



**ADDENDUM #3** – This addendum forms part of the Contract Documents and modifies the original Contract Documents. All other parts of the Contract Documents remain unchanged. Offerors must acknowledge receipt of this addendum in the Proposal.

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**DOCUMENT 00 9113 – ADDENDUM #3**

**1.3 PROJECT INFORMATION**

- A. Project Name: **Sandoval County Sheriff & Emergency Operation Center**
- B. Owner Project Number: **FY22-SCPW-05**
- C. Owner: **Sandoval County**
- D. Architect: **RMKM Architecture, P.C.**
- E. RMKM Architect Project Number: **1904**
- F. Date of Addendum: **18 February 2022**

**1.4 NOTICE TO BIDDERS**

- A. This Addendum is issued to all registered plan holders pursuant to the Instructions to Bidders and Conditions of the Contract. This Addendum serves to clarify, revise, and supersede information in the Project Manual, Drawings, and previously issued Addenda. Portions of the Addendum affecting the Contract Documents will be incorporated into the Contract by enumeration of the Addendum in the Owner/Contractor Agreement.
- B. The Contractor shall acknowledge receipt of this **Addendum 03**. Please email Leslie Olivas at [ldolivas@sandovalcountynm.gov](mailto:ldolivas@sandovalcountynm.gov) and Mark Hatzenbuhler at [mhatzenbuhler@sandovalcountynm.gov](mailto:mhatzenbuhler@sandovalcountynm.gov) for acknowledgement and any additional questions.

**1.5 SHEETS:**

- A. E-701
  - 1. Type U1 Change.
    - a. Description
      - 4'X1.37" Adjustable linear luminaire with a single driver. Driver to be located at or near luminaire location. Wet rated where installed outdoors. Provide with hinge mounting.
    - b. Voltage
      - 120V
    - c. Mounting
      - Surface mount to top of cloud. Refer to architectural details of cloud for additional information.
    - d. Lens
      - 120 degree asymmetric spread polycarbonate clear lens
    - e. Catalog numbers indicated are the same.
  - 2. Type U3 Delete entirely.
- B. T-602
  - a. Add sheet in its entirety. AV Functional Line Diagrams.
- C. 27 4100 – specification
  - a. Update Appendix A at the end of spec section to include updated parts list
- D. 27 1500 – specification
  - a. Update acceptable manufactures.



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1.6 QUESTIONS:

1. Questions regarding the AV Systems for the Sandoval Sheriff's Office and Emergency Operations Center:

- a) Is a list of basis of design parts available for the AV Systems described in 27-4100?

**Answer:** Yes, Please see attached updated specification 27 4100 Audio-Visual Systems\_ADDENDUM 3.

- b) Are there any AV System one lines available?

**Answer:** Please see attached new sheet T-602 and specification 27 4100 Audio-Visual Systems\_ADDENDUM 3.

2. The Schedule of Allowances (spec. 012100-3.3) lists \$75,000.00 for planning & installation of irrigation & landscaping, but plan sheet AS-101 already shows a landscaping plan. Please clarify if bidders should use the landscaping plan provided or create a new plan.

**Answer:** The approved Landscape Plan is provided for general reference with the intension of fulfilling La Plazuela Master Plan requirements within the allowance amount specified. The revised amount for the Landscape Allowance will now be \$210,000 for planning & installation of irrigation & landscaping.

3. Specification Volume 1 pg 9 - Notice of Invitation to Bid states Bid Date as 3/8/2022 in the first paragraph whereas below in the sequence of events it states item 6 states submission of sealed bids 3/15/2022, which is the correct bid date?

**Answer:** Please reference Addendum 1, 1.5 Attachments, Section D for the proper sequence of events: Correct date is 3/15/2022 for submission of sealed bids.

4. Specification Volume 1 pg 9 – Notice of Invitation to Bid, Sequence of Events item 4 Deadline to Submit Questions is 1/25/2022 and item 5 Response to Written Questions is 2/4/2022, are these correct dates? That gives us only 1 week from pre-bid to ask questions and then 1 week for you to respond to the questions, and then over a month until bid date. Can these dates be changed or were they supposed to be 2/25/2022 and 3/4/2022 which would still give over a week from response to questions until bid date?

**Answer:** Please reference Addendum 1, 1.5 Attachments, Section D for the proper sequence of events: Correct date is 2/18/2022 for response to written questions.



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5. I need clarification on the window sill in Room 130 Booking. Elevation 2/A402 indicates the coiling counter door as relocated. Does this include the stainless steel sill as a relocated item?

**Answer:** Yes, please reference detail 23/A402 and note: “Evidence lockers and counter coiler door assembly. All items to be relocated from existing Sheriff’s Facility and installed by contractor. Also reference Specification Section 10 5113, Part 1.3 A.2: “Mounting: Extra parts which may required to be verified by Contractor.” See existing photos below:



Lobby Side



Evidence Room Side



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6. Can we get specific information regarding the additional EG sign requirement noted on General Note A, Sheet EL101 that is mounted 12" AFF? Is the EG sign a light fixture, or just a sign? Is it an EXIT sticker? Does it actually go below every exit light in the building or just below the exit lights at the door ways? Can a part # be provided?

**Answer:** There are no EG type exit signs. General Note A should read as follows: "All exit signs are type E1 (Single Face) or E2 (Double Face). All exit signs will be connected to the circuit serving the room they are located in and from no other circuit."

7. Are bid submissions due on 3/8/2022 or 3/15/2022? Both dates are listed on sheet 4A-7 of the specifications.

**Answer:** Please reference Addendum 1, 1.5 Attachments, Section D for the proper sequence of events: Correct date is 3/15/2022 for submission of sealed bids.

8. Please clarify PNM's scope of work versus the electrical contractor's scope of work, with regards to the primary distribution between the existing transformer and the new utility transformer. Who furnishes and installs conduit, wire, and terminations? See ES101 keyed note #5, ES102 keyed note #3, and E601 keyed note #2.

**Answer:** This is to be coordinated with PNM prior to commencement of any work as notes indicate. PNM has indicated via email that they and the contractor will do the following: **"You will install the transformer pad and the conduit stub outs. PNM will handle the boring/trenching of the new conduit, wires, transformer, fusing, etc. to complete the project. I will send you a standard procedure letter once we get closure to construction. This will spell out all that is required from the customer."** When contractor coordinates this work with PNM service guide and PNM Representative prior to commencement of any work for further details will be vetted by the contractor.

9. There is no type U1 fixture listed in the lighting schedule. Please provide.

**Answer:** Type "U1" will be provided in the final addendum; it will be a strip type luminaire. Type "U3" in Luminaire schedule is **not** used in this project. See page 1, note 1.5 A.

10. Division 27 1500 lists Bertek / Leviton for communication cabling/connectivity solution. Is Essex / Ortronics an acceptable solution? Essex/Ortronics is equal or better performance, is more cost



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effective, can provide same or better warranty, and can provide LEED points if needed. Essex / Ortonics surpasses the performance standards listed in the specifications.

**Answer:** Essex/Ortonics is an acceptable solution. Please see attached Appendix “A” for Basis of Design for A/V system configuration. This is NOT a LEED Project. And attached updated specification 27 1500 – Communications Horizontal Cabling\_Final Addendum.

11. There is no description for keyed note #5 for sheet EL102 room #213. Please provide.

**Answer:** Delete note #5 from this room. Notes have been updated on EL102.

**END OF ADDENDUM 3**

**SECTION 27 1500 - COMMUNICATIONS HORIZONTAL CABLING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Contractor is responsible for providing and installing a complete "turn-key" Category 6 Infrastructure Cabling system that meets or exceeds the specifications listed below. (Contractor to use Category 6A cabling for the Wireless Access Points throughout the building)

**1.2 SUMMARY**

- A. Section Includes:
  - 1. UTP cabling, (Category 6).
    - a. Category 6 for desk top applications
    - b. Category 6 for WAP's
  - 2. Multiuser telecommunications outlet assemblies.
  - 3. Cable connecting hardware, patch panels and cross-connects.
  - 4. Telecommunications outlet/connectors.
  - 5. Cabling system identification products.
  - 6. Cable management system.
- B. Related Requirements:
  - 1. Section 27 1300 "Communications Backbone Cabling" for voice and data cabling associated with system panels and devices.

**1.3 DEFINITIONS**

- A. BICSI: Building Industry Consulting Service International.
- B. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- C. EMI: Electromagnetic interference.
- D. IDC: Insulation displacement connector.
- E. LAN: Local area network.
- F. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
- G. RCDD: Registered Communications Distribution Designer.

- H. UTP: Unshielded twisted pair.

#### 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate layout and installation of telecommunications cabling with Owner's telecommunications and LAN equipment and service suppliers.
- B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
  - 2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
  - 3. Cabling administration drawings and printouts.
  - 4. Wiring diagrams to show typical wiring schematics, including the following:
    - a. Cross-connects.
    - b. Patch panels.
    - c. Patch cords.
  - 5. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
- C. Samples: For workstation outlets, jacks, jack assemblies, in specified finish, one for each size and outlet configuration and faceplates for color selection and evaluation of technical features.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For splices and connectors to include in maintenance manuals.
- B. Software and Firmware Operational Documentation:
  - 1. Software operating and upgrade manuals.
  - 2. Program Software Backup: On magnetic media or compact disk, complete with data files.
  - 3. Device address list.
  - 4. Printout of software application and graphic screens.

#### 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Patch-Panel Units: One of each type.
  - 2. Connecting Blocks: One of each type.
  - 3. Device Plates: One of each type.

4. Multiuser Telecommunications Outlet Assemblies: One of each type.

#### 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
  1. Layout Responsibility: Preparation of Shop Drawings and Cabling Administration Drawings, Cabling Administration Drawings, and field testing program development by an RCDD.
  2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician, or Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
  3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- B. Testing Agency Qualifications: An NRTL.
  1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

#### 1.9 QUALIFICATIONS

- A. Communications Cabling: The Contractor shall have (5) five years of documented experience performing cable placement, splicing, termination, connecting, and testing for each of the media types and (3) three years of applicable experience with the proposed system manufacturer. In the case of newer technologies that do not have a (3) three year history, the Contractor shall have documented experience for at least half of the lifetime of the new technology. The approved contractor shall, at a minimum, maintain a ratio of one manufacturer or BICSI certified installer for every two non-certified installers assigned to the project.
- B. The contractor shall have on staff a BICSI Certified RCDD as a permanent employee. This staff member shall have been on staff for a minimum of (1) one year prior to the date of this projects release for bid.
- C. The contractor shall have on staff at least (1) one BICSI Certified Technician and this staff member shall have been a full time employee for no less than (1) one year prior to the date of this projects release for bid. A BICSI Certified Technician shall be employed as the on-site Field Supervisor for this project.
- D. The contractor shall provide resumes for the Project Manager, Supervisors and any skilled technicians or installers. Each resume shall include applicable certification documents provided by the manufacturer or BICSI.
  1. Project Manager, Supervisors, and Principal Skilled Technicians: minimum of (5) five years' experience in like work.
  2. Category 6 Unshielded Twisted Pair and Fiber Optic Cable Technicians: documented training, licensing, and/or certification for the types of media specified, as applicable as well as certification from the manufacturer of the solution chosen by the owner.

