems and Services. Technology is constantly changing and the CSU System is mandating changes and equipment refreshes at times and in ways you may not be aware.

The cost of construction is of course important, but the cost of maintaining and servicing is also substantial and on-going. We will work with you to develop a system design and equipment suggestions in the areas of Telephone, Data, CATV, WiFi and Radio Communications Systems that will be cost-effective over the long-term. The earlier we are involved the better and more comprehensive the result will be.

To offer the greatest level of support we can, the Cal Poly ITS Telecomm group has developed a ***Telecommunications Standard Document (TCD)*** for the Cal Poly Campus. It is the most definitive document describing how to do all things Telecomm on campus. The TCD is available on-line 24/7 at www.calpolyitstelecomm.edu. This 4 page "Cheat Sheet", the Labeling, Design and Syntax Standards, the Campus Building Numbering and Naming Listing and more are available for download or printing at your convenience. The documents and data provided will be used by us to evaluate if the work done meets the developed standards. If you have any questions you can contact ***Tech Services*** at (805) ***756-7315***. If we do not hear from you we will assume that you fully understand the expectations and requirements of the CSU System and the Cal Poly ITS Telecomm group.

We look forward to working with you to create the greatest value for all parties.

telecommunications@calpoly.edu

Phone: 805-756-7315 Email: telecommunications.calpoly.edu

WEB Site: http://www.telecommunications.calpoly.edu