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ADDENDUM NO. 8

DATE: 09/28/2026

NOTE:
Addendum 1 through Addendum 6 were issued as Part of Phase 3.
These were all DSA approved and incorporated into the Phase 3b Bid Documents.

Addendum 7 was prepared for this Phase 3b bid and a select set of Structural, Plumbing and Mechanical sheets have been incorporated into the set of bid documents.
Addendum 7 has been sent to DSA for review and approval.

This Addendum 8 is the first Addendum to be published to the bidders for the Phase 3b bid.

PROJECT:
SANGER EDUCATION COMPLEX – PHASE 3b
Development of Building L, associated site development work and Alternate Bid 1
1850 S. Fowler Ave, Fresno, CA 93727



OWNER:
SANGER UNIFIED SCHOOL DISTRICT
1905 Seventh Street
Sanger, CA 93657

ARCHITECT:
DARDEN ARCHITECTS, INC.
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DARDEN PROJECT NO. 2171.L
DSA APPL. NO. 02-120779

It will be the responsibility of the General Contractor to submit the information contained in this addendum to all its subcontractors and suppliers. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.

The following additions, deletions, and revisions to the SHEETS and Project Manual are hereby made and do become a part of these Contract Documents.

INDEX OF ADDENDA TRANSMITTED HEREWITH

CHANGES TO BIDDING CONDITIONS..... AD8-CBC01 thru AD8-CBC02
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- 11 61 23 - PORTABLE SEATING PLATFORMS AND SEAT SYSTEMS ..... 10 pages
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CHANGES TO BIDDING CONDITIONS

AD8- CBC01 Material Procurement and Project Planning.

1. Following the award of contractor, the Distict would like the contractor to set up a meeting and discuss material procurement, lead times and the contractors plan to manage these items.
2. The following is a list of materials that we might suggest the contractor consider and better define for material durations, and installation target dates.

   MCM panels
   Fiber Cement Plans
   Mechanical Equipment
   Electrical Equipment: Switchgear, specialty panels with motorized breakers
   Distribution Panels, etc.
   ABB, GE, Siemens, Eaton and SQD may have lead times as much as 9 months.
   Note: The Overcurrent Coordination Study shall be concurrent with the equipment procurement.
3. The Contractor shall also prepare a plan on how Temporary services will be used and any planning the contractor needs to take with getting access to the existing school site utilities.

AD8- CBC02 Site Cleanliness.

1. The Contractor shall, at all times, maintain the Project site and all building spaces affected by the Work in a clean, neat, and orderly condition. Trash, debris, packaging, and other waste materials shall not be allowed to accumulate at the site; at a minimum, the Contractor shall collect and legally remove all trash and debris from the site and from within building spaces not less than once per week, and more frequently as conditions warrant. Interior work areas shall be left broom-clean, and exterior areas free of loose debris, at the close of each work week. Because the Work is being performed on an active, occupied school campus, the Contractor shall give particular attention to areas visible to or accessible by students, staff, and the public, and shall not permit trash or debris to create an unsafe, unsanitary, or unsightly condition. The cost of complying with this requirement shall be included in the Contractor's bid; no additional compensation or extension of Contract Time will be allowed on account of site cleanliness or cleanup obligations. Should the Contractor fail to maintain the site and building spaces as required, the Owner may perform or contract for the necessary cleanup and deduct the cost thereof from amounts otherwise due the Contractor.

CHANGES TO PREVIOUS ADDENDUM:

AD8-CPA1 Refer to Addendum 7, Structural Drawing Sheet L/S202A.4 AD7

1. Omit Sheet L/S202A.4 AD7 and replace the sheet with the attached L/S202A.4 AD8.
2. The changes are clouded.
3. The Steel members for the equipment blocking and supports have changed.

AD8-CPA2 Refer to Addendum 7, Structural Drawing Sheet L/S202B.4

1. Omit Sheet L/S202B.4 AD7 and replace the sheet with the attached L/S202B.4 AD8.
2. The changes are clouded.
3. The Steel members for the equipment blocking and supports have changed.

AD8- CPA3 Refer to Addendum 7, Sheet L/P301.4 AD7 - OVERALL PLUMBING ROOF PLAN

1. **Add the following note.**

   NOTE: *Roof drain locations shall be coordinated with the structural steel shop drawings. Where conflicts occur between roof drains and structural framing members, relocate drains as necessary to avoid interference with structural members. Locations shown on the plumbing drawings are diagrammatic and indicate approximate locations only.*

CHANGES TO SPECIFICATIONS:

AD8-SP01 **Refer to Specification Section 01 11 13 – SUMMARY OF WORK**

1. Omit Specification Section **01 11 13 – SUMMARY OF WORK** and replace the Section with the attached Section **01 11 13 – SUMMARY OF WORK** AD8.
2. The revised Section is identified with "AD8" in the upper left-hand corner of each page.

AD8-SP02 **Refer to Specification Section 013216 – CONSTRUCTION SCHEDULES.**

1. Add the following Article to this Section:
   SCHEDULE, ADVERSE WEATHER, EXCAVATION PROTECTION, SOIL STABILIZATION, AND TEMPORARY WORKING SURFACE REQUIREMENTS

   a. **Adverse Weather Planning.** The Contractor shall include within the Contract Time and Contract Sum an allowance for 2.5 months of cumulative rain delays and associated impacts. The Project is anticipated to experience significant and prolonged wet weather conditions during the construction period.
   The Contractor shall be solely responsible for planning and executing all operations necessary to maintain progress during wet weather. Refer to Specification Section 01 50 00 TEMPORARY FACILITIES AND CONTROLS.

AD8-SP03 **Refer to Specification Section 01 31 13 – CONTRACTORS PROJECT MANAGMENT.**

1. Add the SIS requirements to the weekly construction progress meetings.

   a. SIS - Short Interval Schedule (Look-Ahead): At each weekly progress meeting, the Contractor shall present and review the SIS in accordance with Specification Section 01 32 16 – CONSTRUCTION SCHEDULES. The SIS shall provide a three-week look-ahead snapshot of the Work and include the items complete in the prior week. The look ahead portion shall include the current week and the two weeks thereafter, generated from the most recent monthly Schedule Update. The SIS shall contain sufficient detail to evaluate inspection requirements and for the Contractor to anticipate manpower and equipment needs. Each SIS activity item shall be identified as
   (**X**) meaning on Schedule.
   (**A**) meaning Ahead of Schedule.
   (**B**) meaning Behind Schedule.
   (**C**) meaning Completed in the prior week.

AD8-SP04 **Refer to Specification Section 01 50 00 TEMPORARY FACILITY AND CONTROLS**

1. Omit Specification Section 01 50 00 TEMPORARY FACILITY AND CONTROLS and replace the Section with the attached Section 01 50 00 TEMPORARY FACILITY AND CONTROLS AD8.
2. The revised Section is identified with "AD8" in the upper left-hand corner of each page.

AD8-SP05 **Refer to Specification Section 074243 – FIBER-CEMENT PANELS**

1. Omit Specification Section 074243 – FIBER-CEMENT PANELS and replace the Section with the attached Section 074243 – FIBER-CEMENT PANELS AD8.
2. The revised Section is identified with "AD8" in the upper left-hand corner of each page.

AD8-SP06 **Refer to Specification Section 074012 – MCM PANELS**

1. Refer to Article 2.1, A., 5., a.
2. Strikeout ~~RMAX (a SIKA company) TSX-8500 Polyiso Insulation~~ and replace with RMAX (a SIKA company) ECOMAXCI FR Polyiso Insulation with SIKA / FR Sika/Rmax-approved foil-faced flashing tape compatible with the foil facer of the insulation board.

AD8-SP07 **Refer to Specification Section 076000 – SHEET METAL**

1. Refer to Article 2.1, A., 1., f.
2. Strikeout ~~TSX-8500" and "R-Seal 3000" Tape~~ and replace with RMAX (a SIKA company) ECOMAXCI FR Polyiso Insulation with SIKA / FR Sika/Rmax-approved foil-faced flashing tape compatible with the foil facer of the insulation board.

