UNIVERSITY OF CENTRAL FLORIDA

AUDIOVISUAL DESIGN STANDARDS

The purpose of this document is to ensure that all AV upgrades and new construction meet the standards of the Office of Instructional Resources and the university. Basic requirements for AV equipment used in academic and administrative spaces will be covered but not all space types and scenarios will be covered.

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1.0 Revision Notes

Revision History

2.01 4/27/2023

- Revision completed for the update of this document

2.00 3/23/2023

- Initial draft of the updated design standards

1.04 3/02/2021

- First edition of the design standards complete

2.0 Definitions

- Active Learning - Student centered, interactive, integrated, flexible learning spaces.
- ADA - The Americans with Disabilities Act which prohibits discrimination against people with disabilities in several areas, including employment, transportation, public accommodations, communications, and access to state and local government' programs and services.
- ANSI - The American National Standards Institute (ANSI), a private, not-for-profit organization dedicated to supporting the U.S. voluntary standards and conformity assessment system and strengthening its impact, both domestically and internationally.
- Audiovisual Integrator - Any person or company commissioned by UCF (University of Central Florida) to perform work on audiovisual systems who is not UCF staff.
- AV Systems - Audiovisual Systems include all equipment necessary to fulfil the intent of communicating audio and/or video content to an audience.
- AV/IT - Audiovisual Information Technology.
- AVIXA - A trade association representing the professional audiovisual and information communication industries worldwide.
- Dante - Digital Audio Network Through Ethernet is a combination of software, hardware, and network protocols that deliver uncompressed, multi-channel, low-latency digital audio over a standard Ethernet network using Layer 3 IP packets
- DSP - Digital Sound Processor, a microprocessor that is dedicated to receiving the signal from the source and then routing it to an amplifier.
- HDBaseT - Promoted by the HDBaseT Alliance, consumer electronic (CE) and commercial connectivity standard for transmission of uncompressed high-definition video (HD), audio, power, home networking, Ethernet, USB, and some control signals, over a common category cable (Cat5e or above) using the same 8P8C modular connectors used by Ethernet
- HDCP - High-bandwidth Digital Content Protection is a form of digital copy protection developed by Intel Corporation to prevent copying of digital audio and video content as it travels across connections
- HDMI - High-Definition Multimedia Interface, a proprietary audio/video interface for transmitting uncompressed video data and compressed or uncompressed digital audio data from an HDMI-compliant source device, such as a display controller, to a compatible computer monitor, video projector, digital television, or digital audio device.
- POE - Power over Ethernet, a technology that lets network cables carry electrical power.
- Rack (Cabinet, enclosure) - A frame or enclosure with mounting rails to house AV equipment.
- RU - Rack unit which, as defined in IEC 60297-3-100: 1 rack unit = 44.45 mm (1.75 inch) height.

3.0 Types of Academic Spaces

- General Purpose Classrooms w/ movable furniture – flat-floored space with movable furniture for flexible use. Standard technologies include PC, display(s) (projector and/ or TVs), projector screen if needed, control, audio, screen sharing, video conferencing, HDMI connections, power and networking.

- General Purpose Classrooms w/ fixed furniture – flat-floored space with fixed table and chairs. Standard technologies include PC, display(s) (projector and/ or TVs), projector screen if needed, control, audio, screen sharing, video conferencing, HDMI connections, power and networking.

- Computer Labs – flat-floored lab space with computers installed on fixed tables. Standard technologies include PC, display(s) (projector and/ or TVs), projector screen if needed, control, audio, screen sharing, video conferencing, HDMI connections, power and networking.

- Lecture Halls – tiered or sloped space. Standard technologies include PC, display(s) (projector and/ or TVs), projector screen if needed, control, audio, screen sharing, video conferencing, HDMI connections, power and networking.

- Active Learning Spaces – flexible group seating space that can, but is not required to have, high-end technology. Standard technologies include PC, display(s) (projector and/ or TVs), projector screen if needed, control, audio, screen sharing, video conferencing, HDMI connections, power and networking at each group location.

- Conference Room – a meeting space equipped with video conferencing functionality.

- Executive Boardroom – executive meeting space for large group presentations and video conference meetings. Standard technologies would include multiple displays, HDMI and USB-C for external sources, local PC, camera, table microphones and two to four speakers. Additional hardware may be determined on a case-by-case basis due to the room configuration.

- Huddle/ Study Room – small space seating one to five people. Minimal technology includes display (43”-55”), HDMI input for external source.

