Introduction

California State University, Chico has committed itself in recent years to a very large investment in technology infrastructure to support learning, research, and the business operations of the University. Prudent management of that investment of public resources requires that all possible strategies be adopted to assure its long-term viability. Among those strategies, a principal focus is, and will continue to be, assurance that the products and services being acquired are of the highest possible quality. This document is only one of numerous specific statements of the University’s commitment to that goal.

It must be emphasized that the technical material incorporated in this document should be regarded by the planning and design personnel considering them as minimum standards. Nothing in this document is intended to relieve design consultants of their basic professional and contractual obligations for careful project analysis, strict adherence to sound design principles and best practices, and responsible oversight of construction and installation activities.

The primary purpose of this document is to provide a standardized approach to developing intra- and inter-building campus telecommunications infrastructure physical plant systems: facilitating teaching and learning, improving productivity and efficiency, enhancing research and scholarship, and increasing the efficiency of institutional management. This document is not intended to be the sole source of technology physical plant planning and design information; it is, rather, a tool for defining and explicating the specific telecommunications-related infrastructure requirements common to CSU, Chico’s facilities.

This document provides direction for information technology managers, facility planners, architects, and other design professionals in the design and technical integration of telecommunications media, pathways, and spaces. The objectives of the document are to:

1. Provide a universal framework for inter/intra-building infrastructure design, development, and deployment at CSU, Chico.
2. Define minimum standards for the spaces, pathways, and telecommunications-related infrastructure that must be programmed into either new building construction or retrofit projects.
3. Outline specific media selection and design criteria.
4. Highlight technical issues that must be incorporated into a campus design and procurement process.
5. Delineate methods and procedures for installing, testing, and documenting cable and related infrastructure.

This document is not intended to provide all the answers to information technology-related infrastructure design issues encountered at CSU, Chico. The document’s nature is such that, while providing topical information regarding certain specific solutions or design methods, it also serves to identify the range of components and issues covered by the telecommunications distribution requirements in a typical University building construction or renovation project. Most of the content in this document is based upon various national standards and guidelines for telecommunications systems, including those developed by the Electronic Industry Association (EIA), Telecommunications Industry Association (TIA), Institute of Electrical and Electronics Engineers (IEEE), and Building Industry Consulting
Services International (BICSI) and the CSU’s Technology Infrastructure Planning Standards (TIP). Great emphasis is placed herein on the idea that taking guidance from such sources is generally more desirable than using specific manufacturer’s proprietary designs which may quickly become outdated or may be incompatible with other needed equipment.

To better clarify guidance, should a conflict between documents arise; the order of precedence shall be as follows:

1. The CSU, Chico Telecommunications Standards Document
2. The CSU’s Technology Infrastructure Planning Standards (TIP)
3. Electronic Industry Association (EIA), Telecommunications Industry Association (TIA), Institute of Electrical and Electronics Engineers (IEEE), and Building Industry Consulting Services International (BICSI)

This precedence can be overridden in the case where an applicable building code does not allow or with the approval from Communications Services.

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Telecommunications Spaces

There are primarily three types of telecommunications spaces in a building. Each building has an Equipment Room (ER), and Building Service Entrance (BSE) and potentially one or more Telecommunications Rooms (TR). A single room can serve as the ER and BSE but must comply with the requirements for both rooms.

Specific Facility Definitions

**Equipment Rooms (ER)**

The ER is generally on the lowest floor of a building; the equipment in the ER connects the building backbone to the outside world. It can also serve as the TR for the floor it is located on. If the ER will also be used for telecommunications equipment or as a TR for the floor it is located on it must meet the requirement listed for the Telecommunications Room. The ER can also serve as the BSE.

The ER generally houses telecommunications equipment, cabling, environmental control equipment, power distribution/conditioners, and uninterruptible power supply (UPS) systems. They must also be large enough for equipment installation/replacement without interfering with other systems.

The ER interior dimensions must be no less than 10’ x 15’.

**Building Service Entrances (BSE)**

The BSE is where the outside plant (OSP) cables connects (through protection devices and distribution cross-connects) to the building backbone.

The BSE must be large enough for the plywood backboards with 36 inches of clearance in front of the entrance cross-connects and the same door and lighting requirements as a TR.

**Telecommunications Rooms (TR)**

Telecommunication rooms (TRs) differ from Equipment Rooms (ERs) and Building Service Entrances (BSEs) in that they are generally considered to be floor serving (as opposed to building or campus serving).

<table>
<thead>
<tr>
<th>Square Footage Served</th>
<th>Required Room Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 5,000 sq ft.</td>
<td>10’ x 10’</td>
</tr>
<tr>
<td>5,000-10,000 sq ft.</td>
<td>10’ x 12’</td>
</tr>
<tr>
<td>10,000+ sq ft.</td>
<td>10’ x 15’</td>
</tr>
</tbody>
</table>
Requirements for Telecommunications Spaces

Access Control

Each telecommunications room shall have infrastructure in place to support card access for entry.

