

**SECTION 16785  
AUDIO VISUAL SYSTEMS**

**PART 1 - GENERAL**

**1.00 SUMMARY**

- A. The work covered in this document consists of furnishing all labor, material and services necessary to install a complete audiovisual system as indicated on the project drawings and in these specifications.
  
- B. Deliverables
  - 1. Prior to ordering materials or commencing any construction activities, the contractor shall provide the Owner with a complete bill of materials, including all quantities of components, devices, equipment, and wiring required to complete this work. Submit product data, including manufacturer's data sheets for all proposed system components. Submit three copies with all specific items that will be provided clearly indicated and any options highlighted.
  
- C. Contractor Qualification
  - 1. The successful bidder shall be a California licensed C7 or 10 premise wiring contractor. Subcontractor may not be utilized in the implementation of the installation or programming.
  - 2. The successful contractor shall have design staff with CTS certification and must have the following certifications from Extron Electronics.
    - a. AMX ACE programming certification
    - b. Extron Advanced A/V Certification
    - c. Installers must be factory trained in the MediaLink PoleVault System
    - d. Installers must be certified in twisted pair, Category 5 structured cabling
  - 3. All bidders must demonstrate knowledge of school construction techniques and should possess a working ability to perform and support similar sized and scope school construction projects. All bidders must provide a listing of three (3) educational projects with similar size and similar scope of work using the proposed classroom audio & video projection system. This listing shall be complete with facility names, completion dates, names of contacts, and their telephone numbers. Referenced projects must have been completed in the past 2 years
  
- D. Code Compliance
  - 1. All systems must be approved under Part 15, Subpart B, and Section 15.107b of the FCC rules and Regulations.
  - 2. All material and systems must be UL approved.
  - 3. The System shall follow Local and National electrical codes and be installed in accordance.
  - 4. All enclosures and A/v equipment shall be anchored to the structure and shall comply with CBC Section 1632A.

## **PART 2 – PRODUCTS**

### **2.00 ACCEPTANCE MANUFACTURERS**

- A. Extron Electronics
- Address: 1230 South Lewis Street  
Anaheim, Ca 92805  
Phone 714.491.1500 or 800.633.9876
- B. Substitutions: Exceptions to the specifications are not acceptable. No substitutions permitted.

### **2.01 CLASSROOM AUDIOVISUAL SYSTEM DESCRIPTION**

- A. Provide a complete Audiovisual System for small to medium sized classrooms. All classrooms as indicated on construction plans will require the Audiovisual System as described in this section. The system switching and audio amplification equipment shall be securely mounted and concealed in an enclosure above the suspended projector. Portable video source equipment can be connected to the system and displayed via three interface panels located throughout the room. Video and audio signals from source devices shall be transmitted from the interface panels over standard UTP cabling architecture.
- B. The exact location of projector mounting assembly shall be verified in field by Architect/District prior to installation. Provide minimum of 80" head clearance above the finished floor where projector is installed.

### **2.02 GENERAL EQUIPMENT REQUIREMENTS**

- A. Acceptable products are listed below 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.
- B. Deviations from this specification must be documented in writing to the Architect and Owner at least ten business days prior to the bid date.
- C. The System components shall all be listed and labeled by Underwriters Laboratories Incorporated (UL).
- D. All products shall be new and under warranty at the time of installation. B-stock, previously installed, refurbished or used equipment shall not be provided on this project.
- E. Where the specification lists several manufacturers for a major item, or group of items, the AV Integrator shall provide that entire item from one manufacturer only.
- F. The 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. mounting kits, separate or additional power supplies, input modules, transformers, etc.).

### **2.03 FIXED EQUIPMENT**

- A. Provide the following Pole Vault system as an all inclusive system as described below, one system for each classroom:
1. Projector Mounting - shall be mounted using the following components.

