# DIVISION 27
# COMMUNICATIONS

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# DIVISION 27 COMMUNICATIONS

## Part 1 - General

### 1.1 Purpose

These guidelines identify and define Sam Houston State University requirements and policies for designing and installing telecommunications infrastructure

Corning EWP

## 1.5 Specific Equipment

In an effort to reduce maintenance inventory and to provide consistency across the campus, IT@Sam has standardized on specific brands and warranties for telecommunications systems. All designs and specifications shall be based on the following approved manufacturers without substitution:

### 1.5.1 Telecommunications

- Chatsworth 19" Universal Rack 7' with 2 post Black Freestanding Aluminum Rack
  - 46353-703
- Chatsworth Combination Cable Section (CCS) with 10" vertical wire managers for 7'
  - CCS-30163-703
- Siemon 24 or 48 Port Patch Panel
  - 48 Ports: HD6-48
- Siemon Horizontal Switch Wire Management
  - 2U WM-145-5
- Telecommunications Cable
  - CommScope Ultra Media 6
    - CAT 6 Teal Plenum CommScope Ultramedia 7504
      - 466250014/10
- CAT 6 Yellow Plenum Arlington Industries The Loop Cable Hanger in 5" diameter
  - AI-TL50
- Siemon Assembly
  - Siemon Jumpers
    - 7ft Teal
      - MC6-07-07
    - 10ft Teal
      - MC6-10-07
  - Siemon Wall Phone Faceplate
    - MW-WP-K6-

MX-SM1
MX-SM2

FSR Series 600 Floor Box with the FL-GRD Series Floor Pan

Corning Ribbon OSP Fiber

048EC5-141-01D53
144EC5-141-01D53
216EC5-141-01D53

Corning Ribbon Plenum Fiber

024EC8-14101-20

Corning Housing with Pre-terminated Heads

PR4E4P24-A9-3RJ3L0
PR148P24-A9-3RJ1D0
PR124P24-A9-3RJ1D0

Circa 100 PAIR INDOOR BET 710/110

1880ECS1-100

Circa Semi-Conductor Unit

faceplate, i.e., “203.a2”, or “110.b1”. If there are multiple faceplates within the room, the alphabetical sequence shall begin at the door and will increment sequentially in a clockwise direction around the room.

Special circumstance connections, such as for wireless, camera, courtesy phone, or door access connections, should be placed together in a common area on the patch panel. These should be labeled with WAP-closet-room, or CAM-closet-room.1 (if multi in same room, .1 to left of door then clockwise), CPH-closet-room and DOOR-closet-room, on both ends, as CPH-A-215, WAP- C-400.1.

Cable TV wiring will also be labeled identically on each end with cable-wrap labels.

B. Refer to typical drawings in section 10 for examples.

# Part 2 – Telecommunications and Equipment Room Guidelines

## 2.1 Definitions

A. ***Main Distribution Facility (MDF)*, *or Equipment Room (ER):*** Any space where telecommunications equipment common to the occupants of a building resides.

B. ***Intermediate Distribution Facility (IDF)*, *or Telecommunications Room (TR):*** The space that acts as the common access point between backbone and horizontal distribution pathways. TR’s contain telecommunications equipment, control equipment, cable terminations and cross-connect wiring.

C. ***Optical Loss Test Set (OLTS):*** Used to measure optical power and power loss, and reflectance and reflected power loss on fiber medium.

D. ***Optical Time Domain Reflectometer (OTDR):*** Used to measure optical link loss if its markers are set at the terminus points for which the fiber loss is desired.