Backboards

Each telecommunications space will have all walls covered from one foot above finished floor to the deck above with \( \frac{3}{4} \) inch x 4-feet x 8-feet 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 either fire-rated or painted with a white fire retardant paint, two coats on all sides (front, back and edges).

Cable routing inside the TR

Cables that are to be terminated on a backboard will be routed on the ladder around the perimeter to a point directly above or below the termination hardware.

Cable will not be run along the floor or across a workspace in the TR. All cable, including grounding wire, will approach the equipment rack from above via cable runway or conduit.

Ceiling

The minimum ceiling height is 9-feet above the finished floor. For TRs 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 TR.

Conduit

Conduits that protrude through the floor of the TR need to extend 3-inches above the floor surface.

One 4” trade size conduit 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 TR.

Install mule tape or pull cord in all conduit.

Conduit must not be routed across the backboards.
Doors

The door to the telecommunications space should be 3 feet wide, opening fully (180 degrees on flat wall, 90 degrees in the corner) and be locked with a campus standard telecom key. (Campus TR1 or Housing 725) The door shall be sealed and provided with a door sweep to insulate from outside contaminants. It is also preferable that the door opens outward into a public hallway.

Duct Sealing

Any conduits that enter a telecommunications space from outside must be sealed at both ends with a product specifically listed for that application.

Environmental Service

Any telecommunications space housing active communications equipment must have dedicated air conditioning providing positive air flow. Temperature control should be maintained continuously 24 hours a day, 365 days a year.

Equipment Racks

Floor Mount

Use standard 19-inch by 7-foot racks separated by and flanked with vertical cable management. Generally there should be a 3-feet working clearance to access the communications equipment mounted on the racks (National Electrical Code, Section 110-26). Each rack needs to have a minimum of three (3U) wire horizontal wire managers provided.

Specified Product: Chatsworth Universal Rack Part# 46353-503

Vertical Wire Management

Each rack will require vertical wire management on each side. Each ER/TR should be provided with 6” vertical wire managers, and one 10” vertical wire manager. ER/TRs with four racks will require 6” vertical wire managers, and two 10” vertical wire manager.

Specified Product for 6”: Chatsworth MCS Series Part#: 30092-503

Specified Product for 10”: Chatsworth MCS Series Part#: 30093-503
Horizontal Wire Management

Minimum three horizontal wire managers per rack are required.

*Specified Product: Chatsworth Universal Horizontal Cable manager
Part# 30130-719*

Equipment position

Generally, copper is not terminated on patch panels in telecom racks, it is terminated on the wall on blocks. Fiber and coax (both intra-building and inter-building) are typically terminated inside racks.

Attachment

The bottom of the rack must be attached (bolted) to the floor. An adequately sized cable path (ladder rack) should run from the TR wall to the top of the rack and be securely attached at both ends.

Fire Protection

All telecommunications spaces should be provided with a portable CO2 fire extinguisher with current certification.

Both telecommunications spaces should be provided with a smoke detector tied into the building’s fire alarm system.

Firestopping

All firewall penetrations into a telecommunications space shall utilize a Zero-Maintenance Firestopping Assembly. All firestopping must match the specific fire rating of the wall. Products used must be reusable/reenterable to allow for additional cabling and maintenance.

*Specified Product: STI EZ-PATH® Series 44+*

Grounding

All Telecommunications facilities are to be provided with a telecommunication main grounding busbar (TMGB) in accordance with NEC Article 250, ANSI/EIA/TIA-607, as well as local grounding protection codes.

All equipment, racks, metal conduit, cable tray and cable shields will be properly bonded to the TMGB or telecommunications grounding busbar (TGB) as appropriate.

The electrical panel serving a telecommunications space should be grounded to that facilities TMGB or TGB.

*Specified Product for TMGB: Chatsworth Part# 40153-012*

*Specified Product for TGB: Chatsworth Part# 13622-012*
Labeling

Inside cables must be labeled on each end using Dymo self laminating 1” white with black lettering cable labels.

*Specified Product: Dymo Rhino Part# 1734821*

Backbone and riser cables must be labeled using 1” white nylon with black lettering.

*Specified Product: Dymo Rhino Part# 1734524*

Outdoor cables must be labeled with 1¼” stamped brass tags at each endpoint and in each manhole or pullbox.

All pullboxes, manholes, terminating cabinets, telecommunications facilities and ground/bonding bars & electrodes must be labeled.

All interior racks, cabinets and panels must be labeled using ½” white permanent polyester with black labeling

*Specified Product: Dymo Rhino Part# 18483*

Faceplates must be labeled with typewritten windowed inserts.

Lighting

Install fluorescent lighting a minimum equivalent of 500 lux (50 foot-candles) measured 1 m (3-feet) above the finished floor.

