

ADDENDUM NO. 3



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ARCHITECTS

**Texas A&M University – Corpus Christi
Chaparral Building Renovations**

**TAMU-CC Project #157191FY21
TAMU-CC Proposal #CSP3-003**

PROJECT # 2021-11

223 N. Chaparral St.
Corpus Christi, TX 78401

Issue Date: 09/15/2023

The following additions, deletions, modifications, or clarifications shall be made to the appropriate sections of the plans and specifications and shall become a part of the Contract Documents. Bidders shall acknowledge receipt of this Addendum in the space provided on the Bid form.

MAKE THE FOLLOWING ADDITIONS, MODIFICATIONS OR DELETIONS TO THE DRAWINGS AND SPECIFICATIONS

MODIFICATIONS TO THE CONTRACT SPECIFICATIONS

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

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ADD Owner provided Specification Section 27 40 00 INTEGRATED AUDIOVIDEO SYSTEMS AND EQUIPMENT to the Table of Contents.

DOCUMENTATION: Section 27 40 00 INTEGRATED AUDIOVIDEO SYSTEMS AND EQUIPMENT attached.

END OF ADDENDUM #3

2SECTION 27 40 00 - INTEGRATED AUDIOVIDEO SYSTEMS AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Section includes: furnishing, installing, testing and documenting audio-visual systems for spaces included by not limited to:

1. General Design Guidelines

- a. All Audiovisual displays shall conform to ANSI/INFOCOMM 3M-2011 Projected Image System Contrast Ratio (or most recent revision).
- b. Audiovisual display image sizes shall conform to ANSI/INFOCOMM V202.01:2016 Display Image Size for 2D Content in Audiovisual Systems (or most recent revision). Specific applications of this standard shall be confirmed with TAMU-CC Division of Information Technology
- c. Audiovisual sound systems shall conform to ANSI/INFOCOMM A102.01:2017 Audio Coverage Uniformity in Listener Areas (or most recent revision). Specific applications of this standard shall be confirmed with TAMU-CC Division of Information Technology
- d. Closet viewer of an Audiovisual shall not be less than the width of the image shown on the display.
- e. Middle of a display shall not exceed 15 degrees above the standard eye level line of sight (0 degrees)
- f. Seating for an audiovisual display shall not exceed 45 degrees from the far edge of the display.
- g. Where Electric Projector screens are called for an electrical quick disconnect with lock out tag out capabilities shall be installed for servicing or replacement purposes.
- h. Audiovisual equipment shall be supplied a dedicated electrical circuit.
- i. Where Assisted Listening Systems are called for number of receivers for system shall be dictated by current ADA standards. Specific applications of this standard shall be confirmed with TAMU-CC Division of Information Technology
- j. All Audiovisual systems will have the capability to be controlled remotely via IP connection.
- k. All audiovisual equipment shall be housed within specified locations with adequate cooling to maintain environment for equipment as specified by manufacturer.
- l. All audiovisual physical installations shall conform to ADA standards.

2. Standard Classrooms

- a. General Description – Generally a small to medium sized room that sits 20 to 150 participants
- b. Control – The Audiovisual system shall be controlled by a countertop touch panel and via webpage-enabled control. This control shall include control of power of the AV system, projection screen control, audio levels, and source selection. Base standard programming will be provided by TAMU-CC

Division of Information Technology.

- c. Audio – Audio for this location shall be provided via ceiling-recessed distributed loudspeakers installed per manufacturer specifications. There shall be a wireless lavalier microphone with charging station at the instructor station. An Assistive Listening system with transmitter and receivers shall be provided for this space according to ADA standards. There shall be audience response microphones to support remote classroom engagement. There shall be Digital Signal Processors to limit feedback and allow usage of software-based video conferencing solutions.
- d. Video — Video for this space shall be provided via a ceiling-mounted projection system with non-tensioned ceiling-recessed manual projection screen under 110” diagonal requirements. Over 110” diagonal requirements will necessitate electric screens. A USB pan-tilt-zoom camera shall be provided for use in software-based video conferencing solutions.
- e. User Inputs – There shall be a computer installed within the lectern and a separate HDMI input with adaptor ring and retractor for a laptop computer at the cable cubby. There shall be a USB connection at the cable cubby to the PC within the lectern. There shall be a wireless video receiver for BYOD video input. There shall be a document camera with simultaneous USB and HDMI output for displaying books, documents, or samples.
- f. Equipment Location - Instructor Station
- g. Additional Notes – There shall be an electrical outlet for laptop use on top of the instructor station.

3. Auditorium Classrooms

- a. General Description – A large room with tiered seating, sits 150 to 200 participants.
- b. Control – The Audiovisual system shall be controlled by a countertop touch panel and via webpage-enabled control. This control shall include control of power of the AV system, projection screen control, audio levels, and source selection. Base standard programming will be provided by TAMU-CC Division of Information Technology.
- c. Audio – Audio for this location shall be provided via ceiling-recessed distributed loudspeakers installed per manufacturer specifications. There shall be a wireless lavalier microphone with charging station at the instructor station. An Assistive Listening system with transmitter and receivers shall be provided for this space according to ADA standards. There shall be audience response microphones to support classroom engagement. There shall be Digital Signal Processors to limit feedback and allow usage of software-based video conferencing solutions.
- d. Video — Video for this space shall be provided via a projection system accessible from ground level via projector lift if needed with a fixed frame projection screen where feasible or alternatively a ceiling recessed electric projector screen. There shall be a confidence monitor for the instructor to reference separate from the desktop PC monitor. Alternative designs considered may incorporate multiple projection systems in order to accommodate standards requirements.
- e. User Inputs – There shall be a computer installed within the lectern and a

separate HDMI input with adapter ring and retractor for a laptop computer at the cable cubby. There shall be a USB connection at the cable cubby to the PC within the lectern. There shall be a wireless video receiver for BYOD video input. There shall be a document camera with simultaneous USB and HDMI output for displaying books, documents, or samples.

