June 7, 2016

ADDENDUM NO. 2

TO THE CONTRACT DOCUMENTS

FOR

CAJON HIGH SCHOOL - THEATER RENOVATION

FOR THE
SAN BERNARDINO CITY UNIFIED SCHOOL DISTRICT
777 North F Street
San Bernardino, CA 92410

DSA No. 04-114799 File No. 36-H7

NOTICE TO BIDDERS

This Addendum forms a part of the Contract and modifies the original documents dated April 2016. It is intended that all work affected by the following modifications shall conform with related provisions and general conditions of the contract of the original drawings and specifications. Modify the following items wherever appearing in any drawing or sections of the specifications. Acknowledge receipt of Addendum No. 2 in the space provided on the Bid Form. Failure to do so may subject bidder to disqualification.

CHANGES TO THE SPECIFICATIONS

Item No. 2.1 Reference Section 06 61 13 - Composite Wood:
2.1.1 Delete Section 06 61 13 in its entirety.

Item No. 2.2 Reference Section 07 21 00 - Thermal Insulation:
2.2.1 Paragraph 1.02.C, revise to read:
Section 07 52 00 - Modified Bituminous Membrane Roofing: Insulation specified as part of roofing system.

Item No. 2.3 Reference New Section 07 42 23 - Wood Composite Wall Panels:
2.3.1 Add attached new Section 07 42 23 in its entirety.

Item No. 2.4 Reference Section 07 46 45 - Fiber Reinforced Hybrid Siding:
2.4.1 Delete Section 07 46 45 in its entirety.

Item No. 2.5 Reference New Section 07 52 00 - Modified Bituminous Membrane Roofing:
2.5.1 Add attached new Section 07 52 00 in its entirety.

Item No. 2.6 Reference Section 07 54 00 - Thermoplastic Membrane Roofing:
2.6.1 Delete Section 07 54 00 in its entirety.

Item No. 2.7 Reference Section 07 62 00 - Sheet Metal Flashing and Trim:
2.7.1 Paragraph 1.02.C, revise to read:
Division 7 - Thermal and Moisture Protection: Roofing System.

Item No. 2.8 Reference Section 08 71 00 - Door Hardware:

2.8.1 Add the following items to Hardware Group 8 (HW-8):

1	Mullion Seal	5110	BLK	PEM
1 SET	Door Seals	303S HEAD & JAMBS	628	PEM

Item No. 2.9 Reference Section 26 55 61 - Stage Lighting:

2.9.1 Add attached Section 26 55 61 in its entirety. Section was missing from specifications due to a scanning/printing error.

CHANGES TO THE DRAWINGS

Item No. 2.10 Reference Sheet T-2:

2.10.1 Omit note regarding Site Mockup for testing for exterior wall panel. This material omitted per this addendum. Reference new section 07 42 23 for additional information on system.

Item No. 2.11 Reference Sheet AD-2.2:

2.11.1 Replace Sheet AD-2.2 in its entirety per attached.

Item No. 2.12 Reference Sheet AD-6.0:

2.12.1 Replace Details 17 and 19 per attached Sketch ASK-2.1.

Item No. 2.13 Reference Sheet TL-8.2.1:

2.13.1 Revise Network Port # for Booth Rail HR to be 35.36 per attached Sketch TLSK-3.

Item No. 2.14 Reference Sheet TL-8.2.3:

2.14.1 Revise Network Patch Panel Layout per attached Sketch TLSK-4.

Item No. 2.15 Reference Sheet TL-9.1.1:

2.15.1 Revise stage lighting control riser as shown per clouded areas of attached Sketch TLSK-1.

2.15.2 Replace Detail 2 Houselight Control Flow per attached Sketch TLSK-2.

ATTACHMENTS

General

Specifications 07 42 23, 07 52 00, 26 55 61

Sketches ASK-2.1, TLSK-1 thru TLSK-4

Sheets AD-2.2

END OF ADDENDUM NO. 2

_____

Roger Clarke, Principal

#C-21340

SECTION 07 52 00
MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Modified bituminous roofing membrane, conventional application.

B. Insulation, flat and tapered.

C. Deck sheathing.

D. Base flashings.

E. Roofing cant strips, accessories, and walkway pads.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood nailers and curbs.

B. Section 07 62 00 - Sheet Metal Flashing and Trim: Counterflashings, reglets.

C. Section 07 72 00 - Roof Accessories: Roof-mounted units.

D. Divisions 21, 22, & 23 - Mechanical: Piping penetrations, Plumbing vents and internal roof drains.

E. Divisions 26, 27, & 28 - Electrical: Conduit penetrations.

1.03 REFERENCE STANDARDS

A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.

B. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board; 2012.

C. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.

D. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.

E. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 2011.

F. ASTM D312/D312M - Standard Specification for Asphalt Used in Roofing; 2015.

G. ASTM D 1079 - Standard Terminology Relating to Roofing and Waterproofing; 2010

H. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012)e1.

I. ASTM D4601/D4601M - Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing; 2004 (Reapproved 2012)e1.

J. ASTM D6162/D6162M - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements; 2000a (Reapproved 2015).

K. ASTM E 108 - Standard Test Methods for Fire Tests of Roof Coverings; 2010a.

L. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011.

M. FM DS 1-28 - Wind Design; Factory Mutual Research Corporation; 2007.

N. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; National Roofing Contractors Association; Fifth Edition, with interim updates.

O. Western States Roofing Contractors Association (WSRCA): Published details and recommendations.

P. UL (DIR) - Online Certifications Directory; Underwriters Laboratories Inc.; current listings at database.ul.com.

Q. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

B. Cold Process Built Up Roofing – An asbestos free formulation of asphalt, solvent, thixotrope, mineral stabilizer and reinforcing fibers used as an interply adhesive.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of associated flashings and counterflashings installed by other sections.

B. Preinstallation Meeting: Convene minimum two weeks before starting work of this section.

1. Review preparation and installation procedures and coordinating and scheduling required with related work.

2. Notification: Two weeks prior to pre-application conference, inform District and Architect of scheduled roofing beginning and completion dates, such that District may arrange for independent inspection of roofing Work, and presence of independent testing and inspection agency at pre-application conference.

3. Attendance: Require attendance by Contractor's superintendent and other supervisory and quality control personnel having responsibility for roofing, supervisory personnel of roofing applicator and, if required for warranty provisions, representative of roofing products manufacturer.

a. Construction Manager, Architect's insurer, independent testing and inspection agency and Architect, if authorized by District, will attend.

b. Require attendance of installers of each component of related Work, including deck or substrate construction, rigid insulation, metal flashing, rooftop equipment, penetrations of roof deck, and other Work integral with or adjacent to roofing may attend.

c. If required, attendance shall include authorities having jurisdiction. Contractor shall verify requirement with authorities having jurisdiction and arrange for attendance.

d. Agenda:

1) Meeting purpose is to review Drawings and Specifications for suitability for application of roofing system.

2) Review application procedures and coordination required with related Work. Discuss changes and deviations from Drawings and Specifications, if any, recommended or required.
3) Walk roof areas to review and discuss substrate preparation including repair of unacceptable surfaces, roof drainage, penetrations, equipment curbs, and work performed by other trades, which require coordination with roofing system.
4) Review contract document requirements and submittals for roofing system, including roofing schedule, inspection and testing, and environmental conditions. Identify which governing regulations or insurance requirements will affect roofing system installation.
5) Discuss anticipated weather, as well as procedures for responding to unacceptable weather, including using temporary roofing. Temporary roofing, if necessary, will be added to scope of the Work by contract modification (change order or construction change directive), with acceptable adjustment in Contract Time and Contract Sum.
6) Document discussions in writing, including actions required, and distribute copy of report to each meeting participant.
7) Attendance by Construction Manager, Architect and independent testing and inspection agency shall not relieve Contractor of sole responsibility for means, methods, techniques and sequence of construction, in accordance with provisions of the Conditions of the Contract.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog data for membrane and bitumen materials, base flashing materials and surfacing.

1. CHPS Submittal: Include testing documentation of solar reflectance index.

C. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, and mechanical fastener layout.

1. Base flashings, cants, and membrane terminations.

2. Tapered insulation, including slopes.

3. Crickets, saddles, and tapered edge strips, including slopes.

D. Samples: Submit two samples 8 by 8 inches in size illustrating granule surfaced sheet, colored coated sheet, and insulation.

E. Certification required for existing buildings to be re-roofed per Chapter 3 of Part 1 of Division 2 of the Public Contract Code Section 1 Section 3006(b):

1. I, _____ (Name), _____ (Name of Employer), certify that I have not offered, given, or agreed to give, received, accepted, or agreed to accept, any gift, contribution, or any financial incentive whatsoever to or from any person in connection with the roof project contract. As used in this certification, “person” means any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals. Furthermore, I _____ (Name), _____ (Name of Employer), certify that I do not have, and throughout the duration of the contract, I will

not have, any financial relationship in connection with the performance of this contract with any architect, engineer, roofing consultant, materials manufacturer, distributor, or vendor that is not disclosed below.

I _____ (Name), _____ (Name of Employer), have the following financial relationships with an architect, engineer, roofing consultant, materials manufacturer, distributor, or vendor, or other person in connection with the following roof project contract:

_____

Name and Address of Building, Contract Date and Number

I certify that to the best of my knowledge, the contents of this disclosure are true, or are believed to be true.

_____ (Signature) _____ (Date)

_____ (Print Name)

_____ (Print Name of Employer)

2. Submit this certification to District, Construction Manager, and Architect.

F. Manufacturer's Qualification Statement.

G. Installer's Qualification Statement.

1. Applicator's Certification: Written documentation that applicator is certified by roofing manufacturer to install roofing systems to be provided for the Project as specified in this Section.

H. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1. Instructions and recommendations for application of roofing system, for each substrate and condition of the Project, with specific directions and recommendations for conditions of the Project for specified guarantee by manufacturer.

I. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

J. Manufacturer's Field Reports: Indicate procedures followed.

K. Warranty: Submit manufacturer warranty and ensure forms have been completed in District's name and registered with manufacturer.

L. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.07 QUALITY ASSURANCE

A. Comply with California Building Code and Title 24 Energy Code requirements

B. Roofing System shall be Energy Star Certified.

C. UL Classified Fire Rating - UL 790, Class A

D. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.

1. Maintain one copy on site.

E. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.

F. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years experience and approved by manufacturer.

G. Industry Standards: Work specified in this Section shall comply to manufacturer's product data and application instructions. Work shall also conform to recommended practices and details published in NRCA Roofing and Waterproofing Manual and the recommended practices and details of Western States Roofing Contractors Association (WSRCA), where such practices and details are more stringent.

H. Testing and Inspection: District's independent inspection and testing agency will perform inspections and tests of roofing work. Costs of this service will be paid for by District. Contractor shall cooperate with independent testing and inspection agency. Refer to general requirements specified in Section 01 40 00 - Quality Requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

B. Store products in weather protected environment, clear of ground and moisture; ballast materials may be stored outdoors.

C. Protect foam insulation from direct exposure to sunlight.

1.09 FIELD CONDITIONS

A. Temporary Roofing: Provide temporary roof membrane if necessary to protect portions of the Work before final roofing can be installed.

1. Remove temporary roofing before starting installation of final roofing system.

B. Do not apply roofing membrane when environmental conditions are outside the ranges recommended by manufacturer.

C. Do not apply roofing membrane during unsuitable weather.

D. Do not apply roofing membrane when ambient temperature is below 40 degrees F.

E. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

F. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a two year period after Date of Substantial Completion.

1. Special Project Warranty: Submit roofing Installer's warranty, on warranty form in Section 01 78 33 - Warranties and Bonds, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:

a. Warranty Period: Two years from date of Substantial Completion.

C. Provide twenty (20) year, No Dollar Limit (NDL), manufacturer's material and labor warranty to cover failure to prevent penetration of water.

1. Roofing system manufacturer shall, at the beginning of the second, fifth, tenth, fifteenth, and twentieth year of this warranty service agreement, provide the following service:
    a. An inspection by a manufacturer's representative and delivery of a written inspection report documenting roof conditions.
    b. Preventive maintenance and necessary repairs, including splits, tears, or breaks in the roof membrane system and flashings which threaten the integrity of the roof system and are not exempt due to neglect, negligence, vandalism, or some other exclusion. Include job progress photos.
    c. Contractor and roofing applicator shall agree to repair or replace all built-up asphalt roofing, membranes, flashings, counterflashing, reglets, copings and other elements essential to watertightness of roof, with no dollar limit on such corrections.
    d. General rooftop housekeeping and cleanup, subject to limits, but generally including removal of incidental debris.
2. Guarantee shall be in addition to, and not a limitation of, other rights the District may have under the Contract Documents.

D. Special Project Warranty: Submit roofing Installer's warranty, on warranty form in Section 01 78 00 - Closeout Submittals, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

A. SBS Cold applied built-up roofing, installed over non-nailable rigid insulation substrate, shall be provided as necessary for complete, weathertight installation conforming to actual conditions of new and existing construction.

B. Contract Drawings and Specifications:

1. Contract Drawings and Specifications are diagrammatic and of a general nature only.
2. Materials manufacturer's specifications for roofing and related flashings shall govern Work as if set forth herein, except as specifically indicated or where requirements that are more stringent are specified or required by authorities having jurisdiction.
3. All Work shall be completed as required to obtain specified warranty and guarantee.

C. Design Review:

1. Contractor, roofing applicator and materials manufacturer shall review Drawings and Specifications.
2. Provide from materials manufacturer written certification that selected roofing and flashing are proper, compatible and adequate for the Project and that conditions and

details indicated and specified do not conflict with requirements and recommendations of manufacturer.

2.02 PERFORMANCE REQUIREMENTS

A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. Roofing System Design: Provide a roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7.

1. Safety Factor: As required by code; minimum 2.0

2.03 MANUFACTURERS

A. Membrane Materials:

1. Basis of Design Product: White Top Coat as manufactured by Henry Company, or approved equal.
2. Firestone Building Products Co; www.firestonebpco.com.
3. GAF: www.gaf.com/sle.
4. Garland Company, Inc.: www.garlandco.com.
5. Henry Co.; www.henry.com.
6. Johns-Manville; www.specjm.com
7. Siplast: www.siplast.com.
8. Soprema USA; www.soprema.us.

B. Insulation:

1. Any insulaton as part of the tested and warrantable roofng system membrane assembly.
2. Atlas Roofing Corporation: www.atlasroofing.com.
3. Dow Chemical Company: www.dow.com.
4. GAF: www.gaf.com/sle.
5. Johns-Manville; www.specjm.com
6. Owens Corning Corporation: www.owenscorning.com.
7. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 COLD APPLIED ROOFING - CONVENTIONAL APPLICATION

A. Modified Bituminous Roofing: Two-ply membrane, plus cap sheet.

1. Metal Deck Assembly: (from the top down)
   a. Roofing Membrane
   b. Cover Board

c. Rigid Insulation, R-30 Minimum.
d. Roof Deck.

B. Roofing Assembly Requirements:
1. Solar Reflectance Index (SRI): 78, minimum, calculated in accordance with ASTM E1980, based on 3-year aged data.
a. Field applied coating may be used to achieve specified SRI.
2. External Fire Exposure Classification: ASTM E108 Class A, UL (FRD) listed.
3. Wind Resistance Classification: Factory Mutual I-90, in accordance with FM DS 1-28.
4. Insulation Thermal Value (R), minimum: 30; provide insulation of thickness required.
5. Surfacing: California Green Code (T24) compliant surfacing. Comply with California Title 24 Parts 6 and 11.

C. Acceptable Insulation Types - Constant Thickness Application: Any of the types specified.
1. Single layer of polyisocyanurate board.

D. Acceptable Insulation Types - Tapered Application: Any of the types specified.
1. Tapered polyisocyanurate or extruded polystyrene board.

2.05 MEMBRANE AND SHEET MATERIALS

A. Membrane System Cap Sheet: Polymer modified asphalt, reinforced with non-woven fabric; granule surfaced; with the following characteristics:
1. Minimum Quality: ASTM D6162 Type III, Grade G; styrene-butadiene-styrene (SBS) modified, composite glass fiber and polyester reinforced. Suitable for application.
2. Solar Reflectance: 0.75, minimum, initial, and 0.60, minimum, 3-year, certified by Cool Roof Rating Council.
a. Comply with California Title 24 Parts 6 and 11.
3. Thermal Emissivity: 0.75, minimum, initial, and 0.85, minimum, 3-year, certified by Cool Roof Rating Council.
a. Comply with California Title 24 Parts 6 and 11.
4. Color: White.
5. Thickness (ASTM D5147): 160 mils.
6. Tensile Strength: Machine direction 450 lbf/in; cross-machine direction 500 lbf/in measured according to ASTM D5147 at 73 degrees F.
7. Elongation to Break: 6 percent, measured according to D5147.
8. Low Temperature Flex, maximum, ASTM D 5147: -35 deg. F (-37 deg. C).

B. Membrane System Ply and Base Sheet: Polymer modified asphalt, reinforced with non-woven fabric; mineral surfaced on both sides; with the following characteristics:
1. Minimum Quality: ASTM D4601 Type II; asphalt-coated composite glass fiber and polyester reinforced; unperforated.
2. Breaking Strength, minimum, ASTM D 146: machine direction, 130 lbf/in (22.5 kN/m); cross machine direction, 120 lbf/in (21.0 kN/m).

3. Tear Strength, minimum, ASTM D 4073: machine direction, 200 lbf (880 N); cross machine direction, 200 lbf (880 N).
4. Pliability, 1/2 inch (12.7 mm) radius bend, ASTM D 146: No failures.
5. Thickness (ASTM D5147): 50 mils.
6. Average Weight: 0.3 lb/sq ft.

C. Dry Sheathing Paper: Red rosin paper, unsaturated.

D. Flexible Flashing Material: Same material as membrane.

E. Base Flashing Sheet: ASTM D 4434, Type IV, internally fabric reinforced, uniform, flexible TPA sheet, CRRC listed and California Title 24 Energy Code compliant.
1. Tensile Strength at 0 deg. F (-18 deg. C), minimum, ASTM D 6509: 300 lbf/in (52 kN/m).
2. Tear Strength at 77 deg. F (25 deg. C), minimum, ASTM D 6509: 100 lbf (0.44 kN).
3. Elongation at 0 deg. F (-18 deg. C), minimum at fabric break, ASTM D 6509: machine direction, 25 percent; cross machine direction, 25 percent.
4. Thickness: 45 mils, nominal.
5. Exposed Face Color: White.
6. Reflectance, ASTM C 1549: 86 percent.
7. Thermal Emittance, ASTM C 1371: .86.
8. Solar Reflectance Index (SRI), ASTM E 1980: 108

2.06 BITUMINOUS MATERIALS

A. Bitumen for Insulation: Asphalt, ASTM D312 Type IV.

B. Interply Adhesive: Cold processed adhesive as required for manufacturers Warranted system.

C. Primer: ASTM D41/D41M, asphalt type.

D. Cap Sheet Adhesive: Cold processed adhesive as required for manufacturers warranted system.

E. Flashing Sheet Adhesive: Cold processed, vertical grade, flashing sheet adhesive as required for manufacturers warranted system.

F. Roof Cement: ASTM D4586/D4586M, Type II.

2.07 DECK SHEATHING AND COVER BOARDS

A. Deck Sheathing: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/2 inch thick. (for use at metal deck without insulation)
1. Manufacturers:
a. Georgia-Pacific DensDeck DuraGuard: www.densdeck.com.
b. Temple-Inland Building Products by Georgia-Pacific, LLC; GreenGlass Roof Board or GreenGlass Primed Roof Board: www.temple.com.
c. United States Gypsum Company, Inc.; Securock Gypsum-Fiber Roof Board: www.usg.com.
d. Substitutions: See Section 01 60 00 - Product Requirements.

2.08 INSULATION

A. Cellulose Fiber Board Insulation: ASTM C208, Type II; one face finished with mineral fiber, asphalt and kraft paper, with the following characteristics:

1. Board Size: 48 by 96 inch.
2. Board Thickness: 1/2 inch.
3. Board Edges: Square.
4. Thermal Conductivity (k factor): 0.38.

B. Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C1289, Type I, aluminum foil both faces; Class 1, non-reinforced foam core, and with the following characteristics:

1. Compressive Strength: 16 psi
2. Board Size: 48 by 96 inch.
3. Board Thickness: 1.5 inch.
   a. Not including cover board.
4. Tapered Board: Slope as indicated; minimum thickness 1/2 inch; fabricate of fewest layers possible.
   a. Maximum thickness: 3 inches.
5. Board Edges: Square.
6. Manufacturers:
   a. Atlas Roofing Corporation; ACFoam-II and Tapered ACFoam-II: www.atlasroofing.com.
   b. Dow Chemical Co.: www.dow.com.
   c. GAF; EnergyGuard PolyIso Insulation: www.gaf.com/sle.
7. Substitutions: See Section 01 60 00 - Product Requirements.

C. Extruded Polystyrene (XPS) Board Insulation: ASTM C578, Type XII; Extruded polystyrene board with natural skin surfaces; with the following characteristics:

1. Tapered Board: Slope as indicated; minimum thickness 1/2 inch; fabricate of fewest layers possible.
2. Thermal Resistance: R-value of 4.6 per 1 inch at 75 degrees F mean temperature using ASTM C177 test method.
3. Compressive Resistance: 40 psi.
4. Board Density: 1.2 lb/cu ft.
5. Water Absorption: 0.3 percent by volume, maximum.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes for sloping to drain and at transitions.

1. Include on the high side of all curbs.
2. Use individual pieces no greater than 2 ½ inches thick.

2.09 SURFACING MATERIALS - CONVENTIONAL APPLICATION

A. Protective Coating: Acrylic, White color. Non-fibrated, semi-gloss, water-based acrylic roof coating, with the following physical properties:

1. Asbestos Content, EPA/600/R-93/116: None.
2. Non-Volatile Content (by weight), minimum, ASTM D 1644: 45.0 percent.
3. Volatile Organic Compounds (VOC), ASTM D 3960: <50 g/L.
4. Density at 77 deg F (25 deg. C) minimum, ASTM D 1475: 9.0 lbs/gal.
5. Reflectance, minimum, ASTM C 1549: 70 percent.
6. Emissivity, minimum, ASTM C 1370: 0.75.

B. Walkway Pads: Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane.

1. Composition: Asphaltic with mineral granule surface or Roofing membrane manufacturer's standard, slip-resistant.
2. Minimum Size: 18 x 18 inch.
3. Surface Color: White or yellow.
4. If not indicated on on Drawings provide for 36 inch wide walking paths from the nearest point of normal roof access to all roof mounted HVAC and electrical equipment. Walking path shall include all four sides of HVAC equipment and front access of electrical switches or panels.

2.10 ACCESSORIES

A. Cant and Edge Strips: Inorganic fibrous glass, compatible with roofing materials; cants formed to 45 degree angle.

B. Sheathing Adhesive: Non-combustible type, for adhering gypsum sheathing to metal deck.

C. Sheathing Joint Tape: Paper type, 6 inch wide, self adhering.

D. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches wide; self adhering.

E. Insulation Adhesive: As recommended by insulation manufacturer.

F. Strip Reglet Devices: Galvanized steel, maximum possible lengths per location, with attachment flanges.

G. Insulation Perimeter Restraint: Stainless steel edge device configured to restrain insulation boards in position and provide top flashing over ballast.

H. Sealants: As recommended by membrane manufacturer.

I. Rubber Blocks: 100% rubber blocks with steel channels and reflective strips designed for supporting conduit.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck is supported and secure.

1. Ensure that roof deck is structurally sound to support live and dead load requirements of roofing system and sufficiently rigid to support construction traffic.
2. Distribute weight of packaged roofing materials over roof deck area to prevent substantial deflection of roof deck and overloading of the structure.

C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.

D. Verify deck surfaces are dry and free of snow or ice.

1. Do not conduct roofing operations when water in any form is present on deck, such as rain, dew or frost.
2. Moisture Test: Conduct moisture test in accordance with roofing system manufacturer's instructions. Do not proceed with roofing application until deck is suitably dry.