Light switches must be located for easy access upon entry.

Locate light fixtures a minimum of 9-feet above the finished floor.

At least one light should be on emergency power, if available.

Light ballast cannot be within 1’ of telecommunications cable, and the light fixture itself cannot be within 5”. This is typically an issue around the telecom ladder and cable trays used to route telecom cable.

A typical telecom room will include at least two 8’ light rows placed parallel to illuminate the wiring walls and equipment.

Location (BSE)

The BSE should be nearest the point of entry for conduits entering from the underground.

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.
Location (ER/TR)

Locate the telecommunications such that the majority of the cable runs are 150 feet or less.

TRs need to be accessible from a hallway or other common area.

In multi-floor buildings the TRs should be stacked vertically.

If any of the cable runs will be more than 290 feet, two TRs should be built on the floor, located so that they can equally service the floor without exceeding the 290 foot limit.

Telecommunications facilities should be located such that infrastructure can enter the space from all four sides.

Preferably telecommunications facilities should not be directly adjacent to elevator shafts, electrical or mechanical spaces, stairs, kitchens, restroom facilities, or on exterior walls.

Locations that specifically are unsatisfactory include those with sources of excessive electromagnetic interference, hydraulic equipment or other heavy machinery that causes vibration.

Power

ERs/TRs must be equipped to provide adequate electrical power. There should be consideration to supply ERs/TRs with emergency generator power. Life safety systems, building access, lighting, and other building management systems depend on network Power over Ethernet.

Communications Equipment circuits:

A minimum of two dedicated, protected, non-switched 3-wire 120 volt, 20 amp, NEMA 5-20R duplex electrical outlets, each on separate branch circuits. Also, one dedicated, protected, non-switched 4-wire 120/250 volt, 30 amp, NEMA L14-30R electrical outlet.

Convenience outlets (tools, test sets, etc)

Duplex, protected 3-wire, 120 volt, 20 amp, NEMA 5-20R non-switched circuits, located at least 6-inch above the finished floor (below the plywood backboards) and placed at 6-ft intervals around perimeter walls. Convenience outlets should be identified and marked.

Do not run conduit for electrical circuits on top of plywood backboards, route around or behind the backboard (inside the wall).
Electrical Distribution Panels

Electrical distribution panels that serve telecommunications rooms should be dedicated only for that purpose.

The electrical distribution panel serving a telecommunications space should be grounded to that facility’s TMGB or TGB.

Safety

Telecommunications spaces must be safely accessible by technicians, free of storage material or other obstructions that could block access to equipment and should be at standard working height. It should be free from moisture, severe temperature conditions, or possible submersion in case of flooding.

Shared Use

Shared use of any telecommunications space with other building facilities must be avoided. To maintain campus security policies, telecommunications spaces must be dedicated to the telecommunications function and their related support facilities.

Telecommunications spaces must not contain equipment not related to the support of the TRs such as piping, duct work, and distribution of building power. These items must not be located in, or pass through, the TR.
**Interior Communication Pathways**

**Ceiling Cable Pathways (cable trays, conduit, etc.)**
Horizontal pathways will follow building lines as much as possible. Typically horizontal cables feed from rooms/offices via individual conduits to a hallway or other common space where they transit to the cable tray then proceed to the telecommunications room.

**Cable Hangers**
No cable hangers (J-Hooks, Bridle Rings, Bat Wings, Etc.) will be used.

**Cable Tray**
Cable tray should be aluminum with solid corrugated flooring. Minimum width for cable tray is 18”. Minimum load rating should be 100 lb./ft.

*Specified Product: Cope Trof Part# 3B54-18SL-12-S*

**Conduit**
All conduits will be home run back to a cable tray, TR or ER.

All conduits shall be continuously bonded back to the TGBB in the TR/ER.

All conduit terminations will be equipped with threaded bushings.

Conduits runs for horizontal cabling shall not be installed below a building’s slab, however they may be installed within the slab.

**Cable Pull Force**
The maximum allowable pulling force on a 4-pair cable or bundle of cables is 25 lbs. Over-filled conduit, long conduit runs and bends increase the pulling force required to pull the cable.

**Conduit Bends**
There should be no more than two 90-degree bends (or combination of bends equaling 180 degrees) between pull points or pull boxes.

For reverse bends (between 100 and 180 degree), Insert a pull box at each bend.

The recommended 90-degree bend radius for conduit is 6 times the internal diameter of the conduit (10 times the internal diameter if conduit larger than 2 inches).
Conduit Fill (4 pair UTP, plenum rated)

Recommended conduit sizes is based on the campus standard Commscope Systimax 2091b Category 6A Plenum cable which is approximately .285” in diameter.

<table>
<thead>
<tr>
<th>Conduit Size</th>
<th>Sleeve &lt; 2’</th>
<th>Straight &lt; 100’</th>
<th>2x 90° Bends &gt; 100’</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4”</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>1 1/4”</td>
<td>13</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>31</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>91</td>
<td>137</td>
<td>64</td>
</tr>
</tbody>
</table>

Conduit length

Conduit runs should contain no continuous sections longer than 100 ft without a pull box.