#### 1.10 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, qualified layout technician, installation supervisor, field inspector and company. The contractor shall provide resumes for the Project Manager, Supervisors and any skilled technicians or installers. Each resume shall include applicable certification documents provided by the manufacturer or BICSI.



1. Project Manager, installation supervisor, and Principal Skilled Technicians: As a minimum be required to have no less than (5) five years' experience in like work.
  2. The Company/Contractor proposing shall provide historical data confirming the company has a minimum of (5) five years applicable experience.
  3. The Company/Contractor shall have a minimum of (3) three projects of similar size and type within the last (2) years. References for all submitted projects are required to assist with the evaluation.
- B. Category 6 Unshielded Twisted Pair and Fiber Optic Cable Technicians: Documented training, licensing, and/or certification for the types of media specified, as applicable as well as certification from the manufacturer of the solution chosen by the owner.
- C. Source quality-control reports.
- D. Field quality-control reports.

#### 1.11 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
1. Test optical fiber cables to determine the continuity of the strand end to end. Use optical fiber flashlight or optical loss test set.
  2. Test optical fiber cables while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; including the loss value of each. Retain test data and include the record in maintenance data.
  3. Test each pair of UTP cable for open and short circuits.

### PART 2 - PRODUCTS

#### 2.1 HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called a "permanent link," a term that is used in the testing protocols.
1. TIA/EIA-568-B.1 requires that a minimum of two telecommunications outlet/connectors be installed for each work area.
  2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
  3. Bridged taps and splices shall not be installed in the horizontal cabling.
  4. Splitters shall not be installed as part of the optical fiber cabling.
- B. A work area is approximately 100 sq. ft., (9.3 sq. m), and includes the components that extend from the telecommunications outlet/connectors to the station equipment.
- C. The maximum allowable horizontal cable length is 295 feet, (90 m). This maximum allowable length does not include an allowance for the length of 16 feet, (4.9 m), to the workstation equipment or in the horizontal cross-connect.

## 2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1 when tested according to test procedures of this standard.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 50 or less.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Grounding: Comply with J-STD-607-A.

## 2.3 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches, (19 by 1220 by 2440 mm). Comply with requirements in Section 061000 "Rough Carpentry" for plywood backing panels.

## 2.4 UTP CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Berk-Tek (blue in color)
  - 2. Superior Essex
  - 3. Customer and consultant Approved equal
- B. Description: 100-ohm, four-pair UTP, covered with a blue thermoplastic jacket.
  - 1. Comply with ICEA S-90-661 for mechanical properties.
  - 2. Comply with TIA/EIA-568-B.1 for performance specifications.
  - 3. Comply with TIA/EIA-568-B.2 Category 6 and 6A.
  - 4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
    - a. Communications, Plenum Rated: Type CMP, complying with NFPA 262.

## 2.5 UTP CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Leviton (Blue in color)
  - 2. Ortonics
  - 3. Customer and consultant approved equal

- B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
- C. Category 6 Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
  - 1. Number of Jacks per Field: One for each four-pair UTP cable indicated conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria.
- D. Category 6 Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.
- E. Patch Panels:
  - 1. Leviton Category 6
  - 2. Ortronics
  - 3. Owner and Consultant approved equal
- F. Patch Cords: Factory-made, (of same cabling solution manufacturer), Category 6, four-pair cables; terminated with eight-position modular plug at each end.
- G. Manufactures:
  - 1. 5' length
  - 2. – 10' length.
  - 3. Customer and consultant approved equal.
  - 4. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.
  - 5. Patch cords shall have color-coded boots for circuit identification.

## 2.6 TELECOMMUNICATIONS OUTLET/CONNECTORS

- A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-B.1.
- B. Workstation Outlets; Four-port-connector assemblies mounted in single or multi-gang faceplate.
  - 1. Plastic Faceplate: High-impact plastic. Coordinate color with Section 262726 "Wiring Devices."
  - 2. Metal Faceplate: Stainless steel, Brass, complying with requirements in Section 262726 "Wiring Devices."
  - 3. For use with snap-in jacks accommodating any combination of UTP, optical fiber, and coaxial work area cords.
    - a. Flush mounting inserts, Blue in color.
  - 4. Legend: Factory labeled by silk-screening or engraving for stainless steel or brass faceplates.
  - 5. Legend: Machine printed, in the field, using adhesive-tape label.
  - 6. Legend: Snap-in, clear-label covers and machine-printed paper inserts.

## 2.7 GROUNDING

- A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.

- B. Comply with J-STD-607-A.

## 2.8 IDENTIFICATION PRODUCTS

- A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- B. Comply with requirements in Section 26 0553 "Identification for Electrical Systems."

## 2.9 CABLE MANAGEMENT SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. iTRACS Corporation, Inc.
  - 2. TelSoft Solutions.
- B. Description: Computer-based cable management system, with integrated database and graphic capabilities.
- C. Document physical characteristics by recording the network, TIA/EIA details, and connections between equipment and cable.
- D. Information shall be presented in database view, schematic plans, or technical drawings.
  - 1. Microsoft Visio Professional or AutoCAD drawing software shall be used as drawing and schematic plans software.
- E. System shall interface with the following testing and recording devices:
  - 1. Direct upload tests from circuit testing instrument into the personal computer.
  - 2. Direct download circuit labeling into labeling printer.

## 2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.
- C. Factory test UTP cables according to TIA/EIA-568-B.2.
- D. Factory test multimode optical fiber cables according to TIA-526-14-A and TIA/EIA-568-B.3.
- E. Cable will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 ENTRANCE FACILITIES

- A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

### 3.2 WIRING METHODS

- A. Install cables in pathways and cable trays except within consoles, cabinets, desks and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal pathways and cables except in unfinished spaces.
  - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
  - 2. Comply with requirements in Section 270528 "Pathways for Communications Systems."
  - 3. Comply with requirements in Section 270536 "Cable Trays for Communications Systems."
- B. Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures:
  - 1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
  - 2. Install lacing bars and distribution spools.
  - 3. Install conductors parallel with or at right angles to sides and back of enclosure.

### 3.3 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
  - 1. Comply with TIA/EIA-568-B.1.
  - 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
  - 3. Install 110-style IDC termination hardware unless otherwise indicated.
  - 4. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
  - 5. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches, (760 mm) and not more than 6 inches, (150 mm), from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
  - 6. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
  - 7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
  - 8. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
  - 9. Cold-Weather Installation: Bring cable to room temperature before de-reeling. Heat lamps shall not be used for heating.
  - 10. In the communications equipment room, install a 10-foot, (3-m), long service loop on each end of cable.
  - 11. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
- C. UTP Cable Installation:
  - 1. Comply with TIA/EIA-568-B.2.

2. Do not untwist UTP cables more than 1/4 inch (6.35 mm) from the point of termination to maintain cable geometry.

D. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches, (200 mm), above ceilings by cable supports not more than 60 inches, (1524 mm), apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

E. Group connecting hardware for cables into separate logical fields.

F. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-B for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

### 3.4 FIRESTOPPING

- A. Comply with requirements in Section 07 8413 "Penetration Firestopping."
- B. Comply with TIA-569-B; Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

### 3.5 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding and Electrical Protection" Chapter.
- B. Comply with J-STD-607-A.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch, (50-mm), clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

### 3.6 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Section 26 0553 "Identification for Electrical Systems."
  - 1. Administration Class: 4, TIA/EIA-606-A.
  - 2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.
- B. Using cable management system software specified in Part 2, develop Cabling Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation. At completion, cable and asset management software shall reflect as-built conditions.
- C. Comply with requirements in Section 09 9123 "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
- D. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 4 level of administration, including optional identification requirements of this standard.
- E. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- F. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.
- G. Cable and Wire Identification:
  - 1. Label each cable within 4 inches, (100 mm), of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
  - 2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
  - 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet, (4.5 m).
  - 4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
    - a. Individually number wiring conductors connected to terminal strips and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device, shall be identified with name and number of particular device as shown.

- b. Label each unit and field within distribution racks and frames.
- 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- H. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.
  - 1. Cables use flexible vinyl or polyester that flex as cables are bent.

### 3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
  - 2. Visually confirm Category 6 marking of outlets, cover plates, outlet/connectors and patch panels.
  - 3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
  - 4. Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
    - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments, (Normative)," Annex, complying with measurement accuracy specified in "Measurement Accuracy, (Informative)," Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- 5. UTP Performance Tests:
  - a. Test for each outlet and MUTOA. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:
    - 1) Wire map.
    - 2) Length (physical vs. electrical, and length requirements).
    - 3) Insertion loss.
    - 4) Near-end crosstalk (NEXT) loss.
    - 5) Power sum near-end crosstalk (PSNEXT) loss.
    - 6) Equal-level far-end crosstalk (ELFEXT).
    - 7) Power sum equal-level far-end crosstalk (PSELFEXT).
    - 8) Return loss.
    - 9) Propagation delay.
    - 10) Delay skew.



6. Final Verification Tests: Perform verification tests for UTP and optical fiber systems after the complete communications cabling and workstation outlet/connectors are installed.
  - a. Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.
  - b. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.
- D. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

### 3.8 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning with Substantial Completion, provide software support for two, (2), years.
- B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two, (2), years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
  1. Provide thirty, (30), days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

### 3.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets. Include training in cabling administration software.

### 3.10 SYSTEM WARRANTY

- A. Contractor shall perform all labeling requirements and provide testing documentation for verification as described herein.
- B. Contractor shall submit cable records to reflect all moves, adds, and changes.
- C. Contractor shall provide site plans showing locations of all telecommunication routes. See Item 3.06.
- D. Contractor shall submit final paperwork for warranty to manufacturer and a copy to the Owner one week prior to the substantial completion date.
- E. Contractor must be a certified as required by the owner and approved solution supplier such as Mohawk, Berk-Tek, Ortronics, and Siemens.

- F. Contractor must offer a minimum 20-year extended manufacturer's warranty for the premises fiber cabling solution comprised of approved manufacturer products and must follow all warranty registration procedures set forth by the manufacturer, including submitting all required documentation to the manufacturer for warranty certification.
- G. All installed equipment must conform to the manufacturer's official published specifications. The warranty shall begin at the system acceptance date and remain in effect for a period of 20 years (minimum) from that date. The contractor shall agree to repair, adjust, and/or replace, as determined by the owner and to replace defective equipment, materials, or other parts of the system at the contractor's sole cost. Owner will incur no costs for service or replacement of parts during the warranty period of 20 years. All third party warranties shall be passed through from the contractor to the owner.
- H. Contractor shall warrant that the system will function as specified in the approved manufacturer's Technical Description Guide.
- I. Contractor shall warrant that the system shall accommodate the specifications in all appropriate sections of this Request for Proposal and all applicable sections of the owners Specifications.

