

**August 8, 2014**  
**BOARD OF COUNTY COMMISSIONERS**  
**ORANGE COUNTY, FLORIDA**  
**Y14-7027-MM / ADDENDUM #1**  
**ORANGE COUNTY CONVENTION CENTER DESTINATION SPACE BUILDOUT**

**Bid Opening Date: August 14, 2014 at 2:00 P.M.**

This addendum is hereby incorporated into the bid documents of the project referenced above. The following items are clarifications, corrections, additions, deletions and/or revisions to and shall take precedence over the original documents. Underlining indicates additions, deletions are indicated by ~~strikethrough~~.

- A. The Bid Opening Date is unchanged.
- B. In Part D of the IFB, The Bid Form, Delete page D-2 and replace with the Attached REVISED Page D-2 and D-2A.

**FAILURE TO SUBMIT THE REVISED BID FORM ATTACHED IN THIS ADDENDUM WITH YOUR BID SHALL RESULT IN YOUR BID BEING DETERMINED NON-RESPONSIVE.**

- C. The following are questions/responses/clarifications/additives to the project:

1. **Question:**

Part G Supplemental Conditions, Section 2A states that the contractor is to work on a 7 day, night shift availability. Does this mean the entire project is to be done at night, or only at night when there are convention center events?

**Response:**

Yes, entire project is to be done at night.

2. **Question:**

We were going over the plans and specifications and noticed an inconsistency on the Destination Lounge signage. The architectural drawing states the logo and letters are solid aluminum however the technical specs say that they have acrylic faces. Please clarify the finish material.

**Response:**

Please refer to changes in specifications/drawings in this addendum:

In specifications, delete the following paragraphs:

1. SECTION 10432, 2.2, A, 5
2. SECTION 10432, 2.3, C

On drawing detail A5/A531 change note “Existing rated wall to remain – Patch and repair drywall finish to match – Typ” to “Existing rated wall ... finish to match existing adjacent wall – Typ”

**3. Question:**

On drawings T903 Video System Block Diagram: On LC #77-78 and #79-80 the fiber optic cable is routed from the Fiber Patch Panel to a Fiber Optic SDI to RGB/DVI Converter, then from there over DVI to a Fiber Optic Scaling Receiver VGA/DVI. The DVI cable coming from the converter is not compatible with the Fiber Optic Scaling Receivers. Do you want us to use [an Extron DSC 3G-HD A HDMI Scaler] instead?

**Response:**

No. Delete the requirement for the Fiber Optic Scaling Receiver on these two circuits. Per the equipment manufacturer the DVI output of the Fiber Optic SDI to RGB/DVI Converter to connect directly to the HDMI switcher. Provide the appropriate cable between the two pieces of equipment per the manufacturer.

**4. Question:**

Specification section 16751, item 2.15, specifies an Extron SMX system Multimatrix Modular Multi-Plane Matrix Switcher. The single line drawing T903 indicate a 16x 16 HDMI matrix. The SMX series of switchers cannot be configured for a matrix greater than 8x8. Please provide alternate drawings T903 Video System Block Diagram: On LC #77-78 and #79-80 the fiber optic cable is routed from the Fiber Patch Panel to a Fiber Optic SDI to RGB/DVI Converter, then from there over DVI to a Fiber Optic Scaling Receiver VGA/DVI. The DVI cable coming from the converter is not compatible with the Fiber Optic Scaling Receivers. Do you want us to use [an Extron DSC 3G-HD A HDMI Scaler] instead?

**Response:**

Provide and install video matrix switchers as follows: The 16 x 16 Fiber Optic Matrix Switcher basis of design shall be an Extron #60-1257-000003 Custom FOX 32x32 Matrix 3200; the 16x16 HDMI Matrix Switcher basis of design shall be an Extron #60-1250-000338 Custom XTP 1600 configured as 12x16 HDMI.

5. **Question:**  
Please confirm all conduit, back boxes, raceway and cable management system require by the AV systems will be provided by the Electrical contractor.

**Response:**

Prime contractor is responsible to provide what is required for AV systems. Reference technology drawings and specification Division 16 – Electrical for electrical and technology components.

6. **Question:**  
Drawing T903 depict fiber optic field connection and rack mount patch, can it be assumed the field panels, fiber optic cable and patch panel are in the scope of the Voice Data contractor (27 10 00) not the AV system contractor?

**Response:**

Prime contractor is responsible to provide what is required for all equipment and materials associated with the Sound and Video Systems as noted in the technology drawings and specifications SECTIONS 16741 – SOUND SYSTEM and 16751 – VIDEO SYSTEM. Associated components are also described in the rest of Division 16 – Electrical.

7. **Question:**  
Drawing T201 shows two SP selector panels in the conference center and two in the lounge. Please provide additional information on the panel and its function. These devices are not shown on drawing T901, 902, or 903.

**Response:**

These selector panels are to be part of the AV Control System. (refer to SECTION 16751, Paragraph 2.19.F.2)

8. **Question:**  
Drawing T201 shows multiple floor boxes. These boxes have both voice/data and fiber terminations. Can it be assume these boxes are in the Voice Data contractor (27 10 00) not the AV system contractor? If not please provide additional data regarding there model and manufacture.

**Response:**

The floor boxes are specified as basic electrical materials. Refer to Division 26. The Audio/Video Installer shall be required to coordinate with the Voice/Data Installer and the Electrical Sub-Contractor as necessary to meet the requirements of the project.

D. CHANGES TO SPECIFICATIONS:

1. SECTION 10432 – DIMENSIONAL LETTER SIGNAGE  
DELETED Section 10432 Dimensional Letter Signage entirely  
ADDED revised Section 10432 Dimensional Letter Signage
2. SECTION 16741 – SOUND SYSTEM  
REVISED:
  1. Modify Paragraph 2.10, A, 3
  2. Modify Paragraphs 2.10, D, 3 and 2.10, D, 6
  3. Modify Paragraph 2.10, E, 1, a

E. CHANGES TO DRAWINGS - SKETCHES:

**Add01-SKa01:** Reference Sheet A251: Enlarged Floor Plans and Details; Revised Detail E6- Added and revised dimensions at bar ADA space (see clouded area)

**Add01-SKa02:** Reference Sheet A451: Wall Sections; Revised detail A1- Revised note “3/4” plywd” to “3/4” fire-retardant treated plywd” (see clouded area)

**Add01-SKa03:** Reference Sheet A451: Wall Sections; Revised detail A9- Revised note “3/4” plywd” to “3/4” fire-retardant treated plywd” (see clouded area)

**Add01-SKa04:** Reference Sheet A531: Ceiling Details; Revised detail A5- Revised note “Existing rated wall to remain – Patch and repair drywall finish to match existing adjacent wall – typ” (see clouded area)

**Add01-SKa05:** Reference Sheet A801: Millwork Elevations and Details; Revised detail A5- Revised dimensions of millwork (see clouded area)

**Add01-SKa06:** Reference Sheet A801: Millwork Elevations and Details; Revised detail C3- Revised dimensions of millwork (see clouded area)

**Add01-SKa07:** Reference Sheet A801: Millwork Elevations and Details; Revised detail G1- Revised elevation section reference to A5/A801 (see clouded area)

**Reference Sheet T901:** Details – Systems; Revised detail 5 (see clouded area)

**Reference Sheet T902:** Details – Systems; Revised detail 1- Audio System Block Diagram

**F. ATTACHMENTS:**

- 1. Specification Sections:**
  - 10432 Dimensional Letter Signage**
  - 16741 Sound System**

- 2. Sketches:**
  - Add01-SKa01-**
  - Add01-SKa02**
  - Add01-SKa03**
  - Add01-SKa04**
  - Add01-SKa05**
  - Add01-SKa06**
  - Add01-SKa07**

- 3. Drawings:**
  - T901**
  - T902**

G. All other terms and conditions of the IFB remain the same.

The Proposer shall acknowledge receipt of this addendum by completing the applicable section in the solicitation or by completion of the acknowledgement information on the addendum. Either form of acknowledgement must be completed and returned not later than the date and time for receipt of the proposal.

**Receipt acknowledged by:**

\_\_\_\_\_

**Authorized Signature**

\_\_\_\_\_

**Date Signed**

\_\_\_\_\_

**Title**

\_\_\_\_\_

**Name of Firm**

**To the Board of County Commissioners  
Orange County, Florida**

The Undersigned, hereinafter called "Bidder", having visited the site of the proposed project and familiarized himself with the local conditions, nature and extent of the work, and having examined carefully the Contract Form, General Conditions, Supplementary Conditions, Plans and Specifications and other Contract Documents, with the Bond requirements herein, proposes to furnish all labor, materials, equipment and other items, facilities and services for the proper execution and completion of: **ORANGE COUNTY CONVENTION CENTER, SOUTH BUILDING, DESTINATION SPACE BUILDOUT** in full accordance with the drawings and specifications prepared in accordance with the Contract Documents and, if awarded the Contract, to complete the said work within the time limits specified for the following LUMP SUM.

BASE BID:

\_\_\_\_\_ DOLLARS  
(In Words)

\$ \_\_\_\_\_

**ADDITIVE BID ITEM 1:**

(Reference Spec Section 01230 Alternates 3.1A)

Base Bid: Base bid includes gypsum wallboard and suspended acoustical ceiling.

**Additive:** Provide a total cost figure to provide the Resin Panel System and associated lighting for the Bar back wall and ceiling areas.

\_\_\_\_\_ DOLLARS  
(In Words)

\$ \_\_\_\_\_

**ADDITIVE BID ITEM 2:**

(Reference Spec Section 01230 Alternates 3.1B)

Base Bid: Base Bid does not include Monitors and monitor mounting brackets.

**Additive:** Provide a total cost figure to provide all Monitors and monitor mounting brackets.

\_\_\_\_\_ DOLLARS  
(In Words)

\$ \_\_\_\_\_

**REVISED  
D-2**

**ADDITIVE BID ITEM 3:**

(Reference Spec Section 01239 Alternates 3.1C)

Base Bid: Base bid does not include drapery pockets and Counter at East Wall.

**Additive:** Provide a total cost figure to provide drapery pockets and Counter at East Wall.

\_\_\_\_\_ DOLLARS  
(In Words)

\$ \_\_\_\_\_

**ADDITIVE BID ITEM 4:**

(Reference Spec Section 01239 Alternates 3.1D)

Base Bid: Base bid includes rough-in only to service corridor.

**Additive:** Provide a total cost figure to provide power in service corridor.

\_\_\_\_\_ DOLLARS  
(In Words)

\$ \_\_\_\_\_

In the event the Contract is awarded to this Bidder, he/she will enter into a formal written agreement with the County in accordance with the accepted bid within ten (10) calendar days after said Contract is submitted to him/her and will furnish to the County a Contract Payment and Performance Bond with good and sufficient sureties, satisfactory to the County, in the amount of 100% of the accepted bid. The Bidder further agrees that in the event of the Bidder's default or breach of any of the agreements of this proposal, the said bid deposit shall be forfeited as liquidated damages.

**Failure of the Bidder to provide pricing for all unit priced items and/or the Base Bid and ALL requested additive/deductive bid items, or alternate bids shall be cause for rejection of the bid as non-responsive.**

**REVISED  
D-2A**

## SECTION 10432 - DIMENSIONAL LETTER SIGNAGE

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Illuminated, fabricated channel dimensional characters.

#### 1.2 COORDINATION

- A. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: For dimensional letter signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic elements, and layout for each sign at least.
4. Show locations of electrical service connections.
5. Include diagrams for power, signal, and control wiring.

- C. Samples for Verification: For sign assembly showing all components and with the required finish, in manufacturer's standard size unless otherwise indicated and as follows:

1. Dimensional Characters: Full-size Sample of dimensional character.

- D. Qualification Data: For Installer and manufacturer.

- E. Sample Warranty: For warranty.

- F. Maintenance Data: For signs to include in maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer of products or an entity that employs installers and supervisors who are trained and approved by manufacturer.



## 1.5 FIELD CONDITIONS

- A. Field Measurements: Verify locations of electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

## 1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering.
    - b. Separation or delamination of sheet materials and components.
  - 2. Warranty Period: Minimum five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: For exterior fabricated channel dimensional characters, allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change: Local ambient.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### 2.2 DIMENSIONAL CHARACTERS

- A. Fabricated Channel Characters: Translucent face with metal side returns, formed free from warp and distortion; with uniform faces, sharp corners, and precisely formed lines and profiles; internally braced for stability and for securing fasteners;\.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. APCO Graphics, Inc.
    - b. A. R. K. Ramos Signage Systems.
    - c. ASI Sign Systems, Inc.

2. Illuminated Characters: Backlighting character construction with LED lighting including transformers, insulators, and other accessories for operability, with provision for servicing and concealing connections to building electrical system. Use tight or sealed joint construction to prevent unintentional light leakage. Space lamps apart from each other and away from character surfaces as needed to illuminate evenly.
  - a. Power: As indicated on electrical Drawings.
3. Character Material: Sheet or plate aluminum.
4. Material Thickness: Manufacturer's standard for size and design of character.
5. **Not Used** ~~Translucent Face Sheet: Acrylic sheet, manufacturer's standard thickness for size of character, and with integral color as selected by Architect from manufacturer's full range.~~
6. Character Height: As indicated.
7. Character Depth: As indicated.
8. Finishes:
  - a. Aluminum Finish: Brushed with clear anodized finish.
9. Mounting: Projecting studs.
  - a. Hold characters at distance indicated from wall surface.
10. Typeface: As indicated on the Drawings.

## 2.3 DIMENSIONAL CHARACTER MATERIALS

- A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. **Not Used** ~~Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).~~
- D. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

## 2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
  1. Use concealed fasteners and anchors unless indicated to be exposed.

2. Sign Mounting Fasteners:

- a. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

- B. Adhesives: As recommended by sign manufacturer and that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
5. Internally brace signs for stability and for securing fasteners.
6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

2.6 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that electrical service is correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
  - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
  - 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
  - 3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods:
  - 1. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
    - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
    - b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10432

## SECTION 16741 – SOUND SYSTEM

### PART 1 - GENERAL

#### 1.1 RELATED SECTIONS

- A. Comply with the requirements of Section 16701 “Common Work Results for Communications”

#### 1.2 DESCRIPTION OF SYSTEM:

- A. Provide and install a complete system as described herein and on the drawings.
- B. System to include but not be limited to:
  - 1. All sound reinforcement system equipment as outlined herein and as required for a complete and fully functional system.
  - 2. Support
    - a. Raceways, outlet boxes, cabinets, identification, etc. Conform to applicable sections in these specifications. Provide/install complete with all required basic materials.
    - b. Power: Refer to Division 16
    - c. Grounding: Refer to Division 16
- C. All cable shall be installed in complete raceway system as shown on the drawings.

#### 1.3 SPECIAL REQUIREMENTS

- A. The Contractor shall provide and install all equipment, materials, programming, testing, and labor necessary to provide and install a complete and fully functional system whether or not specifically shown on the drawings or called out herein. Claims for additional equipment and materials not called out in the contract document shall not be allowed.
- B. The Owner is in the process of implementing a separate project that will upgrade the Sound System throughout the Convention Center. The Sound System installed as part of this project shall be interfaced to and act as an extension of the Convention Center-wide system. The Contractor shall prepare the system installed under this project for interconnection to the Convention Center-wide system and shall coordinate with that project to provide the interconnection and programming necessary to meet all Owner's requirements on that project. Any changes to the system installed as part of this project or its subsequent programming shall be brought to the attention of the Designer in writing as soon as discovered by the Contractor.
- C. The equipment cabinets specified herein are for both the Sound System and the Video System as called out in Section 16751. The Contractor shall coordinate installation of equipment and materials for both systems as shown on the drawings.