Firestopping

All firewall penetrations shall utilize a Zero-Maintenance Firestopping Assembly. All firestopping must match the specific fire rating of the wall. Products used must be reusable/reenterable to allow for additional cabling and maintenance.

*Specified Product: STI EZ-PATH® Series 44+

Pull Boxes

Pull boxes shall not be used in lieu of a 90 degree bend, and conduits should be aligned such that pulls are straight through with no jogs.

Pull boxes should be located such that conduit runs do not exceed 100 feet.

Minimum size for pull boxes; length should be 8x diameter of the largest entering conduit; width should be 4x the diameter of the largest entering conduit.

Walls

All conduits will be placed within the interior of a wall.

Ladder Racking

Ladder racking should be made of 3/8” x 1 - 1/2 ” x .065” wall rectangular steel tubing with cross members welded at 12” intervals. Minimum width required is 15”. Finish shall be grey powder coated. Ladder racking is only for use within telecommunications spaces.
Outlets

Each work area should be provided with a minimum of one outlet location with a minimum of three station cables.

Wall Outlets

The "standard" wall outlet should be a 4 11/16 inch square outlet box, 2 ¼ inch deep, equipped with a single gang mud ring. Each outlet should be served by a dedicated 1¼-inch conduit with no more than a total of 180 degrees of bend.

Telecommunications outlet boxes should never be daisy-chained or mounted back-to-back using a common feeder conduit.

Floor Outlets

If flush-mounted floor outlets are required, the designer should place a dual use (signal & power) preset outlet in the floor surface and feed the conduit (1¼" for signal only) through the floor slab to the nearest wall and immediately into a pullbox before continuing to a cable tray or telecommunications space. Flush-mount units must provide a space for telecommunications comparable to the standard NEMA outlet box.

Specified Product: Legrand Evolution EHWB8 Hinged Wall Box

If a large number of such outlets are required, use of cast-in-place floor boxes with feeder duct served by multiple two-inch conduits back to a telecommunications room or cable tray.

Specified Product: Walkerduct ProSeries Underfloor Duct System

Single Surface Mount Outlet

When a single surface mount outlet is required, it should use a steel raceway 7/8” x 1 29/32”. Outlet boxes should be 2¼” deep, and all surface mount pathways should have fiber rated fittings.

Specified Product: Wiremold 2400 Series (V2400BC/V2410FC/V2444)

Multiple Surface Mount Outlets

In some laboratories, work areas, and/or counter spaces, wall-mounted wire mold should be utilized to distribute power and signal to a variety of user locations. This raceway must be metal, must be grounded, and at a minimum be 4.75” wide by 3.56” high. The communications portion of the raceway should be fitted with
standard single gang knockouts for mounting the communications jacks. The
designer should provide for multiple access points into the raceway, and place a
minimum of two 1¼” feeder conduits into every eight feet of raceway section.

All surface mount pathways should have fiber rated fittings.

*Specified Product: Wiremold 6000 Series (Faceplate Part#: V4047C-1)*
Exterior Communication Pathways

**Underground Conduit**

Pitch all ducts a minimum of 4” per 100 ft. to drain away from the building towards manholes.

Use manufactured elbows only for stub ups at building entrances or equipment.

Use manufactured long sweep bends with a minimum radius of 6 feet both vertically and horizontally at all other locations.

All conduits need to be sealed at their endpoints and at any other open points underground.

**Entrance Conduit, Size and Number for Copper**

Underground entrance conduits size and quantity guidelines based on the number of telephone pairs to the building.

<table>
<thead>
<tr>
<th>Telephone Entrance Pairs</th>
<th>Required Size and Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-300</td>
<td>Two 4-in. conduit (1 is a spare)</td>
</tr>
<tr>
<td>301-600</td>
<td>Three 4-in. conduit (1 is a spare)</td>
</tr>
</tbody>
</table>

**Entrance Conduit, Size and Number for Fiber**

Underground entrance conduits size and quantity guidelines based on the number of telephone pairs to the building.

<table>
<thead>
<tr>
<th>Fiber Optic Cable Size</th>
<th>Required Size and Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>6SM/6MM</td>
<td>One 4-in. conduit w/ 4x 1”Innerduct</td>
</tr>
<tr>
<td>36SM/36MM</td>
<td>One 4-in. conduit w/ 4x 1”Innerduct</td>
</tr>
<tr>
<td>144SM/144MM</td>
<td>Two 4-in. conduit w/ 4x 1”Innerduct</td>
</tr>
</tbody>
</table>

**Entrance Conduit for Telecom Ground**

All underground entrance conduits must be accompanied by a common ground system.