E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 METAL DECK PREPARATION

A. Install deck sheathing on metal deck:

1. Lay with long side at right angle to flutes; stagger end joints; provide support at ends.
2. Cut sheathing cleanly and accurately at roof breaks and protrusions to provide smooth surface.
3. Tape joints.
4. Fasten sheathing to roof deck with continuous mopping of adhesive on each flute.
5. Adhere deck sheathing over metal decking using low-rise foam adhesive per manufacturer’s written instructions.

B. Conventional Application: Apply mopped two-ply vapor retarder.

3.03 BUILT-UP ROOFING SYSTEM APPLICATION

A. Built-Up Roofing System Application, General: Install roofing system in compliance with manufacturer's instructions and recommendations unless requirements that are more restrictive, are indicated by the Contract Documents or are necessary to accommodate Project conditions.

1. Comply with roofing system manufacturer's application instructions and recommendations for application of roofing system for specified applicator's extended warranty and manufacturer's guarantee.
2. Comply with recommendations of NRCA - Roofing and Waterproofing Manual and WSRCA recommendations and standard details, where more stringent than manufacturer's requirements and details indicated on Drawings.
3. Comply with requirements of insurance underwriter(s) for fire resistance and windstorm resistance ratings.
4. Roll Materials Application: Apply felts smooth, free of air pockets, wrinkles, fish mouths, lap joints, or tears.

5. Cold Process Asphalt Heating:
    a. An in-line heat exchange unit may be used to facilitate application.
        1) Do not exceed maximum adhesive temperature of 100° F.
    b. Heat exchange unit: Use heat transfer oil approved by heating equipment manufacturer.
    c. Follow operation procedures recommended by heating equipment manufacturer.
6. Penetrations: Coordinate roofing Work with plumbing, mechanical and electrical Work and other Work involving penetrations of roofing membrane. Provide pipe and conduit penetrations as indicated on Drawings, or if more stringent, as detailed in NRCA - Roofing and Waterproofing Manual.
7. Membrane Protection: Under areas to receive traffic pads, embed additional roofing ply in solid mopping of roofing bitumen. Roofing ply shall be 6-inches wider than walkways and protective covering around equipment.
8. Other Roofing Accessories: Install other accessories in accordance with manufacturer's instructions and recommendations, and NRCA Construction Details, as applicable.

3.04 WALKWAYS

A. Traffic Pads Installation: Review layout with Architect before starting roofing application.
    1. If not indicated on on Drawings provide for 36 inch wide walking paths from the nearest point of normal roof access to all roof mounted HVAC and electrical equipment. Walking path shall include all four sides of HVAC equipment and front access of electrical switches or panels.
    2. Apply traffic pads in elastomeric adhesive in accordance with manufacturer's instructions and recommendations.

3.05 TEMPORARY ROOFING

A. Temporary Roofing: Provide if necessary due to inclement weather, as specified in PART 1 herein. Install 2 plies of system manufacturer approved temporary roof felt, with 19-inch (plus or minus 1/2 inch) overlap, and a 15 pound per square (plus or minus 5 pounds) interply mopping of asphalt.
    1. Broom plies to ensure complete adhesion.
    2. Apply glaze coat of steep asphalt at rate of 10-15 pounds per square. Apply glaze coat in accordance with NRCA - Roofing and Waterproofing Manual, "Specification Plate 10-TR", "Diagram TR-N" and roofing manufacturer's recommendations. Water glaze is not acceptable.
    3. Temporary Flashings: Install temporary flashings at edges and penetrations using one ply of roofing felt without reinforced base flashing.
    4. Removal of temporary roof prior to installation of permanent roofing system not required. Inspect, repair and clean surface and prime if surface is unusually worn.

3.06 FLASHING AND CANT APPLICATION

A. Details not addressed in Drawings and specification shall be in accordance with NRCA Manual Plates and recommendations, and the Architectural Sheet Metal Manual, as issued by Sheet Metal and Air Conditioning Contractors' National Association, Inc., (SMACNA).

B. Flashing and Sheet Metal Work: Set and flash in integrated sheet metal.

C. Cants, Crickets, Saddles, and Tapered Areas: Install to fully support roofing membrane and to provide proper transitions at changes in roof plane.

1. Install 45 degree cants where roof meets vertical surface, unless indicated otherwise.
2. Install preformed crickets, saddles other tapered areas using insulation adhesive or a solid mopping of steep asphalt.
3. Install tapered edge strips at roof edges where gravel stops, scuppers and sumps are installed.

3.07 INSULATION INSTALLATION - CONVENTIONAL APPLICATION

A. Attachment of Insulation:

1. Mechanically fasten first layer of insulation to deck in accordance with roofing manufacturer's instructions and Factory Mutual requirements (I-29).
2. Embed second layer of insulation into adhesive in accordance with roofing and insulation manufacturers' instructions.

B. Lay subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.

C. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

D. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.

E. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

F. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.

G. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 18 inches.

H. Provide minimum 1/4:12 slope to drains, crickets and transitions.

I. Do not apply more insulation than can be covered with membrane in same day.

3.08 MEMBRANE APPLICATION

A. Apply membrane in accordance with manufacturer's instructions.

B. Apply membrane; lap and seal edges and ends permanently waterproof.

C. Apply smooth, free from air pockets, wrinkles, fish-mouths, or tears. Ensure full bond of membrane to substrate.

D. At end of day's operation, install waterproof cut-off. Remove cut-off before resuming roofing.

E. At intersections with vertical surfaces:

1. Extend membrane over cant strips and up a minimum of 8 inches onto vertical surfaces.
2. Apply flexible flashing over membrane.
3. Secure flashing to nailing strips with termination bar and TF tape secured at 8 inches on center.
4. Insert base flashing into reglets and secure.

F. At gravel stops, extend base sheet membrane under gravel stop and to the outside face of the wall.

G. Around roof penetrations, mop in and seal flanges and flashings with flexible flashing.

H. Coordinate installation of roof drains and sumps and related flashings.

3.09 SURFACING - CONVENTIONAL APPLICATION

A. Apply roof coatings in accordance with roofing and coating manufacturers' instructions.

B. Prime roof system

C. Apply coating in two coats at 1.5 gallons per 100 sq. ft. per coat over roof system and flashings

1. Back roll coating to insure an even application over all surfaces.
2. Roofs to be left clean.

D. Install walkway pads by setting in roof cement. Set joints 6 inches apart. Avoid placement in waterways. If a waterway may be disturbed, cut pad in a diagonal manner to allow for the water way to be minimum 6 inches wide.

3.10 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field quality control and inspection.

B. Comply with insurance underwriter's requirements for use of manufacturer's products or systems.

C. Require site attendance of roofing material manufacturers field inspection service daily during installation of the Work.

1. Regular daily written reports shall be provided to the Contractor and Architect for every day of roofing installation work.
2. Roofing system manufacturer shall provide to Architect a written on-site approval and sign off on pre-roofing deck, base sheet installation, ply installation, MB cap sheet installation, flashing details and completed coating.
3. Roofing system manufacturer shall provide to Architect a Project Closeout Report upon delivery of the project warranty. This report shall include the following sections:
   a. Project Specifications
   b. Project Summary
   c. Progress reports as a result of roof inspections

d. Job progress photos
e. Warranty document with Maintenance Manual describing maintenance and emergency repair.

D. Roofing Inspection and Testing Services by Independent Agency: District's independent agency will provide inspection and testing services during application of roofing system.

1. Unless otherwise directed, inspection, including test cuts and evaluation procedures, will be performed in accordance with Chapter V, "Quality Control," of The NRCA Low-Slope Roofing Manual.
2. Independent agency will provide reports of inspections and tests to Construction Manager and Architect. Copies of reports will also be provided to Contractor.
3. Water Test: Conduct simulated rain storm test by indirect spray of water for 15 minutes over entire roof surface. Check area below roofing for leaks and check top surface for standing water.
   a. Record test and inspection by video tape or digital recording.
4. Remedial Work: Correct all defects and irregularities reported from inspections and tests, at no change in Contract Sum or Contract Time.

3.11 CLEANING

A. Remove debris, scraps, containers and other rubbish and trash resulting from installation of the roofing system from job site each day.

B. Remove bituminous markings from finished surfaces.

C. In areas where finished surfaces are soiled by bitumen or other source of soiling caused by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

D. Repair or replace defaced or damaged finishes caused by work of this section.

3.12 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

C. Storing, walking, wheeling or trucking is to be permitted directly on roofed surfaces only as recommended by the roofing system manufacturer. Provide protective coverings, including temporary plywood work surfaces, as necessary to protect completed roofing during subsequent construction activities.

3.13 COMPLETION

A. Prior to Substantial Completion review, when remaining Work will not adversely affect or endanger roofing, Contractor and applicator shall make a final inspection of roofing and prepare a written report to District and Architect describing nature and extent of deterioration or damage, if any, found in the roofing Work.

B. Repair or replace, as necessary, deteriorated or defective roofing and associated Work to a condition free of damage and deterioration, except normal weathering, at time of Substantial Completion review.

END OF SECTION

SECTION 07 42 23
WOOD COMPOSITE WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wood composite panels, rainscreen wall cladding.

B. Support substructure.

1.02 RELATED REQUIREMENTS

A. Section 05 40 00 - Cold-Formed Metal Framing: Panel substrate.

B. Section 06 10 00 - Rough Carpentry: Panel substrate.

C. Section 07 25 00 - Weather Barriers: Weather barrier under panels.

D. Section 07 92 00 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

E. Section 09 21 16 - Gypsum Board Assemblies: Panel substrate.

1.03 REFERENCE STANDARDS

A. ASTM C1186 - Standard Specification for Flat Fiber Cement Sheets; 2008 (Reapproved 2012).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Convene one week before starting work of this section to verify project requirements, coordinate with installers of other work, establish condition and completeness of building substrate, and review manufacturers' installation instructions and warranty requirements.

1. Require attendance by the installer and relevant sub-contractors.
2. Include rainscreen manufacturer’s representative and wall system manufacturer’s representative to review storage and handling procedures.
3. Review in detail truck transportation, parking, vertical transportation, schedule, personnel, installation of adjacent materials and substrate.
4. Review procedures for protection of work and other construction.
5. Review safety precautions.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Manufacturer's requirements for related materials to be installed by others.
2. Preparation instructions and recommendations.
3. Storage and handling requirements and recommendations.
4. Installation methods, including nail patterns.

C. Shop Drawings: Show actual panel layout and elevations, dimensions and thickness of panels, connections, details and location of joints, sealants and gaskets, method of anchorage, number of anchors, supports, reinforcement, trim, flashings, and accessories.
    1. Indicate panel numbering system.
    2. Differentiate between shop and field fabrication.
    3. Indicate substrates and adjacent work with which the wall system must be coordinated.
    4. Include large-scale details of anchorages and connecting elements.
    5. Include large-scale details or schematic, exploded or isometric diagrams to fully explain flashing at a scale of not less than 1-1/2 inches per 12 inches.
D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
E. Verification Samples: For each finish product specified, minimum size 12 inches square, representing actual product in color and texture.
F. Certificate: Certify that the work results of this section meet or exceed specified requirements.
G. Test Report: Applicable model code authority evaluation report (e.g. ICC-ES).
H. Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
I. Warranty: Submit copy of manufacturer’s warranty, made out in District’s name, showing that it has been registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section with minimum 3 years of experience and approved by the manufacturer.
B. Mock-Up: Provide a mock-up for evaluation of fabrication workmanship.
    1. Locate where directed.
    2. Provide panels finished as specified.
    3. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products under waterproof cover and elevated above grade, on a flat surface.

1.08 PROJECT CONDITIONS

A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Wall System Warranty: Provide joint written warranty by manufacturer and installer, agreeing to correct defects in manufacturing or installation within a two year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 PANELS

A. Decorative laminated wood composite panels made of thermosetting resins homogeneously reinforced with cellulose fibers, and are manufactured using high pressure and tempurature.

1. Basis of Design Product: Meteon FR as manufactured by Trespa, trespa.com, or approved equal.
2. Texture: Simulated wood grain.
3. Length (Height): 100.4 inches, nominal.
4. Width: 73.2 inches.
5. Thickness: 3/8 inch, nominal.
6. Weight: 4 psf.
7. Finish: Integrated decorative surface created using Electron Beam Cured (EBC) technology.
8. Color: As selected by Architect from manufacturers full range of available colors.
9. Grade: EDF.
10. Material SUrface Burning CharacteristicsFire Rating: Class A per ASTM E84.

B. Soffit Panels: Smooth panels of same material and finish.

2.02 ACCESSORIES

A. Subframe Assembly: Concealed fastening, as indicated on Drawings.

1. Subframe: 6063-T6 extruded aluminum channels, painted black, with minimum thickness of 1/8 inch (3.2 mm).
2. Fasteners for Panel Assembly:
   a. #12-11 Stainless Steel, 300 Series.
   b. Spacers: Stainless steel with a diameter and length of 1/2 inch (12.7 mm).

B. Installation Materials: Provide extruded aluminum trim and concealed, corrosion resistant metal tongues.

C. Trim: Same material and texture as panels.

D. Fasteners: Galvanized or corrosion resistant; length as required to penetrate minimum 1-1/4 inch.

PART 3 EXECUTION

3.01 PREPARATION

A. Examine substrate and clean and repair as required to eliminate conditions that would be detrimental to proper installation.

B. Verify that weather barrier has been installed over substrate completely and correctly.

C. Do not begin until unacceptable conditions have been corrected.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and recommendations.

1. Read warranty and comply with all terms necessary to maintain warranty coverage.
2. Install in accordance with conditions stated in model code evaluation report applicable to location of project.
3. Use trim details indicated on drawings.
4. Touch up all field cut edges before installing.
5. Pre-drill nail holes if necessary to prevent breakage.

B. Install aluminum channel subframe, fasteners and composite wall panel system per approved shop drawings.

C. Install girt/support and anchoring systems true and plumb in order to provide support for wall panels.

D. Installed panels shall have open joints.

1. Fabricated Joints: Allow a minimum 1/2 inch (12.7 mm) of free space for movement of panels.
2. Vertical joints to have hat channel directly behind the joint.
3. Coordinate exact sizes and dimensions with the drawings, field conditions and approved shop drawings.

E. Every vertical section of the façade cladding shall have a ventilation opening at the bottom and top, having a width/depth of 2.36 sq.in./sq.ft.

F. Cover the opening between bottom of façade and structural wall by ventilation profile to prevent animals or other objects from being hidden behind the panels.

G. Over Steel Studs: Use hot-dipped galvanized self-tapping screws, with the points of at least 3 screws penetrating each stud the panel crosses and at panel ends.

3.03 FIELD QUALITY CONTROL

A. Wall System Manufacturer's Field Services: Provide field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with instructions.

1. Site Visits: Schedule two site visits during execution of installation.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 26 55 61
STAGE LIGHTING

PART 1 -GENERAL

1.1 SUMMARY

A. This specification section includes the engineering, fabrication, furnishing, delivery, and installation of new theatrical stage lighting equipment as specified in the 'Products' specifications and as indicated on the related stage lighting drawing documents for the auditorium stage.

B. Contract Documents and General Requirements apply to the work of this Section.

C. All bidders shall fully inform themselves of the conditions under which the work is to be performed. No additional compensation shall be allowed for any labor or item the bidder could have been fully informed of prior to the bid date.

D. While the components, quantities, and arrangements described herein and shown on the drawings indicate specific details for the realization of the stage systems, bidders may propose alternate details and components that will fulfill the functional parameters of the envisioned system. In such event, bidders shall submit a complete set of specifications and drawings, not less detailed than these and following the same general outline, together with a detailed statement indicating paragraph by paragraph wherein the equipment to be offered deviates from specifications included in this bid request. Where alternate proposals are offered they shall be submitted with the amount to be added or deducted from the base bid which is required from all bidders.

1.2 SCOPE OF WORK

A. Work under this section consists of the installation of all materials and equipment necessary for the proper operation of all stage lighting equipment. Installation contractor shall furnish qualified personnel to test and adjust the equipment after installation until specified performance is attained.

B. Preparation and submission of complete engineered shop drawings for approval by the Architect and Theatre Systems Consultant.

C. Verification of conditions and dimensions at the job site.

D. The adjustment and testing of the completed installation by the Contractor's personnel, subject to Architect and Theatre Systems Consultant's approval.

E. Submission of required record documents.

F. Coordination with other affected work, trades, and inspections.

G. Installation work includes, but is not limited to the following:

1. New stage lighting dimmer racks.
2. New stage lighting data distribution and lighting control processor racks.
3. New lighting control receptacle stations and low voltage control wiring.
4. New house lighting control stations and low voltage control wiring.
5. New stage manager's control panel and low voltage control wiring.

6. New worklight control stations and low voltage control wiring.
7. New lighting control DMX512 protocol wiring, low voltage house light, worklight, and rehearsal light wiring, Ethernet data wiring, and any additional new control wiring per the systems manufacturer's final shop drawings.
8. New circuitry distribution connector strips, plug boxes and wall boxes.
9. New stage lighting spotlight fixtures and followspots.
10. New stage lighting control console, remote focus unit, video monitors, and Ethernet nodes.
11. New power service, circuit protection, system conduit, raceways, junction boxes, pull boxes and related wiring as specified on the electrical drawings.
12. Installation and connection of system line voltage equipment and components.
13. The contractor shall furnish and install all low voltage stage lighting control wiring. The contractor shall coordinate with the stage lighting equipment manufacturer regarding the responsibility for termination of stage lighting control low voltage wiring.
14. Initial hanging and plugging of new portable stage lighting fixtures per the Theatre Systems Consultant's directive.
15. All scaffolding, hoisting equipment, ladders, man-lift devices, tools, etcetera necessary to perform the work.

H. The above scope of work is intended as a reference guide only and is not intended to define the limits of the work necessary for a complete installation. All labor, materials, and equipment necessary for the proper operation of all systems must be provided.

1.3 RESPONSIBILITY

A. Organize and program the Work of the Section to harmonize with the work which will be performed by other contractors during the Project so that work will proceed as expeditiously as possible.

B. The engineering, fabrication, installation, and coordination of systems and associated components specified in this Section are the Contractor's responsibility.

C. Comply with all applicable code requirements and the requirements of federal, state, and local authorities having jurisdiction over the design, fabrication, installation, and operation of the systems and associated components specified in this section.

D. Take full responsibility for the proper placing and fitting of equipment and materials furnished under this Section into the structure.

E. Design components and install equipment to fit into the structure as built.

F. Specifications only establish criteria and do not attempt to dictate specific details and methods that may be necessary for proper installation; drawings related to the Work of this Section may therefore be diagrammatic.

G. Become familiar with the building construction and finishes, access and space available for equipment, and obvious interferences requiring special attention.

H. Check and verify pertinent dimensions, sizes, loads, and the appropriateness of structure supporting the proposed Work of this Section, both on the Drawings and in the field before proceeding with any work.

I. Provide additional structural and support members and guards as necessary for proper installation and operation of the Work of this Section.

J. All stage lighting equipment and hardware must be of new and recent manufacture.

K. All components utilized in the stage lighting equipment shall be specifically recommended by their manufacturer or trade organization for stage lighting applications. They shall be installed and used in accordance with the manufacturer's specification.

L. Provide equipment, devices, machinery, and systems based upon the following:

1. Safety to personnel during operation, use, and maintenance.
2. Adequate strength.
3. Reliability, with consideration for special or unusual requirements of the unit or installation.
4. Ease of maintenance.
5. Coordination with associated and adjacent systems provided under other Sections.

1.4 CODES, LABELS, AND STANDARDS

A. All stage lighting equipment and installation methods must conform to current State rules and all local codes and ordinances.

B. All components shall be listed by Underwriters Laboratories (UL).

C. A manufacturer's label shall be conspicuously and permanently attached to each piece of stage lighting equipment.

D. Those parts of the stage lighting equipment that require maintenance shall be safely and easily accessible and serviceable.

E. Conform to the applicable requirements of the current editions of the following reference codes or standards:

1. National Electrical Code.
2. United States Institute for Theatre Technology (USITT).
3. Entertainment Services & Technology Association (ESTA).

F. Where in these Specifications one certain kind, type, or brand of manufacturer or material is named, it shall be regarded as the required minimum standard of quality. Substitutions lowering performance, quality, method of assembly or installation, or in general, not in keeping with Drawings and Specifications will not be permitted. Only written approval of the Architect and Theatre Systems Consultant will permit substitution for materials specified. Where both catalog number and description is indicated, requirements of description shall take precedence and prevail.

1.5 QUALIFICATIONS

A. Provide the Work of this Section under a single contractor with a contractor widely experienced in providing and installing theatrical stage lighting equipment and related electrical hardware of the quality and complexity specified in this Section.

B. Maintain a competent Supervisor, acceptable to the School and the Architect, during the entire installation. Change of Supervisor during the Project is not acceptable without prior written approval from the School and the Architect.

C. Employ only experienced electricians and stage lighting technicians on the Project.

D. Employ only certified welders, if welding is required.

1.6 BIDS MUST INCLUDE

A. All equipment, labor, and services indicated in these specifications and in the related stage lighting drawing documents, including all necessary hardware, fittings, and components necessary for a full and complete system.

B. A schedule and time estimate for preparation, fabrication, equipment delivery, and installation.

C. A list of manufacturer's names, model and type numbers, and catalog data sheets covering all items included in the 'PRODUCTS' section of this document.

1.7 SUBMITTALS

A. Make submittals to the Architect per requirements in Division 1 for transmittal to their consultants.

B. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of the completed Work.

C. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions. All submittals shall be submitted in a timely manner in order to allow adequate time for review and resubmittal if necessary.

D. Submit and identify each shop drawing using both descriptive title and numeric or alphanumeric drawing number. Do not change drawing title or number after first submittal.

E. The review of shop drawings, brochures, and samples is general only and does not relieve Manufacturer or Contractor of responsibility for errors, equipment design responsibility, deviations from Drawings and Specifications, or conflict with other work which may result from such deviations.

F. The review of a separate item does not indicate review of the complete assembly in which it functions.

G. No work shall begin on fabrication of equipment until drawings are approved and returned to contractor. No material shall be shipped to job site until formally approved in writing.

1.8 PERMITS AND INSPECTIONS

A. Obtain and pay for required permits and inspections of Work of the Section.

B. Furnish material and Work under this Section that meets or exceeds applicable legal and code requirements.

C. Perform tests required by the Architect, School Representative, and authorities having jurisdiction.

1.9 SAFEGUARDS AND PROTECTION

A. Provide suitable barriers and warning signs associated with or adjacent to stage lighting installation wherever necessary for the protection or safety of workers on the Project, School's personnel, and others during construction. Maintain barriers and warning signs during installation of the Work of this Section.

B. Provide guards and guides at structural edges and corners and surrounding equipment as necessary to prevent fouling or tearing of adjacent theatrical equipment or contact with personnel.

C. Protect materials and equipment from dirt and damage. Cover materials until just before the completion of the Project to prevent the adhesion of foreign matter or unintended paint.

D. Replace damaged or defective work or material prior to final payment request.

E. Take full responsibility for loss or injury to persons or property resulting from neglect of the above precautions.

1.10 RECORD DRAWINGS AND MANUALS

A. Within thirty days of final installation approval, provide to the Architect (6) copies of an 'Operating and Servicing Manual' for the Stage Lighting System. Provide (1) copy of the manual to the Theatre Systems Consultant. Each manual shall be bound in a hard cover binder and contain the following information:
   1. Final as-built shop drawings including updated equipment locations and conduit runs.
   2. Catalog data.
   3. Operating and maintenance data.
   4. Parts lists and source for parts and service.
   5. Guarantees and warrantees.
   6. Test reports.

B. Each complete manual shall include all instructions necessary for proper operation and servicing of the systems. The instructions must be written in a manner that easily describes the necessary day-to-day operating procedures.