#### 1.4 FUNCTIONS AND OBJECTIVES

- A. Provide and install a complete and fully functional Sound Reinforcement system providing pickup, amplification, distribution, and reproduction of voice and/or other audio program material from various sources such as microphones (hard-wired and wireless), CD Players, Computer audio, etc. as shown on the drawings and described herein.
- B. Provide integration between the Sound Reinforcement Systems and other related systems as required by Code and the Contract Documents.
- C. The Contractor shall be responsible for any damage to any surfaces or work disrupted as a result of his work. Repair of surfaces, including painting, shall be included as necessary.
- D. Coordinate all work with other trades and Owner provided equipment as necessary.

## PART 2 - PRODUCTS

### A. FLOOR MOUNT EQUIPMENT CABINET

- 1. Base shall be constructed of double formed front and rear sections; MIG welded and reinforced with 11 gauge CRS corner caster gussets. Vertical columns shall interlock with frame top and base.
- 2. Base shall include four (4) 3/8-16 threaded sockets for installation of levelers. Base shall also have provisions to be permanently secured to the floor.
- 3. Mounting rail channel support members shall be multi-formed and MIG welded for interlocking support.
- 4. Panel mounting rails shall be fully adjustable front to rear. Rails shall be formed from 14 gauge CRS, zinc plated and punched on EIA pattern with .281 diameter holes on 5/8" - 5/8" - 1/2" continuous centers (2 pair supplied).
- 5. Manufactured to EIA standards.
- 6. 22.31" Width by 25" Depth by 83.125" Height with 61.25" panel mounting space.
- 7. Front and rear access to equipment.
- 8. Shall include side panels.
- 9. Shall include metal louvered rear door.
- 10. Shall include surface mount plexi-glass front door.
- 11. Door shall include cylinder lock, lift-pull handle, and quick release hinges.
- 12. Color shall be black.
- 13. Provide all panels as required to mount equipment, including panel for power strip and filler panels. Filler panels shall be installed to allow future addition of equipment without the need for the Owner to maintain a stock of filler panels in a separate location. Filler panels larger than three (3) racks spaces shall not be acceptable.
- 14. Top and bottom rack units shall be vent panels. Other spaces shall be provided with blank or vent panels as shown on the drawings.
- 15. Provide, in each equipment cabinet, one (1) fan tray assembly with two (2) 115 CFM fans.
- 16. Provide ground bus full height minus six (6) inches. Mount to back of equipment cabinet. Connect to Systems ground bus bar.
- 17. Provide all brackets to mount non-rack mountable equipment.

18. Provide all hardware, supports, etc. as required to mount/house all equipment called for and/or shown at each location.
19. Provide additional shelves as required for each piece of equipment mounted in cabinet that requires a shelf.
20. Cabinet to include two (2) multi-outlet power strips.
  - a. Comply with UL 1363.
  - b. Rack mounting.
  - c. Six, 20-A, 120-V ac, NEMA WD 6, Configuration 5-20R receptacles.
  - d. LED indicator lights for power and protection status.
  - e. LED indicator lights for reverse polarity and open outlet ground.
  - f. Circuit Breaker and Thermal Fusing: When protection is lost, circuit opens and cannot be reset.
  - g. Cord connected with 15-foot (4.5-m) line cord.
  - h. Rocker-type on-off switch, illuminated when in on position.
  - i. Peak Single-Impulse Surge Current Rating: 33 kA per phase.
  - j. Protection modes shall be line to neutral, line to ground, and neutral to ground. UL 1449 clamping voltage for all 3 modes shall be not more than 330 V.
21. Provide casters to allow equipment cabinets to be moved out of installation space far enough to gain access to rear of cabinets with adequate working space. Contractor shall provide cabling to cabinets with enough slack to allow cabinets to be properly moved.
22. Equipment Cabinets shall have 44 Rack Units (RU) of usable space.
23. Manufacturers
  - a. Basis of Design
    - 1) Atlas Soundolier #544-25 equipment cabinet with top panel, side panels, plexiglass front door, rear doors, SVP19 Series Vent Panels, S19 Series Filler Panels, CFT-0 Fan Tray and CFM-2-120 Fan Assembly; Leviton #5500-192 Power Strips
  - b. Acceptable Substitutions
    - 1) Newton
    - 2) Chatsworth
    - 3) Middle Atlantic

## 2.2 Power Sequencer

- A. The Power Sequencer shall be a series multi-stage surge protected device with linear filtering and automatic voltage shutdown used to power up and power down audio equipment in a logical sequence that prevents damage to audio components such as amplifiers.
- B. The Power Sequencer shall have six sequenced rear panel outlets in three groups of two with two additional switched rear panel outlets, and one front panel unswitched outlet.



- C. The power Sequencer shall be provided with a momentary remote control plate to allow power up or power down of the sound system without having to enter the sound system equipment cabinet. The momentary remote control plate shall be installed where shown on the drawings.
- D. Technical
  - 1. Current Rating: 15 amps
  - 2. Operating Voltage: 90 to 140 VAC
  - 3. Over Voltage Shutdown: 140 VAC
  - 4. Spike Protection Modes: Line to neutral, zero ground leakage
  - 5. Spike Clamping Voltage: 188 Vpk @ 3,0000 amps, 133 VAC RMS
  - 6. Response Time: 1 nanosecond
  - 7. Maximum Surge Current: 6,500 amps
  - 8. Noise Attenuation: 10 dB @ 10 kHz; 40 dB @ 100 kHz; 100 dB @ 10 MHz
  - 9. Safety Agency Listings: CE, NRTL-C
  - 10. Shall be provided with a three year warranty
- E. Manufacturers
  - 1. Basis of Design
    - a. Furman Sound PS-8R II Power Conditioner/Sequencer with an RS-2 Remote System Control Panel or acceptable substitution

## 2.3 WIRELESS MICROPHONE SYSTEM

- A. Functions and Features
  - 1. 42 MHz bandwidth: 1680 tunable UHF frequencies.
  - 2. Enhanced frequency bank system with up to 24 compatible frequencies
  - 3. Ethernet port for connecting to the Wireless Systems Manager (WSM) software for control via computer.
  - 4. High-quality true diversity reception.
  - 5. Pilot tone squelch for eliminating RF interference when transmitter is turned off
  - 6. Automatic frequency scan feature.
  - 7. Enhanced AF frequency range.
  - 8. Increased range for audio sensitivity.
  - 9. Wireless synchronization of transmitter parameter from receiver.
  - 10. Illuminated graphic display.
  - 11. Auto-Lock function
  - 12. HDX Compander
  - 13. Programmable Mute function
  - 14. Integrated Equalizer and Soundcheck mode
  - 15. Contacts for recharging BA 2015 accupack directly in the transmitter
- B. Technical
  - 1. RF frequency range: 516 - 865 MHz
  - 2. Transmission/receiving frequencies: 1680
  - 3. Presets: 24

4. Switching bandwidth: 42 MHz
  5. Peak deviation:  $\pm 48$  kHz
  6. Compressor: HDX
  7. Frequency response (microphone): 80 - 18,000 Hz
  8. Signal-to-noise-ratio:  $> 115$  dB(A)
  9. Total harmonic distortion (THD):  $< 0.9\%$
  10. In compliance with: ETS 300422 , ETS 300445 , CE , FCC
  11. Antenna connector: 2 BNC,  $50\Omega$
  12. XLR connector: 6.3 mm
  13. Audio output level (balanced): XLR: +18 dBu max
  14. Audio output level (unbalanced): Jack: +12 dBu max
  15. RF output power: 10/30 mW
  16. Operating time (transmitter):  $> 8$  hours
  17. Input voltage range: 1.8 V, line / 2.4 V, line
  18. Transducer / microphone type: electrets
  19. AF sensitivity: 40 mV/Pa
  20. Sound pressure level (SPL): 120 dB(SPL) max.
  21. Pick-up pattern: cardioid
- C. Each Wireless Microphone system shall be provided with rack mount.
- D. The Contractor shall provide and install the Wireless Microphone System with all accessories required for the complete and fully functional system within this specific facility. The accessories shall include but not be limited to an Antenna Splitter and Mounting package and Boosters for proper receipt of signals from remote antennas. The Contractor shall provide a block diagram as part of his Submittals that identifies all equipment and materials, as well as the specific installed location for each, to confirm the system configuration to be installed as part of this project. The Contractor shall coordinate with the Manufacturer prior to providing Submittals for review.
- E. The Contractor shall determine the initial frequencies to be used by each Wireless Microphone system and shall provide that information as part of his submittals. Upon completion of the installation, but prior to requesting the Substantial Completion review, the Contractor shall accomplish final verification of the permanent frequencies for each system necessary for proper system operation without interference and shall annotate his final as-built documents.
- F. Each Wireless Microphone system shall be provided with one (1) lavalier microphone and one (1) handheld microphone.
- G. Manufacturers:
1. Basis of Design
    - a. Sennheiser EW 322 G3 Wireless Microphone System
  2. Acceptable Substitutions
    - a. Telex
    - b. Shure

## 2.4 HANDHELD MICROPHONES

- A. The microphone shall be a unidirectional (cardioid) dynamic vocal microphone designed for professional vocal use in sound reinforcement and studio recording applications. The microphone shall include a built-in spherical filter to minimize wind and breath "pop" noise. The microphone shall be of rugged construction with a proven shock mount system, and a steel mesh grille to ensure consistent performance.
- B. The microphone shall be provided with a windscreen and 25 foot cable.
- C. The microphone shall include the following minimum features:
- D. Frequency response tailored for vocals with brightened midrange and bass rolloff
- E. Uniform cardioid pickup pattern that isolates the main sound source and minimizes background noise.
- F. Pneumatic shock-mount system to reduce handling noise
- G. Effective, built-in spherical wind and pop filter
- H. Included break-resistant stand adapter which rotates 180 degrees
- I. Technical
  - 1. Frequency Response: 50 to 15,000 Hz
  - 2. Polar Pattern: Unidirectional (cardioid), rotationally symmetrical about the microphone axis, uniform with frequency.
  - 3. Sensitivity (at 1,000 Hz, open circuit voltage): -54.5 dBV/Pa (1.85 mV)
  - 4. Rated Impedance: 150 Ohms actual (300 Ohms actual)
- J. Provide quantity of eight (8) each
- K. Manufacturers
  - 1. Basis of Design
    - a. Shure SM58 Series Handheld Microphones or acceptable substitution

## 2.5 MICROPHONE FLOOR STANDS:

- A. The microphone floor stand shall be a professional full-height microphone stand designed for commercial audio applications. It shall feature a low profile base, be of rugged construction, and include a wearproof clutch with positive locking control for microphone height placement.
- B. The stand shall be constructed of heavy-duty welded cold rolled steel tubing with a cast iron base that includes anti-tip stabilizers.
- C. The microphone stand base and tubing shall be ebony in color.
- D. Provide quantity of eight (8).

E. Manufacturers

1. Basis of Design
  - a. Atlas Soundolier MS-12CE
2. Acceptable Substitution
  - a. Konig & Meyer
  - b. Hercules

2.6 MICROPHONE DESK STANDS:

- A. The microphone desk stand shall be a fixed height stand with a circular cast iron base and steel tubing for application with any standard microphone.
- B. The microphone stand base and tubing shall be ebony in color.
- C. Provide quantity of four (4).
- D. Manufacturers
  1. Basis of Design
    - a. Atlas Soundolier DS-5
  2. Acceptable Substitution
    - a. Konig & Meyer
    - b. AKG

2.7 MICROPHONE AND LINE LEVEL INPUT PLATES

- A. Stainless steel single-gang faceplates with quantity and type of XLR connectors as shown on the drawings.
- B. Provide one (1) 25 foot microphone cable for each jack type.
- C. Manufacturers:
  1. Basis of Design
    - a. Atlas Soundolier
  2. Acceptable Substitutions
    - a. Pro Co Sound
    - b. Whirlwind

2.8 CD/MP3 PLAYER

- A. General

1. Shall be a commercial grade CD/MP3 Player designed for use in installed sound reinforcement systems.

B. Functions and Features

1. Play finalized CD/CD-R/CD-RW discs containing MP3, WMA or WAV audio files.
2. Number of Channels: 2
3. Quantization Rate: 16-bit
4. Sampling Frequencies: 32 kHz, 44.1 kHz, 48 kHz
5. Shall have Backup Memory
6. Analog Audio Output
  - a. Connectors (Unbalanced)
    - 1) Connector: RCA pin jacks
    - 2) Output Impedance: 1 kOhm or less
    - 3) Standard Output Level: -10 dBV
    - 4) Maximum Output Level: +20 dBu
  - b. Connectors (Balanced)
    - 1) Connector: BLR-3-32
    - 2) Output Impedance: 150 Ohms
    - 3) Standard Output Level +4 dBu
    - 4) Maximum Output Level: +20 dBu
  - c. Phone Connectors: 6.3 mm (1/4") standard stereo
7. Digital Audio Output
  - a. Connector: Optical and Coax
  - b. Signal Format: IEC-60958
  - c. Output Impedance: 75 Ohm (Coaxial); 110 Ohm (AES-EBU)
  - d. Output Level: 0.5 Vp-p
8. Control
  - a. S-232C Connector; D-sub 16-pin

C. Technical

1. Frequency Response: 20 Hz – 20kHz
2. S/N Ratio: 95 dB min
3. Dynamic Range: 95 dB min
4. Distortion: 0.005% max
5. Channel Separation: 95 dB min.

D. Shall include a rack mount kit.

E. Shall include an IR remote control

F. Manufacturers

1. Basis of Design
  - a. Tascam CD-500B
2. Acceptable Substitutions
  - a. Denon Professional
  - b. Gemini

2.9 LINE LEVEL MIXER

A. The Line Level Mixer shall be a two input, two output device design for mixing two audio sources. It shall allow two mic or line level source to be combined and output as either a mic or line level signal.