**END OF SECTION 27 1500**

**SECTION 27 4100 - AUDIO-VISUAL SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SCOPE OF WORK**

- A. Work covered by this Section shall consist of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified, and in performing the following operations recognized as necessary for the installation, termination, testing and labeling of all telecommunications infrastructure as described on the Drawings and/or required by these specifications.
  - 1. Furnishing equipment, cabling, supplies, and materials
  - 2. Furnishing labor for installation, testing, software programming, and user training.
  - 3. Third party testing and commissioning
  - 4. Service and maintenance contract
  - 5. All other operations that are not explicitly described herein but are necessary for a complete functioning system which shall adhere to the performance parameters as described on the drawings and/or required by these specifications.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
  - 1. Division 11, Section 11 5213, Projection Screens.
  - 2. Division 26, Section 26 0500 "Common Work Results for Electrical": Power supply, conduit and wiring.
  - 3. Division 27, Section 27 0500, Common Work Results for Communications.
  - 4. Division 27, Section 27 1622, Cabling for Audio-Visual Systems.
  - 5. Division 27, Section 27 4111, Projector Mounts

**1.3 REFERENCES**

- A. Underwriters Laboratories Inc. (UL)
- B. International Code Council (ICC):
  - 1. International Building Code, Latest Edition adopted by State of New Mexico current Commercial Building Code.

**1.4 DEFINITIONS**

- A. Terms:
  - 1. Bidder: Entity generating the bid response.
  - 2. Contractor: Successful Bidder to whom the Owner has awarded the contract.
  - 3. Installer (a.k.a. "Audiovisual Systems Integrator" or similar): Actual entity providing the audiovisual systems installation. Generally equivalent to "Contractor" or else a sub-contractor hired by the Contractor.
  - 4. Furnish: Indicates the responsibility to ship or deliver the item to the job site, freight prepaid, for receipt, staging and installation by others.

5. Install or Installation: Indicates the responsibility of receiving the item at the job site, providing adequate storage, unpacking or uncrating the item, physically securing the item or otherwise making ready the item for its intended use by following the instructions and approved methods of the manufacturer and those contained herein.
6. Provide: Indicates the responsibility to both "Furnish" and "Install."
7. Installation Materials: Shall refer to installed materials which may or may not be explicitly specified herein, but which are essential to a complete functioning system such as the following:
  - a. Concealed cabling, exposed and/or loose cabling, cable terminations, cable adapters, cable management, cable labeling, cable dressing, and patch cords (voice, data, audio and/or video)
  - b. Custom connection panels and/or blank cover panels for rough-in devices (wall boxes, floor boxes, ceiling boxes, cubbies) or rack-mounted termination/patch fields.
  - c. Equipment rack fit-out accessories: Ganging hardware, leveling feet, floor anchors, raised floor pedestals, riser bases, caster bases, doors, locks, side panels, rear panels, top panels, vent blockers, ventilation fans, thermostats, power distribution strips, grounding lugs, grounding bus bars, vertical & horizontal cable lacing bars, rack and/or equipment labels, rack shelves, rack mounts, rack storage drawers, security rack panels, blank rack panels, and rack header identification panels.
  - d. Any unmentioned materials as needed to install the systems defined herein.
8. NIC or Not In Contract: Equivalent to "Provided by Others".
9. OFOI or Owner Furnished Owner Installed: Shall refer to equipment that will be furnished by the Owner for installation by the Owner.
10. The term "shall" is mandatory; the term "will" is informative; and the term "should" is advisory.
11. Format or Aspect Ratio: Proportion of image area expressed as a ratio of width/height.
  - a. 4:3 or "NTSC" or "SD" or "SDTV" or "Legacy Video" Format: 1.33:1.
  - b. 16:9 or "HD" or "HDTV" Wide Format: 1.78:1.
  - c. 16:10 or "Computer" Wide Format: 1.60:1.

B. Acronyms:

1. ADA: Americans with Disabilities Act
2. ALS: Assistive Listening System intended for persons with hearing disabilities
3. AV: Audio-Video or Audio-Visual
4. BGM: Background Music
5. CATV: Community Access Television (aka "cable television")
6. CPU: Central Processing Unit
7. DSP: Digital Signal Processor
8. DVD: Digital Video Disc or Digital Versatile Disc. This acronym refers to the standard optical disc format for playback of audiovisual and/or multi-media.
9. FPD: Flat Panel Display
10. FM: Frequency Modulation. Also refers to the electromagnetic band of frequencies between 88 – 108 MHz used for radio broadcasting within the United States.
11. IP: Internet Protocol
12. IR: Infrared
13. IT: Information Technology
14. LAN: Local Area Network
15. LCD: Liquid Crystal Display, a type of flat panel display
16. MATV: Master Antenna Television
17. PC: Personal Computer. This acronym applies to stationary "tower" or "desktop" workstations, in addition to portable "notebook" or "laptop" computers.
18. PDP: Plasma Display Panel, a type of flat panel display
19. RF: Radio Frequency
20. TO: Telecommunications Outlet – contains one or more service drops for data/voice systems.
21. TV: Television
22. UHF: Ultra High Frequency band of electromagnetic waves, currently 470 – 806 MHz for television broadcasting within the United States.

- 23. UPS: Uninterruptible Power Supply.
- 24. USB: Universal Serial Bus, a serial bus standard to interface data devices.
- 25. VHF: Very High Frequency band of electromagnetic waves, currently 55 – 88 MHz for television broadcasting within the United States.
- 26. VHS: Video Home System. This acronym refers to the standard consumer-grade video cassette format for playback of audiovisual media.
- 27. WAN: Wide Area Network.

## 1.5 SYSTEM NARRATIVE

### A. Conference room (121)

- 1. Contractor provided and installed 85" wall mounted flat panel display. The Aspect Ratio of the Flat Panel Display shall conform to the 16:9 Minimum 4K Wide Format as defined herein.
- 2. Wall mounting hardware attached to reinforced backing to accommodate size and weight of 85" flat panel.
- 3. Inputs are wall mounted or on table to top well with Data and HDMI/VGA/Audio ports.
- 4. Owner provided standard desktop PC, and monitor fed to auto-switcher.
- 5. Wall mounted sound bar.
- 6. Floor box to flat panel auto switcher. Basis of design (Hall Research EX-HDU or similar switching device.)

### B. Conference room (218)

- 1. Contractor provided and installed 85" wall mounted flat panel display. The Aspect Ratio of the Flat Panel Display shall conform to the 16:9 Minimum 4K Wide Format as defined herein.
- 2. Wall mounting hardware attached to reinforced backing to accommodate size and weight of 85" flat panel.
- 3. Inputs are wall mounted or on table to top well with Data and HDMI/VGA/Audio ports.
- 4. Owner provided standard desktop PC, and monitor fed to auto-switcher.
- 5. Wall mounted sound bar.
- 6. Floor box to flat panel auto switcher. Basis of design (Hall Research EX-HDU or similar switching device.)

### C. Training Room (134)

- 1. Contractor provided and installed ceiling mounted medium throw projector. XGA Projector must be solid state laser lighting source, with at least 6000 lumens. Must accommodate ceiling pole mount. Follow Div 274111 for mounting specifications.
- 2. Contractor provided and installed ceiling recess motorized projection screen. Follow Division 11, Section 11 5213, Projection Screens, for basis of design.
- 3. Sound reinforcement system tied into projection. Small amplifier able to handle Crestron Amp X50MP or equivalent, with four ceiling recess loud speakers.
- 4. Owner provided standard desktop PC, and monitor fed to auto switcher.
- 5. Wall box to projector auto switcher. Basis of design, (Hall Research EX-HDU or similar switching device.)

### D. Interview Rooms.

- 1. PTZ Cameras Microphone and recording devices to route back to Middle Atlantic DWR Series Sectional Wall Mount - 22 Inch Depth - 10 RU or equivalent rack.

## 1.6 DESIGN PRINCIPLES

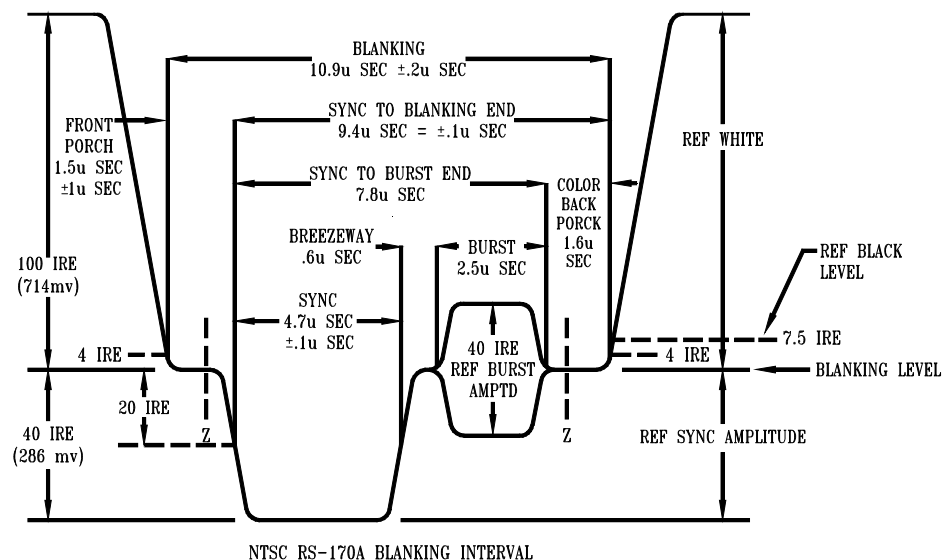
- A. Flexibility: The facility's cable pathway infrastructure (utilized for audiovisual signals, as well as relevant data/voice and AC power signals) shall be sufficiently flexible to allow future expansion of the audiovisual systems. Design parameters for such expansion are in accordance with the Owner's long-term goals and expectations for such systems, as outlined within this section.
- B. Cost Effectiveness: The AV systems shall utilize limited resources with utmost efficiency. Emphasis lies on common usability and current technology standards, and not on emerging technology trends or enhanced features.
- C. Ease of Operation: The AV systems shall require a minimal amount of Owner training for successful operation. User interfaces (control panels, signal connection panels, etc.) shall have a consistent look and feel throughout the facility.
- D. Sustainability: The AV systems shall be designed with a high degree of reliability in mind. Operation of such systems shall require minimal ongoing maintenance, as well as minimal investment by the Owner in dedicated support personnel. It is recommended that the Owner establish an agreement with the AV systems integrator, to secure warranty service calls and/or ongoing maintenance support.
- E. Network Connectivity: With the convergence of audiovisual and information technologies, careful planning must occur to ensure that network connectivity is provided for IP-enabled audiovisual devices and systems. Telecommunications outlets and their port quantities must be coordinated to meet or exceed the requirements of the appropriate audiovisual equipment. Discussion with the Owner's IT staff/entity will be required to ensure proper coordination between the audiovisual systems and the network design.