AD8-SP08 **Refer to Specification Section 088000 – GLASS**

1. Refer to page 9 for Mirrored Glass Products, and replace the specified products with the following.

   Mirrors shall be fabricated from 1/4-inch tempered safety mirrored glass complying with CPSC 16 CFR 1201, Category II. Provide factory-applied safety backing film designed to retain glass fragments upon breakage. Provide mirror mastic specifically recommended by the mirror manufacturer and compatible with the mirror backing. Secure mirrors with continuous chrome J-channel at the bottom and sides and concealed mechanical attachment at the top. All exposed mirror edges shall be seamed and sealed to prevent deterioration of the reflective coating

2. Refer to page 15 for "M" Mirrored Glass, and add the following.

   Mirrors shall be fabricated from 1/4-inch tempered safety mirrored glass complying with CPSC 16 CFR 1201, Category II.

AD8-SP09 Refer to Specification Section 14 24 23 – HYDRAULIC ELEVATORS.

1. THYSSEN KRUPP ELEVATOR CORPORATION is an acceptable equal.
   If a TK elevator is part of the award, the Contractor coordinates the shop drawings with the Pit size and steel. The pit size and the steel shop drawings shall not proceed until the elevator shop drawings have been provided.
   Any changes to the pit size, will need to be submitted to DSA as a CCD.
   The electrical system requirements, fire alarm, signaling, etc, shall remain the same. Any costs for revising the pit layout and steel shall be part of the base bid.

2. Add the following performance appendix to the Specification

APPENDIX A - ELEVATOR PRE-INSTALLATION COORDINATION

A. Within thirty (30) days of Contract Award, and prior to commencement of elevator-related work, the Contractor shall conduct an Elevator Coordination Meeting attended by the Elevator Manufacturer, Elevator Installer, Architect, Structural Engineer, Electrical Contractor, Mechanical Contractor, Fire Alarm Contractor, Fire Sprinkler Contractor, General Contractor, and all other trades whose work interfaces with the elevator systems.

B. The purpose of the meeting shall be to review and verify all project-specific requirements including, but not limited to:

1. Hoistway dimensions and tolerances.
2. Pit dimensions, sump requirements, and drainage.
3. Overhead clearances.
4. Structural supports and embedded items.
5. Electrical power requirements and disconnects.
6. Emergency power requirements.
7. Fire alarm and elevator recall requirements.
8. Fire sprinkler coordination.
9. HVAC and ventilation requirements.
10. Communication and monitoring systems.
11. Equipment access, delivery, and storage requirements.
12. Manufacturer-specific installation requirements.

C. The Elevator Contractor shall prepare and submit a project-specific Elevator Quality Control Checklist identifying all required field conditions, dimensions, utility connections, clearances, tolerances, and associated responsibilities of each trade. The checklist shall be reviewed at the coordination meeting and updated throughout construction as necessary.

D. Prior to fabrication of elevator equipment, the Elevator Contractor shall verify and certify that all required field conditions have been reviewed,

coordinated, and are compatible with the elevator manufacturer's requirements.

E. Beginning immediately after the initial coordination meeting and continuing until elevator acceptance testing is complete, the Contractor shall conduct coordination meetings at intervals not exceeding two (2) months. Meetings shall include the Elevator Contractor, Elevator Manufacturer's representative, General Contractor, and all affected trades.

F. Coordination meeting minutes shall be prepared and distributed within five (5) working days of each meeting. Meeting minutes shall identify action items, responsible parties, required completion dates, unresolved issues, and pending decisions.

G. Failure to coordinate the work or identify conflicts during the required coordination meetings shall not relieve the Contractor, Elevator Contractor, or affected subcontractors of responsibility for corrective work, delays, or additional costs resulting from such conflicts.

H. Costs associated with coordination activities, field verification, quality control reviews, meetings, documentation, and resolution of coordination issues shall be considered incidental to the Work and included in the Contract Sum / Base Bid.

AD8-SP10 **Refer to Specification Section 11 61 23 – CHOIR RISERS.**

1. Omit Specification Section 11 61 23 – CHOIR RISERS and replace the Section with the attached Section 11 61 23 AD8.
2. The revised Section is identified with "AD8" in the upper left-hand corner of each page.

AD8-SP11 **Refer to Specification Section 11 61 23 – PORTABLE SEATING PLATFORMS AND SEAT SYSTEMS.**

1. Omit Specification Section 11 61 23 – PORTABLE SEATING PLATFORMS AND SEAT SYSTEMS and replace the Section with the attached Section 11 61 23 AD8.
2. The revised Section is identified with "AD8" in the upper left-hand corner of each page.

AD8-SP12 **Refer to Specification Section 11 61 33 – PRODUCTION RIGGING SYSTEMS.**

1. Omit Specification Section 11 61 33 – PRODUCTION RIGGING SYSTEMS and replace the Section with the attached Section 11 61 33 AD8.
2. The revised Section is identified with "AD8" in the upper left-hand corner of each page.

AD8-SP13 **Refer to Specification Section 11 61 83 – PRODUCTION LIGHTING CONTROL SYSTEMS.**

1. Omit Specification Section 11 61 83 – PRODUCTION LIGHTING CONTROL SYSTEMS and replace the Section with the attached Section 11 61 83 AD8.
2. The revised Section is identified with "AD8" in the upper left-hand corner of each page.

AD8-SP14 **Refer to Specification Section 11 61 93 – PRODUCTION LIGHTING FIXTURES – FF&E.**

1. Omit Specification Section 11 61 93 – PRODUCTION LIGHTING FIXTURES – FF&E and replace the Section with the attached Section 11 61 93 AD8.
2. The revised Section is identified with "AD8" in the upper left-hand corner of each page.
3. Appendix A, Lighting Fixtures and Equipment List, and Appendix B, Light Plot, are included with the attached Section.

AD8-SP15 **Refer to Specification Section 12 66 23 – TELESCOPIC SEATING.**

1. Omit Specification Section 12 66 23 – TELESCOPIC SEATING and replace the Section with the attached Section 12 66 23 AD8.
2. The revised Section is identified with "AD8" in the upper left-hand corner of each page.

AD8-SP16 **Refer to Specification Section 23 00 01 – HEATING, VENTILATING AND AIR CONDITIONING.**

1. Omit Specification Section 23 00 01 – HEATING, VENTILATING AND AIR CONDITIONING and replace the Section with the attached Section 23 00 01 AD8.
2. The revised Section is identified with "AD8" in the upper left-hand corner of each page.

AD8-SP17 **Refer to Specification Section 26 05 35 – PRODUCTION SYSTEMS ELECTRICAL INSTALLATION.**

1. Omit Specification Section 26 05 35 – PRODUCTION SYSTEMS ELECTRICAL INSTALLATION and replace the Section with the attached Section 26 05 35 AD8.
2. The revised Section is identified with "AD8" in the upper left-hand corner of each page.

AD8-SP18 **Refer to Specification Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION:**

1. Refer to Part 1 1.3.A.2: Revise paragraph to read:

   Protective equipment submittals and shop drawings may be submitted at the same time or prior to completion of the overcurrent protective device study. If equipment submittals / shop drawings are submitted prior to completion of overcurrent protective device study for the benefit of schedule acceleration, Contractor shall provide written acknowledgement that device ratings provided in equipment shop drawings are contingent upon finalization of protective device study. Such acknowledgement will allow for equipment procurement concurrent with protective device study, but does not otherwise absolve the Contractor from providing equipment that complies with the requirement of the overcurrent protective device study.

AD8-SP19 **Refer to Specification Section 27 41 16 – PRODUCTION AV SYSTEMS.**

1. Omit Specification Section 27 41 16 – PRODUCTION AV SYSTEMS and replace the Section with the attached Section 27 41 16 AD8.
2. The revised Section is identified with "AD8" in the upper left-hand corner of each page.

CHANGES TO SHEETS:

CIVIL:

AD8-C01 **Refer to the Alternate Bid Drawings for the North Parking Lot. Add the following note:**

"***Refer to the Base Bid Drawings for Sheet SD/C001 for the Topo Legend***".