B. Technical

1. Inputs: Two (2) selectable mic or line
2. Input Level for +4 dBu Output:
  - a. Mic: -45 dBu to +65 dBu; Max input -28 dBu
  - b. Line: -18 dBv to +1- dBu; Max input +22 dBu
3. Input Impedance: Mic 200 Ohm; Line 20 k Ohm bridging
4. Input or Output Configuration: Balanced or unbalanced
5. Outputs: Two (2); mic or line
6. Output impedance: 150 Ohms (mic or line)
7. Frequency Response:
  - a. Mic: 25 Hz to 50 kHz ( $\pm 1$  dB)
  - b. Line: 10 Hz to 30 kHz ( $\pm 0.25$  dB)
8. THD+N:
  - a. Mic: < 0.05% 25 to 20 kHz
  - b. Line: < 0.005%
  - c. IMD: < 0.004%
9. Output Level: Mic: -45 dBu; Line +4 dBu
10. Headroom:
  - a. Mic Input: >22 dB
  - b. Line Input: >32 dB
  - c. Output: > 20 dB
11. Noise: Mic: <-70 dB; Line <-90 dB
12. CMRR: Mic: > 65 dB; Line >45 dB

C. The Mixer shall be provided with a power supply

- D. The Contractor shall provide and install Line Level Mixers as necessary for signal compatibility between system equipment.
- E. Manufacturers
  - 1. Basis of Design
    - a. Radio Design Labs St-MS2 Line Level Mixer or acceptable substitution

## 2.10 DIGITAL AUDIO NETWORKING PLATFORM

### A. Audio Core Panel

- 1. The System Processor shall be an Intel based centralized processor and control engine. It shall be a single-chassis processor with no internal or external audio busses to other processors. The system shall operate on a native gigabit Ethernet, employ DiffServ quality of service, IEEE 1588 time reference, UDP/IP data transport, and floating point format audio data representation. The overall system latency from analog input to synchronized analog outputs shall be 2.5 ms or less. For routed networks, the end to end system latency shall be 3.2 ms or less.
- 2. The system shall have the capability of being completely redundant. The processor shall be able to support a second synchronized backup processor with complete automatic failover in ten seconds or less. Each processor and I/O peripheral shall have redundant network connections for seamless audio stream failover.
- 3. The system processor shall have a minimum network channel capability of **128 channels** ~~64 channels~~ and an end node capacity of at least **128 channels** ~~64 channels~~ of audio. I/O capacity shall be 8 card slots using one of six I/O circuit cards (HD-15 pin Amp Out, Line Out, High-performance Mic/Line In, Standard Mic/Line In, CobraNet In/Out, and AES/EBU In/Out).
- 4. The system processor shall have the following front panel controls and indicators: LCD page forward momentary switch, Unit ID button momentary switch, Clear settings momentary switch, Power On blue LED, Device Status tri-color LED, 32 audio signal tri-color LEDs, and a 240 x 64 monochrome LCD graphics display displaying the device name, design name and status, type of I/O cards in the I/O slots, LAN A and B settings, and the firmware version.
- 5. On the rear panel, the system processor shall have one RS232 DE-9 (male 9-pin D-shell) connector, VGA and DVI Video Out, GPIO A: DA-15 (female 15-pin D shell) connector, GPIO B: DA-15 (female 15-pin D shell) connector, LAN A RJ45 1000 MBps only, LAN B: RJ45 1000 MBps only.
- 6. The system processor shall store a single design which can be comprised of components, wiring, links, text, and graphics on a single or multiple schematic pages. Designs shall include any of the following DSP functions, test and measurement components, control components, and layout components: Acoustic Echo Cancellers, Audio Players, Audio Streaming components, Crossfaders, Crossovers, Delay components, Auto Gain control elements, Compressors, Gates, Duckers, Expanders, Ambient Noise Compensators, Limiters, Gain blocks, Graphic Equalizers, Parametric Equalizers, FIR Filters, All-Pass Filters, Band-Pass Filters, Band-Stop Filters, High-Pass Filters, Low-Pass Filters, FIR High-Pass filters, FIR Low-Pass Filters, Dual-Shelf Equalizers,

Notch Filters, Meters, Matrix Mixers, Gain-Sharing Automatic Mixers, Gated Automatic Mixers, Signal Routers, Public Address Routers, Room Combiners, Signal Presence Meters, Tone Generators, Tone and Noise Generators, Dual Trace FFT Measurement Modules, Real Time Analyzers, Signal Injectors, and Signal Probes.

7. The system processor shall support custom user control interfaces either on proprietary touch screen controllers, or network computers utilizing a control application, or iOS devices on Wi-Fi. Custom control interfaces shall be capable of having multiple user-selectable pages with different controls on each.
8. Functions and Features
  - a. Centralized processing architecture using Intel® processing
  - b. Eight on board slots accommodate all I/O cards
  - c. Abundant DSP capacity
  - d. Uses standard GigabitEthernet hardware and protocols for audio transport and control
  - e. Control and interface to external devices using TCP/IP, GPIO and RS-232
  - f. Powerful and intuitive design GUI
  - g. System seamlessly integrates with amplifiers and loudspeakers
  - h. Supports multiple levels of system redundancy
  - i. Technical support is available from manufacturer 24/7 – worldwide
9. Technical
  - a. Description System processor and control engine
  - b. Front Panel Controls LCD page forward momentary switch
  - c. Unit ID button momentary switch
  - d. Clear settings momentary switch
  - e. Front Panel Indicators Power On: Blue LED; Device Status: Tri-color LED
  - f. Audio Signal: 32 Tri-color LEDs
  - g. Card Status: 8 tri-color LEDs
  - h. 240 x 64 monochrome LCD graphics display
  - i. Rear Panel Controls Power Switch
  - j. Rear Panel Connectors RS-232: DE-9 (male 9-pin D shell connector)
  - k. Video Out: HD-15 (female 15-pin D shell connector); DVI-D, HDMI (500i only)
  - l. Aux USB ports: USB host (type A) x4
  - m. Aux Network Port: RJ45 10/100/1000 Mbps (switchable between Q-Sys LAN B or Aux Network Port on 250i model)
  - n. GPIO ports: DA-15 (female 15-pin D shell connector) x2
  - o. LAN A: RJ45 1000 Mbps only
  - p. LAN B: RJ45 1000 Mbps only (switchable between Q-Sys LAN B or Aux Network Port 10/100/1000 Mbps on 250i model)
  - q. IEC inlet: AC mains power connector
  - r. Network Channel Capacity 64 128
  - s. Audio I/O Capacity 8 card slots, up to 32 channels; Requires purchase of Q-Sys Type 2 audio I/O cards: CB, CIML4, CIML4-HP, COL4, CODP4, CAES4, CCN32
  - t. Line Voltage Requirements 100 VAC - 240 VAC, 50 - 60 Hz



- u. Current Draw 1.5A (120V mains) 1.7A (120V mains)
- v. Thermal 500 BTU/h (typical) 650 BTU/h (typical)
- w. Included Accessories 6 ft UL/CSA/IEC line cord, User Manual, Software CD

B. Input/Output Peripherals

1. Input/Output Frame

- a. The I/O Frame shall operate on a native gigabit Ethernet network, employing DiffServ quality of service, IEEE 1588 audio clock synchronization, UDP/IP data transport, and floating-point format audio data representation. The overall system latency from analog input to synchronized analog output(s) shall be 2.5 ms or less. For routed networks, the end to end system latency shall be 3.2 ms or less.
- b. The I/O Frame shall have the capability of being redundant. The Frame shall have a backup that has the same input source as the primary. The outputs of the backup are disconnected by relays, until a failover occurs, at which time the primary outputs are disconnected. Each I/O Frame shall have redundant "hot" network connections for seamless audio stream failover.
- c. The I/O capacity shall be up to 16 analog input and/or output channels using any combination of the following: Mic/Line Input card (High Performance or Standard), Line Output card, DataPort Output card. The I/O capacity shall be up to 32 digital channels using the AES-3 Input/Output card.
- d. The I/O Frame shall have the following front panel controls and indicators: LCD page forward momentary switch, Unit ID momentary switch, Clear settings momentary switch, Power on - blue LED, Device status - tri-color LED, audio signal - five tri-color LEDs per I/O card slot, 240 x 64 monochrome LCD graphics display.
- e. The I/O Frame shall have the following rear panel connectors: RS232 - DE-9 (male 9-pin D shell connector), GPIO - DA-15 (female 15-pin D shell connector), Q-Sys Network LAN A and LAN B - RJ45 1000 MBps only, line voltage connection for 100 VAC - 240 VAC, 47 - 63 Hz.

2. Required Input/Output Cards

a. Mic/Line Input Card

- 1) Description: Four channels of microphone/line-level analog audio input with 48V phantom power
- 2) Performance: Dynamic Range >105 dB min
- 3) Distortion (20 Hz – 20 kHz +4 dBu nominal input): <0.009% THD+N
- 4) Crosstalk (20 Hz – 20 kHz): > 100 dB min.
- 5) Frequency Response: 20 Hz – 20 kHz +/- 0.5 dB
- 6) Input Impedance: 10 kohms
- 7) Common Mode Rejection: >45 dB min.
- 8) Max Input Level: 0.123, 2.25, 8.70, 17.35 VMS; -16, 10, 21, 27 dBu; -18.2, 7.04, 18.8, 24.78 dBv (4 selections)

- 9) Mute: Infinite attenuation (via digital mute)
  - 10) Audio Converters: 24-bit delta-sigma at 48 or 96 kHz sample rate analog to digital conversion
  - 11) Connectors: Four 3-terminal Euro-style detachable terminal blocks
  - 12) User-Configurable Options: +48V phantom power
- b. High Performance Mic/Line Input Card
- 1) Description: Four channels of microphone/line-level analog audio input with 48V phantom power and high performance pre-amplifiers and A/D converters
  - 2) Performance: Dynamic Range >112 dB min
  - 3) Distortion (20 Hz – 20 kHz +4 dBu nominal input): <0.004% THD+N
  - 4) Crosstalk (20 Hz – 20 kHz): > 100 dB min.
  - 5) Frequency Response: 20 Hz – 20 kHz +/- 0.5 dB
  - 6) Input Impedance: 10 kohms
  - 7) Common Mode Rejection: >45 dB min.
  - 8) Max Input Level: 0.123 to 17.35 VMS; -56 to 27 dBu; -58.2 to 24.8 dBv (continuously variable)
  - 9) Mute: Infinite attenuation (via digital mute)
  - 10) Audio Converters: 24-bit delta-sigma at 48 or 96 kHz sample rate analog to digital conversion
  - 11) Connectors: Four 3-terminal Euro-style detachable terminal blocks
  - 12) User-Configurable Options: +48V phantom power
- c. Line Output Card
- 1) Description: Four channels of line-level analog audio output
  - 2) Performance: Dynamic Range >112 dB min
  - 3) Distortion (20 Hz – 20 kHz +4 dBu nominal input): <0.004% THD+N
  - 4) Crosstalk (20 Hz – 20 kHz): > 100 dB min.
  - 5) Frequency Response: 20 Hz – 20 kHz +/- 0.5 dB
  - 6) Mute: Infinite attenuation (via digital mute)
  - 7) Audio Converters: 24-bit delta-sigma at 48 or 96 kHz sample rate digital to analog conversion
  - 8) Output Trim: 8.7 V Vrms; 21 dBu; 18.8 dBv
  - 9) Connectors: Four 3-terminal Euro-style detachable terminal blocks
- d. DataPort Output Card
- 1) Description: Four audio output channels for connection to DataPort equipped audio power amplifiers
  - 2) Performance: Dynamic Range >114 dB min
  - 3) Distortion (20 Hz – 20 kHz +4 dBu nominal input): <0.004% THD+N
  - 4) Crosstalk (20 Hz – 20 kHz): > 95 dB min.

- 5) Frequency Response: 20 Hz – 20 kHz +/- 0.5 dB
- 6) Mute: Infinite attenuation (via digital mute)
- 7) Audio Converters: 24-bit delta-sigma at 48 or 96 kHz sample rate digital to analog conversion
- 8) User-Configurable Options
  - a) Amplifier Standby: Set or clear amplifier in standby mode
  - b) Mute: Set or clear individual channel mutes
  - c) Enable Meters: Enable data collection of meters for each channel
  - d) Audio Output Levels: Adjust individual audio channel levels.
- e. CobraNet Bridge Card
  - 1) Description: Up to 32 input and 32 output channels of CobraNet digital audio
  - 2) Frequency Response: 20 Hz – 20 kHz +/- 0.2 dB
  - 3) Mute: Infinite attenuation (via digital mute)
  - 4) Group Delay: 64 Samples (2.687 ms actual), 128 Samples (4.020 ms actual), 256 Samples (6.686 ms actual)
  - 5) I/O Capacity: Selectable 4X4, 8X8, 16X16 or 32X32 (in Core only)
  - 6) Bundle Packing: 0 to 8 channels
  - 7) Network Transmitters: 4
  - 8) Network Receivers: 4
  - 9) Management: CobraNet management via SNMP
  - 10) Connectors: Dual RJ-45
3. Remote Input/Output Module
  - a. Shall include all functions and features of the I/O Frame and Cards except as modified below.
  - b. Functions and Features
    - 1) Two mic/line inputs and two line outputs
    - 2) One 9-Watt speaker output
    - 3) May use Power over Ethernet (PoE) or local power supply
    - 4) Premium 24-bit AD and DA conversion used throughout
    - 5) Includes mounting brackets
    - 6) Uses standard Gigabit Ethernet hardware for audio transport with dual Ethernet connection for network redundancy.
- C. Audio Power Amplifiers
  1. The amplifier shall contain all solid-state circuitry, using complementary silicon output devices. The amplifier shall operate from 50–60 Hz AC power and shall draw 1104 VA or less when driven with random program material at 1/8 of rated power into 4-ohm loads. The amplifier shall have a 320-C19 16A IEC mains connector and shall be equipped with a removable power cord having a

- standard NEMA AC plug. The amplifier shall operate safely from a 15A 120V AC outlet, and shall comply with FCC part 15 Class B requirements.
2. The amplifier shall have internal heat sinks cooled by forced air, driven by a 24-volt DC fan whose speed shall vary in response to heat sink temperatures to minimize acoustic noise. The fan's speed shall be controlled by a drive voltage ranging from approximately 9 volts when cool to approximately 24 volts when at the upper ranges of its operating temperature. Air flow shall be from rear to front to avoid temperature rise inside equipment racks; rack mounting of multiple amplifiers shall be possible without clearance for ventilation. The amplifier shall be capable of continuous operation at 1/3 of rated power into 4-ohm loads, in ambient temperatures up to 104° F (40° C).
  3. The amplifier shall contain eight independent amplifier channels powered by a low-impedance switching power supply. All amplifier protection systems shall be synchronized and self-resetting upon removal of fault. A failure in any channel shall not interrupt operation of the other channels.
  4. Each channel shall have circuitry to protect against short circuits or mismatched loads. Each channel shall independently monitor heat sink temperature and shall trigger fan speed boost, and if necessary, signal muting to prevent excessive temperature rise. Both channels shall have synchronized on-off muting, acting for three seconds after turn-on, and within ¼ second after turn-off or loss of AC power. Each channel shall have DC fault protection for the load, consisting of a shutdown of the power supply. Each channel shall have an independent and defeatable clip limiter and a 12 dB per octave high-pass filter. The corner frequency of the filter shall be selectable between 33 Hz and 75 Hz.
  5. The front panel shall contain these features: an AC power switch; LED status indicators for power (green), bridged mono (yellow), and parallel inputs (yellow); independent LED output metering indicators for each channel for signal present or -30 dB (green), -20 dB (green), -10 dB (green), and clip (red); and a recessed, detented gain control for each channel with 21 attenuation settings. From 0 to 14 dB, the attenuation steps shall be 1-dB increments. The labeled attenuation settings shall be 0, 2, 4, 6, 8, 10, 12, 14, 18, 24, and ∞ dB. The 0 dB attenuation settings shall also be labeled with the amplifier's equivalent voltage gain in dB. A removable security panel shall be provided for covering and preventing unauthorized access to the gain controls, when needed.
  6. The output connectors shall be barrier strips located on the rear panel, with screw terminals and a safety shroud. One barrier strip shall be used for each pair of sequentially numbered channels (1 and 2, 3 and 4, etc.). The terminals shall be arranged to facilitate bridged mono connection.
  7. The inputs shall be located on the rear panel, and shall consist of a 3-pin detachable terminal block and a 3-pin XLR connector for each channel. The XLR input shall be wired with pin 2 high. Inputs shall be electronically balanced, with a minimum impedance of 12 kilohms balanced and 6 kilohms unbalanced, and a common mode rejection of at least 50 dB from 20 Hz to 20 kHz.
  8. On the rear panel, each pair of sequentially numbered channels — 1 with 2, 3 with 4, etc. — shall have a high-density 15-pin DataPort connector for carrying both audio and amplifier operational status signals to and from a network. The DataPort shall also accommodate plug-in crossover filters and other such accessories.
  9. Also for each sequentially numbered channel pair a set of DIP switches shall be provided on the rear panel for: setting bridged mono and parallel-input

- operation; selecting clip limiters; and selecting high-pass filters and setting their frequencies.
10. Each channel shall be capable of meeting the following performance criteria with all channels driven: sine wave output power of 90 watts into 8 ohms, 20 Hz to 20 kHz at <0.1% THD; 120 watts into 4 ohms, 20 Hz to 20 kHz at < 0.1% THD; and watts into 2 ohms, Khz at <1.0% THD. Frequency response (with filters not engaged) at 3 dB below rated power shall be 20 Hz to 20 kHz  $\pm 0.2$  dB. The voltage gain shall be 20.0x, equivalent to 26.0 dB, and the input sensitivity shall be 1.35 Vrms (+4.8 dBu). The unweighted signal to noise ratio over the range of 20 Hz to 20 kHz shall exceed 107 dB, referenced to full output. IHF damping factor shall exceed 200.
  11. The amplifier chassis shall occupy two rack spaces and have provisions for securing the rear corners. Depth from mounting surface to tips of rear supports shall be 14 in. (35.6 cm). The amplifier's weight shall not exceed 21.0 lb. (9.5 kg).