- f. Equipment Location – Instructor Station
- g. Additional Notes – There shall be an electrical outlet for laptop use on top of the instructor station.

4. Specialty Classrooms

- a. All Items – Collaborate with TAMU-CC Division of Information Technology for specific functions or needs if not covered by standard classroom.

5. Small Conference Rooms

- a. General Description – Small room, fits 2 to 6 people.
- b. Control – The Audiovisual system shall be controlled via wall-mounted keypad. This control shall include control of power of the AV system, audio levels, and source selection.
- c. Audio – Audio for this location shall be provided via wall mounted combination microphone/speaker bar installed according to manufacturer specifications. Microphone/Speaker bar will be connected to PC for software-based video conferencing.
- d. Video – Video for this space shall be provided via wall-mounted flat screen display. A camera will be integrated with the microphone/speaker bar and connected for use with the PC for software-based video conferencing.
- e. User Inputs – There shall be an HDMI input for a dedicated PC and (1) HDMI with adapter ring located at the table. The conference table cable cubby shall be provided by the furniture manufacturer. There shall be a wireless video receiver for BYOD video input.
- f. Equipment Location - All AV equipment shall be housed under conference tables or behind the display.

6. Medium Conference Rooms

- a. General Description – Medium room, fits 6 – 12 people.
- b. Control – The Audiovisual system shall be controlled via desktop-mounted touch panel. This control shall include control of power of the AV system, audio levels, and source selection.
- c. Audio – Audio for this location shall be provided via ceiling-recessed distributed loudspeakers installed according to manufacturer specifications. There shall be ceiling microphones and a small form factor Digital Signal Processor to limit feedback that connects to the PC and allows usage of software-based video conferencing solutions.
- d. Video – Video for this space shall be provided via wall-mounted flat screen display alternatively projector-based video system if required. There shall be a pan-tilt-zoom USB based camera for use with software-based video conferencing solutions.
- e. User Inputs – There shall be an HDMI input for a dedicated PC and (1) HDMI input with adapter ring located at the table. The conference table

cable cubby shall be provided by the furniture manufacturer. There shall be a wireless video receiver for BYOD video input.

- f. Equipment Location - All AV equipment shall be housed under conference tables, behind the display, or in an AV rack within a credenza.

7. Large/Executive Conference Rooms

- a. General Description – Large or Executive room, fits 10 – 24 people.
- b. Control – The Audiovisual system shall be controlled via wireless touch panel. This control shall include control of power of the AV system, audio levels, control of PTZ camera, and source selection.
- c. Audio - Audio for this location shall be provided via ceiling-recessed distributed loudspeakers installed according to manufacturer specifications. There shall be ceiling microphones and a Digital Signal Processor to limit feedback and allow usage of software-based video conferencing solutions.
- d. Video – Video for this space shall be provided via projector-based system. There shall be a pan-tilt-zoom USB based camera connected to the PC for use with software-based video conferencing solutions.
- e. User Inputs – There shall be an HDMI input for a dedicated PC and (1) HDMI located at the table. The conference table cable cubby shall be provided by the furniture manufacturer. There shall be a wireless video receiver for BYOD video input.
- f. Equipment Location - All AV equipment shall be housed under conference tables, behind the display, or in an AV rack in a credenza.

8. Huddle Spaces

- a. Control – The Audiovisual system shall be controlled via wall-mounted keypad. This control shall include control of power of the AV system, audio levels, and source selection.
- b. Audio - Audio for this location shall be provided by the display's built-in speakers.
- c. Video - Video for this space shall be provided via wall-mounted flat screen display.
- d. User Inputs – There shall be (1) HDMI input with adapter ring located at the table. The huddle space table cable cubby shall be provided by the furniture manufacturer. There shall be a wireless video receiver for BYOD video input.
- e. Equipment Location - All AV equipment shall be housed under conference tables or behind the display.

9. Digital Signage

- a. Control - Digital Signage shall be controlled via IP and CEC commands from Digital Signage Computers
- b. Audio - Audio for this location shall be provided by the display's built-in speakers.
- c. Video – Video for this space shall be provided via wall-mounted digital signage display. The primary input for these displays shall be digital signage computers. Digital Signage displays may be mounted in landscape or portrait format but must be done with consistency and

- uniformity throughout building.
- d. Equipment Location - All AV equipment shall be housed behind the display.

10. Interactive Directory

- a. Control - Digital Signage shall be controlled via IP and CEC commands from Digital Signage Computers
- b. Audio - Audio for this location shall be provided by the display's built-in speakers.
- c. Video - Video for this space shall be provided via interactive digital signage display. The primary input for these displays shall be digital signage computers. Interactive Directories may be wall mounted or utilize floor stand. All installations must conform with ADA standards.
- d. Equipment Location - All AV equipment shall be housed within the kiosk stand or wall mount.

11. Distributed Audiovisual systems

- a. Control: Systems shall be controlled via IP based Crestron control solution
- b. Audio/Video: Systems should employ Crestron NVX or approved alternative AVoIP solutions
- c. Equipment Location: AV infrastructure, routing, and control equipment must be housed in own controlled space
- d. All items: All designs must be completed in collaboration with and verified by TAMU-CC Division of Information Technology

12. Other Specific or Unique Audio/Visual Applications

- a. All items: All designs must be completed in collaboration with and verified by TAMU-CC Division of Information Technology.

B. Audiovisual Systems shall consist of multiple systems with various configurations per the AV Room Type Device Schedules and the design specifications and drawings.