1.11 DELIVERY AND STORAGE OF MATERIALS

A. Contractor is responsible for the scheduling and timely delivery and placement of items furnished under this Section.

B. Clearly identify on each container the contents stored within.

1.12 SPARE PARTS

A. Provide spares, spare parts, and special tools for all stage lighting equipment if necessary for proper operation and maintenance of equipment.

1.13 COMPLETION

A. Provide all labor, engineering, design, testing, supervision, material and equipment required even though not specifically mentioned herein, so that when work is completed, an operable system will be turned over to the School. Any errors, omissions, or ambiguities are not to condition this requirement but shall be brought to the attention of the Owner in their possible effect on intent of this Specification.

B. Before operating any equipment for demonstration or test comply with manufacturer's preparation instructions.

C. Once equipment has been installed a factory authorized field service technician shall check and test equipment and make adjustments as necessary.

D. After checkout and adjustment, the stage lighting system shall be operated for approval of the School, Architect, and Theatre Systems Consultant.

E. If due to installation-caused matters the Architect or Theatre Systems Consultant are required to perform any follow-up checkout or inspection visits after the approved completion of the project, the Contractor shall compensate the Architect or Consultant at their standard hourly rates for all time expended.

1.14 WARRANTY

A. Guarantee all materials, equipment, and work against defects of any kind for a period of one year from written acceptance of the work.

B. Parts Warranty: Obtain guarantees and/or warrantees for factory assembled equipment and include with 'Operations and Maintenance Data'.

C. Replacement: In the event of failure of any work, equipment, or device during the life of the guarantee, at no cost to the School, repair or replace the defective work and remove, replace, or restore any parts of the structure or building which may be damaged as the direct result of the defective work or in the course of making the replacement of defective work or materials. Any work, equipment, or device replaced due to failure shall be guaranteed for a period of one year from date of replacement.

D. Make a minimum of two inspections with operations personnel, within the warranty period, at no expense to the School, to insure all systems to be in satisfactory operating condition. Submit a written report signed by operating personnel witnessing inspection to the School indicating inspection results with copies to the Architect and Theatre Systems Consultant.

E. The Contractor shall provide field service maintenance, at no cost to the School, within 24 hours of notification of system malfunction. This service response shall be in effect for a period of 12 months after the School's acceptance of the system.

1.15 INSURANCE

A. Provide full insurance against loss or damage during equipment shipment, storage, installation, and testing.

PART 2 - PRODUCTS

2.1 DIMMING SYSTEM

A. DIMMER RACKS

1. The dimmer racks shall be designed specifically for entertainment lighting, and shall consist of 6, 12, 24, or 48 dimmer module spaces. Dimmer rack shall be UL listed.

2. Rack set-up and preset data shall, as standard, be fully user programmable on a per rack or system wide basis.

3. Dimmer rack shall be a modular, freestanding cabinet. Cabinet shall be a welded, heavy gauge steel framework and be fully enclosed with removable panels and include a hinged, locking door over dimmer section. The dimmer rack shall allow for adjacent or back-to-back mounting of multiple racks. The rack shall be constructed to permit insertion and removal of dimmers and control modules without the use of tools. Finish shall be baked enamel over a primed surface.

4. Dimmer racks shall operate at 120/208VAC 3 phase, 5 wire (double neutral) + ground 60 Hz at a maximum of 800A per phase. Bussing across adjacent multiple racks shall be possible.
5. Load phase, neutral, and ground terminals shall, as standard accept up to a #6 gauge wire. An optional terminal adapter accepting up to #2 gauge wire shall be provided to minimize load voltage losses. Dimmer racks shall be braced for 50,000 amps. Provisions shall be made for optional amp trap devices to provide higher fault current protection, if required.
6. Dimmer rack shall be designed for up to 48 dual plug-in modules. Each module shall contain two 2.4KW dimmers, non-dims, constant voltage breakers, or one dual-sized special purpose fluorescent dimmer, comprising a total of up to 96 dimmers per cabinet. Provide additional special purpose modules as defined herein. Provide dimmer modules as indicated on Drawings.
7. Dimmer modules shall rest on mounting trays with guide rails to align dimmer during insertion. Cabinet shall be shipped without dimmers or mounting trays installed for ease of installation.
8. All dimmer input power and control wiring shall be factory wired with terminated load wires to terminals adjacent to each dimmer receptacle. A neutral buss shall also be furnished in cabinet.
9. Ventilation shall be provided using multiple low-noise fans. The fans shall maintain the temperature of all components at proper operating levels with dimmers at any load. Air shall flow over the surfaces of the heat generating components using a combination of convection and fan assisted airflow. Each rack shall be outfitted with a lockable door that does not impede airflow in any manner. Fans shall operate only when the lighting control console is activated.
10. Load terminations shall be clearly marked with the rack circuit number. Signal terminations shall be by plug-in screw terminals to facilitate contracting and servicing and shall be clearly labeled.
11. Provide a label for each dimmer rack with rack ID# and circuit # range contained within rack. Label to be attached near top of rack with mechanical fasteners, adhesive only fastening is not acceptable.
12. Provide spare modules as noted in schedule of quantities on project drawings.

B. DIMMER RACK CONTROL ELECTRONICS

1. The main dimmer control electronics shall be housed in one processor plug-in module. The dimmer control electronics shall have a direct Ethernet connection and shall accept (2) DMX512 protocol inputs.
2. All rack setup and preset data shall be stored in a non-volatile manner and may be transferred to a replacement control processor module without losing data.
3. The dimmer system shall support the following range of peripherals:
    a. Remote backup preset panels.
    b. Remote hand held programmers.
    c. Remote panels for architectural style channel and preset control of separate and independent zones of lighting.

4. Dimmer rack control electronics shall have the provision to select any circuit in the rack for activation by a Panic function. Panic function shall be activated by a remote contact closure.
5. Dimmer rack control electronics shall contain provisions for mapping DMX512 addresses from any of the three control inputs to circuits in that rack. Control electronics shall also support setting of minimum and maximum output levels, dimmer curves, non-dim operation, and direct dimmer level setting.

C. DIMMER MODULES

1. The dimmer modules shall be fully plug-in and factory wired. Dimmer modules shall be of rugged and heavy-duty construction. Power and signal pins shall be recessed in a self-aligning housing to avoid handling, storage, and insertion damage. A contoured handle shall be provided for ease of insertion and withdrawal. All chassis parts, except heat sinks and handle, shall be properly treated, primed and finished in fine texture, scratch resistant, gray powder coat paint. Each module shall be labeled with the manufacturer's name, catalog number and rating. Dimmer modules shall be UL recognized devices.
2. Dimmer modules shall be keyed so that dimmer modules of greater capacity shall not be interchangeable.
3. Each dimmer module shall contain one or two single pole circuit breakers, associated solid state switching modules, filters, power, and control components.
4. Dimmer electronics shall be completely solid state. They shall utilize two silicon controlled rectifiers in a back-to-back electrical configuration. The full load of the circuit is to be carried and controlled by the silicon controlled rectifiers.
5. Each dimmer shall be protected by a fully magnetic circuit breaker of the appropriate current rating and 10,000 AIC surge rating mounted on the face plate of the dimmer module so that the trip current is not affected by ambient or rack temperature. The circuit breaker shall be rated for tungsten loads having an inrush rating of no less than 20 times normal current and shall disconnect the power to the dimmer module before damage can be done to the dimmer power components. The circuit breakers shall be rated for 100 percent switching duty applications and shall be a UL recognized device.
6. SSR devices shall be encapsulated, epoxy filled high impact plastic cases with optically isolated firing circuits, control circuitry, and two silicon controlled rectifiers (SCRs). There shall be a minimum of 2,500 volts RMS of isolation between the AC line and the control lines of the SSR.
7. The SSR shall be in an industry standard format that is easily field replaceable without removing any other electrical or electronic devices.
8. Each dimmer module shall have an integral inductive filter, minimum 350 micro-second rise time, to reduce the rate of current rise time resulting from the SSR switching on. The filter shall limit objectionable harmonics, reduce lamp filament sing and limit the radio frequency interference on line and load conductors.
9. Special Purpose Modules
    a. Standard factory modules shall be available to provide dedicated non-dim circuits utilizing mechanical relays and not employing SSR devices. Each non-dim shall be provided with a primary circuit breaker of the appropriate rating. Non-dims shall be designed so they can be used for inductive loads.

b. Standard factory modules shall be available to provide hard fired output for use with neon, cold cathode, and fluorescent loads. Hard fired modules shall provide a current source independent of the load current for the SCR Gate Drive Signal. Hard fired dimmers shall function independent of load as a result and shall drive loads of 1 watt or less.

c. Standard factory modules shall be available to provide constant 120VAC voltage irrespective of control signal to dimmer racks.

d. Standard factory modules shall be available that are capable of functioning as a dimmer, relay, or constant voltage breaker on either half of a dual module. Either of the three functions can be mixed or matched on either half of the module. Dimmer or relay functions can be remotely configured from the stage lighting control console or from the dimmer rack processor. The constant voltage function shall be manually activated at the dimmer module without the need for configuration at the dimmer processor.

1) If Stage Lighting Manufacturer does not make a module capable of the three functions on either half of the module provide 2.5 times the number of modules for each multi-function module specified in the following configurations and quantities (% of total):
   a) Dimmer/Dimmer (13%),
   b) Relay/Relay (18%),
   c) Dimmer/Relay (18%),
   d) Relay/Dimmer (18%),
   e) Constant/Constant (11%),
   f) Dimmer/Constant (11%),
   g) Constant/Dimmer (11%).

2) If Stage Lighting Manufacturer can provide a multi-function module capable of dimmer or relay functionality on either half of the module but without the constant voltage function provide an additional dual constant module for every 4th multi-function module specified, rounded up to next even number.

10. See project drawings for details on re-use of existing dimmer modules in new dimmer rack enclosure.

D. RELAY RACK

1. Provide relay panels with 3-pole 120/208V main power feed and motorized circuit breakers.

2. Breakers shall be hydraulic magnetic with a high inrush trip curve. Breakers shall be rated for 100% continuous operation.

3. Control processor shall include ability to record and playback sequences, presets, and astronomical time events.

4. Control inputs shall include DMX512 and network operation via sACN.

5. Basis of design: E.T.C. Sensor IQ Intelligent Breaker System.

2.2 POWER DISTRIBUTION & EMERGENCY LIGHTING

A. DIMMER-CIRCUIT DISTRIBUTION EQUIPMENT

1. Provide stage lighting circuitry connector strips and plug boxes as shown on the stage lighting drawing documents.
    a. Each connector strip and plug box shall be provided with screw terminal strips for feed connections, mounting bracket devices, and basket weave strain-relief multi-cable connectors where necessary.
2. Provide all necessary mounting hardware for pipe or surface mounted strips and boxes as detailed on project drawings.
3. Backboxes for all plug boxes shall be provided by stage lighting manufacturer unless noted otherwise on project drawings.
4. Plug boxes shall have two sets of knockouts on each of the sides.
    a. Production dimmer and relay circuits shall utilize grounded stage pin connectors or 5-20R connectors as indicated on project drawings.
    b. Rehearsal light circuits shall utilize L5-20R connectors.
    c. Dimmable running light circuits and non-switched 120VAC power shall be supplied to connector strips and plug boxes via pigtail or panel mount 5-20R receptacles.
5. Exterior finish shall be flat, black baked enamel. Custom colored finishes shall be required if indicated on project drawings.
6. Circuit identification numbers shall be securely affixed to face of plug box and to one or both sides of plug strips as indicated on project drawings. Numbers shall be engraved lamacoid tags, white letters on black background and shall be secured via rivets or other mechanical fasteners. Adhesive-only fastening is not acceptable. All labels shall be attached at the factory where distribution devices are fabricated.

B. EMERGENCY LIGHTING TRANSFER SYSTEMS

1. Provide (1) UL 1008 code rated emergency lighting transfer relay panel to switch dimmed and non-dimmed lighting circuits to emergency power in the event that the normal power supply to the stage lighting system fails. Features include:
    a. The transfer panel shall provide dimmer pass-through for normal operation.
    b. The panel shall be wall or floor-mounted, separate from the dimmer racks.
    c. The transfer panel shall be configured to accept a multiple 20A 120VAC emergency circuits. The source voltage settings shall be field adjustable for either single or three phase power.
    d. The panel shall have a quantity of 20-amp circuits for transfer switches sufficient to supply emergency power to all applicable circuits as indicated on electrical drawings.
    e. The panel shall have voltage sensing of normal supply lines and automatic retransfer of power on restoration of normal supply.
    f. An integral test switch shall be provided to simulate normal power source failure for periodic verification of system operation. The test switch shall be accessible without opening the panel.

g. Provide remote test switches to indicate the state of emergency transfer switch and to provide for ability to change the transfer switch from normal power to emergency power for testing purposes or manual changeover to emergency power.

2. Provide a DMX Emergency Bypass Controller to bypass the DMX control signal and drive all connected loads to full in a loss-of-power or emergency situation.
   a. Bypass controller shall accept a contact closure input that will drive a single universe of DMX512 to full or to a preset level when activated. Bypass controller shall not process the DMX512 signal when in Normal input mode.
   b. Bypass controller shall contain an LED indicator on exterior of unit signaling normal state or bypass state. Controller shall contain internally accessible DIP switches for configuration o DMX record mode, Contact Input Type, and Wait Time for Restore of incoming DMX.
   c. Provide quantity of DMX bypass controllers to support emergency lighting layout as indicated on project electrical drawings. No more than 28 loads should be connected on any one DMX wiring segment.
3. Provide an Emergency Bypass Detection Kit for monitoring normal 3-phase power feed to dimming system and providing a maintained contact closure output upon loss of power to trigger other lighting bypass controller(s).
   a. Provide remote reset switch station(s) that maintain the bypass state until the user manually resets the system.
4. Provide surface mounted 30A 3-pole circuit breaker enclosures for connection of sense feed wiring between dimmer rack and transfer switch as well as between dimmer rack and bypass controller.

2.3 STAGE LIGHTING CONTROL SYSTEM

A. STAGE LIGHTING CONTROL DATA NETWORK DEVICES

1. Provide Ethernet and DMX512 data network control and distribution devices as described herein. All devices connected to the Ethernet data network shall be compatible with the lighting control console and any other lighting control devices connected to the Ethernet network. All connected Ethernet devices shall support 10BaseT and utilize Neutrik EtherCon RJ-45 connectors for data connections. All DMX512 network devices shall comply with the USITT DMX512/1990 standard. All DMX512 and Ethernet network components shall be compatible with the following ANSI Standards.
   a. ANSI E1.11 - Entertainment Technology USITT DMX512-A - Asynchronous Serial Digital Data Transmission Standard For Controlling Lighting Equipment and Accessories.
   b. ANSI E1.20 - Entertainment Technology RDM - Remote Device Management Over DMX512 Networks
   c. ANSI E1.31 - Entertainment Technology - Lightweight Streaming Protocol For Transport of DMX512 using ACN.
2. Provide all control wiring and control cables for a complete functioning system so that all control and dimming components, except portable lighting fixtures, can be interconnected and tested at the time of system commissioning.

3. Provide portable control cables as required to connect ceiling or gridiron junction boxes with operable stage lighting batten connector strips as indicated on project drawings.
    a. Cables for Ethernet network signals shall be constructed from a heavy duty cable constructed to ISO/IEC 11801 CAT5e standards. Cable shall be supplied with Neutrik Ethercon connectors at each end. Cable shall be TMB ProPlex PCCATEP or pre-approved equal.
    b. Cables for DMX512 signals shall be constructed from a heavy duty, double shielded low capacitance cable suitable for RS422/RS485 applications. Cables shall be supplied without connectors at each end if distribution devices have terminal strips for data connections, otherwise cables shall be supplied with Neutrik XLR 5-pin connectors with gold contacts. Cable shall be TMB ProPlex PC224P or pre-approved equal.

B. CONTROL EQUIPMENT RACKS

1. Provide floor or wall-mounted control equipment rack(s) for housing selected components described in this section and as noted in contract drawings.
2. Control equipment rack shall be a 16-gauge steel wall-mounted enclosure with provisions for a locking front door. The front door shall be solid or with a plexiglas insert per drawings. Doors shall be easily removable in the field. Plexiglas doors shall be reversible to hinge on the left or right side in the field. The side and rear panels shall contain louvered vents. Provide 5 sets of keys to the owner. When multiple racks are indicated they shall be keyed alike
3. The rack shall contain 2 pair (front and rear) of 11 gauge CRS mounting rails predrilled for #10-32 screws on standard EIA 19" spacing. Both sets of rails shall be adjustable from front to back. Provide screws sufficient to fasten all devices mounted in rack including blank cover plates and vent panels.
4. All devices within rack shall be powered via UPS mounted in rack. Provide additional power strips, as necessary, connected to UPS and designed to securely mount inside rear rails of rack.
5. Control equipment racks located in the stage areas or areas in or adjacent to the auditorium, seating area or control rooms shall only utilize a UPS power source if there are system control devices in the rack requiring 120VAC power. In this case the UPS shall be passively cooled with no fan noise or power shall come from a remote power source.
6. The rack shall be designed for single-phase 2-wire with ground operation at a maximum of 20 amps, 120 volts 60 Hz AC.
7. The rack shall be designed to allow for easy insertion and removal of all components, and for convenient access to all rear-mounted power and control connections.
8. The rack shall contain a minimum of 3 open rack spaces to accommodate future control devices. Provide solid blank panels for all empty spaces.
9. Provide labels on all devices in equipment rack if necessary to define function or where control signals are fed from. Devices requiring labels include Ethernet nodes, DMX repeaters, and others as indicated on project drawings.
10. Items contained in the data network distribution rack shall include but are not limited to:
    a. Ethernet switch(es).
    b. CAT-5 cable management panel(s).

c. Ethernet patch panel(s).
d. Ethernet port label panel(s).
e. DMX512/Ethernet nodes as required.
f. DMX512 Repeaters as required
g. Sliding shelf & storage drawers.
h. (1) UPS device.
i. (lot) blank or vent panels as required.
j. Architectural Lighting Control System Processor (see below.)

C. CONTROL RECEPTACLE STATIONS AND JUNCTION BOXES (CRS)

1. Control receptacle stations shall contain locking data-grade connectors and be provided with appropriately sized surface-mounted electrical back boxes unless noted otherwise. The faceplates shall have engraved nomenclature filled with contracting paint color for all connections. Ethernet connectors shall be Neutrik EtherCon RJ-45. Provide control receptacle stations with receptacles as indicated on Theatre Systems Consultant's drawings.
2. All connectors shall utilize screw terminal or punchdown connections for termination of installed wiring, field soldering of connections is not acceptable.
3. Control data junction boxes at ceiling or gridiron level shall be placed adjacent to junction boxes for power circuits.
   a. Junction boxes for Ethernet network signals shall utilize Neutrik Ethercon receptacles to connect portable cables between ceiling/gridiron and stage lighting batten connectors strips below.
   b. Junction boxes for DMX512 signals shall contain data grade quality terminal strips. The junction boxes shall include integral cord connectors with strain-reliefs to resist lateral loading on the cables.
   c. Gridiron control junction boxes with network ports shall include label with network port #. Provide port # labeling at each end of flexible data cabling between gridiron receptacles and connector strip receptacles. Provide port # at receptacles where flexible cable enters connector strips.
4. Provide labels with unique port ID numbers corresponding to patch panel for every Ethernet network receptacle in the system. On the same label with port # provide maximum extension cable length for use with portable extension cables based on a 330 foot maximum network segment length. Label shall be an engraved Lamacoid tag with white characters on a black background.
5. All Lamacoid labels for network port #'s and maximum cable lengths shall be screwed or riveted to receptacle facepanels. Adhesive only fastening will not be acceptable. Pre-drill facepanels at factory at time of fabrication for ease of label installation onsite once extension cable lengths have been determined.

D. ETHERNET SWITCH(ES)

1. Provide high-speed multiport Ethernet switch(es) suitable for use with the stage lighting control console and related Ethernet nodes.
   a. Ethernet switch(es) shall contain a minimum of 24 ports. All connectors shall be located on the front of the unit.
   b. The switch shall have, located on the front panel, indicator status lights for each port as well as for general network and hub status.

c. Switch(es) shall be mounted in equipment rack 'CER-1'. Rack-mounting ears shall be provided.

d. Ethernet switch(es) shall provide Power-over-Ethernet, PoE, based on the IEEE 802.3af standard.

e. Provide a quantity of Ethernet switches as required, sufficient to support system design as indicated on contract drawings.

E. ETHERNET PATCH PANEL

1. Provide Ethernet patch panel(s) for terminating Category-5 Ethernet wiring from field devices.

2. The patch panel(s) shall contain a quantity of ports sufficient to connect all field wiring devices. Minimum of 12 ports per patch panel. If all slots in patch panel are not required provide (5) spare, un-used RJ45 panel mount connectors for future expansion.

3. Patch panel(s) shall be mounted in equipment rack 'CER-1'.

4. Provide separate 1RU blank panel(s) for labeling patch panel ports. Label each port with a unique I.D. label indicating port # and location for all Ethernet jacks connected to field wiring devices.

5. Provide a sufficient quantity of CAT-5 patch cables to connect all field wiring devices to Ethernet switch(es) plus (5) spare cables. Provide red patch cables for all devices that are to remain permanently connected for basic system functionality including dimmer, racks, architectural control processor, hard wired LCD stations, and installed Ethernet nodes.

6. Provide rack-mounted cable management panel(s) for dressing of patch cables between patch panel and Ethernet switch(es).

F. UNINTERRUPTIBLE POWER SUPPLY (UPS)

1. Provide (1) rack-mounted uninterruptible power supply (UPS) for use with the control data network devices located within the control equipment rack "CER-1". The UPS shall be sized to power all equipment installed in the rack with an allowance for future equipment but shall not be rated for less than 450 watts.

G. ETHERNET NODES

1. PORTABLE DMX512-TO-ETHERNET NODES

a. Provide portable DMX512 Ethernet pipe-mount nodes for connection to the stage lighting control network. DMX512 Ethernet Nodes shall be provided with the following features:

1) ACN and RDM compatibility.
2) LCD screen for displaying status and configuration information.
3) (1) Neutrik EtherCon RJ-45 Ethernet receptacle.
4) (2) DMX512 receptacles configured as Outputs or Inputs. Ports shall be fully configurable via software provided by the Manufacturer.
5) Nodes shall be capable of PoE Power-over-Ethernet operation.
6) Pipe Clamp, mounting hardware, and safety cable for attachment to lighting pipes or handle with mounting hardware for desktop or surface mount applications.

b. Temporarily connect nodes at field locations to ensure functionality of node with system. Return portable nodes to owner after system checkout, acceptance, and training.
    1) Refer to schedule of quantities on project drawings for types and quantities of nodes.

2. RACK MOUNTED DMX512-TO-ETHERNET NODES
    a. Provide rack-mounted DMX512-to-Ethernet nodes for distribution of control signals to/from field devices as shown on Theatre Consultant's drawings. Rack-mounted DMX512-to-Ethernet Nodes shall be provided with the following features:
        1) ACN and RDM compatibility.
        2) LCD screen for displaying status and configuration information.
        3) RJ-45 Ethernet receptacle on rear of unit or integral to circuit board.
        4) (2) DMX512 receptacles per node configured as outputs or inputs. Ports shall be fully configurable via software provided by the Manufacturer.
        5) Nodes shall be capable of PoE Power-over-Ethernet operation.

3. PANEL MOUNTED DMX512-TO-ETHERNET NODES
    a. Provide panel mounted one-port, DMX512-to-Ethernet nodes, user configurable as an input or output, as shown on Theatre Consultant's drawings.
    b. Node shall be capable of PoE operation, shall fit in a standard single gang deep backbox, and shall mount with standard Decora-style faceplates.
    c. Node shall utilize an XLR5 male or female connector and shall contain signal indicators for Network and DMX512 status.
    d. Node shall support multiple protocols including E1.31 Streaming ACN [sACN/Net3], ArtNet, Pathport Protocol, ETC Net3, Strand ShowNet.