This ground should be bare 2/0 copper conductor in a dedicated 1” conduit. Ground should attach to the TMGB in the ER, and connect to the reinforcing bar of the duct bank, and to the existing grounding infrastructure in the vault system.

**Pull Cords**

Install pull cords in all conduit. When pulling cable in conduit install a pull cord with the cable so additional cable can be installed later if needed.
Innerduct

For 4” conduits provide 4x 1” Corrugated HDPE innerduct in all conduits designated for fiber use. Each of the four 1” innerduct should be different colors.

Specified Product: Endot Endocor1050 Series

For conduits under 4” provide fabric innerduct specific to that size conduit, with a minimum of three cells.

Specified Product: Maxcell 3 Cell Fabric Innerduct Family

Manholes

Use only precast interlocking mating sections complete with cover. Include cast in openings for known requirements. Provide knockouts giving 25% spare capacity.

Manhole cover shall be labeled “SIGNAL” or “COMMUNICATIONS”

Specified Product: Jensen Precast Product #612-7

Pull Boxes

Pull boxes rather than manholes can be used only when the maximum number of conduits on that route is never expected to exceed 2x 4” conduits.

Pullbox cover shall be labeled “SIGNAL” or “COMMUNICATIONS”

Specified Product: Jensen Precast Product #35TA

Handholes

Hand holes may be used only when the maximum number of conduits on that route is never expected to exceed a single 2” conduit. Handholes should only be used to serve isolated endpoints, and should never be used for backbone cabling.

Handhole cover shall be labeled “TELEPHONE”, SIGNAL” or “COMMUNICATIONS”

Specified Product: Jensen Precast Product #P9 with a P9D Lid
Interbuilding Backbone Cabling

Application: Use in outside plant conduit for use between buildings

Fiber Backbone

Install one composite OSP, dielectric, loose tube, 36 Strand SingleMode/ 36 Strand 50µ Laser Optimized OM-4 MultiMode fiber from the nearest MDF Facility designated by CCSV to the BSE or ER/TR in the building.

Terminate the fiber inside SCS fiber termination bays using duplex LC connectors.

Mount fiber bay in top position in the 19” rack.

Specified Product: CommScope Systimax D-072-LN-CM-F12NS/8W036/5K036

Service Loop

A service loops are required for all fiber runs so that they can be relocated or spliced if necessary. A minimum of 50 feet of cable for a service loop is required at each end of a fibercable. Fiber cable slack can be coiled and mounted to backboard.

Copper Backbone

Copper tie cables are to be installed from the nearest MDF Facility (Meriam Library or Butte Hall) to the ER in the building.

Cables should be specifically gel filled, qualpeth sheathed with aluminum shield, 22 gauge, multipair cables in multiples of 100 pair.

Specified Product: Superior Essex Sealpic-FSF RDUP PE.89 Part#: 09-069-02-100

Building Entrance Terminals

Building entrance terminals shall be 489A type, 100 pair with input stub cable and 110 block style output.

Specified Product: Porta Systems 25100-ST-M110C

Building Entrance Protectors

Building entrance protectors shall be gas discharge type with heat coils and gold plated connectors, type 5-Pin Gas Tube Protector Module.

Specified Product: Porta Systems 195-6C1EM

Note: For Building Entrance Protectors specifically in Butte 401, contact Communications Services for a specified product to match existing.
Intrabuilding Backbone Cabling

**Fiber Riser**

Install one composite, riser rated, 24 Strand SingleMode/ 24 Strand 50µ Laser Optimized MultiMode hybrid fiber from the ER to all other telecommunications spaces in the building.

Terminate the fiber inside SCS fiber termination bays using duplex LC connectors.

Mount fiber bay in top position in the 19” rack.

*Specified Product: Commscope Systimax Part#: R-048-DS-CM-FMUAQ/8W024/5L024*

**Fiber Service Loop**

A service loops are required for all fiber runs so that they can be relocated or spliced if necessary. A minimum of 20 - 30 feet of cable for a service loop is required at each end of a fiber riser cable. Fiber cable slack can be coiled and mounted to backboard.

**Copper Riser:**

Copper riser cables are to be installed from the ER to all other telecommunications spaces in the building.

Cables should be specifically ARAM, aluminum shielded, 22 gauge, multipair cables in multiples of 100 pair.

*Specified Product: Superior Essex ARAM 02-069-03-100*
Horizontal Cabling

Each horizontal cable run will be continuous, between the telecommunications space and the station outlet, without any joints or splices. In areas where temporary or modular office systems are used, horizontal cabling can be installed using a MUTOA (multi-user telecommunications outlet assembly) or CP (consolidation point).

Cable Types

**Horizontal UTP Station Cable**

Cable should be White Category 6A Plenum Rated cable

*Specified Product: Commscope Systimax Model# 2091b-WH*

**Horizontal Multimode Station Fiber**

Cable should be plenum rated, OFNP/FT6, laser optimized, 50µ multimode, strippable jacket and either a central strength member or high tensile strength yarn for mechanical protection.