D. Project Performance Requirements

1. The system shall be provided with design software specifically created by the equipment manufacturer for use in developing and programming the system equipment for operation. The Contractor shall utilize this software to install and program the system and then, at the end of construction as part of the close-out documentation, shall provide the Owner with an original copy of the software and all programming files and system passwords. Use of backdoor type passwords by the Contractor shall not be acceptable.
2. The system shall be installed and configured to provide redundancy. This redundancy shall be for 2N Core redundancy as defined by the Basis of Design equipment manufacturer.
3. **Two (2) DataPot I/O Cards** ~~A DataPort I/O Card~~ shall be installed in each Audio Core Panel.
4. All system equipment shall use Type 2 hardware and connectors.
5. Mic/Line Level Input Card shall all be High Performance Type
6. System shall be provided with one (1) CobraNet Bridge Card **in each Core** for connection to Owner's future building-wide system.
7. The system shall be interfaced to the Control System (refer to Section 16751) for full control as described therein. Interconnect the system to the Control System as necessary, providing all required equipment, materials, and programming necessary, to provide the Owner with a single unified Audio/Video Control System. Interconnection of the system to the Control System shall not eliminate the need for the system software as described herein.
8. The Audio Power Amplifiers shall be provided with 70V outputs.

E. Manufacturers

1. Basis of Design
  - a. QSC Q-Sys System with **Core 500i** ~~Core 250i~~, I/O Frame, I/O Cards including but not limited to CIML4-HP High-Performance Mic/Line Input Cards, COL4 Line Output Cards, CODP4 DataPort Output Cards, and CCN32 CobraNet Bridge Cards, I/O 22 Remote I/O Module and

CX108V 8-Channel Professional Power Amplifiers or acceptable substitutions.

2.11 RACK MOUNT COMPUTER, MONITOR AND KEYBOARD

A. Computer

1. Shall include an Intel i5 or i7 processor, 16 GB or RAM, and a 500 GB hard drive. Hard drive shall include Operating System that is compatible with the Digital Audio Networking Platform System Software. Shall be rack mounted
2. Manufacturers
  - a. Basis of Design
    - 1) Lenovo
  - b. Acceptable Substitutions
    - 1) HP
    - 2) Dell

B. Monitor and Keyboard

1. The Monitor/Keyboard/Mouse Console consisting of a 17" LCD single rail Console with integral KVM Switch.
2. 17" LCD Single Rail Console shall have the following functions and features:
  - a. Support for SunT Native Resolution
  - b. Support for seventeen different keyboard languages
  - c. Bright Active TFT Display
  - d. OSD Functions for LCD Display and KVM Switch
  - e. Durable Keyboard with Touchpad
  - f. LCD Panel protected by tempered glass
  - g. Integration with various KVM switches
3. The KVM Switch shall have the following functions and features:
  - a. KVM Type: PS/2 and USB interface
  - b. Console Port plus one Remote Module
  - c. PC Port Connector: HDDB-15
  - d. PC Ports: 8
  - e. Max Distance (KVM Switch – Host): 32 feet
  - f. Video Resolution: 1920 x 1440 (Local Console); 1280 x 1024 (IP-based remote console)
  - g. IP-Based Remote Module: RJ-45 for 10/100M Ethernet, DB9 male for Modem; Null modem and serial power control; Mini USB 2.0 receptacle.
  - h. Daisy Chaining: Support with both Bus (8-layer) and Tree (2-layer) topologies; DB15 female connector
  - i. Computer Port Selection: On Screen Display (OSD) Menu, Hot Key
  - j. Security: Access Control List (SCL) security function; up to 8 independent controllable computer lists.

- k. Auto-Scan Intercals: 5 ~ 99 sec.
- l. Keyboard Emulation: PS/2 or USB
- m. Mouse Emulation: PS/2 or USB

4. Manufacturers

a. Basis of Design:

- 1) Atlas Soundolier MMK17-RM 17" LCD Console with MMK-KVM8 Modular KVM Switch or acceptable substitution

2.12 DATA SWITCHES

A. Shall be an enterprise-class stand-alone data switch providing high availability, scalability, security, energy efficiency, and ease of operation.

B. Features

- 1. 24-port 10/100/1000 PoE+ data switch
- 2. Shall include uplink network modules
- 3. Dual redundant, modular power supply and fan.
- 4. Media Access Control Security (MACsec) hardware-based encryption
- 5. Flexible NetFlow and switch-to-switch hardware encryption
- 6. Open Shortest Path First (OSPF) for routed access in IP Base image.
- 7. IPv4 and IPv6 rounding, multicast routing, advanced quality of service (QoS), and security features in hardware.
- 8. Enhanced limited lifetime warranty with next business day (NBD) advance hardware replacement and 90 day access to technical assistance center support.
- 9. USB Type-A and Type-B ports for storage and console respectively and an out-of-band Ethernet management port.
- 10. Provided with LAN Base feature set:
  - a. LAN Base: Enhanced Intelligent Services
  - b. IP Base: Baseline Enterprise Services
  - c. IP Services: Enterprise Services

C. Parameters

- 1. Rack mounted.
- 2. Twenty-Four (24) PoE 10/100/1000 Ethernet Ports
- 3. 750W Max Default AC Power Supply

D. Project Performance Requirements

- 1. Contractor shall provide and install one (1) Data Switch
- 2. Data Switches for the Sound System shall be shared with any other system (e.g. Control System). Other systems shall be provided with their own Data Switches.

E. Manufacturers

1. Basis of Design
  - a. Cisco 3560E-24PD 24-Port Data Switch or acceptable substitution
2. Acceptable Substitutions
  - a. HP ProCurve

## 2.13 UNINTERRUPTIBLE POWER SUPPLY (UPS)

- A. Shall be an interactive UPS with enhanced LCD interface offering network-grade power protection for critical server, network, and telecommunications equipment.
- B. Shall have built-in Auto-Voltage Regulation (AVR) to actively correct for brownouts and over-voltages back to usable levels while maintaining a full battery charge in case of power failure.
- C. Features
  1. 2RU rack mount UPS with 3000 VA / 3kVA capacity (1600W maximum load)
  2. Corrects for brownouts and over-voltages from 83 to 145V
  3. NEMA L5-30P input plug; 8 NEBA 5-15/20R and 1 L5-30R output receptacles. Two independently switchable output load banks.
  4. 98% efficiency rating in line-power mode
  5. Internal batteries offering 10 minutes at 50% load (1125W) and 3.5 minutes at 100% load (2250W)
  6. Hot-swappable, user-replaceable internal batteries.
  7. Front panel LCD monitoring screen with MODE and ENTER buttons reporting operating mode with 5-bar battery charge graphic plus seven selectable screens of detailed UPS and site power information.
- D. Shall include:
  1. PowerAlert software with USB, Serial, and IPO cabling
  2. 4-post rack mount kit
  3. Instruction manual
- E. Project Performance Requirements
  1. Shall be provided with SNMPWEBCARD
  2. Quantity of UPS's Required: Minimum of one (1) UPS for every three (3) data switches installed for Sound System.
- F. Manufacturers
  1. Basis of Design
    - a. Triplite SMART3000RM2U with SNMPWEBCARD option
  2. Acceptable Substitutions
    - a. APC



## 2.14 AUDIO PATCH PANELS

- A. Shall be a programmable audio patchbay in a 2 X 24, 1 RU size.
- B. Functions and Features
  - 1. Front programmable audio long-frame 1/4" patchbay
  - 2. Normals and grounds can be programmed by the end user.
  - 3. Rear interface options including E-3, E-90, and D-25.
- C. Project Performance Requirements
  - 1. Contractor shall provide, install and configure Patchbays to meet the Owner's AV staff requirements in regard to normal and ground configuration.
- D. Manufacturers
  - 1. Basis of Design
    - a. Blitree 488 Series Audio Patchbay or acceptable substitution.

## 2.15 CONTROL SYSTEM

- A. Refer to Section 16751.

## 2.16 ASSISTED LISTENING SYSTEM

- A. Transmitter
  - 1. The FM Transmitter shall be designed to provide auditory assistance in both personal and group situations. It operates on the 17 narrow-band channels in the 72-76 MHz band. The base FM transmitter is rack mountable and accepts balanced and unbalanced audio inputs. It runs from a wall plug 12 VAC transformer and includes a detachable telescoping 1/4 wave antenna.
  - 2. System Components
    - a. The FM Transmitter shall transmit 17 FCC-approved narrow band frequencies (in the 72-76 MHz radio band) available for the transmitter. The transmitter must identify numerically with a back lit LCD indicator the designated radio channel being transmitted.
    - b. The FM Transmitter shall accept unbalanced line level, balanced microphone level and 70 Volt distributed audio sources.
    - c. The transmitter shall have Enhanced Dynamic Range (E.D.R.) feature to improve Signal to Noise and audio quality when used with the SR-400 in E.D.R. mode.
    - d. The FM Transmitter shall have Normal and High RF transmitter settings.
    - e. The FM Transmitter shall have an on/off power switch.
    - f. The FM Transmitter LCD shall be backlit to indicate "on" status.
    - g. The FM Transmitter shall be mountable in a 19 inch equipment rack.
    - h. The FM Transmitter shall have a three year parts and labor warranty.

3. Technical

- a. Audio Input Characteristics: XLR-3F Balanced, ¼ inch unbalanced.
- b. Antenna: detachable ¼ wave telescoping
- c. Modulation: FM, +/- 25 KHz deviation
- d. Frequency Response (System): 100 Hz to 10,000 Hz
- e. Automatic Gain Control Range: 30 dB
- f. System Signal to Noise: 58 dB, > 77 dB with E.D.R.
- g. Preemphasis: 100 micro seconds
- h. Maximum Power: 80K micro Volt/m @ 3 m (25K micro V/m in Normal)
- i. Power Requirements: 13-20 Vdc or 12 Vac; 115Vac 60 Hz @ 300 mA plug-in wallpack power supply

B. Receiver

1. General Description

- a. The Personal FM Receiver shall be designed for use in auditory assistance and personal communication applications. The Personal FM Receiver provides amplification for mild to severe hearing losses. Persons with normal hearing, when used with an appropriate listening accessory may also use the Personal FM receiver.
- b. The Multi-Channel Personal FM Receiver shall feature an advanced digital PLL synthesizer which makes 17 narrow band hearing assistance channels in the 72-76 MHz range available in one unit. The current channel must be displayed on a back lit LCD display.

2. Multi-Channel Personal FM Receiver

- a. Shall have seventeen-channel synthesized user adjustable.
- b. Shall have a high frequency boost filter accessible by a push button switch. This filter shall increase intelligibility of the audio signal, providing additional assistance for individuals with reduced high frequency sensitivity and for users wearing earphones with limited audio response.
- c. Shall have Enhanced Dynamic Range (E.D.R.) feature to improve the signal to noise ratio and audio quality.
- d. Shall have an advanced synthesized design which eliminates channel drift.
- e. Shall have top mounted, tactile-feel controls to make operating any function easy.
- f. Shall have power saving feature which automatically shuts off power when the earphone, headset, or neckloop is removed.
- g. The Personal FM Receiver shall run on 2 AA-size alkaline batteries (20 hrs. continuous use), or 2 Ni-MH batteries (14 hrs. continuous use).
- h. Earphone jack shall accept any standard 3.5 mm (0.138 inch) mini stereo or mono earphone/headphone.
- i. The Personal FM Receiver shall have a three year parts and labor warranty.

3. Technical

- a. RF Frequency Range: 72.1 - 75.9 MHz
  - b. Audio Response: 100 - 10,000 Hz +/- 3 dB
  - c. Modulation: FM, +/- 25 KHz deviation
  - d. Harmonic & Spurious Emissions: Meets FCC part 15
  - e. Sensitivity: 0.5  $\mu$ v typical, 1.0  $\mu$ v maximum, 12 dB SINAD @ 25 KHz deviation
  - f. Image Rejection: >65 dB
  - g. Signal-to-Noise Ratio: >65 dB, >77 dB with E.D.R.
  - h. Distortion: <2% T.H.D.
  - i. Audio Output: @10% distortion ---- Into 8 Ohms--48 mW Into 32 Ohms--30 mW
  - j. Antenna Type: 1/4 wave omni-directional, in earphone cord
  - k. Batteries: 2 AA-size alkaline (20 hrs. continuous use), or 2 Ni-MH (14 hrs. continuous use)
  - l. Audio Controls: Volume, On/Off, High Frequency Boost (push-on type)
  - m. Earphone Connector Type: 3.5 mm (0.138 inch) mini stereo or mono
  - n. Channels Tuned: 72.1, 72.2, 72.3, 72.4, 72.5, 72.6, 72.7, 72.8, 72.9, 74.7, 75.3, 75.4, 75.5, 75.6, 75.7, 75.8, 75.9
- C. The system shall be provided with
1. An antenna connector kit that the Installer can use to field assemble the antenna cable using coaxial cable as specified by the equipment manufacturer.
  2. An antenna.
  3. All required cables.
  4. One (1) minimum twelve (12) receiver charging unit.
- D. The Contractor shall accomplish a factory scan of the installation site to determine the proper frequencies for the system (transmitter and receiver).
- E. The Contractor shall provide and install the Assisted Listening System with all accessories required for the complete and fully functional system within this specific facility. The accessories shall include but not be limited to an Antenna Splitter and Mounting package and Boosters for proper receipt of signals from remote antennas. The Contractor shall provide a block diagram as part of his Submittals that identifies all equipment and materials, as well as the specific installed location for each, to confirm the system configuration to be installed as part of this project. The Contractor shall coordinate with the Manufacturer prior to providing Submittals for review.
- F. Provide and install ten (10) receivers for each system as shown on the drawings.
- G. Manufacturers
1. Basis of Design
    - a. Telex Soundmate Personal Listening System with ST-300 Transmitter and SR-400 Receivers or acceptable substitution
  2. Acceptable Substitutions
    - a. Williams Sound

b. Phonic Ear

2.17 VOLUME CONTROLS

- A. Shall be an industry standard, commercial grade Volume Control on a flush mount single-gang stainless steel plate.
- B. Functions and Features
  - 1. A Range of Attenuation Steps (1.5dB or 3dB Steps) as well as Continuous to Meet Application and Budget Requirements
  - 2. Wall Plates are Stainless Steel with Stamped and Filled or Screen Printed Dial Scale, and a Skirted Black Knob.
  - 3. Mounts into Most 1-Gang E.O. Boxes. (2-3/4" Deep)
  - 4. UL Listed
- C. Technical
  - 1. Power Rating: 10, 35, or 100 watts
  - 2. Attenuation Per Step: 3 dB
  - 3. Insertion Loss: No greater than 0.6 dB
- D. Contractor shall provide and install Volume Control with power rating for connected speaker load plus fifty percent spare capacity.
- E. Manufacturers
  - 1. Basis of Design
    - a. Atlas Sound AT Series Volume Controls or acceptable substitution

2.18 SPEAKERS (DESTINATION LOUNGE)

- A. The Speaker shall be a high output, full-range, two-way pendant type loudspeaker to provides superb sound reproduction and very consistent, wide coverage for rooms with open architecture ceilings.
- B. Installation of the Speaker shall be accomplished with a galvanized steel cable affixed to the speaker chassis via an integrated snap hook. For safety redundancy, a secondary steel cable shall be installed.
- C. Technical
  - 1. Frequency Response (-10 dB): 58 Hz – 18 kHz
  - 2. Frequency Range (3 dB): 78 Hz – 16 kHz
  - 3. Power Capacity: 75 Watts continuous pink noise; 150 watts continuous program
  - 4. Sensitivity (dB @ 2.83 V/1 m): 90.0 dB
  - 5. Nominal Coverage Angle: 120 degrees
  - 6. Directivity (Q): 5.7
  - 7. Directivity Index (DI): 7.5 dB

8. Max SPL @ 1 m: 109.0 dB
9. Transformer Taps: 70V – 60W, 30W, 15W, 7.5W
10. Transducer
  - a. Low-Frequency Driver: 6.5 inch polypropylene-coated paper with pure butyl rubber surround, 1 inch copper voice coil, vented fiberglass resin voice coil-former
  - b. High-Frequency driver: 1.0 inch textile soft-dome, neodymium magnet assembly, ferro-fluid cooling, aluminum voice coil former.
11. Regulatory: UL 1480

- D. The Speakers and all hanging hardware shall be black in color.
- E. The Speaker shall include all required hanging hardware. The Contractor shall provide and install structural bracing as necessary to fly the Speaker in the correct location for proper sound reinforcement of the floor area being covered.
- F. The Contractor shall field verify the mounting of the speakers so that they are coordinated with other installed equipment within the space.

