**SECTION 27 41 16**

**Note to Editor: This is a master specification and needs to be edited to become project specific. FURTHER PROJECT SPECIFIC COORDINATION IS REQUIRED WITH FACILITIES DESIGN STANDARDS VOLUME 4, WHICH CAN BE ACCESSED AT THE FOLLOWING LINK:**

*https://www.lbschoolbonds.net/facilities-design-standards/facilities-design-standards-volume-4*

**Please remove all highlights, comments and text boxes. make all text black once editing is complete.**

**rEVISE TITLE and specification AS NECESSARY TO INCLUDE THE ROOMS THAT are in this project’s scope of work. REMOVE UNUSED ROOM TYPES AS NEEDED.**

**AUDIOVISUAL SYSTEMS**

1. **GENERAL**
	1. **SUMMARY**
		1. Section Includes:
			1. Audiovisual system requirements for various Room Based Designs including: typical classrooms with Soft and Hard lids, small classrooms, or conference rooms, small, medium, and large auditoriums, and other (Library/MPR/Gym).
			2. Requirements for an Integrator to provide equipment for and install a complete instructional classroom that can be arranged in multiple configurations. There shall be a multimedia display as primary projection, and all audio and image sources should be capable of being shown on the screen and heard in the room.
			3. All projectors will be OFCI (Owner Furnished Contractor Installed), unless otherwise specified.
		2. Related Sections
			1. Division 01
			2. 11 52 13: Projection Screens
			3. 26 05 00: Common Work Results for Electrical
			4. 27 10 00: Structured Cabling
			5. 27 30 00: Voice Communications
			6. 27 41 33: Master Antenna & TV Systems
			7. 27 50 00: Digital Intercom Clock & Bell
	2. **REFERENCES**
		1. National Electrical Manufacturer's Association (NEMA)
		2. American National Standards Institute (ANSI)
		3. National Electric Code (NEC)
		4. Relevant State Electric and Fire Codes
		5. Institute of Electrical and Electronic Engineers (IEEE)
		6. Underwriters Laboratories, Inc. (UL)
		7. ANSI/TIA 568-C.0 Generic Telecommunications Cabling for Customer Premises
		8. ANSI/TIA 568-C.1, Commercial Building Telecommunications Cabling Standard
		9. ANSI/TIA 568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standard
		10. ANSI/TIA 568-C.2-1, Transmission Performance Specifications for 4-pair 100 Ω Category 6 Cabling, provided the accuracy requirements for Level III Field Testers; Category 6
		11. ANSI/TIA 568-C.3, Optical Fiber Cabling Components, Standard
		12. ANSI/TIA 569A, Commercial Building Standard for Telecommunications Pathways and Spaces
		13. ANSI/TIA 598, Color Coding of Optical Fiber Cables
		14. ANSI/TIA 606, The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
		15. ANSI/TIA 607, Commercial Building Grounding and Bonding Requirements for Telecommunications
		16. TIA TSB 67 Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling System
		17. BICSI – Building Industry Consulting Service International publications:
			1. Telecommunications Distribution Methods Manual
			2. LAN and Internetworking Design Manual
			3. Telecommunications Cabling Installation Manual
			4. Customer Owned Outside Plant Design Manual
		18. All cabling shall comply with all appropriate requirements of NEC Articles 770 and 800, and shall comply with the latest State Fire Codes as interpreted by the State Fire Marshall’s Dept.
		19. All publications referred to in this document shall be the latest publicized edition
	3. **DEFINITIONS**
		1. Audiovisual system – The combination of technologies that create a system that displays video and plays audio from various input sources.
		2. ALS – Assistive Listening System – a complimentary sound system for hearing impaired that may integrate with the audiovisual system.
		3. Contractor – The entity responsible for performing or overseeing the installation and configuration of the system.
		4. District – Long Beach Unified School District
		5. District Approved Equivalent –. A product that the Contractor submitted as equal to or greater than the product specified, which subsequently received District Board approval for use on the intended project. Refer to Division 01 for additional information
		6. District Standard – a design or brand that has been selected by the District Board as the acceptable product.
		7. District Technology Representative – An individual from the District’s Facilities Technology Group. They should possess an official @lbschools.net email address.
		8. District Representative – An authorized individual representing the District, for example a project manager or construction manager.
		9. Hard Lid – A fixed ceiling where the ceiling material is affixed directly to the underside of roof framing.
		10. Integrator – The entity performing the physical installation and configuration of the system, who may be a sub-contractor of the Contractor.
		11. Large Auditorium – Auditorium that seats 700 or more.
		12. Owner – The District’s Technology Information Services Branch (TISB), who will oversee the system after turnover.
		13. Small Auditorium – Auditorium that seats less than 700.
		14. Soft Lid – A ceiling using a hanging grid system where there is space between the ceiling and the panels
		15. Switcher – The central unit of the Extron System that connects all associated devices.
		16. Classroom: A teaching room that has fixed instructional media video projection capabilities, internet connectivity at the teacher's desk, student networking, a document camera (not in contract “NIC”), DVD/Blu-ray (NIC), and other multimedia input devices, standard laptop interface, multimedia control system that are connected to the network and have capabilities for additional add-on modular features.
		17. For any general definitions that do not appear here, such as RFI, refer to Division 01. Should any contradictions occur between the definitions in this section and those in Division 01, the definitions above will take priority only in regard to Specification Section 27 41 16.
	4. **SUBMITTALS**
		1. Certificates
			1. Contractor shall hold and maintain, through the completion, commissioning, closeout, and warranty period of the project, manufacturer’s certification for the Audiovisual system.
			2. The Contractor must be certified with the manufacturer for the Audiovisual system for at least twelve (12) months prior to bid.
			3. The Contractor shall submit proof of certification to the District during bid time.
		2. Qualification Statements
			1. Submit Contractor’s experience and qualifications, include three (3) years of projects of similar complexity. Include names and locations of two (2) projects successfully completed using instructional classroom technology.
			2. Submit documentation during bid time indicating Contractor has been in the telecommunications contracting business for a minimum of five (5) years under the same name and is located within two hundred (200) miles of the District.
		3. Equipment Schedule
			1. Submit a complete bill of materials, including all quantities of components, devices, equipment, and wiring required to complete this scope of work prior to ordering any materials or commencing any construction activities.
		4. Product Data and Shop Drawings
			1. Shop Drawing: Integrator to submit shop drawings with device locations and cable routes prior to install.
			2. Submit product data, including manufacturer’s data sheets, for all proposed system components.
			3. Submit Manufacturer’s installation instructions.
			4. Provide a list of complete part numbers and confirm with District during submittal phase.
			5. Contractor and Integrator shall verify all equipment models, components, and quantities are correct prior to submission.
			6. If additional equipment is required to meet performance specifications of the system, the Contractor shall provide the equipment with written District approval prior to installation.
		5. Refer to Section 01 33 00 for additional submittal requirements
	5. **CLOSEOUT SUBMITTALS**
		1. Documentation to be submitted by Contractor upon completion of system is:
			1. Prepare and submit “as-built” drawings of the system. As-Builts shall be of each floor plan indicating exact device locations, panels, cable routes and wire numbers as tagged.
			2. O&M: Submit complete operations and maintenance manuals.
			3. Contractor shall submit, as part of the closeout documentation, the manufacturer’s toll-free hotline and support center to assist the District in servicing the specified product.
			4. Unless otherwise indicated, provide a complete list of MLC devices, IP addresses, MAC addresses, serial numbers, and room locations in excel. .
			5. Provide a list of commissioning steps undertaken per system installed. This document may be in the form of a checklist. Commission per manufacturer requirements. At minimum, this must include checking the image, sound, microphones, paging sensor, and button toggles on the system.
			6. Documentation of the completed system shall be submitted in Adobe PDF format; PDF submitted shall be bookmarked, and text to be searchable.
			7. Contractor shall gather and provide all non-waste items to the District. See section 1.6 Delivery, Storage, and Handling
			8. End user turnover bundles: Each classroom in scope shall have one (1) bundle of equipment turned over for use with the new system. The contractor will coordinate and assemble this end user bundle per room and provide to District Representative in charge of verifying receipt of materials. Do not turn bundles over to teachers or school staff. District Representative must sign for AV end user equipment bundle. Bundle shall include:
				1. One (1) right angle connector Male HDMI to Male HDMI for each AV system installed (Contractor Furnished)
				2. Two (2) 15’ cables for each AV system installed (Owner Furnished)
				3. Classroom Microphones (Contractor Furnished)
				4. Mini display to HDMI adaptor (Owner Furnished)
				5. USB C to HDMI adaptor (Owner Furnished)
				6. Quick start guide (Contractor Furnished)
	6. **DELIVERY, STORAGE, AND HANDLING**
		1. Store materials such that they are protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
		2. Repair or replace lost or damaged components prior to project completion.
		3. ALL excess material that comes with the system shall be turned over to the District Representative at the conclusion of work. This includes but is not limited to unused button stencils, tweakers (Extron screwdrivers), faceplates and unused input labels.
	7. **WARRANTY**
		1. The Contractor shall submit manufacturer’s warranty that any equipment installed under this specification shall be free from defect for a period of five (5) years from the date of final acceptance.
		2. The Contractor shall warrant the workmanship and installation of the system for one (1) year. Contractor will come out onsite to correct these issues at no cost during the warranty period.
		3. Refer to Section 01 78 36 Warranties for additional requirements
2. **PRODUCTS**
	1. **ACCEPTABLE MANUFACTURERS – SYSTEMS**
		1. Audiovisual Equipment
			1. RGB Systems, Inc. dba Extron Electronics, <http://www.extron.com/>
			2. No substitutions are permitted – District Standard
		2. Projector (OFCI)
			1. Epson – Model required varies based on room type, see room based designs for requirements.
		3. Screens – Reference 11 52 13 – Projection Screens for additional details.
		4. Microphones
			1. RGB Systems, Inc. dba Extron Electronics
			2. Shure Incorporated
		5. Speakers and Amplifiers
			1. RGB Systems, Inc. dba Extron Electronics
			2. Or District Approved Equivalent