Jacket color should be aqua for all applications except drops dedicated for fire alarm or life safety systems while should use a red jacket.

*Specified Product: Commscope Systimax Model# P-002-DS-5K-FSUAQ*

**Horizontal Copper UTP OSP Station Cable**

Cable should be Category 6A U/UTP Cable, outdoor, flooded gel, black jacket, 4 pair count.

*Specified Product: Commscope Systimax Model# 1592A BK 4/24*

**Horizontal Fiber OSP Station Cable**

Cable should be 6 strand, laser optimized, 50µ multimode, Single Jacket All-Dielectric Outdoor Cable Arid-Core Construction Stranded Loose Tube

*Specified Product: Commscope Systimax Model# O-006-LN-5L-F06NS*
Copper Cable Length

The cabling between and including the work area telecom outlet/connector, the horizontal cross-connect distributor (in the TR) and the interconnect cable going to the voice/data/video equipment are not to exceed 280 feet in length. This includes not only the horizontal distance between the TR and the work area, but also the service loop, routing of the cable along the walls, inside the pathways, and vertical distances (up the wall inside conduit, etc).

Horizontal UTP Cables

Copper horizontal cables are not to exceed 280 feet in length from the wall termination in the telecommunications space to the wall outlet.

Multi-User Telecommunications Outlet Assembly (MUTOA)

If a MUTOA is used the combined length of the horizontal cable between the TR and the MUTOA and the patch cord between the MUTOA to the user workstation cannot exceed 280 feet.

Riser UTP Cables

Copper data riser cables are not to exceed 280 feet in length between the main cross-connect and the horizontal patch panel in the telecommunications room (TR). Riser distance should be minimized where possible so that a combination of horizontal and riser cable wouldn’t exceed the 280 foot limit.

Patch Cords (Mounting Cords)

From the wall outlet to the telecommunications device shall not exceed 25 feet.

Interconnect Patch Cord

From the wall termination to the electronic equipment shall not exceed 25 feet.

User Space Fiber Cable

A 12 inch service loop is required at the work area location.

A fiber loop should be a minimum of 10 feet placed in the telecommunications room, on the backboard, above the ladder in a loose coiled configuration.

Station Outlets & Faceplates (Copper)

Faceplates and outlets shall be ivory or white in color, coordinate with finished color of electrical outlets. Faceplates shall be flush mount with windowed insets for labels.
Install blank module inserts for all unused module locations.

*Specified Product: Commscope Systimax Part# M16L-246 or M16L-262*

**Telecommunications Space Cable Termination**

Telecommunications space should provide a framework for wall mounted patching with integrated cable management. Required features include support for 10 Gb/s and 1 Gb/s Ethernet applications, snap together components, integrated labeling, reversed connector patching, and expandability.

*Specified Product: Commscope Systimax VisiPatch® 360 System*

**Entrance protectors for Horizontal Copper UTP OSP Station Cable**

For each OSP cable that extends beyond the dripline of the building, a single cable entrance protector module is required at each end.

*Specified Product for data: ITW Linx Part# 10Gb CAT6A-75*

*Specified Product for voice: tii Network Technologies Part# Porta Systems 1506*
Specific End Device/Location Requirements

All spaces within a building (including support areas, electrical rooms, mechanical rooms, etc.) shall contain at minimum one outlet location with three cables. The following areas contain specific scenarios, rooms or systems that require additional connectivity.

Access Control Box (Keybox)

A single 1¼” conduit, homerun directly to a telecommunications space or cabletray is required to each Access Control Box. At minimum a single Category 6A cable shall be provided in this pathway.

Building Automation System Control Box

A single 1¼” conduit, homerun directly to a telecommunications space or cabletray is required to each Building Automation Control Box. At minimum a single Category 6A cable shall be provided in this pathway.

Building Generator

A single 1 ¼” conduit, homerun directly to a telecommunications space is required to a building’s backup generator. At minimum a single Category 6A cable shall be provided in this pathway.

Card Access Control Panel (Card Swipe)

A single 1¼” conduit, homerun directly to a telecommunications space or cabletray is required to each Card Access Control Panel. At minimum a single Category 6A cable shall be provided in this pathway.

Electrical Room

A minimum of a single 1 ¾” conduit, homerun directly to a telecommunications space or cabletray is required to each electrical room. At minimum three Category 6A cables shall be provided in this pathway.

Elevator Control Room

A minimum of a single 1 ¾” conduit, homerun directly to a telecommunications space is required to each elevator control room. At minimum three Category 6A cables shall be provided in this pathway.
Emergency Telephones

Emergency telephones require a minimum of one 1¼” conduit homerun directly to a telecommunications space. At minimum a single Category 6A cable shall be provided in this pathway. Emergency telephones should also be provided with a dedicated 120v circuit.