## 2.2 Room Planning and Spacing

| Serving Area (Sq. Ft.) | Room Size |
|---|---|
| 40,000 | 12’ X 14’ min. |
| 19,000 | 9’ X 7’ min. |
| 8,000 | 6’ X 7’ min. |

COS

*NOTE: SPECIAL PURPOSE ROOMS, SUCH AS LABORATORIES, COMPUTER ROOMS AND CERTAIN INSTRUCTIONAL SPACES, MAY HAVE A HIGHER THAN AVERAGE DENSITY OF COMMUNICATIONS OUTs6/TT64.6[illegible]Tj/TT[illegible]3080TD[illegible](CO)9374(8.62Tj061Tc(*N)Tj7.02007.02(I)/TT(8.62Tj)Tj89.8(A)13.2(L263.44

B. If there are fewer than 48 telecommunications ports to be terminated in a closet, a wall-mounted rack or cabinet may be acceptable with prior agreement by IT@Sam.
C. Telephone cable entering the building shall be terminated on entrance terminals and grounded in accordance with NEC and BICSI standards. Cross-connect panels and telephone tie cables shall be installed where necessary within and between distribution facilities, and shall be terminated into patch panels in the equipment racks. These panels shall be placed in a group separated from the Category 6 patch panels distributing horizontal cable. Final placement of panels in equipment racks shall be pre-approved by IT@Sam.
D. Telephone tie cable run between distribution facilities within the building shall be Superior Essex Plenum rated cable of a size determined by IT@Sam commensurate with the size of the cable providing service to the building.
E.

telecommunications cables and reduce the potential of EMI/RFI interference. Cable separation shall be maintained from possible sources of EMI/RFI. All EMT conduit, metal cable trays, equipment racks or cabinets shall be grounded per BICSI standards.

D. Telecommunications cable concealed within a wall shall be run from the outlet box within a minimum of ¾" metal conduit with nylon bushings and stubbed out into the ceiling space a minimum of 2" above drop ceilings. If the finished ceiling will not provide ready access, metal conduit musprovidea continuous pahway to the accessible cable pah allowing no more than two 90-degree sweeping turns.

E. Tc6.8(e)]TJ/TT11Tf3.95630TD0Tc0.0003Tj/TT31Tf.21860TD-0.0003Tc[(fro)-5.1(m)]TJ/TT11Tf2.0820TD0Tc0.0003Tj

Four data ports shall be installed in any floor boxes that are required, and dust covers shall be used on modules.

E. Where telecommunications cables cannot be concealed within the walls at a telecommunications port location, surface mounted wire mold shall be installed. The wire mold shall extend into and above the ceiling a minimum of 2", and continue down to a surface mounted box. The surface mounted full-sized, single gang box will house the faceplate and modular jacks as well as provide mechanical protection for the terminals. The wire mold and surface mounted box colors shall match, and shall complement the existing wall color. Wire mold may be of either metal or plastic which shall be mechanically affixed to the surface. Mounting brackets will be concealed or pre-approved by IT@Sam.

## 3.3 Inside Plant Wireless

A. Wireless access point locations shall be located above ceiling when practical and shall consist of 2 (Two) data lines terminated into a small surface mount box at the end of a 15' service loop. The loop shall be suspended above the ceiling and labeled for easy identification as well as being labeled on face plate and cable.
B. A building shall have at least 2 wireless access point lines for every 1800 sf of floor space with staggered locations so that they don't overlap on the adjacent floor.
C. Wireless access point line locations above the ceiling shall be marked with a removable sticker that is visible from the floor.

## 3.4 Inside Plant Telephone

A. All telephone station lines shall be data station lines and shall follow the appropriate standards.
B. There shall be at least one courtesy phone location per floor in a structure.
C. The location shall be 40" AFF and be terminated with a wall phone keystone jack to a single gang telephone face plate, as specified.
D. The location should be generally in the area of the elevator but final placement shall be decided after consulting with SHSU.

## 3.5 Inside Plant Public Safety and Cellular Communications

### 3.5.1 Bidirectional Amplification for Public Safety Two-Way Radio and Cellular/Smart Phone

A. Provide RF amplified communications within the public areas including stairwells and mechanical areas of a building to ensuo016Tc0.0030003Tc(Wireless)Tj/TT11oTf3.0250TD0Tc0.0033Tj/TT61Tf.2

C. All ducts in pertinent maintenance holes or those connecting to exterior locations, whether in use or empty, shall be sealed with duct plugs at each end.
D. All ducts shall be able to hold 100 psi for 45 minutes.
E. All ducts shall have locatable tracer-tape installed and properly secured in them.
F. All buildings shall have divergent pathways enter the building from separate maintenance holes.
G. All ducts shall be inspected by IT@Sam prior to being back filled.
H. Provide galvanized rigid metal conduit at the entrance to each building starting at 6' minimum outside the foundation wall to termination in the Equipment Room. Bond the conduits to the TMGB with a #6 AWG copper ground wire and bonding bushings.
I. All existing communications ducts that are within a construction site must be proofed using a rod prior to substantial completion.