H. STAGE LIGHTING CONTROL CONSOLES
1. Provide (1) stage lighting control console "CC-1". The control console shall support the following minimum requirements:
    a. 1,024 DMX512 channels via XLR5 outputs or via lighting network. 500 Control channels.
    b. 1,000 cues, 1,000 groups, 1,000 Macros. 400 effects.
    c. 1000 Palette presets for each of 4 moving light attribute groups
    d. 1 master playback fader with support for additional virtual playback faders with fully independent cuelists. Tracking and cue-only operation.
    e. 60 Submasters (minimum).
    f. Connections for (2) external DVI or VGA 1280x1024 video displays.
    g. Attribute library support for automated lights.
    h. Onboard editing function to allow user to add new fixtures to the attribute library.
    i. Color picker function for color-changing lights.
    j. Data storage via 40GB internal hard drive or via USB flash drive.
    k. Automated lighting control support. Attribute library support for automated lights including an onboard editing function to allow user to add new fixtures to the attribute library.

l. Ability to configure network devices such as DMX-to-Ethernet nodes, RDM-enabled devices, dimmer racks for multi-function dimmer modules.

m. Wireless Remote Focus Unit (WRFU) support via lighting network.

n. Offline editing software for creation and editing of control console show files.

o. Console facepanel and processor shall be a single integrated unit.

p. Basis of Design Products

1) Electronic Theatre Controls, Element 500-60.

2) Others contingent on pre-approval by Theatre Consultant.

2. Provide (2) minimum 21" LCD flat panel video display monitors with touchscreen capabilities ("CC-1").

3. Provide (1) uninterruptible power supply (UPS) for use with the stage lighting control console "CC-1". The UPS shall be sized to power the control console and (2) LCD monitors. The UPS shall be suitable for floor or desk-top mounting. UPS shall be passively cooled, no fans or other noise generating devices shall be included.

4. Provide all related cables and accessories needed for a complete operating system that integrates the new stage lighting control and dimming system. All cables to be constructed from high quality data cable suitable for repeated flexing and portable operation, ProPlex or equal. These cables and accessories include but are not limited to:

a. (1) 15' CAT-5 data cable with RJ-45 connectors (for "CC-1")

b. (1) 15' DMX512 data cable with XLR5 connectors (for "CC-1")

c. (2) Console 18" gooseneck dimmable 'Littlite' or equal dimmable LED worklights. Lights shall either securely attach directly to console via an XLR or BNC-style connector or if detached Littlites they shall include a weighted base suitable for tabletop use.

1) Detached dimmable Littlites shall be model #MV-18-LED with #CWB cast weighted base

d. Control console and video monitor dust covers.

e. (1) Keyboard and (1) mouse.

f. (2) USB flash drives for storing show and system information.

I. WIRELESS REMOTE FOCUS UNIT (WRFU)

1. The WRFU shall be a portable hand held unit with the following features:

a. Color, backlit LCD touch screen.

b. Wireless Ethernet card.

c. Rechargeable battery.

d. Log in, Soft key, User Macro, Configuration, and Help screens.

e. Access to Stage, Blind Cue, Blind Group, Blind Sub, Patch, and Park modes.

f. Access to Channel, Dimmer, Cue, Sub, Group, Record, and Playback commands.

2. Provide docking cradle with integral battery charger.

3. Provide a quantity of PoE Wireless Access Points with mounting hardware and portable Ethernet cables sufficient to ensuring wireless coverage throughout the facility including all Stage Lighting Positions, Catwalks, Box Booms, Stage, and Audience areas of the venue.

4. If manufacturer's wireless remote utilizes a proprietary wireless base station provide an additional WiFi base station that is PoE powered for use in providing wireless connectivity between control console and Android or iOS devices (tablets and phones).

2.4 ARCHITECTURAL LIGHTING CONTROL SYSTEM

A. The Architectural Lighting Control System shall control the following components and functions:
   1. Houselighting Control for dimming of the permanently installed house light fixtures located in the auditorium.
   2. Worklighting Control for switching of all permanently installed worklight fixtures located backstage, in the box boom and front catwalk areas.
   3. Rehearsal Lighting Control for dimming of all portable lighting fixtures mounted in the FOH catwalk and on the stage lighting electric battens over the stage.
   4. Running Light Control for dimming of permanently installed performance run light fixtures in the backstage stage area and for receptacles for portable run light circuits as indicated on project drawings.
   5. Stage Preset Lighting Control shall provide the capability to record and playback scenes that have been created with the stage lighting control console. Playback of scenes shall be possible without the aid of the control console.

B. The Architectural Lighting Control System shall not utilize control stations that are addressed using rotary encoders, DIP switches or other physical means at the individual station.

C. Provide station power modules or repeater modules in sufficient quantities to support the number of control stations and layout as shown on project drawings.

D. The Architectural Lighting Control System shall support the following system functionality.
   1. System shall support creation and scheduling of real time events via a network connected PC with a web browser. Real time events shall also be able to be created, modified, and monitored from LCD stations connected via the Stage Lighting Ethernet network.
   2. Houselight presets and stage presets shall have user-configurable fade times adjusted from a single page on any of the LCD stations via a password protected setup page. House or stage presets shall operate with the same fade time regardless of where they are recalled from, this includes multiple LCD pages, hard buttons on the SMP, or hard buttons on the PCS devices.
   3. Run light circuits shall include the capability to set a maximum level via a level fader on a password protected setup page. Run light circuits can then be toggled on and off via a single button per circuit without the level exceeding the maximum set on the fader.
   4. Logic shall be incorporated to manage power supply circuits for DMX512-controlled houselights. Features shall include:
      a. Power supply circuits shall be turned on if any DMX control channel is above 0%.
      b. Power supply circuits shall automatically turn off after a pre-determined time if no houselight DMX control channels are above 0%.
   5. The portable control stations (PCS-x) shall reflect the current state of circuits and presets in the system when re-connected to system receptacles.

6. The system shall support the ability to separately lockout remote houselight stations (HCS-x) and remote worklights control stations (WCS-x) from any LCD screens in the system. When remote stations are locked out they shall exhibit behavior to indicate they are in a different state. Indications could include the button changing color or button illumination blinking several times.
7. The system configuration software shall have the ability to create full pages of mult-line text with system information and operating instructions.

E. STAGE MANAGER'S CONTROL PANEL (SMP-1)

1. Provide an integrated Stage Manager's Panel "SMP-1" that consists of separate control sections for Houselights, Worklights, Rehearsal Lights, and Stage Preset pushbuttons. The panel shall be a dedicated enclosure and shall contain physical faders & buttons.
2. The Stage Manager's Panel shall provide the following capabilities and requirements for the facility:
   a. Houselight Control: Houselight area controls via physical zone fader controls and a master fader, take-control, preset record, and lockout functions for houselight circuits.
   b. Worklight Control: Control of non-dimmable worklights, lockout, and all-off functions for worklight circuits via pushbutton controls with LED indicators.
   c. Rehearsal Light Control: Control of the rehearsal light circuits, all-off functions for rehearsal light circuits via pushbutton controls with LED indicators.
   d. Stage Preset Control: Recording and playback of stage lighting via user recordable DMX snapshots. Stage Presets shall be snapshots assigned to pushbuttons.
3. The Stage Managers Panel shall be constructed as a shallow surface mounted enclosure and shall also contain the following components:
   a. A digital clock and timer panel.
   b. Adjustable panel mounted LED gooseneck worklites with dimmer switch (Littlite or equal).
   c. Locking door with clear Plexiglas insert. Door shall be removable and the hinge side shall be reversible in the field.

F. STAGE MANAGER'S CONTROL PANEL (SMP-2)

1. Provide a Stage Manager's Panel "SMP-2" that consists of a wall mounted 7" color LCD touchscreen display. The LCD touchscreen display shall mimic all functions available as physical faders and buttons on the "SMP-1" panel. The LCD shall also provide for additional functionality not available with physical controls including monitoring of real time events created in the architectural control system as well as setting of fade times for presets. Programming of LCD pages shall be submitted and reviewed with Theatre Systems Consultant 2 weeks prior to system commissioning.
2. Provide instructions for recording Houselight & Stage presets as well as general operation of architectural lighting control system. Instructions shall be provided as user selectable help screens on the 7" LCD touchscreen.

G. PORTABLE CONTROL STATION (PCS-1)

1. Provide a portable, table-top mount control consolette with control capabilities and features identical to those of the houselight section of the Stage Manager's Control Panel (SMP-1). See above section 'STAGE MANAGER'S CONTROL PANEL (SMP-1)'.
2. The PCS-1 consolette shall control houselights via physical faders and pushbuttons for presets. Fade rates for presets shall be user adjustable via a setup page on the Architectural Lighting LCD screens at 'SMP-2'.
3. Provide with (1) 15' and (1) 50' portable control cable with positive lock quick disconnect multipin connectors at each end for connection to control receptacle stations as indicated on project drawings and in project specifications.

H. HOUSELIGHT CONTROL STATIONS (HCS)

1. Provide prewired house pushbutton stations with appropriately sized back boxes to control the house lights. 1 momentary contact pushbutton with LED indicator light shall be provided to take control and turn on and off the house lights to a preset intensity level (cleanup preset). The control stations shall be suitable for flush mounting in custom electrical back boxes and shall include smoked Plexiglas hinged covers with magnetic catches. The faceplates shall be engraved with appropriate identification.

I. WORKLIGHT CONTROL STATIONS (WCS)

1. Provide prewired worklight pushbutton stations with appropriately sized back boxes to control the stage worklights. 1 momentary contact pushbutton with an LED indicator light shall be provided for each control circuit to turn on and off the work or rehearsal light circuits. The faceplate shall be engraved with appropriate identification. The stations and labels are indicated on the project drawings. Stations shall have smoked Plexiglas hinged covers with magnetic catches where indicated on project drawings.

J. CONTROL PROCESSOR FOR ARCHITECTURAL LIGHTING SYSTEM

1. The control processor for the Architectural Lighting System shall be mounted in the control equipment rack (CER-1). The control processor shall be designed for single phase 2 wire with ground operation at a maximum of 20 amps, 120 volts 60 Hz AC. The control processor shall have the following characteristics and requirements:
2. Interface electronics for controlling all house light dimmers, worklight non-dims, rehearsal light non-dims, and the stage presets control system shall be mounted in the control equipment rack
3. The control processing device shall have a control module with a multi-character display and keypad for system configuration. The control module shall have a memory card slot for storing the system configuration.
4. All control connections shall be terminated via factory provided plug-in connectors.

2.5 STAGE LIGHTING FIXTURES

A. Provide stage lighting instruments as indicated on the schedule of quantities on project drawings.

B. All stage lighting instruments shall be provided with the following accessories:

1. Pipe-mounting C-clamp (except followspots and floor-mounted instruments) and hanger brackets if yoke is not integral to instrument.

2. Floor trunions for floor mounted fixtures.
3. Color filter frame and 30” wire-rope safety cable with snap link closure.

C. Provide 26°, 36°, and 50° Ellipsoidal Reflector Spotlights with 575watt, 115V, 2,000 hour lamp, grounded stage pin connector. Fixtures to have high efficiency dichroic glass reflector, rotating fixture or shutter assembly, wide gate for two template pattern holders, safety cable attachment point, and positive locking hand operated yoke clutch.

D. Provide 26° & 36° Profile Spotlights with 4-color LED array. Fixture shall include the following:
1. Die cast all metal housing, rotating fixture or shutter assembly, wide gate for two template pattern holders, safety cable attachment point, and positive locking hand operated yoke clutch.
2. Neutrik PowerCon power input and pass-thru connectors and shall be supplied with 5’ PowerCon to 5-15 parallel blade and ground connector. Fixture shall include XLR 5-pin DMX input and pass-thru connectors.
3. Fixture shall incorporate RDM functionality to set DMX address and manage fixture settings.
4. Built-in power supply, on-board processor, (60) LED emitters with a minimum 20,000 hour L70 lamp life,
5. Theatrical grade dimming and low noise cooling via a variable speed, temperature controlled fan.
6. Fixture to be complete with light engine body, shutter barrel, and lens tube. Lens tube types and quantities per schedule of quantities in project drawings.
7. Acceptable product: E.T.C. Color Source Spot Series. Others contingent on pre-approval.

E. Provide 4-color LED wash lights suitable for long throw applications with a minimum 20,000-hour L70 lamp life, power cord with grounded 5-15P connector, hanger yoke bracket and 25-degree secondary lens. The fixture shall feature a built-in power supply, on-board processor, (40) LED emitters, theatrical grade dimming, and shall utilize low-noise cooling via a temperature controlled fan. Fixture shall contain power and DMX512 input and pass-thru connectors. Fixture shall incorporate RDM functionality to set DMX address and manage fixture settings.
1. Acceptable products: E.T.C. ColorSource PAR, additional lenses per equipment list. Others contingent on pre-approval by Theatre Consultant.

F. Provide LED cyclorama floodlights with (1) 100 watt RGBA LED emitter, asymmetrical reflector, feed-thru PowerCon power and XLR5 DMX data connectors, power cord with grounded 5-15P Edison connector, yoke and pipe mount kit
1. Acceptable product: Altman Lighting, Spectra Cyc 100.

G. Provide wide flood LED work lights suitable for long throw worklight applications with a minimum 40,000-hour L70 lamp life, 10,000 initial lumens of output, diffused lens in frame, adjustable yoke, C-clamp, parallel blade and ground connector, and safety cable. The fixtures shall have a CCT of 3,000° kelvin and a minimum CRI of 90. The fixture shall feature a built-in power supply and shall be passively cooled with no fans.
1. Acceptable product: Altman Lighting, #WL-130. Others contingent on pre-approval by Theatre Consultant.

H. PAR 64 Spotlight (FOH Rehearsal Light) with 1,000 watt, 4,000 hour Q1000PAR64/WFL lamp, 36" pigtail with L5-20P twistlock connector.

I. Spare Lamps: Provide a quantity of spare lamps per schedule eon project drawings.

J. Provide 400 Watt HTI Followspots. Followspots to include lamp, 5-15P connector installed, integral ballast/power supply & igniter, circuit breaker, elapsed time meter, and power on/off switch. Other features include :
   1. 7-color self-canceling boomerang
   2. Heavy duty douser with dual controls allowing operation from side and side and rear of unit..
   3. Heavy duty nichrome steel iris capable of being coupled & uncoupled from zoom mechanism.
   4. Quick re-lamping via ¼-turn fasteners without disturbing lamp alignment.
   5. Telescoping floor stand with folding legs, swivel casters and leveling jacks.
   6. Provide alternate mounting hardware to attach yoke of followspot to 1-1/2” pipe railings (1.90” O.D.). Provide 36” pipe, yoke-to-pipe adaptor, and two pipe clamps per followspot.

K. Followspots shall be Lycian Super Arc 400 Model 1267 or pre-approved equal.

L. Provide (1) spare lamp per each followspot.

M. Stage lighting fixtures & accessory quantities per schedule of quantities on project drawings.

2.6 STAGE LIGHTING ACCESSORIES

A. Provide stage lighting cable and accessories as indicated on the schedule of equipment quantities on project drawings.

B. Extension cables
   1. Provide CAT-5 Ethernet data portable extension cables with TMB ProPlex PCCAT5P cable & Neutrik EtherCon RJ-45 connectors with black shells and colored bushing to identify cable function.
   2. Provide portable DMX512 control extension cables constructed from TMB ProPlex PC224P cable with heavy-duty jacket and Neutrik 5-pin XLR connectors with gold plated contacts, black shells, and colored bushing to identify cable function.
   3. Provide 12/3 type SO portable stage extension cables with male and female grounded stage pin connectors.
   4. Provide 12/3 type SO portable stage extension cables with male and female grounded 5-20 Edison connectors.
   5. Provide 12/3 type SO portable stage extension cables with male and female grounded L5-20 connectors.
   6. Provide 12/3 type STW multi-receptacle extension cord with (1) 5-20 plug and (6) 5-15 receptacles. Black cable, 23’-4” long (Lex Products E-String Orchestra or equal).
   7. Provide PowerCon jumper cables for daisy-chain of LED wash lights.
   8. All extension cables shall be marked near each end per details on project drawings. Labels shall be covered with 3” long, clear, shrink-wrap tubing. Install tie-line with each extension cable for securing cables when coiled. Provide colored bushings for data cables

to identify functions per detail drawings. All data connectors shall be either Neutrik X-series or Neutrik XX-series.

C. Adaptor & Miscellaneous Cables

1. Provide molded-rubber-cable twofers with 20 amp grounded stage pin connectors. Lengths and quantities per schedules on project drawings.
2. Provide 12/3 female grounded stage-pin to male grounded Edison adaptors.
3. Provide 12/3 male grounded stage pin to female grounded Edison adaptors.
4. Provide DMX5-pin turnaround cables, XLR5M-to-XLR5M, XLR5F-to-XLR5F.
5. Provide DMX adaptor cables, XLR3M-to-XLR5F, XLR3F-to-XLR5M.
6. Provide DMX terminating plug, XLR5M with 120 ohm resistor across pins 2 and 3.
7. All DMX data adaptor cables shall utilize either Neutrik X or Neutrik XX-series connectors with gold plated contacts, black shell, and colored bushings to identify cable function per detail drawings.

D. Provide stage lighting tophats to fit 19°, 26°, 36°, 50° ellipsoidal reflector spotlights. Sizes and quantities per schedules on project drawings. Tophats shall have a safety cable permanently-affixed.

E. Provide 4-pane stage lighting barndoors to fit Parnel or fresnel spotlights and LED washlights. Barndoors shall have a safety cable permanently-affixed.

F. Tophats, barndoors, and color extenders shall have a safety cable permanently-affixed via a galvanized aircraft cable attached to the device with a loop terminated with a nicopress sleeve and with a snap hook captured at the other end via a loop and nicopress sleeve.

G. Provide template holder for ellipsoidal reflector spotlights for A-size patterns.

H. Provide assorted replacement fixture parts as detailed on project drawings. Parts include but are not limited to: lamp sockets, lamp burner assembly, barrel knob sets, c-clamps.

2.7 ACCEPTABLE STAGE LIGHTING EQUIPMENT MANUFACTURERS

A. Acceptable stage lighting dimming and control manufacturers

1. Electronic Theatre Controls (ETC)
   3030 Laura Lane
   Middleton, WI 53562
   800-688-4116
   Acceptable dimmers: Sensor
2. Strand Lighting
   6603 Darin Way
   Cypress, CA 90630
   714-230-8200
   Acceptable dimmers: C21

B. Acceptable stage lighting fixture manufacturers

1. Electronic Theatre Controls (ETC)
2. Strand Lighting
3. Altman Stage Lighting

C. Acceptable dimmer circuit distribution equipment manufacturers
   1. Electronic Theatre Controls (ETC)
   2. Strand Lighting
   3. Performance Electric
   4. Altman Stage Lighting

PART 3 - EXECUTION

3.1 INSTALLATION

A. Contractor shall furnish and install a completely functioning dimming system. All equipment, fittings, and peripheral devices for correct system operation shall be quoted and supplied.

B. Installation shall be in conformance with local, state and N.E.C. codes specifications and in accord with manufacturer's recommendations.

C. All lighting instruments and items of equipment, and individual components where applicable standards have been established, shall be listed by Underwriter's Laboratories, Inc. and shall be the U/L or ETL label when delivered and installed on job.

D. All Ethernet cabling shall be category 5 UTP and shall conform to TIA-568B and shall be installed, terminated, and certified by a qualified technician. All installed Ethernet segments shall be less than 250 feet (76 meters) in length to allow for the use of short lengths of portable Ethernet cabling. All Ethernet network receptacles shall be labeled with a permanently engraved label attached to the receptacle faceplate indicating a unique port ID # as well as the maximum portable cable length allowed based on a maximum 100 meter run.

E. A report with individual test reports for all Ethernet cable segments shall be submitted to the consultant 5 days prior to commencement of the final punch list inspection. The report should be generated by a network analyzer similar to the Fluke DSP-4000 series.

F. Configure control data distribution system and architectural lighting control system with the following parameters:
   1. Ethernet-to-DMX node ports configured as outputs at field wiring devices shall be configured as DMX universe #2.
   2. Ethernet-to-DMX node ports configured as inputs at field wiring devices shall be configured as DMX universe #1.
   3. All portable 2-port Ethernet-to-DMX nodes shall be configured with port #1 assigned to DMX universe #1 and port #2 configured as DMX universe #2.
   4. Ethernet-to-DMX node ports for nodes installed in equipment racks shall be configured per project drawings.
   5. The control network and dimming system shall be configured so that architectural lighting circuits (house lights, work lights, rehearsal lights) are not controlled by the stage lighting console.
   6. The control network and dimming system shall be configured so that the stage preset pushbuttons can record all DMX addresses in universe #2 and all addresses in universe #1 except for the architectural lighting circuits.

7. The programming of the architectural lighting touchscreen stations and all button and fader stations shall be configured and tested with offline software 4 weeks prior to the expected system commissioning date in conjunction with the Theatre Consultant.
    a. All pushbuttons at remote WCS and HCS stations shall utilize dim blue indicators when associated circuit(s) is off and bright green when on. All pushbuttons shall flash with a slow red indicator when button is pressed if station is locked out.
    b. Instructions for recording Houselight & Stage presets as well as general operation of architectural lighting control system. Instructions shall be provided as user selectable help screens on the 7" LCD touchscreen. Circuit #'s for architectural lighting power circuits shall be listed along with help screens.

G. Provide trained and highly qualified theatrical stage lighting technicians to properly hang and focus aim adjust the stage lighting spotlight fixtures. This installation shall consist of the following:
    1. Unpack light fixture, install lamp, bench focus fixture, install c-clamp, safety cable, and any related hardware or accessories, dispose of packing materials.
    2. Hang fixtures and connect to dimmer circuit receptacles as noted on initial light plot.
    3. Install color filters as noted on initial light plot in project drawings.
    4. For programmable fixtures perform a complete setup including assigning DMX addresses and applying other profile settings as requested by Theatre System Consultant or as required to provide an integrated functioning system.
    5. Do not install fixtures until facility is reasonably dust free to prevent the accumulation of dust and dirt on lenses and reflectors. If facility is not dust free place plastic bags over fixtures and until time of checkout. Unplug fixtures to prevent accidental activation while fixtures are covered.
    6. Maintain an inventory of how many sheets of color have been used as well as any cable or accessories installed for the purpose of verifying inventory of system accessories at time of final checkout.

H. No part of the system shall be energized before being checked and the installation approved.

I. Protection and cleaning:
    1. Materials and Equipment: Cover all equipment stored or installed on the site with polyethylene sheets or approved equivalent, to protect equipment from dust, moisture, plaster, cement, paint or work of other trades.
    2. Storage: Provide proper and adequate storage facilities.
    3. Damage: Replace all damaged or defective work, materials, or equipment. Install sensitive or delicate equipment after major construction work is completed.
    4. Site Cleaning: Regularly remove waste and rubbish and maintain order.
    5. Equipment Finish: Clean and polish all surfaces.
    6. Acceptance: Remove all debris, dirt, grease, and oil from building surfaces caused by installation work. Clean and vacuum all rooms in which installation work has occurred.

J. Installation Notes:
    1. Each dimmer circuit requires a separate hot and separate neutral. NO COMMON NEUTRALS.

2. The theatrical stage lighting drawings are diagrammatic only. Do not scale the drawings to determine the location of equipment.
3. Do all drilling, cutting, channeling and patching required to install lighting equipment and electrical work as indicated or herein specified. All holes, curbs, etc. in floors, ceilings, and walls shall be patched, unless indicated otherwise. Paint all new exposed electrical raceways, cabinets, enclosures, and fittings to match in color adjacent surfaces in finished areas.
4. Seal all penetrations through fire rated walls, ceilings, floors, etc., to maintain the fire rating. Furnish and install fire rated enclosures for all equipment penetrating into fire rated envelopes, spaces, etc.
5. Location of all conduit runs and junction boxes must be approved by the Theatre Systems Consultant and Electrical Engineer prior to actual construction.