G. Manufacturers

1. Basis of Design
  - a. JBL Control 321CT 12" Coaxial Ceiling Loudspeaker with HF Compression Driver
2. Acceptable Substitutions
  - a. Soundtube Entertainment HP129a High-Power Speaker

2.19 SPEAKERS (CONFERENCE CENTER)

- A. The Speaker shall consist of an 8" full range, point source, constant directivity dual concentric transducer and passive frequency dividing network mounted in a vented, injection molded, paintable front baffle in UL94V-0 ABS material.
- B. The back can shall be constructed of zinc plated steel. A recessed termination box shall be integrated with the back can, a removable locking connector with screw terminals for secure wire termination with loop through facility shall be provided. Strain relief shall be provided by a clamping mechanism for use with plenum rated cable or conduit.
- C. Performance of the Speaker shall meet or exceed the following criteria:
  1. The Speaker shall have a conical coverage pattern of 100 degrees (1kHz to 6 kHz).
  2. Frequency response measure on axis shall be 40 Hz – 34 kHz (-10 dB from rated sensitivity, measured in an IEC baffle in an anechoic chamber) with no equalization.

3. Sensitivity shall be 92 dB (1W @ 1m).
  4. Long term power handling capacity as defined in EIA-426B test shall be 90W, recommended amplifier power 180W. Dynamic high frequency protection shall be provided for occasional overpowering.
  5. The nominal system impedance shall be 8 Ohms (in low impedance setting).
- D. The Speaker shall be equipped with a 60W high performance line transformer for use in 70.7 and 100 V distributed audio systems with 60, 30, 15, and 7.5 Watt taps available. An easily accessible rotary switch located on the front baffle shall be available for selecting transformer and low impedance settings. A weather resistant perforated steel grille shall cover the transducer and switch.
- E. Two support rails and one C-ring shall be included with the Speaker.
- F. Manufacturers
1. Basis of Design
    - a. Tannoy CMS 801DC Ceiling Speaker Assembly
  2. Acceptable Substitutions
    - a. JBL

## 2.20 CABLE

- A. Microphone Cable:
1. Two (2) conductor, 20 (19 x32) AWG, high-strength custom alloy, TV braid shield (85% coverage), 11.5 ohm per 1000 feet, EPDM jacket with nominal O.D. of .262 inch.
  2. Manufacturers
    - a. Basis of Design:
      - 1) Belden #1776 Microphone Cable or acceptable substitution
- B. Line Level Cable:
1. The speaker cable shall be a power-limited type suitable for sound and audio applications.
  2. Two (2) conductor, 22 AWG Solid, tinned copper, 17.5 ohm per 1000 feet, overall 75 degree PVC jacket with a nominal O.D. of .118 inch, 22 AWG solid drain wire. UL Listed NEC Type CM; constructed in accordance with UL Standard 444; complies with UL 1581 Vertical Tray Flame Test; meets 300 volt requirements as specified in Section 800-51 of the NEC.
  3. Manufacturers:
    - a. Basis of Design
      - 1) West Penn #450

b. Acceptable Substitutions

- 1) Belden
- 2) CommScope

C. Speaker Cable:

1. The speaker cable shall be a power-limited type suitable for sound and audio applications.
2. Two (2) conductor minimum 16 AWG, UL Listed NEC type CL2, complying with UL 1581 Vertical Tray Flame Test, bare copper, nominal DCR of 4.2 Ohms per 1000 feet, with PVC insulation with nylon, and short overall twist lengths.
3. The Contractor shall increase the size of speaker cables as necessary for the connected speaker load.
4. Manufacturers

a. Basis of Design

- 1) West Penn #C205

b. Acceptable Substitutions

- 1) Belden
- 2) CommScope

D. Category 6 Cable

1. Category 6 cable required for Audio Systems shall be provided and installed by the Audio System Installer. Refer to Section 16710 for cable specifications.

E. Fiber Optic Cable

1. Fiber Optic cable required for the Audio System shall be per Section 16751.
2. Microphone Input Plates

a. Stainless steel single-gang faceplates with quantity of XLR connectors as shown on the drawings.

b. Provide one (1) 25 foot microphone cable for each jack.

c. Manufacturers

1) Basis of Design

- a) Atlas Soundolier

2) Acceptable Substitutions

- a) Pro Co Sound
- b) Whirlwind

PART 3 - EXECUTION

3.1 COMPLY WITH REQUIREMENTS OF SECTION 16701

3.2 GENERAL

- A. Equipment and materials shall be installed in accordance with manufacturer's installation instructions.
- B. The Vendor shall tune the installed system for the room being utilized. Accessories required to achieve this response are to be considered a part of the contract.
- C. Upon completion, the system shall be clean and in good operating condition. There shall be no evidence of audible components of hum, noise or distortion.
- D. Loudspeaker grills shall be installed with hardware matching the color of the grills, Grill color to match ceiling color.
- E. Loudspeaker grills shall be flush against the ceiling and enclosures shall be supported from the structure above.
- F. Infrared receivers shall be mounted on the ceiling to a flush outlet box.

3.3 TESTING

- A. Comply with the requirements of Section 16701.
- B. Sound Reinforcement Systems
  - 1. Equalization
    - a. The purpose of the equalization is to adjust the acoustic amplitude response of the Audio system to a specified uniformity measured throughout the entire audience area. This adjustment is made to realize maximum acoustic gain and optimum tonal balance from the Audio system throughout the audience area and stage monitoring area.
    - b. Instrumentation: Provide the following minimal standard laboratory test equipment. Any substitutions or additions to the following list must be accepted by the Designer.
      - 1) Impedance Bridge.
      - 2) Audio Oscillator.
      - 3) Random-noise generator.
      - 4) Precision sound level meter.
      - 5) Octave real-time audio frequency analyzer.
      - 6) Oscilloscope.
      - 7) Sound level calibrator.
      - 8) Master equalizer set with broad band (i.e. full octave) and narrow band (i.e. 1/3 octave), high-pass, and low-pass filters, plus comparator switch and attenuator.
      - 9) Digital camera.
    - c. Inspection of Audio System Prior to Equalization:



- 1) Prior to undertaking equalization of the Audio System, perform the following inspections on the Audio System, and submit to the Designer the written results of each inspection for inclusion on the permanent records of the Audio System.
  - 2) Measure and record the impedance of each loudspeaker line before connecting it to the output of its respective amplifier. The load impedance shall be equal to or greater than the rated impedance. Record the total impedance.
  - 3) Measure and record the output impedance of each active device operating as a source to any passive device or series of passive devices. Record the dc resistance of any buildout resistor used.
  - 4) Measure and record the input impedance of any active device used to terminate passive devices, and record the total impedance of all such devices. Record the dc resistance of any terminating resistor used.
  - 5) Measure and record the acoustic distribution of the loudspeakers in the Audio System throughout the entire seating area. Record the location of all positions in the seating area where any 1/3 octave band, from 250 to 5000 Hz. deviates more than 3 dB from the desired house curve.
  - 6) Measure and record the polarity of all microphones to be used in the system.
  - 7) Measure and record, with an oscilloscope, the output of each power amplifier. The input source to each amplifier being measured shall be a sinewave oscillator with less than 0.5% THD adjusted to 10 dB less than full power output of the amplifier. Inspect the output sinewave appearing on the oscilloscope of complete freedom from hum, noise, parasitic oscillation and RF interference.
  - 8) Measure and record the frequency response of each mixer preamplifier and power amplifier in the system.
- d. Microphone Proximity Instability: Suppress the tendency of the Audio System microphone to become unstable when approached by a talker. Identify the 1/3 octave band affected by the approach of a person, and provide enough attenuation to ensure stability. Records shall be made of additional attenuation provided.
2. Documentation of Tests, Measurements, and Adjustments Performed:
- a. List of personnel and certified test equipment used.
  - b. Impedance of all loudspeaker lines.
  - c. Output impedance of all active sources connected to passive devices and the value of any buildout resistor used.
  - d. The input impedance of all active devices used to terminate passive devices and the value of any termination resistor used.
  - e. The variation of acoustic distribution throughout the seating area above and below a reference level at each 1/3 octave center frequency from 20 to 5000 Hz.
  - f. The recorded polarity of the loudspeakers.

- g. The documented information for all settings in the audio mixer / processor.
- h. The list of microphones tested.
- i. The recorded inspection results observed for hum, noise, parasitic oscillation, and RF interference from the output of each power amplifier.
- j. All DSP settings.

END OF SECTION 16741



BASE AS SCHEDULED

SEALANT

CARPET AS SCHEDULED

3/4" FIRE-RETARDANT  
TREATED PLYWD

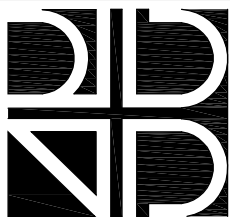
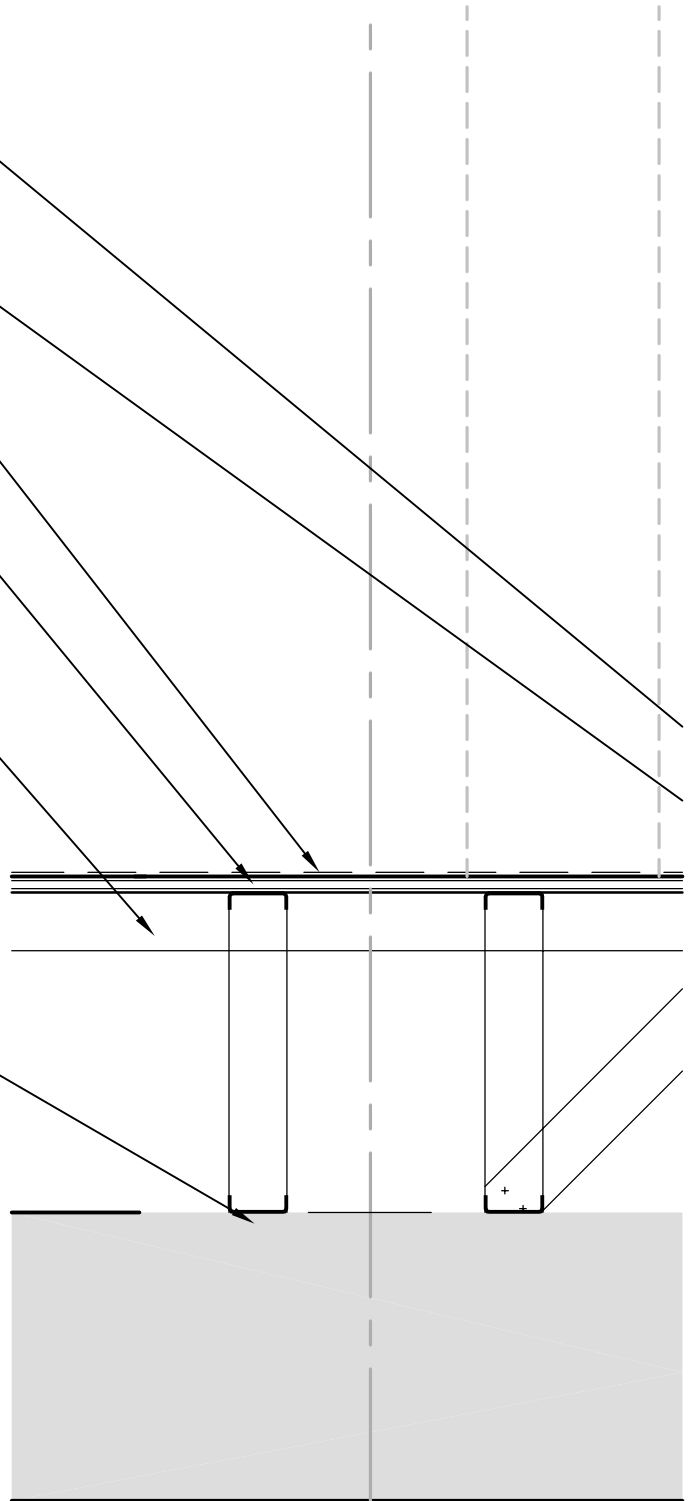


MTL STUD FRAMING -  
PROVIDE BRACING AS  
REQUIRED FOR A RIGID  
STRUCTURE

EL 101'-9"  
FIN FLR PLATFORM

EXISTING CONCRETE SLAB  
AND BEAM

EL 100'-0"  
PROJ FIN FLR



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601 N. MAGNOLIA AVENUE SUITE 100  
ORLANDO, FL 32801



Orange County Government  
Orange County Convention  
Center  
Destination Lounge  
Orange County, FL  
Capital Planning Division  
9400 Universal Blvd, Orlando, FL 32819

