

SECTION 27 41 16 – INTEGRATED AUDIO VISUAL SYSTEMS AND EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. This document covers the general requirements for the installation of Audio Visual (AV) systems for the University of Texas Health Science Center at Houston School of Nursing Level 4 Simulation Lab Project. This project is a remodel/renovation project and encompasses the AV specifications, technical standards and installation procedures associated with the total or partial development of the AV component within the project as it pertains to:
1. Skills & Tasks classroom AV presentation systems.
 2. Debrief rooms AV presentation systems.
 3. Patient Flex and Home Health rooms medical simulation AV system components.
 4. Control Room medical simulation AV system components.
 5. Exam rooms medical simulation AV system components
- B. Room/System Functional Description(s)
1. Skills & Tasks Labs 1 through 4
 - a. Each Skills & Tasks lab will have a ceiling mounted video projector with motorized projection screen for showing presentations. Input sources include a dedicated room computer and wired input at the instructor's desk for a laptop or other HDMI connection for presentation equipment (document camera, etc.)
 2. Debrief Rooms 1 through 4
 - a. Each Debrief Room will have a large flat panel display for presentation purposes. Input sources include a wireless presentation system for Owner furnished devices (i.e. tablets, laptops and phones), and a video feed from a dedicated simulation capture computer assigned to the room. Control for switching sources will be through a wall control touch panel.
 - b. Each Debrief Room will have a video camera mounted at the rear of the room to record presentations for lecture-capture to a record/streaming device accessible from the network for integration with control room distribution system.
 3. Exam Areas Basic Functional System Components (Typical)
 - a. The exam areas are defined as Simulation Environment, Patient Flex and Standard Patient. Each area shall have the same basic components as follows:
 - 1) Ceiling mounted fixed focus IP camera.
 - 2) Ceiling mounted pan/tilt/zoom IP cameras
 - 3) Ceiling mounted Dante-networked microphone
 - 4) Ceiling mounted Dante-networked loudspeaker
 - 5) Wireless intercom system with earbud and lapel microphone for confidant use.
 4. Simulation Exam Environment at Skills & Tasks (Total of 6)
 - a. Each simulated exam environment area will have three ceiling mounted video cameras for recording proceedings and training sessions. A pan-tilt-zoom

- camera (PTZ) is provided at each corner of the space, with a fixed focus camera positioned in the center of the ceiling above the patient table. The cameras are controlled and monitored from the Control Room.
- b. Each simulated exam environment area will have a ceiling mounted loudspeaker and microphone for recording proceedings and facilitating talk-back communication with the Control Room. A wireless intercom system is provided to allow discrete two-way communication from the Control Room with an individual providing support for the participants in the form of 'help available', and/or to provide information about the manikin that is not available in other ways.
 - c. Each simulated exam environment area will have system for capturing vital signs from medical simulation components (manikin or other) for video encoding on the simulation software platform with accompanying video display monitors.
5. Patient Flex Rooms (Total of 6)
- a. Each patient flex room will have three ceiling mounted video cameras for monitoring and recording proceedings. A pan-tilt-zoom camera (PTZ) is provided at each corner of the room, with a fixed focus camera positioned in the center of the room above the patient table. The cameras are controlled and monitored from the Control Room.
 - b. Each patient flex room will have a ceiling mounted loudspeaker and microphone for recording proceedings and facilitating talk-back communication with the Control Room. A wireless intercom system is provided to allow discrete two-way communication from the Control Room with an individual providing support for the participants in the form of 'help available'.
 - c. Each patient flex room will have a portable 'headwall column' stand with two video display monitors fed from the Control Room.
6. Standard Patient/Psy Exam Rooms (Total of 14)
- a. Each patient exam room will have two ceiling mounted video cameras for monitoring and recording proceedings. A pan-tilt-zoom camera (PTZ) is provided at each corner of the room above the patient table. The cameras are controlled and monitored from the Control Room.
 - b. Each patient exam room will have a ceiling mounted loudspeaker and microphone for recording proceedings and facilitating talk-back communication with the Control Room. A wireless intercom system is provided to allow discrete two-way communication from the Control Room with an individual providing support for the participants in the form of 'help available'.
 - c. Each patient exam room will have a wall-mounted flat panel display for indicating vital signs fed from Control Room.
7. Control Room (470K)
- a. The control room shall consist of five (5) workstations with owner provided computers with simulation software. Each PC station will have capability to control cameras and select sources from each of the simulation rooms through the simulation software. Control will be through a wireless tablet provided for each station to remotely add notes to simulations. This tablet must utilize a standard UT image and be compatible with existing computers and equipment.
 - b. The five (5) control room stations will also have capability to run selectable

room audio monitoring/ intercommunication system for each of the simulation rooms. A desktop microphone shall be provided allowing the operator to speak to any selected exam room through the ceiling loudspeaker. Headphone ports at each of the workstations are provided for audio monitoring of the room and two-way communication with a support person. Audio input devices at each control station for playing program audio through the intercom and/or room simulation capture system.

- c. Each control room workstation will have two (2) wall-mounted 22" diagonal flat panel monitors for displaying video content from the selected simulated patient room. The desktop computer monitors are provided by the owner.

8. Director's Office (484)

- a. The Director's office will have an owner provided computer with simulation software for monitoring the simulation capture feed to the exam and debrief rooms. A wireless tablet will be provided for routing control. The office will also have a camera monitoring station with controller for dedicated video cameras in the hallway for observation (separate from Security cameras adjacent).

C. AV Contractor Qualifications

1. The Audio-Visual System Contractor shall normally be engaged in the business of furnishing and installing professional commercial AV systems. NOTE: Electrical or general contracting firms responsible for completion of this work, but not meeting above requirement, shall employ services of an approved AV Contractor as subcontractor to perform work described herein.
2. Be experienced in installations of similar size and scope within last five (5) years.
3. Submit list of four (4) (minimum) installed jobs of similar magnitude, completed within last five years. For verification, submit complete information, including project name, project address, contact person, daytime telephone number plus month and year of project completion. At Owner's request, accompany Owner or Owner's representative on visit to any or all example completed projects submitted.
4. The AV contractor must provide proof of being an Authorized Dealer for all major lines of equipment listed in Part 2. Must have at least one permanent staff member who is factory trained in the installation and maintenance of each major product line offered. This training must have been completed within the last two years from the date of the bid.
5. Employ personnel (at all levels of work) experienced in projects of similar size and scope. Provide list of key personnel to be responsible for each of the following aspects of work: Project Management, Project Engineering, Technical Documentation, Control System programming, DSP programming and Leadership of Field Work (one who is present for all field work). For each identified employee, indicate number of years employed by contractor, number of years' experience in assigned responsibilities, and list of previously completed projects where similar responsibilities were required. They must also possess an INFOCOMM CTS certification at a minimum.
6. Project Manager assigned to this project must have a minimum of five (5) years' experience in installing and integrating AV systems of similar scale. Project Manager shall also have either Infocomm CTS-I or CTS-D or Project Management Institute PMP certification.
7. Control system personnel interfacing with control system programming assigned to the project must be certified by the control system manufacturer to program their designated system type with a minimum of five (5) years' experience. A copy of the certification must be provided.

8. Installed systems shall comply in product, performance, and practices as outlined in the document "AV 9000" given in the References and Standards as listed in Section 1.9. The Contractor shall certify compliance by furnishing affidavits prepared by individuals on behalf of the vendor with recognized industry qualifications, namely CTS-D and/or CTS-I (Certified Technology Specialist – Design, Installation), or CQD and/or CQT (AV9000 Certified QA Designer, Technician). Affidavits shall reflect that the system passed a Design Review, Staging, and the Commissioning battery of tests without defect before the system can be accepted.
9. Prospective bidders must attest that they possess, and are skilled in the use of, all the necessary test equipment for verifying that the performance of the system is in compliance with AV9000. The Bid Response must include the name of the Certified qualified individual(s) assigned to the project, so that credentials may be verified on the Infocomm International Association's website, or with the Association for Quality in Audio Visual Technology, Inc. (AQAV).
10. No award will be made until these certificates have been presented by the Contractor for review by the Owner or his representative. The Owner retains the right to enlist the services of a third party Testing and Verification Services Provider to verify compliance, and may elect to do so in the event of any discrepancy in test results. Vendor's final payment may be offset by the cost of corrective actions as well as third party re-testing.

1.2 THE SPECIFICATION

- A. The "Specification" is defined as the body of documentation provided to the Bidder with the Request for Quotation, as well as all addenda to said documentation. Throughout this document, words such as "herein" refer to the entire Specification, and not just this written document.
- B. The Specification includes, but is not limited to:
 1. This written specification document.
 2. All drawings, as listed in the List of Drawings.
 3. Additions and/or modifications as detailed in written Addenda.
 4. Additions and/or modifications as detailed in drawing additions or reissues.
- C. The purpose of the Specification is to provide sufficient detail for the Bidder to understand the functional requirements of the systems, the installation and performance standards that must be met, and the required Scope of Work, in order to generate and submit a complete and accurate bid.

1.3 INTENT OF THE SPECIFICATIONS

- A. It is the intent of these Specifications to describe and provide for Audio-Visual systems of high professional quality and reliability. Consequently, rigid performance standards by the Audio-Visual System Contractor and the equipment will be required. In all cases, the Owner shall determine the acceptability of the work based upon the observations, visits and reports of the project team.
- B. Prior to the consideration or approval of proposed substitutions, manufacturer product samples may be required for testing.
- C. Notwithstanding anything to the contrary, complete systems will be furnished and installed including all necessary options, licenses and accessories.
- D. Where discrepancies appear, the greater quantity and better quality will be furnished.

1.4 DEFINITION OF TERMS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.

1. "Approved": The term "approved," when used in conjunction with Architect's action on Contractor's submittals, applications, and requests, is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract, without any implied meaning extending the Architect's responsibility into the Contractor's area of Contractor coordination, supervision, or means and methods of construction as outlined in the Conditions of the Contract.
 2. "As Indicated": Means indicated in the Contract Documents. Other terms, including "shown", "noted", "scheduled", and similar terms have the same meaning as "indicated".
 3. "Authorities Having Jurisdiction" (AHJ): Means the agencies, either individually or collectively, charged by statute with administration and enforcement of the requirements of building codes and other regulations at the Project location.
 4. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Architect, requested by Architect, and similar phrases.
 5. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on Drawings; or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.
 6. "ODR/PM": Owners Designated Representative/Project Manager.
 7. "Project Manual": A volume or volumes assembled for the Work which may include the procurement requirements, contracting requirements, and Specifications.
 8. "Project Site": Space available for performing construction activities, either exclusively or in conjunction with others performing other work as part of Project. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
 9. "Project Team": Lead by the Owners Designated Representative/Project Manager (ODR/PM) and includes members from the following groups – architect, AV consultant, the Cizick School of Nursing, UTHealth Information Technology, UTHealth Facilities, Planning, and Engineering.
 10. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- B. Within this section of the specification, the following definitions shall apply:
1. The term "Owner" is used to indicate The University of Texas Health Science Center at Houston School of Nursing.
 2. The term "Architect" is used to indicate FKP Cannon Design.
 3. The term "Consultant" is used to indicate Datacom Design Group, LLC.
 4. The term "Bidder" is used to indicate that entity generating the bid response.
 5. The term "Contractor" is used to indicate the successful Bidder to whom the Owner has awarded the Contract.
 6. The term "Installer" means the Contractor or other entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor to perform a particular construction operation at the Project site, including preparation, erection, installation, application, construction, re-installation, and similar operations required for execution of the Work.
 - a. The term "experienced," when used with the term "installer," means having successfully completed a minimum of five previous projects similar in size and

scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.

7. The term "Furnish" is used to indicate the responsibility to procure and ship or deliver the item to the job site, freight prepaid, for receipt, staging and installation by others.
8. The term "Install or "Installation" is used to indicate the responsibility of receiving the item at the job site, assuring 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.
9. The term "Provide" is used to indicate the responsibility to both "Furnish" and "Install".
10. The term "Provided by Others" shall refer to material and work which is related to this contract, but has been provided by parties other than the AV Contractor. An example might be in reference to a projection screen installed during building construction but requiring interface to the AV control system.
11. The terms "NIC and Not in Contract" are equivalent to "Provided by Others".
12. The term "OFCI" (Owner Furnished Contractor Installed) shall refer to equipment that will be furnished by the Owner for installation by the Contractor. The Contractor shall be responsible for installing and integrating this equipment as detailed herein.
13. The term "Installation Materials" shall reference installed cable, loose cable, terminations, signal extenders, cable management, voice/data/video patch cords, adapters, I/O panels, cable dressing, lacing bars, copper bus bars, labels, rack shelves, rack mounts, power strips/distribution and other materials as needed to install the systems defined herein.
14. The term "Substantial Completion" is used to indicate the stage in the progress of the work where the systems are determined to be sufficiently complete in accordance with the Specification so that the Owner can utilize the systems for their intended use.
15. The term "Final Acceptance" is used to indicate the point in which all contract requirements have been met by the Contractor after Substantial Completion has been achieved. This includes, but is not limited to, the correction and acceptance of any remaining punch list items, approval and delivery of all Final Documents, and user training as specified.
16. The term "shall" is mandatory, the term "will" is informative, and the term "should" is advisory.

1.5 EXCEPTIONS

- A. The Bidder shall notify Procurement prior to bid submission of any and all exceptions to these specifications and related drawings. This shall include any errors or omissions in the system design and/or any inconsistencies or ambiguities between package documents that, in the Bidder's opinion, may impact costs to the Owner or prevent the systems from achieving all purposes of the Specification.

1.6 ADDENDA

- A. Written or graphic instruments issued by the Architect and/or Consultant prior to execution of Contract, which modify or interpret Bidding Documents by additions, deletions, clarifications or corrections will be issued and posted to the UTHealth bid website. These addenda shall be binding and become part of the Contract Documents.

B. Bidder.

1.7 CODES AND REGULATIONS

- A. Comply with terms and conditions of Americans with Disabilities Act, especially regarding provisions for hearing impaired and wheelchair access in control areas.
- B. Execute work in accordance with AV system installation best practices as defined by Infocomm International and The Association for Quality in Audio Visual Technology, Inc., National Electrical Code, and applicable state and local codes.

1.8 REFERENCES AND STANDARDS THAT MUST BE FOLLOWED

- A. Infocomm, 2003, "Basics of Audio and Visual Systems Design"
- B. Infocomm International, 2008, "AV Installation Handbook – The Best Practices for Quality Audiovisual Systems"
- C. Davis and Davis, 1987, "Sound System Engineering"
- D. Giddings, 1990, "Audio Systems Design and Installation"
- E. IEC 61947-1 ED. 1.0 EN.2002 "Electronic Projection – Measurement and Documentation of Key Performance Criteria – Part 1: Fixed Resolution Projectors"
- F. IEC 61947-2 ED. 1.0 EN.2001 "Electronic Projection – Measurement and Documentation of Key Performance Criteria – Part 2: Variable Resolution Projectors"
- G. Maltese, 2006, "AV9000: Defining Quality in Engineered Audio Visual Systems"
- H. AQAV, 2014, "AQAV Standard AV-9000-2014 Quality Management System for the Audio Visual Technology Industry" Revision 7/1/14"
- I. ANSI/INFOCOMM 3M-2011, "Projected Image System Contrast Ratio"
- J. ANSI/INFOCOMM 2M-2010, "Standard Guide for Audiovisual Systems Design and Coordination Processes"
- K. ANSI/INFOCOMM 1M-2009, "Audio Coverage Uniformity in Enclosed Listener Areas"
- L. ANSI/INFOCOMM 4:2012, "Audiovisual Systems Energy Management"
- M. INFOCOMM 10:2016 DS1, "Audiovisual Systems Performance Verification"

1.9 RELATED DOCUMENTS

- A. The General Conditions, Requirements, and Special Provisions of any larger body of specifications of which this Specification may be a part, are hereby made a part of this Specification. In the event that any clauses or provisions of the larger body of specification conflict with the letter or intent of this Specification, the Bidder shall immediately notify UTHealth Procurement for clarification and direction.
- B. Section 26 00 00 – Electrical
 - 1. Including all Sub-Sections
- C. Section 27 00 00 – Communications
 - 1. Including all Sub-Sections
- D. Section 28 00 00 – Electronic Safety and Security
 - 1. Including all Sub-Sections

1.10 SCOPE OF THE WORK

- A. The Contractor shall provide complete, turnkey audiovisual (AV) systems performing all of the services and functions described herein, together with all other apparatus, cable, materials, labor, tools, transportation, and any other resources necessary to provide a complete system conforming to the design intent for the project. It shall meet all campus IT Standards.
- B. Specifically, the work shall include, but is not limited to:
 1. Coordination
 - a. Communicating and coordinating directly with the Owner, Architect, Consultant and other trades, complying with all requirements as defined under this Scope of Work and elsewhere, to fulfill all requirements of the Specification.
 - b. Scheduling installation operations in sequence required in order to obtain best completion results.
 - c. Coordinating installation of different components to assure maximum accessibility for required maintenance, service and repair.
 - d. Verifying required cable lengths for all bulk cable or manufactured cable assemblies prior to ordering as outlined in 'Installation Practices'.
 - e. Verify the accuracy of Master Quote or other quotation numbers prior to ordering. Where given, Master Quote numbers or other quotation numbers have been provided for bidding purposes only.
 2. Documentation
 - a. Generating and submitting Shop Drawings as required for approvals and As-Built drawings as specified herein.
 - 1) Note - The Owner, Architect, or Consultant is under no obligation to provide Contractor with digital drawing files. However, digital drawing files may be provided to the Contractor at no cost for use in the development of Shop Drawings or As-Built drawings under separate agreement between Contractor and Architect and/or Consultant.
 - b. Generating and Submitting "Progress Reports" as defined herein.
 - c. Documenting the completed installed systems as defined herein.
 - d. Contractor will provide a high level diagram indicating all network interconnections and dependencies. This diagram should include connections between Contractor provided Ethernet connected devices, the Aruba network switch, and all connections to the Owner's general network. Accompanying this diagram will be a written description of what is required to be provided to this network from the Owner to include general outbound internet access, any desired port openings through the switch to the Owner network, any desired inbound access for vendor support, total number of IP addresses which may be needed. This description should also detail the Dante network and layout of all Dante connected devices. This description should also a full understanding how the Owner provided wireless access points will be integrated into this system and what functionality is being desired. Note: Unless otherwise noted in the description, wireless access points are connected to the Owner's network, but may not be available to the provided unless specifically indicated.
 3. Design Verification and Acceptance
 - a. Verifying the accuracy of the system designs documented in the Specifications and acceptance of responsibility. Any issues, discrepancies, substitutions, or exceptions to the Specification by the Contractor shall be communicated to the project team prior to the purchase of any equipment or materials by way of the Shop Drawings Submittal process. Upon approval of the Contractor's Shop

Drawing Submittal by the Owner's designated representative, or if the Contractor fails to submit Shop Drawings, the Contractor shall assume all responsibility for supplying such materials and taking such actions as to satisfy the full intentions of the Specification without claim for any additional compensation. This shall include providing any incidental equipment, accessories, licenses, installation materials and labor needed in order to result in a complete and operable system, even if such equipment, materials or labor are not listed in this Specification. Exceptions include Owner-requested changes, unexpected field issues due to work by other trades, or schedule changes initiated by others.

4. Cabling, Equipment and Installation

- a. Providing all cable and pull strings in conduits for the specified systems, except where otherwise noted.
- b. Providing station cables for connection of IP-enabled audiovisual equipment to associated data network outlets, including but not limited to instructor's computers, production computer's, laptop connections, control system processors, codecs, displays and projectors. This applies to all equipment installed by the Contractor, including Owner Furnished (OFCI) items. Coordinate station cable requirements with the greater building-wide structured cabling system.
- c. Providing portable interconnection cables for connection of ancillary devices to the audiovisual system where ancillary device connection has been directly designed or can be reasonably assumed.
- d. Coordinating and providing cable labels as stipulated by the Owner and/or specified herein.
- e. Furnishing and/or installing all equipment as specified.
- f. Installing Owner furnished equipment as specified.
- g. Providing loudspeakers as complete assemblies with back boxes, grilles, tile bridges, wall mounts, hanging hardware and other installation hardware as required.
- h. Coordinating with the Architect and Owner on final color selection, and/or the painting of any exposed loudspeakers and any/all exposed system components to match the room's aesthetics and finishes.
- i. Coordinating with local entities and necessary (manufacturer, Owner, SBE, FCC, etc.) to determine final channel selection for all wireless devices and resolve conflicts where they may occur.
- j. Providing to the Owner, upon completion, all accessories and ancillary items included with the manufacturer's equipment but not used for the physical installation of the device. This shall include all user manuals, remote controls, batteries, tools, installation hardware, carrying cases, protective covers, etc.
- k. Furnishing all lifts, ladders, scaffolding or other resources as needed for proper and safe installation. Coordinate with other trades as needed.
- l. Interconnecting all components, both internal and external to rack cabinets.
- m. Ensuring that all cabling, equipment, and terminations are installed in accordance with accepted industry standards, approved Shop Drawings, manufacturer's recommendations and as stipulated herein.
- n. Providing cable management hardware as required including that required internal to rack cabinets, that required between pieces of equipment not housed in rack cabinets, and that required to extend cabling from rack cabinets and equipment to the greater facility cabling infrastructure.