3.2 TESTING AND COMPLETION

A. Provide all instruments for testing and demonstrate in presence of the School's Representatives that all circuits and wiring tests free of shorts and grounds.

B. Furnish all labor, instruments, appliances, equipment, and materials necessary to demonstrate to the School that the installations perform as required and are as specified herein.

C. The School reserves the right to make independent tests of all equipment furnished to determine whether or not equipment complies with requirements specified herein and to accept or reject any or all equipment on basis of results thereby obtained.

D. Within 14 days of written request, stage lighting systems manufacturer shall provide a factory engineer to check installed systems and make any adjustments or modifications necessary for proper operation.

E. The theatrical stage lighting systems manufacturer must provide services to configure the Architectural Lighting Control System as directed prior to system commissioning. One set of changes to the initial operating configuration may be required subsequent to commissioning. One set of changes may be required following acceptance.

F. Should any follow-up checkout and inspection visits be required by the Architect, Electrical Engineer or Theatre Systems Consultant due to any installation caused matters after the approved completion of the project, the Contractor shall bear this cost at the Architect’s, Engineer’s and Consultant’s standard hourly rates. This shall be scheduled and approved in writing.

3.3 TRAINING AND INSTRUCTION

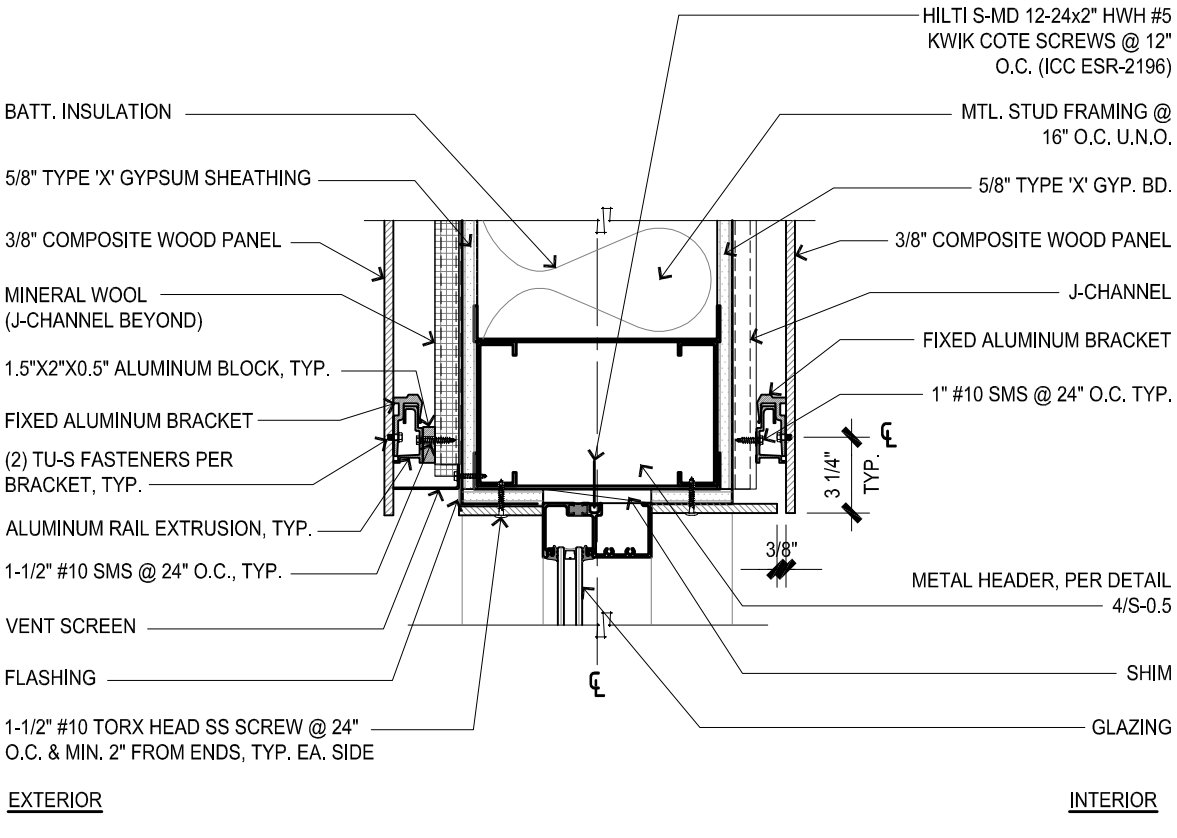
A. The stage lighting equipment manufacturer and/or the Contractor shall provide operations and maintenance instruction to School personnel as follows:

1. A minimum of two (2) and not to exceed four (4) hours of operations instruction for the School's faculty, staff, and students.
2. A minimum of one (1) and not to exceed two (2) hours of maintenance instruction for the School District’s maintenance staff

B. All training sessions shall be coordinated with the school schedule. Cost of such instructional services shall be part of the Contractor's bid.

C. Review of written operations and maintenance manuals and submittal drawings shall take place during these training sessions.

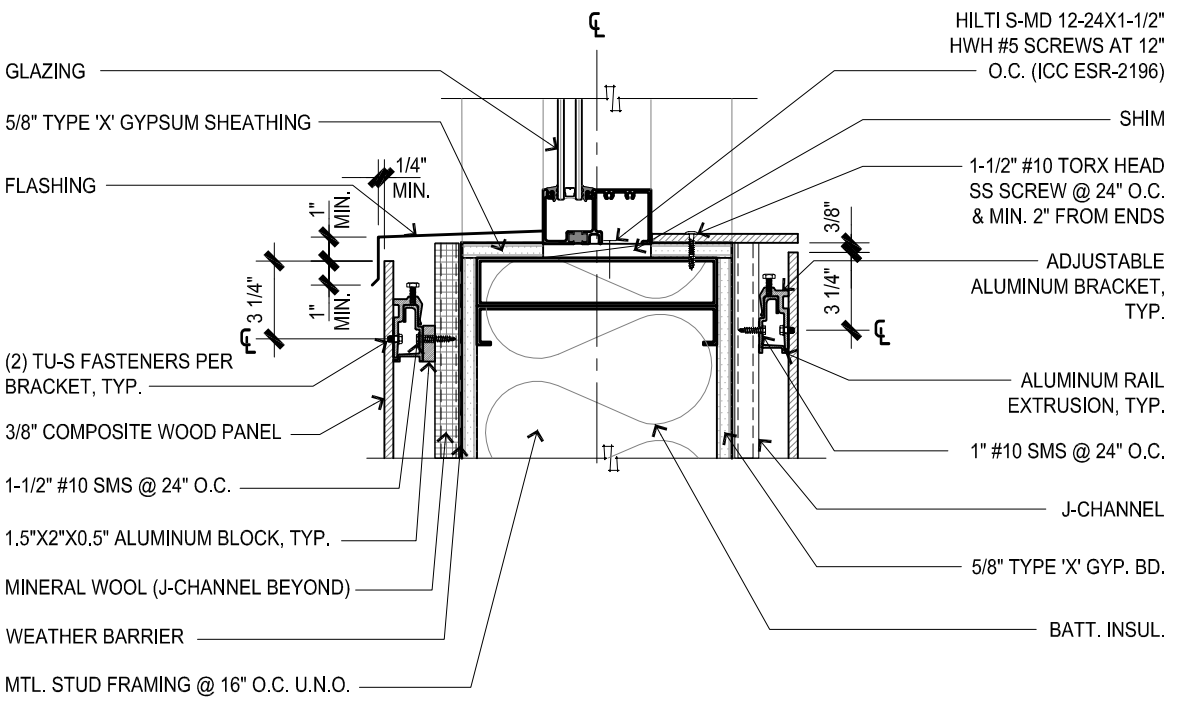
END OF SECTION



ACOUSTIC WALL PANELS @ DOOR

EXT. ALUM. WINDOW - HEAD (JAMB SIM.)	1-1/2"=1'-0"	17

2



ACOUSTIC WALL PANELS @ DOOR

EXT. ALUM. WINDOW - SILL	1-1/2"=1'-0"	19

2

LICENSED ARCHITECT ROGER CLARKE No. C-21340 Exp. 10-31-17 STATE OF CALIFORNIA

ADD #2

Project **CAJON HIGH SCHOOL THEATRE RENOVATION**
SAN BERNARDINO CITY UNIFIED SCHOOL DISTRICT

Title **EXT. WINDOW HEAD AND SILL DETAILS**
17 & 19/AD-6.0 DOOR & WINDOW DETAILS

Ruhnau Ruhnau **Clarke**
Architects▪Planners
3775 Tenth Street ▪ Riverside, CA 92501-3669 ▪ T 951 684 4664 ▪ F 951 684 6276
5751 Palmer Way, Suite C ▪ Carlsbad, CA 92010-7249 ▪ T 760 438 5899 ▪ F 760 931 8194

DSA A#	Date	Sheet No.
04-114799	6/2/2016	ASK 2.1
DSA F#	Scale	
36-H7	1-1/2"=1'-0"	

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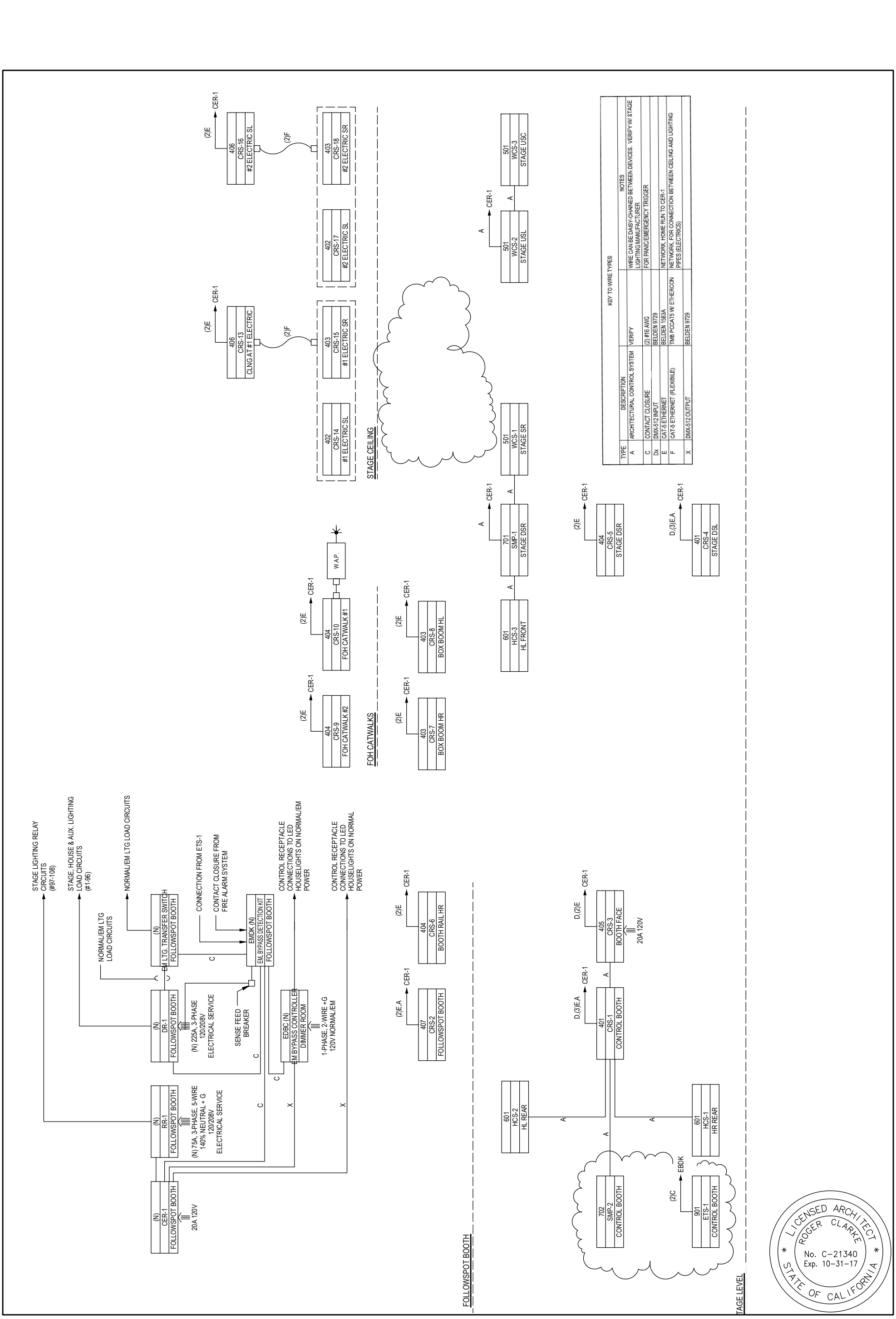
1-78-04



ADD 2

Project: CAJON HIGH SCHOOL THEATRE RENOVATION SAN BERNARDINO CITY UNIFIED SCHOOL DISTRICT		Title: CONTROL RISER REVISIONS 1/TL9.1.1	
Ruhnau Ruhnau Clarke Architects▪Planners 3775 Tenth Street▪ Riverside, CA 92501-3669▪ T 951 684 4664▪ F 951 684 6276 5751 Palmer Way, Suite C▪ Carlsbad, CA 92010-7249▪ T 760 438 5899▪ F 760 931 8194		DSA A#: 04-114799 DSA F#: 36-H7	Date: 6/6/2016 Scale: N.T.S.
			Sheet No.: TLSK 1

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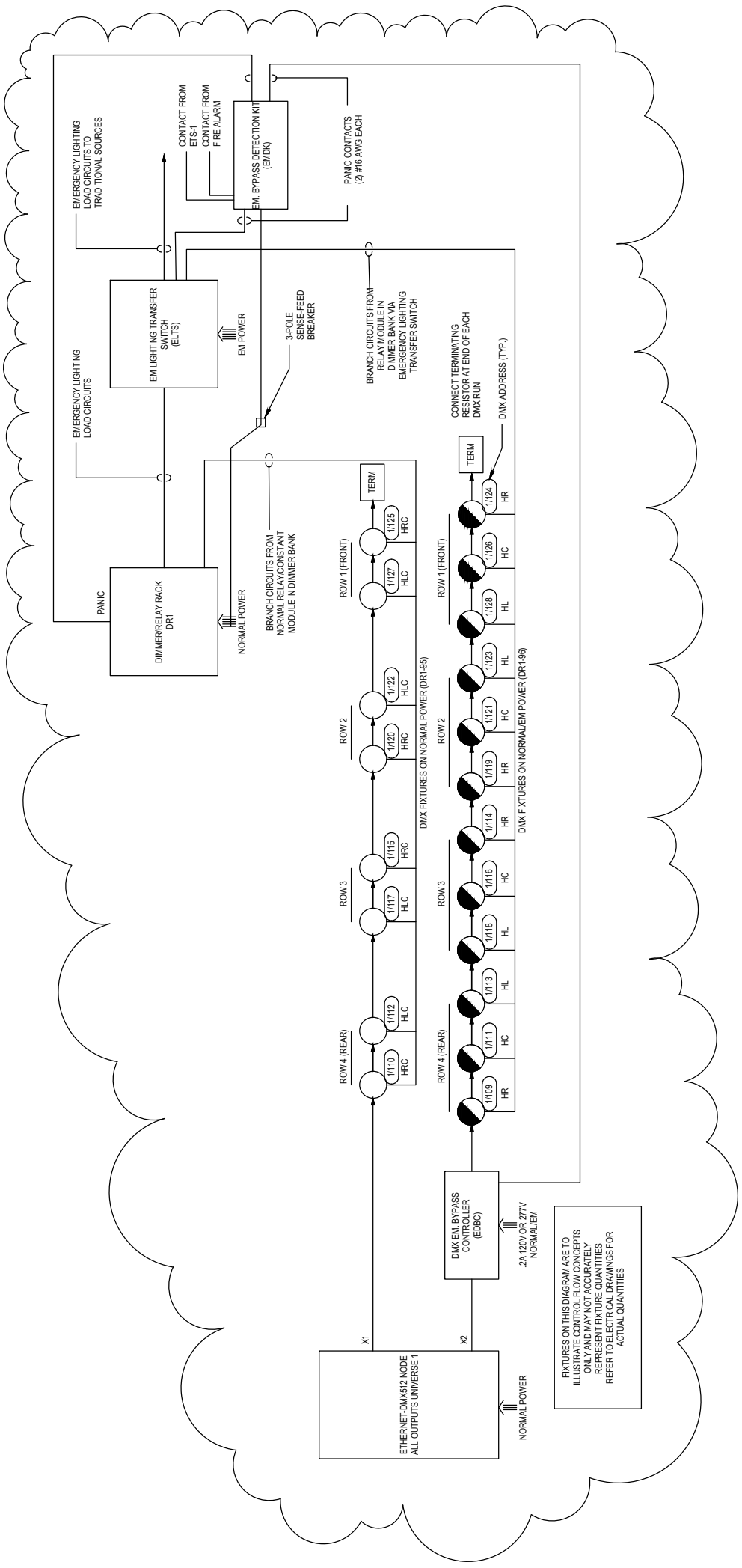

LICENSED ARCHITECT
ROGER CLARKE
No. C-21340
Exp. 10-31-17
STATE OF CALIFORNIA

ADD 2

Project: CAJON HIGH SCHOOL THEATRE RENOVATION SAN BERNARDINO CITY UNIFIED SCHOOL DISTRICT		Title: HOUSELIGHT CONTROL FLOW 2/TL9.1.1	
Ruhnau Ruhnau Clarke Architects▪Planners 3775 Tenth Street▪ Riverside, CA 92501-3669▪ T 951 684 4664▪ F 951 684 6276 5751 Palmer Way, Suite C▪ Carlsbad, CA 92010-7249▪ T 760 438 5899▪ F 760 931 8194	DSA A#: 04-114799 DSA F#: 36-H7	Date: 6/6/2016 Scale: N.T.S.	Sheet No.: TLSK 2

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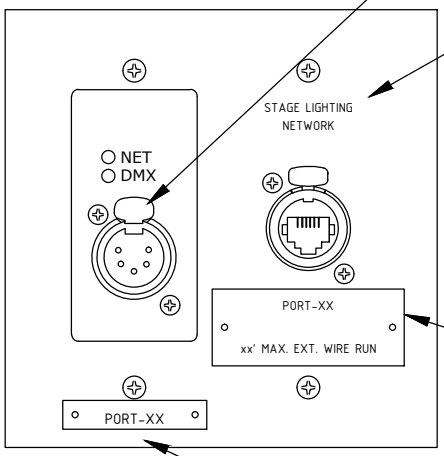


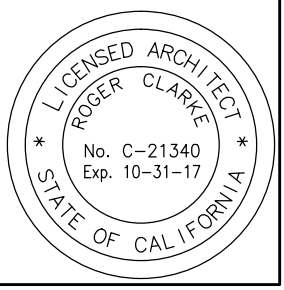
1-PORT ETHERNET-TO-DMX512 OUTPUT NODE WITH INDICATOR LEDS. NODE TO BE POWERED VIA PoE

CONNECTOR ID LABEL. ENGRAVE AND FILL WITH WHITE PAINT. (TYPICAL FOR ALL CONTROL RECEPTACLE STATIONS)

LAMACOID LABEL WITH PORT # AND MAXIMUM EXTENSION CABLE LENGTH. TYPICAL FOR ALL STAGE LIGHTING NETWORK CONNECTIONS.

LAMACOID LABEL OR ENGRAVING WITH PORT #. TYPICAL FOR ALL INSTALLED 1-PORT NODES.

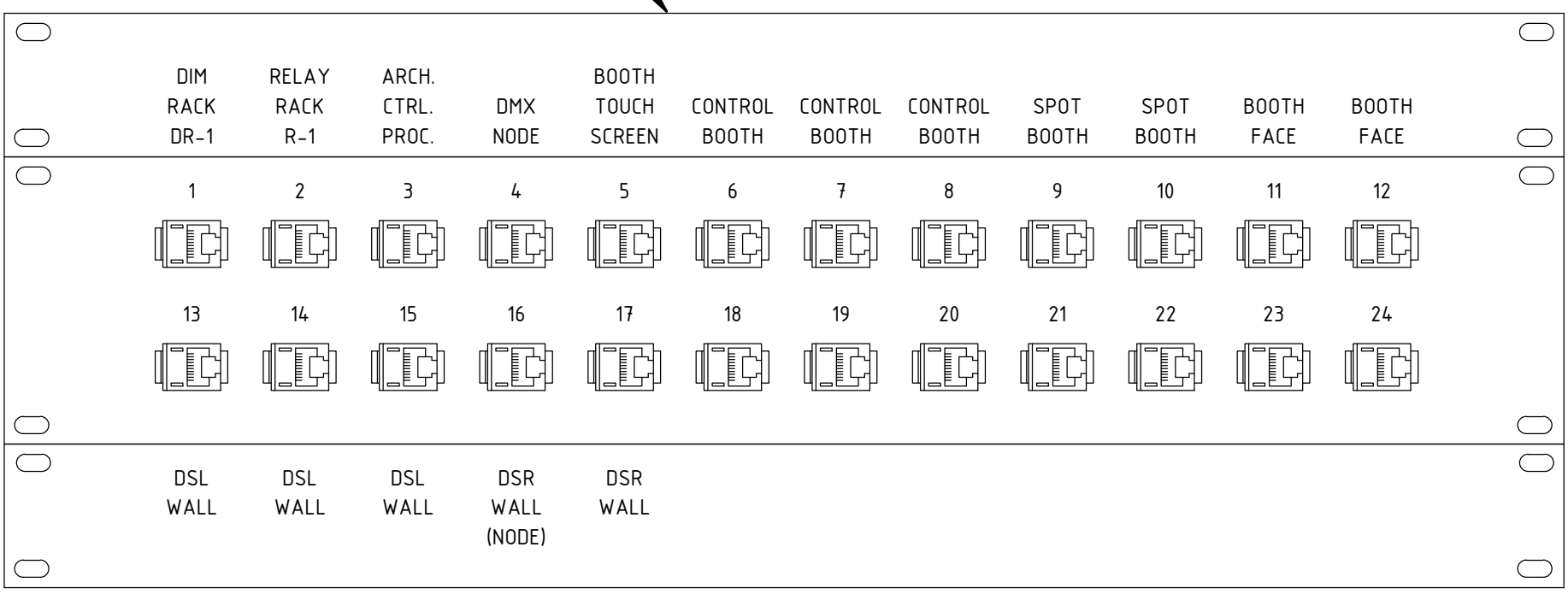
STA.	ID	LOCATION	MOUNTING	BOX SIZE	FINISH	NETWORK PORT #
CRS	5	STAGE DSR	FLUSH	2G DEEP BY E.C.	BLACK	16,17
CRS	6	BOOTH RAIL HR	FLUSH	2G DEEP BY E.C.	BLACK	35,36
CRS	9	FOH CATWALK #2	SURFACE	2G BY LTG. MFR.	BLACK	25,26
CRS	10	FOH CATWALK #1	SURFACE	2G BY LTG. MFR.	BLACK	27,28