Sheet Ref: A1/A451  
Submittal: Addendum No01

REVISION NO:	1
REV DATE:	08-01-2014
PROJECT NO:	12002-0011
SCALE:	1" = 1'-0"
DRAWN:	DVL
CHECK:	MB

Add01-SKa02

EXISTING WINDOW  
TO REMAIN - TYP

VCT AS SCHEDULED

3/4" FIRE-RETARDANT  
TREATED PLYWD

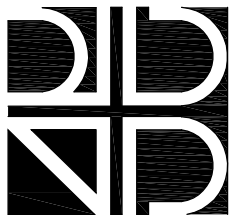
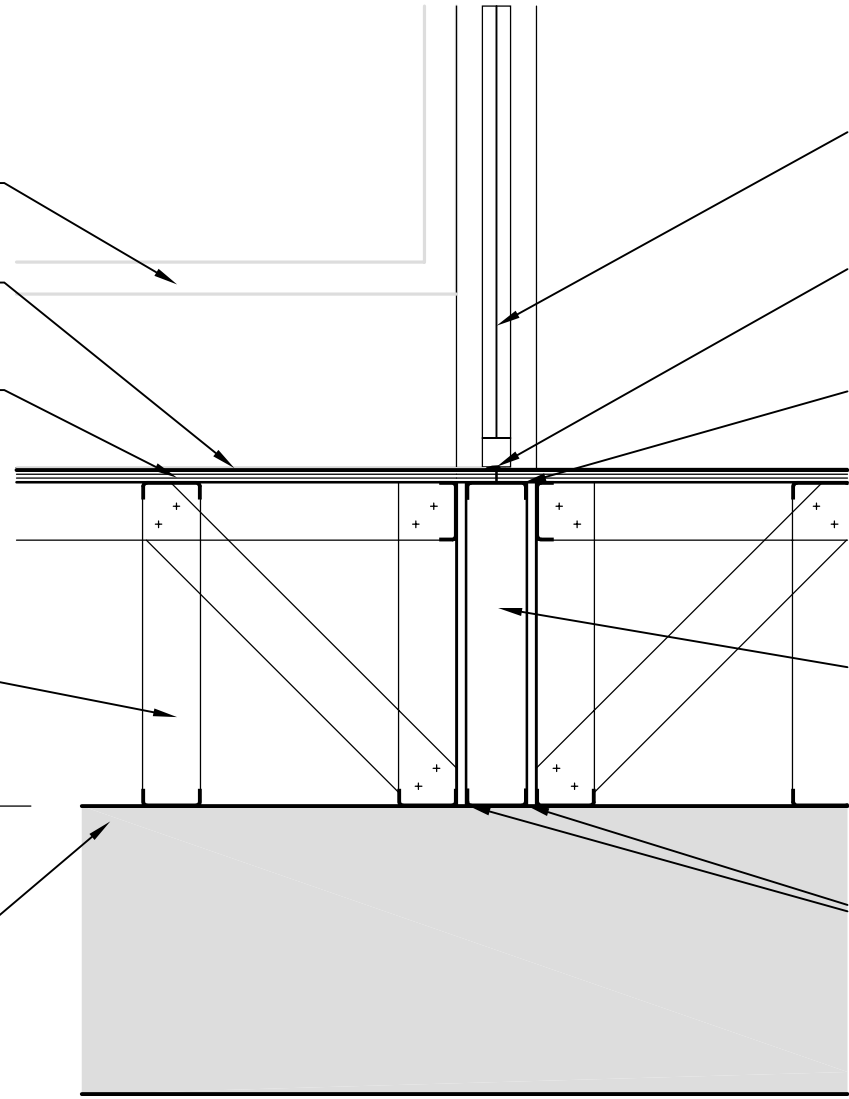


EL 101'-9"  
FIN FLR PLATFORM

MTL STUD FRAMING -  
PROVIDE BRACING AS  
REQUIRED FOR A  
RIGID STRUCTURE

EL 100'-0"  
FIN FLR

EXISTING CONCRETE  
SLAB AND BEAM



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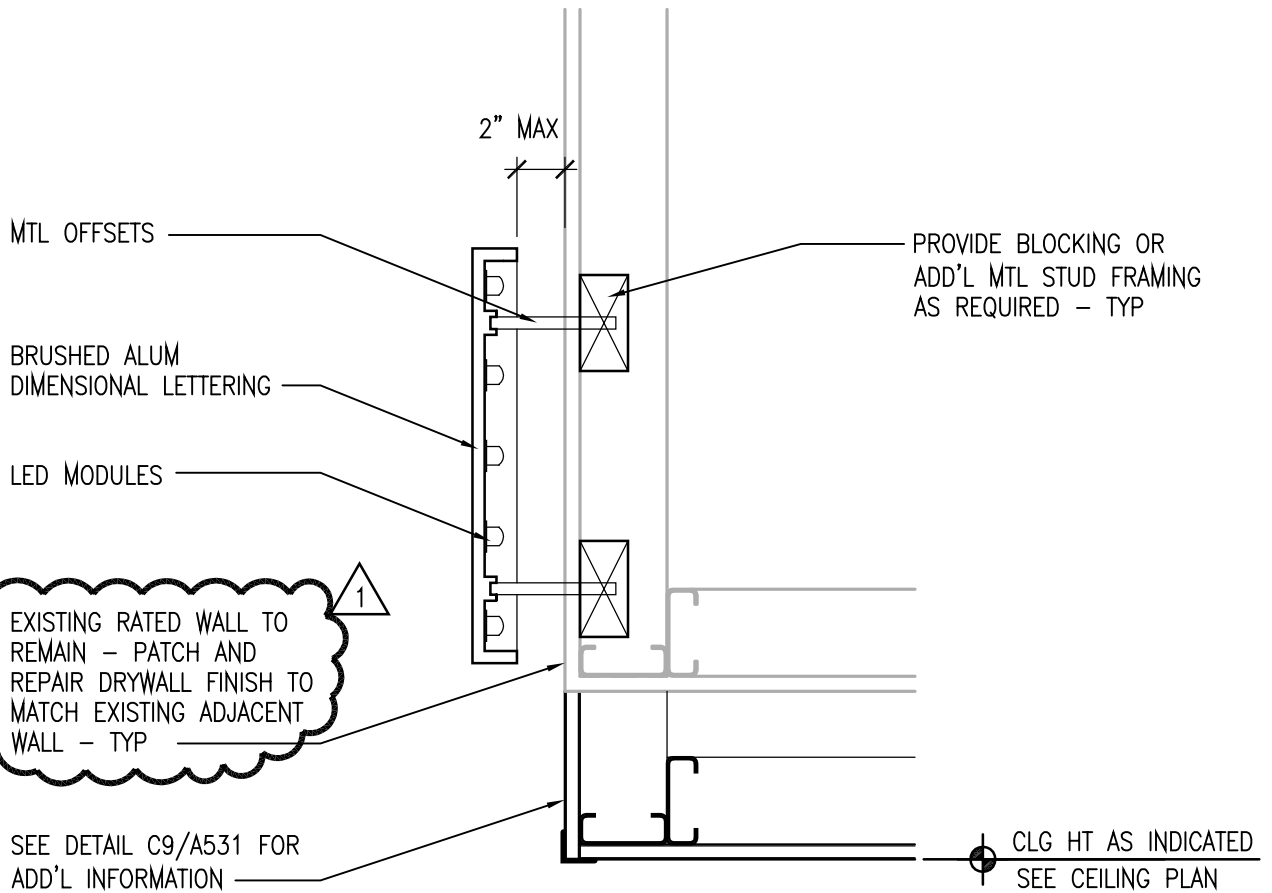


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Sheet Ref: A9/A451  
Submittal: Addendum No01

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PROJECT NO:	12002-0011
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CHECK:	MB

Add01-SKa03

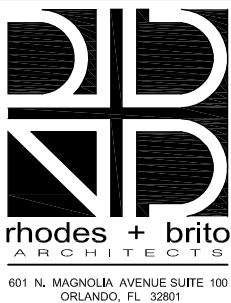


NOTE:  
SEE SHEET A701 FOR  
FULL SIGN INFORMATION

A5  
A531

## Entry Signage Mounting Detail

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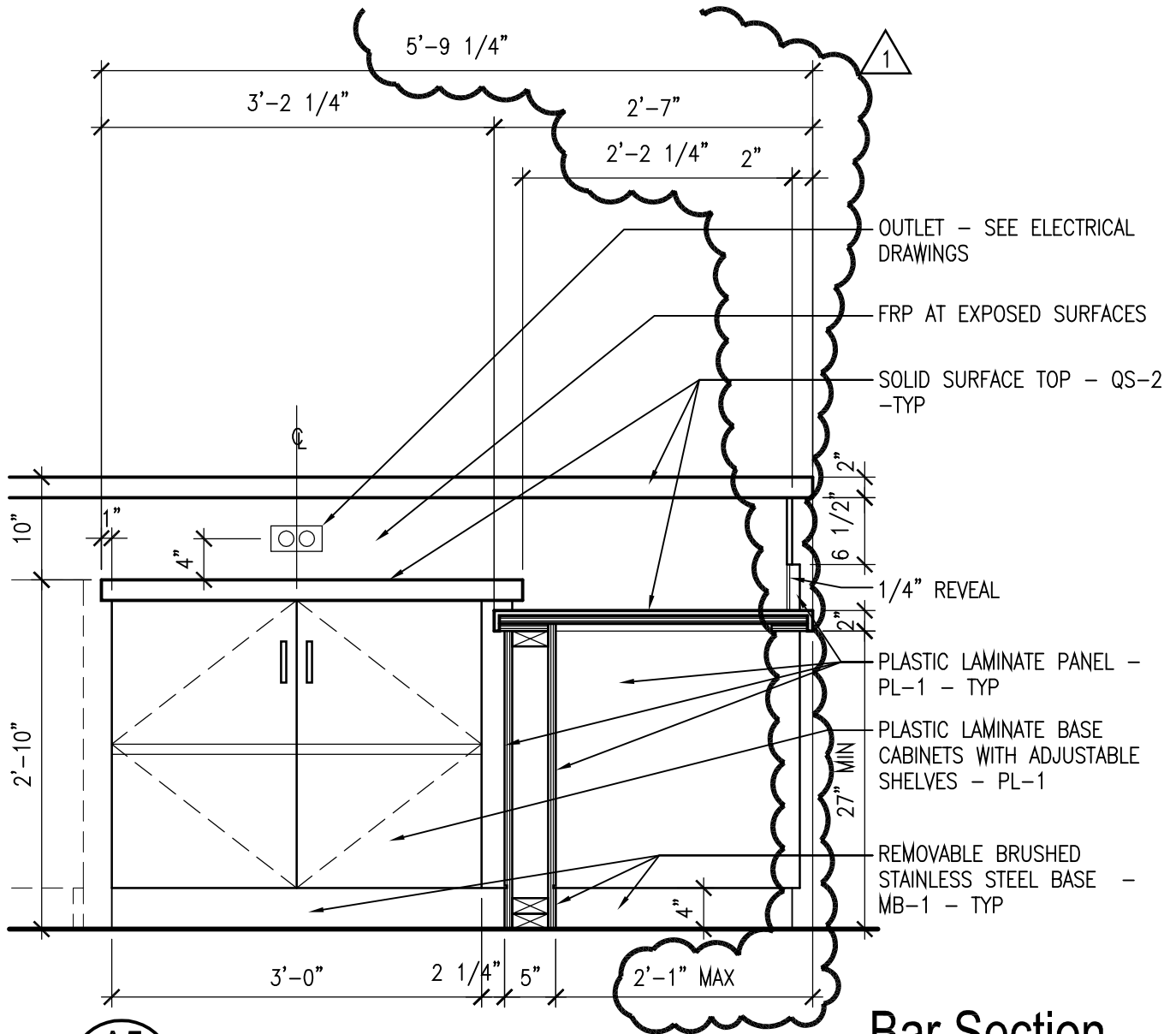


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REV DATE:	08-01-2014
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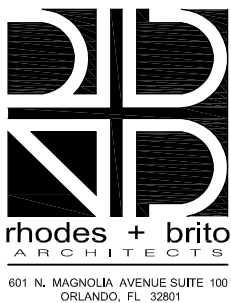
Add01-SKa04



# Bar Section

scale: 3/4" = 1'-0"

A5  
A801



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PROJECT NO:	12002-0011
SCALE:	AS NOTED
DRAWN:	DVL
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Sheet Ref: A5/A801  
Submittal: Addendum No01

Add01-SKa05



— MONITOR – SEE TECHNOLOGY DRAWINGS  
 ALTERNATE No 02: MONITORS AND MONITOR MOUNTING BRACKETS

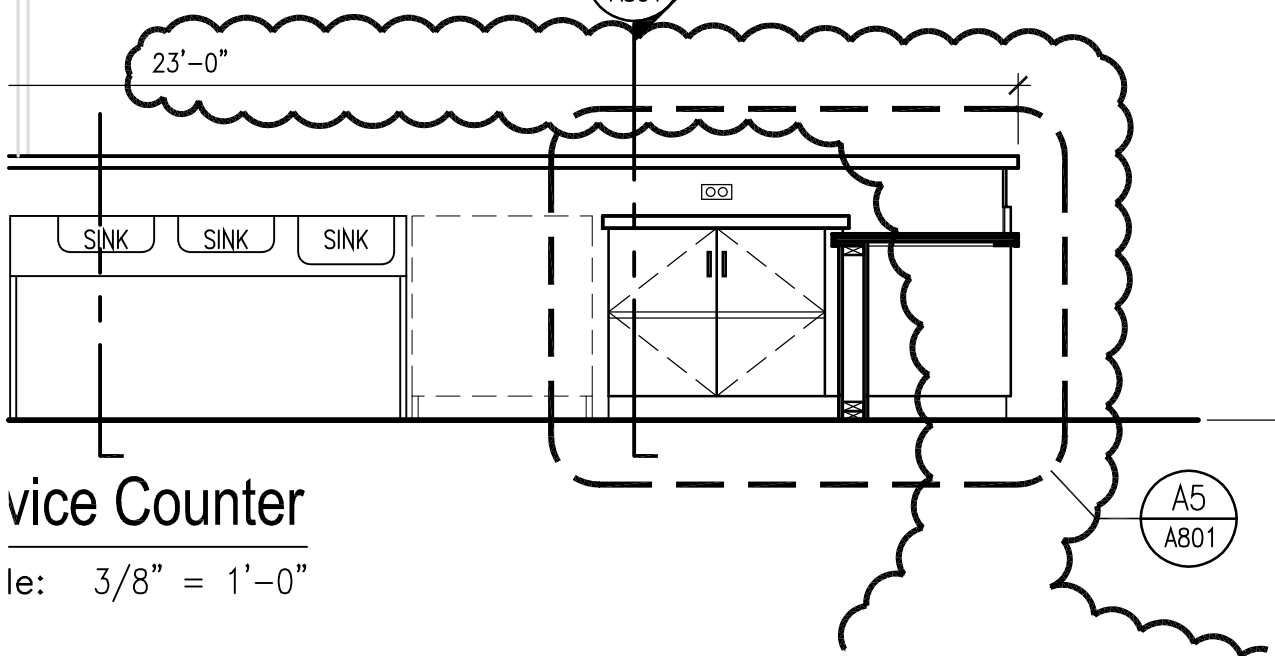
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— BAR EQUIPMENT – OWNER PROVIDED AND INSTALLED BY CONTRACTOR – NIC

— FRP AT EXPOSED SURFACES

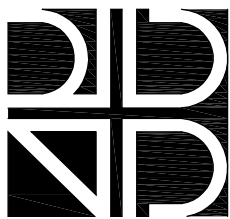
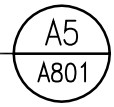


23'-0"



**vice Counter**

le: 3/8" = 1'-0"