- o. Providing custom cover plates, wall plates, I/O connection plates, floor box insert plates as required. Coordinate with Architect and/or Owner on the final selection of finishes.
 - p. Insuring that all equipment, with the exception of portable equipment, is firmly fastened or attached in place. A safety factor of at least five shall be utilized for all brackets, fasteners, and attachments. Provide safety retention cables for overhead equipment such as loudspeakers, projectors, etc.
 - q. Insuring that all equipment mounting styles and locations comply with the 2010 ADA Standards for Accessible Design.
 - r. Providing any/all patching, caulking, fire stopping, and painting required to restore damaged finished during installation.
5. Furniture
- a. Providing audiovisual lecterns, credenzas, tables and other technical furniture where specified.
 - b. Coordinating with the Owner, Architect and Consultant on the final selection of all technical furniture including design details (make/model), available options, dimensions, cable management and ventilation needs, color and finish.
 - c. Coordinating with furniture manufacturer or others who are providing all necessary furniture/millwork modifications (“cut-outs” or other) as required allowing for a neat and professional installation of integrated technology system components. This includes, but is not limited to: integrated table/lectern “cubbies”, table-top microphones, cable management grommets, etc., and providing manufacturer’ cut-out templates to others when requested.
 - d. Coordinating with the furniture manufacturer, Owner and Architect on cable management needs and equipment installation requirements, including AC power distribution required in all furnishings so equipped and as outlined in “Installation Practices”.
6. Coordination with Owner’s Network
- a. Securing from Owner private IP addresses for use by Ethernet equipped audiovisual devices. No Ethernet equipped device shall be connected to Owner’s network without the express permission of the Owner. This shall include, but is not limited to, configuration parameters such as DHCP, IP addresses, subnet information, VLAN setup and authorization.
 - b. Confirming with the Consultant that coordination with the Owner regarding Ethernet equipped audiovisual devices as outlined in “Submittals – Software”.
 - c. All systems shall prohibit remote activation of collaborative computing devices such as cameras and microphones and provide an explicit indication of use to local users (e.g. ‘in use’ or ‘connected’ notification or an icon indicating a connection in progress).
 - d. Control System Programming
 - e. Providing Control System design submittals and up to two Control System design revisions in order to satisfy system requirements as approved by Owner. .
 - f. Developing and installing all custom control programming code as required and/or as specified herein.
 - g. Providing centralized media control systems including GUI (Graphical User Interface) and code development in order to satisfy the guidelines outlined herein.
 - h. Developing Control System help-desk and system administrator functionality as defined herein.

- i. Providing Control System interfaces to mechanical systems including motorized screens, as specified.
 - j. Providing low voltage control system control of facility lighting where specified.
 - k. Providing the executable (uncompiled) programming control code as defined herein.
 - l. Developing and installing all custom software for Digital Signal Processor (DSP) devices as required to optimize system performance.
7. Testing, Training, Acceptance and Warranty
- a. Ensuring that all individual components function as intended by this Specification.
 - b. Ensuring that the entire audiovisual systems function as intended by this Specification.
 - c. Testing, adjusting, and fine-tuning the completed systems and components.
 - d. Coordinating and participating in a Systems Performance Verification review with the Owner and Consultant.
 - e. Providing "sign-off" documents for each space type as defined herein.
 - f. Conducting training in systems operation and maintenance for the Owner's designated representative(s).
 - g. Providing a Warranty Service Contract as defined herein.
- C. Work Excluded: Work not included under the contract shall be:
1. Providing conduit, power receptacles, junction boxes, cable raceways, electrical back-boxes, and floor boxes, except as specifically called out herein.
 2. Providing lighting fixtures, lighting dimming systems, lighting controllers, and lighting system low voltage AV interfaces at the dimmer side, except as specifically called out herein.
 3. Providing blocking as required to support wall-mounted audiovisual components.
 4. Providing window treatments and motorized shade system low voltage AV interfaces at the controller side.
 5. Providing telecommunications structured cabling systems, including horizontal and backbone cabling and termination, voice and data face plates, associated racks and cabinets, raceway and cable management.

1.11 PROJECT/SITE CONDITIONS

- A. Conflicts: The Bidder shall be responsible for investigating any potential conflicts with site-related issues regarding use of personnel, scheduling, access to the site, storage of tools and equipment on-site, and other areas of potential conflict. If these issues impact the Bidder's Bid Response, the impacts on cost and schedule should be clearly noted in the Bid Response.
- B. Coordination: In the interest of a coordinated and professional project, the Contractor shall:
 1. Coordinate his/her work with that of other trades. The Contractor should anticipate attending project coordination meetings with the Owner, Architect, General Contractor, Consultant or other trades as required.
 2. Afford other trades reasonable opportunity for installation work and for storage of materials.
 3. Staff the job to keep pace with other Trades.

- C. Equipment Delivery and Storage Costs: 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.
- D. Refuse / Cleaning Up:
1. The Contractor shall keep the site and building free of all debris and clutter, to the satisfaction of the Owner or site manager. On a daily basis, the Contractor shall remove refuse and rubbish related to the specified work from the site and shall leave the relevant areas and equipment clean and in an operational state. The Contractor shall be responsible for repairing any damage caused to the premises by the Contractor's installation activities at no cost to the Owner.
 2. At completion of the Work, the Contractor shall remove from and about the project waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials.
 3. If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.
- E. Use of Site:
1. Contractor shall adhere to the Owner's instructions regarding non-smoking, noise, disruptions, behavior, parking, etc. This can be found in the Owners Special Condition Document.
 2. The Contractor shall confine operations at the site to areas permitted by the Contract Documents and shall not unreasonably encumber the site with materials or equipment.
 3. Cutting and Patching:
 - a. The Contractor shall be responsible for cutting, fitting or patching as required to complete the Work or to make its parts fit together properly.
 - b. The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.
 4. Access to Work: The Contractor shall provide the Owner, Architect and Consultant access to the Work in preparation and progress wherever located.

1.12 JOB CONDITIONS

A. Space Conditions

1. Architectural reference drawings provided to the Contractor for bidding purposes may not reflect construction site as-built conditions. It shall be the responsibility of the Contractor to field-verify all site conditions relevant to his work.
2. The Contractor shall verify dimensions of equipment, equipment arrangements, space availability (including any millwork or cabinetry provided by others) and provide systems that work within constraints of the space available. The Contractor shall notify the ODR/PM of any situation where space constraints are a problem, prior to the submission of shop drawings or the ordering or purchase of equipment. The Contractor shall bear the expense of providing alternate equipment which will work within the available space, if space availability problems are discovered after shop drawings are submitted and approved.

3. Drawings indicate locations of equipment and components. Changes in the location and offsets of same to accommodate building conditions, and coordination with the work of other trades shall be made prior to installation, without additional cost to the Owner.
4. The Contractor shall insure during installation that access is provided to equipment and components requiring operation, service or maintenance within the life of the system.
5. It shall be the responsibility of the Contractor to identify any condition where the recommended environmental and/or electrical operating parameters for specified equipment/products cannot be assured. Should such condition exist, it shall further be the responsibility of the Contractor to notify the ODR/PM of any such condition.

1.13 SUBMITTALS

A. General

1. Refer to Division 1
2. Submit in quantities, format and timetable as required by the Uniform General Conditions.

B. Product Data Manuals

1. Minimum number of sets:
 - a. Four (4).
2. Timetable:
 - a. Submit within twenty-one (21) calendar days after award of contract.
 - b. Submit simultaneously with Shop Drawings.
 - c. Allow minimum of fourteen (14) calendar days for review. All sets minus one (1) will be returned with review comments. If a resubmit is required, resubmit total quantity of complete sets. If second resubmit is required, Contractor shall reimburse Owner for expenses incurred during additional review process.
 - d. Review and approval of Product Data is required before equipment purchase and installation.
 - e. Submit product data sheets together electronically as one bound PDF format document.

C. Shop Drawings

1. Minimum number of sets:
 - a. Four (4)
2. Timetable:
 - a. Submit within twenty-one (21) calendar after award of contract.
 - b. Submit simultaneously with Product Data Binders.
 - c. Allow minimum of fourteen (14) calendar days for review. All sets minus one (1) will be returned with review comments. If a resubmit is required, resubmit total quantity of complete sets. If second resubmit is required, Contractor shall reimburse Owner for expenses incurred during additional review process.
3. Description:
 - a. Shop Drawings shall be used for coordination between trades and updated as final record drawings.
 - b. Bind all Shop Drawings together to form set. Loose drawings will not be accepted.

- c. Each drawing shall include: Project, Building, Location, Contractor Name, Owner, Architect, AV Consultant, Date and Revision Number.
- d. Number and title each drawing in logical manner as a set.
- e. Include cover sheet with listing of all drawings included in bound set.
- f. Ensure that labeling on Shop Drawings match labeling on equipment.
- g. Minimum Scale:
 - 1) Floor Plans: 1/8 inch = 1 foot
 - 2) Rack Elevations: 1-1/2 inch = 1 foot
 - 3) Plate/Panel Details: 6-0 inches = 1 foot
 - 4) Loudspeaker Details: 1-0 inch = 1 foot
- h. Include as a minimum:
 - 1) Floor plans indicating locations of all AV devices, vertical risers, pull boxes, and exposed wiring. Include Device ID (PRJ, SCREEN, FRK, FB, AVP, etc., as referenced in design contract documents), as appropriate for projectors, screens, racks, floor boxes, AV plates in walls, etc.
 - 2) Schematic diagrams showing all primary and secondary devices, interconnectivity and signal flow.
 - 3) Plate details showing size, material, finish, connectors, engraving, etc.
 - 4) Mounting detail drawings of loudspeakers, racks, and overhead equipment.
 - a) If required by the General Conditions, the Architect, or the AHJ, provide services of professional structural engineer, licensed by the appropriate governing authority, to review shop drawings, building structural drawings, and any existing structures from which equipment is to be suspended. Include Structural Engineer's stamped report with shop drawing submittal.
 - 5) Equipment rack elevations
 - 6) Complete schematic diagram. One-line diagram with detailed descriptions of product inputs and outputs is acceptable. Include terminal strip details and cable label information. If wiring diagram spans more than three (3) sheets, additionally provide simplified block diagram of entire system on one (1) sheet.
 - 7) Electrical power wiring diagram. Include circuit, switching, and control details.
 - 8) Wiring diagram of grounding and shielding scheme.
 - 9) Drawings for custom-fabricated items (i.e., plates, panels, cables, and assemblies).
 - 10) General construction drawings necessary for completion of work.
 - 11) Provide a logical diagram showing all network devices and how they are interconnected. Connections to Owner's network should be clearly shown as well as all routing and switching elements.

D. Operation and Maintenance Manuals

1. Minimum number of sets:
 - a. One (3) hard copy and three (1) electronic as a single bound PDF document.
2. Format and Minimum Information:
 - a. Section 1 – System Operation
 - 1) Introduction/Overview to system components and their functions and locations. Include a brief listing of basic system functions.
 - 2) Complete but simple system operating instructions to accomplish basic system functions, written for non-technical personnel.

- 3) Certificate indicating names of Owner personnel trained by AV Contactor, date of training, name of AV Contractor representative that provided training, and name of project.
- b. Section 2 – System Documentation
 - 1) Simplified system one-line schematic diagram showing changes made during construction.
 - 2) Complete inventory of system components including serial numbers. Identify location (equipment rack, over stage, stored in control room, etc.) of each component.
 - 3) Cable and terminal strip documentation including cable numbers, functions, originating locations, terminating locations, and signal levels.
 - 4) All Shop Drawings corrected to reflect as-built conditions.
 - 5) Other data and drawings required during construction.
 - 6) Initial Tests and Adjustments data.
 - 7) Final Tests and Adjustments data.
 - 8) Electronic copies of all utilized manufacturer's software and saved copies of software configurations (configurations as established during Final Tests and Adjustments).
- c. Section 3 – Manufacturer's Documentation
 - 1) Provide for each equipment model, at no additional costs to Owner even if manufacturer does not include costs of such documentation with purchase of equipment item, the following:
 - a) Manufacturer's Product Datasheet
 - b) Operating Instructions
 - c) Installation Instructions
 - d) Service Information
 - e) Schematic Diagrams
 - f) Replacement Parts List
- d. Section 4 – Maintenance Information
 - 1) Provide a preventative maintenance schedule letter clearly stating target dates of six month and end-of-warranty preventative maintenance inspections, and list of maintenance tasks performed.
 - 2) Maintenance instructions including manufacturer's recommended maintenance, recommended maintenance schedule and information concerning proper inspection, testing, and replacement of components.
 - 3) Troubleshooting information complete with instructions for procedures during equipment failure.
- e. Section 5 – Warranty Information
 - 1) System warranty letter
3. Submit one (1) set of Operation and Maintenance Manuals at least ten (10) days before Final Tests and Adjustments procedures (minus data from Final Tests and Adjustments). This set will be reviewed by Project Team and returned to Contractor. Re-submit after Final Tests and Adjustments and include data. NOTE: Do not schedule Final Tests and Adjustments or perform training of Owner personnel before submitting Operation and Maintenance Manual.
4. Submit remaining number of complete manuals as required by General Conditions within ten (10) days after return of reviewed set(s). Include Final Tests and Adjustment data, warranty period letter, and any other data not included in first submission.

1.14 SUBSTITUTIONS

- A. Many items are listed in the Specifications by the manufacturer's type or model number, without a detailed performance specification, and may not include the phrase "or approved equal". Where this is the case, no substitutions will be accepted without the written consent of the ODR/PM. Where the phrase "or approved equal" appears, the item specified shall set a standard of quality and performance based on the published

specifications of the manufacturer and on the actual performance as known by the Consultant.

- B. Requests for proposed substitution shall be made in writing to the ODR/PM.
 - 1. Request shall be received by the UTHealth Procurement representative before the bid question deadline listed within the Request for Proposals (RFP).
 - 2. Request shall include name of material, product or equipment to be substituted and a complete description of proposed substitution including drawings, performance and test data and other information necessary to demonstrate that the substitution will meet all intentions of this Specification or required for a complete evaluation.
 - 3. Bidder should be prepared to submit samples if deemed necessary for evaluation and possible destructive testing.
 - 4. Bidder shall assume and bear all responsibility for coordinating and performing related changes in the Work necessitated by such substitution and has included such costs in the Bid.
- C. All approved substitutions shall be communicated via Addenda. No Bidder shall rely upon approvals made in any other manner.
- D. No substitutions will be considered after award of Contract, unless otherwise approved by Owner.

1.15 COOPERATION AND COORDINATION

- A. The Audio-Visual System Contractor shall cooperate and coordinate as required with other Divisions, Trades, Contractors, and Subcontractors who are responsible for work not included in this Section. He shall provide, in a timely manner, any and all information as required or requested in order for this work to be completed to the satisfaction of the Architect and in the best interests of the Project. Requested assistance or information shall be transmitted in writing to the requesting party in all cases.

1.16 WORK BY OTHER DIVISIONS

- A. All conduit, floor boxes, poke-thru devices, in-wall storage boxes, electrical junction boxes, pull boxes and plenum in-ceiling storage boxes as shown on the Drawings are furnished and installed by Division 26 except where otherwise indicated. Audio-Visual System conduit, utility boxes and speaker enclosures are shown on the Audio-Visual Drawings for reference only and must be verified with the Electrical Contractor. Conduit to the equipment racks shall be run to the racks and connected with insulated sleeves so that no metal conduit ties directly to the racks.
- B. 120V, 60 Hz AC power to the equipment racks and other AV related equipment and connection of that power is by Division 26. AC wiring and distribution within equipment racks is by this section.
- C. All cables penetrating walls must be run through approved sleeves. Where cables penetrate fire-rated walls, approved sleeves with Firestop to be used.

1.17 QUALITY ASSURANCE

- A. Unless otherwise stated, all equipment for this installation will be new, less than one year from the date of manufacture, and without blemish or defect.
 - 1. All electrical, electronic and optical equipment provided by the contractor shall be

a product of companies regularly engaged in the manufacture of electrical, electronic or optical equipment.

2. The equipment shall be the latest model or type offered which meets the applicable specifications at the time of submittal. Discontinued items replaced by newer models or versions are prohibited from use in the project. It shall be the Contractor's responsibility to provide the ODR/PM with information regarding discontinued products listed in the specification. If a product listed is discontinued prior to installation, the Contractor shall submit a substitution request.
 - a. Request shall include name of material, product or equipment to be substituted and a complete description of proposed substitution including drawings, performance and test data, and other information necessary to demonstrate that the substitution will meet all intentions of this Specification or required for a complete evaluation.
 - b. Contractor shall assume and bear all responsibility for coordinating and performing related changes in the Work necessitated by such substitution. This includes, but is not limited to, changes to other related audiovisual components, installation materials, architectural integration details, software programming, and required infrastructure.
- B. Quality of workmanship and fabrication of all equipment and components, which are custom fabricated shall be comparable to professional equipment produced by specialized manufacturers of the trade involved and shall be verified by observation. Only firms having 10 years' experience in all aspects of the fabrication and installation of similar systems shall be allowed to perform the work.
- C. The work specified herein, and in each of the allied sections, shall be accomplished by a single Audiovisual Contractor experienced in the design, fabrication, installation, commissioning and warranty contract management of systems such as those described in each section.
 1. The Contractor shall have complete responsibility for systems described herein and shall be the single contract point for the Owner, Architect, and/or the Consultant with respect to all work specified herein.
 2. The Contractor shall maintain the same project manager and field supervisor throughout the installation, and where practical, maintain the same installers.
- D. The Contractor shall supply and install any incidental materials, equipment, software, licensing, etc. needed in order to result in a complete and operable system conforming to the design intent without claim for additional payment, even if such equipment is not specifically listed in the Specification.
- E. All work related to this Specification shall be completed in a professional manner by fully qualified workers.

1.18 RELIABILITY

- A. General: The systems are 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 the systems.
- B. Warranty: The Bidder shall make known, in writing, at time of Bid any exceptions that might exist between conditions described herein and Bidders policy of warranty. After acceptance of bid, all conditions and requirements of warranty described herein shall apply.
 1. The Contractor shall guarantee all equipment, materials and labor for a period of one (1) year from the date of Substantial Completion.

2. During the warranty period, within 24 hours of notification, the Contractor shall answer all service calls and requests for information.
3. During the warranty period, within 48 hours of original notification, the Contractor 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 to the Owner.
4. The Contractor shall notify the Owner before any service call whether such call is or is not covered under warranty. The Owner may be billed for non-warranty calls. The Contractor shall notify the Owner of any service call or work to be performed for which charges may be incurred before such work commences.
5. 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.
6. The Contractor 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 Contractor shall be responsible for the repair or replacement of said equipment that the Contractor installs which fails due to environmental or electrical conditions, even if not covered by the manufacturer's warranty. The Contractor shall not be held responsible for damages due to changes in environmental conditions, which occur after the date of Substantial Completion.
7. Unless otherwise directed, the Contractor shall activate all manufacturer warranties in the Owner's name. The start date of the warranties shall be the date of Substantial Completion.
8. If the Contractor has modified certain components, the manufacturer warranty may be voided. In this case, the Contractor is responsible for providing warranty coverage equal to that of 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 Contractor's responsibility to make arrangements for the complete manufacturer warranty to apply. These arrangements are to be at no additional cost to the Owner.
10. As part of the Bid Response, the Contractor shall provide the Owner with a proposal to extend the Warranty to cover Year 2, Year 3 and Year 4 of operation. These offerings are to include all parts and all labor; all conditions and restrictions listed above apply.

1.19 PROTECTION OF PERSONS AND PROPERTY

- A. Safety Precautions and Programs: The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract. This requirement applies continuously 24 per day during construction of the Project.
- B. Safety of Persons and Property: The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to:
 1. Employees on the Work and other persons who may be affected thereby.
 2. The Work and materials and equipment to be incorporated therein, whether in

storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors and vendors.

1.20 SUBMISSION FOR PUBLICATION

- A. Prior written consent from the Owner is required before submitting any information about this project for publication or award. This shall include, but not be limited to, photographs, descriptions, drawings, renderings, equipment lists, or any other information regarding the project. If written consent is provided by the Owner, any submission for publication or award must properly credit the Owner, Architect, and Consultant.