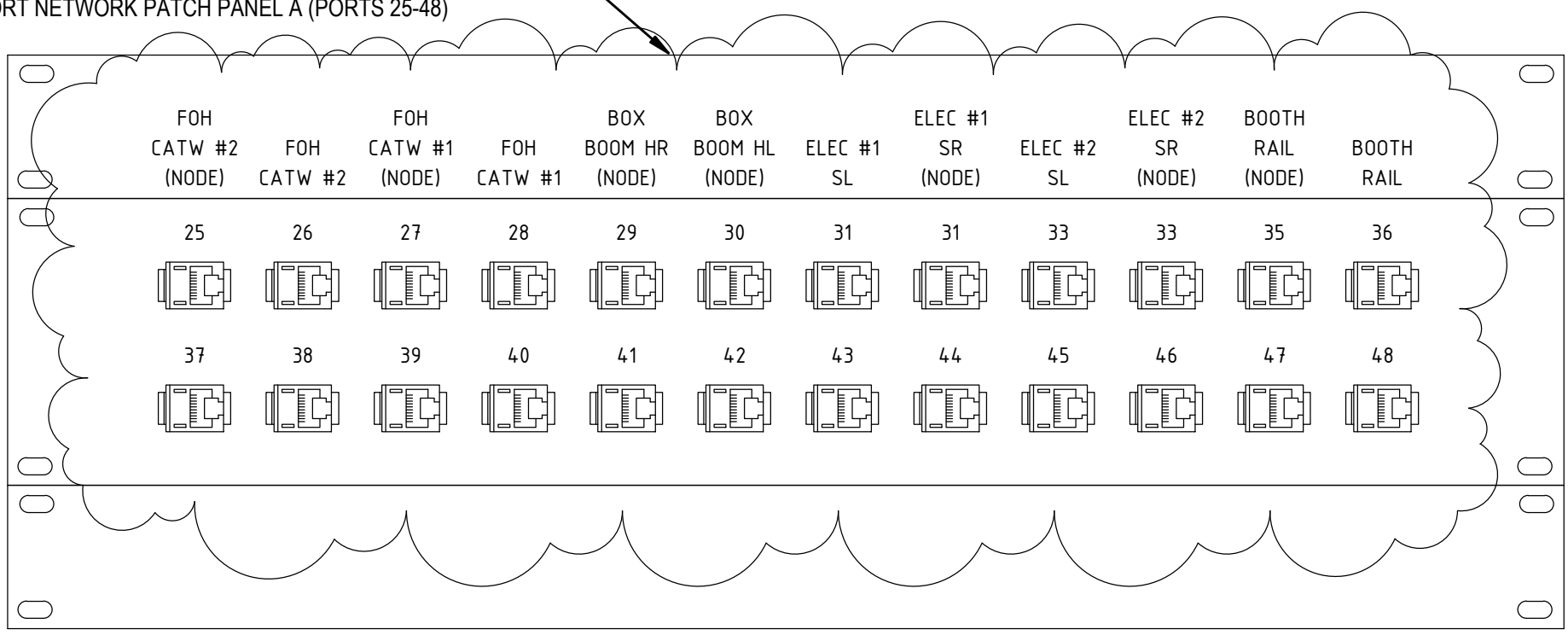
ADD 2

Project CAJON HIGH SCHOOL THEATRE RENOVATION SAN BERNARDINO CITY UNIFIED SCHOOL DISTRICT		Title CONTROL RECEPTACLE STATION - TYPE 404 4/TL8.2.1	
Ruhnau Ruhnau Clarke Architects▪Planners ▫ 3775 Tenth Street▪ Riverside, CA 92501-3669▪ T 951 684 4664▪ F 951 684 6276 ▫ 5751 Palmer Way, Suite C▪ Carlsbad, CA 92010-7249▪ T 760 438 5899▪ F 760 931 8194	DSA A# 04-114799	Date 6/6/2016	Sheet No. TLSK 3
	DSA F# 36-H7	Scale 6"=1'-0"	

STAGE LIGHTING CONTROL NETWORK
12-PORT LABEL PANELS A (UPPER) & B (LOWER).
24-PORT NETWORK PATCH PANEL A (PORTS 1-24)



STAGE LIGHTING CONTROL NETWORK
12-PORT LABEL PANELS C (UPPER) & D (LOWER).
24-PORT NETWORK PATCH PANEL A (PORTS 25-48)



NOTES:

1. REFER TO 1/TL8.2.3 FOR PLACEMENT OF PATCH AND LABEL PANELS IN CONTROL EQUIPMENT RACK 'CER-1'.
2. SUPPLY RED PATCH CABLES FOR PERMANENTLY-CONNECTED DEVICES (PORTS 1-5). ALL OTHER PATCH CABLES ARE TO BE BLUE, OR ANOTHER CONTRASTING COLOR.

LICENSED ARCHITECT
ROGER CLARKE
No. C-21340
Exp. 10-31-17
STATE OF CALIFORNIA

ADD 2

Project: CAJON HIGH SCHOOL THEATRE RENOVATION SAN BERNARDINO CITY UNIFIED SCHOOL DISTRICT		Title: NETWORK PATCH PANEL LAYOUTS 3/TL8.2.3	
Ruhnau Ruhnau Clarke Architects▪Planners 3775 Tenth Street▪ Riverside, CA 92501-3669▪ T 951 684 4664▪ F 951 684 6276 5751 Palmer Way, Suite C▪ Carlsbad, CA 92010-7249▪ T 760 438 5899▪ F 760 931 8194	DSA A#: 04-114799 DSA F#: 36-H7	Date: 6/6/2016 Scale: N.T.S.	Sheet No.: TLSK 4

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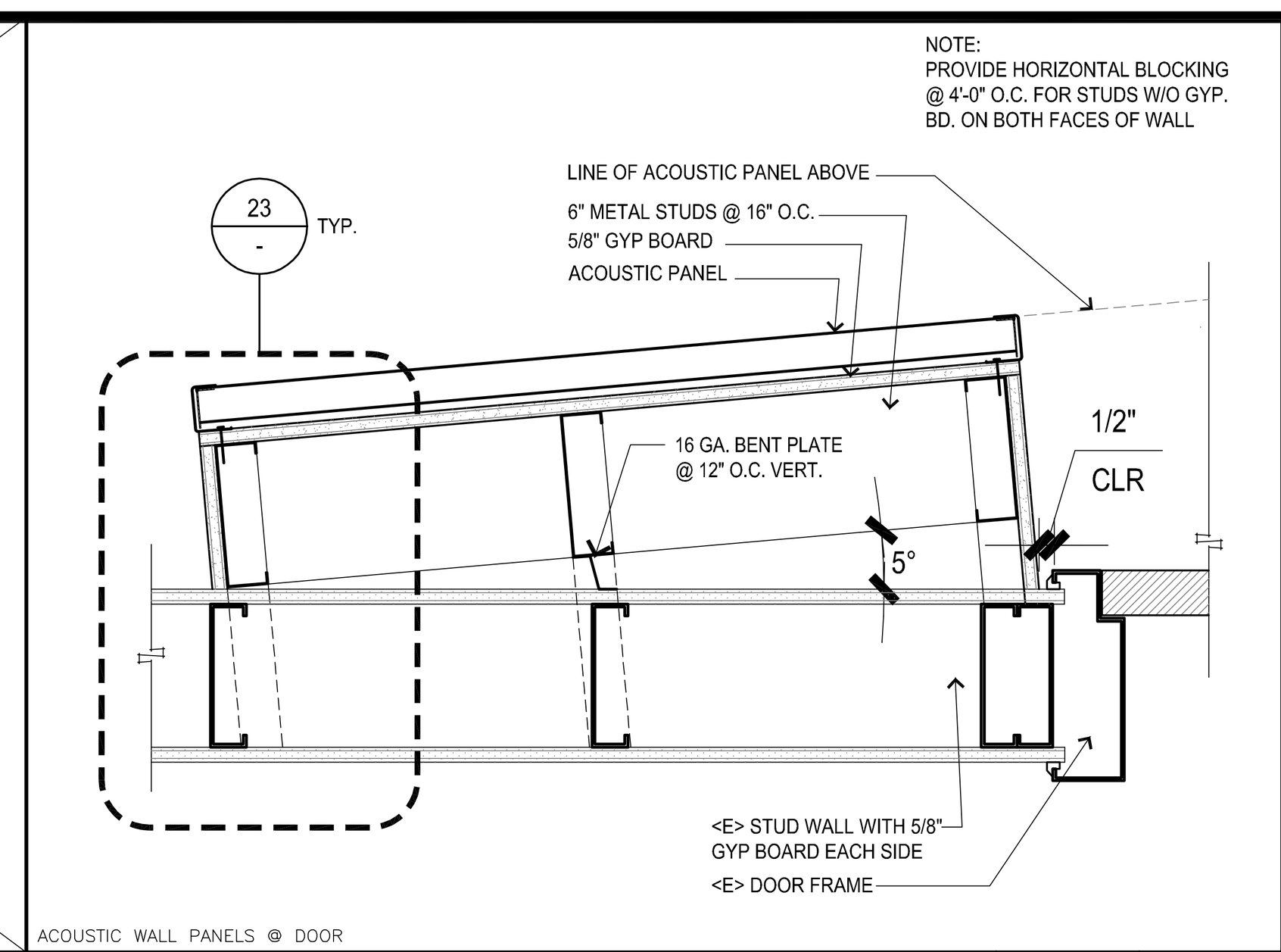
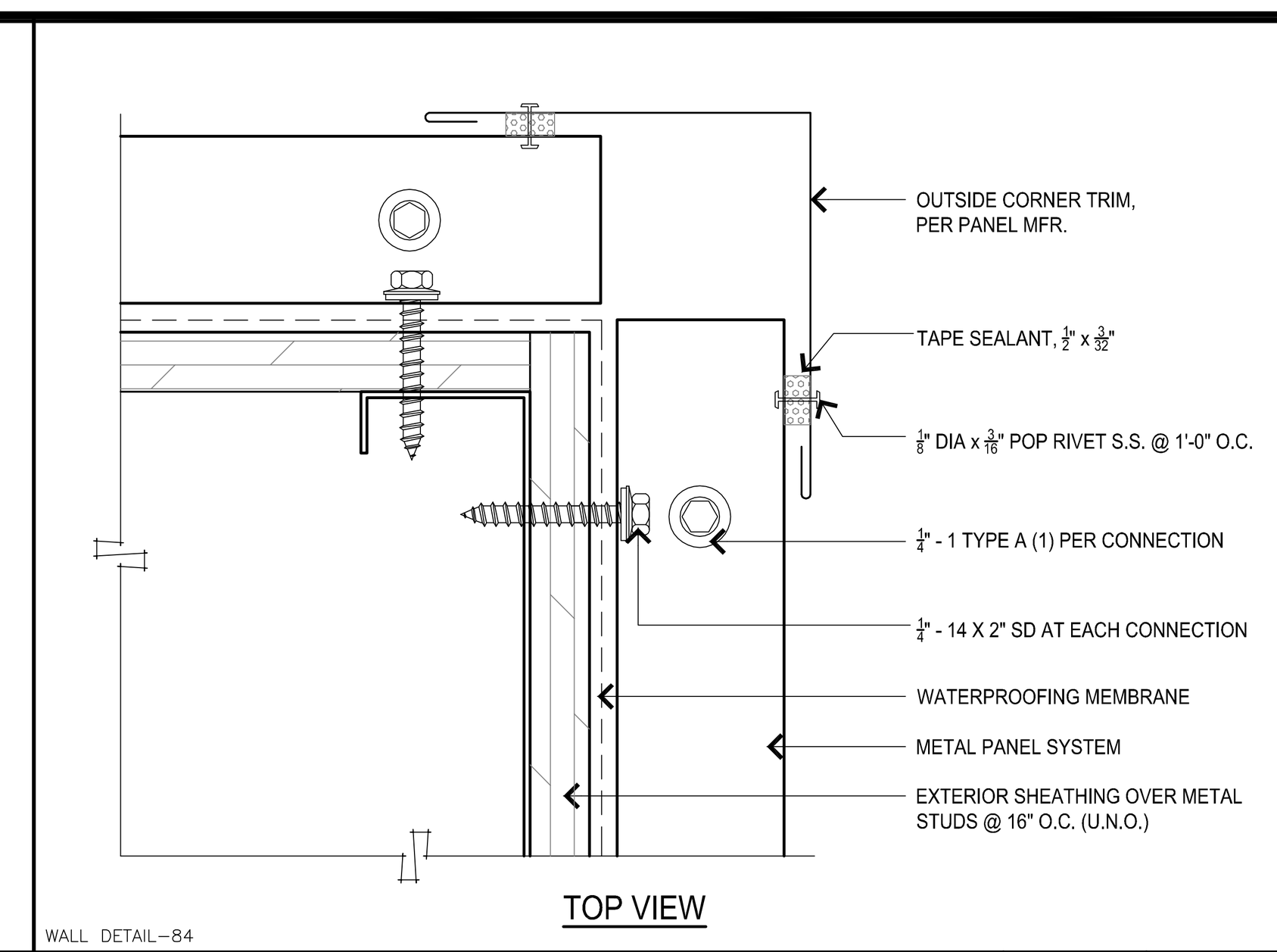
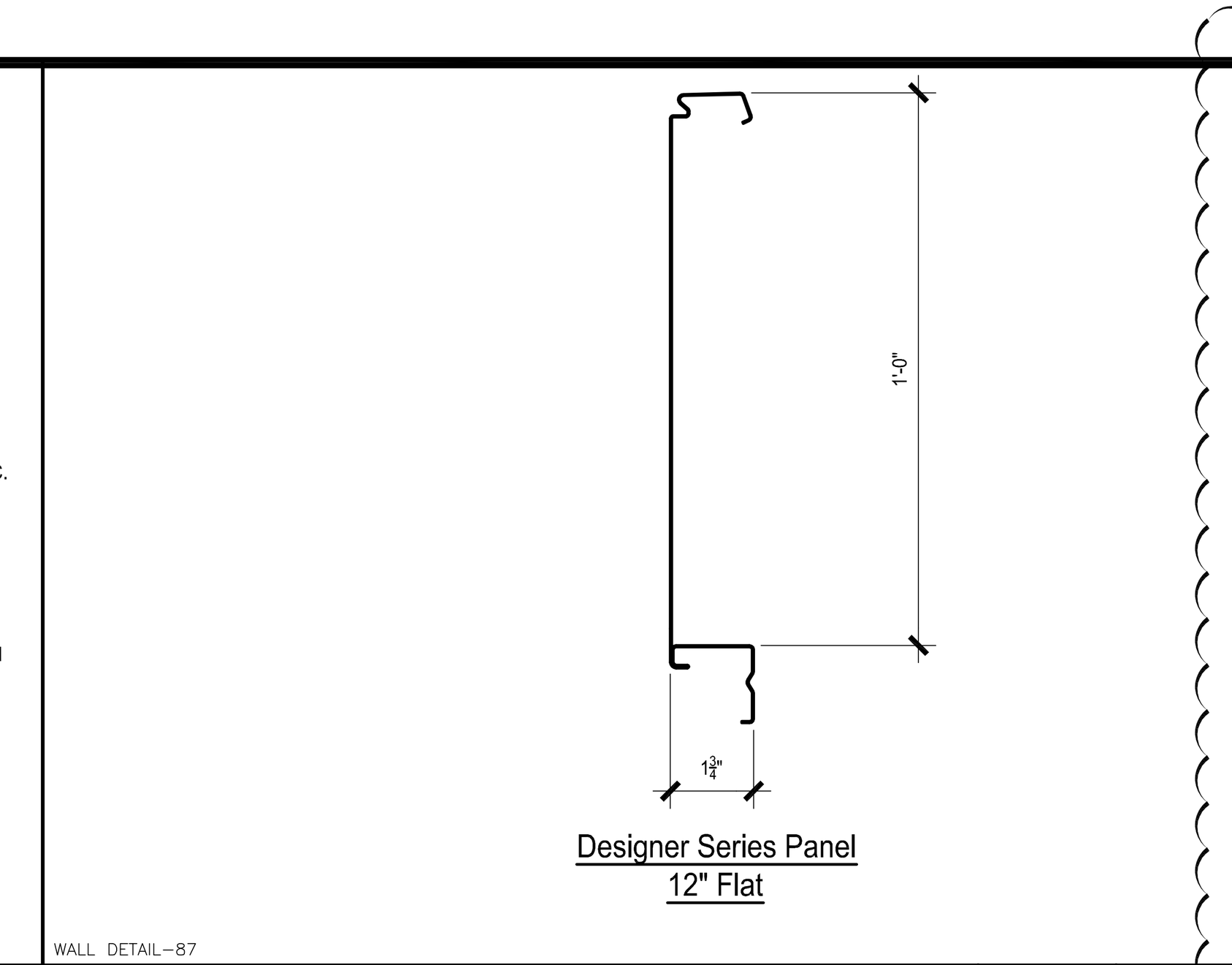


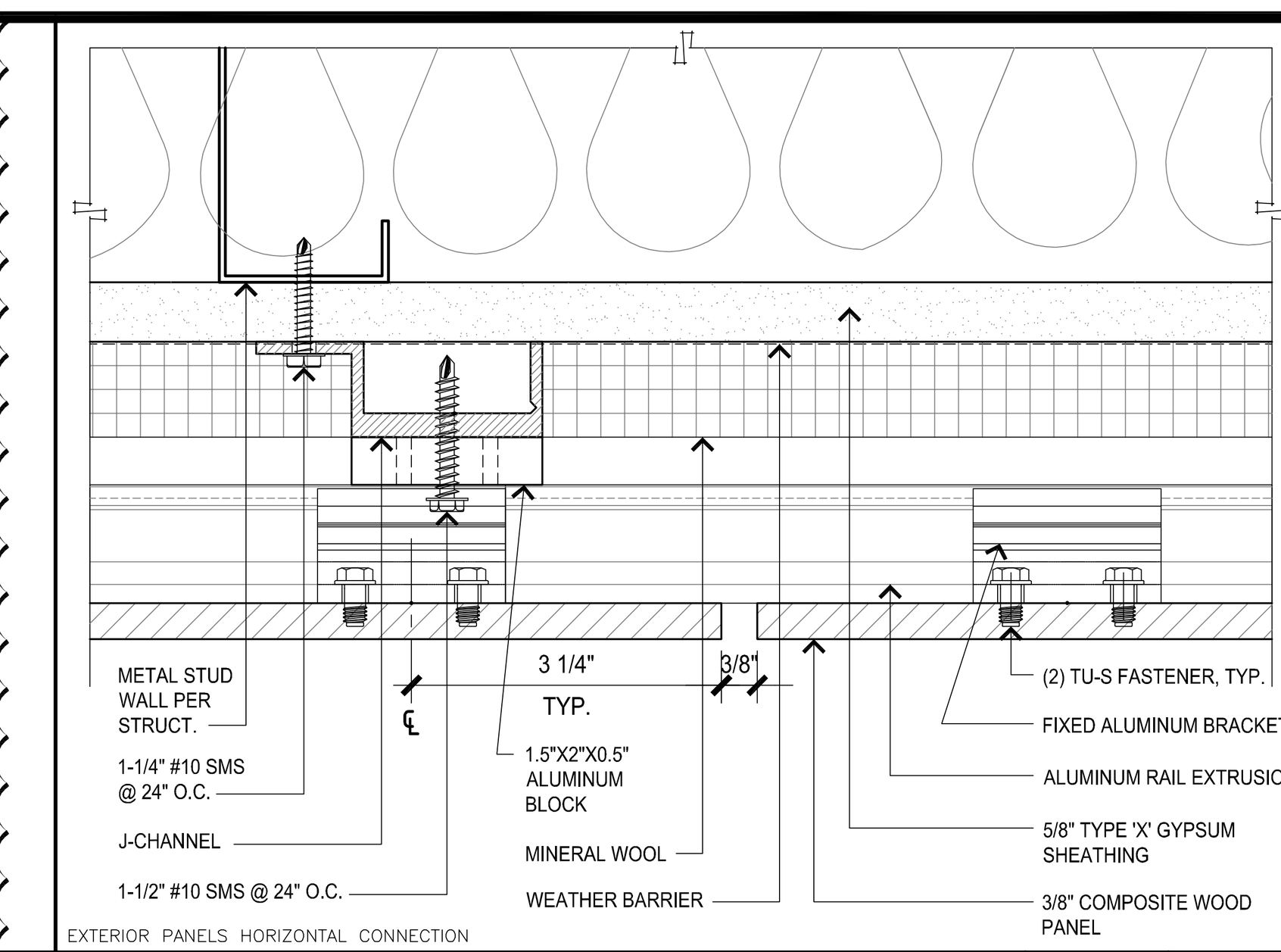
ACOUSTIC WALL PANELS @ DOOR FRAME | 1-1/2"=1'-0" | 21



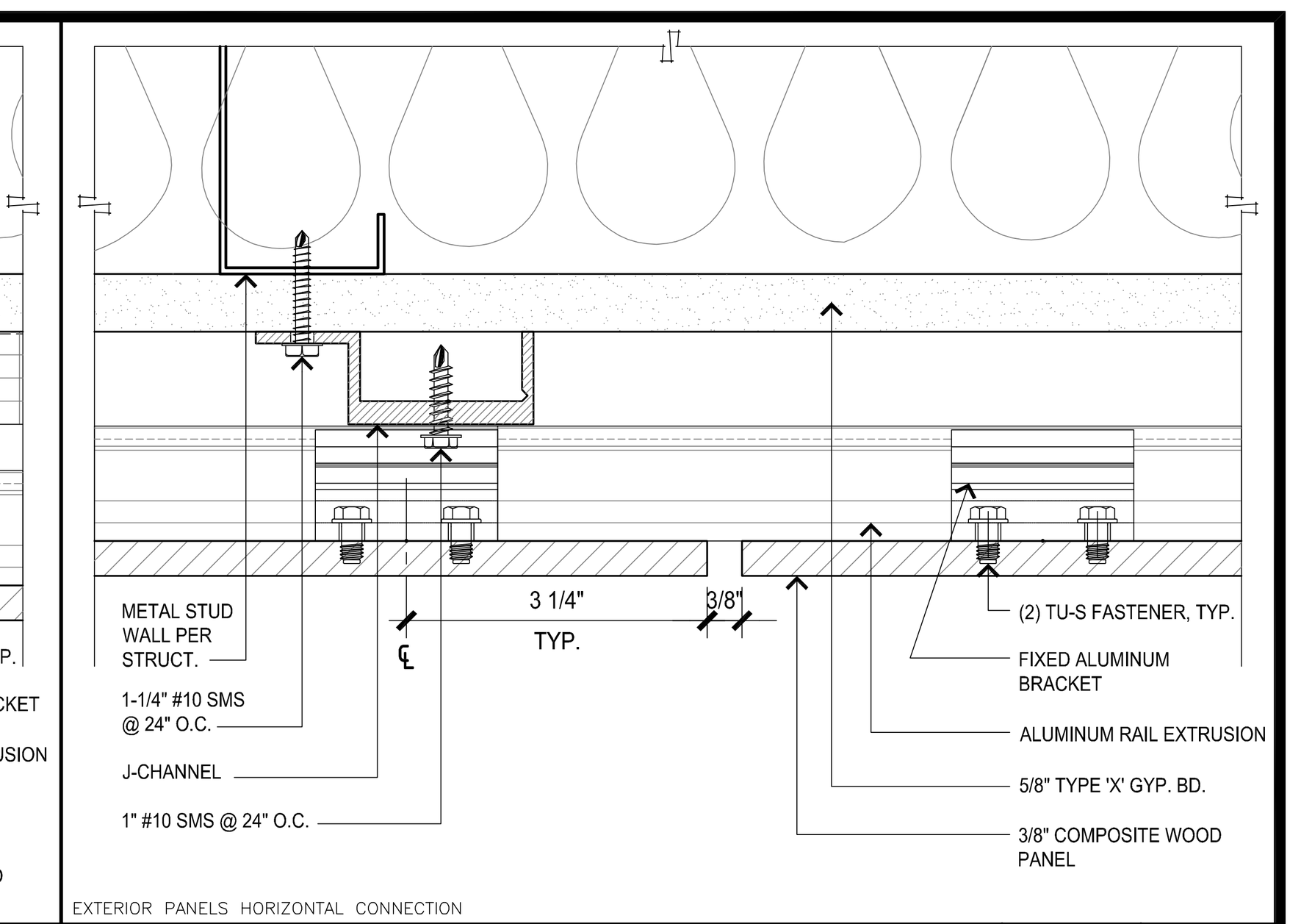
METAL PANEL SYSTEM - OUTSIDE CORNER | 6"=1'-0" | 16