**NOTE TO EDITOR: REVISE RELATED SPECIFICATION SECTION AS APPROPRIATE FOR SPECIFIC PROJECT REQUIREMENTS. EVAULATE NEED FOR ADJUSTABLE COLUMN EXTENSIONS AND INFORPORATE INTO DESIGN AS REQUIRED. IN SCENARIOS WHERE AN EXISTING AUDIO SYSTEM IS PRESENT, THE SCOPE SHALL BE CLARIFIED WITH DISTRICT REPRESENTATIVE TO DETERMINE IF INTERFACING THE EXISTING AUDIO WITH THE NEW AUDIOVISUAL SYSTEM IS COMPATIBLE. EXISTING SYSTEM SHALL BE COMPATIBLE AND SUPERIOR IN QUALITY. DESIGN TEAM RESPONSIBLE FOR VERIFYING IF VIBRATION IS A CONCREN AT PROJECTOR HARD LID APPLICATIONS.**

* 1. **ROOM-BASED DESIGN FOR TYPICAL CLASSROOM, PORTABLE CLASSROOM OR CONFERENCE ROOM WITH SOFT LID CEILING**
		1. Projector
			1. PROJECTOR MODEL (OFCI)
				1. Epson Short-Throw PowerLite L200SW Model: V11H993020.
				2. Turn off projector IR receiver in settings prior to close-out.
				3. Turn off Eco-mode prior to close-out.
				4. Set lighting to Dynamic to adjust brightness automatically.
				5. Adjust focus of projector using manufacturer recommended methods.
				6. Do not connect projector to district network.
			2. PROJECTOR MOUNTING
				1. Ceiling mounted bracket – Unistrut or galvanized pipe flange.
				2. Chief CMA 347 Projector Vibration Isolator, mounted above the soft lid ceiling, except portable classrooms.
				3. An escutcheon ring is required on all pole vault projector poles. Escutcheon ring is to be installed on the ceiling tile such that 1” clearance around the pole in every direction is achieved.
				4. Escutcheon ring shall be Mockett ZG1/TM4, or equal.
				5. Contractor is responsible for ensuring the mount is safely mounted to the deck per manufactures recommendations.
				6. An adjustable extension column shall be provided as required due to ceiling deck height. Excessive keystone, due to an improperly sized column, shall not be permitted. The contractor shall build a Unistrut structure to accommodate ceiling conditions, if the distance is too great for a column or other obstructions exist.
				7. Chief <https://www.legrandav.com/en/search#q=adjustable%20extension%20column&sort=relevancy>
				8. Extron <https://media.extron.com/public/download/files/userman/68-1232-01PMPSeriesrevC040109.pdf>
				9. The mount shall be capable of supporting up to 50 pounds (23 kgs) of audiovisual equipment.
				10. Projector distance from marker board/projection surface must be confirmed prior to installation by District representative. Mount must be placed with consideration given to the short throw projector capabilities and requirements.
				11. Contractor/Integrator to engage District Technology Representative should any conflict be identified between lighting or HVAC/Mechanical elements and the projector mount location. Contractor/Integrator to perform survey and plan checks to identify potential conflicts prior to construction start.
				12. Integrator will factor in projector requirements and projection surface when determining if mounting of screen or projector needs to be adjusted.
				13. Contractor shall install projector duplex electrical outlet on grid, below ceiling within 1 foot of projector mast/pole. This outlet should be behind the projector, not in front of the projector.
		2. AV System
			1. Master Quote Number
				1. Refer to Extron master quote included in the Appendix for a full part number list.
			2. Extron Enclosure
				1. In soft lid scenarios use Plenum Vault PVM 220.
				2. Locate Plenum Vault in such a way that it will not obstruct the projector when maintenance is required.
				3. The plenum mount multi-product mounting kit shall house the key electronic components of the AV system including the switcher, audio amplifier and power supply. The kit shall mount components above a suspended ceiling, isolating them from the plenum space, and protecting them from tampering and theft.
				4. All cables connecting from the enclosure to the projector must be concealed within the wall, if possible. Otherwise, cables are to be concealed in surface mounted wire mold.
				5. Install according to Manufacturer recommendations. Contractor shall be responsible for coordinating and/or providing electrical connection to plenum vault and projector.
			3. Extron Switcher
				1. System source selection and switching shall be provided by a PVS audiovisual Switcher Model Number PVS 407D.
				2. The switcher shall have two (2) inputs that each support connection to a dual input switching wall plate via one (1) female RJ-45 connector.
				3. The audio for switched video sources shall be carried on the same RJ-45 connectors.
				4. The switcher shall have a switched auxiliary audio input to support audio from video sources that are directly connected to the projector or sources that only offer audio content.
				5. The switcher shall have one HDMI video output.
				6. Connection from the switcher to the display device shall be provided with one HDMI to HDMI video cable.
				7. An onboard audio amplifier shall provide gain / volume adjustment from -10db to +10db, adjustable in 1 dB steps. The speaker amplifier shall have two (2) channels, one (1) stereo (default) or dual (2) mono channels via one (1) 5.0 mm 4 pole captive screw connector. The output of the amplifier shall be 25 watts (rms) per channel at 4/8 ohms.
				8. In addition to the stereo / mono speaker output, an additional audio output that will produce line level output shall also be available. This line level audio output must be capable of being set at either “fixed” or “variable” and with “balanced” or “unbalanced” settings.
				9. The switcher shall be connected to the data network.
			4. Media Link Controller (MLC)
				1. Classroom media sources shall be controlled with a MediaLink Controller – MLC Plus 200, Part Number 60-1470-02.
				2. Locate MLC above projection wall input such that both may utilize the same pathway.
				3. Height for MLC will be between 42” and 48” per ADA requirements.
				4. The Media Link Controller shall contain ten fully configurable tri-color, multi-status LED buttons for dedicated input selection. Reference Appendix for Button Layout.
				5. Buttons shall illuminate red, green, or amber, depending on function, for ease of use in low-light environments.
				6. Buttons shall feature removable button caps allowing them to be custom labeled for easy identification.
				7. Device shall include black and white three gang face plates. Use white faceplates for install.
				8. MLC shall be programmed to operate with all connected peripheral devices for the Extron system.
				9. MLC shall be programmed to default back to last source used when powered on.
				10. At Science Labs, provide Media Link Controller at teacher’s workstation mounted in a demonstration island. Provide and Install Extron MLC Plus 200 three gang box recessed flush mount, within accessible reach, in vertical surface under counter.
				11. The RJ45 connection on the MLC shall connect to the PVS 407D switcher, NOT District network.
				12. RS232 shall be used to send control signals to projector. Do not use RJ45 or Ethernet-based signals to control projector.
			5. Extron Inputs (Media Source Interfacing)
				1. Two (2) PVT HDMI Input wall plates (60-1270-13) shall be used to connect HDMI devices to the system and transmit the video and audio data to the PVS AV switcher. In scenarios where the drawings only call for one Input Wall plate, such as conference rooms, the PVT HDMI (60-1270-13) shall still be used.
				2. One (1) WPD 3.5 MM Female audio out faceplate (70-1173-01). This faceplate shall be used for Assistive Listening and connected to handle audio out. Install this faceplate in a 1 gang box near the primary, front input; near to the MLC. The wire may share the same raceway as the input. Label this faceplate as “Assistive Listening”.
				3. The media source equipment shall be connected to the Audiovisual system via two Active (powered) dual input, switching wall plates. These wall plates shall enable the system to display video, graphic data and audio from Laptop computers, Blu-Ray, document cameras, camcorders, streaming devices, tuners, etc.
				4. These active interface transmitters shall be placed in convenient locations throughout the classroom to facilitate easy connection of sources, per the drawings. One shall be installed near the projection surface, and the other will be on the opposite side of the classroom in the opposite corner. In scenarios where only one input is required by the drawings, input shall be near the projection surface.
				5. The AV Inputs shall be located within 6’ feet of a power outlet and data port.
				6. The AV inputs shall be mounted at 18 inches AFF, in line with electrical outlets, unless drawings indicate otherwise.