PART 2 PRODUCTS

2.1 GUIDELINES

- A. Active Equipment - All active AV equipment shall be furnished by the Contractor selected by the Owner. All active electronics shall be contractor furnished, contractor installed (CFCI).
- B. Infrastructure Devices - All conduits, basket tray/cable tray, pull boxes and associated parts required for infrastructure shall be installed by the electrical contractor unless specifically excluded in these specifications or drawings.
- C. Performance - Regardless of completeness of descriptive paragraphs herein, each device shall meet its manufacturer's published specifications.
- D. Contract Documents - Drawings and specifications are to be used in conjunction with one another and to supplement one another. In general the specifications determine the nature and quality of the materials, and the drawings establish the quantities, details, and give characteristics of performance that should be adhered to in the installation of the AV system components. If there is an apparent conflict between the drawings and specifications, the items with the greater quantity or quality shall be provided and installed. Clarification with the ODR/PM about any such items shall be made prior to the ordering and installation.
- E. Quantities - Confirm quantities on final Contract Documents. If Contract Documents do not include quantities necessary to deliver complete working system, provide notification of disparity, and install required quantity of devices for complete working system.
- F. Small Parts - Systems are described in terms of major products. Even if not specifically mentioned, provide and install patch cables, connectors, hardware, converters, power supplies, labels, terminals, mounting accessories, software, licenses, etc. necessary for complete and working system meeting design intent of specifications.
- G. Balanced Lines - Unless specifically directed otherwise, wire all line and microphone level circuits as balanced with respect to signal ground. For products without balanced inputs or outputs, provide high quality balancing transformers with proper level, shielding, and impedance characteristics. Assure all audio levels arriving and leaving matrix and routing switchers are equal to the manufacture's recommended input audio level. If required, use Edcor Electronics (www.edcorusa.com) products or equivalent for level matching.
- H. Keys - Provide five (5) sets of keys for any AV system product requiring keys.
- I. Condition - Provide and install products listed in this section in factory new condition, conforming to applicable provisions of American National Standards Institute.
- J. Designations - Each major product item is given unique designation (such as MIX1 for mixer number 1). The product designations are unique in this section only and may be repeated in other specification sections.

- K. Security Screws - Use Middle Atlantic HTX screws and bits to secure rack components, LCD mounts, Projector mounts and any other location deemed necessary by Owner. Use nylon washers to protect equipment surfaces. Account for appropriate tip wear when ordering quantity and do not use a bit beyond the manufacturer's recommendations. Provide ten (10) additional unused driver bits and deliver to the customer after completion.
- L. Electrical Power - Coordinate with Electrical Contractor regarding proper placement of isolated-ground duplex outlets for any AV equipment. Electrical circuits should be connected (and outlets wired) by the Electrical Contractor to the AV system circuit breaker panel (N.I.C.). Ensure that "Star" ground configuration is properly implemented by the Electrical Contractor. Ensure that ground wires from each outlet are isolated from conduit, neutrals, and each other.
- M. Wireless Microphones - Coordinate frequency selection with other radio-frequency sources in the area and with manufacturer's recommendations.
- N. Control System Programming:
 - 1. Program each user interface to provide simple, intuitive control of all basic AV functions including: program and speech volume levels, video source and destination routing, screen and lift control, AV system power and external media player transport functions.
 - 2. Utilize Infocomm International's "Dashboard for Controls" concept for touch panel layout unless directed otherwise by Owner.
 - 3. Provide layout of each and every touch panel and hard-button panel pages in the product data submittal for approval by Owner.
 - 4. To include standard UT logos using approved fonts and colors.
 - 5. Provide web-control for each touch panel in AV system. Include page tracking, and track current button feedback between touch panel and web-control panel.
 - 6. After programming is approved, all control system code and programming, including touch panel code and graphics, will become property of Owner. AV Contractor shall provide Owner both source and compiled code on CD-R disc. Or other approved storage medium.
 - 7. If requested by Owner, one (1) additional control system review/update shall be conducted at no additional cost to Owner.
- O. Audio System Programming - Contractor shall coordinate layout and logical branching of DSP audio system. Include screen layout and menu branching drawings in AV submittal. After AV system is approved, all audio control system code and programming will become property of Owner. AV Contractor shall provide Owner both source and compiled code on CD-R disc or other approved storage medium.
- P. Projection Screens - For any screen specified, size as indicated in drawings. Unless otherwise indicated in drawings or specifications, set limits so projected images are 48" above finished floor, and include additional black drop as appropriate considering screen size and mounting height.
- Q. AV Equipment Racks:
 - 1. Provide blank faceplate in any area marked BLANK in drawings.
 - 2. Provide shelf for mounting of any device for which rack mount kit is not available.
- R. AV Floor Boxes:
 - 1. Clean floor boxes of all dust and debris prior to installation of any active or connectorized plate.

2. Any floor box with active or connectorized AV plates found to have any dust, debris or water in bottom of box are subject to replacement of all plates and components. A re-test of all associated components must be completed.
- S. AV Design Bid and Substitutions
1. System design is around products listed in Part 2. Intent of product specification is to provide standard of quality and function for installed materials. Certain performance specifications are given to clarify job requirements.
 2. Bid AV system with products specified in Base Bid section below unless noted otherwise from Owner.
 3. No substitutions will be allowed without prior submission of Request for Substitution and approval from ODR/PM specific to proposed manufacturer and model numbers
 - a. All requested substitutions need to meet or exceed performance of devices listed in Part 2. For each request, provide manufacturer's published specifications to verify performance and explain functional and cost impact.
 - b. Evaluation and approval of substitution requests will be performed by the project team.
 4. Equipment listed in Part 2 is based on performance criteria to meet Owner design requirements.
- 2.2 AV ACTIVE PRODUCTS – Provide and install quantities as shown on Drawings. Submit product equals for Owner approval.
- A. The following are major active products for Skills & Tasks Labs: see paragraph E
1. Surface Mounted Connection interface at Instructor Desk
 - a. Cable Cubby – Crestron model TT-101
 - 1) Coordinate exact mounting location with architect and furnish dimensioned sketches and/or shop drawings of cut-out template location.
 2. Digital AV Twisted Pair Transmitter (DMT)
 - a. Crestron Electronics model DM-TX-4K-302-C 4K DigitalMedia 8G+ Transmitter
 - 1) Mount in poke-thru floor box as shown on Drawings.
 3. Digital AV Twisted Pair Receiver (DMR)
 - a. Type 1 - Crestron Electronics model DM-RMC-4K-SCALER-C digital media receiver with scaler.
 - 1) Mount in display or projector backbox as shown on Drawings.
 - b. Type 2 - Crestron Electronics model DM-RMC-4K-100-C-1G receiver.
 - 1) Mount at junction box for flat panel display as shown on Drawings.
 4. Wall Control Panel (WCP)
 - a. Crestron Electronics TSW-760-B-S 7" touchscreen panel
 5. Video Projector (PRJ)
 - a. Provided and installed under separate contract. Coordinate with Melton Electrical & Structured Cabling. VERIFY
 - b. Provide and install all associated cabling and connections for integration with audio-visual system.

- c. Panasonic PT-RZ770 laser-diode projector (7000 lumens)
 - 1) Include Chief Manufacturing universal ceiling projector mount.
 - 2) Include Chief Manufacturing CMS adjustable extension column and CMA plate.
 - 3) Include Chief CMS492 plenum ceiling box.
 - 6. Ceiling Loudspeaker (S)
 - a. Crestron Electronics model SAROS IC6T-W-T 6.5" Ceiling Loudspeaker Transducer Assembly w/ Transformer; tap at 7.5watts.
 - 1) Include suspended ceiling mounting kit with tile bridge.
 - 7. Assisted Listening System (LA)
 - a. Williams Sound PPA 457 PRO FM assistive listening system
 - 1) Extend antenna as necessary for full coverage within the corresponding room.
 - 2) Provide additional PPA R37 bodypack receivers with batteries and EAR 013 earbuds as necessary to comply with ADA requirements.
 - 8. Motorized Projection Screen (SCREEN)
 - a. Provided and installed under separate contract. Coordinate with Melton Electrical & Structured Cabling. VERIFY
 - b. Provide and install all associated cabling and connections for integration with audio-visual system.
- B. The following are major active products for Debrief Rooms:
- 1. Wall Mount Pan/Tilt/Zoom HD Camera (CAM)
 - a. Vaddio RoboSHOT 15 HD-SDI pan-tilt-zoom camera
 - 1) Include manufacturer recommended wall mount.
 - 2) Power remotely from equipment rack.
 - 2. Ceiling Mounted Microphone (CMIC)
 - a. Biamp Tesira TCM-1 with extension cables.
 - 3. Ceiling Loudspeaker (S)
 - a. Crestron Electronics model SAROS IC6T-W-T 6.5" Ceiling Loudspeaker Transducer Assembly w/ Transformer; tap at 7.5watts.
 - 1) Include suspended ceiling mounting kit with tile bridge.
 - 4. Flat Panel Display (FPD)
 - a. Type 1 - LG 75UV770H 75" Pro grade 4K HD Display
 - 1) Provide with Chief Manufacturing XTM1U tilt wall mount
 - b. Type 2 – Panasonic TH-84LQ70U 84" Pro grade 4K HD Display
 - 1) Provide with Chief Manufacturing XTM1U tilt wall mount
 - 5. Simulation Capture PC (SIM PC) - OFCI
 - a. Owner Furnished Equipment equal to Dell OptiPlex 5060 MFF; 256GB with Windows 10 Pro OS; .
 - 6. Wall Control Panel (WCP)
 - a. Crestron Electronics TSW-760-B-S 7" touchscreen panel

7. Assisted Listening System (LA)
 - a. Williams Sound FM ADA KIT 37 portable assistive listening system
 - 1) Include one (1) 10'-0" custom cable with each system for interconnection between the flat panel and listening assist transmitter.
 - 2) If the flat panel connection is not easily accessible from the side, provide a pigtail from the audio out connector on the flat panel to the table (balance the run).
- C. The following are major active products for Control Room (each workstation):
1. Flat Panel Display (FPD CR)
 - a. Type CR - LG 32MU99-W 32" 24UD58-B 24" Ultra HD 4K Monitor
 - 1) Provide with Chief Manufacturing MTM1U tilt wall mount
 2. Desktop Microphone (MIC)
 - a. Shure MX412/S gooseneck microphone base with push-to-talk button
 3. Audio Player Dante Interface (API)
 - a. AtteroTech unBT2A wall plate interface (Blu-tooth)
 4. Headphone Amplifier Dante Interface (HPH AMP)
 - a. Radio Design Labs Model AV-NH1; Qty. of ten (10).
 5. Headphones (HPH)
 - a. Sennheiser HD 380 Pro or approved equal by Shure, Sony.
 - 1) Include two pair per workstation; Qty. of ten (10).
 6. Simulation Capture PC (SIM PC) - OFCI
 - a. Owner Furnished Equipment equal to Dell OptiPlex 7060 SFF with Windows 10 Pro OS; 512GB; one (1) per workstation.
 7. Touch Panel Control User Interface
 - a. (TP) Wireless Tablet – Apple IPAD Pro 12.9" 64GB; one (1) per workstation
 8. Intercom System for Confidant/Actor Communication
 - a. ListenTALK Collabor-8 System model LKS-3 by Listen Technologies. Provide two (2) systems with charging stations and additional inventory as listed below for a total of thirty-two (32) transceivers with accessories.
 - 1) Include an additional sixteen (16) LK-1 transceivers w/ leader clip, LA-401 ear speaker, LA-445-BK lanyard
 - 2) Include thirty-two (32) line/headset mix cables; model LA-437
 - 3) Include thirty-two (32) mic input/headphone output cables; model LA-436
 - 4) Include thirty-two (32) dual over-ear headsets with boom mic; model LA-454
 - 5) Include thirty-two (32) ear speaker with boom mic headset; model LA-451
 9. Desktop Equipment Cabinet
 - a. Middle Atlantic DTRK-718 (7RU)
- D. The following are major active products for Simulation Environment / Patient Rooms – including six (6) simulation exam areas at Basic Skills & Tasks rooms, six (6) Patient Flex rooms and fourteen (14) Psy/Exam rooms.

1. Ceiling Mount Fixed Focus IP Camera (CAM FF)
 - a. Axis Communications P3375-V Fixed Focus Network Camera
 - 1) 1080p resolution
 - 2) Include one (1) per area (except at Psy/Exam) as indicated on Drawings.
 2. Ceiling Mount Pan/Tilt/Zoom IP Camera (CAM PTZ)
 - a. Axis Communications Q6055 PTZ Dome Network Camera
 - 1) 1080p resolution; 32x zoom
 - 2) Include two (2) per area as indicated on Drawings.
 3. Ceiling Mount Dante Microphone
 - a. Audio Technica ATND931C Cardioid Condenser Hanging Microphone with Dante Network Output Power Module.
 - 1) Provide with optional ESE-O omnidirectional (360°) microphone element
 - 2) Include one (1) per area as indicated on Drawings.
 4. Ceiling Mount Dante Loudspeaker
 - a. Type 1 - AMK Innovations DT61-A Dante Enabled, PoE+ Powered 6" coaxial, 2x2 Lay-In Ceiling Speaker or approved equal.
 - 1) Include one (1) per area as indicated on Drawings
 5. Flat Panel Display (FPD HC) – Patient Flex
 - a. Type HC - LG 24UD58-B 24" Ultra HD 4K Monitor
 - 1) Install two (2) on Owner Furnished medical head column stand
 6. Flat Panel Display (FPD vs) – Standard Patient; Psy Exam; Simulation Exam
 - a. Type VS - LG 24UD58-B 24" Ultra HD 4K Monitor
 - 1) Provide with Peerless SmartMount model SA740P articulating wall mount
- E. The following are major active products for Home Health Room
1. Ceiling Mount Fixed Focus IP Camera (CAM FF)
 - a. Axis Communications P3375-V Fixed Focus Network Camera
 - 1) 1080p resolution
 2. Ceiling Mount Pan/Tilt/Zoom IP Camera (CAM PTZ)
 - a. Axis Communications Q6055 PTZ Dome Network Camera
 - 1) 1080p resolution; 32x zoom
 3. Ceiling Mount Dante Microphone
 - a. Audio Technica ATND931C Cardioid Condenser Hanging Microphone with Dante Network Output Power Module.
 - 1) Provide with optional ESE-O omnidirectional (360°) microphone element
 4. Ceiling Mount Dante Loudspeaker
 - a. Type 2 - AMK Innovations DS61-A -X Dante Enabled, PoE+ Powered 6.5" coaxial ceiling speaker, or approved equal.
 - 1) Provide blind-mount enclosure and mounting bracket for gypboard ceiling.

- F. The following are major active products for AV Rack Room 4D03 -provide network switches for system connectivity to IDF/MDF rooms as required. Provide fiber connectivity to campus Data Center as required.
1. Floor Equipment Rack (FRK)
 - a. Middle Atlantic ERK-4425 series Provide two (2) units.
 - 1) Middle Atlantic ERK-4QFT-FC fan top for ventilation.
 - 2) Provide with MPR series modular power distribution.
 - 3) Provide vents and blanks as required.
 2. Presentation Switcher (PSW) - Skills & Tasks
 - a. Crestron Electronics model DMPS3-4K-150-C
 3. Matrix Presentation Switcher (MSW) – Debrief Rooms
 - a. Crestron DM-MD8x8-RPS with 8G+ input and output cards as appropriate to support AV system as indicated on the drawings.
 - 1) Include Creston DM-CBL-ULTRA-P cable and DM-8G-CONN connector for connection with transmitters and receivers.
 4. Wireless Presentation System (WPS)
 - a. Crestron AM-200 404 AirMedia unit; provide with rack shelf
 5. Power Amplifier (AMP)
 - a. Type 1 – QSC Audio CX204V four-channel 70volt amplifier
 6. Power Management (PWR)
 - a. Type 1 - Middle Atlantic UPS-2200R-IP uninterruptable power supply
 - 1) Connect to Simulation Capture video server.
 - b. Type 2 - Middle Atlantic PDC-915R-6 power supply
 - 1) Provide for each presentation system as shown on Drawings.
 7. Record/Stream Device (RCD)
 - a. Mediasite RL700 Recorder by Sonic Foundry.
 8. Audio Digital Signal Processor (DSP)
 - a. Type 1 - Biamp Tesira Server I/O digital signal processor with DSP-2 card
 - 1) Include I/O cards and expansion units to support AV system functionality as indicated on the drawings.
 - 2) Include DAN-1 Dante input card.
 - 3) Use Extron Electronics ASA 131 passive audio summing adapters for incoming balanced stereo audio signals.
 - b. Type 2 - Biamp TesiraFORTÉ DAN VT
 - 1) Includes auto echo cancellation (AEC) on all inputs.
 - 2) Includes VoIP interface.
 - 3) Includes Dante audio network protocol.
 9. Simulation Capture Server (SERVER) - OFCI
 - a. Owner Furnished Equipment equal to Dell Precision 7920; 1.8TB with vendor operating system; quantity as required.

10. Network PoE Switch (NET) - OFCI
 - a. Owner Furnished Equipment: Aruba 3810M 48G POE+ 4SFP+ 1050W SWITCH (Model# JL429A)
 - b. NetGear M4300 for simulation capture network
11. Control Processor (CP)
 - a. Type 1 - Crestron CP3 Series Control System
 - b. Type 2 - Crestron AV3 Series Control System
12. Wireless Microphone System (WMIC) – Debrief and Skills & Tasks
 - a. Type 1 - Shure ULXS124/85 combo lavalier/handheld wireless system
 - 1) Include Shure UA844SWB antenna distribution system.
 - 2) Provide full coverage within each system's corresponding room using UA864US wideband antenna mounted in finish ceiling at box "A".

G. The following are major active products for Director's Office

1. Ceiling Mount Pan/Tilt/Zoom HD Camera (CAM MON) - **ADD ALTERNATE #1**
 - a. Vaddio RoboSHOT 30 HD-SDI pan-tilt-zoom camera
 - 1) Include manufacturer recommended wall mount.
 - 2) Power remotely from equipment rack.
2. Camera Control Interface Unit (CCU) - **ADD ALTERNATE #1**
 - a. Vaddio RoboSHOT 30 QCCU System
3. Camera Controller (CCC) - **ADD ALTERNATE #1**
 - a. Vaddio PCC Premier
 - b. Include TeleTouch 27" USB Touch-Screen Multiviewer
4. Touch Panel Control User Interface (TP)
 - a. Wireless Tablet – Apple IPAD Pro 12.9" 64GB
5. Flat Panel Display (FPD)
 - a. LG 43UV560H 43" flat panel display w/ integrated Pro:Idiom
6. Control Processor (CP)
 - a. Type 1 - Crestron RMC3 controller

2.3 VIDEO MANAGEMENT SYSTEM – SIM Vendor to comply with UTHSC configuration standards.

- A. Synopsis: the system server is to integrate and distribute simulation room monitoring functions in a scalable, cost-effective solution for the day-to-day control and capture of simulation scenarios. The system shall be capable of capturing and archiving multiple camera feeds for recording and playback in high-definition (HD). The system shall be capable of both standard simulation capture as well as specialized OSCE recording applications, including implementation of manikin vital sign software. See room descriptions. The system shall implement a flexible solution for debriefing sessions, allowing seamless integration with the audio-visual system and record/stream lecture capture devices. The system shall allow external access from a remote location for faculty viewing of archived videos for playback and editing through internet log-in access code.

B. Subscription Options:

1. Include Service Plan with maintenance response time within 24 hours.

2. Include Licensing Fee Options:
 - a. Subscription period of 1 year to 3 years.
 - b. Extended subscription period beyond 3 years (to 10 years).
- C. Physical Parameters: no off-site storage or Cloud AV subscription services will be allowed. Storage capacity to store 7000 hours of high-definition (HD) video simulation for duration specified by client. Videos can be stored for archiving through export function of software.
- D. Software capability with Manikins provided by CAE

2.4 WIRE AND CABLE

- A. Interconnect Wiring - Wire and cable shall be new and unused. Cable shall be installed splice-free in all cases. Where splices must occur, other than at terminal points of wiring, they must be made with approved connectors and screw terminals in totally enclosed junction boxes. Approval must be obtained in writing from the Consultant before such splices are made.
- B. Wire not installed in equipment racks, nor portable, nor installed in conduit, shall meet all fire and other applicable codes per NEC.
- C. Bulk Wire - Wire shall be by Belden, West-Penn or Liberty AV.
 1. Low-Z loudspeaker wire shall be stranded, twisted pairs, #12 each wire for low-frequency, high-frequency and full range loudspeaker.
 - a. Belden 6000UE
 - b. West-Penn 25227B
 - c. Liberty AV 12-2C-TTP
 2. Hi-Z loudspeaker wire shall be stranded twisted pairs, #16 each wire.
 - a. Belden 6200PE
 - b. West-Penn D25291
 - c. Liberty AV 16-2C-P
 3. Microphone level wire, installed but not portable, and wire for line-level circuits and inter-amplifier wire shall be 1 pair 22 AWG stranded, twisted, and shielded.
 - a. Belden 6500PE
 - b. West-Penn D25291
 - c. Liberty AV 22-1P-EZ
 4. HDBaseT AV transport cable shall be stranded #23 4-pair conductor overall shielded Category 6A Cable.
 - a. Belden AV6SHP
 - b. West-Penn 254246F
 - c. Liberty AV 24-4P-L6SH
 5. TV, Video and RF cable shall be RG-6/u or better.
 - a. Belden 1695A
 - b. West-Penn 2563050
 - c. Liberty AV 18-CMP-VID-COAX
 6. Component video cable shall be five conductor mini-flex coaxial.
 - a. Belden 1279P

- b. West-Penn WP258255
 - c. Liberty AV RGB5C-25-CMP
7. Control equipment wire and data cable shall be stranded wire of gauge and number of conductors as required by the manufacturer of the equipment furnished.
8. Wire for all other devices shall be according to the recommendation of the device manufacturer.
- D. Pre-Terminated Cable Assemblies
- 1. HDMI cable shall be retention locking High Speed type in appropriate length for application.
 - a. Liberty AV HD 1000 Series
 - b. Crestron CBL-HD-DVI Series
- E. Connectors - All AV connectors shall be of the quantity and type as required for proper and durable operation, and signal transmission of the electrical characteristics for associated circuitry.
- 1. Provide strain relief for each and every connector.