## 1.7 PERFORMANCE REQUIREMENTS

- A. All Audiovisual Systems shall interface and be compatible with each other.
- B. Audio
  - 1. Polarity: Absolute signal polarity will be maintained throughout the signal chain such that a positive signal at the input produces a corresponding positive excursion at the loudspeakers.
  - 2. Electronics: The audio system electronics shall deliver the following minimum performance standards as measured from all source inputs for microphones, disc and/or cassette playback devices, etc., through all mixers, audio distribution amplifiers, routers, etc., to all audio signal destinations.
    - a. Frequency Response: +/- 0.5dB, 20-20,000 Hz
    - b. Hum and Noise: -70 dBu, 20-20,000 Hz, un-weighted
    - c. Distortion: 0.1% THD, 20-20,000 Hz
  - 3. Speech Signal: The system shall provide a speech signal in the audience seating area that meets the following requirements:
    - a. Frequency response within +/- 3 dB from 500 Hz to 15,000 Hz.
    - b. Overall SPL variance of +/- 3 dB.
    - c. Measured percentage articulation loss of consonants (Alcons) of 10% or lower.
    - d. Maximum average SPL of 87 dB (flat), with 10 dB of undistorted headroom available.
- C. Video
  - 1. Interconnection: At the points of interconnection, the input and output impedance of each link shall be unbalanced to ground, nominally 75 Ohms  $\pm 0.5\%$  resistive. The nominal signal

amplitude shall be 1.0 volt peak-to-peak (140 IRE units). The polarity of the signal shall be "positive," i.e., such that black-to-white transitions are positive going.

2. Electronic Signals: The Contractor shall test the video system to ensure sure that it meets the NAB Engineering Standards of NTSC RS-170A as defined below. Videotape machines are exempt from these requirements.
  - a. NTSC RS-170A Performance Standards
  - b. Frequency Response: +0.1dB to 5.5MHz, -0.5dB at 8 MHz
  - c. Crosstalk: -60dB at 3.58 MHz
  - d. S/N Ratio: 75dB RMS below 1 volt p-p
  - e. Hum: < 10mV p-p
  - f. Line and Field Tilt: .5% with 60 Hz square wave
  - g. Differential Gain: 1% at 3.58 MHz 10 - 90% APL
  - h. Differential Phase: +/- 1% a 3.58 MHz 10 - 90% APL
  - i. Envelope Delay: +/- 0.1 microseconds. 0.2 to 2.1 MHz. +/- 0.5 MHz microseconds at 3.58 MHz.
  - j. Color Production: Primary and Complementary Color (R. G. B. Cy. Y1. Mg) at 75% saturation within inner 50% of inner boxes +/- 2.5 degrees when viewed on a vectorscope.
  - k. Switching Transients: < 30 mV
  - l. Chrominance / Luminance Delay: < 10 ns
  - m. NTSC RS-170A Video Levels:
  - n. White is 100 IRE, +0, -2 IRE.
  - o. Black is 7.5 IRE, +/- 2.5 IRE.
  - p. Sync is 40 IRE, +/- 2 IRE.
  - q. Burst is 40 IRE, +/- 2 IRE.
  - r. Burst Pedestal not to exceed +/- 2 IRE.
  - s. Burst frequency shall be 3.579545 MHz, 10 Hz
  - t. Breezeaway, burst, color back porch, and sync to burst end are nominal as shown in detail below:



## 1.8 SUBMITTALS

- A. Product Data: For all proposed equipment, cables and connectors, and faceplates for evaluation of technical features. Reference each product to a location on Drawings. Include the following:
  1. Manufacturer's submittal sheet (if applicable).
  2. Manufacturer's published specification "cut" sheets.

3. Operating characteristics, furnished specialties, and accessories.
  4. Physical data (dimensions, weight, line art and/or photos).
  5. Test and evaluation data (frequency and phase plots at on-axis and multiple off-axis incidence angles, impedance plot, 1/3-octave polar coverage patterns, etc.)
- B. Shop Drawings: The shop drawings listed below are required of the Contractor. Submit all Shop Drawings complete as a single submission. Isolated items will not be accepted, except with prior approval.
1. System Narrative: Concise narrative description of the system's performance capabilities, physical connection topology, and sequence of operation for each different "scene" or "mode".
  2. Schematic: Detailed wiring diagrams showing interconnection of components and products, wiring and cabling diagrams depicting cable types and designators, and device designators. Provide connector designations and terminal strip identification, along with color codes for cables connecting to these devices. Give each component a unique designator and use this designator consistently throughout the project.
  3. Diagrams for cable management system – e.g., inside equipment racks, in cable tray, etc.
  4. Cabling Schedule: A list containing the cable type, cable marker identifier, and origination and destination location and connector types for each cable.
  5. Mounting Details for Loudspeakers: Scaled drawings of complete mounting details, hardware and support surfaces, including details on all load requirements, safety factors, and structural materials.
  6. Panels: Scaled drawings of interconnect panels.
  7. Equipment & Panel Labels: A list containing the identifier label for all panels and rack mounted equipment. Include information on label type and construction.
  8. Equipment Rack Layouts: Fully detailed rack drawings (rack front elevations) indicating equipment orientation within the equipment rack.
  9. DSP Functional Diagrams: Complete functional diagrams of all DSP programming and configurations. These diagrams shall utilize functional blocks to graphically depict the routing and processing applied to an audio signal as it passes through the DSP.
  10. Cable Routing / Riser Diagram: Diagram showing conduits/pathways for audio and control cabling with clear indications of which cables will be installed in each pathway. Cabling installed in each pathway may be called out via tags on the diagram or via cable run schedule(s) included with the diagram. All cable runs shall be identified with cable ID tags which match those shown on the signal flow diagram described above.
  11. Consultant's floor plan and enlarged plan project document sheets in electronic format are available to be supplied to the Contractor (upon formal request) for their use as part of submittals. Consultant's detail and diagram sheets in electronic format shall not be provided to the Contractor. Shop drawing submittals containing information copied directly from the Consultant's document sheets without addition of proposed installation or configuration information shall be rejected.
- C. Calculations:
1. Loudspeaker Cabling: Provide calculations for loudspeaker cable sizing based on load impedance, voltage drop, and damping factors.
  2. Output Limiters: Provide calculations for proper output compressor/limiter settings in DSP units to prevent loudspeaker damage.
- D. Project planning documents as specified in Part 3.
- E. Product Samples (upon request):
1. Cabling and connectors – typical for each type
  2. Cable marking samples: As described in Section 27 1622.
  3. Equipment labels
  4. Connection panel / faceplate with etched engraving
  5. Equipment rack identification panel – refer to paragraph (G) below.



- F. Field quality-control test reports: For speech and program audio amplification systems identified herein to ensure proper speech intelligibility, gain-before-feedback, loudness and coverage uniformity under typical operating circumstances.
1. Measured ambient noise levels with all normal systems operating (HVAC, lighting, etc) and with all components of sound reinforcement system powered on without any amplified signal.
  2. Plots of real-time system frequency spectrograms.
  3. Plots of system Reverberation Time (RT) measurements.
  4. Plots of system Speech Transmission Index (STI) measurements.
  5. Plots of system Sound Pressure Level (SPL) histograms.
- G. Equipment Rack Identification Panel:
1. Within each room containing equipment racks for audio-visual systems, a custom graphical identification panel shall be installed within one (1) of the equipment rack(s) in that room. All equipment rack identification panels in the facility shall be identical aside from information specific to the associated room or system type.
  2. Submit preliminary graphical layout of this panel to the Owner and Consultant for review using a common digital image format such as JPEG, GIF, TIFF or Bitmap.
  3. The panel design shall include the following – no exceptions:
    - a. Installer's name and contact information
    - b. Design Consultant's name
    - c. Owner's name and a brief description/identifier of the project or system type.
  4. The panel shall be mounted in the top rack space unless otherwise indicated on the Drawings.

#### 1.9 CLOSEOUT DOCUMENTATION

- A. Operation and Maintenance Data: Complete operating instructions and features available. In addition to items specified in Division 01 include the following:
1. Equipment documentation and instructions.
  2. Operating documentation, manuals, and software for equipment and all installed peripherals and features. Software shall include system restore, emergency boot diskettes, and drivers for all installed hardware.
  3. Hard copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware
  4. System installation and setup guides, with data forms to plan and record options and setup decisions.
  5. Quick-reference guides for the installed systems. This includes both touchpanel and general system quick-reference guides.
  6. Two (2) USB thumb drives with electronic copies of all submittal items listed above. CD/DVDs will contain bookmarked PDF files, easily searchable by owner.
- B. PDF files on CD-ROM of all submittal items listed above.
- C. PDF files on CD-ROM with serial numbers for equipment. List to include the associated manufacturer, model number, and installed location of the equipment.
- D. As-built shop drawings.

#### 1.10 QUALITY ASSURANCE

- A. Installer Qualifications: As part of the Bid Response and Submittal Documents, the Contractor shall furnish evidence of his/her qualifications to perform the work specified. Evidence of Contractor qualifications shall include the following:
1. The Bidder shall clearly identify project team members (Installers) pertaining to the installation of AV systems. Team members to be identified shall be Principal, Project Manager, Chief Engineer, Senior Field Technician, and Software Programmer. The documentation shall include the individual's name, years with firm, and brief resume of the employee's past projects. Resumes shall include a listing of years of experience and any special training, certification by trade associations, and any applicable certification documentation for the proposed system.
  2. Due to the complexity of the control & automation system, a manufacturer-certified software programmer shall be required to author the programming component of this project. The Contractor shall include in the Bid Response, the name *and office location* of the manufacturer certified person or entity that will provide programming for the remote control system. The resume shall include a listing of years of experience and include a statement of manufacturer authorization, certification, and qualification.
  3. The Bidder's software programmer(s) shall hold a valid credential of Silver Level (or higher) "Crestron Certified Master Programmer" as licensed by the Crestron Technical Institute (CTI).
  4. The Bidder's installation team members shall include at least one (1) Crestron DigitalMedia Certified Designer (DMC-D) and shall maintain a ratio of at least one (1) Crestron DigitalMedia Certified Technician (DMC-T) per every three (3) installers.
  5. The demonstration and acceptance tests shall be done by a Crestron DigitalMedia Certified Engineer (DMC-E).
  6. A manufacturer-certified software programmer shall be required to author the audio Digital Signal Processor (DSP) programming component of this project. The Contractor shall include in the Bid Response, the name *and office location* of the manufacturer certified person or entity that will provide programming for the DSP. The resume shall include a listing of years of experience and include a statement of manufacturer authorization, certification, and qualification.
  7. A list of equipment manufacturer product lines, *relevant to the project*, for which the Contractor is authorized as a Distributor, Dealer, and Installer.
  8. A list of equipment manufacturer product lines, *relevant to the project*, for which the Contractor is authorized to provide warranty repair service.
- B. All provided Installer and Programmer Qualifications (listed above) shall be current and valid at the time of bidding. For example, the Contractor shall not list a product manufacturer or line for which he/she is not a dealer on the bid due date, but for which he/she hopes or intends to become a dealer in the future.
- C. Source Limitations: Obtain common materials and equipment through one source from a single manufacturer as much as practical.
- D. All equipment for this installation shall be new (packaged in the manufacturer's original packaging), less than one year from the date of manufacture, and without blemish or defect.
- E. The Contractor shall maintain the same project manager and field supervisor throughout the installation, and will maintain the same installers.
- F. The Contractor shall supply and install any incidental equipment needed in order to result in a complete and operable system without claim for additional payment, even if such equipment is not listed in this Specification.
- G. All work related to this Specification shall be completed in a professional manner by fully qualified workers.
- H. Reliability: The systems shall be designed to provide professional quality operation over a period of several years without the need for continual maintenance. Equipment that has a high failure rate is not acceptable for installation as part of these systems.