## 4.2

E. All ducts entering hand hole shall extend 6” into the hand hole and be plugged with an expanding duct plug.
F. Any penetrations made to hand hole shall be sealed appropriately.
G. All hand holes shall have a two piece lid.

## 4.3 Splicing

A. All splices of copper cable up to 300 pair shall be set up as a butt splice and housed in an appropriately-sized stainless case. All stainless cases shall be pressure encapsulated. The splice a

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E. Farthest seats to projected image follow ANSI standards.

## 6.2 Certification Requirements and Documentation

A. The lead AV designer shall be a full time staff member employed with the contracting vendor and shall hold a CTS-D AVIXA Certification as well as a Crestron DM Engineer Certification.
B. The lead installer shall hold a CTS-I AVIXA Certification or other industry standard certification deemed acceptable by IT@Sam.
C. Submittals shall be provided with cut sheets and design drawings during the design phase and approved by IT@Sam.
D. Progress reports shall be provided to IT@Sam at least once per month and once per week once principle installation of AV equipment has begun.
E. As built drawings shall be provided in PDF and DWG or DXF digital format upon completion of the project. Digital copies of all manuals shall be part of the final submissions.
F. All AV Cable Testing documentation shall be provided to IT@Sam for review before the final inspection of the system.
G. All AV equipment and cables shall be labeled on both ends according to industry standard labeling conventions including cabling inside the lectern.
H. Contractor shall deliver the un-compiled code for any systems configured as part of the AV design after final testing has been completed.
I. Contractor shall schedule one training sessions with the owner for each system type installed in the building.
J. Upon completion of project, AV contractor shall provide to IT@Sam a commissioning plan for approval. The AVIXA "Audiovisual Systems Performance Verification Checklist" shall serve as a format and content guide for this list. Upon approval contractor will schedule the commissioning with IT@Sam personnel who will participate in the process.

## 6.3 Warranty and Maintenance

A. All AV systems shall be covered by a next business day on-site parts and labor warranty against defects in parts, workmanship, equipment failure and cabling infrastructure. This warranty shall be for a term of one year.
B. Maintenance on the AV System should be covered by the contractor at no additional charge to Sam Houston State Unc9007e for a æ as a Ad ß charge

E. Projection screens for ceilings 10’ or lower, shall be a Dalite model, ceiling recessed

E. All Crestron Control System interconnect cabling shall comply with the Crestron specifications for cabling and fiber infrastructure.

## 6.9 Floor Boxes, Conduit and Networking, Basic Technology Enhanced Classroom

A. IT@Sam specified floor box shall be used in all classroom, the position of the box, which defines the teaching position, shall be coordinated so that when the teaching lectern is placed over the box, it does not obstruct the function of the projection screen(s) and is not an obstruction to the projected image from the projector(s) and does not allow for any cables to become a tripping hazard.

B. The floor box shall have one 20-amp, 120-volt duplex outlet mounted in the box.

C. A floor

# Part 7 – Basic ITV Technology Enhanced Classroom Design Standards

## 7.0 Basic ITV Technology Enhanced Classroom, ITV additions

***The standards*** for Minimum Technology Enhanced Classroom Design ***will apply to ITV classrooms with the following additions.***

A. ITV Video Conferencing is a simulation of face-to-face delivery of education using video conferencing technology. The environment is highly customized with technology and environmental features which maximize this simulation.
B. Each student seat will be supplied with power for laptop connectivity to receive digital instruction materials and virtualized content.
C. Ceiling height must be no less than 10', and no greater than 11' for acoustical and video requirements.
D. Array microphones will be used to capture both the instructor and the student audio interaction.
E. Video Conferencing System shall be capable of sending and receiving shared content.
F. Shall be capable of hosting multi-point calls using the software option.
G. Shall be capable of 1080p camera and video + content resolution. If required, the appropriate software key shall be installed.