- a. Extron ACMP100 (Part Number 70-503-02) angled ceiling mount.
  - i. The PCM 240 angled projector mount must be capable of mounting to the structural ceiling (concrete or wood joists), to provide a full 100 degrees of adjustment enabling a PMP Series pole to hang level.
  - ii. The mount shall be capable of supporting up to 50 pounds (23 kgs) of A/V equipment.
  - iii. The mount must also include a 1.5" threaded pipe adapter for projector mount poles.
- b. Extron UPB 25 (Part Number 60-773-02) Universal Projector Bracket.
  - i. The bracket shall be able to support projectors up to 25 pounds.
  - ii. The projector bracket must have independent adjustments of horizontal tilt or roll ( $\pm 4$  degrees of horizontal tilt), vertical angle or pitch ( $\pm 25$  degrees of vertical angle), and rotation or yaw (360 degrees of rotation).
  - iii. The projector bracket shall also use a 1.5" NTP (National Tapered Pipe) threaded pipe adapter for mounting a projector pole.
  - iv. The projector bracket should also maintain positioning adjustments even if the projector is removed for service.
  - v. The bracket should also feature security flanges that enable the entire unit to be padlocked to prevent theft.
- c. Extron PMP Projector Mounting Pole.
  - i. The projector mounting pole shall be 1.5" NTP (National Tapered Pipe) threaded pipe threaded at both ends to facilitate mounting the projector to the ceiling mount and to the universal projector mount.
  - ii. The projector mounting pole shall be of a custom length for proper mounting from building structure.
  - iii. The pole shall provide a cutout section to allow for cable access.
- d. Extron PMK 550 (Part Number 70-655-03) Easy Installation Pole Mount Kit.
  - i. The Easy Installation Project Mounting Kit is a lightweight, fully enclosed vented housing for quickly installing and securing Extron PoleVault System components above a pole-mounted projector. These products may be Extron PVS 305SA TP, Switcher, power supplies, audio amplifiers, IP Link products and other Extron quarter rack product options.

## 2. Media Source Switching

- a. System source selection and switching shall be provided by the Extron PVS Switcher with Stereo Amplifier (Part Number 60-986-01).
  - i. The PVS 305SA Switcher shall have two (2) RGB video inputs capable of VGA - UXGA RGBHV, RGBS, RBsB and RsGsBs input resolution via (2) two pairs of female RJ-45 connectors.
  - ii. The PVS 305SA Switcher shall have two (2) composite video inputs via two (2) female RJ-45 connectors.

- iii. Audio input shall be via four (4) stereo, balanced /unbalanced inputs via the same four (4) RJ-45 RGB and Composite video connectors.
- iv. The PVS 305SA Switcher shall have two video outputs, one (1) RGB output capable of outputting VGA - UXGA RGBHV, RGBS, RBsB and RsGsBs (following input type) via a 15-pin HD female connector and one (1) composite video via one (1) RCA female connector.
- v. Connection from the PVS 305SA Switcher to the display device shall be provided with one 3' VGA to VGA molded cable (Part Number 26-567-01) and one 3' composite video cable (Part Number 26-600-03).
- vi. 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 ohms and 7 watts (rms) per channel at 8 ohms.

3. Media Source Control

- a. Classroom media sources shall be controlled with the Extron MLC 104 IP Plus (Part Number 60-818-03) MediaLink Controller with IP Link.
  - i. The MediaLink Controller shall contain six tri-color, multi-status LEDs push-buttons for device selection and projector on / off control. A rotary volume control switch with five (5) LED volume indicators shall permit system volume level control.
  - ii. The MLC 104 IP Plus controller shall feature Extron IP Link Ethernet for monitoring, scheduling and control. This IP technology shall enable the device to be controlled, scheduled and monitored over a LAN, WAN or the Internet using Extron Global Viewer or MLC controller software.
  - iii. The Controller shall contain a serial host port which shall consist of one (1) bi-directional RS-232 front panel 2.5mm mini stereo jack. This host connection port shall be for configuration and control of the controller itself and to install device drivers for the equipment to be controlled.
  - iv. The Controller shall also feature (2) bi-directional serial ports to provide device control. These two ports shall control the display device and PVS 305SA switcher respectively via bi-directional RS-232 control via one (1) 3.5mm direct insertion captive screw connector.
  - v. An IR control port shall also be used to provide device control via IR commands to IR controllable devices. The port shall have TTL level (0 to 5 V) infrared control up to 1 MHz via one (1) 3.5mm direct insertion captive screw connector.
  - vi. The MLC 104 IP Plus shall also have three (3) configurable (via software) digital input / outputs for devices such as sensors, switches, LEDs and relays via one (1) 3.5mm 4-pole direct insertion captive screw connector.
  - vii. Connection from the MLC 104 IP Plus to the display shall be provided by one (1) 50' Projector control cable (Part Number 26-621-50).