C. These systems include some or all of the following:

- 1. Wall mounted, ceiling mounted and ceiling hung speaker systems.
- 2. Mounting of flat screen video displays and projectors.
- 3. Audio input/output panels, microphones, wireless microphone systems, mixers, switchers, audio digital signal processors and amplifiers.
- 4. Video input/output panels, switchers, and scalars.
- 5. Microphones, mounts, and cables.
- 6. Programmable audio-visual remote and automated control system and associated support devices for controlling: audio and video systems, etc.
- 7. Floor, wall and desktop connection hubs for audio, video, broadband, LAN, remote control signaling, computer and power connections.
- 8. Termination, connector and pull junction boxes.
- 9. Flat screen video display mounting systems.
- 10. Projector mounting
- 11. Wiring and connectors.

1.2 RELATED SECTIONS

- A. Section 05500 - Metal Fabrications: Supports for suspended projection screens.
- B. Section 06100 - Miscellaneous Carpentry: Wood blocking in walls and ceilings.
- C. Section 09510 - Acoustical Ceilings: Suspended panel ceilings for recessed screens.
- D. Section 09900 - Painting: Field painting.
- E. Section 16155 - Equipment Wiring: Electrical supply, conduit, and wiring for electric motor operated projection screens.
- F. Section 271500 - Horizontal Communications Cabling
- G. Section 270528 - Pathways for Communications Cabling

1.3 SUBMITTALS

- A. See Section 01300 - Submittals, for submittal procedures.
- B. Product Data: Manufacturer's catalog cuts and descriptive information on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Operation and Maintenance Data: Provide manufacturer's operation and maintenance instructions.
- D. Shop Drawings: Drawings depicting detailed floor plan locations and elevations of all audio-video equipment to be installed. Must include detailed interconnection diagrams with pinouts. Drawings to be submitted in electronic PDF format and legible hard copy prints (minimum size 11"x17") to Owner for review prior to ordering equipment or commencement of any work.
- E. Operational System Documentation: Provide drawings and/or Operational/Procedures manual including drawings and instructions of sufficient detail to allow users to understand system operations and procedures. Include "as-built" system drawings, equipment Owner's Manuals, equipment warranty information, audio-video cabling termination diagrams, operational flowcharts and basic system troubleshooting information.
- F. All audiovisual control programming must be submitted to TAMU-CC Division of Information Technology as uncompiled code with appropriate documentation.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Experienced in manufacturing products specified in this section.
- B. Installer Qualifications: Installer shall have experience in installation of systems of comparable size and scope as specified herein. Installer shall have any and all certifications that pertain to the installation of the systems specified herein offered by the manufacturer for installation of their equipment and/or cabling.
- C. Designs must be completed and verified by a full time staff member of the Audiovisual

Consultant or Contractor with AVIXA CTS-D credentials

1.5 DELIVERY, STORAGE, AND PROTECTION

- A. AV Contractor shall provide off-site, secure storage for all audio-video equipment. Deliver all audio-video equipment to storage site in manufacturer's original unopened packaging. Inspect for damage and size before accepting delivery. Any equipment delivered in damaged condition may not be installed and shall be replaced by new equipment.
- B. Store in a protected, clean, dry area with temperature maintained between 50 degrees F and 110 degrees Fahrenheit or according to manufacturer specifications. Stack according to manufacturer's recommendations. Keep all materials with magnetic fields away from material and equipment that may be damaged by such magnetic fields.
- C. Acclimate all equipment including projection screens to building temperatures for 24 hours prior to installation, or in accordance with manufacturer's recommendations.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Maintain interior of building between 60 degrees Fahrenheit and 75 degrees Fahrenheit during and after installation of projection screens or according to manufacturer specifications.
- B. Installation of powered/active equipment may commence once work that generates dust or static has been completed and ceased. If unplanned further work is to occur equipment must be powered down and recommissioning must occur. There is no restriction on prewiring, installation of mounting structure, or other related items. All work must be coordinated with the General Contractor and with TAMU-CC Division of Information Technology.

PART 2 PRODUCTS

All audiovisual equipment shall use the below products, any alternate products or proposed equipment must be confirmed for use in audiovisual installations as approved by TAMU-CC Division of Information Technology. Standard equipment is subject to change due to quickly evolving nature of the audiovisual field. Equipment may also be changed if needed to accommodate specifics of design, priority should be given to maintaining the same manufacturer as below equipment, all deviations must be approved by TAMU-CC Division of Information Technology. Audiovisual consultant and contractor are held responsible for ultimate functionality and overall design of the systems and solutions. Refer to Equipment and Specification Appendix and end of section for specific equipment and general design guidelines.

PART 3 EXECUTION

3.1 CONSTRUCTION MEETINGS

- A. The Consultant and/or Owner will hold regular construction meetings to review the installation schedule. It is mandatory that the Audiovisual Consultant and the Contractor's project manager attend each meeting.
- B. All changes to design and/or scope must require TAMU-CC Division of Information Technology approval before proceeding.

3.2 SITE INSPECTION

- A. Audiovisual Contractor and Audiovisual Consultant shall continuously verify that the site conditions are in agreement with the Contract Documents, ASI's, and the AVS design. Notify TAMU-CC Division of Information Technology representative immediately of conditions that affect the performance of the installed system.
- B. Coordinate any required work that is not specified in the Contract Documents.

3.3 COORDINATION

- A. The audiovisual consultant and contractor are responsible for coordination of all items related to design and installation of the audiovisual systems with the General Contractor, Architect and Engineering firms, and all trades as needed.
- B. Changes or conflicts must be coordinated and vetted by Audiovisual Consultant and Audiovisual Contractor, with all parties.
- C. TAMU-CC Division of Information Technology must approve changes and be provided timely and routine updates of coordinated work by Audiovisual Consultant and Audiovisual Contractor.
- D. The audiovisual consultant and contractor are responsible for verifying adequate conduit and back boxes are provided for the specified system installation.
- E. The audiovisual consultant and contractor are responsible for verifying adequate power has been provided for the specified system installation.
- F. The audiovisual consultant and contractor are responsible for verifying adequate data connectivity has been provided for the specified system installation.
- G. The audiovisual consultant and contractor are responsible for verifying mounting location of all devices with TAMU-CC Division of Information Technology prior to installation.
- H. Audiovisual Contractor shall provide MAC addresses of all equipment to be connected via IP utilizing the campus network infrastructure to TAMU-CC Division of Information Technology two (2) weeks prior to installation. All equipment shall be configured for DHCP connections unless otherwise specified.