				7. Wall plate shall fit in a standard, 2-gang electrical box and feature Decora® type faceplates.
				8. One (1) stereo audio input on 3.5mm mini stereo jack shall be available for each video input.
				9. The output of the interface shall be via one (1) female RJ-45 connector.
				10. Connection to the PVS AV Switcher shall be via one (1) UL plenum rated shielded twisted pair cable, 50’ in length.
			6. Speakers
				1. In suspended ceiling applications, install Extron Model FF 120 (40-120-03) speakers with two-foot cross bars. Speaker quantity is two (2)/ (one pair), unless otherwise indicated on drawings.
				2. Secure to substructure above utilizing aircraft cable as required.
				3. The speaker input connector uses one (1) 5mm captive screw for one (1) input.
				4. Connection from the PVS switcher to the FF 120 speaker shall be provided by Plenum rated 18 Gauge Speaker Cable Extron SPK-18.
				5. The coverage angle of the speaker offers a dispersion area of 170 degrees, providing a very wide room coverage pattern. Speakers will be positioned apart from each other to provide maximum coverage of seating areas.
			7. Microphone Systems
				1. For each Classroom provide and install one (1) VoiceLift Wireless RF microphone system – VLM 3002H option 42-255-03
				2. System shall include one (1) pendant and one (1) handheld VoiceLift Wireless RF microphone. Microphones shall amplify the sound level of the speaker in the classroom to approximately 15 dB above ambient room noise. Speech will be mixed with the program audio and distributed out of the system speakers for even room coverage.
				3. The VoiceLift Wireless RF Receiver shall be mounted within the system vault, and shall be connected to the VoiceLift Receiver input on the PVS AV Switcher.
				4. RF receiver installation must not exceed 12 feet above finished floor or areas larger than 40 feet by 40 feet, per manufacturer’s recommendation.
				5. Provide VoiceLift Wireless RF Microphone Charging Station VLC 302 device for holding and charging station of up to two of the Extron VoiceLift wireless RF microphones.
				6. Configure microphone system frequencies such that rooms do not interfere or cross talk with one another.
				7. The pendant and handheld VoiceLift Wireless RF microphone shall be labeled with the classroom or location it will be assigned to.
				8. The VoiceLift microphones shall not be muted by the AV Mute button on the MLC.
			8. Data Connectivity
				1. Contractor will coordinate with Active Data Integrator and/or District Technology Representative to connect all Extron Switchers to the District network.
				2. The PVS Switcher incorporates a three-port network switch, allowing a single network drop to provide connectivity for the switcher, the MediaLink controller and one additional device.
				3. Contractor shall never plug in more than three devices containing MAC addresses to a switcher.
				4. The audio video system shall include an IP Link enabled MediaLink controller, connected to the network switch in the PVS Switcher, allowing remote monitoring, scheduling, and control of the system over a network.
				5. The Audiovisual system requires two (2) unique IP addresses; one IP address for the Media Source Control (MLC), and one IP address for the Media Source Interfacing (switcher). Static IP addresses must be requested from District to ensure duplicate IP addresses are not handed out. Requests may be sent to District Technology Representative.
				6. Contractor is responsible for determining and furnishing pathway, patch panel and termination of cable. Contractor shall receive prior authorization from District if existing pathways or patch panels are to be used.
				7. The District utilizes Global Viewer Enterprise for management. Contractor shall add each Audiovisual system once they are reachable on the network. Refer to section 3.2 for Global Viewer Enterprise installation requirements and procedures for all Extron systems.
			9. Power Requirements and Energy Efficiency
				1. The system shall incorporate an Auto Power Save Mode with fast power-up that automatically deactivates the audio amplifier after 30 minutes of inactivity. The system shall return to full power status in less than one second upon signal detection.
				2. The system shall incorporate a Standby Mode that allows the amplifier and twisted pair transmitters to be deactivated when not in use.
				3. The system shall incorporate monitoring and scheduling of system peripherals, such as sources and displays, in order to deactivate them when not in use or alert to unauthorized use.
				4. Switcher will be configured by Contractor to automatically send a shutdown signal to projector at 11pm each night.
				5. Projector shall be configured to have “Eco mode” turned off.
			10. Priority Pager System
				1. The priority page sensor allows the PVS407D Switcher to mute program audio during announcements from the public address system. Part number PPS35 or PPS25.
				2. This sensor will be placed and configured in such a way to allow it to detect announcements from the intercom/PA system. When announcements are detected the Audiovisual system will lower the volume to allow the announcement to be heard.
	2. **ROOM-BASED DESIGN FOR TYPICAL CLASSROOM OR CONFERENCE ROOM WITH HARD LID CEILING**
		1. Projector
			1. PROJECTOR MODEL
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			2. PROJECTOR MOUNTING
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
				2. In Hard Lid applications, the Chief CMA 347 vibration isolating coupler shall not be installed.
		2. AV System
			1. Master Quote Number
				1. Refer to Extron master quote for full part number list. This quote is included in Appendix.
			2. Extron Enclosure
				1. In Hard Lid scenarios use Wall Mount Kit WMK 160
				2. Contractor is responsible for field verifying the length of HDMI cable required to reach from projector to WMK/Switcher prior to ordering material.
				3. The wall mount kit shall be mounted to fire-rated painted plywood with ¾ inch thickness. Plywood backboard shall be secured to studs, steel or wood. For wood studs, use 3/8ths lag bolts. For steel stud framing, use the appropriate size metal stud screws. Toggle Bolts are acceptable where two studs cannot be used. Contractor is responsible for ensuring the mount is safely mounted to the wall.
				4. Locate Wall Mount Kit on the projection wall, unless indicated otherwise on the drawings.
				5. The Wall Mount Kit multi-product mounting kit shall house the key electronic components of the AV system including the switcher, audio amplifier and power supply.
				6. All cables connecting from the enclosure to the projector must be concealed within wall, if possible. Otherwise, conceal in surface mounted wire mold.
				7. Provide electrical to WMK 160 as required for system operation.
				8. Install according to Manufacturer recommendations.
			3. Extron Switcher
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			4. Media Link Controller (MLC)
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			5. Extron Inputs (Media Source Interfacing)
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			6. Speakers
				1. In Hard Lid ceiling applications, install white Extron SM3 (42-133-03) for surface mount. Speaker quantity is two (2) (one pair), unless indicated otherwise on the drawings.
				2. The speakers shall include an exclusive mounting system that allows the speaker to slide onto the mount, lock into place, and automatically mate with the pre-wired contacts.
				3. The power capacity shall be 15 watts of continuous pink noise or 30 watts of continuous program media.
				4. The speaker input connector uses (1) 5mm captive screw for 1 input.
				5. Connection from the PVS switcher to the SM3 speaker shall be provided by Plenum rated 18 Gauge Speaker Cable Extron SPK-18.
				6. Speakers shall be positioned apart from each other to provide maximum coverage of seating areas.
			7. Microphone Systems
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			8. Data Connectivity
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			9. Power Requirements and Energy Efficiency
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			10. Priority Pager System
				1. The priority page sensor shall allow the PVS407D Pole Vault Switcher to mute program audio during announcements from the public address system. Part number PPS35 or PPS25.
				2. This sensor shall be placed and configured in such a way to allow it to detect announcements from the intercom/PA system. When announcements are detected, the Audiovisual system shall lower the volume to allow the announcement to be heard.