ARCHITECTURAL:

AD8-A01 **Refer to Sheet L/A102.4 – First Floor Plan – Area A**

1. Omit Sheet L/A102.4 and replace the sheet with the attached L/A102.4 AD8.
2. The changes are clouded (Delta 11).
3. At Women L103 and Men L105, the toilet partition layout has been revised.

AD8-A02 **Refer to Sheet L/A103.4 – First Floor Plan – Area B**

1. Omit Sheet L/A103.4 and replace the sheet with the attached L/A103.4 AD8.
2. The changes are clouded (Delta 11).
3. At Girls L132 and Boys L133, the toilet partition layout has been revised.

AD8-A03 Refer to Sheet L/A121.4 – Enlarged Floor Plans

1. Omit Sheet L/A121.4 and replace the sheet with the attached L/A121.4 AD8.
2. The changes are clouded (Delta 11).
3. At the enlarged plans for Women L103 and Men L105, the toilet partition layout and associated dimensions have been revised.
4. At the enlarged plan for Girls L132 and Boys L133, the toilet partition layout and associated dimensions have been revised.

AD8-A04 Refer to Sheet L/A202.4 – First Reflected Ceiling Plan – Area A

1. Omit Sheet L/A202.4 and replace the sheet with the attached L/A202.4 AD8.
2. The changes are clouded (Delta 11).
3. At Women L103 and Men L105, the reflected ceiling plan has been updated to reflect the revised toilet partition layout.

AD8-A05 Refer to Sheet L/A203.4 – First Reflected Ceiling Plan – Area B

1. Omit Sheet L/A203.4 and replace the sheet with the attached L/A203.4 AD8.
2. The changes are clouded (Delta 11).
3. At Girls L132 and Boys L133, the reflected ceiling plan has been updated to reflect the revised toilet partition layout.

AD8-A06 Refer to Sheet L/A601.4 – Interior Elevations L101–L105

1. Omit Sheet L/A601.4 and replace the sheet with the attached L/A601.4 AD8.
2. The changes are clouded (Delta 11).
3. At Women L103 and Men L105, the toilet partition note has been revised to read "TOILET PARTITIONS, Full Height Floor Mounted Overhead Braced Toilet Compartments."
4. At Women L103 and Men L105, the note "TOILET ACCESSORIES, Hand Dryer, Typ." has been added.

AD8-A07 Refer to Sheet L/A603.4 – Interior Elevations L115-L116

1. Omit Sheet L/A603.4 and replace the sheet with the attached L/A603.4 AD8.
2. The changes are clouded (Delta 11).
3. The Mirrored Glass notes have been updated.
4. A wall backing note has been added for all wall mounted items.

AD8-A08 Refer to Sheet L/A604.4 – Interior Elevations L116A–L120

1. Omit Sheet L/A604.4 and replace the sheet with the attached L/A604.4 AD8.
2. The changes are clouded (Delta 11).
3. At Restroom L116A and Restroom L118A, the note "TOILET ACCESSORIES, Hand Dryer, Typ." has been added.
4. The Mirrored Glass notes have been updated.
5. A wall backing note has been added for all wall mounted items.

AD8-A09 Refer to Sheet L/A606.4 – Interior Elevations L122B-L123

1. Omit Sheet L/A606.4 and replace the sheet with the attached L/A606.4 AD8.
2. The changes are clouded (Delta 11).
3. Backing requirements have been added for the wall-mounted monitor located backstage in the Scene Shop

AD8-A10 Refer to Sheet L/A607.4 – Interior Elevations L124-L124B

1. Omit Sheet L/A607.4 and replace the sheet with the attached L/A607.4 AD8.
2. The changes are clouded (Delta 11).
3. Backing requirements have been added for the wall-mounted monitor located backstage in the Drama Room

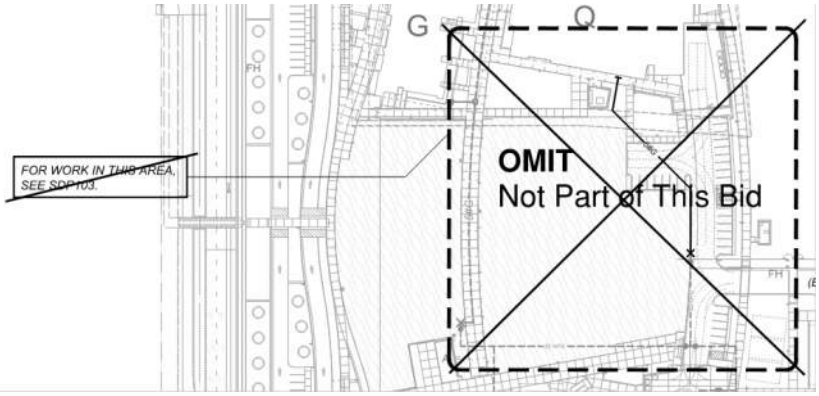
AD8-A08 Refer to Sheet L/A614.4 – Interior Elevations L132–L202

1. Omit Sheet L/A614.4 and replace the sheet with the attached L/A614.4 AD8.
2. The changes are clouded (Delta 11).
3. At Girls L132 and Boys L133, the toilet partition note has been revised to read "TOILET PARTITIONS, Full Height Floor Mounted Overhead Braced Toilet Compartments."
4. At Girls L132 and Boys L133, the note "TOILET ACCESSORIES, Hand Dryer, Typ." has been added.

PLUMBING:

AD8-P01 Refer to Plumbing Sheet SD/P101

1. Refer to the site work by Building Q.
2. This work is not needed. Strike this out and state "OMIT Not Part of this bid", as indicated below.



AD8-P02 Refer to Plumbing Sheet SD/P101.4

1. Omit Sheet **SD/P101.4** and replace the sheet with the attached **SD/P101.4** AD8.
2. The changes are clouded (with Delta 8)

AD8-P03 Refer to Plumbing Sheet X-P102

1. Omit Sheet **X-P102** and replace the sheet with the attached **X-P102** AD8.
2. The changes are clouded (with Delta 8).
3. Details not used for this Phase of work have been stricken out.

MECHANICAL:

AD8-M01 Refer to Mechanical Sheet X/M101

1. Strike out and Omit Details A and B.
2. The details are not used for this Phase of work.

AD8-M02 Refer to Mechanical Sheet X/M102

1. Omit Sheet X/M102 and replace the sheet with the attached X/M102 AD8.
2. The changes are clouded (with Delta 8)
3. Details D: Notes updated.
4. Detail P: The name of the detail was changed.

AD8-M03 Refer to Mechanical Sheet X/M104

1. Strike out and Omit Detail C.
2. The detail is not used for this Phase of work.

AD8-M04 Refer to Mechanical Sheet X/M201

1. Omit Sheet X/M201 and replace the sheet with the attached X/M201 AD8.
2. The changes are clouded (with Delta 8)
3. The Mechanical Equipment Schedules have been updated.

AD8-M05 Refer to Mechanical Sheet X/M202

1. Omit Sheet X/M202 and replace the sheet with the attached X/M202 AD8.
2. The changes are clouded (with Delta 8)
3. The Mechanical Equipment Schedules have been updated.

AD8-M06 Refer to Mechanical Sheet L-M102.4

1. Omit Sheet L-M102.4 and replace the sheet with the attached L-M102.4 AD8.
2. The changes are clouded (with Delta 8)
3. The note for the enlarged plan was updated.

AD8-M07 Refer to Mechanical Sheet L-M201.4

1. Omit Sheet L-M201.4 and replace the sheet with the attached L-M201.4 AD8.
2. The changes are clouded (with Delta 8)
3. Some of the notes were revised.

AD8-M08 Refer to Mechanical Sheet L-M202.4

1. Omit Sheet L-M202.4 and replace the sheet with the attached L-M202.4 AD8.
2. The changes are clouded (with Delta 8)
3. Some of the notes were revised.