- viii. Connection from the MLC 104 IP Plus to the PVS 305SA switcher shall be provided by one (1) 50' Switcher Control cable (Part Number 26-626-50).
  - ix. Connection from the MLC 104 IP Plus to the IDF must be a home run and will not utilize exiting connects within the room.
4. Audio and Speech Reinforcement:
- a. Speakers. In suspended ceiling applications in each classroom, a two (2) pair of Extron SI 3C LP are used.
    - i. These speakers feature 4" deep low profile metal back can for plenum environments.
    - ii. The speakers feature a frequency response of 75 Hz to 17 kHz – 10 db, half space.
    - iii. The power capacity is 16 watts of continuous pink noise or 32 watts of continuous program media.
    - iv. The coverage angle of the speaker is 170 degrees of conical coverage.
    - v. The nominal impedance is 8 ohms.
    - vi. The input connector shall be (1) 5mm captive screw for 1 input and 1 loop-through connection.
    - vii. Connection from the PVS 204SA switcher to the SI 3C LP speaker is provided by one (1) 50' Plenum rated 18 Gauge Speaker Cables Extron SPK-18.
  - b. VoiceLift Wireless IR Microphone. (VLM 2000, Part Number 42-139-02 or approved equal.) The integrated wireless microphone is lightweight designed to be worn around the neck with a lanyard or clipped on the belt or lapel. The instructor's voice is picked up by the microphone and transmitted wirelessly to the receiver mounted on the ceiling near the center of the room of an unobstructed wall. The signal is then passed to the VoiceLift receiver input of the PVS 305 SA located in the PMK 550 or vault mounted above the projector. This is used to amplify the sound level in the classroom up to approximately 15 dB above the ambient room noise. Speech is mixed into the program audio using the PVS 305 SA and distributed out of the 2 each FF120 speakers for Evan room coverage. Each mic features volume control, a power switch and an auxiliary input to use for an MP3 player or other audio source. The IR mic system can operate on two IR frequencies 2.3 MHz and 2.8 MHz, selectable. The Wireless IR Microphone has the ability for the instructor to issue an instant alert feature by holding both the volume up and down buttons simultaneously which can trigger a contact closure in the Wireless IR Mic Receiver reference in Paragraph c.
  - c. VoiceLift Wireless IR Mic Receiver. (VLR 102, or approved equal). The receiver has a round base with dome shaped translucent cover. This allows for flush mounting in the ceiling and concealed wiring above the ceiling using plenum rated cables run to the aux mix input of the PVS 204 SA located in the PMK 550 or vault above the projector. The device acts as the receiver of up to two room microphones and transmits their audio signal to the PVS 305 SA for mix into the program content of presented material. The mic receiver has a contact closure that when wired and configured to the digital input of the MLC can be triggered to send instant alert messages to a designed text or email outlook account.
  - d. VoiceLift Wireless IR Mic Charging Base Station. (VLC 102 or approved equal). This device is constructed of high impact ABS plastic and acts as a holding and charging station of up to two of the Extron wireless IR

microphones. It ships with its own power supply that acts as a recharging station for the to mics.

- e. Public Address System Interruption: The Priority Page Sensor Kit (70-619-01) mutes classroom audio during a page from a public address system. The sensor connects to a PA speaker lead and detects current flow when a PA announcement is initiated. The sensor signals the PVS 305SA switcher to mute classroom audio for the duration of the announcement.

**Note:** *The Priority Page Sensor Kit must be installed in a sealed enclosure, such as the included metal junction box to meet the UL 2043 plenum rating requirement.*

## 5. Media Source Interfacing

- a. Owner furnished media sources equipment (OFE) shall be connected to the audiovisual system via three Twisted Pair Transmitter Wall Plates. These wall plates shall enable the system to display video and graphic data from Laptop computers, DVD and VCRs, document camera, camcorders, etc.
  - i. Provide two types of interface panels. They are the Extron PVT RGG AAP VGA Transmitter (Part Number 60-580-13 or approved equal) and the PVT RGB CV Composite Video Transmitter (Part Number 60-828-11 or approved equal.)
  - ii. The PVT RGB AAP shall be mounted securely into the AAP102 mounting frame centered at 18" AFF, along with (2) RJ45 AAP modules allowing connectivity to the PVT RGB CV.
  - iii. The PVT RGB CV shall be mounted inside the teachers workstation utilizing the MBU123 mounting kit. All patch cables to the media sources to extend 6-feet from surface of desktop.
- b. The System shall include one (1) Extron PVT RGB AAP-RGB Video Twisted Pair Transmitter. The RGB Video Pair Transmitter – Adapter Plate shall be used to connect up to one (1) RGB devices to the system and transmit the video and audio data to the switcher.
  - i. The RBG Video Twisted Pair Transmitter – Adapter plate shall fit in the specified AAP102 double-gang mounting frame.
  - ii. The RBG Video Twisted Pair Transmitter – Adapter Plate shall transmit RFG video over UTP cable to the Switcher and support video input resolutions of VGA – UXGA RGBHV, RGBS, RBsB and RsGsBs via one (1) female 15-pin HD connector.
  - iii. Stereo audio shall be input via one (1) 3.5mm mini stereo jack.
  - vi. Connection to each Composite Video Transmitter shall be provided via an Extron male VGA to male VGA and male 3.5 mm TRS to male 3.5mm TRS cable for RGBHV and audio, length to be coordinated by Owner.
  - v. The output of the interface shall be via two (2) female RJ-45 connectors.
  - vi. Connection to the Switcher shall be via two (2) plenum rated.
- c. The System shall include (1) Extron Composite Video and RGB Twisted Pair Transmitter (PVT RGB CV: 60-828-11).
  - i. The Composite Video and RGB Twisted Pair Transmitter - Input shall transmit composite video over (1) UTP cable to the