3.4 GENERAL

- A. New Buildings, Significant Construction and Significant remodels: There must be an Audiovisual Consultant and Audiovisual Contractor hired by the General Contractor that is approved by the TAMU-CC Division of Information Technology.
- B. The TAMU-CC Division of Information Technology provides only specifications of equipment, and general design guidelines in this document. The audiovisual consultant and audiovisual contractor are expected to provide all designs, formal construction documents, and coordination with General Contractor and its trades.
- C. The Contractor shall be responsible for providing all wire and cable as required for complete and operational system.
- D. The audiovisual consultant and contract shall be responsible for providing power locations and specifications for equipment.
- E. The audiovisual consultant and contract shall be responsible for providing HVAC specifications for equipment.
- F. All cables must be continuous runs from device location to the final point of termination. No mid run cable splices will be allowed.
- G. Make connections and splices with solderless devices that are mechanically and electrically secure in accordance with manufacturer's recommendations.

- H. The cable installation techniques shall be such that the mechanical and communications characteristics of the cables are not degraded at the time of installation. Any special environmental requirements for equipment shall be specified.
- I. Wiring Method: Install cables in raceways except in accessible indoor ceiling spaces, in hollow gypsum-board partitions, and as otherwise indicated. Conceal raceways and wiring except in unfinished spaces.
- J. Distribution of the cabling will be accomplished through cable trays, cable runways, conduit raceways, ducts, core holes, extended columns, false half columns and plenums. Horizontal cable segments will be placed in cable trays and when they leave cable trays will be supported by distribution rings. Where cables converge at equipment room locations, they will be supported by cable runways and distribution rings. All cable placements shall be based on the enclosed drawings.
- K. The Contractor shall not place wiring in the same conduit or raceway with wire for electrical power distribution. Industry standard signal separation should be maintained at all times.
- L. Connectors to all devices in system shall be protected against moisture. Approval of the method shall not relieve the Contractor of full responsibility for proper application and workmanship of the materials in the manner specifically approved. All connector threads shall be treated with an approved silicone lubricant.
- M. The Contractor shall be responsible for providing approved grounds for all AVS system equipment per the manufactures recommendations. The Contractor shall also be responsible for ensuring ground continuity by properly bonding all appropriate cabling, closures, cabinets, service boxes, and framework. All ground connections shall consist of minimum 12 AWG copper wire and shall be supplied from an approved building ground and bonded to the main electrical ground. Contractor must notify the Owner prior to making any changes in submitted system design and/or installation.
- N. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
- O. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- P. Grounding: Provide independent-signal circuit grounding per practices published by the manufacturer.

3.5 IDENTIFICATION, LABELING AND DOCUMENTATION

- A. The Contractor shall label all termination devices, panels, enclosures, and equipment rooms. The Contractor will mark each unit with permanently attached markings that will not impair the equipment or present a hazard to maintenance personnel.

- B. Place wire identification numbers ¼" on each end of all conductors and or connectors by using sleeve type heat shrinkable markers. Install markers to be readable from left to right or top to bottom. Wire numbers shall be computer printed (Brady TLS2200 with PermaSleeve cable marking labels or equivalent). Handwritten labels are not acceptable.
- C. Mark all spare conductors.
- D. Contractor to maintain a progress set of design documents on the Project site. These documents shall be updated daily to reflect the current condition of the work and be available for review by the Consultant, TAMU-CC Division of Information Technology, and Owner when requested.
- E. If changes occur prior to acceptance testing altering the documentation previously furnished. The Contractor shall formally update and reissue the relevant documentation to the Consultant, TAMU-CC Division of Information Technology, and Owner.
- F. Consultant, TAMU-CC Division of Information Technology, and Owner will review all documentation for accuracy and completeness and may reject substandard submittals.
- G. The Contractor shall establish and maintain complete system documentation, including documentation procedures, operational information, configuration information and drawings. Documentation shall include the following:
 - 1. Floor plan drawings indicating device locations, unique system point numbers with device legends indicating manufacturers and model numbers for each device.
 - 2. The unique system point number of a device shall identify either through the software or hardwire connection, the specific device or group of devices associated with the unique point number in the system.
 - 3. Floor plan drawings indicating conduit and wire routing and junction box locations.
 - 4. Wire routing shall include cable identification and terminal strip numbers.
 - 5. Mounting details for all equipment and hardware.
 - 6. Functional block diagrams for each system.
 - 7. Wiring details showing rack elevations, equipment wiring and terminations and inter-rack wiring.
 - 8. If applicable: Any AVS control system, digital signal processor, or audiovisual routing programming, or any other device with custom programming or configured presets, must be submitted as an uncompiled archive to TAMU-CC Division of Information Technology.
 - 9. If applicable: Any startup and shutdown procedures or special edge case documentation.
 - 10. Provide as-built / record drawing documentation in hard copy, PDF and AutoCAD formats.

3.6 FIELD QUALITY CONTROL

- A. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
- B. Pre-testing: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements.
- C. Test Schedule: Schedule tests after pre-testing has been successfully completed and system has been in normal functional operation for at least 14 days. Provide a minimum

of 10 days' notice of test schedule.