AD8-M09 Refer to Mechanical Sheet L-M301.4

1. Omit Sheet **L-M301**.4 and replace the sheet with the attached **L-M301**.4 AD8.
2. The changes are clouded (with Delta 8)
3. Some of the notes were added and revised.
4. The cloud with Delta is from a past Addendum 5 that is already part of the documents and is DSA approved.

AD8-M10 Refer to Mechanical Sheet L-M302.4

1. Omit Sheet **L-M302**.4 and replace the sheet with the attached **L-M302**.4 AD8.
2. The changes are clouded (with Delta 8)
3. Some of the notes were added and revised.
4. The cloud with Delta is from a past Addendum 5 that is already part of the documents and is DSA approved.

AD8-M11 Refer to Mechanical Sheet L-M401.4

1. Omit Sheet **L-M401**.4 and replace the sheet with the attached **L-M401**.4 AD8.
2. The changes are clouded (with Delta 8)
3. Some of the notes were added and revised.
4. The cloud with Delta is from a past Addendum 5 that is already part of the documents and is DSA approved.

ELECTRICAL:

AD8-E01 Refer to the Building L Power Plans (Sheet X/E102, L/E201.4, L/E202.4)

1. Install (4) 20/2P circuit breakers in Panel LL1, provide (4) 208V 20AMP single phase branch circuits, and connect to hand dryers in Women's restroom L103, and Men's restroom L105, use #10AWG conductors.

2. Install (4) 20/2P circuit breakers in Panel LL4, provide (4) 208V 20AMP single phase branch circuits and connect to hand dryers in Girl's restroom L132, and Boy's restroom L133.

PRODUCTION – AUDIO VISUAL (AV):

AD8-AV01 Refer to Sheet AV001 – Typical Information, AV ISO Ground, ALS & Conduit Info

1. Omit Sheet AV001 and replace the sheet with the attached AV001 AD8.
2. The changes are clouded.
3. At Detail 1, Assistive Listening Calculations & References: the CBC Assistive Listening Code References, the 11B-219.3 Assistive Listening Receivers table, and the Assistive Listening–CBC calculation table have been added/revised.

AD8-AV02 Refer to Sheet AV003 – Typical Information, AV Panel Schedule

1. Omit Sheet AV003 and replace the sheet with the attached AV003 AD8.
2. The changes are clouded.
3. At Detail 1, AV Panel Schedule: the AV Panel Schedule has been updated.

AD8-AV03 Refer to Sheet L/AV101.4 – AV Device Plan at Level 1

1. Omit Sheet L/AV101.4 and replace the sheet with the attached L/AV101.4 AD8.
2. The changes are clouded.
3. At Detail 2, AV Device Plan at Recording Studio: AV device and equipment rack locations have been revised in Control and along the Live Room wall.
4. Detail 3, Recording Control Furniture isometric, has been added.

AD8-AV04 Refer to Sheet L/AV103.4 – AV Device Plan at Level 2

1. Omit Sheet L/AV103.4 and replace the sheet with the attached L/AV103.4 AD8.
2. The changes are clouded.
3. At Detail 1, AV Device Plan at Level 2: AV Equipment rack models have been revised in AV Equipment wall.

AD8-AV05 Refer to Sheet L/AV401.4 – AV Device Plan at Level 2

1. Omit Sheet L/AV401.4 and replace the sheet with the attached L/AV401.4 AD8.
2. The changes are clouded.
3. At Detail 1, AV enlarged plan at AV 208: AV Equipment rack models have been revised in AV Equipment wall.

AD8-AV06 Refer to Sheet L/AV501.4 – AV Wire & Conduit Riser Diagram

1. Omit Sheet L/AV501.4 and replace the sheet with the attached L/AV501.4 AD8.
2. The changes are clouded.
3. At Detail 1, Wire and Conduit Riser Diagram at Building L New: the riser diagram has been revised.
4. The AV Wire & Conduit Key has been revised.

AD8-AV07 Refer to Sheet L/AV510.4 – AV Block Diagram – Theatre

1. Omit Sheet L/AV510.4 and replace the sheet with the attached L/AV510.4 AD8.
2. The changes are clouded.
3. At Detail 1, Audio Block Diagram at Blackbox: the Blackbox AV panel inputs have been revised, and a 16x8 Audio I/O (Dante) has been revised.

AD8-AV08 Refer to Sheet L/AV511.4 – AV Block Diagram – Theatre

1. Omit Sheet L/AV511.4 and replace the sheet with the attached L/AV511.4 AD8.
2. The changes are clouded.
3. At Detail 1, Video Block Diagram at Blackbox: the Blackbox AV panel inputs have been revised.

AD8-AV09 Refer to Sheet L/AV512.4 – AV Block Diagram – Theatre

1. Omit Sheet L/AV512.4 and replace the sheet with the attached L/AV512.4 AD8.
2. The changes are clouded.
3. At Detail 1, Program/Paging Block Diagram at Blackbox: the diagram has been revised, including the assistive listening, paging, intercom, and 70V ceiling loudspeaker zones.

AD8-AV10 Refer to Sheet L/AV513.4 – AV Block Diagram – Theatre

1. Omit Sheet L/AV513.4 and replace the sheet with the attached L/AV513.4 AD8.
2. The changes are clouded.
3. At Detail 1, Control Block Diagram at Blackbox: equipment previously shown in the Amplifier Room has been deleted.

AD8-AV11 Refer to Sheet L/AV530.4 – AV Block Diagram – Recording Studio

1. Omit Sheet L/AV530.4 and replace the sheet with the attached L/AV530.4 AD8.
2. The changes are clouded.
3. At Detail 1, AV Block Diagram at Recording Studio: the diagram has been revised.

AD8-AV12 Refer to Sheet X/AV701 – AV Panel Elevations

1. Omit Sheet X/AV701 and replace the sheet with the attached X/AV701 AD8.
2. The changes are clouded.
3. The AV panel elevations on this sheet have been revised & & non-applicable details outside the scope of work have been removed.

AD8-AV13 Refer to Sheet X/AV702 – AV Panel Elevations

1. Omit Sheet X/AV702 and replace the sheet with the attached X/AV702 AD8.
2. The changes are clouded.
3. The AV panel elevations on this sheet have been revised, & non-applicable details outside the scope of work have been removed.

AD8-AV14 Refer to Sheet X/AV703 – AV Panel Elevations

1. Omit Sheet X/AV703 and replace the sheet with the attached X/AV703 AD8.
2. The changes are clouded.
3. A panel elevation at the upper left of the sheet has been deleted.
4. At Detail 1, Custom Paging Rack Panel: a switch has been deleted from the panel.
5. At Detail 7, AV Panel HM, has been revised.

AD8-AV15 Refer to Sheet X/AV710 – AV Mounting Details

1. Omit Sheet X/AV710 and replace the sheet with the attached X/AV710 AD8.
2. The changes are clouded.
3. Non-applicable details outside the scope of work have been removed.

AD8-AV16 Refer to Sheet X/AV711 – AV Mounting Details

1. Omit Sheet X/AV711 and replace the sheet with the attached X/AV711 AD8.
2. The changes are clouded.
3. Non-applicable details outside the scope of work have been removed.

AD8-AV17 Refer to Sheet X/AV712 – AV Mounting Details

1. Omit Sheet X/AV712 and replace the sheet with the attached X/AV712 AD8.
2. The changes are clouded.
3. At Detail 1, Floor Mounted Standing Equipment Rack Detail, and Detail 2, Wall Mounted Swing-Out Equipment Rack Detail: the details and the associated rack schedules have been revised.

AD8-AV18 Refer to Sheet X/AV715 – AV Mounting Details

1. Omit Sheet X/AV715 and replace the sheet with the attached X/AV715 AD8.
2. The changes are clouded.
3. At Detail 7, SRSR Equipment Rack Mounting: the Slide-Out AV Equipment Rack schedule has been revised.
4. A detail at the left side of the sheet has been deleted.

PRODUCTION – PRODUCTION RIGGING (PR):

AD8-PR01 Refer to Sheet L/PR101.4 – Production Rigging, Plan at Level 1

1. Omit Sheet L/PR101.4 and replace the sheet with the attached L/PR101.4 AD8.
2. The changes are clouded.
3. At the Theater: crossover legs, the upstage traveler, and the cyclorama have been added.
4. At the Drama Classroom: 6'-0" legs tied to the pipe grid have been added (typical of 2); verify height in field.