4.0 Display Devices

Projection Screen

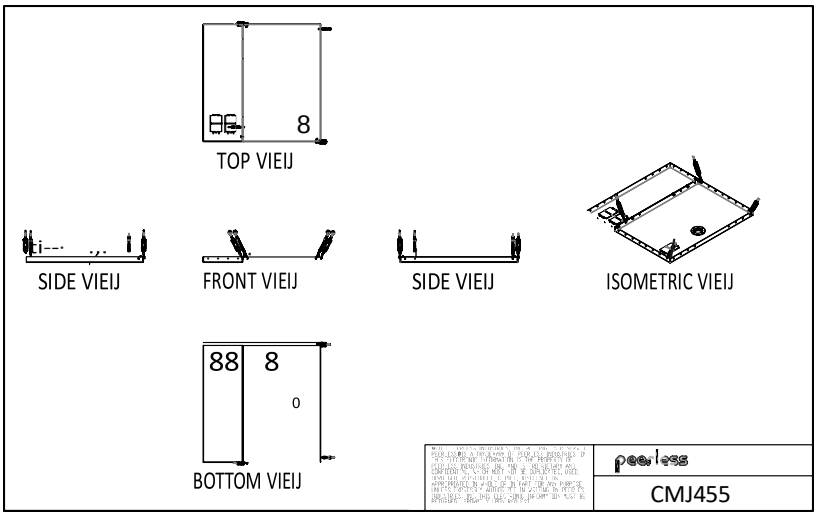
- Motorized electric screens mounting location will be determined during the walk-thru for best viewing angles. The screen will be mounted recessed in the ceiling (unless determined otherwise) and positioned 1ft away from the wall or whiteboard. A minimum of 8" of full clearance above the drop ceiling grid is required. To accommodate the high-definition format, the screen must be a 16:10 aspect ratio.

Projectors

- WXGA Laser Projectors with a minimum output of 7,000 lumens in most locations. All projectors will have a minimum of RS-232 control, along with a minimum of (1) HDMI Input. HDBaseT is preferred for connection. Crestron Connect may be required in some situations.

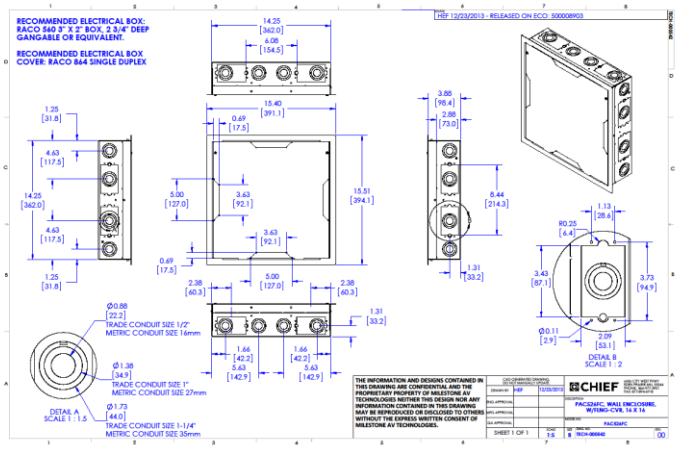
Projector Mounts

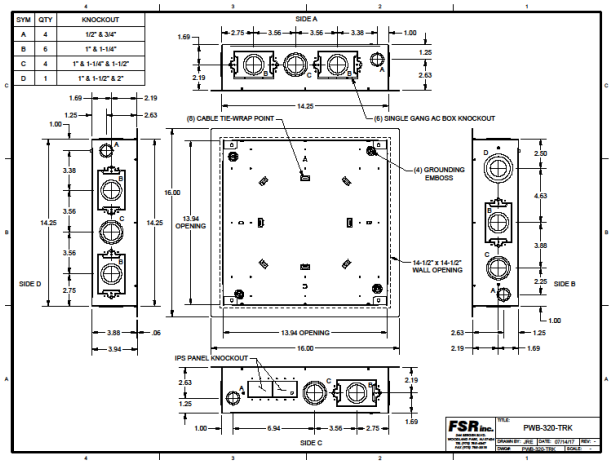
- Mounting in a 2x2 or 2x4 ceiling grid will utilize a Peerless CMJ455 plate. Manufacturer support cables must be utilized during the installation. The corner edge of the projector pan must be a minimum of 3' from the closest sprinkler head. At the projector ceiling pan location, the following infrastructure is required:
  - Dual power outlet
  - Two network ports