**NOTE TO EDITOR: LIBRARIES AND MPRs CAN VARY GREATLY AND HAVE CHALLENGING CEILINGS AND WINDOWS. ARCHITECT/ENGINEER MUST REVIEW EACH SPACE AND CONFIRM SPECIFICATION WILL WORK. IF THE RECOMMENDED SPECIFICATION WILL NOT WORK, ARCHITECT SHOULD NOTIFY DISTRICT AND LOOK TO THE OTHER ROOM BASED DESIGNS FOR ALTERNATE OPTIONS.**

* 1. **ROOM-BASED DESIGN FOR LIBRARY, CAFETERIA, OR SMALL MPR**
		1. Projector
			1. PROJECTOR MODEL
				1. Epson PowerLite 119W Projector
				2. Turn off projector IR receiver in settings prior to close-out.
				3. Turn off Eco-mode prior to close-out.
				4. Focus Projector image.
			2. PROJECTOR MOUNTING
				1. For Soft Lid use Galvanized flange attached to the deck along with a 1.5” adjustable extension column attached to the Chief CMA 347 projector vibration isolator. Use Extron extension column (White) to the universal projector bracket – UPB 125.
				2. The projector drop ceiling mount must be capable of mounting to the structural ceiling (concrete or wood joists), above the suspended Soft Lid ceiling. The mount shall include an integrated pole that provides vertical adjustment to accommodate various projector height requirements. Both ends of the pole shall be finished with 1.5” NPT (National Pipe Thread Taper) for mating with the Ceiling Mounting Plate, Projector Vibration Isolator and Universal Projector Bracket.
				3. For Hard Lid ceilings - The FCMP Series Ceiling mount, or approved equal, shall be utilized for mounting a projector in locations with open ceiling space. The FCMP series is available in black, can support a projector setup weighing up to 500 lbs. (226.8 kg), and is suitable for installation on wooden joists and metal beams. It has an integral 1.5” NPT adapter, allowing the attachment of a suitable projector pole.
				4. Contractor shall install a pole to fit between the FCMP and Vibration Isolator, such that excessive keystone correction of the projector is not required.
				5. Use Universal Projector Bracket - UPB 125 to connect projector to pole. Switcher can be housed in a Wall Mount Kit -WMK 160 for Hard Lid scenarios. Cables to be concealed. Cable length shall be custom ordered such that it can reach from the WMK to the projector and inputs, with 2-3 feet of service loop. Contractor responsible for field verification of all cable lengths prior to ordering material.
				6. The wall mount kit must be mounted to fire-rated painted plywood with ¾ inch thickness. Plywood backboard shall be secured to studs, steel or wood. For wood studs, use 3/8ths lag bolts. For steel stud framing, use the appropriate size metal stud screws. Toggle Bolts are acceptable where two studs cannot be used. Contractor is responsible for ensuring the mount is safely mounted to the wall.
				7. Contractor to verify that the ceiling plate to be used is suitable for the angle of the ceiling where the projector is to be installed. Refer to local building standards and codes to verify that the installation meets all the relevant regulatory standards.
				8. The mount shall be capable of supporting up to 50 pounds (23 kgs) of audiovisual equipment.
				9. The mount shall also include (1) single gang and (1) double gang knockout openings for junction boxes or for use as cable pass-through.
				10. The bracket shall be able to support projectors up to 25 pounds.
				11. The projector bracket shall have independent adjustments of horizontal tilt or roll (± 4 degrees of horizontal tilt), vertical angle or pitch (± 25 degrees of vertical angle), and rotation or yaw (360 degrees of rotation).
				12. The projector bracket shall also use a 1.5” NPT threaded pipe adapter for mounting a projector pole.
				13. The projector bracket shall maintain positioning adjustments even if the projector is removed for service.
				14. Projector distance from marker board/projection surface must be confirmed prior to installation by District Representative. Projector mount is to be mounted with consideration given to the projector capabilities and requirements.
				15. Contractor responsible for verification of vibration caused by nearby HVAC units/vents or other machinery. Contractor to install vibration isolators as needed and adjust per manufacturer recommendations/instructions.
		2. AV System
			1. Master Quote Number
				1. Refer to the Extron quote included in the Appendix for a full part number list.
			2. Extron Enclosure
				1. In Soft Lid scenarios, use Plenum Vault PVM 220.
				2. In Hard Lid scenarios, use Wall Mount Kit WMK 160.
				3. The wall mount kit shall be mounted to fire-rated painted plywood with ¾ inch thickness. Plywood backboard shall be secured to studs, steel or wood. For wood studs, use 3/8ths lag bolts. For steel stud framing, use the appropriate size metal stud screws. Toggle Bolts are acceptable where two studs cannot be used. Contractor is responsible for ensuring the mount is safely mounted to the wall.
				4. Wall Mount Kit shall be placed on a nearby wall as described above in 4.3.2.2
				5. The Wall and Pole Mount Kits shall house the key electronic components of the AV system, including the switcher, audio amplifier and power supply. The kit shall mount components below a suspended ceiling or on a wall, isolating them from the classroom space, and protecting them from tampering and theft.
				6. All cables connecting from the enclosure to the projector shall be concealed within wall or projector mounting pole, otherwise conceal in surface mounted wire mold.
				7. Install according to Manufacturer recommendations.
			3. Extron Switcher
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			4. Media Link Controller (MLC)
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			5. Extron Inputs (Media Source Interfacing)
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			6. Speakers
				1. In suspended ceiling applications, install Extron Model FF 120 speakers (40-120-03) with two-foot cross bars. Speaker quantity is to be four (4), two pairs, unless otherwise indicated on drawings.
				2. Secure to substructure above utilizing aircraft cable as required.
				3. The speaker input connector uses (1) 5mm captive screw for 1 input.
				4. Connection from the PVS switcher to the FF 120 speaker shall be provided by Plenum rated 18 Gauge Speaker Cable Extron SPK-18.
				5. The speaker shall offer a dispersion area of 170 degrees, providing a very wide room coverage pattern. Speakers shall be positioned apart from each other to provide maximum coverage of seating areas.
				6. In Hard Lid ceiling applications, install Extron SM3 (42-133-03) for surface mount. Speaker quantity is four (4), two pairs, unless otherwise indicated on drawings.
				7. The speakers shall include an exclusive mounting system that allows the speaker to slide onto the mount, lock into place, and automatically mate with the pre-wired contacts.
				8. The power capacity shall be 15 watts of continuous pink noise or 30 watts of continuous program media.
				9. The speaker input connector uses (1) 5mm captive screw for 1 input.
				10. Connection from the PVS switcher to the FF 120 speaker shall be provided by Plenum rated 18 Gauge Speaker Cable Extron SPK-18.
				11. Speakers shall be positioned apart from each other to provide maximum coverage of seating areas.
			7. Microphone Systems
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			8. Data Connectivity
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			9. Power Requirements and Energy Efficiency
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			10. Priority Pager System
				1. The priority page sensor shall allow the PVS407D Pole Vault Switcher to mute program audio during announcements from the public address system. Part number PPS35 or PPS25.
				2. This sensor shall be placed and configured in such a way to allow it to detect announcements from the intercom/PA system. When announcements are detected the Audiovisual system shall lower the volume to allow the announcement to be heard.