PART 3 EXECUTION

3.1 INSTALLATION

A. General Guidelines

- 1. Quality of Work - Perform labor to accepted industry standards and state and local codes to accomplish complete and working system.
- 2. Material and Labor - Provide specified products and other incidental equipment, materials, appliances, software, licensing, tools, labor and transportation required for complete and functioning systems. Provide personnel to perform labor who are skilled in techniques and can demonstrate technical knowledge of AV infrastructure and active systems installation.
- 3. Documents at Job Site - Keep following documents at job site during entire construction period:
 - a. Complete Specifications and Drawings
 - b. Approved Shop Drawings
 - c. Approved Product Data
 - d. Progress Set of Project Record Documents
- 4. Mounting - Mount equipment and enclosures plumb and square. Ensure that permanently installed equipment is firmly and safely held in place. Design equipment supports to support loads imposed with project safety factor of five (5) or greater. For devices hung overhead, obtain review by Structural Engineer licensed by the appropriate governing authority prior to installation.
- 5. Dimension Verification - Verify dimensions and space requirements to assure that proper mounting, clearance, and maintenance access space is available for system components.

6. Clean-Up - Leave project clean each day. Place debris where designated by ODR/PM. Debris includes but not limited to: solder splatter, cable ends, stripped insulation, spent crimp connectors, gypsum board and ceiling tile dust, and product wrappings and cartons. After completion of installation, thoroughly clean areas worked, including non-visible areas such as equipment rack interiors, rack top panels, and inside lockable floor and wall boxes.
7. Coordinate installation of AV infrastructure and active equipment with ODR/PM and other trades in order to follow project schedule.
8. Maintain any licensing required by the appropriate governing authority to install and terminate low voltage systems.

B. Labeling

1. Equipment Labels - Contractor shall provide engraved lamicoïd labels on front and rear of rack-mounted equipment. Mount labels plumb and square. Include schematic reference design, item name, and system or area controlled by labeled component. On program preamps and mixers, provide label for each input indicating which source is controlled by labeled channel. Unless otherwise indicated, provide permanently-mounted black labels engraved with 1/8-inch white block characters. Handwritten, self-laminating, or embossed plastic (Dymo) labels are not acceptable. Provide labels for major equipment with two (2) lines (minimum) of engraving, coded as follows:
 - a. Line 1 – Generic name of device, such as MIXER, AMPLIFIER, SWITCHER, etc.
 - b. Line 2: Schematic designation of device, such as AV-MSW-1
 - c. Reconcile naming convention to schematic designation provided on approved shop drawings
2. Control Labels – Contractor shall provide engraved label over each user-operated control that describes the function or purpose of control. Provide label of proper size to fit available space.
3. Terminal Strip Labels - Contractor shall label each terminal strip with unique identification code in addition to numerical label (Cinch MS series) for each terminal. Show terminal strip codes on system schematic drawings included with Project Record Documents.
4. Rear Equipment Labels - AV Contractor shall provide adhesive label on rear of equipment where cables attach, to indicate designation of cable connected at each point.
5. Cable and Wire Labels - Label cables and wiring logically, legibly and permanently for easy identification. Labels on cables shall be adhesive strip type, covered with clear heat shrink tubing. Factory stamped heat shrink tubing may be used. Handwritten or self-laminating type labels are not acceptable.
 - a. Cable Label Codes and Locations - Label each cable with unique alpha-numeric code. Locate cable designation at start and end of each cable run, within three (3) inches of termination point. For cable runs that have intermediate splice points, label cable with same designation throughout, with

additional suffix to indicate each segment of run. Provide cable designation codes to schematic drawings included with Project Record Documents and Operation and Maintenance Manuals.

C. Power and Grounding

1. Power Coordination – Coordinate final connection of power and ground wiring to rack. Electrical contractor will provide power to audio visual systems. Before installation, verify load requirements for systems as accepted.
2. Bus Bars - Install 1-inch by ¼-inch copper ground bus bar, top to bottom in floor mounted AV racks. Ground and bond equipment chassis of each rack-mounted component without three-pin grounding plug to bus bars with #12 AWG insulated green wire using 6-32 or larger nuts, bolts, lock-washers, and appropriate NEMA connectors. Electrical Contractor (Division 16) shall provide and connect #4 AWG green insulated wire from Bus Bars to ground point in AV technical electrical panel.

D. Equipment Racks

1. Ventilation - Provide ventilation adequate to keep temperature in rack below 85 degrees Fahrenheit. Use “whisper” type ventilation fans in racks, adjusted to come on when temperature in rack rises above 85 degrees Fahrenheit, only if adequate cooling cannot be provided by Owner.
2. Raceways - Run vertical wiring inside rack in Panduit (or equivalent) plastic raceways with snap-on covers, sized to allow at least 50% future wiring. Mount raceways on full length ¾-inch flat black plywood backboards, attached to rack sides. If between-rack wiring chases are provided, Panduit raceways are not required. Horizontal wiring in rack shall be neatly tied in manageable bundles with cable lengths cut to minimize excess cable slack, but still allow for service and testing. Provide horizontal support bars if cable bundles sag. Individually bundle excess AC power cable away from rack mounted equipment with Velcro cable ties. Electrical tape and adhesive backed cable tie anchors are not acceptable.
3. Accessibility - Ensure that wiring and connections are completely visible and labeled in rack. Mount termination resistors, if required, on terminal strips, fully visible and not concealed within equipment or connectors.
4. Looking into the rack from the rear, locate AC power, control, data and speaker wiring on the left; line level audio, control, video, and RF wiring on the right. Keep several inches of space between power cables and other signals.

E. Wiring

1. Wiring Standards - Execute wiring in strict adherence to best AV engineering standards and practices.
2. Field Connection Devices - Connect cable to active components through screw terminal connections and spade lugs when appropriate. For BNC connections use three-piece, dual crimp BNC properly sized for cable with insulating bushings. Wire nut or “Skotchlock” connectors are not acceptable. Do not wrap audio cable splices or connections with adhesive backed tape. Punch connectors or telephone-style punch blocks are not acceptable anywhere in the installation unless specifically authorized by Owner.

3. Run cable in ceiling plenums neatly parallel to building walls, supported every three feet to structure with plenum rated Velcro wrap ties.
4. Loudspeaker Polarity - Connect loudspeakers electrically in phase, using same wire color for loudspeaker wiring throughout project.
5. Physical Damage Prevention - Take necessary precautions to prevent physical damage to cables and equipment. Damaged cables or equipment will not be accepted. Separate, organize, and route cables to restrict channel crosstalk and feedback oscillation.
6. Hum Prevention - Ensure that electromagnetic and electrostatic hum is at inaudible levels. For line level signals, float cable shields at the output of the source device. Do not cut or remove shield conductors; fold back unconnected shields over cable jacket and cover with clear heat-shrink tubing. Do not obstruct cable labels.
7. Other Connections - Make connections using rosin core solder or approved mechanical connectors. Where spade lugs are used, crimp properly with ratchet type crimping tool. Solder spade lugs mounted on #22 AWG or smaller cable after crimping.

3.2 STORAGE AND HANDLING

- A. Power up any electronic equipment to ensure its proper functioning before its arrival onsite.
- B. Ensure that materials (especially electronic and electro-acoustic devices) are protected against physical, environmental, and electronic damage until final acceptance by Owner.
- C. Schedule delivery to minimize delays in the project.
- D. Provide storage protection against temperature and humidity extremes, theft, vandalism, physical damage, and environmental damage.

3.3 WARRANTY

- A. Refer to Division 1
- B. Warranty - Submit letter providing warranty covering labor and materials supplied under this contract. Bind in Operation and Maintenance Manuals. Terms as described in General Conditions. Minimum terms as follows:
 1. System - Systems shall be free of manufacturing or installation defects for a minimum period of one (1) year from the date of final acceptance. Clearly designate begin and end dates of system warranty period.
 2. Parts and Labor - Provide parts and labor to repair defects in materials and workmanship during system warranty period.
 3. Response Time - Within system warranty period, provide initial on-site service response within one (1) business day of service call. Provide resolution to any system defects within within 48 hours of receipt of repaired or replaced product from manufacturer.

4. During warranty period, provide a maximum of four (4) preventative maintenance follow-up calls per Owner request at no additional cost to Owner.
 5. Replacement Products - If any item must be removed for repair during system warranty period, provide replacement item of similar quality at no charge.
 6. Repair Limit - Do not repair any piece of equipment found defective during installation or system warranty period more than two (2) times. After second repair, replace defective item with similar approved item at no additional cost to Owner.
 7. Extended Manufacturer's Warranties – Identify products with manufacturer's warranties extending beyond one (1) year. Provide terms and conditions of such warranties.
 8. Service Personnel Information - Provide name(s) and telephone number(s) of service personnel to be contacted regarding repair and maintenance.
- C. Extended Warranty - Warranty - Provide cost to extend complete AV system warranty from one (1) year to four (4) years in annual increments. Included a list of all provided services including maintenance schedules. Note warranty work will be scheduled around normal operations with the owners representative.

3.4 INITIAL TESTS

- A. Purpose - These tests are to ensure that the AV system is installed and functioning as specified, and to ensure the system is ready for Final Tests and Adjustments (described later).
- B. Testing Standards – Perform testing in accordance with ANSI, Infocomm and AV9000 standards.
- C. Inspection - Verify prior to beginning actual tests and adjustments on systems:
 1. Proper grounding of all electronic components (through third prong of power connector or separate connection between component chassis and ground bus bar).
 2. Cables dressed, routed, and labeled, connected with proper polarity.
 3. Insulation and shrink tubing in place.
 4. Dust, debris, solder splatter, etc. removed.
 5. Proper frequency settings (or modules) at crossovers and controllers.
 6. All equalizer bands and tone controls set for flat frequency response.
 7. Survey temperatures of each piece of equipment after four (4) hours use (minimum). Note and report any hot equipment.
- D. Prior to delivery to the jobsite, the system shall be staged completely in the Contractor's shop. A test of the AV system, with peripheral equipment and working control system programming shall be scheduled, and the Owner and/or the Consultant may elect to inspect the staging testing. A written report shall be prepared and signed by qualified individual described above.

- E. Electrical Power Quality - While all sound and AV system components are unplugged from electrical power outlets, Contractor shall turn on power to outlets, and confirm proper voltages at each outlet across the following pairs of terminals: hot and neutral, hot and ground, and neutral and ground (zero volts across neutral and ground). Contractor to document measurements.
- F. General Function Tests - Test each piece of equipment to ensure that it performs its intended function. Include all portable equipment in tests. Intent of initial tests is to verify complete, functioning system before Staging Tests and Adjustments. Correct problems found during initial testing before beginning Final Tests and Adjustments. Document whether all pieces performed intended functions; note any unresolved malfunctions.
- G. Initial Tests and Adjustments Data - Submit written report of Initial Tests and Adjustments data upon completion to the project team. Include printed name(s) of technician(s) performing tests, date(s) and time(s) of tests, model and serial numbers of test equipment, results of each initial test, descriptions of problems encountered and their solutions, and statement that system is ready for Final Tests and Adjustments. Initial Tests and Adjustments Data to include signatures of technician(s) performing tests.

3.5 FINAL TESTS AND ADJUSTMENTS

- A. Purpose - These tests are to be witnessed by Consultant to determine if system is complete and functioning as designed and specified. Also, Consultant will perform listening and viewing tests and witness adjustments of all images for optimum clarity.
- B. Timetable - Coordinate with Owner, General Contractor, and Consultant to schedule Final Tests and Adjustments after submittal of Initial Tests and Adjustments data.
- C. System and Site Conditions –Consultant will witness Final Tests and Adjustments. Have systems fully functional and ready for observation and testing upon AV Consultant's arrival. Coordinate with all trades for quiet conditions throughout the listening areas and for the duration of the test schedule. If upon Consultant's arrival, systems do not meet criteria, site is not sufficiently quiet, or if Owner or Consultant is required to make additional trips to job site to witness additional testing or perform additional reviews of installed equipment, Contractor shall reimburse Owner for labor and expenses incurred by having incurred costs deducted from payments to contractor.
- D. Test Labor - Provide technician familiar with this project's AV systems and operation of test equipment to perform testing. Provide additional technician to assist in the tests and to perform troubleshooting, repairs, and adjustments. Include labor for these technicians to be present for a minimum of one (1), eight (8)-hour day during Final Tests and Adjustments. Provide coordination between renovation phases.
- E. Tools - Provide standard hand tools including screwdrivers, pliers, wire strippers, nut drivers, soldering iron, and other tools appropriate for troubleshooting system problems.
- F. Ladders and Scaffolds - Provide ladders and scaffolds to inspect/adjust loudspeakers and rigging points.
- G. Verification of Initial Tests and Adjustments - Verify that Initial Tests and Adjustments have been performed and meet criteria. During Final Tests and Adjustments, Consultant may require portions of the Initial Tests and Adjustments to be repeated. Repeat measurements as requested without claim for additional payment.

3.6 FINAL ACCEPTANCE BY OWNER

- A. Certificate - Submit Certificate of Final Acceptance form signed by Owner verifying complete installation and proper operation of systems upon fulfillment of all requirements and upon recommendation by Owner.
- B. General Adjustments – Adjust, balance, and align equipment for optimum quality, meeting manufacturers published specifications.
- C. Input/Output Jack Demonstration – Demonstrate proper performance and phase of each system input and output jack (all audio input and output jacks) as received at AV and network systems.
- D. Inventory - Inventory all installed and portable equipment for correct quantities.
- E. Functional Demonstration – Demonstrate operation of each function of each major piece of equipment.
- F. Other Tests - Perform any other tests on any part of the AV system as requested by Owner.
- G. Final Equipment Settings – Record final settings of all equalizer bands, tone controls, filters, delays, limiters, etc., including those established through computer software settings. Include descriptions of settings (including software settings) in Operation and Maintenance Manual. Include software copy of configuration file(s) in Operation and Maintenance Manual.
- H. Security Inspection – Inspect equipment for security from tampering (covers, shaft-locks, etc.)
- I. Review of Labels – Review installed labels on cables, equipment, controls, and terminal strips.

3.7 OWNER TRAINING

- A. Provide Owner training as described in General Conditions. As a minimum, provide eight (8) hours instruction (within two (2) trips to site) regarding AV Systems operation to Owner-designated personnel. Schedule instruction time(s) with Owner to occur after completion of Final Tests and Adjustments. Coordinate with Owner in advance to schedule instruction time. Document date, time, and attendees of the training session and include documentation in Operation and Maintenance Manuals to serve as record of trained personnel.
- B. Contractor shall record training sessions, edit into searchable chapters and include recorded media in Operation and Maintenance Manuals.

3.8 SUPPORT DURING OWNER'S FIRST USE OF COMPLETED SYSTEM

- A. Provide personnel familiar with design, installation, and operation of each system to be present at Owner's first use of completed system (up to eight (8) hours total in a single session). During first use of each system, respond to Owner requests for troubleshooting, adjustments, and additional training. If no one contractor employee or representative can provide expertise in all aspects of the system, provide multiple personnel for the eight (8) hours per session as required. Schedule presence of personnel in advance with Owner. Should significant elements of the new system be operational prior to final completion, Owner may elect to schedule contractor presence for Owner function prior to final completion of system. Should Owner exercise this option, contractor presence will not be required at first use following final completion.

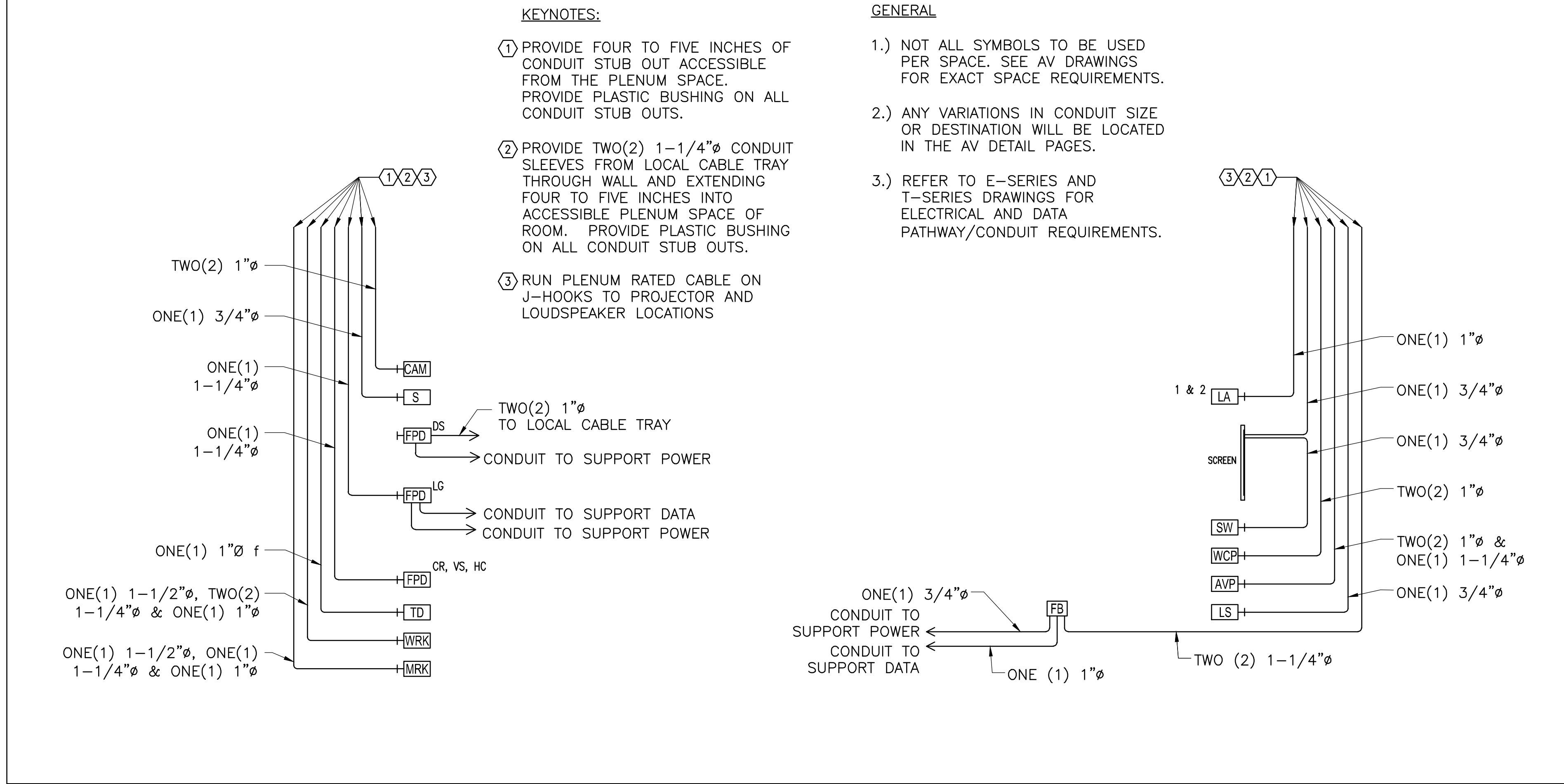
END OF SECTION

AUDIOVISUAL INFRASTRUCTURE DEVICES

AUDIOVISUAL INFRASTRUCTURE DEVICES ARE PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR UNLESS OTHERWISE NOTED
 1. BLOCKS SHOWN ON THIS SHEET ARE NOT TO SCALE.
 2. SEE AV DETAILS FOR MOUNTING AND SPACING REQUIREMENTS
 3. NOT ALL SYMBOLS APPLY