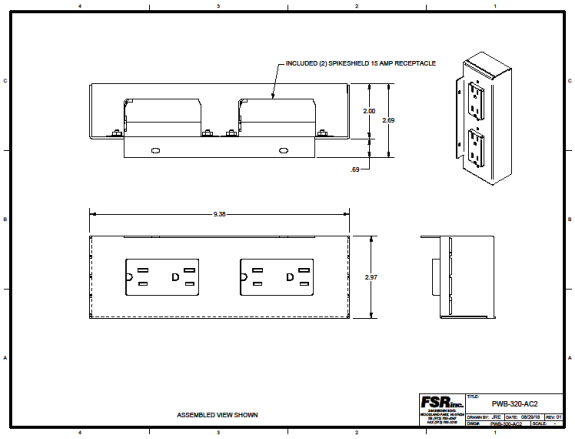


Flat Panel Displays

- 4K commercial grade display a minimum size of 55". The location and size of the display will be determined during the design phase based on the space of the location. Displays must have a minimum of RS232 and CEC or the capability to go with possible ethernet control. Flat panel will use the Chief PAC526FCW wall box or the FSR PWB-320 Kit. Minimum Data/Electrical requirements include (2) data ports, (2) duplex outlets within the wall box and 1.5" conduit stubbed above the ceiling. In addition, a 1.5" conduit running down from the backbox for additional AV cables to 16" AFF.







Flat Panel Mounts

- All mounts will be professional grade wall, ceiling, or mobile mounts. Backing for wall mounts will require a minimum ¾" CDX grade plywood in steel stud construction. When hanging or suspending any equipment, 5 times the weight of the object being installed is required.

Interactive Displays

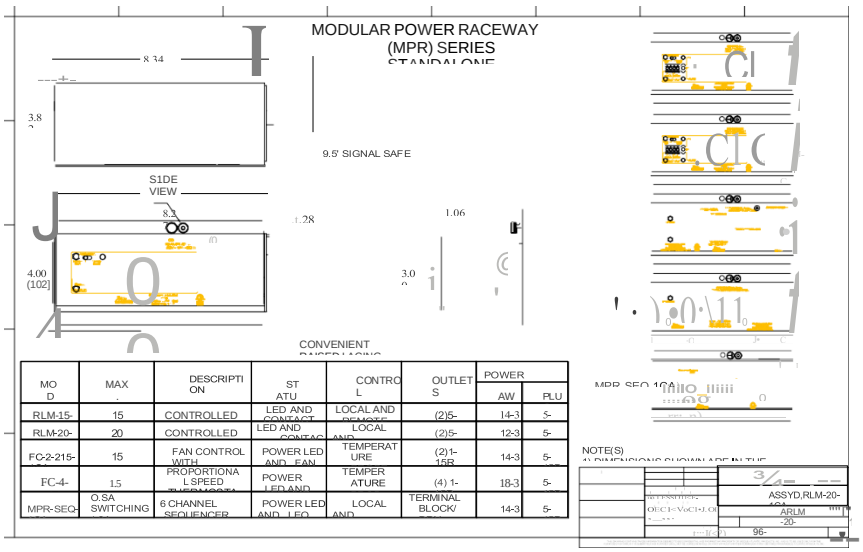
- 4K lightweight commercial grade displays. A minimum size of 65" based on the location.

5.0 Audio and Video

Audio

- Most academic spaces will require voice reinforcement, along with the ability to play audio from PC, laptop, and other sources.
- 2x2 ceiling speakers will be used in most spaces unless determined otherwise.
- The number of microphones and speakers, size of DPS and amplifiers may vary based on the space.
- Any classrooms and event spaces with amplified audio requires a connection to the building fire alarm system. A fire alarm wire connects to the AV system through Middle Atlantic RLM-15-1CA

Module.



MO D	MAX	DESCRIPTI ON	ST ATU	CONTRO L	OUTLET S	POWER AW	POWER PLU
RLM-15-	15	CONTROLLED	LED AND CONTACT	LOCAL AND	(2)5-	14-3	5-
RLM-20-	20	CONTROLLED	LED AND	LOCAL	(2)5-	12-3	5-
FC-2-215-	15	FAN CONTROL WITH	POWER LED AND FAN	TEMPERAT URE	(2)1-15R	14-3	5-
FC-4-	15	PROPORTIONA L SPEED	POWER LED AND	TEMPER ATURE	(4) 1-	18-3	5-
MPR-SEQ-	O.SA	SWITCHING 6 CHANNEL SEQUENCER	POWER LED	LOCAL	TERMINAL BLOCK/	14-3	5-

Video

- Video sources will include HDMI along with USB-C converters.