AD8-PR02 Refer to Sheet L/PR102.4 – Production Rigging, Plan at Level 2

1. Omit Sheet L/PR102.4 and replace the sheet with the attached L/PR102.4 AD8.
2. The changes are clouded.
3. At Detail 1, Floor Plan at Level 2: crossover legs, the upstage traveler, and the cyclorama have been added at the Theater.
4. At the Drama Classroom: 6'-0" legs and borders tied to the pipe grid have been added (typical of 2); verify height in field.

AD8-PR03 Refer to Sheet L/PR301.4 – Production Rigging, Sections

1. Omit Sheet L/PR301.4 and replace the sheet with the attached L/PR301.4 AD8.
2. The changes are clouded.
3. Detail 4, Black Box Drapery Schedule, has been added (upstage traveler, cyclorama, and legs).
4. Detail 1, Drama Room Drapery Schedule, has been added (borders, legs, and curved walk-along drape).
5. At Details 3, 5, and 6: callouts for the borders, legs, crossover legs at the lower-level pipe, upstage traveler, and cyclorama have been added.

END OF ADDENDUM NO. 8

SECTION 01 11 13 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Construction of the work for SANGER EDUCATION COMPLEX - PHASE III, Sanger, California. The work is defined as all material, labor, equipment and services necessary to do all work shown on the drawings and called for in the Specifications.

B. This Section includes the following:

1. Summarizes the Work of the Contract.
2. Establishes requirements governing the Work.
3. Identifies the Work that will be performed under separate contracts and the coordination.
4. Project Site access.
5. Restrictions under which the project will be constructed.

C. Related Sections: The following Project Manual Sections contain requirements that relate to this section:

1. ALL DIVISION 00 SPECIFICATION SECTIONS.
2. ALL DIVISION 01 SPECIFICATION SECTIONS.
3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUMMARY OF WORK

A. The following information defines the scope of work of this Bid.

B. Building:

1. This project is for the development of a new building, Building L.
2. Building L is a Performing Arts Building that offers Drama, Music, Choir and Band Classes.

C. Site Development:

1. This project also includes the development of utility connections, concrete walks, landscaping, and other site improvements to support the new building.

D. Alternate Bids:

1. Alternate Bid 1: Construct the north parking lot expansion; 180 stalls.

E. Note: Building L was Alternate Bid #4 under a prior bid. Any reference to Alternate Bid #4 in the Bid Documents shall be BASE BID.

1.3 DEFINITIONS

A. The words "OWNER" and "DISTRICT" are synonymous and interchangeable, when used throughout this Project Manual.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.

1. Quality Assurance/Control Submittals:
   a. Certificates:
      1) Submit three (3) copies of certificates indicating compliance with the Asbestos Hazard Emergency Regulations Act.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Contractor's Qualifications:
   a. Contractor shall have experience and have successfully completed three (3) projects of similar scope and size to that indicated for this project.

b. Contractor shall have demonstrated that they have the resources to perform all of the requirements of this project.

B. Regulatory Requirements:

1. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of Work, and in accordance with Specification Section - REGULATORY REQUIREMENTS:

a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.

C. Certifications:

1. The Contractor shall certify in writing that no materials containing Asbestos are incorporated in the work, in accordance with the Asbestos Hazard Emergency Regulations Act.

D. Contractor's Duties:

1. Except as specifically noted, provide and pay for:

a. Labor, material and equipment.
b. Tools, construction equipment and machinery.
c. Heat and utilities required for construction. See Specification Section - TEMPORARY FACILITIES AND CONTROLS.
d. Other facilities and services necessary for proper execution and completion of Work.

2. Pay legally required sales, consumer and use taxes.
3. Secure and pay for all site specific as necessary for proper execution and completion of Work.

a. Licenses.
b. Permits and Fees.
c. Government Fees .
d. Royalties.

4. Give required notices.
5. Promptly submit written notice to Architect of observed variance.
6. Enforce strict discipline and good order among employees. Do not employ on Work:

a. Unfit persons.
b. Persons not skilled in assigned task.

1.6 WORK UNDER OTHER CONTRACTS

A. General Requirements:

1. Work under separate contracts will occur throughout the duration of the project. The work being installed under separate contracts will occur around adjacent to the Contract project site.
2. Contractor shall coordinate its work with the work under separate Contracts and shall cooperate with the Contractors of these separate Contracts as they occur.
3. Should the Contractor damage and/or otherwise alter work installed under separate contracts, the Contractor is responsible for the repair and/or correction of installed work.
4. Prior to the installation of the Work, coordinate the work installed or to be installed by separate contracts relative to this project scope of work.

B. Work by Owner:

1. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this contract or work by Owner. Coordinate the work of this Contract with work performed by Owner.
2. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be constructed simultaneously with work under this Contract.

a. Items that are Owner Furnished Contractor Installed and Owner Furnished Owner Installed as indicated on the Contract Drawings and as defined in Specification Section - OWNER FURNISHED ITEMS.

3. Security and Intrusion Alarm System: Owner's Vendor will design the Intrusion Alarm System and identify pathways that need to be provided under the Contractor's Construction Contract.

C. Work Under Separate Contracts by Others:
   1. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the work of this Contract with work performed under separate contracts.
   2. Concurrent Work: Owner will award a separate contract(s) for the following construction operations at the Project Site. Those operations will be conducted simultaneously with work under this Contract.
      a. Off-Site Development: Construction of the Streets Improvements, City of Fresno Municipal Street Utilities and Public Utilities along Fowler Avenue and Church Avenue.
      b. Off-Site Electrical: The Relocation of Off-Site Electrical Transmission and Distribution lines will be provided by PG & E adjacent to the boundaries of the site.

D. Future Work:
   1. The Contract Documents include requirements that will allow the Owner to carry out future work following completion of this Project; provide for the following future work:
      a. Alternate Bids not accepted as part of this construction contract.
         1) Sizing, Routing and Stub outs of underground utility lines.
         2) Earthwork and Grading.
      b. Construction of Future Buildings and associated site improvements per Master Site Plan.
         1) Sizing, Routing and Stub outs of underground utility lines.
         2) Earthwork and Grading.

1.7 PROJECT CONDITIONS OR SITE CONDITIONS

A. Access to Site:
   1. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of the Project.
   2. Contractor shall be responsible for coordinating access to and from the site throughout the duration of the project. Access to and from the site may vary, based upon timing and duration of separate contracts.
   3. The Contractor shall not use the Off-Site areas, with the exception of the Site Access per Specification Section - TEMPORARY FACILITIES AND CONTROLS, and shall not interfere with the work in these areas.

B. Contractor Use of Premises:
   1. Confine operations at sites to areas permitted by:
      a. Laws.
      b. Ordinances.
      c. Permits.
      d. Contract Documents.
   2. Do not unreasonably encumber site with materials or equipment.
   3. Assume full responsibility for protection and safekeeping of Contractor's and Owner's material stored on premises, and keep the site and building secure at all times.
   4. Obtain and pay for use of additional storage Work areas needed for operations.
   5. Limit use of Site Work and storage.

1.8 SCHEDULING

A. The Work of this Project will be constructed under a single contract.
   1. It is anticipated that the start of construction will be around:
      a. January 2027.

1.9 SCHEDULE, ADVERSE WEATHER, EXCAVATION PROTECTION, SOIL STABILIZATION, AND TEMPORARY WORKING SURFACE REQUIREMENTS

A. Adverse Weather Planning: The Contractor shall include within the Contract Time and Contract Sum an allowance for 2.5 months of cumulative rain delays and associated impacts. The Project is anticipated to experience significant and prolonged wet weather conditions during the construction period.