SYMBOL	SUPPORTED AV DEVICE	POWER	DATA DROPS	MOUNTING		INFRASTRUCTURE DEVICE DESCRIPTION (UON)	NOTES	DETAIL
				# DUPLEX TECHNICAL RECEPTACLE ADJACENT (UON)	DATA/VOICE OUTLETS ADJACENT (UON)			
[PB]	CEILING PULL BOX	0	REF. DWG.	CEILING	AT STRUCTURE	4"-SQUARE STANDARD ELECTRICAL TYPE BOX WITH SCREW COVER		
[A]	CEILING ANTENNA	0	NA	CEILING	AT STRUCTURE	4"-SQUARE STANDARD ELECTRICAL TYPE BOX WITH SCREW COVER		
[AVP]	AV WALL PLATE	1	2D	WALL	BLDG. STD. RECEPTACLE HT.	4-11/16" x 4-11/16" x 3-1/4" WALL JUNCTION BOX	PROVIDE WITH DEVICE COVER PER ID.	3 AV5.1
[CAM]	VIDEO CAMERA	0	2D	WALL	96" AFF	2-GANG STANDARD ELECTRICAL TYPE BOX WITH SCREW COVER		
[CAM]	VIDEO CAMERA	0	2D	CEILING	AT STRUCTURE	4"-SQUARE STANDARD ELECTRICAL TYPE BOX WITH SCREW COVER		
[FB]	FLOOR BOX	1	2D	FLOOR	AT FLOOR	MULTI-MEDIA FLOOR POKE-THRU WITH A MINIMUM OF ONE (1) 2-GANG COMPARTMENT FOR AV, ONE (1) GANG FOR DATA AND ONE (1) GANG FOR POWER.	WIEMOLD INC. EVOLUTION B" SERIES OR APPROVED EQUIVALENT	7 AV5.1
[FPD]LG	PANEL DISPLAY	1	1D	WALL	66" AFF UON ON DRAWINGS	RECESSED WALL BOX WITH FLANGE AND COVER (CHIEF MFG. PAC526CFW TYPICAL)	POWER AND DATA OUTLETS INSTALLED WITHIN BOX	2 AV5.1
[FPD]DS	PANEL DISPLAY	1	2D	WALL	72" AFF UON ON DRAWINGS	RECESSED WALL BOX WITH FLANGE AND COVER (CHIEF MFG. PAC525CFW TYPICAL)	POWER AND DATA OUTLETS INSTALLED WITHIN BOX	1 AV5.1
[FPD]OR	PANEL DISPLAY	1	1D	WALL	48" AFF UON ON DRAWINGS	4"-SQUARE STANDARD ELECTRICAL TYPE BOX WITH SCREW COVER FOR WALL-MOUNT FLAT PANEL DISPLAY IN CONTROL ROOM		
[FPD]VS	PANEL DISPLAY	1	1D	WALL	66" AFF UON ON DRAWINGS	4"-SQUARE STANDARD ELECTRICAL TYPE BOX WITH SCREW COVER FOR WALL-MOUNT FLAT PANEL DISPLAY - VITAL SIGN MONITOR		
[FPD]HC	PANEL DISPLAY	1	2D	WALL	66" AFF UON ON DRAWINGS	4"-SQUARE STANDARD ELECTRICAL TYPE BOX WITH SCREW COVER FOR 'HEADWALL' COLUMN DUAL MONITORS		
[FPD]	PANEL DISPLAY	1	1D	CEILING	6" ABOVE FINISHED CEILING	6" x 6" x 4" DEEP PULL BOX WITH SCREW COVER		
[LA]1	LISTENING ASSIST	0	NA	WALL	BLDG. STD. RECEPTACLE HT.	1-GANG STANDARD ELECTRICAL DEPTH TYPE BOX		
[LA]2	LISTENING ASSIST	0	NA	WALL	96" AFF	1-GANG STANDARD ELECTRICAL DEPTH TYPE BOX		
[M]	CEILING MICROPHONE	0	NA	CEILING	AT STRUCTURE	4"-SQUARE STANDARD ELECTRICAL TYPE BOX WITH SCREW COVER		
[MRK]	MILLWORK RACK	1	4D	WALL	24" AFF	6" x 6" x 4" DEEP PULL BOX WITH SCREW COVER		
[P]	PROJECTOR	1	2D	CEILING	AT STRUCTURE	CHIEF CMA-450 SUSPENDED PROJECTOR MOUNT KIT WITH ADJUSTABLE COLUMN DROP. DIV. 26 TO PROVIDE POWER AND DATA BOXES WITHIN PROVIDED KNOCK-OUT.		6 AV5.1
[S]	LOUDSPEAKER	0	NA	CEILING	AT CEILING	CEILING TRIM RING AND CUT-OUT TEMPLATE (PROVIDED BY AV CONTRACTOR FOR INSTALLATION BY ELECTRICAL)	PROVIDE SEISMIC CABLE SUSPENDED FROM STRUCTURE	8 AV5.1
[P]X	PROJECTION SCREEN	1 (HARD-WIRED)	NA	CEILING	AT STRUCTURE	CASE SIZE DEPENDENT ON MAKE/MODEL	SEPARATE CIRCUIT FROM ALL OTHER AV DEVICES. IG NOT REQUIRED	
[P]X	PROJECTION SCREEN	1 (HARD-WIRED)	NA	WALL	6" BFC	NA	SEPARATE CIRCUIT FROM ALL OTHER AV DEVICES. IG NOT REQUIRED	
[SW]	SWITCH	0	NA	WALL	BLDG. STD. SWITCH HT.	1-GANG 3-1/2" DEEP BACK BOX	SWITCH DEDICATED TO PROJECTION SCREEN.	
[WCP]	CONTROL PANEL	0	1D PoE (INSIDE AV BACK BOX)	WALL	BLDG. STD. SWITCH HT.	3-GANG 3-1/2" DEEP BACK BOX		
[FRK]	FLOOR RACK(S)	2 DEDICATED 20AMP CIRCUITS	6D* +COORD. W/ SIM VENDOR	CEILING	108" AFF	BASKET TRAY SUSPENDED FROM STRUCTURE CONDUIT TO STUB OUT AT ADJACENT WALL ABOVE TRAY	DIV. 26 TO PROVIDE NO.4 AWG GREEN FROM GROUND BUS BAR OR ELEC PANEL	9 AV5.1
[RSP]	ROOM SCHEDULING PAD	0	1D	WALL	BLDG. STD. SWITCH HT.	CRESTRON TSW-UMB-60-PMK		
[CA]TZ/TF	VIDEO CAMERA	0	2D	CEILING	AT CEILING	4"-SQUARE STANDARD ELECTRICAL TYPE BOX WITH SCREW COVER	COORDINATE CAMERA LOCATION WITH LIGHTING AND FURNITURE LAYOUT.	

AUDIOVISUAL ONE-LINE CONDUIT DETAIL (TYPICAL)



GENERAL NOTES

GENERAL

FOR PURPOSES HEREIN, HIGH VOLTAGE IS DEFINED AS ANY CIRCUIT, DEVICE OR OTHER ELEMENT OPERATING ABOVE 70 VOLTS.

TELECOMMUNICATIONS CONTRACTOR

- THE TELECOMMUNICATIONS CONTRACTOR SHALL PROVIDE ALL MATERIALS, COMPONENTS, TOOLS, AND LABOR NECESSARY TO MEET VOICE/DATA REQUIREMENTS FOR ALL AV EQUIPMENT THAT REQUIRES VOICE/DATA AS INDICATED IN AV AND TELECOMMUNICATIONS DRAWINGS AND SPECIFICATIONS.

ELECTRICAL CONTRACTOR

- THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR THE FOLLOWING SCOPE OF WORK:
 - COORDINATE WITH DESIGN TEAM ON CONTROL SYSTEM ELEMENTS INCLUDING WALL MOUNTED CONTROL PANELS AND LIGHTING INTERFACES.
 - PROVIDE AND INSTALL:
 - THE "HOUSE" LIGHTING CONTROL SYSTEM, RELATED PERIPHERALS AND LOW-VOLTAGE CONTROL WIRING ASSOCIATED WITH THE "HOUSE" LIGHTING CONTROL SYSTEM.
 - PROVIDE AND INSTALL ALL CONDUIT, APPROPRIATE PULL STRING, JUNCTION BOXES, FLOOR BOXES, WIRE-WAYS, GUTTERS, SURFACE MOUNTED POWER STRIPS, LIGHTING, BREAKER PANELS, AC WIRING, POWER RECEPTACLES, AND OTHER ELECTRICAL EQUIPMENT AS REQUIRED TO ACCOMMODATE COMPLETE AND FUNCTIONAL AUDIO VISUAL SYSTEMS, UNLESS OTHERWISE NOTED.
 - BLANK AV BACK BOX COVER PLATES. CONFIRM BUILDING STANDARD COLOR AND TYPE WITH ARCHITECT PRIOR TO INSTALLATION.
 - PROVIDE SHOP DRAWINGS OF CONDUIT ROUTING AND BOX PLACEMENT FOR REVIEW AND APPROVAL BY THE STRUCTURAL ENGINEER PRIOR TO IMPLEMENTATION.
- ALL CONDUIT FOR LOW VOLTAGE WIRING SHALL:
 - BE METALLIC TUBING OF 1"ø UON IN ALL AREAS OUTSIDE OF CAST CONCRETE.
 - BE PVC TUBING OF 1"ø UON IN ALL AREAS IN CAST CONCRETE.
 - BE SUPPLIED WITH NYLON PULL STRING.
 - BE 100' MAX LENGTH WITHOUT AN INTERMEDIATE JUNCTION BOX.
 - HAVE TWO 90 DEGREE BENDS MAX WITHOUT AN INTERMEDIATE JUNCTION BOX.
 - BE ALIGNED IN PULL BOXES FOR STRAIGHT PULL THROUGH, AND NOT EXCEED 180° OF BENDS BETWEEN PULL POINTS.
 - REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- ALL PULL BOXES SHALL:
 - REMAIN ACCESSIBLE BEFORE AND AFTER COMPLETION OF CONSTRUCTION.
 - NOT TO BE USED IN LIEU OF 90° ELBOWS.
 - NOT BE USED TO CHANGE DIRECTION OR BEND WITHIN BOX, AND BE INSTALLED AS REQUIRED TO MEET THE ABOVE REQUIREMENTS.
- OTHER APPLICABLE SUBCONTRACTORS ARE RESPONSIBLE FOR PROVIDING AND INSTALLING THE FOLLOWING:
 - STRUCTURAL WORK, GLAZING, WALL OPENINGS, PLATFORMS, RAILINGS, HVAC SYSTEMS, MILLWORK AND FINISHES.
 - CABLE TV SERVICE AND RELATED CABLING AND CONNECTIONS, TV RELATED ANTENNA SYSTEMS AND ELECTRICAL GROUNDING AS REQUIRED FOR CONNECTIONS OF AUDIOVISUAL DEVICES.
 - FIRESTOPPING
 - COORDINATE ANY AND ALL FIRESTOPPING WITH THE GENERAL CONTRACTOR BEFORE PROCEEDING WITH ANY WORK INVOLVING FIRESTOPPING.
 - ALL FIRESTOPPING SHALL CONFORM TO THE SPECIFICATIONS AND RECOMMENDATION OF THERMAL AND MOISTURE PROTECTION ON FIRESTOPPING OF THROUGH PENETRATION SYSTEM IN THE CONSTRUCTION SPECIFICATIONS DOCUMENT.
 - SOLUTIONS AND SHOP DRAWINGS/SUBMITTALS FOR FIRE STOP MATERIALS AND SYSTEMS SHALL BE PRESENTED TO THE GENERAL CONTRACTOR FOR WRITTEN APPROVAL OF MATERIAL & SYSTEMS PRIOR TO PURCHASE AND INSTALLATION. ALL MATERIALS AND SYSTEMS SHALL BE COMPLETE, UL LISTED FOR INTENDED INSTALLATION, AND PROVIDE APPROPRIATE RATING AT THE COMPLETION OF JOB.
 - SEAL ALL PENETRATIONS THROUGH FIRE-RATED BARRIERS (CONDUITS, SLEEVES, SLOTS, CHASES) CREATED BY OR MADE FOR OR ON THE BEHALF OF THE AUDIOVISUAL CONTRACTOR TO PREVENT THE PASSAGE OF SMOKE, FIRE, TOXIC GAS, OR WATER THROUGH PENETRATIONS.
 - CONTRACTOR SHALL PROVIDE TRAINING MANUALS WHICH INCLUDE INSTRUCTIONS ON METHODS OF ADDING OR REMOVING CABLING TO/FROM FIRESTOPPED SLEEVES AND CHASES.

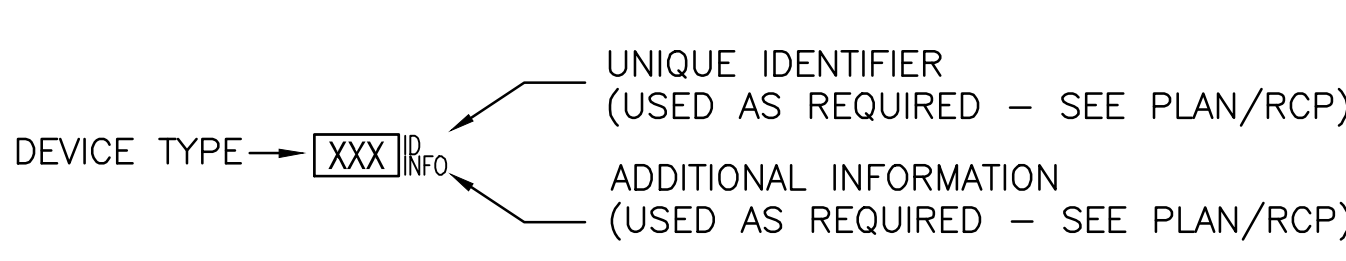
ABBREVIATIONS

DIV 01:	GENERAL REQUIREMENTS
DIV 27:	COMMUNICATIONS
DIV 26:	ELECTRICAL
AFF:	ABOVE FINISHED FLOOR
AV:	AUDIOVISUAL
BFC:	BELOW FINISHED CEILING
BLDG:	BUILDING
HT:	HEIGHT
IG:	ISOLATED GROUND
NA:	NOT APPLICABLE
NIC:	NOT IN CONTRACT
OFIC:	OWNER FURNISHED CONTRACTOR INSTALLED
OFOW:	OWNER FURNISHED OWNER INSTALLED
STD:	STANDARD
UON:	UNLESS OTHERWISE NOTED

DRAWING LIST

AV10.1	LEGEND AND NOTES - AUDIO VISUAL - INFRASTRUCTURE
AV12.1	LEVEL 4 - FLOOR PLAN - AUDIO VISUAL INFRASTRUCTURE
AV14.1	LEVEL 4 - CEILING PLAN - AUDIO VISUAL INFRASTRUCTURE
AV15.1	GENERAL DETAILS - AUDIO VISUAL INFRASTRUCTURE
AV5.3.1	ONE LINE DIAGRAMS - AUDIO VISUAL SYSTEMS
AV5.3.2	ONE LINE DIAGRAMS - AUDIO VISUAL SYSTEMS

TYPICAL AV SYMBOL IDENTIFIERS



TYPICAL SYMBOL TYPES

CEILING DEVICES	WALL DEVICES	FLOOR DEVICES
[X] Rf	[XXX] Rf	[XXX] Rf

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REVISIONS

PROJECT NAME

UTHealth

Jane and Robert Cizik School of Nursing

The University of Texas Health Science Center at Houston

SIMULATION CENTER

PROJECT NUMBER

045017.0000

CIP 1601

ISSUE

PROPOSAL REQUEST #01 FOR AV ACTIVE SYSTEMS

DATE

03/08/2019

DRAWING TITLE

LEGEND AND NOTES - AUDIO VISUAL - INFRASTRUCTURE

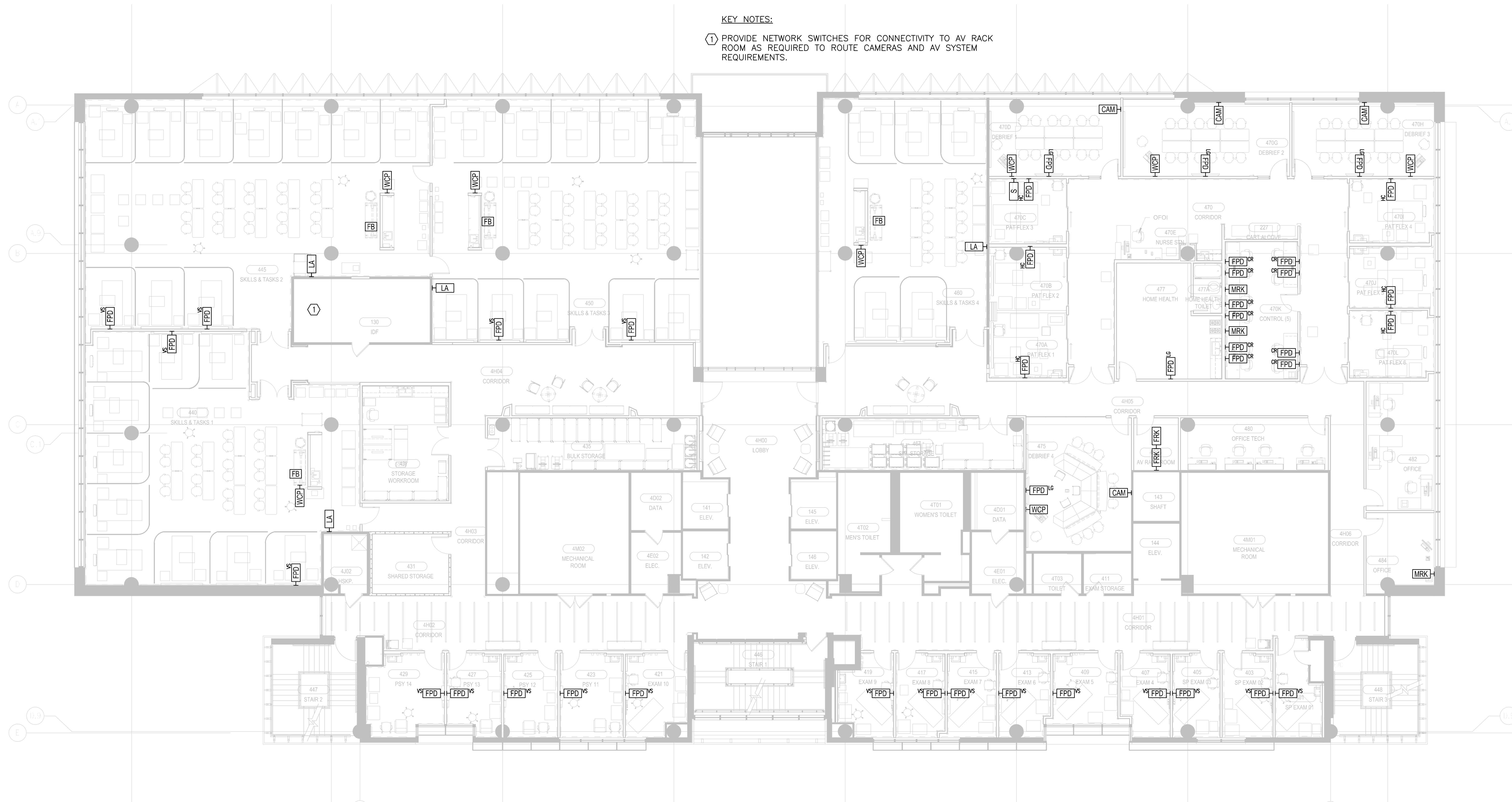
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KEY NOTES:

- 1 PROVIDE NETWORK SWITCHES FOR CONNECTIVITY TO AV RACK ROOM AS REQUIRED TO ROUTE CAMERAS AND AV SYSTEM REQUIREMENTS.