6.0 System Control

- The University of Central Florida is a Crestron AV control-based campus. If Crestron products are unavailable or not able to meet the specifications of a project, the Office of Instructional Resources will determine an acceptable replacement. Any outside integrator must have written permission prior to installation to move forward with a nonstandard control system.

7.0 Lighting

- If an AV system is designed and installed in a room, lighting control should be integrated into the system. The room lighting controllers are owner provided and contractor installed. Lighting controllers should be installed approximately 1' from the left outside edge of the projector screen motor above the ceiling. For electric screens, a local disconnect (kill) switch needs to be installed by the contractor at the last connection before the controller.
- A minimum of three lighting zones should be included in any lighting design.
    - Presets
        - Front
        - Middle
        - Back
- Occ Sensors should provide feedback to either the lighting controller or the AV processor.
- The functions of the occ sensor should consist of
    - Occupant Enters: Turn lights on to at least 50% of lighting power
    - Occupant Exits: Turn lights off within 30 minutes

8.0 Equipment Racks

- Racks installed in some form of cabinetry should have rear access, in the form of a lockable door. The rack design should allow for 75% fill to accommodate for future growth.
- Proper cable management with the rack includes cable handling, serviceability, and signal separation.
- All racks require adequate air flow. The proper system that provides the best cooling system with the minimum noise will be needed.
- At the rack location, a quad AC outlet is needed along with a minimum of 6 data ports and a 1.5" conduit stubbed up to the ceiling for AV cables.
- In the case that a wall box is used at the rack location, a Chief PAC526FCW wall box or the FSR PWB-320 Kit is to be provided.

9.0 Network Infrastructure

- AV system designs shall adhere to UCF Network Infrastructure Standards.

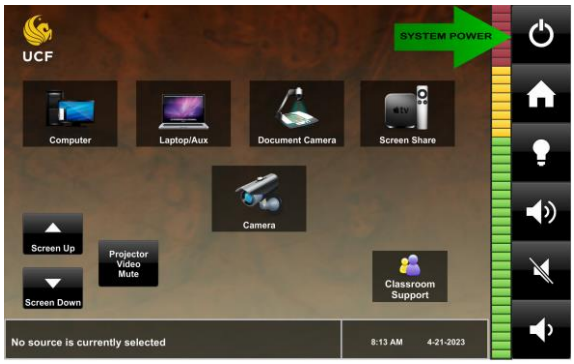
10.0 Cabling

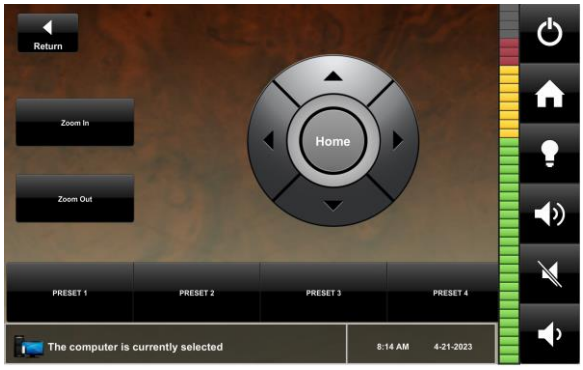
- Attention must be given to installations and the use of plenum-rated cables. Contractors are responsible for verifying the installation requirements. Any in-ceiling cabling must be suspended above ceiling tiles using J-hooks or cable trays. Where J-hooks are used, ¾" plenum-rated Velcro should be used to manage cables.
- Pull strings must be run from the AV rack to the ceiling space.
- The cables listed below are acceptable for classroom audio visual installations. Any substitutions must be approved before the installation begins.