**NOTE TO EDITOR: ALL PROJECTORS AND PROJECTOR LENS WILL BE OFCI (OWNER FURNISH CONTRACTOR INSTALLED).**

* 1. **ROOM-BASED DESIGN FOR ELEMENTARY AND MIDDLE SCHOOL SMALL AUDITORIUMS**
		1. Projector
			1. PROJECTOR MODEL
				1. EB-PU1007W WUXGA 3LCD Laser Projector with 4K Enhancement – 7000 Lumens. Model: V11H940920
				2. This model of projector does not come with a lens. The lens shall be custom selected to work with the space. Architect/Engineer to submit appropriate lens recommendation customized to accommodate screen size and distance to screen.
				3. Turn off projector IR receiver in settings prior to close-out.
				4. Turn off Eco-mode prior to close-out.
				5. Focus Projector image.
				6. Do not connect projector to District network.
			2. PROJECTOR MOUNTING
				1. Contractor shall provide a shelf/enclosure/bracket (mount), or equal, at the rear wall of the auditorium for the projector to mount on.
				2. If enclosed, shelf/enclosure/bracket (mount) shall be adequately ventilated such that the projector will not overheat.
				3. Projector shall be secured to or within shelf/enclosure/bracket (mount) such that it cannot be easily removed or fall during an earthquake.
				4. The shelf/enclosure/bracket (mount) shall be located above door frame such that it does not obstruct any path of travel and all buttons on projector are out of arms reach.
				5. The exact height of the shelf/enclosure/bracket (mount) shall be determined by the projector requirements. Shelf/enclosure/bracket (mount) shall be placed such that the least amount of keystone adjustment is required.
				6. The shelf/enclosure/bracket (mount) shall be capable of supporting up to 50 pounds (23 kgs) of audiovisual equipment. This may require finding studs or adding a backboard.
				7. The shelf/enclosure/bracket (mount) shall be designed such that a technician can easily access the projector for maintenance and service.

**NOTE TO EDITOR: CONFIRM PROJECTION SCREEN SIZE, MOUNTING, HOUSING, LOCATION, ETC., AND UPDATE SPECIFICATIONS AND DRAWINGS AS REQUIRED.**