1. The Contractor shall be solely responsible for planning and executing all operations necessary to maintain progress during wet weather. Refer to Specification Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Temporary Utilities, Support Facilities, and Protection Facilities materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Shop Drawings:
      a. Project Sign.
   2. Quality Assurance/Control Submittal:
      a. Copy of Application to APCD for Dust Prevention and Control Plan.
      b. Copy of approved Application to APCD for Dust Prevention and Control Plan.
      c. Copy of Application to local City or County Engineer for Traffic Control.
      d. Copy of approved Application to local City or County Engineer for Traffic Control.
      e. Temporary Project Enclosure Plan.
      f. Site Safety Plan prior to initial filing of Construction Start Notice/Inspection Card Request.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB — Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
      b. CAL/OSHA — California Division of Occupational Safety and Health Administration
      c. CF — County of Fresno, Codes and Ordinances
      d. EPA — Environmental Protection Agency

B. Dust Prevention and Control Plan:
   1. Prior to commencing the Work, prepare a Dust Prevention and Control Plan and obtain review and approval of the Air Pollution Control District (APCD) in the area where the project is located.
      a. Prepare application and file with appropriate fees to APCD upon completion of Dust Prevention and Control Plan.
   2. The Dust Prevention and Control Plan shall specify the methods of control that will be utilized, demonstrate the availability of needed equipment and personnel, and identify a responsible individual who, if needed, can authorize implementation of additional measures.
   3. All construction shall comply with applicable elements of the APCD's regulations.
   4. The Dust Prevention and Control Plan shall include, but not be limited to, the following:

a. Contractor's name and project identification information.
b. Procedures and measures to be implemented, but not be limited to:
    1) All material excavated or graded shall be sufficiently watered to prevent excessive amounts of dust.
    2) During periods of high winds, all clearing, grading, earth moving, or excavation shall cease when dust control measures are unable to avoid visible plumes.
    3) All dust producing material transported off site shall be either sufficiently watered or securely covered to prevent excessive amounts of dust.
    4) The area disturbed by clearing, earth moving, or excavation activities shall be minimized at all times.
    5) All watering of areas shall be only to the extent required to keep the soil particles in a moist condition and not to the extent that erosion of surface soil occurs.
    6) To control general fugitive dust, on-site vehicle speed shall be limited to 15 mph.
    7) All areas with vehicle traffic shall be watered periodically for stabilization of dust emissions.
    8) Periodically streets adjacent to the project site shall be cleaned as required to remove silts which may have accumulated from construction activities.

C. Traffic Control Plan:
1. Prior to commencing the Work, prepare a Traffic Control Plan and obtain approval of the local City or County Engineer in the area where the project is located.
    a. Prepare application and file with appropriate fees to the local City or County Engineer upon completion of Traffic Control Plan.
2. The Traffic Control Plan shall include information on construction timing and phasing and proposed methods of alleviating potential hazardous and/or inconvenient conditions. Such methods can include, but are not limited to, the use of flagmen, barricades, signs, warning lights, detours, phased lane closures, coordination with adjacent property owners, and coordination with law enforcement, fire protection and other emergency service agencies.

1.4 SITE SAFETY PLAN

A. Contractor shall be responsible for the development, implementation, and maintenance of a written plan establishing a site safety plan at the project site applicable throughout all phases of the construction, repair, alteration, or demolition work.

B. It is the Contractor's responsibility to contact local Fire Authority to discuss the plan.
1. A copy of the report should be made available to the Project Inspector and local Fire Authority.
2. Plan will be turned over to the Owner and AHJ in compliance with rules and regulations, but will not be reviewed.

C. Regulatory References:
1. DSA BU 24-05 Bulletin: Fire Safety During Construction and Demolition.
2. CFC Chapter 33, Section 3308 and sub-sections.

D. Plan shall address at a minimum:
1. Project Phases.
    a. Describe each phase of the construction, repair, alteration, or demolition work.
2. Site Security Provisions.
3. Site Safety Director.
    a. Designate responsible program superintendent per CFC 3308.2.
    b. Include name and contact information.
4. Training Documentation.
    a. Document training of site safety director and fire watch personnel.
5. Emergency Reporting Procedures.
6. Fire Department Vehicle Access Routes.
7. Locations of fire protection equipment.

a. Include portable fire extinguishers, standpipes, fire department connections and fire hydrants.

8. Smoking and Cooking Policies.
   a. Include designated area to be used where approved, and signage locations in accordance with CFC Section 3305.8.
9. Temporary Heating Equipment.
   a. Location and safety considerations.
10. Hot Work Operations.
11. Control Plan for Combustible Waste.
12. Control Plan for Flammable and Combustible Materials.
    a. Locations and methods for storage and use of flammable and combustible liquids and other hazardous materials.
13. Renovation Work Procedures.
    a. Procedure for impairment of fire protection systems.
    b. Procedure for temporary covering of fire protection devices.
14. Procedure for Changes.

1.5 TEMPORARY PROJECT ENCLOSURE PLAN

A. Prior to commencing the Work, prepare a Temporary Project Enclosure Plan indicating the protection of people, animals, and partial and fully completed work until occupancy by the Owner.

B. Identify temporary egress from existing occupied facilities and as required by authorities having jurisdiction.

C. The Temporary Project Enclosure Plan shall include, but not be limited to, the following:
   1. Contractor’s name and project identification information.
   2. Indicate the duration of the proposed measures based on the completion of the work as a whole and if any phases of work are identified.
   3. Indicate proposed temporary fencing and potential exit and entry paths.
      a. Show gate and door locations and indicate who has access.
   4. Indicate proposed temporary wall location(s) and potential exit and entry paths.
      a. Show door location(s) and indicate who has access.
   5. Indicate type of material used for temporary fencing, walls, gates, and doors.
   6. Indicate proposed temporary roads and paved areas.
   7. Indicate proposed temporary offices and storage areas.

1.6 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Heating and Cooling:
      a. Provide temporary heating and cooling required by construction activities for curing, acclimating the building or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed, and is maintained prior, during and after the installation in accordance with the exterior or interior building materials temperature and humidity guidelines.
         1) Do not use heating units that contribute moisture to the enclosed spaces under construction.
   2. Ventilation and Humidity Control:
      a. Provide temporary ventilation required by construction activities for curing, acclimating the building or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1) Exterior Moisture Control:
   a) Perform the installation of all exterior building cladding only after the substrate to which they are being applied is dry and ready to receive them. Do not apply any cladding if it will trap moisture inside a wall or roof cavity (i.e. insulation that has become wet for whatever reasons).
2) Interior Moisture Control:
   a) Perform the installation of all interior moisture sensitive building materials only after the building or space is acclimated to the final environmental conditions under which the building is to be operated in accordance within the Owner's humidity control guidelines.

b. Maintain a consistent humidity in accordance with the guidelines for those materials in the space at least seven (7) days prior to installation of any moisture sensitive materials (i.e. Veneer Plaster, Gypsum Board, Ceiling Tiles, Wood Sensitive Floors, other Flooring sensitive to moisture levels, Interior Painting, etc.).
c. Maintain the same levels or temperature and humidity during the installation of those materials, and after the installation of those materials until the building's own mechanical systems can be turned on to maintain the facility within the Owner's temperature and humidity control guidelines.
d. Replace any materials that have become wet and damaged due to the Contractor not properly protecting installed building materials at no additional cost to the Owner.

3. Dust control:
   a. Perform work in a manner as to minimize the spread of dust and flying particles.
   b. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
4. Burning: No burning will be allowed on-site.
5. Noise Control:
   a. Stationary noise sources shall be of a low-noise emission design, consistent with the best available noise reduction technology.
   b. The hours of operation of noise-generating equipment shall be restricted to 6:00 a.m. to 7:00 p.m. Monday through Friday, and to 8:00 a.m. to 6:00 p.m. on Saturday and Sunday.
   c. Mufflers shall be required on all gas and diesel-powered equipment.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.7 SCHEDULE, ADVERSE WEATHER, EXCAVATION PROTECTION, SOIL STABILIZATION, AND TEMPORARY WORKING SURFACE REQUIREMENTS

A. Adverse Weather Planning: The Contractor shall include within the Contract Time and Contract Sum an allowance for 2.5 months of cumulative rain delays and associated impacts. The Project is anticipated to experience significant and prolonged wet weather conditions during the construction period.
   1. The Contractor shall be solely responsible for planning and executing all operations necessary to maintain progress during wet weather, including but not limited to:
      a. Temporary drainage systems.
      b. Dewatering operations.
      c. Soil stabilization.
      d. Erosion and sediment control measures.
      e. Access road maintenance.
      f. Protection of excavations.
      g. Pumping, diversion, and removal of stormwater.
      h. Rehandling of materials affected by weather.