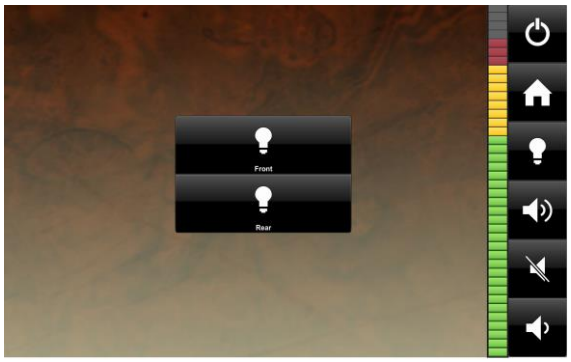
Type	Manufacturer	Model# - Description
DM 8G	Crestron	DM-CBL-8G-P – Plenum-rated Digital Media 8G cable
Data	Belden	Refer to UCF Network Infrastructure Standards
Speaker	Belden	6200UC – Sound, 2 conductor 16 AWG Plenum-rated cable
Audio	Belden	9451P – Line Level Audio cable
4 Conductor	Belden	6502UE – 4 conductor 22 AWG Plenum-rated cable
Cresnet	Crestron	Cresnet-P-TL - Plenum-rated control cable.
Video	Belden	1694A – SDI Coax 75ohm, 18AMG cable

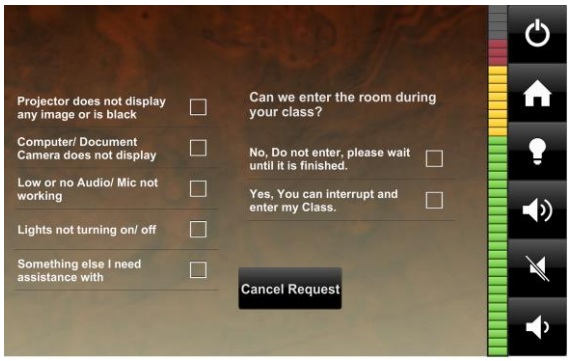
11.0 Touch Panel Interface

- A written description, along with touch panel page examples will be used to design the layouts and functional requirements for UCF control systems.
- The touch panel is used to power on/off the system and to select which source will display on either a projector and/or flat screen. The touch panel can also be used to adjust source audio levels and microphone volume, along with controlling the screen and lights and blanking the projector image.
- A sample VisionTool Pro-e fill will be provided by the contractor to OIR for touch panel layout and design review.









12.0 Programming

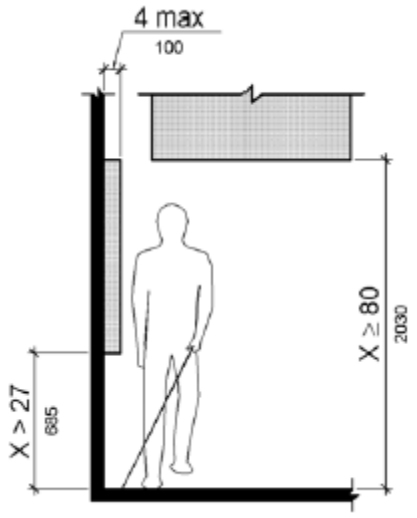
For outside contractors, all completed programming must be provided to the Office of Instructional Resources, UCF in an un-compressed, unencrypted, and not password protected format.

13.0 ADA Compliance

When designing AV facilities, accessibility standards must be in compliance with the ADA Standards for Accessible Design.

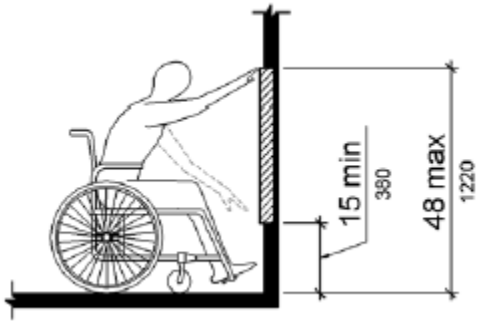
Protruding Objects

- Objects with leading edges more than 27 inches (685 mm) and not more than 80 inches (2030 mm) above the finish floor or ground shall protrude 4 inches (100 mm) maximum horizontally into the circulation path.