METAL PANEL SYSTEM - PROFILE | 3"=1'-0" | 11

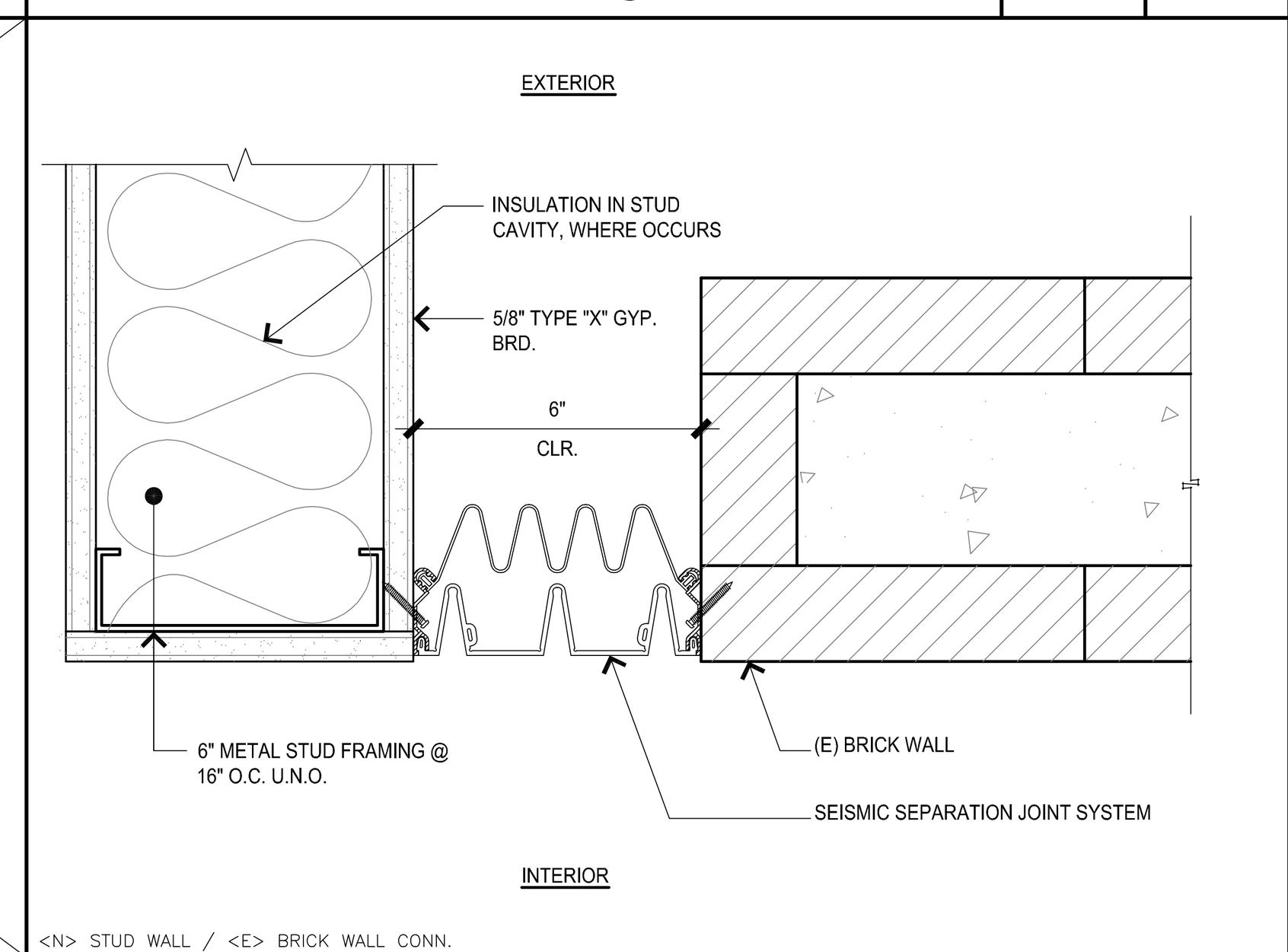


EXT. WALL PANELS HORIZONTAL CONNECTION | 6"=1'-0" | 6

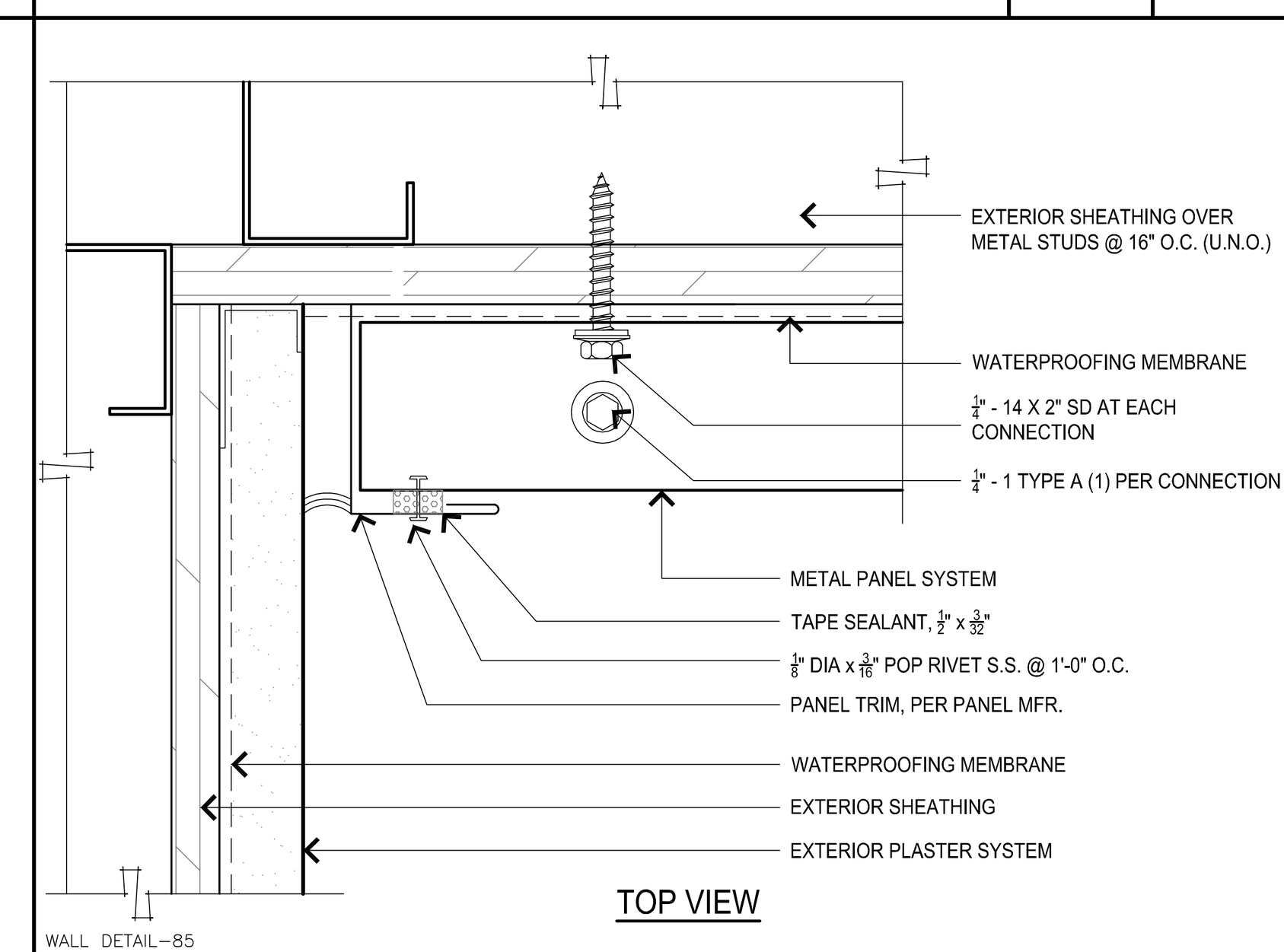


INT. WALL PANELS HORIZONTAL CONNECTION | 6"=1'-0" | 1

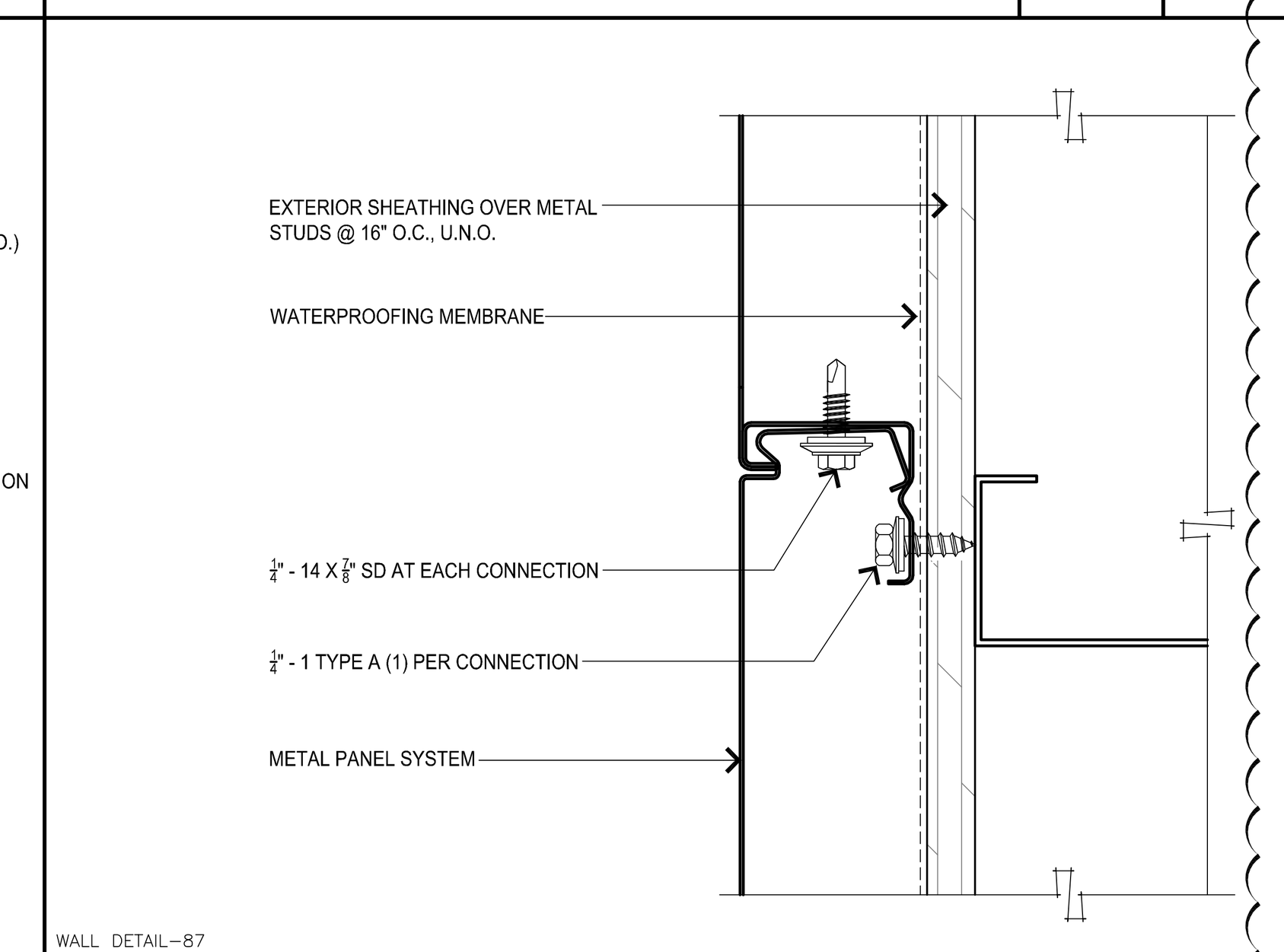
NOT USED | -- | 27



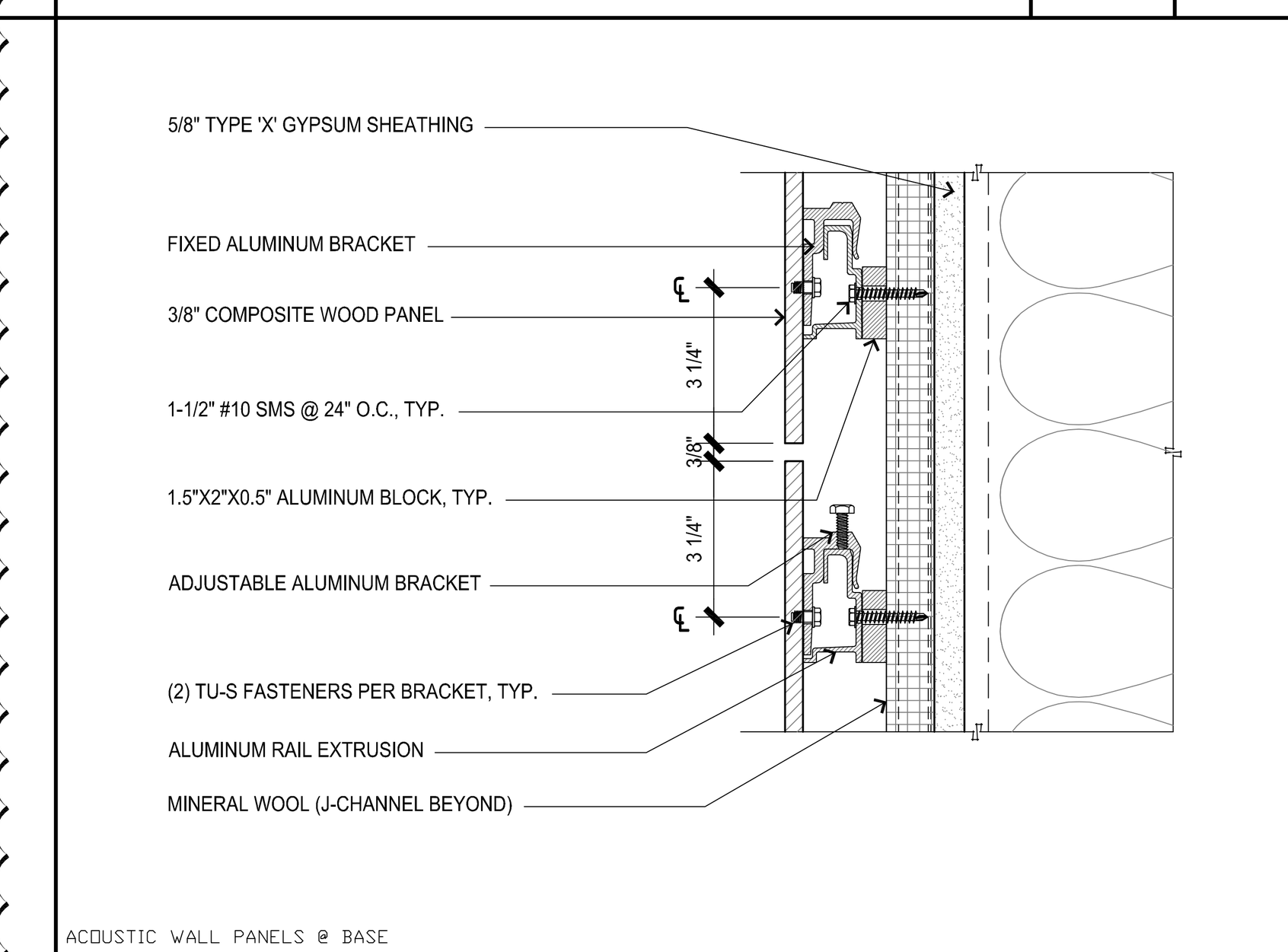
SEISMIC JOINT (N) TO (E) WALL | 3"=1'-0" | 22



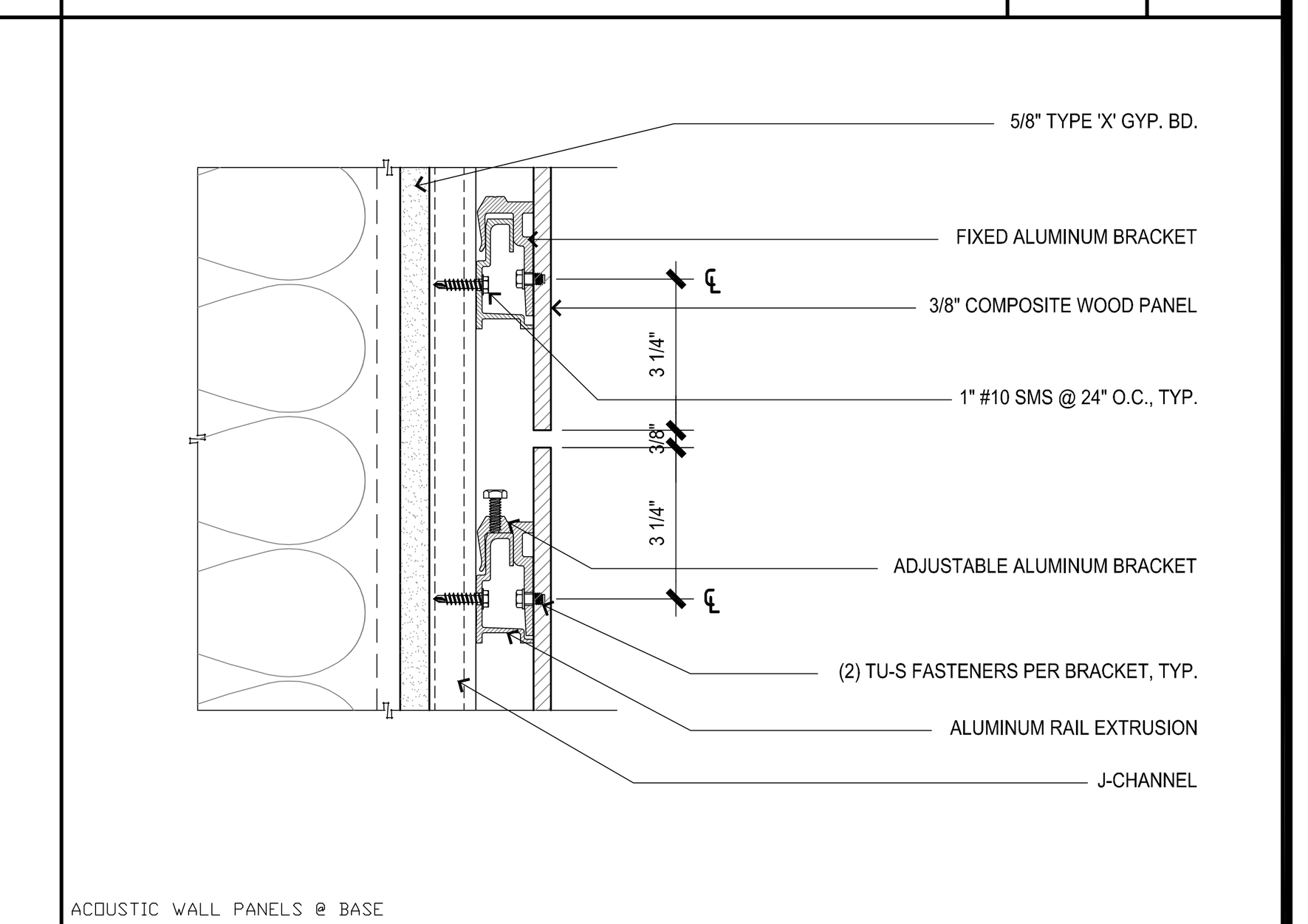
METAL PANEL SYSTEM @ ADJACENT FINISH | 6"=1'-0" | 17