1 LEVEL 4 - FLOOR PLAN - AUDIO VISUAL - INFRASTRUCTURE
1/8" = 1'-0"

PROJECT NAME

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Jane and Robert Cizik
School of Nursing

The University of Texas
Health Science Center at Houston

**SIMULATION
CENTER**

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LEVEL 4 -
FLOOR PLAN -
AUDIO VISUAL -
INFRASTRUCTURE
DRAWING NUMBER

AVI2.1

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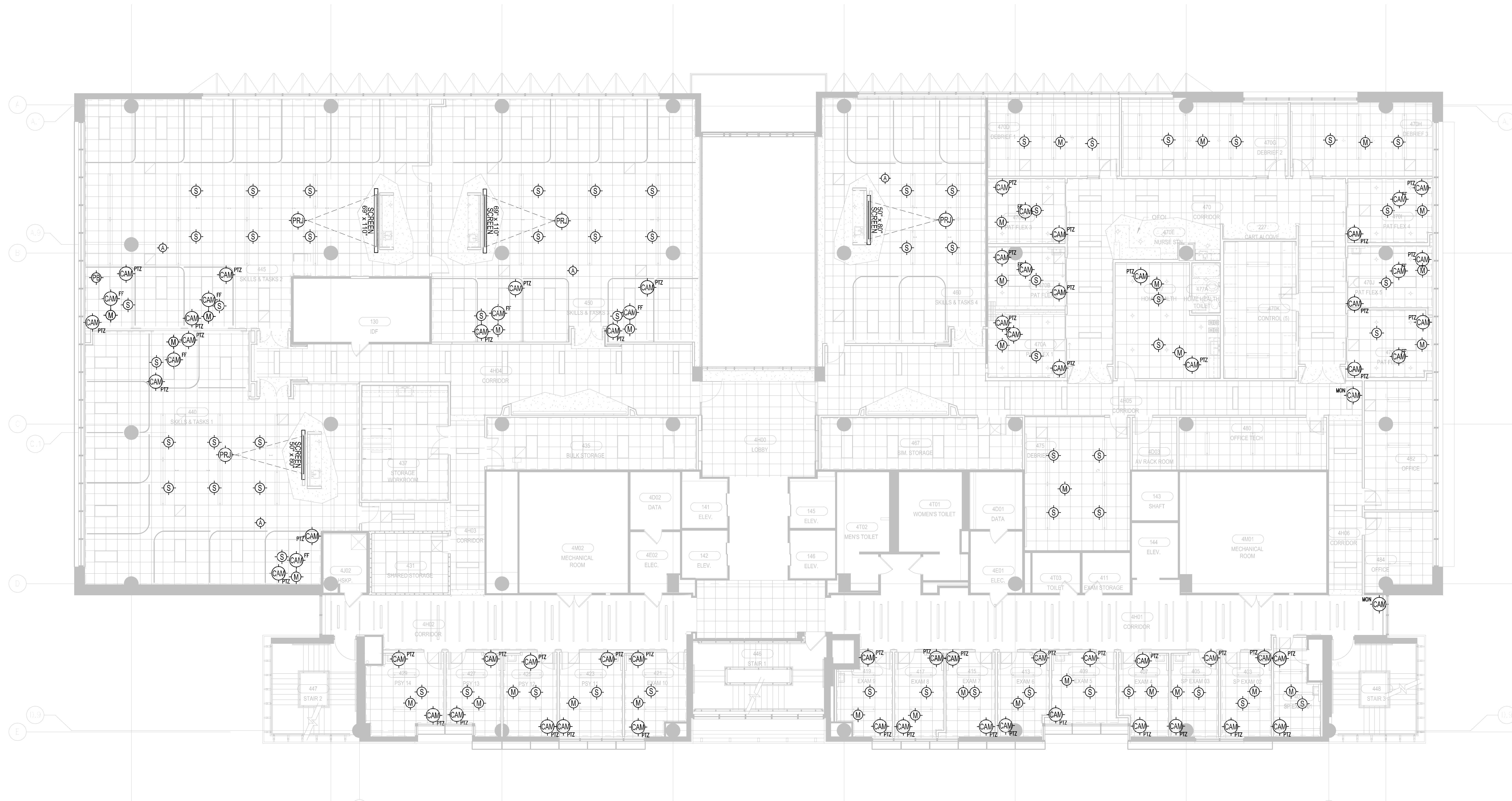
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1 LEVEL 4 - CEILING PLAN - AUDIO VISUAL - INFRASTRUCTURE
1/8" = 1'-0"

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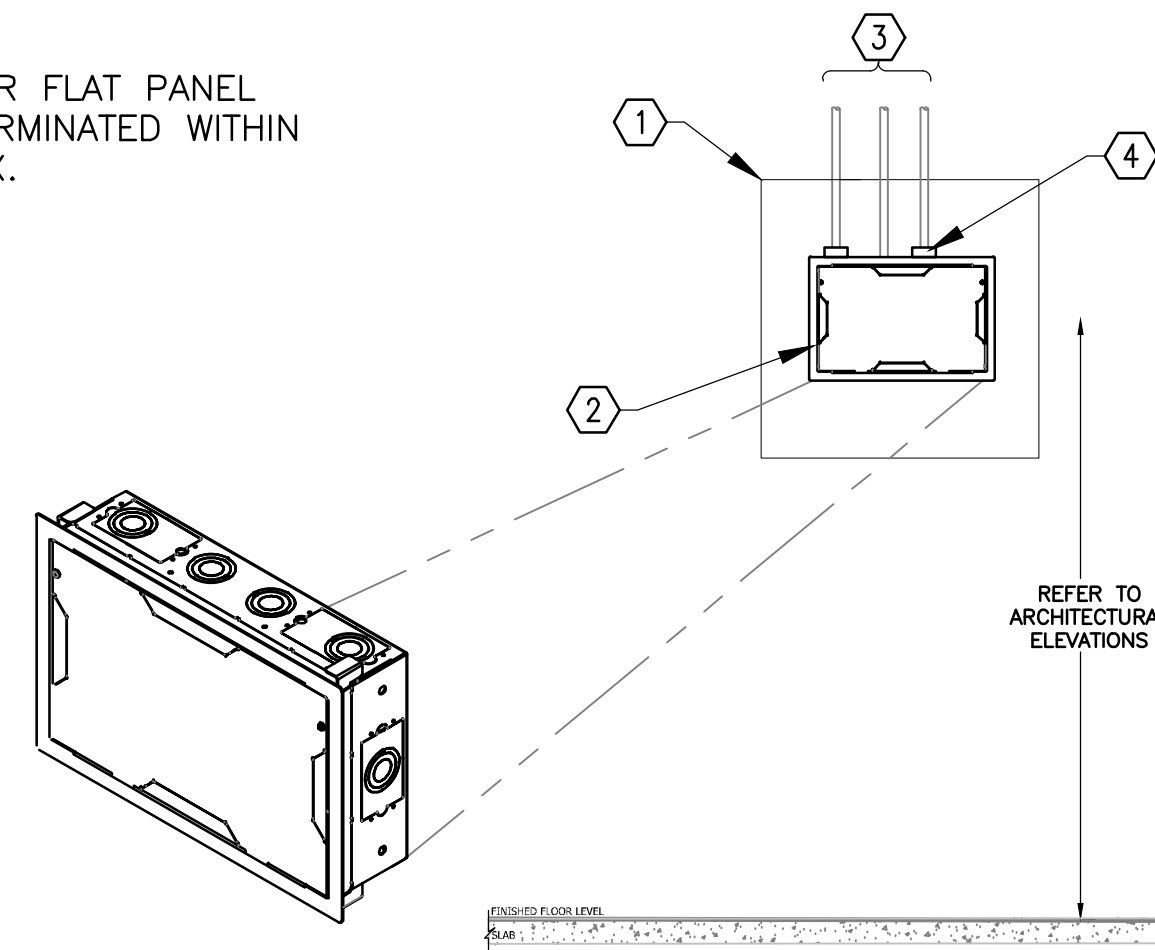
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DRAWING TITLE
**LEVEL 4 -
CEILING PLAN -
AUDIO VISUAL -
INFRASTRUCTURE**
DRAWING NUMBER

AVI4.1

KEYED NOTES:

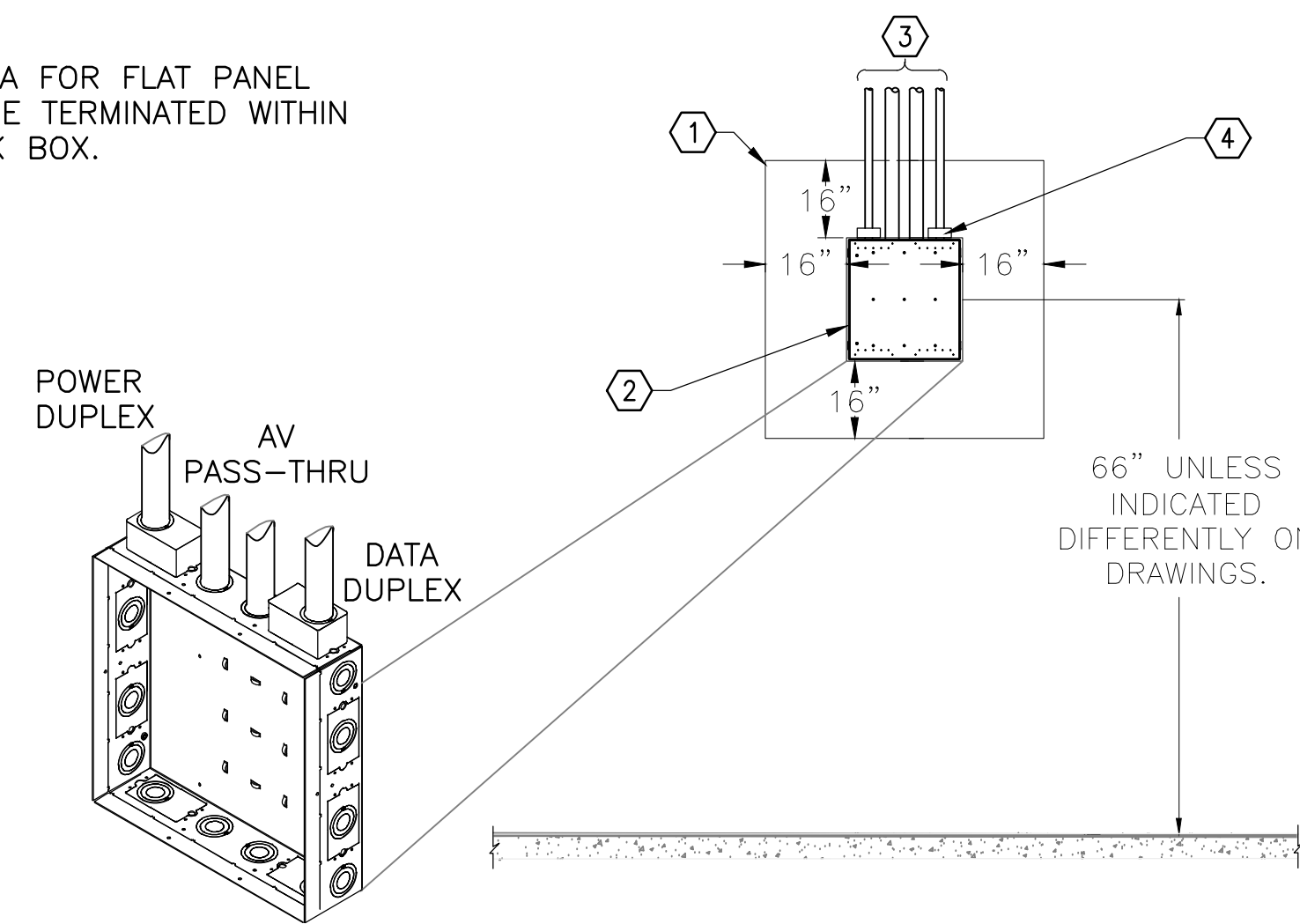
- ① DISPLAY BACKING ACROSS WALL STUDS (PLYWOOD OR 2X BLOCKING)
- ② CUTOUT IN BACKING FOR CHIEF PAC526FW BACK BOX
- ③ CONDUIT NUMBER, SIZE AND DESTINATION PER AV CONDUIT ONE-LINE DETAIL
- ④ POWER AND DATA FOR FLAT PANEL LOCATIONS TO BE TERMINATED WITHIN THE CHIEF BACK BOX.



① FLAT PANEL DISPLAY (DS) INFRASTRUCTURE DETAIL
SCALE: 6" = 1'-0"

KEYED NOTES:

- ① DISPLAY BACKING ACROSS WALL STUDS (PLYWOOD OR 2X BLOCKING)
- ② CUTOUT IN BACKING FOR CHIEF PAC526FW BACK BOX
- ③ CONDUIT NUMBER, SIZE AND DESTINATION PER AV CONDUIT ONE-LINE DETAIL
- ④ POWER AND DATA FOR FLAT PANEL LOCATIONS TO BE TERMINATED WITHIN THE CHIEF BACK BOX.

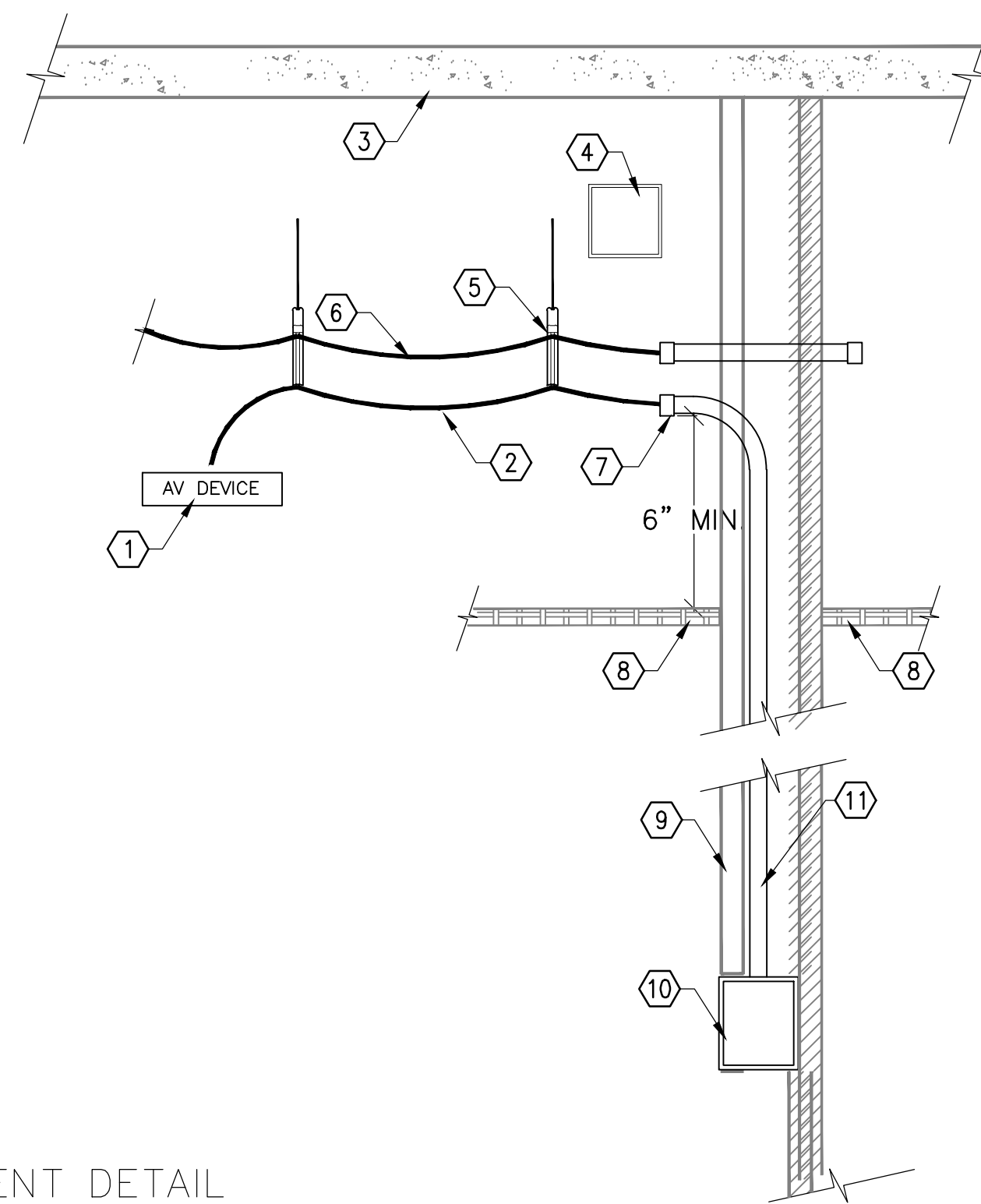


② FLAT PANEL DISPLAY (LG) INFRASTRUCTURE DETAIL
SCALE: 1-1/2" = 1'-0"

③ DETAIL NOT USED
SCALE: NONE

KEYED NOTES:

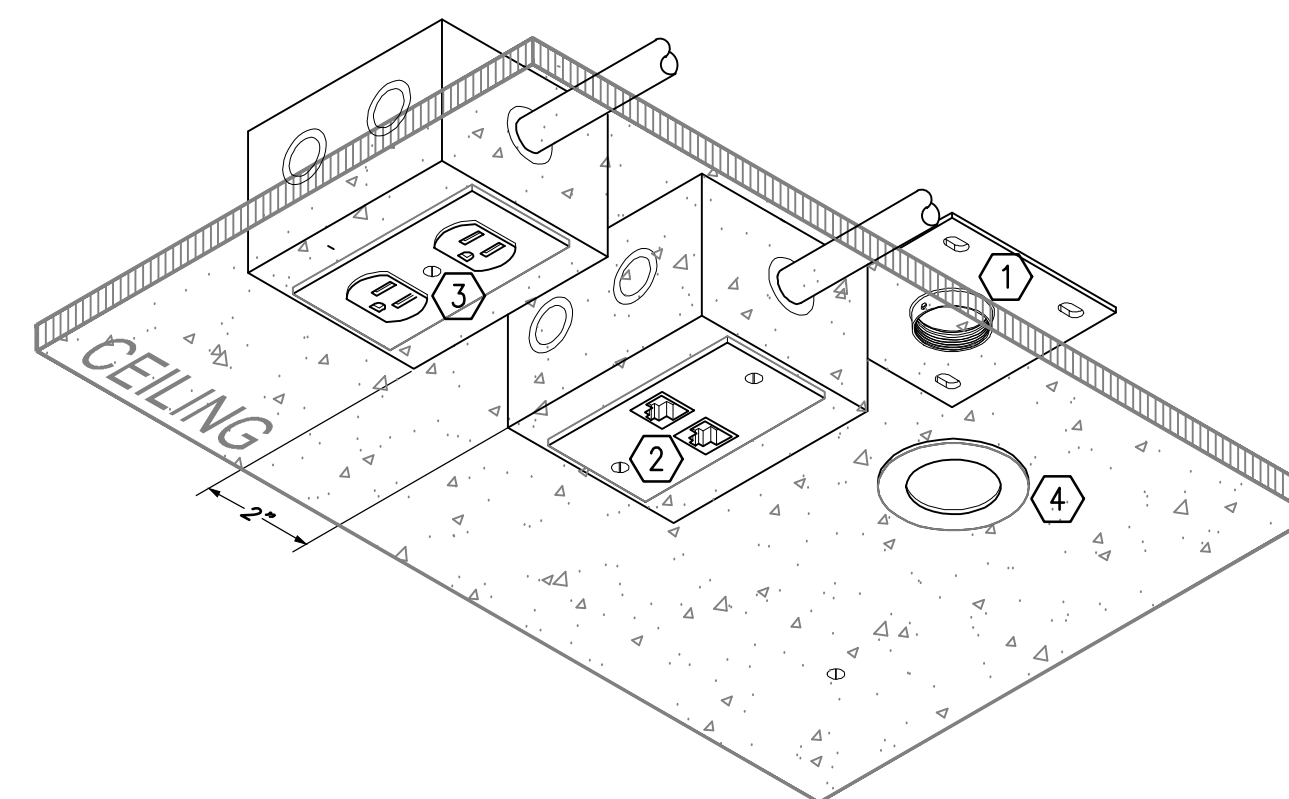
- ① AV DEVICE (PROJECTOR, LOUSPEAKER, ETC.) BY DIV. 27
- ② AUDIO VISUAL CABLE BY DIV. 27.
- ③ DECK.
- ④ POTENTIAL HVAC OBSTRUCTIONS.
- ⑤ J-HOOK AND PULLSTRING SUPPORTED WITH A THREADED ROD.
- ⑥ DATA COMMUNICATION, VOICE COMM, SECURITY CABLING, ETC. BY OTHERS
- ⑦ INSULATED BUSHING.
- ⑧ LAY-IN CEILING.
- ⑨ WALL.
- ⑩ BACK BOX AS INDICATED ON SYMBOL SCHEDULE. (TYP)
- ⑪ EMPTY CONDUIT WITH PULL STRING.



④ TYPICAL CABLE MANAGEMENT DETAIL
SCALE: 1-1/2" = 1'-0"

KEYED NOTES:

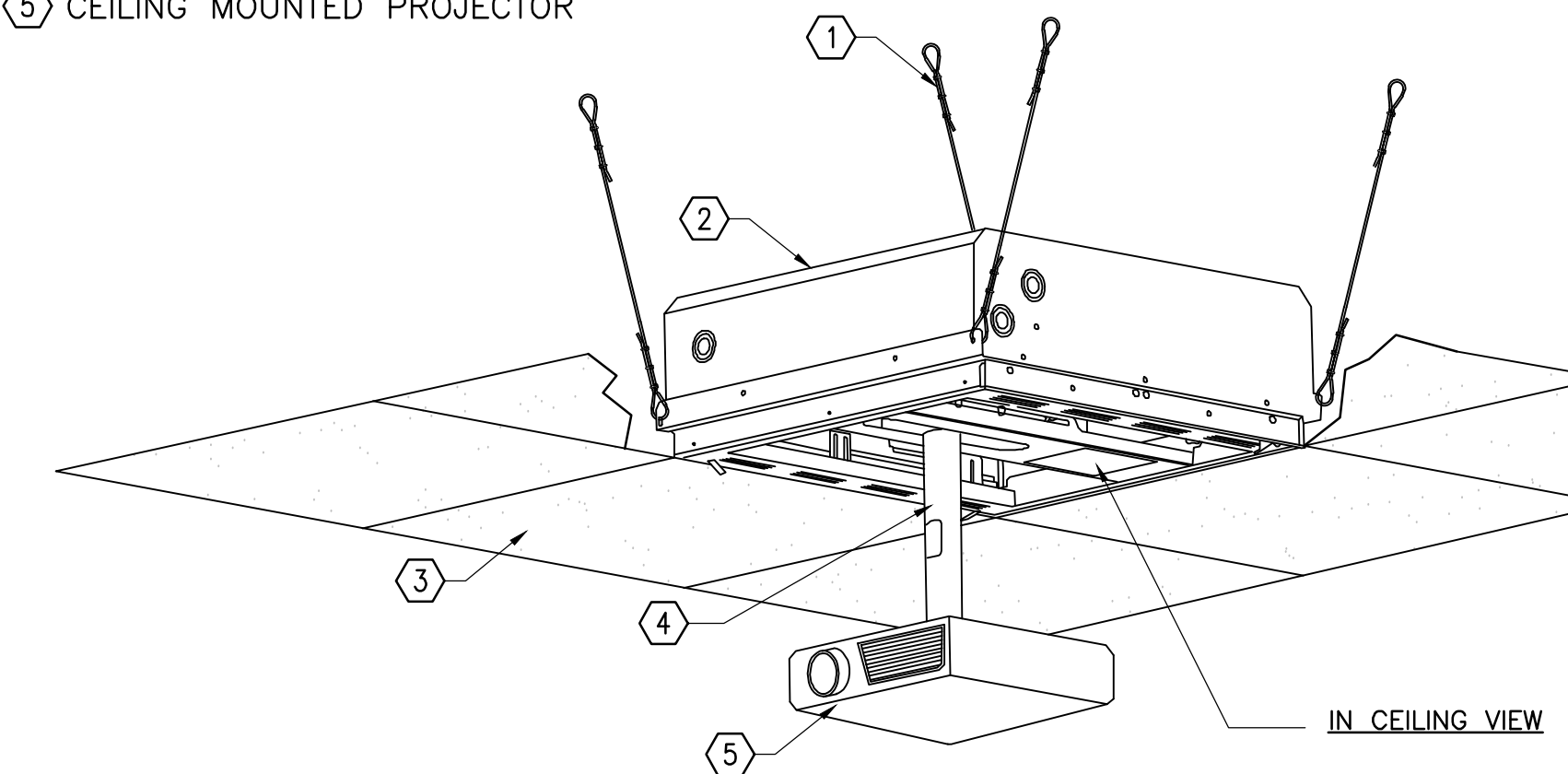
- ① LCD MOUNT PLATE LOCATION AT STRUCTURE.
- ② DATA/VOICE OUTLET AND CABLE BY AV INTEGRATOR; ROUTE TO ROOM LECTERN FLOOR BOX OR MILLWORK RACK BACKBOX.
- ③ TECHNICAL AV POWER OUTLET/FACEPLATE/CONDUIT AS SPECIFIED IN E-SERIES DRAWINGS. (BY DIV 26)
- ④ FINISHING RING AT FINISHED CEILING. (FR-1)



⑤ PRJ CEILING PLATE LAYOUT
N.T.S.