- D. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.
- E. Remove and replace malfunctioning items and retest as specified above.
- F. Record test results for each piece of equipment.
- G. Re-test: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

3.7 ADJUSTING

- A. Speaker Systems
 1. Use a minimum of three measurement locations in the system's intended coverage area to calibrate the system response.
 2. Verify system gain and amplifier levels.
 3. Verify speaker polarity
 4. Adjust appropriate speaker delays.
 5. Set and adjust limiters.
 6. Contractor shall provide for calibration of the system:
 - a. Sound analyzer (SmartLive, TEF SoundLab, Meyer's SIM or equivalent) with trained operator for adjusting and verifying delay timing, cabinet aim and equalization.
 - b. Suitable calibrated microphone.
 7. The Contractor shall coordinate this testing and calibration. It is anticipated that this work will take 1 hour per classroom. It will be necessary to have a quiet room during these times.
 8. Contractor to record all measurements, settings, and adjustment for inclusion in the O&M manuals.
- B. Adjust limit switches on electric operated projection screens.
- C. Adjust back focus on all video cameras.
- D. Occupancy Adjustments: When requested within 12 months following the of date of Substantial Completion, provide on-site assistance in adjusting systems to suit actual occupied conditions and to optimize performance of the installed equipment. Tasks shall include, but are not limited to, the following:
 1. Check cable connections.
 2. Check proper operation of equipment.
 3. Adjust all presets; consult Owner's personnel.
 4. Recommend changes to the AVS to improve Owner' utilization of the system.
 5. Provide a written report of adjustments and recommendations.
- E. Programming: The Vendor shall program all AV Systems to include power on/off, source selection, and volume in addition to room specific controls including but not limited to: audio breakaway, microphone mute, etc. All programming functions shall be coordinated with and approved by the owner before programming begins. Provide additional programming for Crestron Fusion room management system to include remote monitoring and power control for systems, where applicable. There shall be two (2) final

programming changes allowed within contract after substantial completion for fine-tuning of systems and their functions. All programming shall be submitted to TAMU-CC Division of Information Technology as an uncompiled archive at project completion.

3.8 TRAINING

- A. AVS training shall be provided for the operator/user and technical staff. Operator/user training shall minimally consist of 8 ea. 1-hour sessions. Technical operation and maintenance training session shall minimally consist of 8 ea. 1-hour session. Training sessions to be coordinated with the Owner and scheduled throughout the 1-year warranty period. **All training must be video recorded by the contractor and a copy provided to the** TAMU-CC Division of Information Technology.
- B. A complete operation and maintenance manuals and preliminary as-built drawings shall be delivered to the TAMU-CC Division of Information Technology one week prior to the training sessions.
- C. Operator/user training shall minimally consist of:
 - 1. Provide custom system specific printed reference material for each trainee that documents and explains in layman's terms:
 - a. System block diagram.
 - b. Normal day-to-day operation.
 - c. Operator selectable features.
 - d. Provide a hands-on training with Q & A session.
 - 2. Provide and review a custom, system specific, quick reference guide for the inexperienced operator.
- D. Technical Operations and Maintenance training shall consist of:
 - 1. The technical explanation shall be sufficiently thorough that: TAMU-CC Division of Information Technology shall be able to make any programming changes required, analyze malfunctions and make equipment substitutions or bypasses necessary to maintain system operation except for the malfunctioning equipment or circuits.
 - 2. Provide printed reference material for each trainee that documents and explains in technical terms:
 - a. System block diagram with technical features.
 - b. Technical operation, adjustments and programming.
 - c. System features and programming.
 - d. Review of as-built drawings.
 - e. Provide a hands-on training with Q & A session.

3.9 WARRANTY

- A. The Contractor shall warrant the system for parts and labor for a minimum of one (1) year. Warranty commences at the time of substantial project completion and acceptance by Owner. Nothing shall be construed to limit this obligation to a shorter period.
- B. Warranty service shall be rendered on-site by request of TAMU-CC Division of Information Technology to repair or replace any defective materials, equipment and workmanship without cost to the Owner, unless the Owner has previously given the Contractor a written acceptance of such condition.

- C. The Owner shall give prompt notice of the defect(s) either verbally or in writing to Contractor.
- D. Perform preventative maintenance during the warranty period, which includes:
 - 1. Cleaning and inspection of all devices every 6 months.
 - 2. Clean and vacuum console and rack equipment every 6 months.
- E. Service technician performing service / warranty work shall check-in and out with TAMU-CC Division of Information Technology for each visit.
- F. Provide a written report to TAMU-CC Division of Information Technology documenting any work performed during the warranty period within 24 hours of such event. Report shall detail work performed, equipment repaired or replaced, etc.
- G. Provide loaner equipment that is equivalent to the malfunctioning equipment for any equipment not field repairable.
- H. Repair or Replacement Service.
 - 1. Repair or replacement service during the warranty period shall be performed 7 days a week, 24 hours a day and with a 4-hour response time during normal business hours.
 - 2. Emergency repair or replacement service during the warranty period shall be performed 7 days a week, 24 hours a day and with a 1-hour response time during normal business hours.
 - 3. Contractor shall restore system operation or provide acceptable workaround during the warranty period within 2 business days of the system failure.

3.10 SUBSTANTIAL COMPLETION

- A. Work must meet the following requirements to qualify for the Owner's consideration of Substantial Completion:
 - 1. All AVS devices shall be fully installed, powered, online and fully operational.
 - 2. All sub-system interfaces must be complete and operational.
 - 3. All training complete.
 - 4. Owner may utilize the system for its designed intent.
- B. Contractor will provide a list of remaining work items and approximate completion date.
- C. Contractor will certify in writing that all remaining work is minor in nature and will be completed in less than 30 days.

3.11 TESTING REQUIREMENTS

- A. The Contractor shall perform sample tests in the presence of the Consultant, TAMU-CC Division of Information Technology, and Owner. Performing the testing procedures specified herein assures that the communication cabling and system electronics meets the performance characteristics specified.
- B. All testing shall comply with EIA/TIA Standards and that of the equipment manufacturers. If testing indicates that the performance characteristics are not met, the test shall be failed test and any other test that may be affected by the modification and/or repair shall be rerun and verified.