METAL PANEL SYSTEM - SIDE LAP | 6"=1'-0" | 12

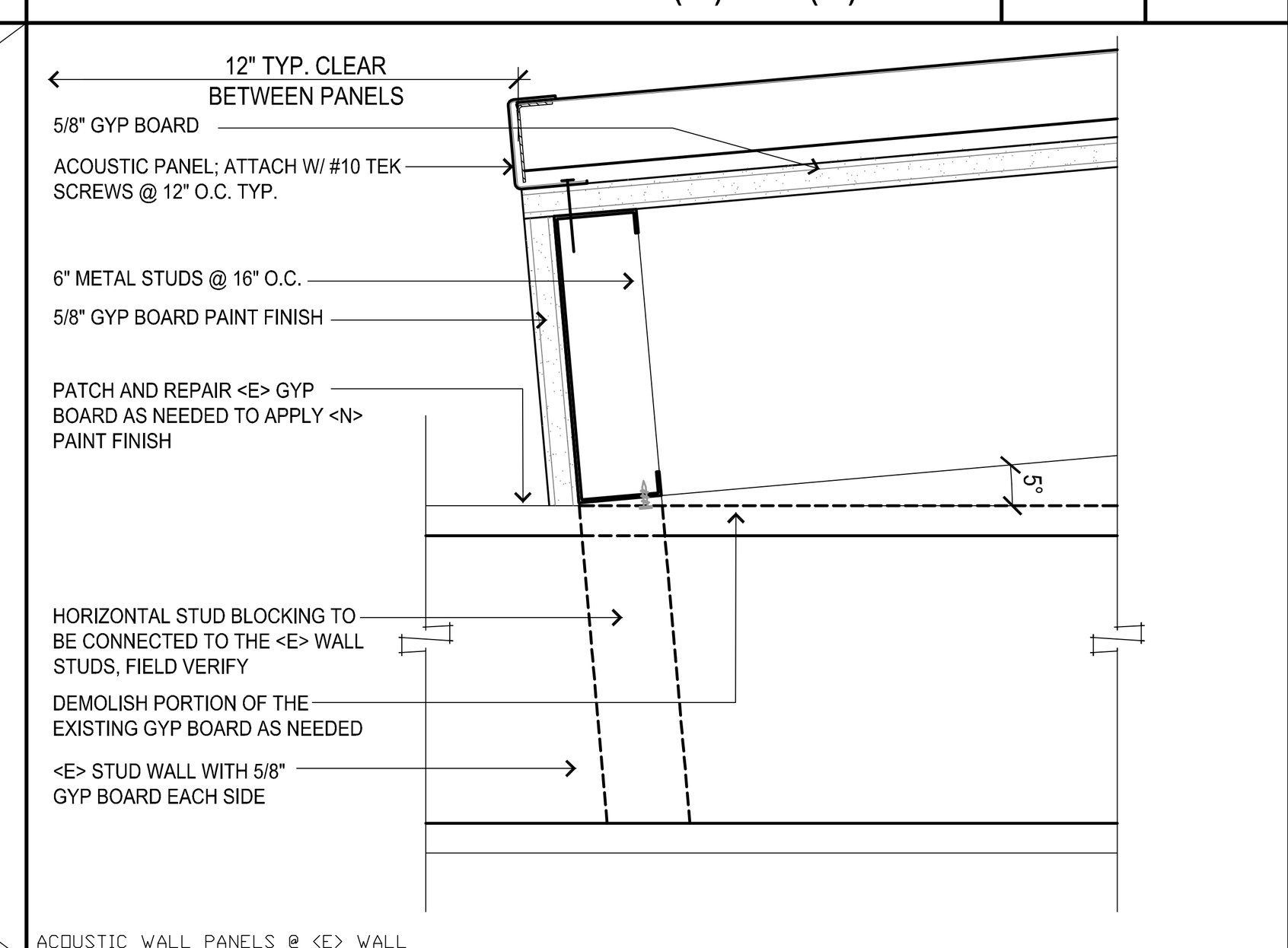


EXT. WALL PANELS VERTICAL CONNECTION | 3"=1'-0" | 7

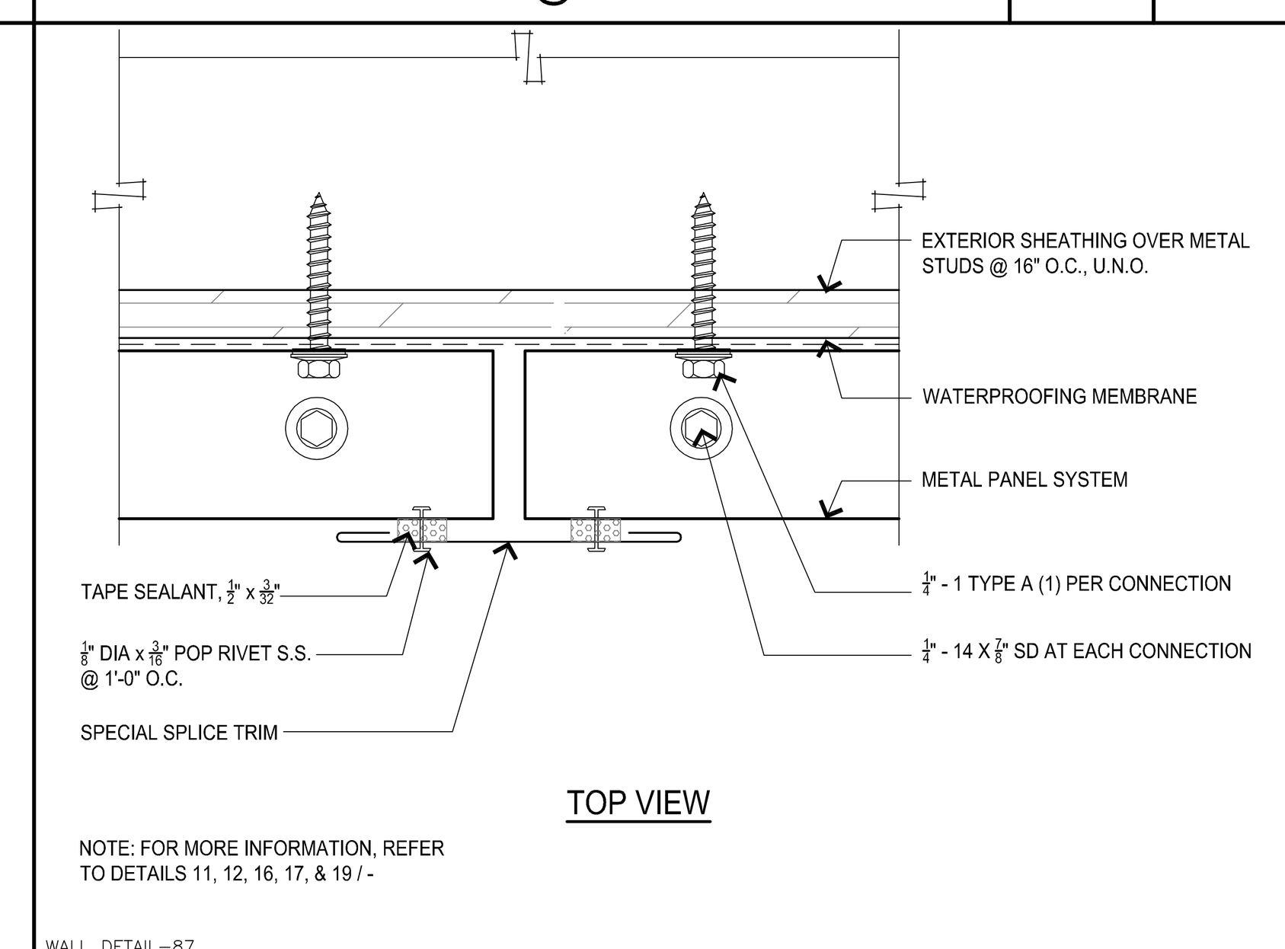


INT. WALL PANELS VERTICAL CONNECTION | 3"=1'-0" | 2

NOT USED | -- | 28

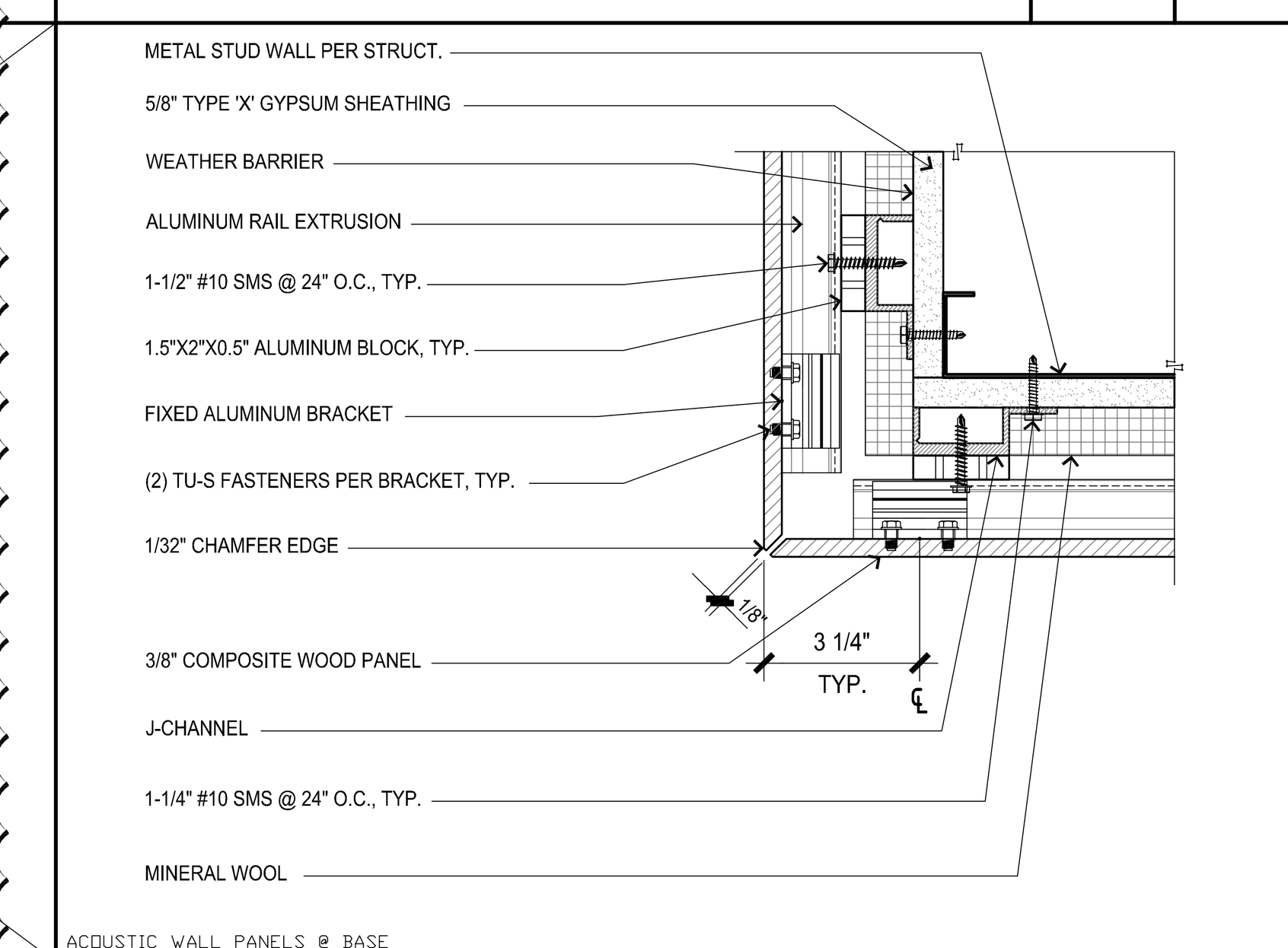


THEATRE ACOUSTIC WALL PANELS @ <E> WALL | 3"=1'-0" | 23

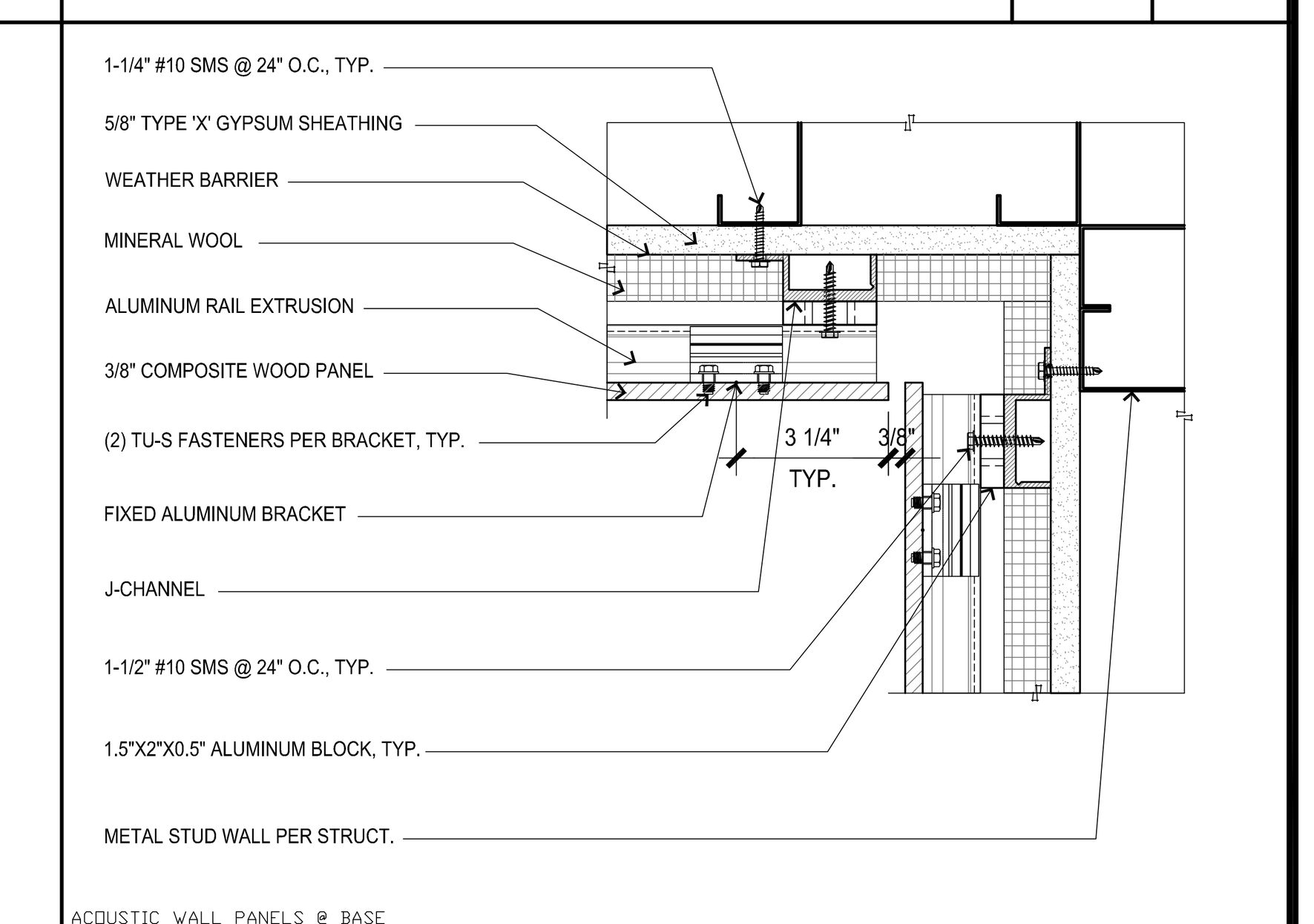


METAL PANEL SYSTEM - JOINT | 6"=1'-0" | 18

NOT USED | - | 13

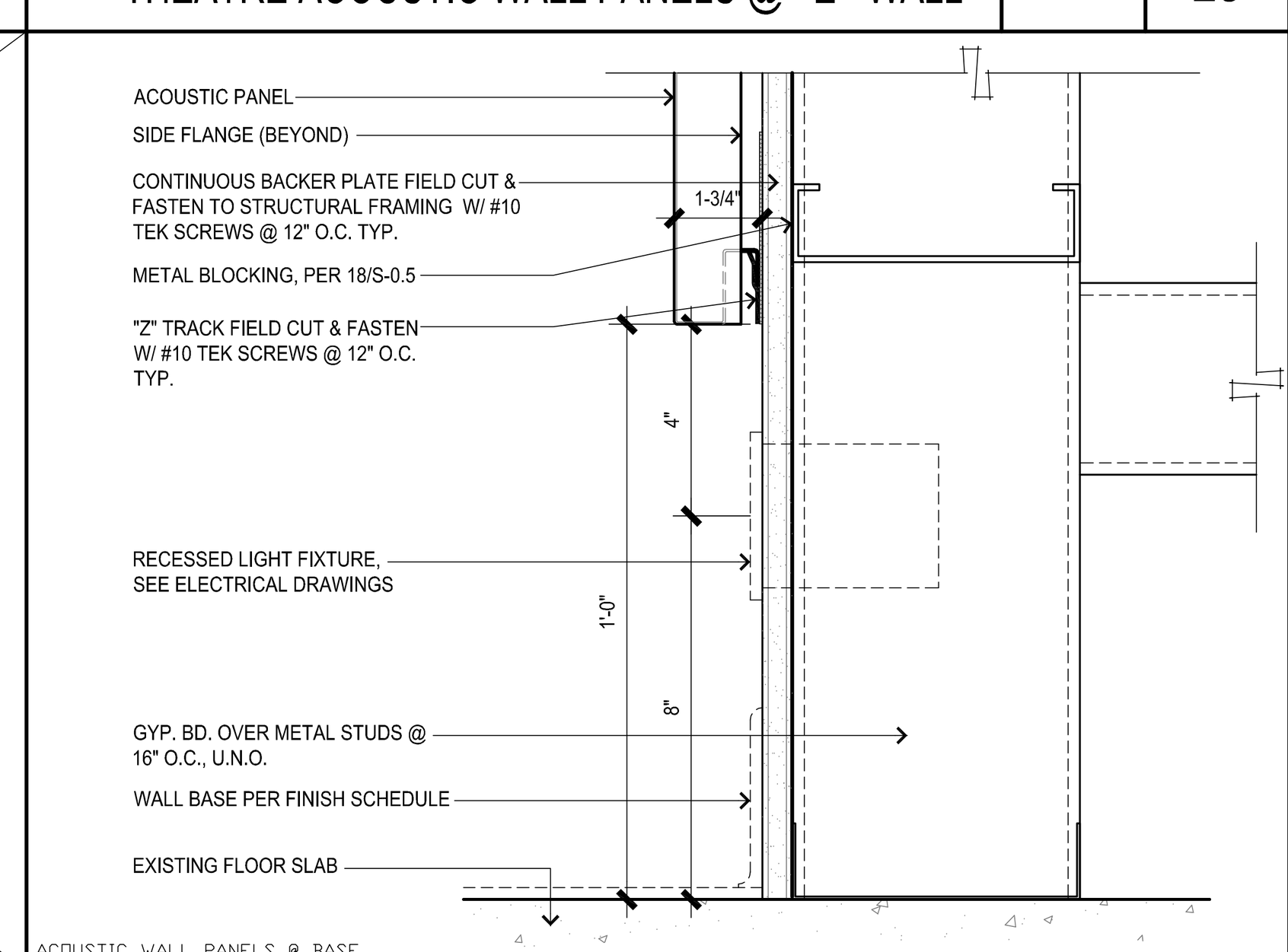


EXT. WALL PANELS EXTERIOR CORNER | 3"=1'-0" | 8

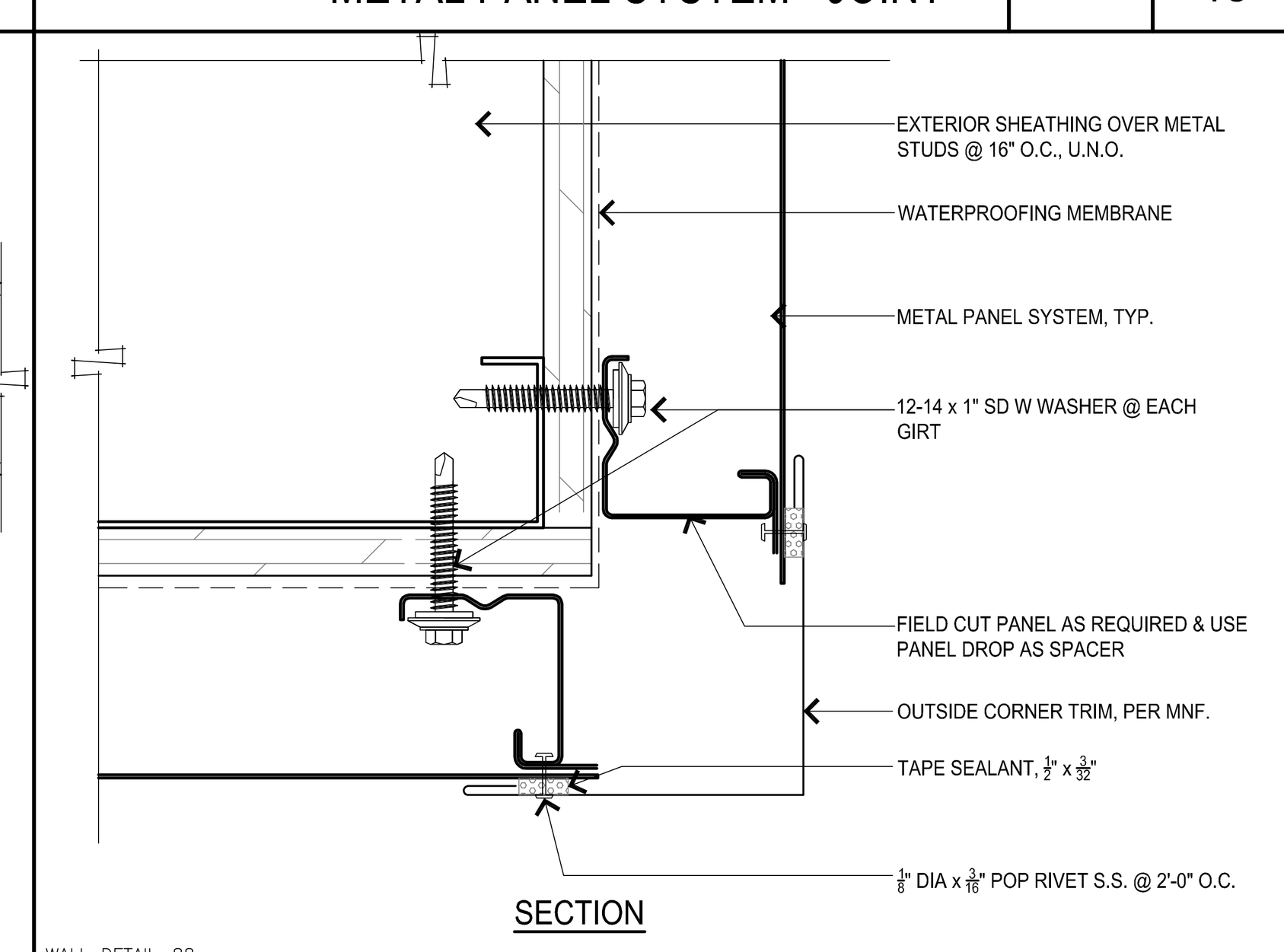


EXT. WALL PANELS INTERIOR CORNER | 3"=1'-0" | 3

NOT USED | -- | 29



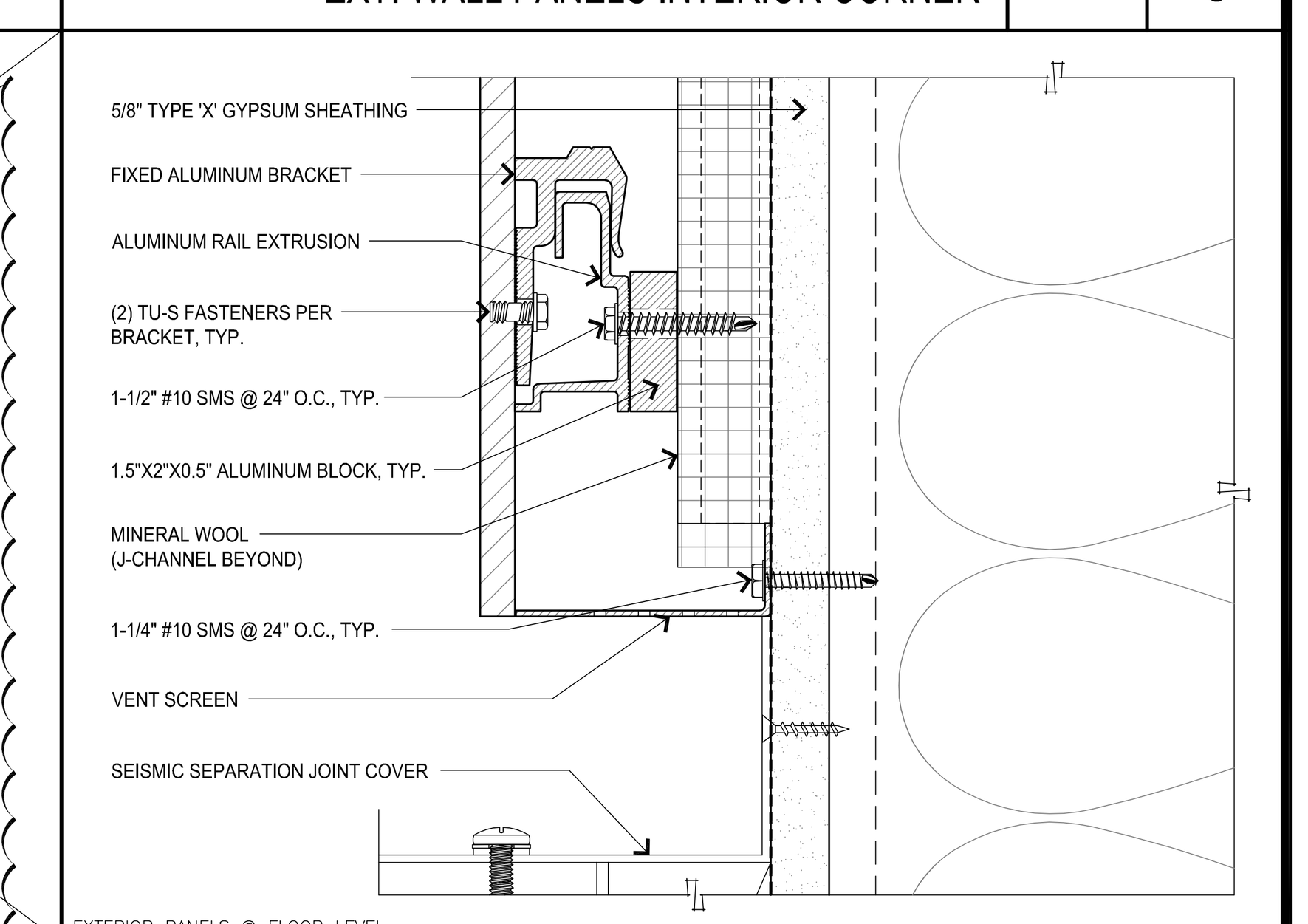
THEATRE ACOUSTIC WALL PANELS @ BASE | 3"=1'-0" | 24



METAL PANEL SYSTEM - SOFFIT | 6"=1'-0" | 19

NOT USED | - | 14

NOT USED | - | 9



DRIP EDGE @ SEISMIC JOINT | 6"=1'-0" | 4

NOT USED | -- | 30

NOT USED | -- | 25

NOT USED | -- | 20

NOT USED | -- | 15

NOT USED | -- | 10

NOT USED | -- | 5

RRC PROJECT NO: 1-78-04
DRAWN BY: DDLR,MM CHECKED BY: JD

ISSUED:

NO.	DATE	DESCRIPTION
1	09/04/15	50% CD SET
2	09/30/15	75% CD SET
3	11/06/15	DSA SUBMITTAL SET
4	04/05/16	DSA BACK CHECK

REVISIONS:

NO.	DATE	DESCRIPTION

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CAJON HIGH SCHOOL THEATRE RENOVATION

1200 HILL DRIVE, SAN BERNARDINO, CA 92407
SAN BERNARDINO CITY UNIFIED SCHOOL DISTRICT

CONSULTANT

ARCHITECT

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
04-114799
AC ___ FLS ___ SS ___
DATE ___

DSA APPROVAL

WALL DETAILS

Sheet Number
AD-2.2

CAJON HIGH SCHOOL THEATRE RENOVATION