* + 1. AV System
			1. Master Quote Number
				1. Refer to Extron quote for full part number list. This quote is included in the Appendix.
			2. Extron Enclosure and AV rack
				1. Extron equipment shall be rack mounted in the AV equipment rack.
				2. The AV rack shall be backstage out of sight of the audience, unless indicated otherwise on the drawings. The AV rack shall be on the side of the stage opposite the lighting control.
				3. Furnish and install wall mount rack at 80” or higher on fire rated backboard. Tripplite Part #SRW12US or equal. Rack shall have rear hinge to swing open for rear cable termination and management. Provide a 6'x6'x24" conduit collector box with screw cover above cabinet.
				4. Contractor shall provide PDU, shelf and fan kit for ventilation to be installed in rack. PDU model to be Tripplite Isobar ISOBAR12ULTRA or equal.
				5. Contractor shall provide a data outlet and dedicated quad receptacle for AV equipment in rack. Rack shall be installed in accordance to Structured Cabling Specifications 27 10 00
				6. AV rack shall not be put in an enclosed space without ventilation.
				7. Secure all equipment with proper mounting and screws.
				8. All cables connecting from the enclosure to the projector shall be concealed within wall or ceiling if possible. Otherwise, conceal in surface mounted wire mold.
				9. Install according to Manufacturer recommendations.
			3. Extron Switcher
				1. System source selection and switching shall be provided by an IN1608 IPCP MA 70 eight input HDCP-Compliant Scaling Presentation Switcher with DTP Extension and 100-Watt amp. Model 60-1238-86
				2. Projector shall connect to switcher via one DTP HDMI 4K 230 Rx Model: 60-1271-13
				3. Switcher shall be mounted in AV rack.
				4. Exact model to be selected based on the number of speakers and their amplifier wattage requirements.
			4. Media Link Controller (MLC)
				1. Small and Medium auditorium media sources shall be controlled with an eBUS Button Panel EPB 200.
				2. EPB shall be located on a wall near the AV equipment rack backstage in a location not visible to the audience. Location must be easily accessible for staff. In most scenarios EPB will be on the backstage wall opposite the lighting controls.
				3. Locate EPB above input such that both may utilize the same pathway.
				4. Height for EPB will be between 42” and 48” per ADA requirements.
				5. The EPB shall contain ten fully configurable tri-color, multi-status LED buttons. See Appendix for Button Layout.
				6. Buttons shall illuminate red, green, or amber, depending on function, for ease of use in low-light environments.
				7. Buttons shall feature removable button caps allowing them to be custom labeled for easy identification.
				8. Device shall include black and white three gang face plates. Use white faceplates for install in auditoriums.
				9. EPB shall be programmed to operate with all connected peripheral devices for the Extron system.
				10. MLC shall be programmed to default back to the last source used when powered on.
			5. Extron Inputs (Media Source Interfacing)
				1. One (1) AAP model 102 60-300-02 configured with dual HDMI (model 70-1219-02) in the top slot, followed by one (1) dual 3.5mm audio jacks (part number 70-331-11). Configure and **label** one (1) jack for audio in and the one (1) for audio out. The third and fourth slots of the AAP shall have XLR 3pin female and RJ45 data (part number 70-103-16) The AAP will be located on the wall near the equipment rack.
				2. RJ45 data of AAP shall be cabled back to IDF as a normal data cable for end user devices to connect to the network. Label and run per 271000 Structured Cabling specifications.
				3. Provide appropriate cables and pathway to connect AAP modules back to Extron Switcher in AV rack.
				4. One (1) 60-1755-13 - DTP T UWP 4K 232 D, white on the rear wall near the projector for end user connections at 18” above finished floor.
				5. The AV Inputs shall be located within 6’ feet of a power outlet and data port.
				6. The AV inputs shall be mounted at 18 inches AFF, in line with electrical outlets, unless drawings indicate otherwise.
				7. Active Twisted Pair Transmitter shall transmit high resolution digital video and audio over shielded STP cable to the AV Switcher. Manufacturer requires Extron XTP DTP 24 shielded twisted pair cable for optimal performance.
				8. Wall plate shall fit in a standard, 2-gang electrical box and feature Decora® type faceplates.
			6. Speakers
				1. Install Extron Model SM 28T (60-1309-13) speakers on auditorium walls. Speaker quantity is four (4), unless otherwise indicated on drawings. Tap speakers at wattages indicated on drawings. Sample Extron system drawings are included in the Appendix.
				2. Connection from the switcher to the speakers shall be provided by Plenum rated 18 Gauge Speaker Cable Extron SPK-18. The speakers shall connect to the amp built into the switcher.
				3. Speakers shall be positioned apart from each other to provide maximum coverage of seating areas. Two (2) speakers shall be located in the front of the room, one on each side. While two (2) will be located further back in the auditorium. Install as indicated on drawings.
				4. Speakers shall be mounted in such a way that they do not block the view of the stage or interfere with the projector.
				5. Speakers shall be mounted at a height which ensures they are tamper safe and maintain paths of travel.
			7. Microphone Systems
				1. For each ES or MS Auditorium provide one (1) Shure SCM 800 mixer or equal.
				2. Provide one (1) hardwired mic, Shure SM 58 or equal.
				3. Provide floor standing adjustable mic stand compatible with hardwired mic.
				4. Provide two (2) wireless handheld microphones Shure SLXD2/B58 + SLXD4 logic receiver or equal.
				5. Each Mixer shall be configured to work with the provided microphones prior to closeout.
				6. The Shure Mixer shall be located in the AV cabinet, and interfaced with the Extron system and speakers.
			8. Data Connectivity
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			9. Power Requirements and Energy Efficiency
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			10. Priority Pager Controller
				1. The priority page controller shall allow the switcher to mute program audio during announcements from the public address system. Acceptable Extron part number PPC25.
				2. This sensor shall be placed and configured in such a way to allow it to detect announcements from the intercom/PA system. When announcements are detected the Audiovisual System shall lower the volume to allow the announcement to be heard.
			11. Fire Alarm Relay
				1. The fire alarm relay shall allow the switcher to mute the Extron sound system in the event of activation of the fire alarm system
				2. A fire alarm relay shall be installed for the Audiovisual System to interface with the Fire Alarm System for areas that provide large capacity such as auditoriums.
				3. Reference Fire Alarm Specification 28 31 11 for additional information.
			12. End user cabling and miscellaneous
				1. Contractor shall provide all options, accessories and hardware necessary to meet the function of the design, even if they are not specifically listed (i.e. low voltage controllers, mounting kits, electrical work, separate or additional power supplies, input modules, transformers, etc.).

**NOTE TO EDITOR: IF SCHOOL HAS A UNIQUE AUDITORIUM, ADVISE DISTRICT AND PROVIDE CUSTOM DESIGN AS NECESSARY.**

* 1. **ROOM-BASED DESIGN FOR HIGH SCHOOL OR LARGE SIZED AUDITORIUM**
		1. Projector
			1. PROJECTOR MODEL
				1. Epson EB-PU1008W WUXGA 3LCD Laser Projector with 4K Enhancement – Model: V11HA33920 8,500 lumens.
				2. This model of projector does not come with a lens. The lens shall be custom selected to work with the space. Architect/Engineer to submit appropriate lens recommendation customized to accommodate screen size and distance to screen.
				3. Turn off projector IR receiver in settings prior to close-out.
				4. Turn off Eco-mode prior to close-out.
				5. Focus Projector image.
			2. PROJECTOR MOUNTING
				1. Contractor shall provide a custom shelf/enclosure to be located on the second story balcony, where possible.
				2. Shelf/Enclosure design shall be approved by District Representative prior to ordering material.
				3. Shelf/Enclosure shall be secured against unauthorized access.
				4. Shelf/Enclosure shall be adequately ventilated such that the projector will not overheat.
				5. Projector shall be secured within the shelf/enclosure such that it cannot be easily removed, or move in the event of an earthquake.
				6. The exact location of the shelf/enclosure is to be determined by the projector requirements. Enclosure shall be placed centered such that the least amount of keystone adjustment is required.
				7. The shelf/enclosure shall be capable of supporting up to 50 pounds (23 kgs) of audiovisual equipment.

**NOTE TO EDITOR:**  **CONFIRM PROJECTION SCREEN SIZE, MOUNTING, HOUSING, LOCATION, ETC., AND UPDATE SPECIFICATIONS AND DRAWINGS AS REQUIRED.**