- I. Pre-installation meeting: Conduct pre-installation meeting with other trades to:
  - 1. Verify project requirements and manufacturers' instructions
  - 2. Coordinate environmental conditioning of the space (temperature & humidity)
  - 3. Coordinate elements attaching to, penetrating through, or concealed above/behind work in this section.
- J. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- K. Comply with NFPA 70, "National Electrical Code."

#### 1.11 DELIVERY, STORAGE, AND HANDLING

- A. Equipment, Cabling and Installation Materials:
  - 1. Costs of all shipping to the site, and of all unusual storage requirements, shall be borne by the Contractor. It shall be the responsibility of the Contractor to make appropriate arrangements, and to coordinate with the authorized personnel at the site, for the proper acceptance, handling, protections, and storage of equipment so delivered.
  - 2. Store in temperature- and humidity-controlled environment in original manufacturer's sealed containers. Maintain ambient temperature between 50 and 85 deg F (10 and 30 deg C), and not more than 80 percent relative humidity, non-condensing.
  - 3. Open each container; verify contents against packing list, and file copy of packing list, complete with container identification for inclusion in operation and maintenance data.
  - 4. Mark packing list with designations that have been assigned to materials and equipment for recording in the system labeling schedules that are generated by cable and asset management system specified in Part 2.
  - 5. Save original manufacturer's containers and packing materials and deliver as directed under provisions covering extra materials.
  - 6. Waste Management and Disposal: Separate waste materials for recycling in accordance with Division 01.
    - a. Remove packaging materials from site and dispose of at appropriate recycling facilities.
    - b. Collect and separate for disposal paper, plastic, corrugated cardboard and/or polystyrene packaging materials in appropriate onsite bins for recycling.
    - c. Dispose of all non-recyclable packaging materials and debris in a safe and environmentally responsible manner according to the instructions set forth by the General Contractor, local ordinances or codes and the Environmental Protection Agency.

#### 1.12 PROJECT CONDITIONS

- A. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
- B. Interior, Controlled Environment: System components installed in temperature-controlled interior environments shall be rated for continuous operation in ambient conditions of 36 to 122 deg F (2 to 50 deg C) and 20 to 90 percent relative humidity.

#### 1.13 WARRANTY

- A. Project Warranty: Refer to Contract Conditions for project warranty provisions.

- B. Manufacturer Warranties: Submit to Owner or Owner's Representative all written and dated warranties, in addition to completed product support registration cards, as issued by product manufacturers warranting all individual components against defects in materials or manufacturing, for the periods established by said manufacturers. The start date of the warranties shall be the date of final system acceptance.
- C. System Warranty: The Bidding Contractor or sub-contractor (Installer) shall make known, in writing, at time of Bid any exceptions that might exist between conditions described herein and Installer's policy of warranty. After acceptance of bid, all conditions and requirements of warranty described herein shall apply.
1. The Installer shall guarantee all provided equipment, materials, and labor for a period of 1 year from the date of final acceptance.
  2. Equipment that the Installer does *not* provide as part of this contract is exempt from this warranty coverage. However, the installation labor and materials associated with any equipment installed by the Installer, including OFCI items, shall be covered under this warranty.
  3. During the warranty period, within 24 hours of notification, the Installer shall answer all service calls and requests for information.
  4. During the warranty period, within 72 hours of original notification, the Installer shall provide emergency service to restore operation of the system, replacing defective materials, repairing faulty workmanship, making temporary repairs, and providing loaner equipment as necessary, all at no charge.
  5. The Installer shall notify the Owner after any service call whether such call is or is not covered under the warranty. The Owner may be billed for non-warranty calls. The Installer shall notify the Owner of any service call or work to be performed for which charges may be incurred before such work commences.
  6. Improper functioning, for warranty purposes, means failure of the system to meet the intentions of the specification because of internal defects. It does not include Owner-caused malfunctions such as re-adjustment of the controls, re-tuning of the system, or injury to the system beyond normal wear. Nor does the warranty cover paint, exterior finishes, fuses, lamps (including projection lamps) or associated labor, unless the damage or failure results from defective materials or workmanship covered by the warranty.
  7. The Installer shall take such actions at the time of installation to ensure that all equipment is installed in accordance with the manufacturer recommended environmental and electrical operating conditions and requirements. After installation, the Installer shall be responsible for the repair or replacement of said equipment that the Installer provided which fails due to environmental or electrical conditions, even if not covered by the manufacturer's warranty. The Installer shall not be held responsible for damages due to changes in environmental conditions which occur after system acceptance.
  8. If the Installer has modified certain components, the manufacturer's warranty for such components may become void. In such a case, the Installer is responsible for providing warranty coverage equal to that originally provided by the manufacturer.
  9. Certain subsystems and system components may require installation by authorized representatives in order for the complete manufacturer warranty to apply. If this pertains to any subsystem or component for this project, it is the Installer's responsibility to make arrangements for the complete manufacturer warranty to apply. These arrangements are to be made at no additional cost to the Owner.

#### 1.14 SERVICE CONTRACT

- A. As part of this Specification, the Contractor shall initiate a one-year service contract to commence on the date of final acceptance and continue to the first anniversary of the date of final acceptance as defined in 'System Acceptance'. The scope of the service contract would normally extend beyond warranty service calls, to include ongoing support of the AV systems such as maintenance, periodic replacement of consumables, Owner training or assistance, and/or additional design-build agreements.

- B. As part of the Bid Response, the Contractor shall provide the Owner with a proposal for continuation of the service contract to include Year Two, Year Three and Year Four of operation. All terms and conditions of the Year One Warranty shall apply.

#### 1.15 PRIOR APPROVAL

- A. For substitutions of products specified herein, Contractor shall submit requests for prior approval at least 10 days prior to submitting bids, and in accordance with the provisions of Bidding Instructions and/or Division 1.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Provide products quantities as required. If a quantity is given, provide at least the given amount.
- B. Products shall be new, free from defects and listed by UL when an applicable UL Standard exists. Provide Products of a given type from one manufacturer.
- C. Regardless of the length or completeness of the descriptive paragraph under article titled "Manufacturers and Products", provide Products complying with the specified manufacturer's published specifications.
- D. Take care during installation to prevent scratches, dents, chips, etc.

#### 2.2 MANUFACTURERS AND PRODUCTS

- A. If a specified product has been discontinued by a manufacturer, provide the replacement model (as certified by the manufacturer) at no additional cost.
- B. Where required provide manufacturer's rack mount adapter or one manufactured by Middle Atlantic or Winsted.
- C. Provide complete and fully functional systems, including items that are not explicitly described herein, but are necessary for a complete functioning system which shall adhere to the performance parameters as described on the drawings and/or required by these specifications. Items shall include, but are not limited to, all required mounting hardware and faceplates.

#### 2.3 SOFTWARE

- A. All commercial software used, shall be registered to Owner, in Owner's name. Owner to be supplied with all software documentation including copies of software registration.
- B. Contractor shall load and test the required software on an Owner furnished computer and load and test all required updates to control panels. Provide a complete and fully functional network management system.
- C. Coordinate all management, control and monitoring functions with the Owner. Minimum requirements shall include:
  - 1. Event scheduling
  - 2. System control of individual systems
  - 3. Monitoring of video projector lamp hours with e-mail notification when hours reach a threshold limit set by the Owner.

## 2.4 CABLING

- A. Refer to Section 27 1622, Cabling for Audio-Visual Systems

## 2.5 PRODUCT SUBSTITUTIONS

- A. Refer to "Prior Approval" in Part 1 of this document.
- B. The materials and products specified herein reflect the minimum acceptable standards of fabrication and manufacture. All materials and products supplied by the Contractor and specified herein are to be new, unused, of first quality and in original packaging or shipping containers or as shown on drawings.
- C. The products listed herein are pre-approved for this project. Substitutions shall be permitted for the manufacturers and products contained herein, provided they equal or exceed the specifications thereof **and** are approved via formal pre-bid Prior Approval request.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.
- B. Examine roughing-in for LAN and control cable conduit systems to AV equipment, PCs, speakers, microphones and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

- A. Comply with EIA/TIA-606, "Administration Standard for the Telecommunications Infrastructure of Commercial Buildings."
- B. In meetings with Owner, Architect, and Consultant, present Project planning documents and review, adjust, and prepare final setup documents. Use final documents to set up system software.

## 3.3 GENERAL INSTALLATION PRACTICES

- A. All equipment with the exception of portable equipment shall be firmly fastened or attached in place. A safety factor of at least four shall be utilized for all brackets, fasteners and attachments.
- B. In the installation of equipment and cable, consideration shall be given not only to operational efficiency, but also to overall aesthetic factors.
- C. The Contractor shall insure that all equipment is installed such that proper cooling and ventilation is insured.
- D. All equipment shall be installed in a manner, which prevents hum, RF/EMI/EMF interference, and

mechanical vibration based noises (e.g. fan mounts, etc.)

- E. All equipment shall be protected from construction dust and debris until final acceptance of the system.
- F. All equipment shall be protected from theft until final acceptance of the system.
- G. The Contractor shall be under obligation to protect completed work and uncompleted work against damage or loss until the Owner has given final acceptance. Should the need arise to repair work or replace items. The Contractor shall do so at no cost to the Owner.

### 3.4 FURNITURE

- A. The Contractor shall ensure that equipment or mounting hardware is compatible with and suitable for installation in furniture specified by the Owner, Consultant, or Furniture Supplier. It shall further be the Contractor's responsibility to ensure that such coordination with the Owner, Consultant, or Furniture Supplier occurs. The Contractor shall exchange with and follow such Shop Drawings as to ensure that dimensions and structural supports are adequate for the installation of specified equipment. It is the Contractor's responsibility that the request and delivery of such critical coordination information is satisfactorily executed. Inasmuch as the Contractor has control over the delivery of such information, he shall deliver it as requested by the Owner, Consultant, or Furniture Supplier.