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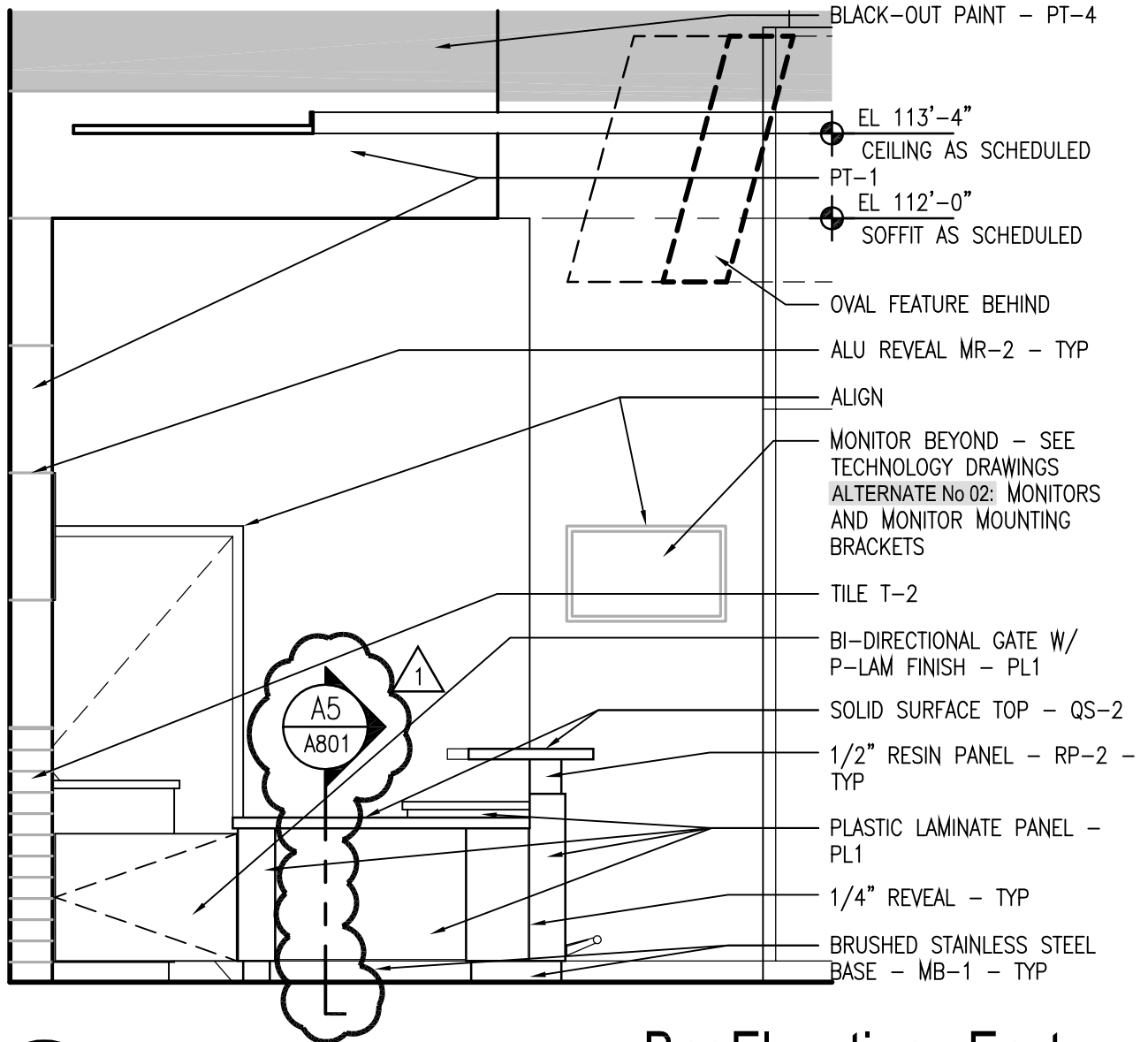
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 Orange County Convention Center  
 Destination Lounge  
 Orange County, FL  
 Capital Planning Division  
 9400 Universal Blvd, Orlando, FL 32819

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 Submittal: Addendum No01

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Add01-SKa06

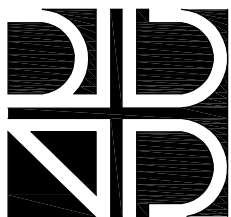




G1  
A801

## Bar Elevation - East

scale: 3/8" = 1'-0"



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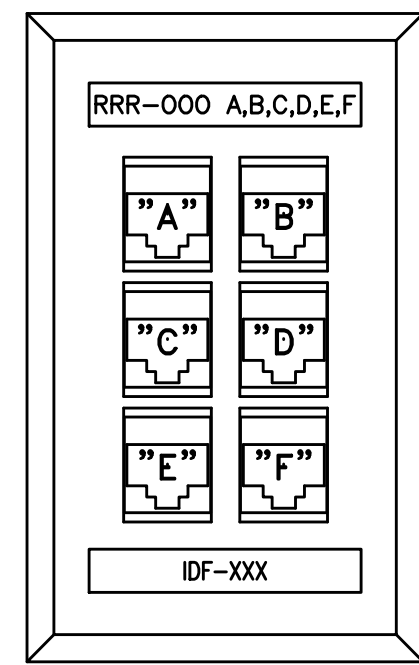
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Submittal: Addendum No01

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PROJECT NO:	12002-0011
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CHECK:	MB

Add01-SKa07

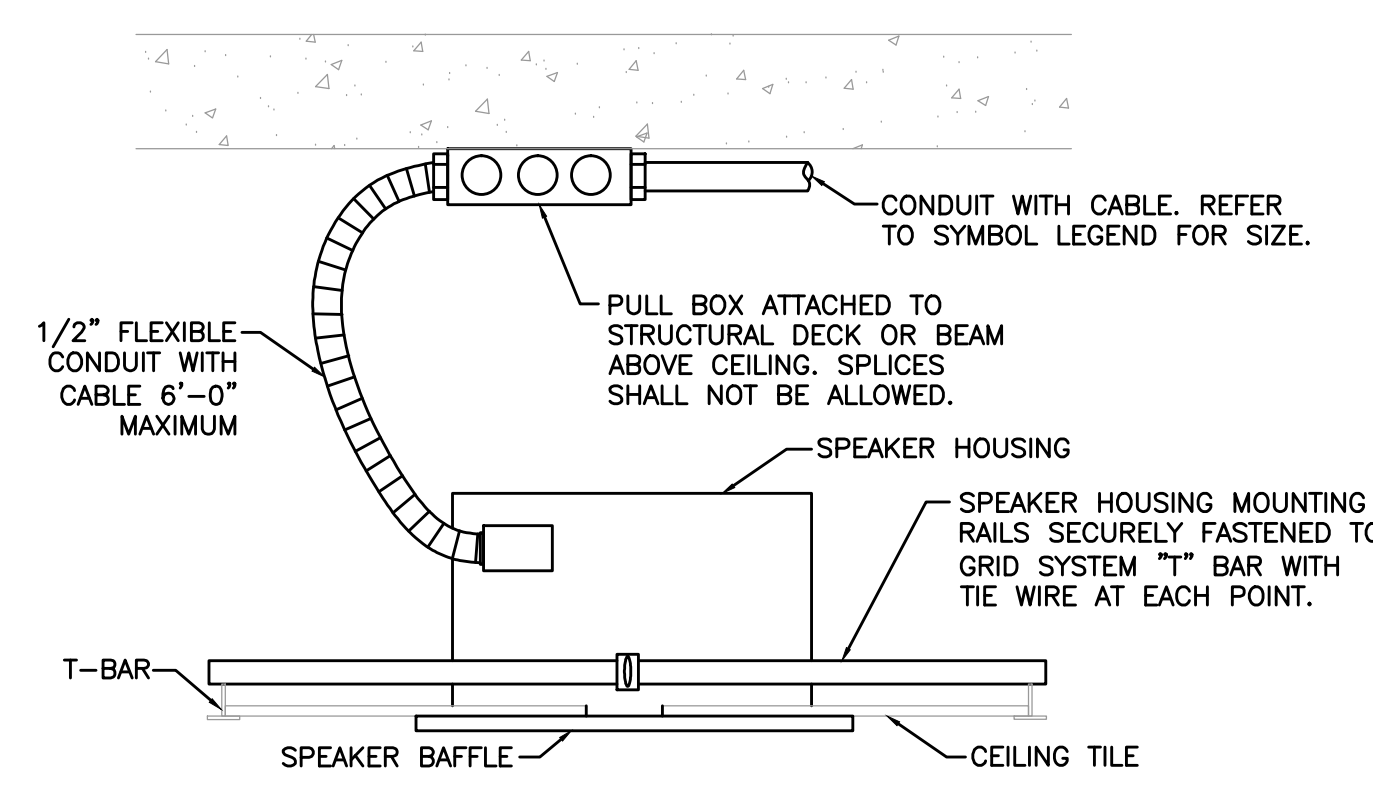
**LABELING KEY**  
 RRR: ROOM #  
 000: "OUTLET #"  
 A-F: "JACK POSITION"  
 XXX: "IF WHERE CABLES ARE TERMINATED"

**LABELING**  
 NO HANDWRITTEN LABELS ARE ALLOWED TO NOT REMOVE ADHESIVE BACKING FROM TYPICAL LABEL PRINTERS. INSERT UNDER CLEAR LENS TO AND BOTTOM OF OUTLET AS SHOWN.

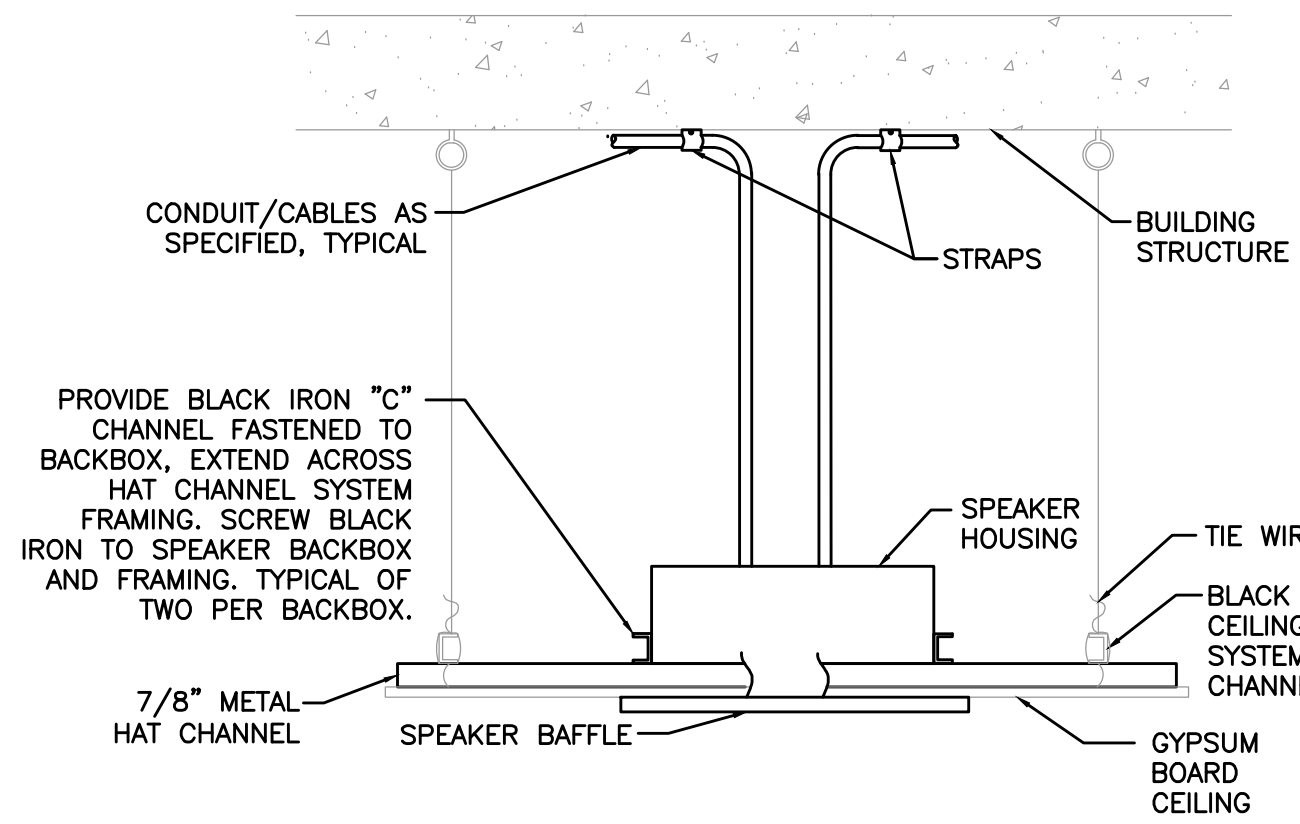


EACH OUTLET TO HAVE QUANTITY OF JACKS AS SHOWN ON FLOOR PLAN. PROVIDE AND INSTALL BLANKS FOR UNUSED POSITIONS.  
 EACH OUTLET SHALL BE INSTALLED WITH CAT5 CABLE AND HARDWARE. PURPLE LAN BEZELS SHALL BE INSTALLED. ALL COMPONENTS SHALL BE CAT5 COMPLIANT. WIRE FOR 568A CONFIGURATION.  
 EACH JACK SHALL BE CABLED WITH (1) VIOLET CAT5 CABLE.  
 EACH OUTLET SHALL HAVE (1) 1" MINIMUM CONDUIT STUBBED UP ABOVE FINISHED CEILING.

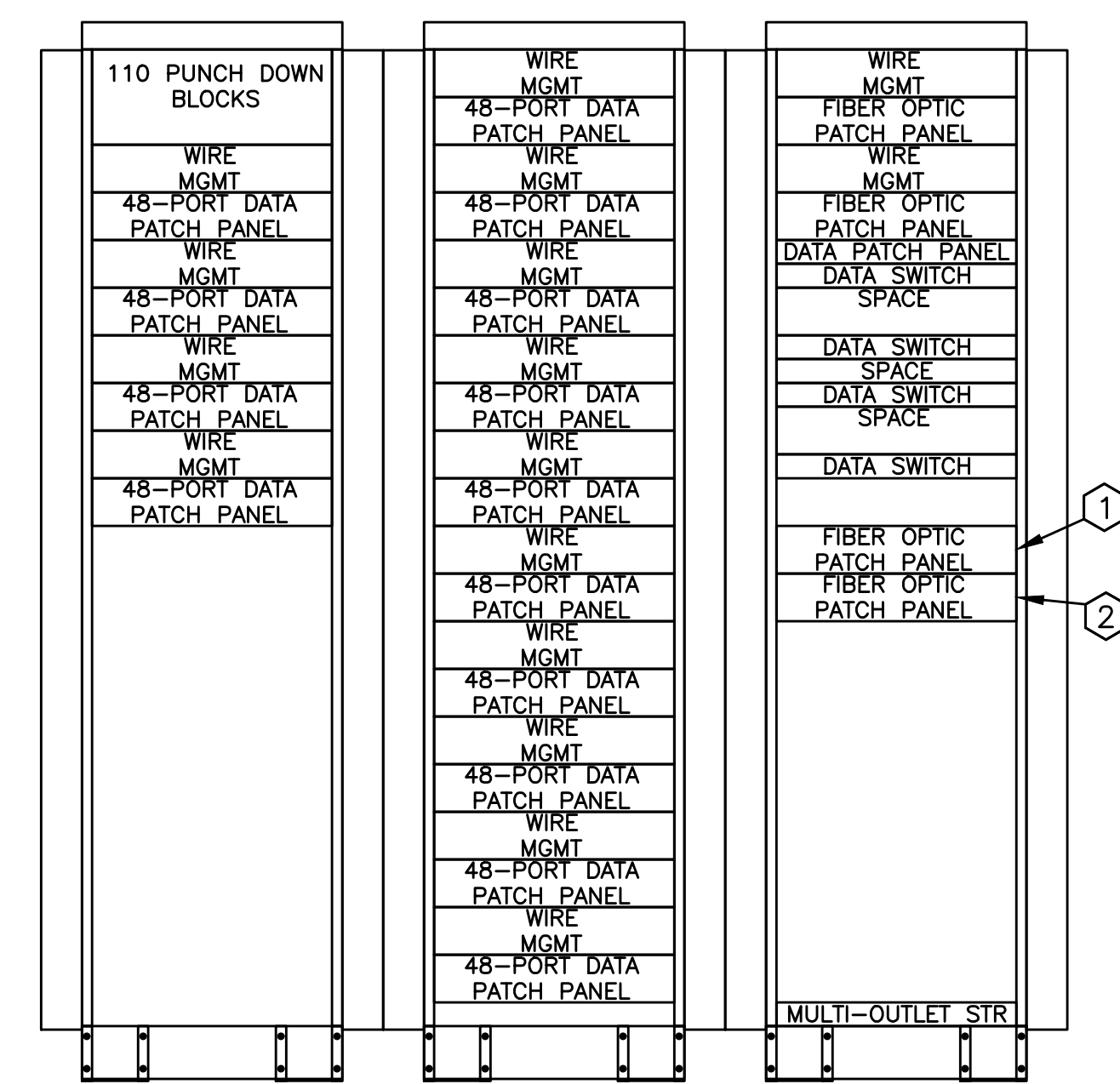
**1 VOICE/DATA FACEPLATE**  
 SCALE: NTS