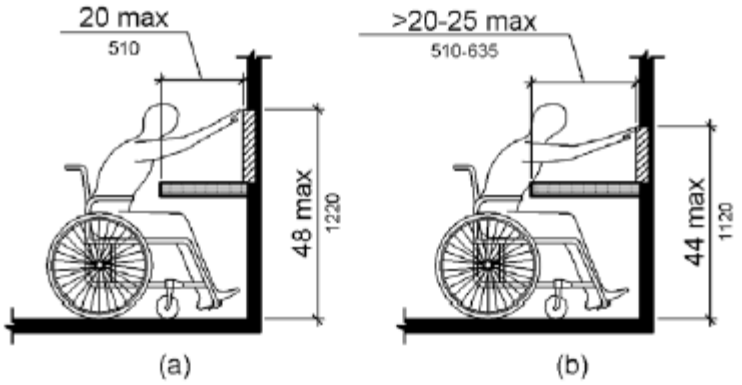


Reach Range

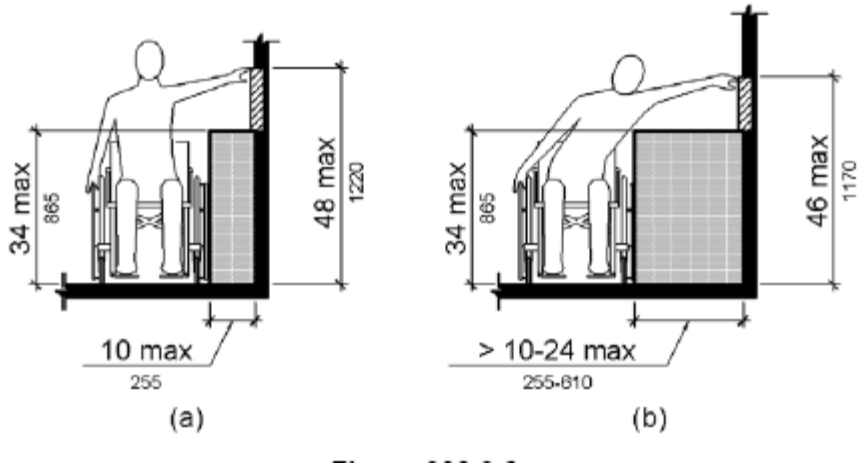
- Where a forward reach is unobstructed, the high forward reach shall be 48 inches (1220 mm) maximum and the low forward reach shall be 15 inches (380 mm) minimum above the finish floor or ground.



- Where a high forward reach is over an obstruction, the clear floor space shall extend beneath the element for a distance not less than the required reach depth over the obstruction. The high forward reach shall be 48 inches (1220 mm) maximum where the reach depth is 20 inches (510 mm) maximum. Where the reach depth exceeds 20 inches (510 mm), the high forward reach shall be 44 inches (1120 mm) maximum and the reach depth shall be 25 inches (635 mm) maximum.



- Where a clear floor or ground space allows a parallel approach to an element and the high side reach is over an obstruction, the height of the obstruction shall be 34 inches (865 mm) maximum and the depth of the obstruction shall be 24 inches (610 mm) maximum. The high side reach shall be 48 inches (1220 mm) maximum for a reach depth of 10 inches (255 mm) maximum. Where the reach depth exceeds 10 inches (255 mm), the high side reach shall be 46 inches (1170 mm) maximum for a reach depth of 24 inches (610 mm) maximum.



Assistive Listening Systems

- Assistive listening systems are a requirement in facilities where audio is amplified under the Americans with Disabilities Act. Compliance provisions and the details of what must be provided to meet accessibility requirements vary; therefore, local legislation regarding access must be considered when designing audio systems for classrooms, conference rooms and lecture halls.

- Signage identifying the availability of Assistive Listening Devices is required to meet ADA Compliance.

14.0 Recommended Hardware List

Equipment Type	Make and Latest Model
Laser Projector	Panasonic (PT-MZ780WU7 7000Lumen)
Electric Recess Screens	Draper (139041QL – 10ft Recess Screen)
Commercial Displays	Sony (Bravia BZ40H or BZ35J Series)
Interactive Displays	ClearTouch (6000K+ - 65”, 75” and 86”)
Projector Mounts	Chief (RPMAUW)
Display Mounts	Chief (LSTU – Large ThinStall Fixed Mount, LSM1U – Large Fusion Micro Adjustable Mount, LTM1U – Large Fusion Tilt Mount)
AV Control System	Crestron
DSP	BiAmp (TesiraFORTE DAN CI, TesiraFORTE DAN AI)
Amplifiers	Crestron (X-300), JBL (CSA 280Z)
Microphones	CatchBox (PLU-2CL-2DC-C), Shure (Microflex)
Speakers	JBL (LCT81C/T – Ceiling)
Cameras	PTZOptics (PT30X-SDI)
Hearing Assistance	Listen Technologies (LT-84-01IR Transmitter)
Consoles	Spectrum
Rack Cabinets	Middle Atlantic
Power Conditioners/ Distribution	Middle Atlantic, TrippLite (PDU1215 – Power Distribution)