### 3.5 EQUIPMENT RACKS AND CABLE MANAGEMENT

- A. Use tamper-resistant Torx type mounting screws for all rack-mounted A/V equipment.
- B. Racks shall be installed in such a way so as to permit access to all equipment for service.
- C. All equipment in racks shall be fitted with vent panels and/or fans as required to provide ventilation and cooling according to equipment manufacturer's recommendations.
- D. Adjacent racks shall be bolted together with appropriate ganging hardware.
- E. As a general practice, all power cables, control cables, and high-level cables shall be dressed to the left rear of an equipment rack. Audio and video cables shall be dressed to the right rear of the rack. Audio, video and control cables shall be bundled separately and spaced not less than three (3) inches apart.
- F. Internal equipment rack cabling shall be supported by lacing strips, support brackets, or other cable management systems as required to ensure that all cabling is supported in both the vertical and horizontal planes within the rack.
- G. With the exception of ganged equipment rack assemblies, cabling routed between equipment racks or pieces of equipment exterior to equipment racks, or extending to the greater facility cabling infrastructure, shall be completely protected, end-to-end, by a raceway, wire-way, or duct appropriately sized for the cable run.
- H. Cabling between rolling pieces of equipment not housed in rack cabinets or a rolling equipment rack and any device to which it is connected, shall be protected by a split-loom corrugated tubing wrap or other such flexible cable management system appropriately sized for the cable run.
- I. Any controls not to be adjusted by the user and accessible from the front of the equipment rack must be furnished with security panels.
- J. UL Listing: Rack system shall be UL Listed in the US and Canada.

## 3.6 CABLING

- A. Refer to Section 27 1622, Cabling for Audio-Visual Systems.

## 3.7 GROUNDING

- A. Comply with Division 26 Section "Grounding and Bonding for Electrical Systems."
- B. Comply with IEEE 1100, "Power and Grounding Sensitive Electronic Equipment."
- C. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
- D. Bond shields and drain conductors to ground at only one point in each circuit.

## 3.8 IDENTIFICATION

- A. All equipment components shall be identified with a unique, permanently affixed laser-engraved label. Provide a schedule or database of labels and identifiers to Owner at completion of project installation.
- B. Cable Labeling: Comply with Section 27 1622, Cabling for Audio-Visual Systems.
- C. At completion, all labels and schedules shall reflect as-built conditions.

## 3.9 FIELD QUALITY CONTROL

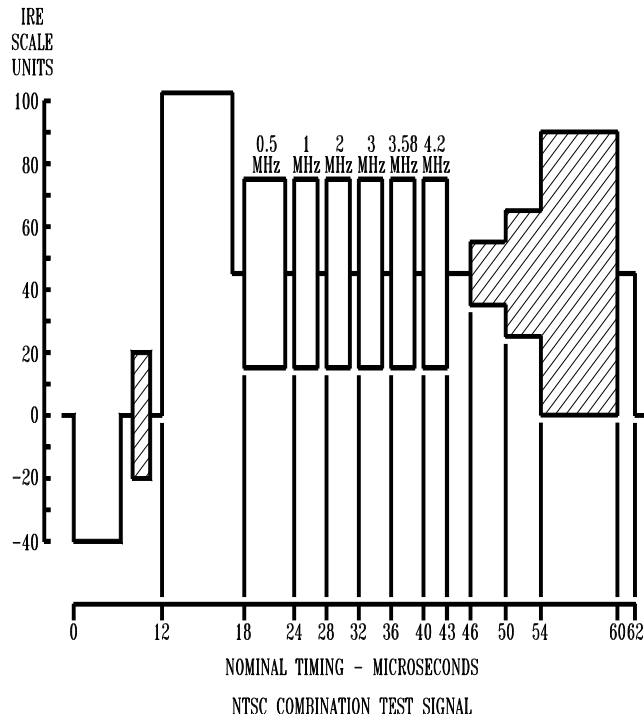
- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including connections. Report results in writing.
- B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports as required.
- C. System Set-up and Tuning
  - 1. Optimization: The Contractor shall install, configure, adjust, program, and calibrate all components in order to optimize the performance of all individual subsystems and the system as a whole.
- D. Preliminary Tests:
  - 1. General: Once the system is installed, the Contractor shall complete the following preliminary tests and prepare a written test report for the Consultant. The test report will list the results of each of the tests described in this section and certify that the installation is complete.
  - 2. Control: Upon completion of installation, the Contractor shall test each function of each control station, push-button panel, touch screen panel, computer control interface, and all components connected to or interfaced to the Control System to verify proper operation and that each switch and indicator operates as intended.
  - 3. Audio: The Contractor shall perform the following tests:
    - a. Prior to the termination of audio amplifiers to speakers, the Contractor shall measure the resistance of the speaker line with reference to ground to determine that no short circuits or paths to ground exist in the line. The Contractor shall connect the speaker to the cable and measure the impedance of each speaker line using a 1,000Hz signal applied to the line. The Contractor shall submit a list, to the Consultant, by cable number, of the impedance of



each speaker line. This test shall be performed with the amplifier disconnected from the speaker line and the speaker connected to the speaker line.

- b. Verify all loudspeakers are functioning.
- c. Verify that the system meets all Performance Requirements as outlined in this section.
- d. Verify that all equipment, panels, and cables are labeled correctly.
- e. Verify each item of equipment is functioning as intended.
- f. Verify the installation is the same as specified.

- E. Video: To establish that the facility cabling and terminations meet the specifications defined in 'Performance Standards', a video test signal shall be applied to each input cable and passed through the system switching and distribution networks with the results measured at each system output. The composite video test signal shall consist of a line bar, a 2T pulse, a chrominance pulse, and a five-riser staircase signal. The combination test signal shall consist of a white flag, a multi-burst, and a three-level chrominance signal. The test signal waveforms are illustrated below.



1. In addition, the Contractor shall:
  - a. Verify each item of equipment is functioning as intended.
  - b. Verify the installation is the same as specified.
2. Specifications:
  - Bandwidth: 450 MHz (-3db)
  - Dot clock: 230 MHz
  - Pixel clock accuracy: 0.02 MHz
  - Scan rate accuracy: +/- 2%
  - Frequency range: 15kHz to 127 kHz
  - Rise/fall time: < 1.2nS
  - Signal types: RGBHV, RGBS, RGsB, RsGsBs
  - Maximum level: 1V p-p
  - Impedance: 75 ohms
  - Return loss: -30db @ 5MHz
  - DC offset: +/- 5mV maximum
3. Test Patterns:
  - Dots 12x16, Alternating pixels
  - Vertical/Horizontal Crosshair
  - Crosshatch 12x16
  - Crosshatch 24x32
  - Flat Field
  - Checkerboard 100% (IRE) White
  - Checkerboard 56% (IRE) White
  - Checkerboard 14% (IRE) White

8 Level Split Gray Scale  
8 Vertical Color Bar  
16 Color Bar  
SMPTE and PLUGE Color Bar

- F. Computer Video Display Devices: The Contractor shall use a computer-video test generator to establish that computer video capable displays such as LCD, flat panel, and projection devices are in good working order and optimally adjusted. The computer-video test generator shall be capable of outputting test signals on 5 BNC connectors or a 15-pin VGA connector. The computer-video test generator shall meet or exceed the following specifications and offer the following test patterns:

1. Specifications:
  - Bandwidth: 450 MHz (-3db)
  - Dot clock: 230 MHz
  - Pixel clock accuracy: 0.02 MHz
  - Scan rate accuracy: +/- 2%
  - Frequency range: 15kHz to 127 kHz
  - Rise/fall time: < 1.2nS
  - Signal types: RGBHV, RGBS, RGsB, RsGsBs
  - Maximum level: 1V p-p
  - Impedance: 75 ohms
  - Return loss: -30db @ 5MHz
  - DC offset: +/- 5mV maximum
2. Test Patterns:
  - Dots 12x16, Alternating pixels
  - Vertical/Horizontal Crosshair
  - Crosshatch 12x16
  - Crosshatch 24x32
  - Flat Field
  - Checkerboard 100% (IRE) White
  - Checkerboard 56% (IRE) White
  - Checkerboard 14% (IRE) White
  - 8 Level Split Gray Scale
  - 8 Vertical Color Bar
  - 16 Color Bar
  - SMPTE and PLUGE Color Bar

G. Final Tests

1. Upon approval of the Contractor's test report, and at a time that is mutually acceptable to the Contractor, Owner and Consultant, the Contractor shall assist the Consultant and Owner in final system tests and adjustments. The Contractor shall allow two (2) days to perform the tests. The Contractor's representatives assisting in the performance of these tests shall be thoroughly familiar with the details of the system and shall include the field supervisor responsible for installing the system.
2. To demonstrate the good working order of all playback devices in the system the Contractor shall make available high quality source materials for all audio and video media types represented in the system. To demonstrate the good working order of all computer-video displays the Contractor shall make available the computer-video signal generator described in 'Performance Standards – Preliminary Tests and Submittals – Computer Video Display Devices'. In addition, the Contractor shall make available a laptop computer with the ability to output 1440 x 900 (WXGA+/WSXGA), 1680 x 1050 (WSXGA+), 1920 x 1080 (Full HD) and 1920 x 1200 (WUXGA) graphics with at least 16bit color depth. The computer shall be capable of displaying spreadsheets, graphs, charts, pictures and text of varying sizes and fonts to effectively demonstrate the systems computer display imaging capabilities.
3. The Contractor shall demonstrate operation of all subsystems, including audio and video recording, displays, cameras, camera controls, streaming, control system and so on, meets or exceeds the criteria as outlined in this section.

- H. Remove and replace malfunctioning devices and circuits and retest as specified above.

### 3.10 STARTUP SERVICE

- A. Engage a factory-authorized service representative to supervise and assist with startup service as needed. Complete installation and startup checks according to approved procedures and with manufacturer's written instructions.

### 3.11 PROTECTION

- A. Maintain strict security during the installation of equipment and software. Rooms housing the AV components that have been powered up shall be locked and secured, with an activated access-control system or keyed system during periods when a qualified operator in the employ of Contractor is not present.

### 3.12 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain AV system. Refer to Division 01 Section "Demonstration and Training."
- B. The Contractor shall provide a total of twenty-four (24) hours of on-site training for the Owner's staff at a time that is mutually agreeable for the Owner and Contractor. The Contractor should anticipate four sessions of the following lengths: two (2) "general" sessions of six hours each, two (2) "basic" sessions of less than three hours each, and one (1) "advanced" session of seven hours. The Owner may choose to have the sessions spread out over a maximum of five different days. Final acceptance and/or final payment for the system shall not be delayed due to scheduling delays beyond the control of the Contractor.
- C. In addition, the Contractor is responsible for scheduling and coordinating the specified manufacturer training with the Owner.