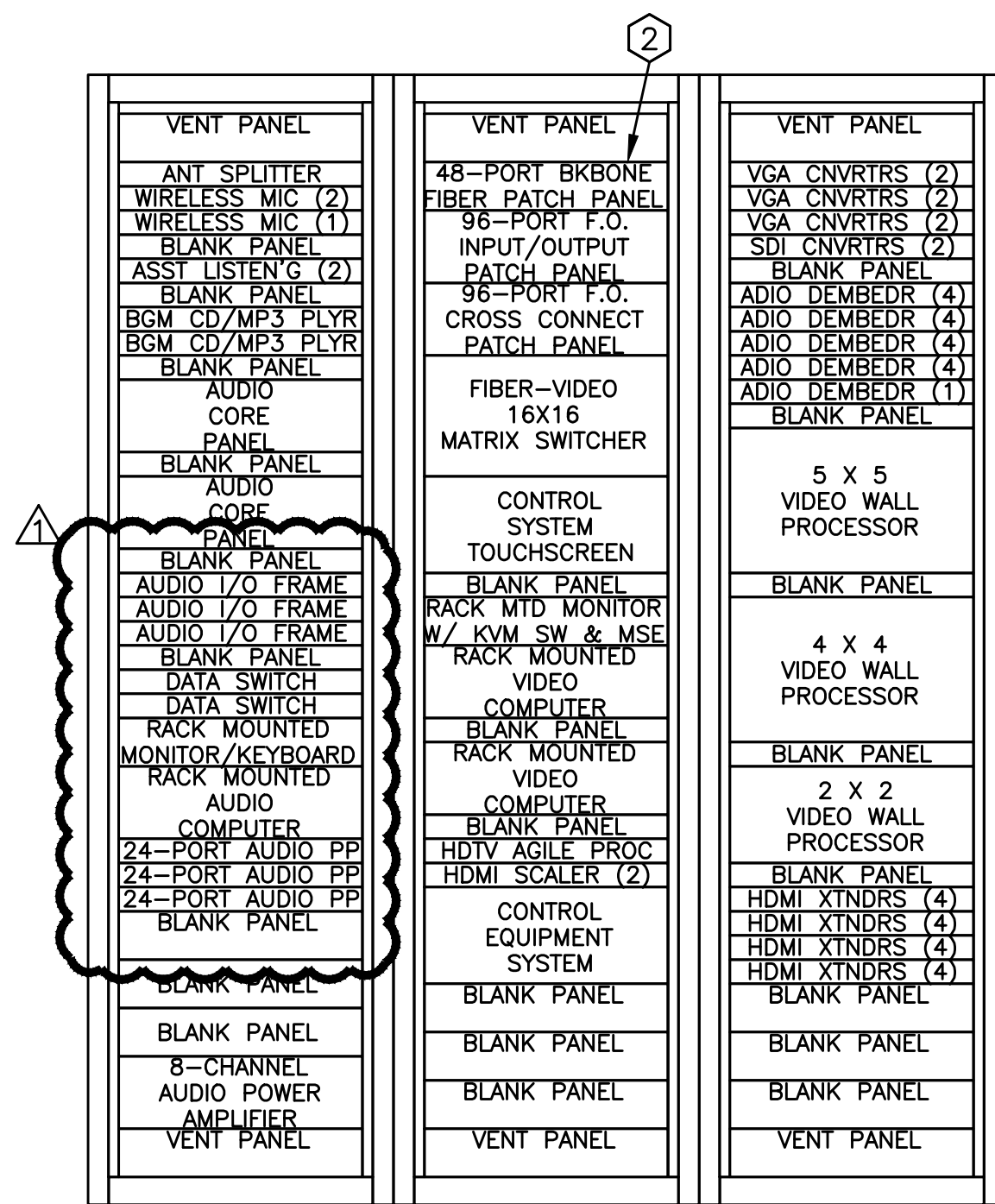
**2 SPEAKER INSTALLED IN ACCESSIBLE CEILING**  
 SCALE: NTS



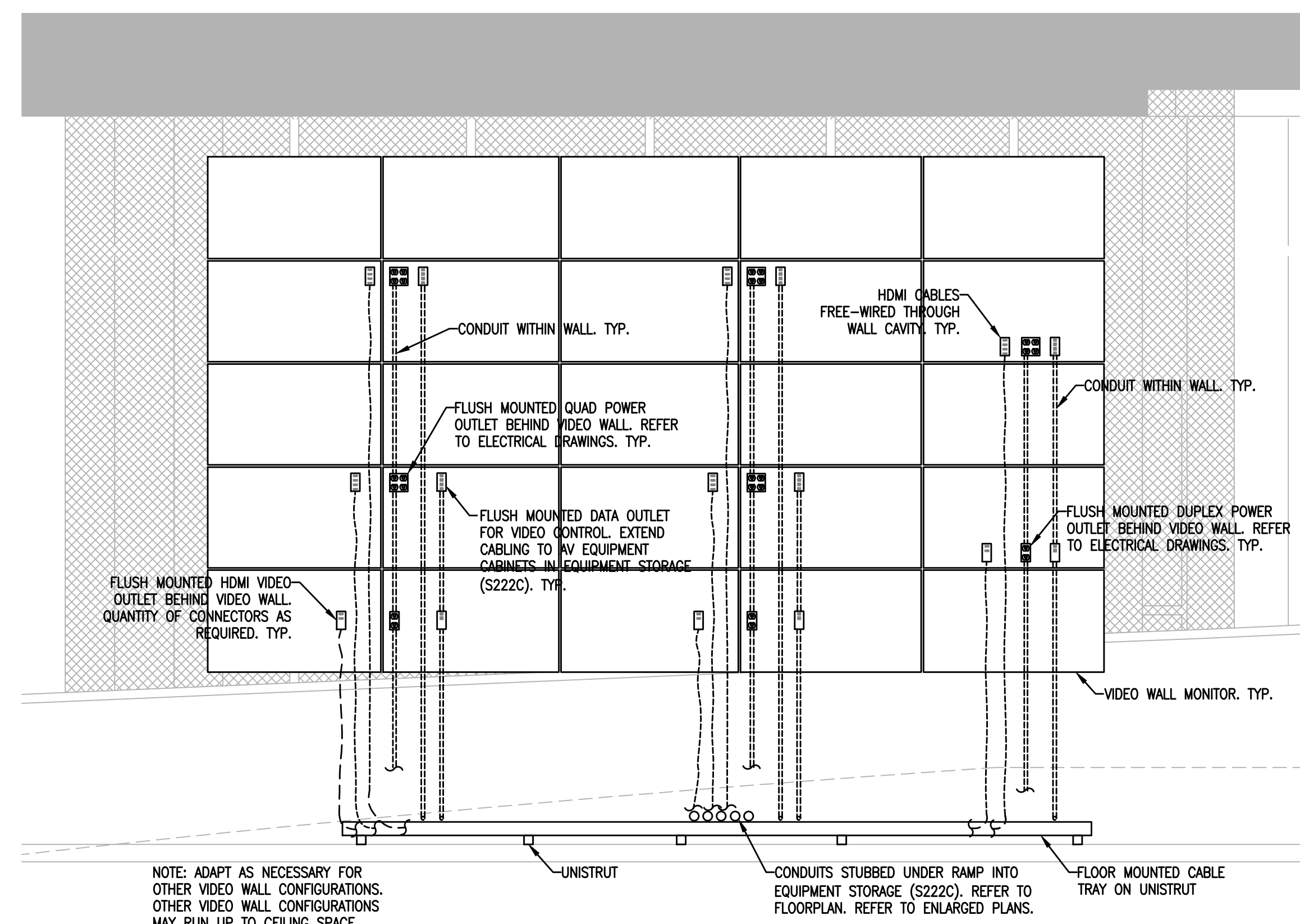
**3 SPEAKER INSTALLED IN INACCESSIBLE CEILING**  
 SCALE: NTS



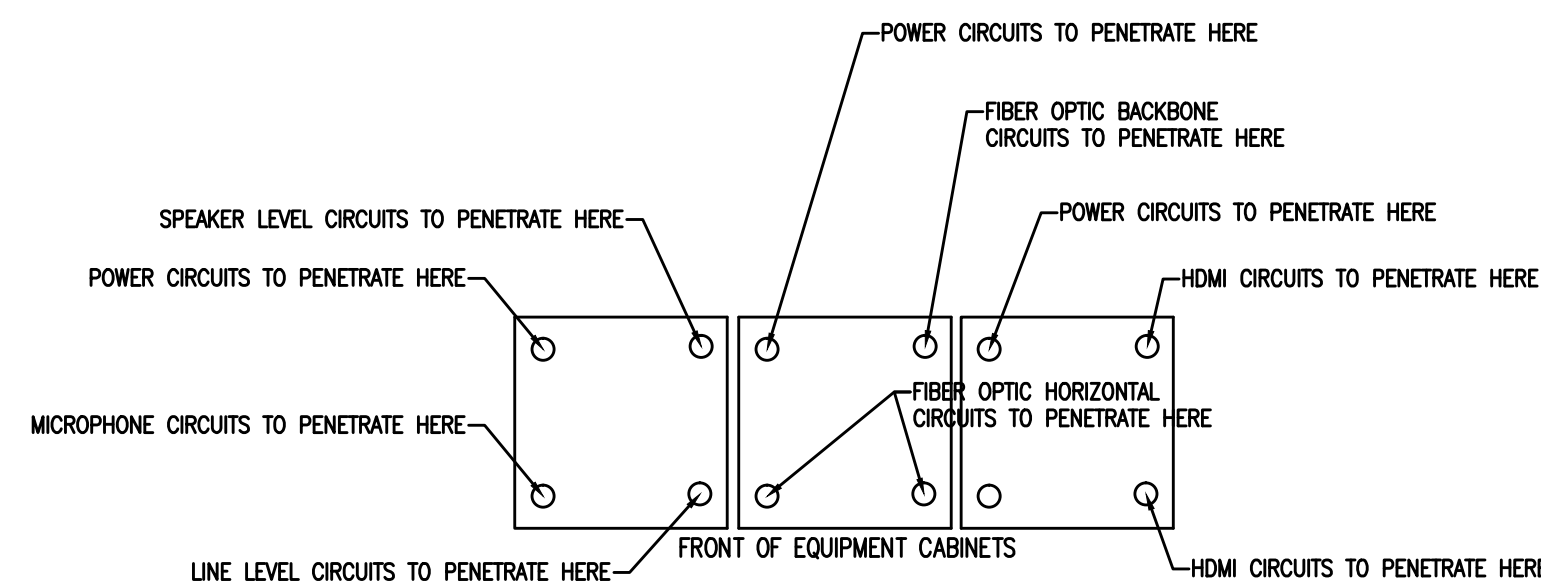
**4 VOICE/DATA EQUIPMENT RACK DETAIL**  
 SCALE: NTS



**5 AUDIO/VIDEO EQUIPMENT CABINET DETAIL**  
 SCALE: NTS

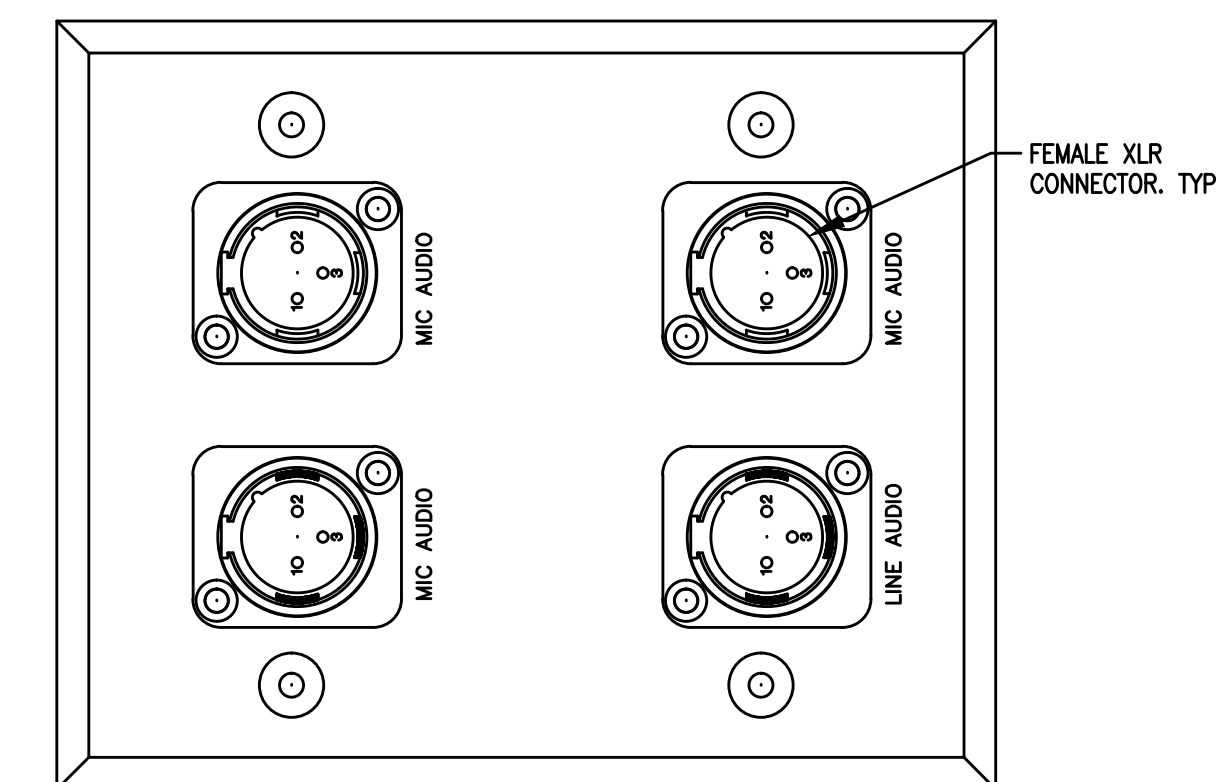


**6 VIDEO WALL CONFIGURATION DETAIL**  
 SCALE: NTS



NOTE: INFORMATION SHOWN IS TO PROVIDE A GENERAL INDICATION OF HOW THE VARIOUS AUDIO, VIDEO, AND POWER CIRCUITS ARE TO BE KEPT SEPARATE. THE CONTRACTOR SHALL AS PART OF HIS SHOP DRAWINGS PROVIDE DETAILED INFORMATION ON HOW HE INTENDS TO ACTUALLY INSTALL THE VARIOUS CIRCUITS AND MAINTAIN THE NECESSARY SEPARATION BASED ON THE EXACT QUANTITY OF CABLES TO BE INSTALLED.

**7 AUDIO/VIDEO CABINET CIRCUIT SEPARATION DETAIL**  
 SCALE: NTS



**8 MIC/LINE OUTLET FACEPLATE**  
 SCALE: NTS

- GENERAL NOTES**
- REFER TO TELECOMMUNICATIONS GENERAL NOTES ON SHEET T001.
- HEX NOTES**
- PROVIDE AND INSTALL ONE (1) 48-PORT FIBER OPTIC PATCH PANEL FOR TERMINATION OF NEW CABLE TO BUILDING MDF.
  - PROVIDE AND INSTALL ONE (1) 24-PORT FIBER OPTIC PATCH PANEL FOR TERMINATION OF NEW CABLE FROM IDF (261) TO EQUIPMENT STORAGE (S222C) IN DESTINATION LOUNGE.

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BID DOCUMENTS -  
 NOT FOR CONSTRUCTION

date	submission/revision	no.
05/28/2014	OC Purchasing Review	
08/01/2014	Addendum No. 01	

DETAILS - SYSTEMS

scale: As Shown  
 drawn: TAJ  
 check: LJT  
 date: JUNE 18, 2014  
 project no: 12002\_0011

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