- C. Test equipment will be provided by the Contractor to test and to certify the 100% operational condition of all materials and equipment.
- D. The Contractor shall prepare and submit all test procedures and data forms for the pre-installation, post installation and subsystem test to TAMU-CC Division of Information Technology. The test procedures shall have TAMU-CC Division of Information Technology approval before the tests.

3.12 SYSTEM CHECK OUT AND VERIFICATION

- A. Verify continuity of cabling between field devices and controllers.
- B. Commission all devices from field to front end.
- C. Contractor supplied "As-Built" Drawings shall show conduit routing.
- D. Review all as-built documentation and Operation and Maintenance manuals with TAMU-CC Division of Information Technology. Revise and reissue as required.
- E. Provide as-built / record drawing documentation in hard copy, PDF and AutoCAD formats.
- F. Demonstrate proper sequences of operation for all devices.

3.13 FINAL ACCEPTANCE OF SYSTEMS

- A. Each area of construction completed and submitted as complete shall meet the following criteria under testing:
 - 1. System must meet all specifications as described in these instructions.
 - 2. Operational prints, manuals, signal logs, and as built prints must be furnished.
 - 3. Visual testing and signal verification will be conducted at random locations to determine that equipment performs satisfactorily.
- B. Specifications set forth for construction of the system have been devised in order to ensure system compatibility and performance. Compliance to these specifications will be determined during periodic observances of construction. Repeated failure to comply with the specification will be considered before the initial acceptance phase of the system commences.
- C. Within ten days receipt of the final acceptance notice, the Owner's and TAMU-CC Division of Information Technology's representatives shall schedule and perform the final inspection. When the work is found to be acceptable according to the agree Statement of Work and all required documentation outlined in this document have been received, TAMU-CC Division of Information Technology will declare the project complete.

EQUIPMENT AND SPECIFICATION APPENDIX

2.1 CRESTRON FUSION SOFTWARE

- A. Software

1. Provide Crestron Fusion Software and programming for occupancy sensing and remote administration of room power functions.
- B. Server is to be installed on a OFOI Server at this time.
 1. Software is to be installed on a OFOI Server at this time.

2.2 Crestron VC-4

- A. Software
 1. Provide appropriate one-time perpetual licenses for IP control of AV systems with Crestron VC-4
 2. Software is to be installed on an OFOI Server.

2.3 Standard Classrooms

- A. Projector
 1. Panasonic PT-FRZ50NU
- B. Projector Mounting
 1. Chief RPMA324 Projector Mount
 2. Chief CMS445P2 Ceiling Tile Replacement Kit
 3. Chief CMS012W or alternative as needed by space
 4. Chief SLM324 custom interface plate for PT-FRZ50NU
 5. Chief CMA472 Plenum-Rated Above-Tile Storage Accessory
 - a. All cabling run into storage box must be run through Projector Pole. Cut custom slot into pole, as necessary.
 6. Coordinate with Telecom and Electrical for Installation of infrastructure.
- C. Projection Screen
 1. Da-Lite Model C with CSR for projector screens under 110" diagonal
 2. Da-Lite Tensioned Advantage Electrol for screens over 110" diagonal
- D. Speakers
 1. Crestron Saros IC6TWT
- E. Control Panel
 1. Crestron TS-1070-B-S
- F. Room Controller
 1. Crestron VC-4
- G. Control Expansion
 1. Crestron C2N-IO-RY-104
- H. Video Switcher
 1. Crestron HD-PS401
- I. Adapter Ring
 1. Liberty DigitalLinx Adapter Ring 2.0 with Mini DisplayPort, Apple USB "C", and USB "C"
- J. Digital Signal Processing
 1. Biamp Tesira Forte-DAN-VT-4
- K. Document Camera
 1. Elmo PX-10E
- L. PTZ Camera
 1. Vaddio ConferenceSHOT 10 HD,
- M. Cable Cubby (Instructor Desk Location)
 1. Crestron FT2-202-PTL with HDMI retractor, US Dual electrical, USB-A Charger
- N. Wireless Video Receiver
 1. Crestron AirMedia 3200
- O. Wireless Microphone System
 1. Shure QLXD14/85 Lavalier Wireless System, frequency spectrum to be approved by

- TAMU-CC Division of Information Technology
- 2. 2 x Shure USB900B rechargeable battery
- 3. Shure USBC101 battery charger
- P. Audience Response Microphone System
 - 1. Shure MXA710 2' Linear Array Microphone, Aluminum, or Shure MXA710 4' Linear Array Microphone, Aluminum, as appropriate for size of space and as recommended by manufacturer.
 - 2. Biamp TesiraConnect TC-5D
- Q. Assistive Listening System
 - 1. Listen Tech LS-9001 (Provide ADA compliant kit for each room)
- R. Occupancy Sensor
 - 1. Crestron CEN-ODT-C-POE
- S. Room Scheduler
 - 1. Crestron TSS-1070-B-S-LB Kit
- T. Amplifier
 - 1. Crestron P2210T or Crestron X300 as appropriate for specified number of speakers and as recommended by manufacturer.
- U. Rack and Accessories
 - 1. Middle Atlantic CFR-14-18 if no integrated AV rack in instructor station
 - 2. Middle Atlantic IUQFP-2 Fan
 - 3. Middle Atlantic Blank Panels
 - 4. Middle Atlantic Lacing Bars
- V. Power Supply and Distribution
 - 1. Middle Atlantic RLINK-915R, coordinate with TAMU-CC Division of Information Technology staff for devices to be connected.
 - 2. Middle Atlantic PD-915R, for all other equipment