- Switcher and support video input via an RCA female connector. It shall also transmit RGB video over (2) additional UTP cables to the Switcher and support video input resolutions of VGA – UXGA RGBHV, RGBS, RBsB and RsGsBs via one (1) female 15-pin HD connector.
- ii. The Composite Video and RGB Twisted Pair Transmitter – Transmitter shall be mounted under the teacher workstation table top utilizing the MBU123 mounting kit, or approved equal.
  - iii. Stereo audio shall be input via two (2) RCS female connectors.
  - iv. Connections to the Composite Video Twisted Pair Transmitter Wall Plate from the DVD/VCR shall be provided via one (1) male 3 x RCA to male 3 x RCA cable for composite video and audio, cable length to be coordinated by Owner.
  - v. The output of the interface shall be via three (3) female RJ-45 connectors.
  - vi. Connection to the Switcher shall be via three (3) plenum rated UTP cables.

### **PART 3 – EXECUTION**

#### **3.00 GENERAL**

- A. All equipment and enclosures described in this specification shall be installed plumb and square per manufacturer's instructions.
- B. All equipment, except that designated as movable, portable or loose equipment, shall be secured and permanently attached to the permanent structure in a manner which will require the use of a tool (e.g.: screw driver, nut driver, etc.) for removal.
- C. All cabling raceways (Wiremold) 3000 series) and High Voltage electrical to be completed by a Certified Electrical Contractor.
- D. All supports shall meet or exceed the load requirements of the intended application with a minimum safety factor of five.
- E. Provide support structure and hardware with a SAE Grade 8 load rating (min.).

#### **3.01 EXAMINATION**

- A. Site Verification of Conditions: Verify that related conditions, including equipment that has been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
- B. All devices connected to equipment specified in this section shall bear the UL label and comply with the applicable National Electrical Code (NEC) standards.

#### **3.02 INSTALLATION**

- A. Contractor 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 components proper mounting and alignment and properly verified signal pathways and operation. Proper operational control functions should be verified.
- B. Install in accordance with manufacturer's handling and installation instructions.
- C. Install in accordance with all local and pertaining codes and regulations.

- D. All low voltage and high voltage cabling must be run in separate raceways and follow standards for local and national electrical codes.
- E. Utilize an installer with demonstrated experience in projects of similar size and complexity.
- F. Equipment shall be ready for use to condition at the end of installation.
- G. Configuration of system shall follow the District standard, available IP addresses and sample configuration file will be issued to the Contractor during the pre-construction meeting.
- H. Energize equipment in accordance with manufacturer's instructions.

### **3.03 PROTECTION AND CLEANING**

- A. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
- B. Repair or replace damaged components before Substantial Completion of the project.
- C. Installed video projection image shall fit target projection area within 1-inch of screen edge with minimal keystone adjustment.
- D. 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.

## **PART 4 – PROJECT CLOSE-OUT**

### **4.00 SUBMITTALS**

- A. Operation and Maintenance Manual: Supply operation and maintenance manuals to include the following:
  - 1. A detailed explanation of the operation of the system.
  - 2. Pictorial parts list and part numbers.
  - 3. Schematic wiring diagrams, grounding systems, pathways or other diagrams as may be necessary for the District to maintain the system(s).
  - 4. Telephone numbers for the authorized parts and service distributor.
- B. Final Cleaning
  - 1. All Contractor installed equipment, cabling, racks, wire management and other network equipment shall receive a final cleaning prior to turnover to the District.
  - 2. If at the time of "turnover", the District finds that the equipment in the MDF and IDF is dirty, the Contractor shall promptly clean all equipment, racks and connectors.
- C. Training
  - 1. At the completion of the work, a period of not less than four hours shall be allocated by Contractor for instruction and training for each of the District's I.T. Low Voltage and Maintenance departments.

D. Certification

1. Upon completion and receipt of the following items, the District shall notify the Contractor and the Architect of Record in writing of formal acceptance of the system.
  - a. All contracted work is complete in accordance with these specifications and drawings.
  - b. Punch list items are completed and verified.
  - c. Test documentation has been submitted and verified
  - d. Performance Warranty documentation has been submitted.
  - e. All documents and submittals as called for herein.
  - f. As-built drawings showing all cable pathways, junctions, equipment locations, grounding points and other details as required to allow for District maintenance and support.

All re-inspection fees or back-charges have been paid in full.

**END**  
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