KEYED NOTES:

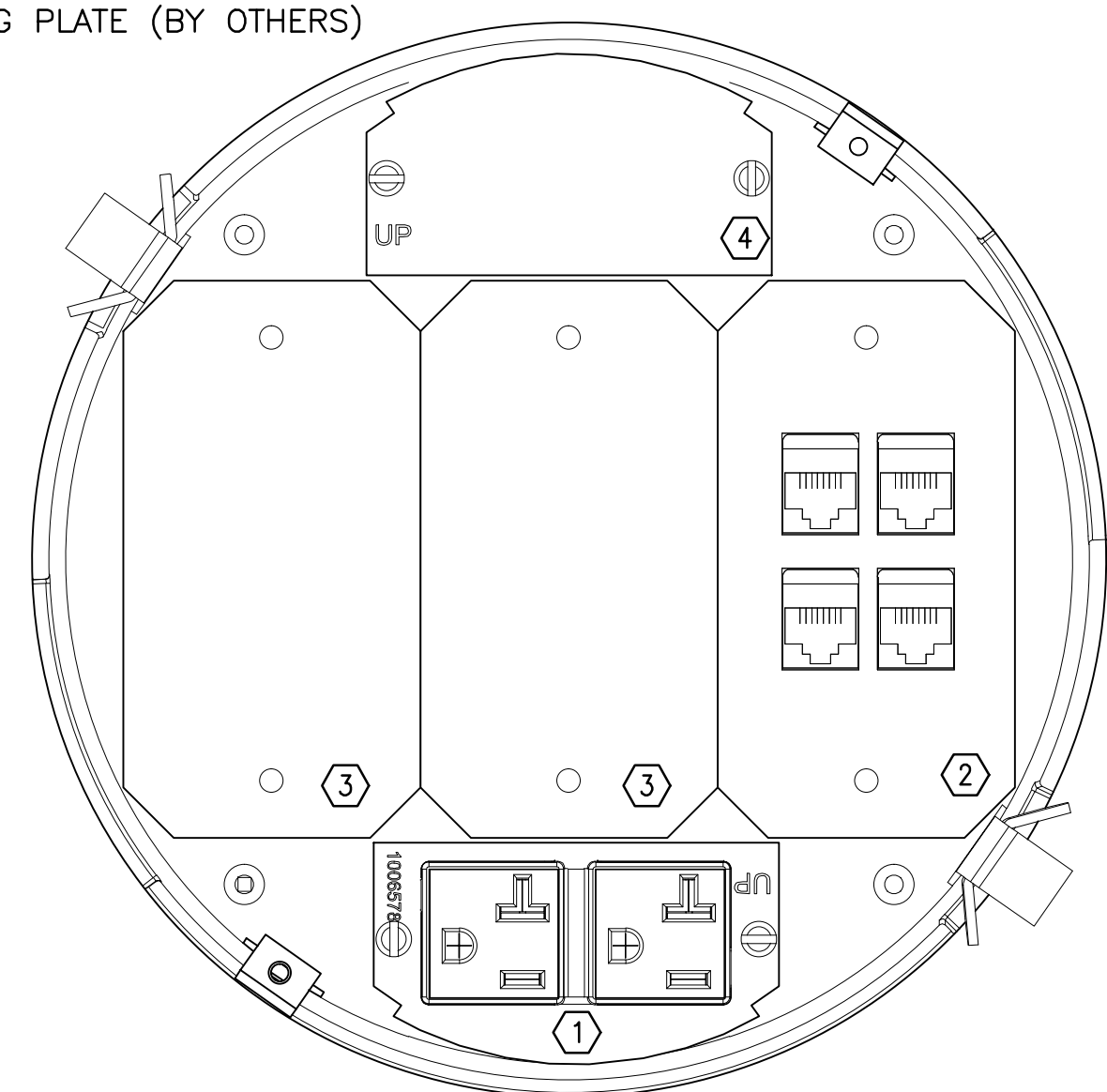
- ① CABLING MOUNTED TO STRUCTURE.
- ② 2'x2' LAY-IN CEILING PROJECTOR MOUNT
- ③ CEILING TILE
- ④ ADJUSTABLE LENGTH EXTENSION COLUMN
- ⑤ CEILING MOUNTED PROJECTOR



⑥ PRJ CEILING DETAIL
N.T.S.

KEYED NOTES:

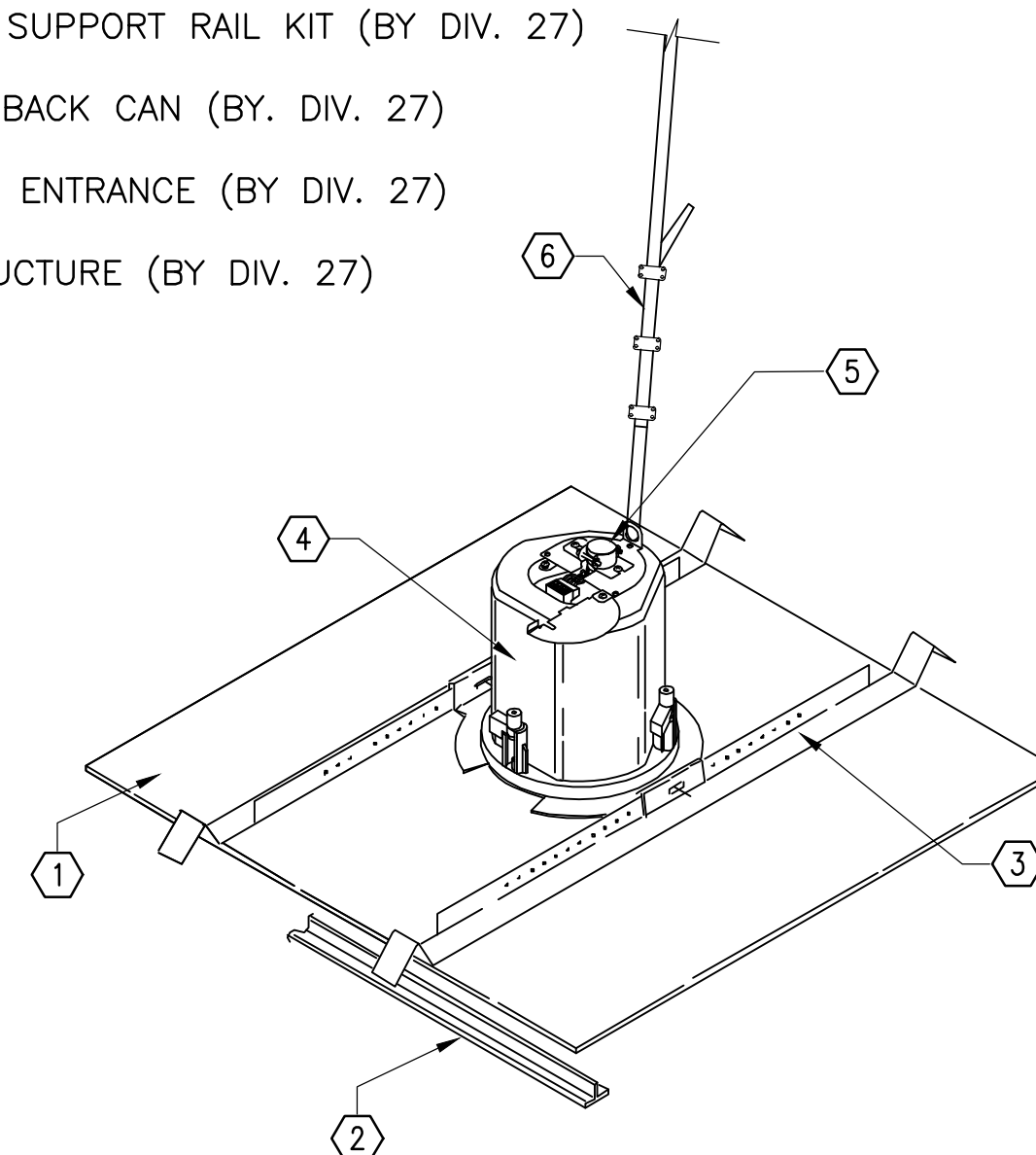
- ① POWER OUTLET (BY OTHERS)
- ② DATA JACKS (BY OTHERS)
- ③ AV GANG PLATES (BY OTHERS)
- ④ AV GANG PLATE (BY OTHERS)



⑦ FB DETAIL
N.T.S.

KEYED NOTES:

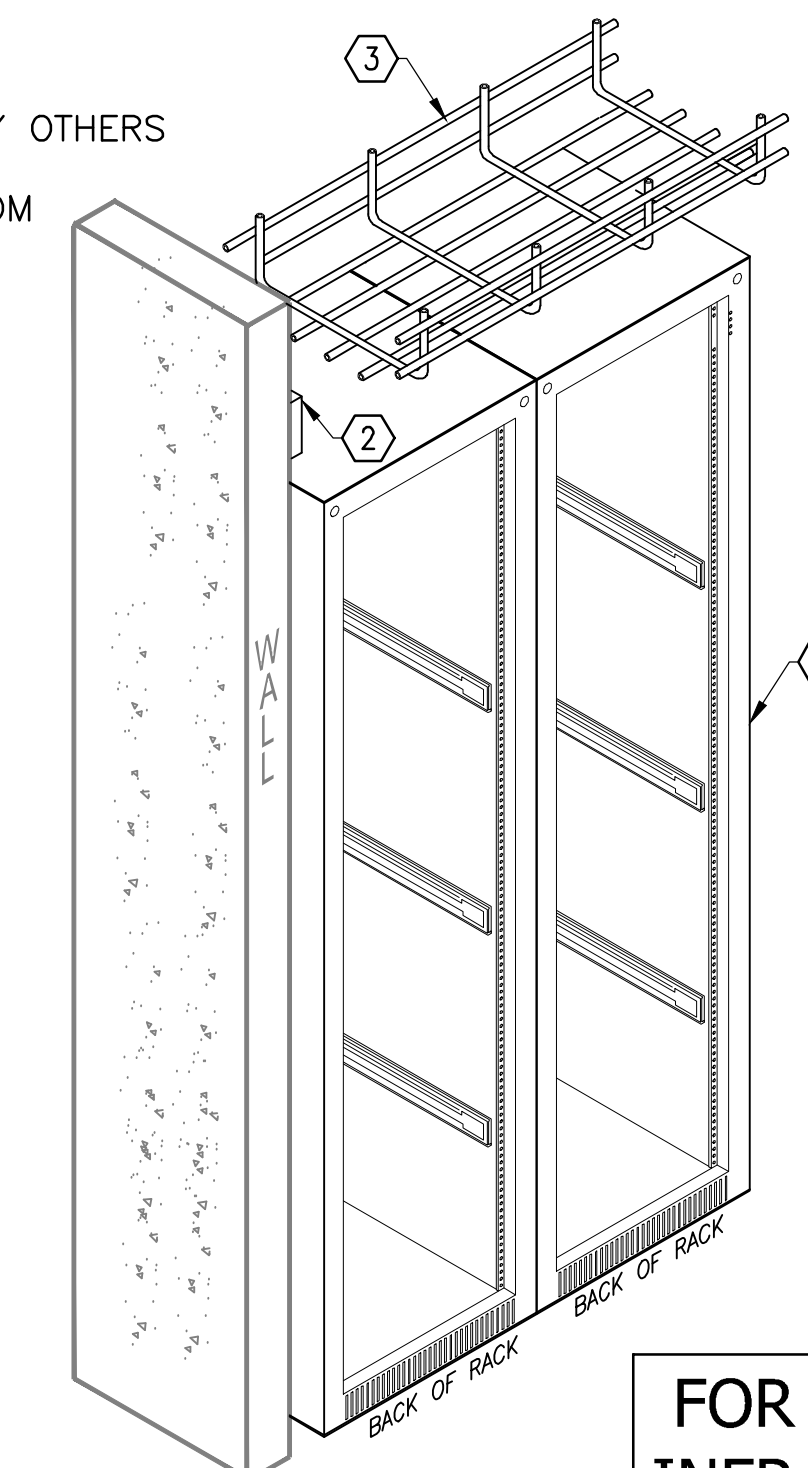
- ① 2X2 CEILING TILE (BY OTHERS)
- ② CEILING TILE SUPPORT TRUSS (BY OTHERS)
- ③ CEILING SPEAKER SUPPORT RAIL KIT (BY DIV. 27)
- ④ LOUSPEAKER IN BACK CAN (BY. DIV. 27)
- ⑤ SPEAKER CABLING ENTRANCE (BY DIV. 27)
- ⑥ SUPPORT TO STRUCTURE (BY DIV. 27)



⑧ SPEAKER S DETAIL
N.T.S.

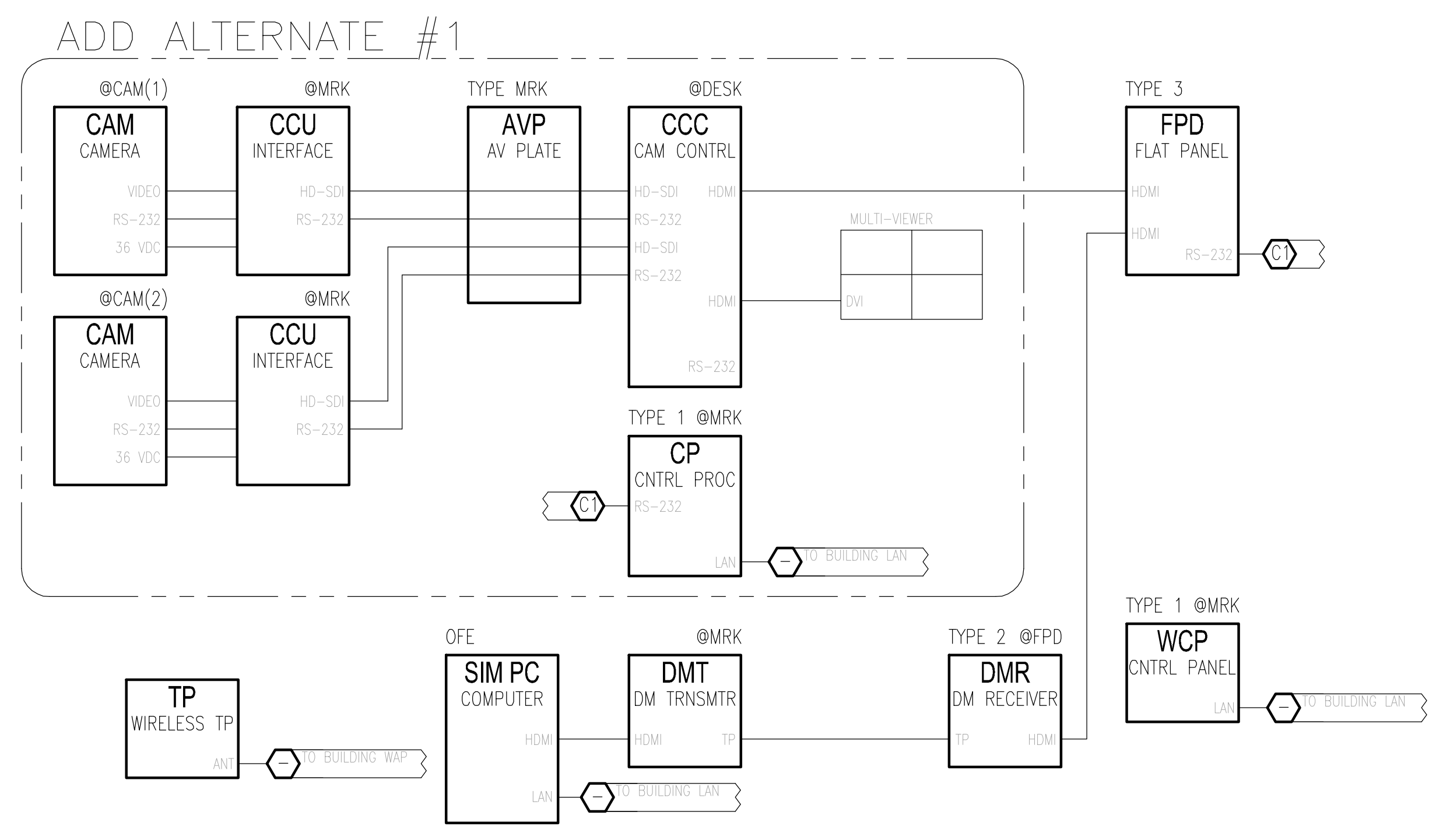
KEYED NOTES:

- ① AUDIOVISUAL EQUIPMENT RACK
- ② POWER AND DATA OUTLETS BY OTHERS
- ③ BASKET TRAY SUSPENDED FROM STRUCTURE ABOVE

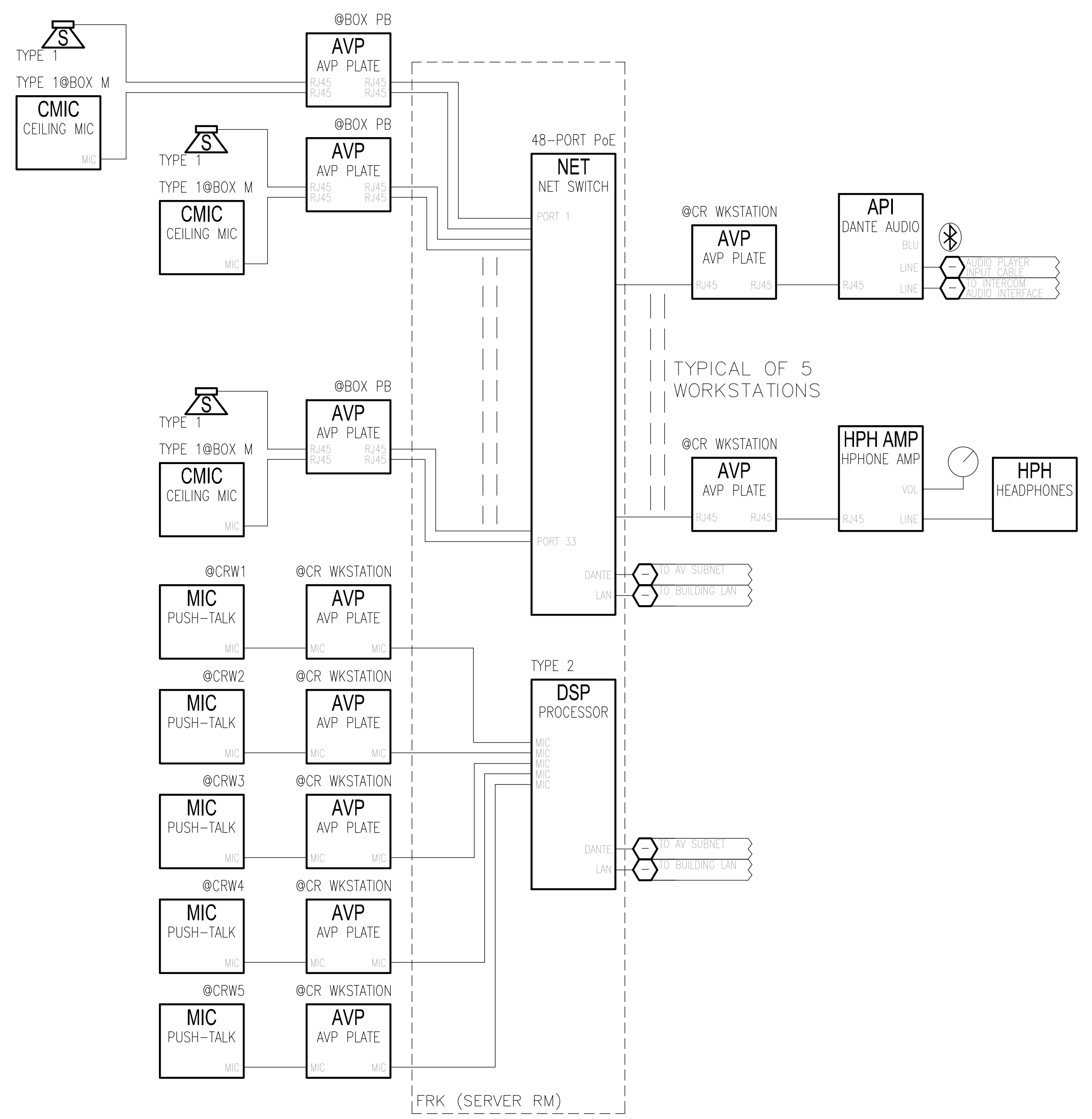


⑨ FLOOR RACK (FRK) DETAIL
N.T.S.