All emergency phone housings shall be blue in color with white lettering “EMERGENCY”.

Placement of all emergency phones is to be coordinated with University Police.

Wall Mount Emergency Telephone

*Specified Product: Talk-A-Phone Model ETP-WM w/ ETP-500E*

Standalone Tower Emergency Telephone

*Specified Product: Talk-A-Phone Model ETP-MT/R no option w/ ETP-500E*

Fire & Life Safety Systems

Fire Alarm Control Panel

A single 1¼” conduit, homerun directly to a telecommunications space is required to a building’s main Fire Alarm Control Panel. A fiber optic tie cable shall be provided in this pathway, specific details to be provided during the project.

Fire Pump Control Panel

A single 1¼” conduit, homerun directly to a telecommunications space is required to a building’s fire pump control panel. At minimum three Category 6A cables shall be provided in this pathway.

Gate Controller

A single 1¼” conduit, homerun directly to a telecommunications space or cabletray is required to a building’s exterior gate controller. Each gate location must have its own dedicated conduit. At minimum a single Category 6A cable shall be provided in this pathway.

HVAC Systems

HVAC Control Panel

A single 1¼” conduit, homerun directly to a telecommunications space or cabletray is required to a building’s HVAC Control Panel. At minimum three Category 6A cables shall be provided in this pathway.
HVAC Devices

A single ¾” conduit, homerun directly to a telecommunications space or cable tray is required to each networkable component in a building’s HVAC System. At minimum a single Category 6A cable shall be provided in this pathway.

Intrusion Alarm Control Panel

A single 1¼” conduit, homerun directly to a telecommunications space or cable tray is required to a building’s main Intrusion Alarm Control Panel. At minimum three Category 6A cables shall be provided in this pathway.

Irrigation Control Panel

A single 1¼” conduit, homerun directly to a telecommunications space or cable tray is required to a building’s Irrigation Control Panel. At minimum a single Category 6A cable shall be provided in this pathway.

Parking Ticket Dispenser

A single 1¼” conduit, homerun directly to a telecommunications space or cable tray is required to any parking ticket dispensers. At minimum a single Category 6A cable shall be provided in this pathway.

Safety Cameras

Indoor Safety Camera Locations

A single ¾” conduit, homerun directly to a telecommunications space or cable tray is required for each safety camera location. Each location shall have a 4 11/16 deep gang box terminating the conduit. At minimum a single Category 6A cable shall be provided in this pathway and terminated in the box. A patch cable will extend to the camera.

Outdoor Safety Camera Locations

A single ¾” conduit, homerun directly to a telecommunications space or cable tray is required for each safety camera location. Each location shall have a 4 11/16 deep gang box on the inside of the building terminating the conduit, and then a separate conduit connecting through the wall to the camera. At minimum a single Category 6A cable shall be provided in this pathway and terminated in the box. A patch cable will extend to the camera.
Learning Spaces

Classrooms or conference rooms have very specific technology needs. This section addresses the basic infrastructure requirements of these spaces. For detailed information concerning infrastructure, design and infrastructure for learning spaces, please read the “Academic Technologies Standards Document”

Learning Space Specific Infrastructure Elements

Media Control Box

Each learning space shall have a Media Control Box. The Media Control Box is to be connected to the A/V Pull Box with a single 2” conduit.

The Media Control Box is to be connected to the buildings telecommunications room or cable tray with an 1¼” conduit containing six Category 6A cables.

The Media Control Box is to be provided with a dedicated 120v 20a circuit.

Specific placement of the Media Control Box is to be determined in coordination with a representative from Creative Media Technology.

For specific information on part numbers or configurations, please refer to the “Academic Technologies Standards Document”.

A/V Pull Box

Each learning space shall have an A/V Pull Box located above the drop ceiling space for the purpose of consolidating A/V conduit runs.

Projector Ceiling Box

Each learning space is to have one Ceiling Mount Projector Box per ceiling mounted projector. This box is to connect back to the A/V Pull Box with an 1¼” conduit containing a minimum of two Category 6A cables. This box also serves as a mounting box for a projector.

This box is to connect to the buildings telecommunications room or cable tray with an 1¼” conduit containing a minimum of two Category 6A cables.

Each Ceiling Box is to be provided with a dedicated 120v 20a circuit.

Specific placement of the ceiling box is to be determined in coordination with a representative from Creative Media Technology.

For specific information on part numbers or configurations, please refer to the “Academic Technologies Standards Document”.
Display Box

Each learning space is to have one Display Box per flat panel wall mounted display. This box is to connect back to the A/V Pull Box with an 1¼” conduit containing a minimum of two Category 6A cables. This will fit flush with the finished wall and be covered by the display.

This box is to connect to the buildings telecommunications room or cable tray with an 1¼” conduit containing minimum of two Category 6A cables.

Each Display Box is to be provided with a dedicated 120v 20a circuit.