### 3.13 SYSTEM ACCEPTANCE

- A. Upon successful completion of Final Tests, Documentation and Training, the Contractor shall notify the Owner, in writing, that the system is complete. The Owner shall have twenty (20) business days to generate a "punch list" of omissions, adjustments, corrections and the like and respond in writing to the Contractor. In the absence of such a "Punch List," the system shall be considered to be complete. The warranty shall commence on the twentieth day after the Contractor's notification of completion of work, and the Owner shall process final payment. In the event that further work is required to complete this project, the Contractor shall be prepared to continue work, without additional compensation, until the system is accepted.

## **APPENDIX A ATTACHED TO END OF SECTION**

## **END OF SECTION 27 4100**

Sandoval County Sheriff's office and EOC - Audio/Visual Systems (Shown estimate if for Centennial only)				
APPENDIX A: Basis of Design System Configuration				
<p><b>NOTE:</b> THIS LIST CONSTITUTES THE EQUIPMENT USED IN THE "BASIS OF DESIGN" FOR THE AUDIO-VISUAL SYSTEM. UNDER NO CIRCUMSTANCES SHALL THIS EQUIPMENT LIST BE TAKEN AS A COMPREHENSIVE LISTING OF ALL EQUIPMENT REQUIRED FOR A COMPLETE AND FUNCTIONAL SYSTEM AS SPECIFIED. <b>CONTRACTOR IS RESPONSIBLE FOR PERFORMING THEIR OWN EQUIPMENT TAKE-OFFS AND VERIFYING ALL REQUIRED EQUIPMENT AND MATERIALS ARE PROVIDED.</b></p>				
	1. Listed equipment is contractor supplied and installed unless specifically labeled as OFCI, Provide all necessary materials, turn-key installation, testing, and commissioning.			
	2. Provide all necessary software programming for automation control system, audio DSP, etc.			
	3. Provide end-user training as specified within these specifications.			
	4. The specific system configurations are listed in the following table. Each ‘system type’ includes a list of key components & instructions which is intended to serve as the basis-of-design / proof-of-concept; however these lists may not be comprehensive of all required materials, cabling, hardware etc. The contractor shall verify all specified components and instructions for compatibility with the intended functionality of the specified audio-visual systems – and provide additional materials etc. as required to perform the work – for turn-key installation of these systems.			
	5. Part numbers have been included as a basis of design and should only be considered for the purposes of estimating prices. This does not include cabling back boxes or pathways.			
Ref #	Item / Description	Make / Model		Unit Qty
Conference room (Typ of rooms)				
1	UR640S86 85" Commercial Display	LG	UR6740	1
2	X-Large Fusion Tilting Wall Mount	Chief	LTAM1U	1
3	HD MD 4K 200-1G-B Kit 2X1 Scaling Receiver	Crestron	6511021	1
4	HD-TX-101-C-1G single gang Transmitter	Crestron		1
5	MLC 50 Controller	Extron	60-11468-03	
6	GS 308 1X8 PoE Network Switch	Netgear	GS 308P	
7	PS-1-20 Wall Mount Sound Bar	JBL	PSB1	1

8	Existing floor box			1
9	12 HDMI Ultra Cable	Extron	2663-12	1
10	12' HDMI male to DP Male	Extron		1
11	Shielded Cat6A Network Cable	CONTRACTOR PREFERENCE		
12	Shielded Cat6A RJ 45 Male Crimp	CONTRACTOR PREFERENCE		
<b><i>Training Room</i></b>				
13	L630U 6000 Lum WUXGA Laser PJ	Epson	V11HA26020	1
14	RPMAU Lockable Ceiling Mount PF	Chief	RPMAUBK	1
15	CB-22P Plenum In Ceiling Enclosure	FSR	CB-22P	1
16	AMP X50MP 50W amplifier	Crestron	AMP-X50	1
17	ICT5T-12 In ceiling Tile Loudspeaker	Crestron	6511003	6
18	12 to 18" Adjustable Extension Column	Chief	CMS012018	1
19	20843 65"X104" or 123" Diag Recessed Electric Screen	Da-Lite	20843	1
20	HD MD 4K 200-1G-B Kit 2X1 Scaling Receiver	Crestron	6510806	1
21	HD-TX-101-C-1G single gang Transmitter	Crestron	6509873	1
22	Extron MLC 50 Controller	Extron	60-1468-05	1
23	Netgear GS 308 1X8 POE Network Switch	Netgear	GSD 308	
<b><i>Interview room (typ)</i></b>				
24	Sepco NVR	Sepco	N4NXL3TB	1
25	CCTV Camera w/microphone	Montavue	MTM5098- AISMD	1
26	Shielded Category 6A	Contractor Preference		TBD
27	AV Rack to house active equipment	Refer to T-sheets		
<b>END OF SECTION</b>				

GENERAL NOTES

- A. SPECIFIED DEVICE MOUNTING ELEVATIONS SHALL BE COORDINATED WITH OTHER DEVICE MOUNTING HEIGHTS UNLESS OTHERWISE NOTED. FOR EXAMPLE, DEVICES SPECIFIED AT 18" AFF SHALL MATCH THE STANDARD MOUNTING HEIGHT FOR POWER RECEPTACLES & TELECOM OUTLETS. DEVICES SPECIFIED AT 48" AFF SHALL MATCH THE STANDARD MOUNTING HEIGHT FOR LIGHT SWITCHES ETC.
- B. ALL JUNCTION BOXES SHALL BE PROVIDED WITH A COVER UNLESS OTHERWISE NOTED. WHERE RAISED COVERS ARE SPECIFIED, MATCH COVER DEPTH TO WALL THICKNESS. WHERE JUNCTION BOXES ARE MOUNTED AT OR ABOVE FINISHED CEILING HEIGHT, INSTALL BOX WITH OPEN SIDE (OR SCREW COVER SIDE) FACING DOWN.
- C. PROVIDE A NYLON BUSHING ON ALL CONDUIT STUBS AND NON-TERMINATED CONDUIT ENDS TO PROTECT WIRE PULLS.
- D. SEAL ALL PENETRATIONS THROUGH WALLS, FLOOR, CEILINGS AND ROOF PER ARCHITECTURAL SPECIFIED REQUIREMENTS. SEAL SHALL MATCH THE FIRE RATING OF EACH PENETRATION LOCATION.
- E. ALL CONDUITS FOR SPECIAL SYSTEMS SHALL BE STEEL, THIN-WALL ELECTRICAL METALLIC TUBING (TYPE EMT) UNLESS OTHERWISE NOTED OR PREVIOUSLY APPROVED VIA FORMAL RFI. UNDER NO CIRCUMSTANCES SHALL FLEXIBLE CONDUITS BE USED FOR PATHWAYS INDICATED ON THIS SHEET.
- F. POWER OUTLETS (LABELED "P" ON DIAGRAMS) ARE SHOWN FOR COORDINATION/REFERENCE PURPOSES ONLY. PATHWAYS FOR POWER OUTLETS ARE NOT INDICATED ON THIS SHEET. PROVIDE ADDITIONAL, DEDICATED PATHWAYS FOR POWER AS NEEDED.
- G. JUNCTION AND/OR PULL BOXES INDICATED HEREIN ARE FOR THE PURPOSE OF IDENTIFYING END POINTS ONLY. THE CONTRACTOR SHALL PROVIDE ADDITIONAL PULL BOXES AS NECESSARY TO ENSURE THAT NO SECTION OF A CONDUIT RUN EXCEEDS 100 FEET IN LENGTH OR CONTAINS MORE THAN QTY(2) NINETY-DEGREE TURNS.
- H. CONDUIT SIZES IDENTIFIED HEREIN REPRESENT STANDARD "TRADE SIZES" AND ARE THE MINIMUM SIZE SPECIFIED FOR THE CABLING DESIGN PARAMETERS.
- I. CONDUIT ROUTING IS AT THE CONTRACTOR'S DISCRETION.
- J. PROVIDE NYLON PULL STRINGS IN ALL CONDUITS WITH PULL RINGS AT BOTH ENDS.
- K. PROVIDE A MEASURING TRACER WIRE IN ALL CONDUITS.
- L. ALL CONDUIT TURNS SHALL BE "SWEEP" TYPE, NO BEND FITTINGS ARE PERMITTED.
- M. COORDINATE FINAL J-BOX LOCATIONS WITH SC-IT

SHEET KEYNOTES

1. REFER TO DETAIL B2 ON SHEET T-505. VERIFY LOCATION WITH AUDIOVISUAL INSTALLER PRIOR TO INSTALLATION.
2. REFER TO DETAILS D1 AND B1 ON SHEET T-505. PROVIDE DUPLEX POWER RECEPTACLE AND DATA OUTLET EACH WITH SINGLE-GANG ELECTRICAL WORK BOX AND INSTALL IN DEVICE KNOCKOUTS AROUND PERIMETER OF BOX.
3. ANCHOR BOX SECURELY TO BUILDING STRUCTURE AND PROVIDE STRUCTURAL BACKING IN WALL PER DETAIL A3 ON SHEET T-505.

3	Addendum No. 3	2/18/2022
NO.	ISSUE	DATE

PROJECT  
**SANDOVAL COUNTY  
SHERIFF'S OFFICE &  
EMERGENCY OPERATIONS  
CENTER**

SCALE  
As indicated

RMKM PROJECT NO.  
1904

DRAWN BY  
Author

CHECKED BY  
Checker

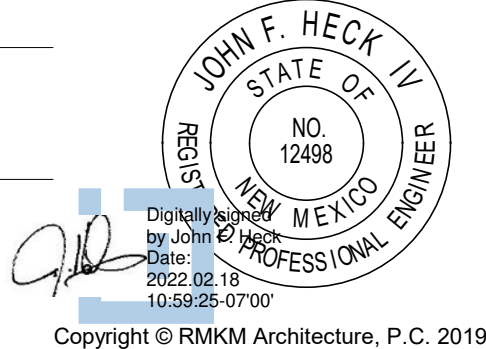
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BERNALILLO, NM 87004

SHEET TITLE  
TECHNOLOGY DIAGRAMS

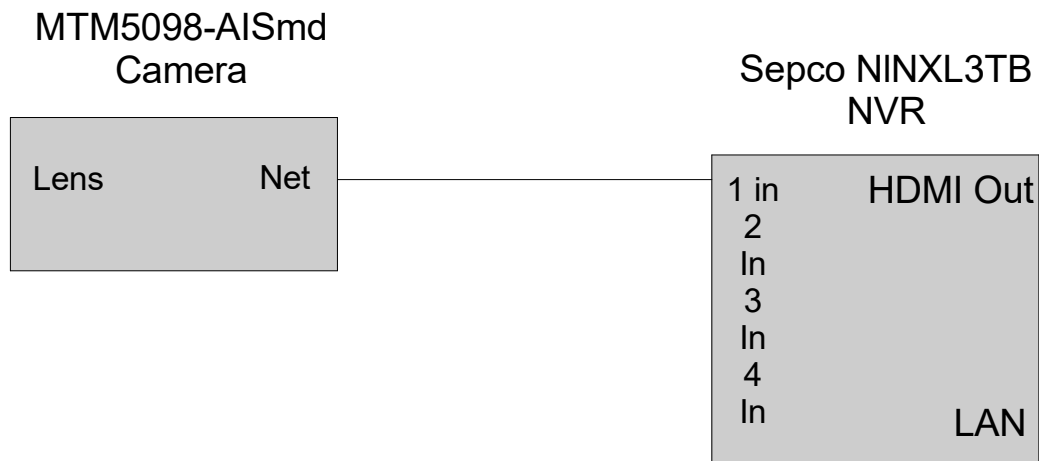
DESIGN PHASE  
CONSTRUCTION SET  
22 DECEMBER 2021