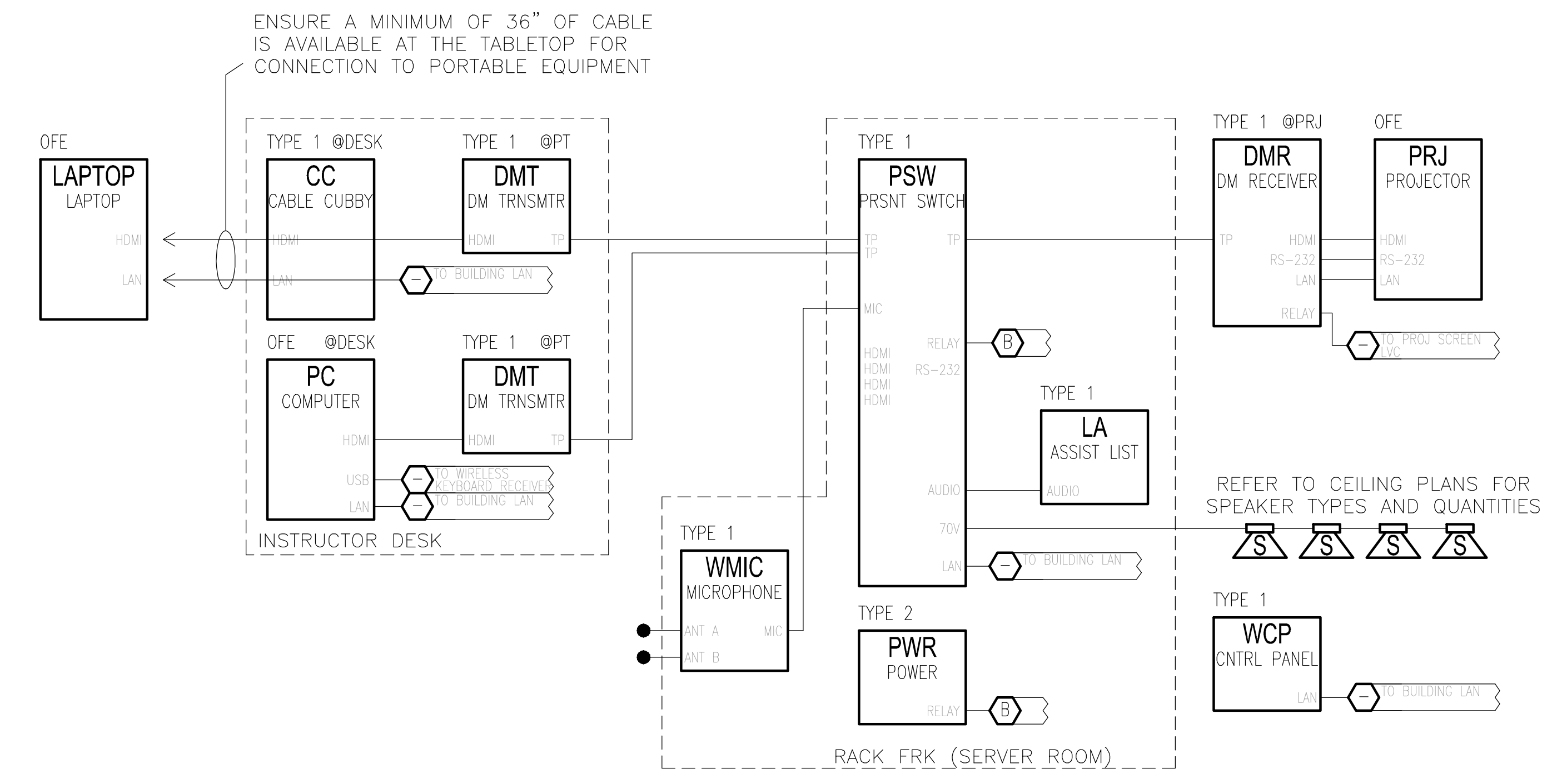
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INFRASTRUCTURE SCOPE
BY OTHERS



2 AUDIO-VISUAL ONE LINE DIAGRAM - DIRECTOR'S OFFICE
NOT TO SCALE HALLWAY OBSERVATION / SIM CAPTURE DEBRIEF FEED



3 AUDIO NETWORK RISER DIAGRAM - SIM CAPTURE
NOT TO SCALE



1 AUDIO VISUAL ONE LINE DIAGRAM - TYPICAL SKILLS & TASKS
NOT TO SCALE TYPICAL OF 4

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CENTER**

PROJECT NUMBER
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FOR AV ACTIVE SYSTEMS**
DATE
03/08/2019
DRAWING TITLE
**ONE LINE DIAGRAMS -
AUDIO VISUAL SYSTEMS**

DRAWING NUMBER
AVS3.1

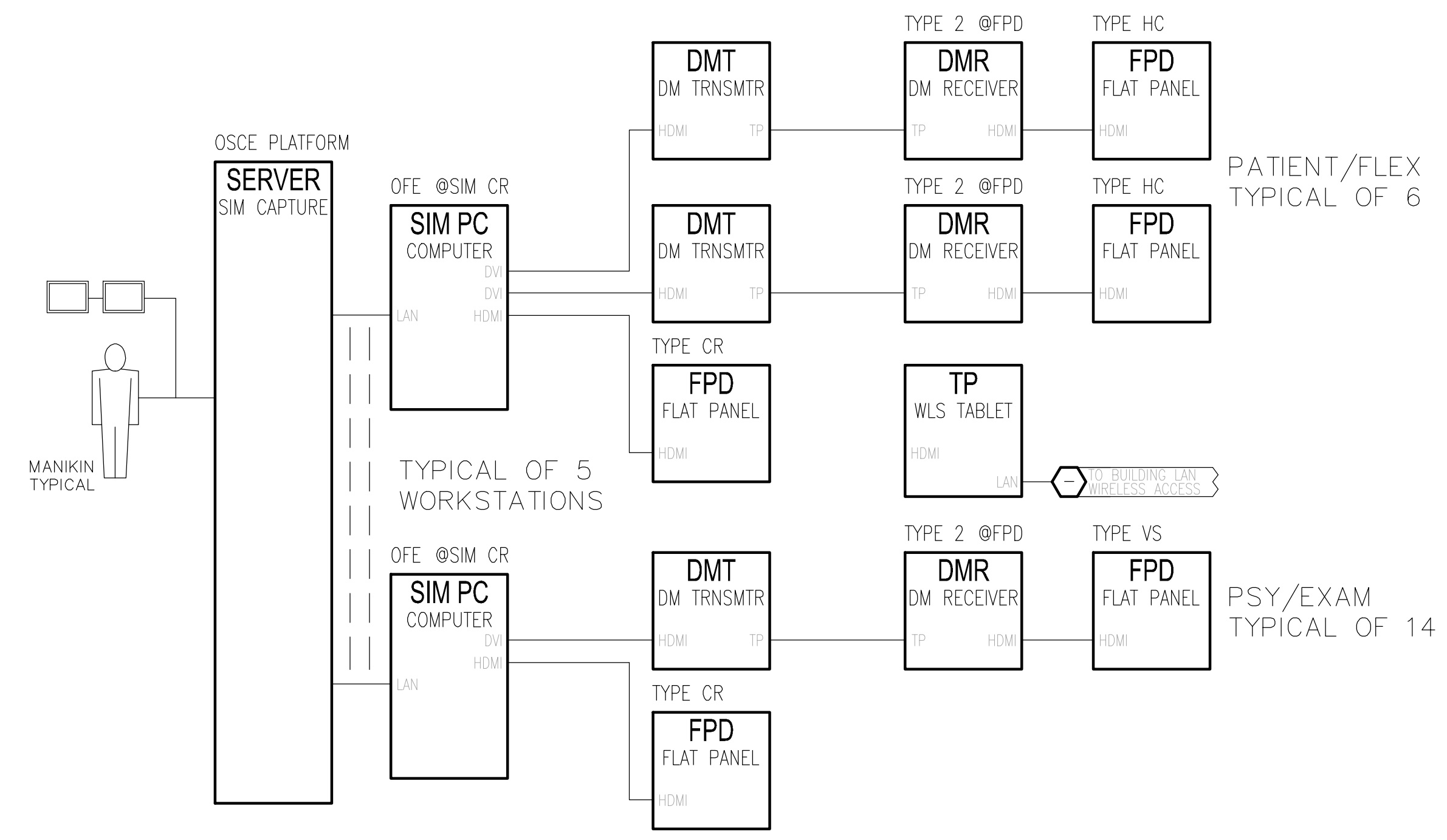
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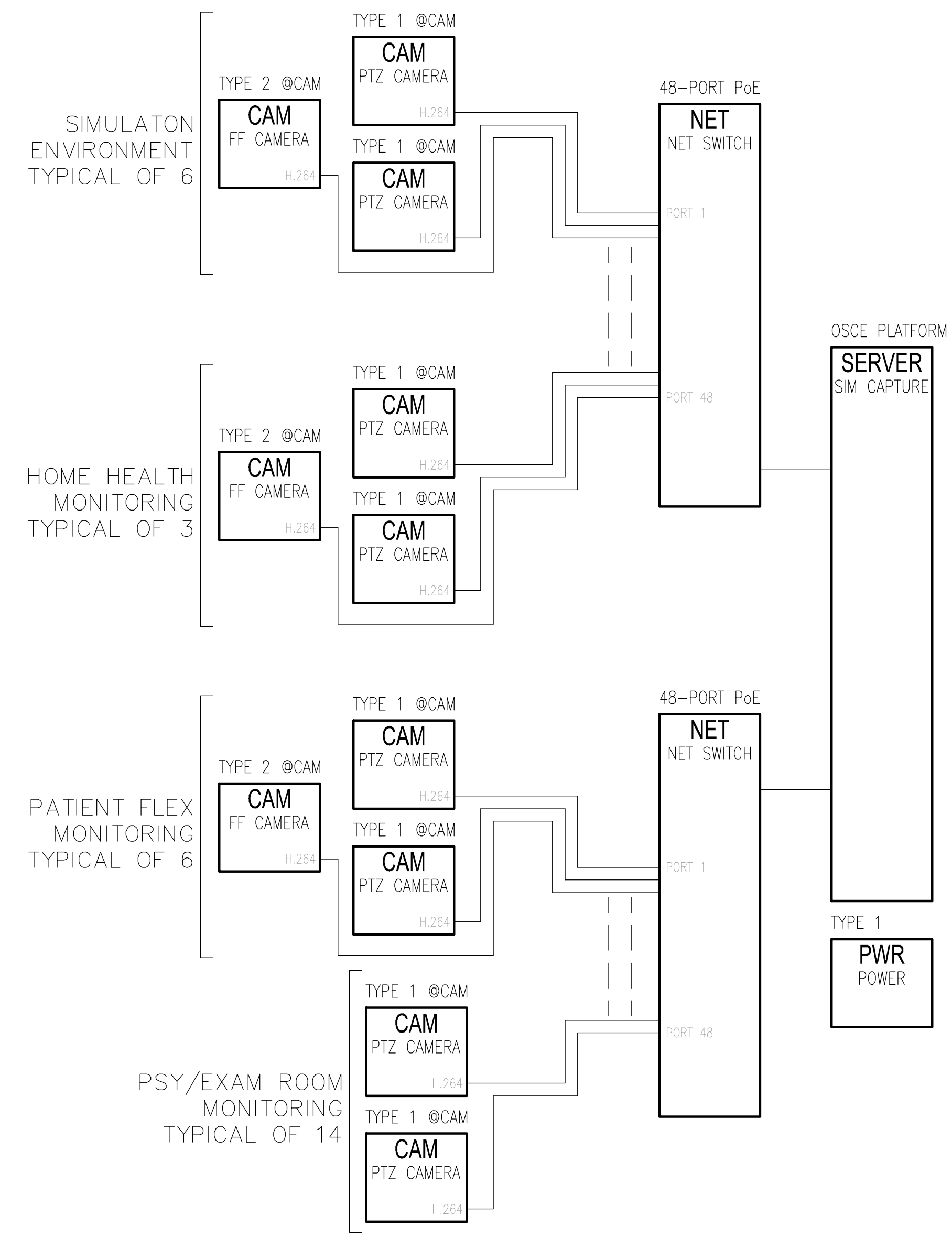
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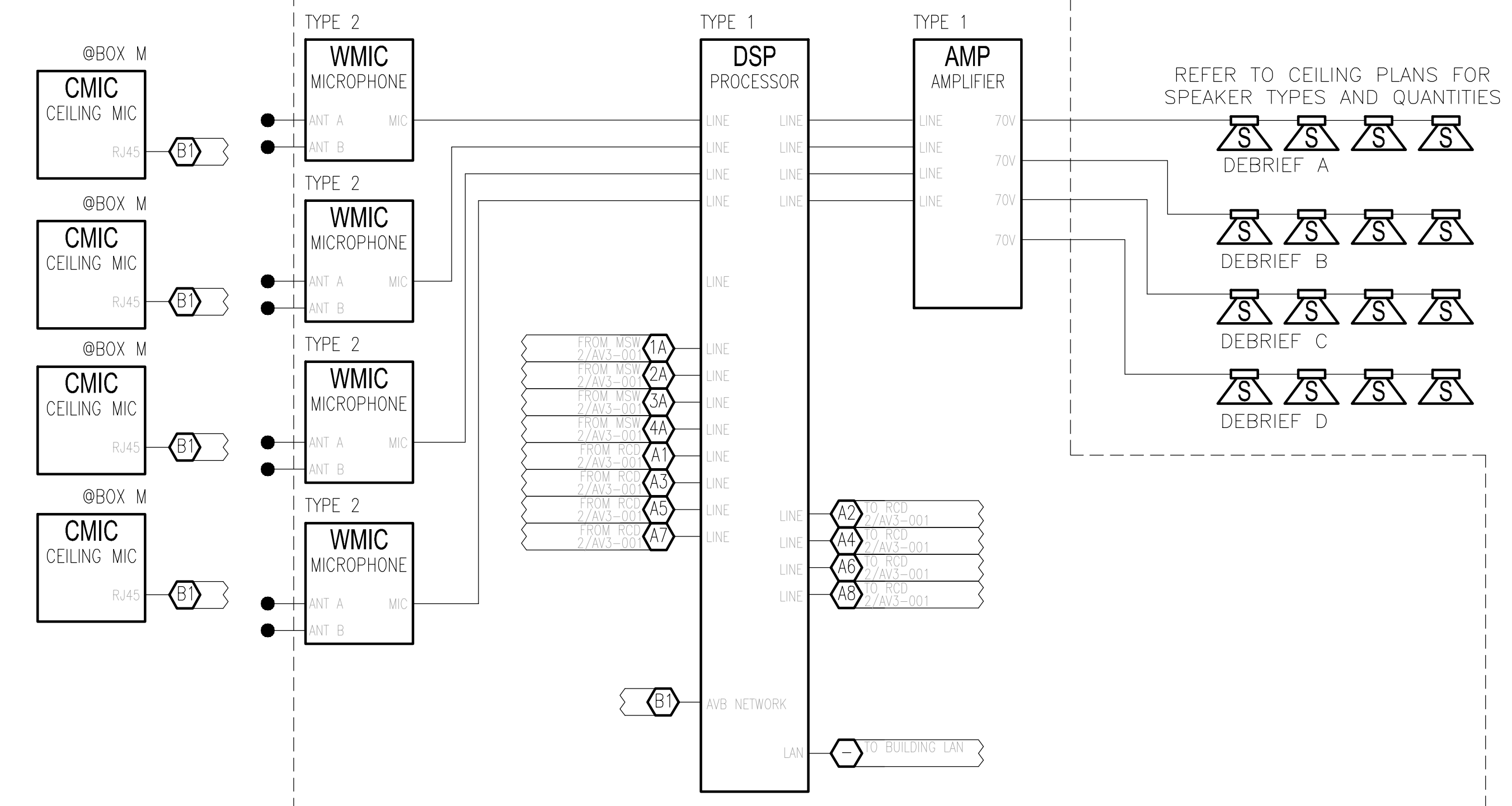
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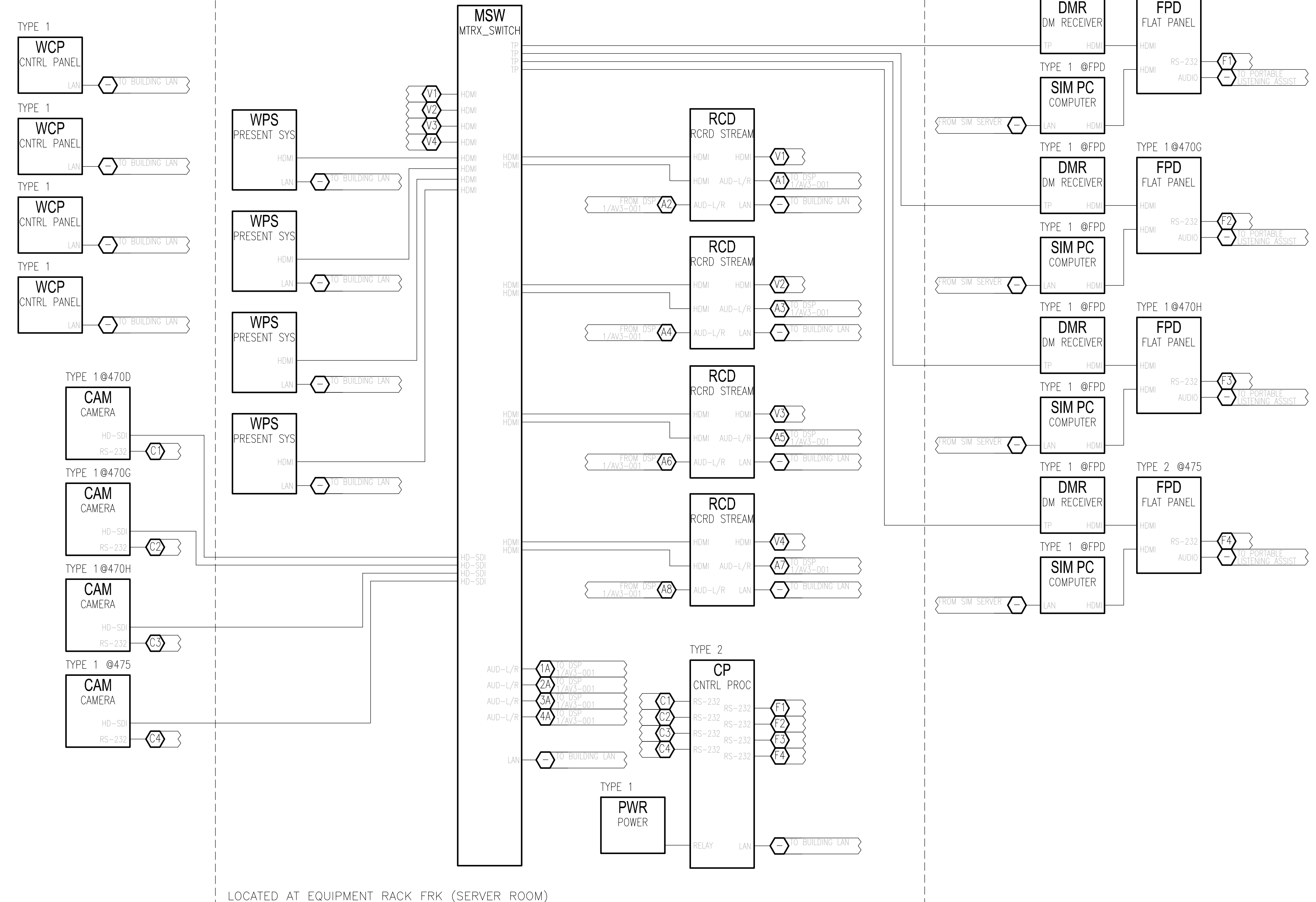
3 CONTROL ROOM SCHEMATIC RISER DIAGRAM - SIM CAPTURE
NOT TO SCALE



2 VIDEO OVER IP NETWORK RISER DIAGRAM - SIM CAPTURE
NOT TO SCALE



1 AUDIO VISUAL SYSTEM ONE LINE DIAGRAM - DEBRIEF ROOMS
NOT TO SCALE



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