Specific placement of the Display Box is to be determined in coordination with a representative from Creative Media Technology.

For specific information on part numbers or configurations, please refer to the “Academic Technologies Standards Document”.

Speaker Back Box

Each learning space is to have one Speaker Back Box per speaker location. Speaker conduits will daisychain with the other speakers back to the Media Control Box via ¾” conduit.

For ceiling mounted speakers, conduits shall be rigid up to the pull box, and then connect to the speaker with a ¾” flex conduit with sufficient slack to drop the speaker one foot below the level of the ceiling.

For wall mounted speakers please refer to the “Academic Technologies Standards Document”.

Specific placement and number of speakers is to be determined in coordination with a representative from Creative Media Technology.

For specific information on part numbers or configurations, please refer to the “Academic Technologies Standards Document”.
Camera Outlet Box

Each learning space is to have a minimum of one Camera Outlet Box per camera. The box will be connected to the A/V Pull Box with a single ¾” conduit containing a single Category 6A cable.

The box is to be connected to the building’s telecommunications room or cable tray with a ¾” conduit containing a single Category 6A cable.

Specific placement of the Camera and Camera Outlet Box is to be determined in coordination with a representative from Creative Media Technology.

For specific information on part numbers or configurations, please refer to the “Academic Technologies Standards Document”
Appendix

Codes & Standards - Specific References

Design, manufacture, test, and install telecommunications cabling networks per manufacturer’s SCS requirements and in accordance with NFPA-70 (National Electrical Code®), state codes, local codes, requirements of authorities having jurisdiction, and particularly the following standards:

- ANSI/TIA/EIA-526 Standard Test Procedures For Fiber Optic Systems
- ANSI/TIA/EIA-568-C Standard for Installing Commercial Building Telecommunications Cabling
- ANSI/TIA/EIA-569-B Commercial Building Standards for Telecommunications Pathways and Spaces
- ANSI/TIA/EIA-570-B Residential and Light Commercial Telecommunications Wiring Standard
- ANSI/TIA/EIA-598-C Optical Fiber Cable Color Coding
- ANSI/TIA/EIA-604 Fiber Optic Connector Intermateability Standard
- ANSI/TIA/EIA-606-A The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
- ANSI/TIA/EIA-607-A Commercial Building Grounding and Bonding Requirements for Telecommunications
- ANSI/TIA/EIA-758-A Customer-owned Outside Plant Telecommunications Cabling Standard
- ANSI/TIA/EIA-854 Full Duplex Ethernet Specification for 1000Mbis/s (1000BASE-TX) Operating over Category 6A Balanced Twisted-Pair Cabling
- ANSI/TIA/EIA-862 Building Automation Cabling Standard for Commercial Buildings
- NFPA 70 National Electrical Code – 2010
- NFPA 72 National Fire Alarm & Signaling Code - 2010
- CEC 2010 California Electrical Code (Title 24, Part3) - 2010
- CSU TIP California State University’s Telecommunications Infrastructure Planning Standards (3rd Edition) – May 2007
Codes & Standards - Organizations

- ADA Americans with Disabilities Act
- ANSI American National Standards Institute
- ASCII American Standard Code for Information Interchange
- ASTM American Society for Testing Materials
- CEO California Electrical Code
- ISO International Standards Organization
- IEC International Electrotechnical Commission
- UL Underwriters Laboratories Cable Certification and Follow Up Program, UL Testing Bulletin
- NEMA National Electrical Manufacturers Association
- IEEE Institute of Electrical and Electronic Engineers
- CSU TIP California State University’s Telecommunications Infrastructure Planning Standards (3rd Edition) - May 2007
- NFPA National Fire Protection Association
- ASIS American Society for Industrial Security
- Federal, state, and local codes, rules, regulations, and ordinances governing the work, are as fully part of the specifications as if herein repeated or hereto attached.

If the contractor should note items in the drawings or the specifications, construction of which would be code violations, promptly call them to the attention of the owner’s representative in writing. Where the requirements of other sections of the specifications are more stringent than applicable codes, rules, regulations, and ordinances, the specifications shall apply.

Warranty

Guarantee in writing the structured cabling system (SCS) (materials, equipment, and workmanship) for a period of not less than fifteen (15) years from date of acceptance by the owner.

Complete documentation regarding the manufacturer’s warranty shall be submitted as part of the proposal. This shall include, but is not limited to: a sample of the warranty that would be provided to the customer when the installation is complete and documentation of the support procedure for warranty issues.

A systems application assurance manual documenting the vendor supported applications and application guidelines shall be provided as part of the submittals.
Field Quality Control

Employ job superintendent or project manager during the course of the installation to provide coordination of work of this specification and of other trades, and provide technical information when requested by other trades. This person shall maintain current RCDD® (Registered Communications Distribution Designer) registration and shall be responsible for quality control during installation, equipment set-up, and testing.
## Document Revision Control

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