## 7.1 Projection Screens, ITV Technology Enhanced Classroom, ITV additions

A. Contractor will specify screen size and will install ceiling recessed screens.
B. Optimal distance between the first row of seating and the projector screen follows the current ANSI standard. Optimal distance to farthest seat follows the current ANSI standard for height.
C. Provide space for whiteboard on side(s) of screen.
D. The bottom of the screen should be a minimum of 4' above the audience floor, allowing those seated toward the rear of the audience to see the screen.
E. Projection screens for ceilings 10' or lower, shall be a Dalite model, ceiling recessed manual. The screen shall be a HD, with a 16:9 aspect ratio.
F. Projection screens for ceilings higher than 10', shall be ceiling recessed electric and have a low voltage interface for contact closure control using Crestron control systems. The screen shall be HD, with a 16:9 aspect ratio. The cable used to connect the low voltage controller to the low voltage switch located in the ceiling shall conform to manufacturer's published guidelinesRecessed screen control area must be accessible from below ceiling. A quick disconnect switch should be mounted above ceiling to allow for services of the electric screen as needed. Coordinate with the MEP and IT@Sam early in the project to avoid possible problems with teaching position placement.
G. For ITV simulation: all student seats to be within 70-degree side-side cone established from center of screen. No greater than 30-degree vertical angle defined from the eyes of the closest

E. All projector locations shall have two data lines located above ceiling in close proximity to the projector when practical and shall consist of a data line terminated into a small surface mount box at the end of a 15' service loop. The loop shall be suspended above the ceiling and labeled for easy identification as well as being labeled on face plate and cable.

F. well

interfacing AV equipment for/to the SHSU network, only one MAC address is allowed on a single network port.

D. Contractor shall be responsible for configuring networking for all projector and control system devices in consultation with SHSU IT@Sam. IT@Sam will plug in all devices to the SHSU local area network. Contractor shall program new rooms to work with existing Crestron Fusion RoomView server including XPanel functionality of individual devices. Contractor shall provide demonstration of all new RoomView functionality and provide training.

E. All Crestron Control System interconnect cabling shall comply with the Crestron specifications for cabling and fiber infrastructure.

## 7.6 Floor Boxes, ITV Additions

A. IT@Sam specified floor box shall be used in all classroom, the position of the box, which defines the teaching position, shall be coordinated so that when the teaching lectern is placed over the box, it does not obstruct the function of the projection screen(s) and is not an obstruction to the projected image from the projector(s) and does not allow for any cables to become a tripping hazard.

B. The floor box shall have one 20-amp, 120-volt duplex outlet mounted in the box.

C. A floor box should have as a minimum two 1-1/2" conduits that terminate at the pull box for the classroom with one conduit going to the hallway cable tray, two conduits going to the projector position. Dust plugs will be utilized in vacant ports in floor box.

D. Four data outlets shall be installed into the floor box directly underneath the lectern.

E. Two Yellow Category 6 data cables shall be pulled from lectern to each camera location. Consult IT@Sam for final camera placement.

## 7.7 Lighting, Conduit and Networking, ITV Additions

A. Do not place any ceiling light fixtures within 7' of any projection screens,

# Part 8 – Minimum Technology Classroom Design Standards for Auditoriums or Large Lecture Halls

## 8.0 Integrated Audio-Video Systems and Equipment for Auditoriums

***The standards*** for Minimum Technology Enhanced Classroom Design ***will apply to lecture hall classrooms with the following additions.***

## 8.1 Projection Screens, Auditorium or Large Lecture Halls Addition

A. There may be a requirement for two projection screens or a larger single screen in large classrooms. Contractor will determine and coordinate such needs with IT@Sam staff.

B. The distance from the screen to the

G. Owner along with IT@Sam should determine if audio will be needed, speakers should be installed should determine if audio will be needed/
H. Owner along with IT@Sam staff should determine if video will be needed, see ITV Additions for specifications.

# Part 10 – Typical Drawings

## 10.0 Typical DrawingsTypical small distribution facility