2.4 Auditorium Classrooms

- A. Projector
 - 1. Single Large Projector
 - a. Panasonic PT-MZ13K equipped with appropriate Panasonic lens dependent on throw distance, alternative Panasonic projectors as appropriate in order to meet needed contrast ratio and lumen output required for space. Deviations to be approved by TAMU-CC Division of Information Technology.
 - 2. Multiple Projectors
 - a. Panasonic PT-FRZ50 or Panasonic alternatives dependent on needs of space, and contrast ratio and lumen output required for space. Deviations to be approved by TAMU-CC Division of Information Technology.
- B. Projector Mounting
 - 1. Single Large Projector
 - a. Chief VCMU – Heavy Duty Projector Mount if serviceable from within ten (10) feet of ground level
 - b. Chief CMS012B or appropriate length for installation
 - 2. Multiple Projectors
 - a. Chief RPMA324 Projector Mount
 - b. Chief CMS445P2 Ceiling Tile Replacement Kit
 - c. Chief CMS012W or alternative as needed by space
 - d. Chief SLM324 custom interface plate for PT-FRZ50NU
 - e. Chief CMA472 Plenum-Rated Above-Tile Storage Accessory
 - f. Coordinate with Telecom and Electrical for Installation of infrastructure.
- C. Projection Screen

1. Da-Lite Da-Snap fixed frame screen
2. Alternative: Da-Lite Advantage Electrol electric projector screen
- D. Confidence Monitor(s)
 1. NEC M series display(s) of appropriate size
 - a. NEC M431/M491/M551/M/651
- E. Speakers
 1. Crestron Saros IC6TWT
- F. Control Panel
 1. Crestron TS-1070-B-S
- G. Room Controller
 1. Crestron VC-4
- H. Control Expansion
 1. Crestron C2N-IO-RY-104
- I. Video Switcher
 1. Crestron HD-PS401
- J. Adapter Ring
 1. Liberty DigitalLinx Adapter Ring 2.0 with Mini DisplayPort, Apple USB "C", and USB "C"
- K. Digital Signal Processing
 1. Biamp Tesira Forte-DAN-VT-4 as appropriate for application
- L. Document Camera
 1. Elmo PX-10E
- M. PTZ Camera
 1. Vaddio ConferenceSHOT 10 HD,
- N. Cable Cubby (Instructor Desk Location)
 1. Crestron FT2-202-PTL with HDMI retractor, US Dual electrical, USB-A Charger
- O. Wireless Video Receiver
 1. Crestron AirMedia 3200
- P. Wireless Microphone System
 1. Shure QLXD14/85 Lavalier Wireless System, frequency spectrum to be approved by TAMU-CC Division of Information Technology
 2. Shure USB900B
 3. Shure USBC101
- Q. Audience Response Microphone System
 1. Catchbox or alternative to be approved by TAMU-CC Division of Information Technology
- R. Assistive Listening Transmitter
 1. Listen Tech LS-9001 (Provide ADA compliant kit for each room)
- S. Occupancy Sensor
 1. Crestron CEN-ODT-C-POE
- T. Room Scheduler
 1. Crestron TSS-1070-B-S-LB Kit
- U. Amplifier
 1. Crestron P2210T or appropriate Crestron alternative as appropriate for specified number of speakers and as recommended by manufacturer.
- V. Rack and Accessories
 1. Middle Atlantic CFR-14-18
 2. Middle Atlantic IUQFP-2 Fan
 3. Middle Atlantic Blank Panels
 4. Middle Atlantic Lacing Bars
- W. Power Supply and Distribution
 1. Middle Atlantic RLINK-915R, coordinate with TAMU-CC Division of Information Technology for devices to be connected.

2. Middle Atlantic PD-915R, for all other equipment

2.5 Specialty Classrooms

- A. All Items
 1. Work with TAMU-CC Division of Information Technology to identify equipment or verify designs.

2.6 Small CONFERENCE ROOM

- A. Display
 1. NEC M551/M651 dependent on size display called for in room
- B. Display Mounting
 1. Chief PAC525FBP2 Backbox with 2 Receptable Filter and Surge (By Electrician)
 2. Chief LSMU micro-adjustable fixed wall display mount
- C. Keypad Controller
 1. Crestron MPC3-302-B
- D. Adapter Ring
 1. Liberty DigitalX Adapter Ring 2.0 with Mini DisplayPort, Apple USB "C", and USB "C"
- E. Wireless Video Receiver
 1. Crestron AirMedia 3200
- F. Unified Soundbar/Microphone/Camera
 1. Crestron UC-SB1-CAM
- G. Table Connectivity
 1. FF&E shall provide a table with (1) HDMI.
 2. AV Contractor shall provide transmitters, receivers, and cabling from display to passthrough plate.

2.7 Medium CONFERENCE ROOM

- A. Display
 1. NEC C750Q
 2. Panasonic PT-VMZ51U/PT-VMZ61U/PT-MZ71U
- B. Display Mounting
 1. For Flat-panel installation
 - a. Chief PAC525FBP2 Backbox with 2 Receptable Filter and Surge (By Electrician)
 - b. Chief LSMU micro-adjustable fixed wall display mount
 2. For Projector installation
 - a. Chief RPMA Elite locking mount
 - b. Chief SLM345
 - c. Chief CMS012W or alternative pipe length as needed by space
 - d. Chief CMS445P2 ceiling tile replacement kit with electrical
- C. Keypad Controller
 1. Crestron TS-1070-B-S
- D. Room Controller
 1. Crestron VC-4
- E. Adapter Ring
 1. Liberty DigitalX Adapter Ring 2.0 with Mini DisplayPort, Apple USB "C", and USB "C"
- F. Wireless Video Receiver
 1. Crestron AirMedia 3200
- G. Amplifier
 1. Crestron X300

- H. Speakers
 - 1. Crestron Saros IC6TWT
- I. Microphone
 - 1. Biamp Parle TCM-XA ceiling microphone
- J. Digital Signal Processor
 - 1. Biamp Tesira X400
- K. Camera
 - 1. Vaddio ConferenceSHOT 10 HD
- L. Table Connectivity
 - 1. FF&E shall provide a table with (1) HDMI.
 - 2. AV Contractor shall provide transmitters, receivers, and cabling from display to passthrough plate.