* + - * 1. The shelf/enclosure shall be designed such that a technician can easily access the projector for maintenance and service.
		1. AV System
			1. Master Quote Number
				1. Refer to the Extron quote included in the Appendix for a full part number list.
			2. Extron Enclosure and AV Rack
				1. Extron equipment shall be rack mounted in the AV equipment rack.
				2. Secure all equipment with proper mounting and screws per manufacturer’s recommendation
				3. All cables connecting from the enclosure to the projector/inputs shall be concealed within wall or ceiling, if possible. Otherwise, conceal in surface mounted wire mold.
				4. Install according to Manufacturer recommendations.
				5. Where required, install Tripp-Lite rack SR42UB according to Structured Cabling standards 27 10 00.
				6. Location to be backstage, or as directed by drawings.
			3. Extron Switcher
				1. System source selection and switching shall be provided by a DTP CrossPoint 82 4k IPCP SA. Model 60-1583-012
				2. Projector shall connect to switcher via one DTP HDMI 4K 230 Rx Model: 60-1271-13
				3. Switcher shall be mounted in AV rack.
				4. Exact model to be selected based on the number of speakers and their amplifier wattage requirements. Contract to submit Extron switcher for approval prior to ordering material.
			4. TouchLink Controller (TLP)
				1. Large auditorium media sources shall be controlled with a TouchLink Pro Controller -TLP Pro 1220TG Model: 60-1341-02.
				2. The TLP Pro shall connect via an XTP PI-01 to the IPCP IP Link Pro Control Processor.
				3. The IPCP PRO is to be integrated within the CrossPoint switcher.
				4. TLP shall be located on the control booth table. Location shall be easily accessible for staff.
				5. TLP shall be table mounted per manufacturer requirements.
				6. TLP shall be programmed to operate with all connected peripheral devices for the Extron system. This includes programming to allow buttons on the TLP to operate the TV tuner and the mechanical screen.
				7. The GUI and controls shall be approved by District Technology Representative prior to installation.
				8. Contractor may request a sample configuration template from an existing auditorium at another site. This can be provided by the District
			5. Extron Inputs (Media Source Interfacing)
				1. Provide and install one (1) DTP T UWP 4K 232 D Model: 60-1270-13 near the control/equipment booth. This unit shall connect to a DTP HDMI 4K 230 Rx Model: 60-1271-13 that terminates in the CrossPoint.
				2. Provide and install one (1) Audio out WPD 101 3.5 mm plate. Model: 70-1173-01
				3. Provide and install two (2) DTP T UWP 4K 232 D Model: 60-1270-13. One (1) will be backstage stage right, and one (1) will be backstage left. The stage left unit will connect to a DTP HDMI 4K 230 Rx Model: 60-1271-13 that terminates in the CrossPoint.
				4. Provide and install one (1) DTP T UWP 4K 232 D Model: 60-1270-13 in the orchestra pit.
				5. The AV Inputs shall be located within 6’ feet of a power outlet and data port.
				6. The AV inputs and WPD shall be mounted at 18 inches AFF, in line with electrical outlets, unless drawings indicate otherwise. The control booth input shall be mounted at wall switch level or to the control booth table.
				7. ALL DTP Active Twisted Pair Transmitters shall transmit high resolution digital video and audio over shielded STP cable to the AV Switcher. Manufacturer requires Extron XTP DTP 24 shielded twisted pair cable for optimal performance.
				8. Wall plate shall fit in a standard, 2-gang electrical box and feature Decora® type faceplates.
			6. Speakers, Amplifiers and Mixer
				1. Install Yamaha IF3115/95 speakers on auditorium walls. Speaker quantity to be determined by architect or engineer, based on the size of the auditorium. Quantity shall be eight (8), unless otherwise indicated on drawings.
				2. Install speakers according to manufacturer recommendations.
				3. Speakers shall be positioned apart from each other to provide maximum coverage of seating areas.
				4. Speakers shall be mounted in such a way that they do not block the view of the stage or interfere with the projector.
				5. Speakers shall be mounted at a height that keeps them safe from tampering and keeps them clear of any paths of travel.
				6. Speakers shall be tied in to work with the Extron system and independent microphone system.
				7. Amplifiers shall be Yamaha TX6n. Quantity of amplifiers to be determined by Architect or Engineer based on the number and wattage of speakers.
				8. Amplifiers shall reside in AV rack and tie in with Extron system.
				9. Mixer shall be Yamaha QL5 and will be interfaced will all audio and visual systems.

**NOTE TO EDITOR: ADJUST MICROPHONE QUANTITIES AS AUDITORIUM REQUIRES.**

* + - * 1. Mixer shall be located on control booth table.
			1. Microphone Systems
				1. Provide one (1) hardwired handheld microphone, Shure SM58SE.
				2. Provide one (1) (25’ foot) XLR microphone cable.
				3. Provide three (3) adjustable mic stand compatible with microphones.
				4. Provide two (2) wireless handheld microphones Shure BLX24/PG58.
				5. Provide two (2) Wireless headsets Shure BLX14/PGA31.
				6. All microphones shall be set up to work with the mixer and speakers as detailed above.
				7. Microphones shall be labeled with assigned location
			2. Data Connectivity
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			3. Power Requirements and Energy Efficiency
				1. See above section 2.2 - Room Based Design for Typical Classroom, Portable Classroom or Conference Room with Soft Lid Ceiling.
			4. Priority Pager System
				1. The priority page sensor shall allow the Switcher to mute program audio during announcements from the public address system. Part number PPS25.
				2. This sensor shall be placed and configured in such that it detects announcements from the intercom/PA system. When announcements are detected, the Audiovisual system shall lower the volume to allow the announcement to be heard.

**NOTE TO EDITOR: COORDINATE DRAWINGS, SPECIFICATIONS, AND APPENDIX, UPDATE THIS SPECIFICATION AS NEEDED**

* 1. **SYSTEMS DESCRIPTION**
		1. Provide a complete Audiovisual System in locations indicated on the Drawings.
		2. The system switching and audio amplification equipment shall be securely mounted and concealed in the specified enclosure.
		3. Audio and image source equipment shall be connected to the system and displayed via active (powered) interface panels located throughout the room. The audio and image signals from source devices shall be transmitted from the active interface panels over standard UTP cabling architecture.
		4. Unless something is specifically called out as existing or OFCI (Owner Furnished Contractor Installed) assume that all items in this specification are CFCI (Contractor Furnished Contractor Installed).
		5. Contractor is responsible for submitting Requests for Information (RFI) for any items that appear on the provided Extron System Schematic Drawings in the Appendix, but not in the corresponding written specifications. If the item appears in either the written specifications, or the drawings then it will be considered within scope, and there will be no additional cost to District.
		6. The room shall include control systems that have American Disabilities Act, Section 508 compliant buttons that are discernible without activating the controls or buttons on the control panel, closed captioning, and hearing assistance capability.
	2. **GENERAL EQUIPMENT REQUIREMENTS**
		1. The room shall be equipped with a standard easy to operate interface (a tactile button keypad layout or touch screen for large systems). The audio system may be monaural or stereo for program sound. The classroom AV system is to be controlled by a control system with a control panel mounted near the teacher’s desk, refer to the drawings for exact location. System parameters can be monitored, administered, and controlled over the data network. The instructional media equipment shall be located within close proximity to the teacher’s desk or through a Graphical User Interface (GUI) on a computer (NIC) to allow for ease of operation during instruction.
		2. Acceptable functionality requirements are listed below and categorized by type of equipment. Quantities are listed for movable, portable, or loose equipment, and other selected entries. Where quantities are not listed, refer to the system drawings.
		3. All products shall be new and under warranty at the time of installation. B-stock, previously installed, refurbished, or used equipment is not acceptable.
1. **EXECUTION**
	1. **EXAMINATION**
		1. Verify that related conditions, including equipment that has been previously installed under other sections, are acceptable for product installation in accordance with manufacturer’s recommendations.
		2. All devices connected to equipment specified in this section shall bear the UL label and comply with the applicable National Electrical Code (NEC) standards
	2. **INSTALLATION**
		1. All equipment and enclosures described in this specification shall be installed plumb and square per manufacturer’s instructions.
		2. Contractor will furnish, install, and terminate all cables required for a fully functional AV system. Should any components (including owner furnished or existing components) be unable to physically connect to the proposed system, Contractor shall provide the appropriate adaptor, captive screw termination or cable to make a connection.
		3. The Switcher shall be connected in accordance with District Structured Cabling requirements. Use cable from switcher to District network equipment. The contractor will be responsible for the following:
			1. Horizontal cable in purple
			2. Modular Patch panel
			3. Cat6 RJ45 inserts in purple
			4. Patch cord of appropriate length to District Switch in purple
			5. Contractor is responsible for all labor to connect cabling for a functional system, including patching to District network switch. See Specification Section 27 10 00 Structured Cabling for additional requirements.
		4. No AV cabling shall be visible within the classroom greater than 1 inch at the transition to the projector mount. Cabling shall be appropriately concealed and protected within wire-mold when below the ceiling.
		5. All equipment, except that designated as movable, portable or loose equipment, shall be secured and mechanically attached.
		6. All supports shall meet or exceed the load requirements of the intended application with a minimum safety factor of five (5).
		7. Provide support structure and hardware with a SAE Grade 8 load rating (min.).
		8. Classroom AV integrator shall test with installing Data Communications Active Infrastructure contractor and confirm correct port placement, functionality for the appropriate VLAN and their overall system functionality. In the event there is no Data Communications Active Infrastructure Contractor, integrator shall contact District Technology Representative.
		9. Integrator shall coordinate with the Digital Intercom Clock and Bell System contractor for the installation of the priority page sensor with the clock and bell system. In the event there is no Contractor, Integrator shall contact District Technology Representative. The actual installation of the priority paging sensor is understood to be in the AV Integrator’s scope and not the Clock and Bell Contractor scope.
		10. The paging sensor shall be installed inside the clock/speaker enclosure. Care will be taken when installing the sensor to ensure that it does not prevent removal of the faceplate for maintenance purposes. The paging sensor shall not be visible from within the classroom.