SHEET NUMBER

T-602



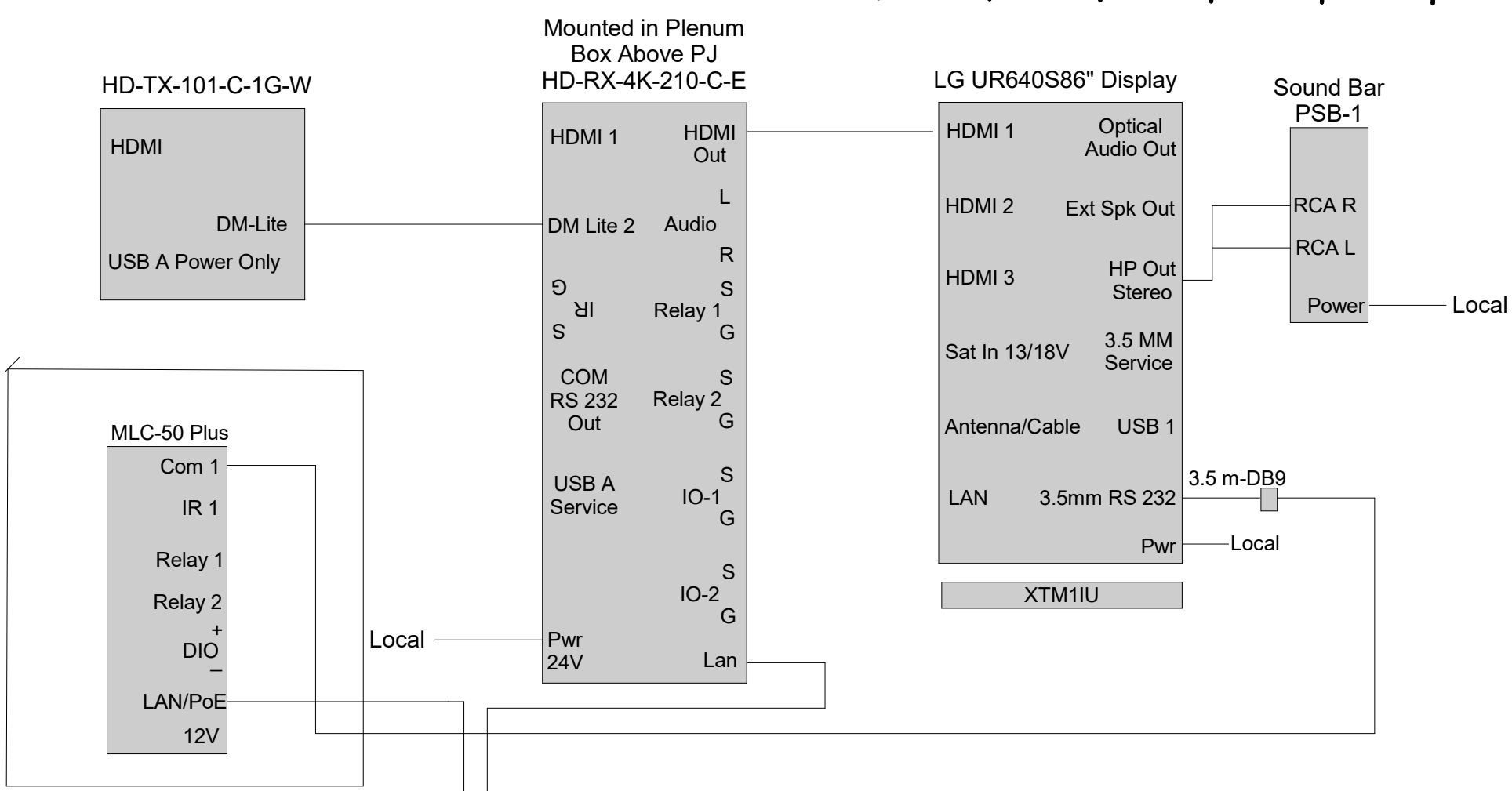
INNOVATIVE | DEPENDABLE | SOLUTIONS



Job 8131  
Sandoval County  
Sheriffs Office- EOC  
Interview Room  
Rev 2  
2-18-2022 JL

D2  
T-602  
1/4" = 1'-0"

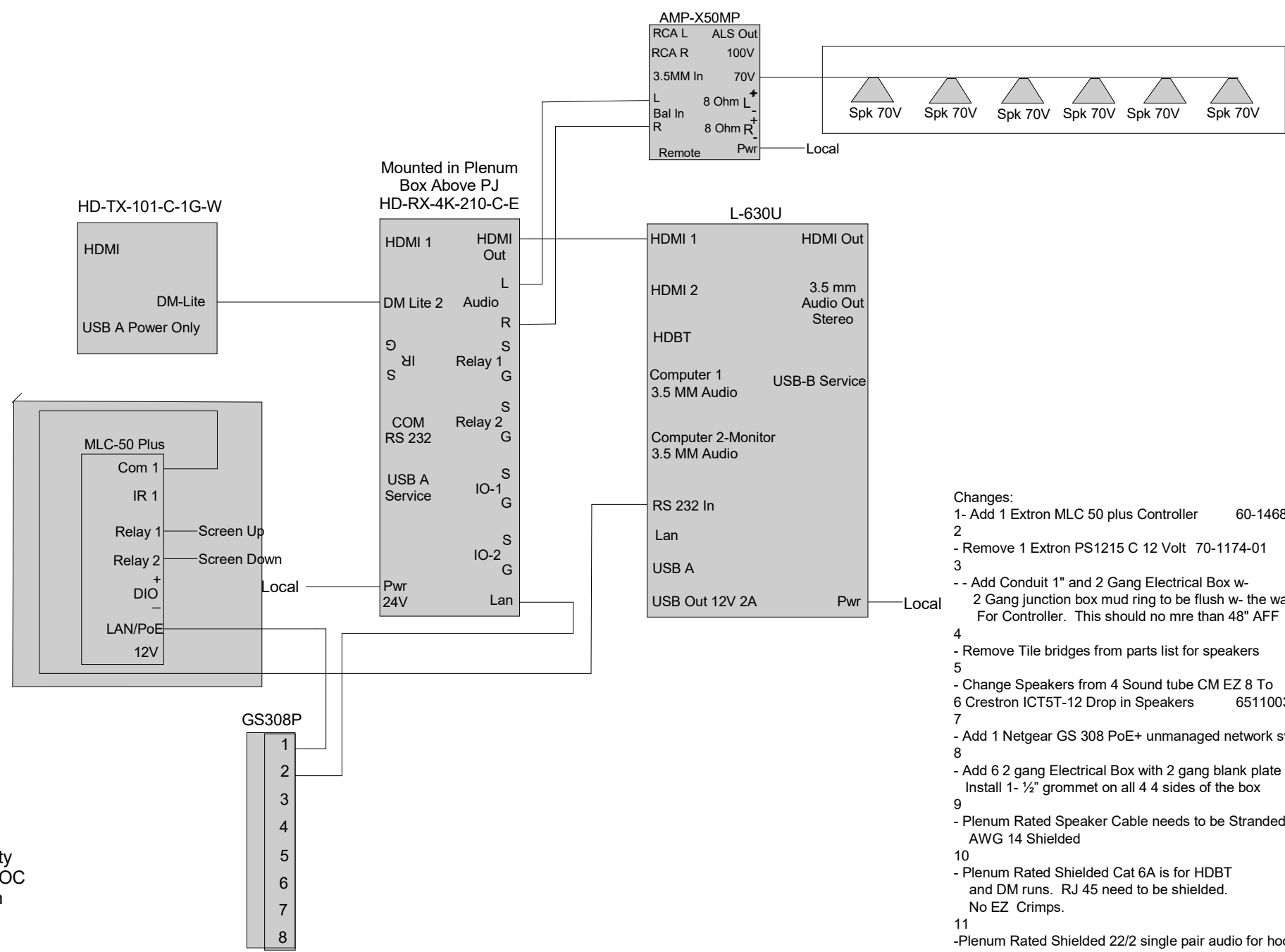
INTERVIEW ROOMS



Sandoval County  
Sheriffs Office & EOC  
Room 218  
Addendum 2  
2/15/2022 jl

C3  
T-602  
1/8" = 1'-0"

CONFERENCE ROOM 218



Job 8131  
Sandoval County  
Sheriffs Office- EOC  
Training Room  
Rev 2  
2-14-2022 JL

A3  
T-602  
1/8" = 1'-0"

TRAINING ROOM 134

- Changes:
- 1- Add 1 Extron MLC 50 plus Controller 60-1468-03
- 2
- Add Conduit 1" and 2 Gang Electrical Box w- 2 Gang junction box mud ring to be flush w- the wall For Controller. This should no mre than 48" AFF
- 3- Add 1 Netgear GS 308 PoE+ unmanaged network switch
- 4
- Add 6 2 gang Electrical Box with 2 gang blank plate Install 1- 1/2" grommet on all 4 sides of the box
- 5
- Plenum Rated Speaker Cable needs to be Stranded AWG 14 Shielded
- 6
- Plenum Rated Shielded Cat 6A is for HDBT and DM runs. RJ 45 need to be shielded. No EZ Crimps.
- 7
- Plenum Rated Non Shielded Cat 6A for control.
- 11
- Plenum Rated Shielded 22/2 single pair audio for hookup of audio in the rack.

- Changes:
- 1- Add 1 Extron MLC 50 plus Controller 60-1468-03
- 2
- Remove 1 Extron PS1215 C 12 Volt 70-1174-01
- 3
- Add Conduit 1" and 2 Gang Electrical Box w- 2 Gang junction box mud ring to be flush w- the wall For Controller. This should no mre than 48" AFF
- 4
- Remove Tile bridges from parts list for speakers
- 5
- Change Speakers from 4 Sound tube CM EZ 8 To 6 Creston ICTST-12 Drop in Speakers 6511003
- 7
- Add 1 Netgear GS 308 PoE+ unmanaged network switch
- 8
- Add 6 2 gang Electrical Box with 2 gang blank plate Install 1- 1/2" grommet on all 4 sides of the box
- 9
- Plenum Rated Speaker Cable needs to be Stranded AWG 14 Shielded
- 10
- Plenum Rated Shielded Cat 6A is for HDBT and DM runs. RJ 45 need to be shielded. No EZ Crimps.
- 11
- Plenum Rated Shielded 22/2 single pair audio for hookup of audio in the rack.