2.8 Large/Executive CONFERENCE ROOM

- A. Display
 - 1. Panasonic PT-VMZ51U/PT-VMZ61U/PT-VMZ71U selection dependent on lighting conditions
- B. Display Mounting
 - 1. Chief RPMA Elite locking mount
 - 2. Chief SLM345
 - 3. Chief CMS012W or alternative pipe length as needed by space
 - 4. Chief CMS445P2 ceiling tile replacement kit with electrical
- C. Keypad Controller
 - 1. Crestron TST-902
- D. Adapter Ring
 - 1. Liberty DigitalnX Adapter Ring 2.0 with Mini DisplayPort, Apple USB "C", and USB "C"
- E. Wireless Video Receiver
 - 1. Crestron AirMedia 3200
- F. Amplifier
 - 1. Crestron X300
- G. Speakers
 - 1. Crestron Saros IC6TWT
- H. Microphone
 - 1. Biamp Parle TCM-XA ceiling microphone
- I. Digital Signal Processor
 - 1. Biamp Tesira X400
- J. Camera
 - 1. Vaddio ConferenceSHOT 10 HD
- K. Table Connectivity
 - 1. FF&E shall provide a table with (1) HDMI.
 - 2. AV Contractor shall provide transmitters, receivers, and cabling from display to passthrough plate.

2.9 Huddle Spaces

- A. Display
 - 1. NEC M551/M651
- B. Display Mounting
 - 1. Chief PAC525FBP2 Backbox with 2 Receptable Filter and Surge (By Electrician)
 - 2. Chief LSMU
- C. Keypad Controller

- 1. Crestron MPC3-302-B
- D. Adapter Ring
 - 1. Liberty DigitalLinx Adapter Ring 2.0 with Mini DisplayPort, Apple USB "C", and USB "C"
- E. Wireless Video Receiver
 - 1. Crestron AirMedia 3200
- F. Input Plate
 - 1. Provide HDMI & USB Passthrough Connection plate.

2.10 DIGITAL SIGNAGE

- A. Display
 - 1. NEC M551
 - 2. Chief LSMU
- B. Recessed Display Mounting
 - 1. Chief PAC525FBP2 Backbox with 2 Receptable Filter and Surge (By Electrician)
 - 2. Chief FCAV1U Pull-Out Accessory & LSM1U Mount

2.11 Distributed Audiovisual Systems

- A. Use of AVoIP solutions
 - 1. Crestron NVX

2.12 Unique or Specific Audiovisual Applications

- A. Video Walls
 - 1. Planar Carbonlight 2.5mm
- B. Video Production Equipment
 - 1. Blackmagic Design production switchers
 - 2. Canon video cameras
 - 3. NewTek Tricaster
- C. Audio equipment
 - 1. QSC TouchMix 30

2.13 INTERACTIVE DIRECTORY

- A. Display
 - 1. NEC M491-PT capacitive touch monitor
- B. Kiosk Hardware
 - 1. For floor-based installation
 - a. Chief Impact Series Kiosk LF49UWP
 - 2. For wall mount-based installation
 - a. Chief Impact Series Kiosk LW49UWP

2.14 CABLING

- A. 70V Speaker Cabling
 - 1. West Penn Wire 16/2C Plenum or approved equal.
- B. Microphone Cabling
 - 1. West Penn Wire 22/2 shielded or approved equal.
- C. Digital Media Cabling
 - 1. Crestron DM-CBL-ULTRA-P or approved equal.
 - 2. This cabling shall be required for all cables connecting Crestron Digital Media

- equipment.
- 3. Only Crestron terminations are to be used with this cabling.
- D. Cat6A/Infrastructure Network and AVoIP Cabling
 - 1. Refer to Section 27 15 00 for Horizontal Cabling Requirements.
 - 2. Unless otherwise specified patch cables may be Leviton Small OD High-Flex Cat6A Patch cords
 - 3. No 'Passthrough' or 'EZ-RJ45' terminations are to be used.
 - 4. Each design should account for at least one dedicated network port for all network capable equipment.
- E. Miscellaneous AV cabling using Category cables
 - 1. West Penn Wire Cat6+ Plenum for any in wall or above ceiling runs
 - 2. West Penn Wire Cat6 UTP CMR for custom length patch cables
 - 3. No Passthrough or EZ-RJ45 terminations are to be used
- F. Floor boxes, Wall plates, and Cabling
 - 1. All floor boxes and wall plates that contain Audiovisual equipment or cabling terminations should be of adequate size to contain all specified equipment without modification.
 - 2. Cabling to floor boxes and wall plates should terminate in floorbox or wall plate and utilize patch cables for remaining runs to all equipment
- G. HDMI Cabling
 - 1. Kramer C-HM/HM/ETH
 - a. Distances over 15 feet should utilize alternative connections if needing 3840x2160p 60 Hz 4:4:4 signal capabilities, Distances over 35 feet should utilize alternative connections if needing 3840x2160p 60Hz 4:2:0 signal capabilities
 - 2. Kramer CP-HM/HM/ETH
 - a. Distances over 15 feet should utilize alternative connections if needing 3840x2160p 60 Hz 4:4:4 signal capabilities. Distances over 35 feet should utilize alternative connections if needing 3840x2160p 60Hz 4:2:0 signal capabilities.
 - 3. Kramer CP-AOCH/60
 - a. May be used for HDMI cable runs over 35 feet that require 3840*2160p 60Hz 4:2:0 signal capabilities. Significant cable runs should use alternative connections such as Crestron DM, or AVoIP with appropriate transmitters and receivers.
- H. Cable Coloring
 - 1. All Audiovisual cable coloring shall be coordinated with TAMU-CC Division of Information Technology before purchase.
- I. Cabling Pathways
 - 1. Refer to Section 27 05 28 for Cable Pathway requirements.

END OF SECTION