**NOTE TO EDITOR: Verify pathway to clocks for paging sensors. Indicate on drawings.**

* + 1. Integrator shall furnish all equipment, labor, system setup, and other services necessary for the proper installation of the products/system as indicated on the drawings and specified herein. System setup information shall include each component’s proper mounting and alignment and properly verified signal pathways and operation. Proper operational and network support control functions shall be verified.
		2. Install in accordance with manufacturer’s handling and installation instructions.
		3. Install in accordance with all local and pertaining codes and regulations.
		4. Utilize an Integrator with demonstrated experience in projects of similar size and complexity.
		5. Equipment shall be configured and in ready-to-use condition at the end of installation.
		6. Extron Equipment shall be added to the EXISTING District Global Viewer Enterprise deployment for remote management and reporting. Integrator/Contractor is to engage District Technology Representative when the systems are ready to be added. District Technology Representative shall enter login information required to complete the addition. Integrator/Contractor is responsible for executing the addition of the system once logged into Global Viewer Enterprise. If an existing Site entry does not exist in Global Viewer Enterprise, Contractor will create one. Refer to Appendix for additional GVE requirements.
		7. Energize and commission equipment in accordance with manufacturer’s instructions. Integrator shall perform tests to verify system functionality before attempting to turn system over to District. For final acceptance of completed systems, Contractor shall coordinate with District Representative. Commissioning the system shall at minimum, consist of the following:
			1. Verify that all items that appear in section 1.5 Closeout Submittals have been tested.
			2. Make the following cable connections:
				1. Power
				2. Local Area Network (LAN)
				3. Classroom Source Devices
				4. MLC connections
				5. Speaker connections
				6. Priority pager connections
			3. Configure MLC, EPB, or TLP in accordance with District Button Labeling Scheme (see Appendix).
			4. Download device drivers for all source and projection devices.
			5. Create a new Global Configurator project file.
			6. Add a device and set its Static IP address – IP address may be requested from District Technology Representative. Contractor to request District’s “IP Address Request Form” from District Technology Representative.
			7. Define the location of the new Media Link Controller device.
			8. Save the new Global Configurator file.
			9. Create an admin username and password (coordinate with District Technology Representative).
			10. Assign serial device drivers.
			11. Assign RF drivers.
			12. Create a shutdown schedule such that the projector will automatically shut down at 10pm each night.
			13. Test the MLC’s setup for proper control and support of the classroom.
			14. Plug into each video port/input within the room and verify audio and video signal.
			15. Verify that audio gain is sufficiently set on the switcher such that the volume on the MLC does not need to be at maximum for a reasonable volume.
			16. Verify the inputs have been labeled such that they match the buttons on the MLC unit.
			17. Verify that the AV Mute button mutes both Audio and Video from the PTV and PVS407D.
			18. Verify that the system defaults to the last selected input after a reboot.
			19. Verify that the system can be reached on the District network via a ping test.
			20. Verify that the system has been added to Global Viewer Enterprise.
			21. Verify that the VoiceLift microphones work properly.
			22. Verify that the VoiceLift Microphones have been labeled on each microphone and the base with the classroom number they are programmed to work with.
			23. Verify that the VoiceLift microphones are not muted by the AV Mute button on the MLC.
			24. Installation of the Extron systems are covered in full detail at [<http://www.extron.com/training/index.aspx>](http://www.extron.com/training/index.aspx).
	1. **CLEANING AND LABELING**
		1. Remove temporary tags, coverings, and construction debris from interior and exterior surfaces of the equipment. Remove construction debris from equipment area and dispose of properly.
		2. Clearly label all inputs and MLC buttons with printed text indicating the function. Custom labels are required if no suitable label comes with the Extron system.
		3. Label all cabling connecting to the District network per specifications as detailed in Structured Cabling 27 10 00 and Data Communications Active Infrastructure 27 20 00.
		4. Button labeling scheme can be found in Appendix or requested from District Technology Representative.
		5. Label each microphone and the charger base with the room number they are programmed to work in.

**NOTE TO EDITOR: REVISE TRAINING SECTION BASED ON PROJECT REQUIREMENTS, TYPES OF SYSTEMS, INCLUDING PHASED TURNOVER OF BUILDINGS**

* 1. **CLOSEOUT ACTIVITIES**
		1. Training
			1. The Contractor shall provide training for school district end users on proper operating procedures for the system after completion per campus, or by building if phased construction. Provide two (2) one-hour trainings per building.
				1. End user training will cover the use of the Extron Audiovisual System. In addition, Contractor is required to provide instruction on all classroom AV functionality to ensure that the user can power up and down the projectors, connect document cameras, control volume, and change between all classroom media equipment.
				2. Training will also cover the use of Extron Voice Lift system. In addition, Contractor is required to provide instruction to District personnel on voice amplification system start up, charging, and volume control.
			2. In addition to site end user training, if the Contractor is installing the first Extron at the campus the Contractor shall provide one (1) advanced training session for the District’s Technology and Information Services team. This advanced training shall be no more than 2 hours and must include GVE administration, maintenance schedules, re-aiming of projectors, and common troubleshooting steps. The training shall show the enclosure that houses the Extron as well as where the power is located. The advanced training will conclude with instructions on how to engage the warranty process, if needed.
1. **APPENDIX**
	* 1. All Appendix items can be found online at: <https://bit.ly/2K97Xyo>
		2. Included items are:
			1. Button Labeling Scheme - Button labeling for classrooms and auditoriums
			2. Extron System Drawings
			3. Extron Master Quotes – System quotes for all Room Based designs, useful for part numbers.
			4. Detailed GVE Requirements – further instructions on how to prepare and add systems in regard to GVE
			5. Summary AV Standards Matrix – Summary sheet for a high-level understanding of typical designs used by the District.

**END OF SECTION 27 41 16**