2. No additional compensation or time extension shall be granted for normal seasonal rainfall, wet soil conditions, groundwater management, or other foreseeable weather-related impacts included within this allowance.

B. Foundation Excavation Protection and Slurry Cap: All building foundations shall be excavated 3 inches deeper than the elevations shown on the Contract Documents.
   1. Immediately upon approval of the foundation bearing surface, the Contractor shall place a 3-inch-thick lean concrete slurry cap (mud slab) over the entire footing excavation bottom. The slurry cap shall:
      a. Protect the approved bearing surface from disturbance.
      b. Prevent degradation of foundation subgrade due to rain and groundwater.
      c. Allow removal of sloughed or softened material without disturbing approved bearing soils.
      d. Facilitate cleanout of foundation excavations following storm events.
   2. Any sloughed, softened, or otherwise unsuitable material deposited above the slurry cap shall be removed immediately prior to footing construction. The Contractor shall maintain excavations in a dry and stable condition at all times.

C. Excavation Sidewall Stabilization: Where foundation excavations are anticipated to remain open during rainy periods, the Contractor shall provide temporary sidewall protection to minimize erosion, sloughing, and sediment migration into excavations.
   1. Acceptable methods include:
      a. Burlap lining.
      b. Jute matting.
      c. Erosion control blankets.
      d. Geotextile fabrics.
      e. Other approved temporary stabilization systems.
   2. The stabilization material shall be securely anchored and maintained throughout the duration of the excavation. Excavation sidewalls shall be inspected following each rain event and repaired as necessary prior to continuation of work.

D. Utility Trench Operations: Utility trench work shall be sequenced to minimize the duration of open trench conditions.
   1. Except where specifically approved by the Owner or Engineer, the Contractor shall:
      a. Excavate, install utilities, test, and backfill within the same work shift whenever practical.
      b. Minimize the total length of open trench exposed at any one time.
      c. Prevent surface water from entering excavations.
      d. Maintain trenches free of standing water.
      e. Restore all disturbed areas immediately following utility installation.
   2. Open utility trenches shall not be left exposed during forecasted rain events unless specifically approved and adequately protected. Following rain events, all trenches shall be inspected, cleaned, reconditioned, and restored to design grade prior to utility installation or backfilling. Water accumulation and saturated trench conditions require corrective measures and reinspection before work proceeds.

E. Temporary Working Surface and Soil Stabilization: The Contractor shall provide and maintain temporary soil stabilization sufficient to support construction traffic, deliveries, equipment operations, emergency access, and the work of all trades throughout the Project duration. Areas exhibiting rutting, pumping, excessive moisture, loss of bearing capacity, or unstable soil conditions shall be stabilized at the Contractor's expense.
   1. At a minimum, the Contractor shall provide temporary all-weather construction access roads, staging areas, crane pads, and building pad working surfaces consisting of:
      a. Nonwoven geotextile separator fabric placed directly on prepared subgrade.
      b. Geogrid reinforcement where pumping, yielding, or unstable subgrade conditions are encountered.
      c. A minimum of 12 inches of compacted Class II aggregate base, crushed rock, or approved equivalent working platform material.

2. The Contractor shall increase section thickness and geogrid reinforcement as necessary to maintain a stable, trafficable surface for construction operations. Alternative stabilization methods may include:
    a. Lime treatment.
    b. Cement treatment.
    c. Chemical stabilization products.
    d. Aggregate working platforms.
    e. Geotextile reinforcement systems.
    f. Geogrid reinforced working surfaces.
    g. Other Engineer-approved methods.
3. The intent of this requirement is that construction operations remain functional during periods of wet weather and that trade contractors are able to perform work without excessive delays resulting from muddy, pumping, or unstable soil conditions.

F. Contractor Responsibility: The Contractor shall be solely responsible for all means and methods associated with temporary works, weather protection, excavation protection, dewatering, soil stabilization, access maintenance, erosion control, sediment control, and maintenance of suitable working conditions.
1. Claims for additional compensation associated with foreseeable wet-weather impacts, unstable soil conditions, excavation deterioration, trench collapse, groundwater management, access maintenance, pumping soils, or insufficient temporary stabilization measures shall not be considered. The Contractor shall include all costs associated with these requirements in its bid.

G. Acknowledgment of Anticipated Conditions: The Contractor acknowledges that the Project will be constructed during the rainy season and that periods of prolonged precipitation, saturated soils, difficult excavation conditions, groundwater intrusion, pumping subgrades, and reduced site accessibility are anticipated conditions and have been included in the Contractor's bid and schedule.

H. Coordination with Related Sections: This Article supplements, and shall be coordinated with, the Project's Geotechnical Investigation Report and Division 31 – Earthwork specification sections for this Project. Where a conflict occurs between this Article and those references, the more stringent requirement shall govern.

I. Building Protection & Weather-Tight Construction: The Contractor shall protect all existing facilities, newly constructed work, partially completed construction, installed materials, equipment, building systems, and finishes from damage caused by rain, wind, groundwater, surface runoff, dust, temperature extremes, and other environmental conditions throughout the duration of the Project.
1. The Contractor shall continuously implement and maintain temporary protection measures necessary to prevent water intrusion and deterioration of the Work. Protection measures shall include, but not be limited to, temporary roofing, waterproof coverings, weatherproof enclosures, temporary walls, protection of openings, stormwater diversion measures, tarping, shrink-wrap systems, pumping, dehumidification, and other measures required to maintain the Work in a dry and protected condition.
2. Materials and equipment stored on-site shall be elevated above grade, adequately covered, and protected from weather exposure, standing water, and moisture accumulation. Moisture-sensitive materials shall not be installed until substrates and surrounding conditions comply with manufacturer requirements.
3. The Contractor shall maintain all newly constructed buildings, additions, renovated areas, and partially completed construction in a weather-tight condition as Work progresses. No portion of the Work shall be enclosed, covered, or concealed while moisture is present within assemblies or construction materials beyond manufacturer-recommended limits.
4. The Contractor shall take all necessary precautions to prevent water intrusion into occupied areas, completed construction, concealed spaces, wall assemblies, ceiling assemblies, electrical rooms, communication rooms, mechanical spaces, and areas designated to receive moisture-sensitive finishes or equipment.
5. Following each storm event, the Contractor shall inspect the Project and immediately repair deficiencies in temporary protection systems. Any water intrusion, moisture damage, mold

growth, corrosion, deterioration, staining, warping, contamination, or damage resulting from inadequate protection shall be corrected by the Contractor at no additional cost to the Owner.

6. Any materials, finishes, equipment, systems, or completed Work determined to be damaged as a result of weather exposure or inadequate protection shall be removed and replaced with new materials meeting the Contract Documents. Drying, cleaning, repair, and restoration efforts shall not relieve the Contractor of the obligation to provide new materials where damage or deterioration has occurred.
7. The Contractor shall include all costs associated with temporary weather protection, moisture control, inspections, temporary enclosures, dehumidification, drying operations, repairs, replacement of damaged materials, and maintenance of a weather-tight structure within the Contract Sum. No additional compensation or extension of Contract Time shall be granted for failure to adequately protect the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.

B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized-steel bases for supporting posts.

C. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain-link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.

D. Wood Barrier Fence: Plywood, 8 feet high, framed with four 2-by-4-inch rails, with preservative-treated wood posts spaced not more than 8 feet apart.

E. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.

F. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.

G. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Field Offices:

1. General Note: Provide one (1) 2A:10B:C Wall Surface Mounted Fire Extinguisher in each field office as a minimum per the CSFM.
2. Contractor's Field Office:
    a. Size: Nominal 10 feet wide minimum, approximately 400 square feet minimum (half of this office is to be reserved for a conference room for job site meetings).
    b. Equipment:
        1) Table for review of Drawings.
        2) Files, rack and shelves as required to store Contract Drawings and Project Record Drawings in a neat, orderly manner.
        3) One copy of each code listed in Specification Section - REGULATORY REQUIREMENTS.
        4) Telephone.
        5) Internet Connection.
        6) Plain Paper Copier / FAX Machine.
        7) Conference room table and chairs for at least 10 people.
    c. Facilities:
        1) Adequate light and power.
        2) Adequate heating, ventilation and air conditioning.

d. Control and Access:
   1) Door shall be lockable and key shall be supplied to Architect and access shall be limited to Owner, Architect, Inspector and Contractor.
e. All of the above items shall be subject to Architect's approval.

3. Project Inspector's Field Office:
   a. Size: Nominal 10 feet wide minimum, approximately 400 square feet minimum (sized for two (2) Owner's Inspectors, and a desk for the Architects use).
   b. Equipment:
      1) Three (3) 48" x 96" layout tables for review of the drawings by each Inspector.
      2) Three (3) 30" x 60" standard desks with two drawers on one side of each desk (the third desk will be used by the Architect when visiting the site).
      3) Three (3) secretarial task chairs with five point rolling bases.
      4) Three (3) 4-drawer legal size, full suspension, lockable file cabinets.
      5) Three (3) 60" high x 36" wide x 12" deep free standing bookcases with four (4) adjustable shelves for each bookcase.
      6) Three (3) 12-capacity rolling, vertical "Plan Holds" with adjustable brackets for 30" x 42" wide drawings.
      7) Three (3) 36" x 48" tackboards mounted to walls as directed by the Owner's Inspector.
      8) Three (3) drafting stools.
      9) Space for one copy of each code listed in Specification Section - REGULATORY REQUIREMENTS.
      10) Two telephones.
      11) Internet Connection.
      12) One Plain Paper Copier / FAX Machine.
   c. Facilities:
      1) Adequate light and power.
      2) Adequate heating, ventilation and air conditioning (ducted central HVAC).
      3) Electric water cooler with both hot and cold water.
   d. Control and Access:
      1) Door shall be lockable and key shall be supplied to Architect and access shall be limited to Owner, Architect, Inspectors and Contractor.
   e. All of the above items shall be subject to Architect's approval.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

D. Project Sign:
   1. The Contractor shall furnish and erect at location as directed by the Architect one sign board approximately 4 feet x 8 feet, fabricated of 3/4 inch exterior grade plywood with a sturdy frame attached to 4 inch x 4 inch x 14 foot redwood posts set 4 feet in the ground minimum, and substantially braced.

2. The sign to be painted on signboard shall be of design in 4 colors as directed by the Architect.
3. Lettering shall be of style shown, neatly executed by a skilled sign painter.
4. The information to be lettered on sign shall be as furnished by the Architect.
5. Sign will include the names of the Contractor, Owner, Architect, and the project designation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   2. Execution of work under this specification section shall constitute acceptance of existing conditions.
   3. Obtain all necessary permits and authorizations by regulatory agencies required to perform the work under this section.

3.2 PREPARATION

A. Coordination:
   1. Before proceeding, verify plans match existing conditions.
   2. Coordinate work under this specification with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. The Contractor shall verify and protect existing landscaping, asphalt area, concrete walkways, and other site improvements to remain on the site before proceeding with the Work.
   2. Prior to starting Work, hose bibbs, utility lines, etc., to be abandoned and removed within the construction area shall be stubbed off outside the limits of construction.
   3. Verify and protect utilities to remain within the construction area and provide special construction for their protection.

3.3 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
   1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.4 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
   1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
   1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with coordination drawings.
      a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
      b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

3.5 IMPLEMENTATION

A. General:
   1. Perform Work and provide and maintain Temporary Utilities and Temporary Facilities in accordance with the requirements of all regulatory authorities having jurisdiction.
   2. Contractors shall cooperate with other contractors and the Owner in the use of the site, Temporary Utilities, Temporary Facilities and shall adjust their operations to maintain harmonious relations and uninterrupted progress of the Work.
   3. The Contractor shall assume all responsibility for the provision and maintenance of these Temporary Utilities and Temporary Facilities and for the provisions of public safety where the operations under this Contract interface with public areas.
   4. Relocate and modify Temporary Utilities and Temporary Facilities, as required by progress of the Work.
   5. Remove Temporary Utilities and Temporary Facilities upon completion of the Project.
   6. Temporary Utilities and Temporary Facilities are to be provided and maintained from commencement of Work until final acceptance.
      a. The Contractor shall pay all charges required of him for the duration of the project, including a 3 month period following the date of the Notice of Substantial Completion.

3.6 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

B. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
   1. Install temporary service or connect to existing service.

C. Sewers: Provide temporary service to remove effluent lawfully.

D. Storm Drainage: Provide temporary service as necessary to remove storm water. Work shall be performed in accordance with the requirements of the Storm Water Pollution Prevention Plan (SWPPP), if any. If no SWPPP is required, then follow local authorities having jurisdiction requirements.

E. Water:
   1. The Contractor will arrange and pay for all water supply for all purposes of construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.
   2. The Owner will pay for all water supply for all purposes of construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.

F. Electrical:
   1. The Contractor shall provide and pay for all electrical facilities and services for all purposes of power and lighting for construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.
      a. The Contractor shall pay for cost of electrical energy required in connection with the testing of such equipment as generators, transformers, power machinery, and similar equipment installed in the work.
   2. The Owner will pay and the Contractor shall provide for all electrical facilities and services for all purposes of power and lighting for construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.

a. The Contractor shall pay for cost of electrical energy required in connection with the testing of such equipment as generators, transformers, power machinery, and similar equipment installed in the work.

3. The Contractor will provide electrical energy to all subcontractors as required on or about the premises.
4. The Contractor will provide power outlets having adequate electrical characteristics and lighting of adequate intensity for the use of other contractors within reasonable distances from their needs and within a reasonable period of time after the other contractors have requested them.

G. Telephone:

1. The Contractor shall provide and pay for all telephone service and telephone equipment in the Field Offices until completion of the Work.
   a. Provide an additional dedicated phone line for modem/network connection in the Project Inspector's Field Office for use by the Architect's representative.

H. Heating:

1. Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity.
2. Select UL or FM approved equipment that will not have a harmful effect on completed installations or elements being installed.
   a. Except where use of the permanent heating system is authorized, provide temporary units that do not introduce moisture into the newly constructed building spaces.
   b. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.
3. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

3.7 SUPPORT FACILITIES INSTALLATION

A. Offices and Storage:

1. Provide temporary offices and storage facilities located within the construction area.
2. Protect materials, construction work and their operations from weather, vandalism, and theft.

B. Sanitary Facilities:

1. Provide adequate, self-contained toilets as required for all persons employed on the Project.
2. In no case shall the permanent plumbing fixtures of the Project be used for this purpose.

C. Temporary Roads and Paved Areas:

1. Construct and maintain temporary roads and paved areas adequate for construction operations and fire protection during construction.

D. Traffic Controls:

1. Implement procedures and measures outlined in the local jurisdiction’s approved Traffic Control Plan.
2. Maintain access for fire-fighting equipment and access to fire hydrants.
3. Conduct work and comply with applicable building codes and regulations regarding the use of public streets and sidewalks and the proper barricading and lighting of public thoroughfares surrounding the construction activities.
4. Provide and maintain access as required to perform work.
5. Repair all damage as a result of work performed on the project to adjacent roads, streets, drives and walks. Restore to condition as good as existed at commencement of the Work.

E. Project Sign:

1. Install project sign as submitted and approved.
2. No other signs will be allowed on the project.

F. Existing Elevator Use:

1. Use of Owner’s existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to the Owner.

2. Do not load elevators beyond their rated weight capacity.

G. Existing Stair Use:

1. Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to the Owner.

3.8 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Existing Facilities:

1. Protect existing vegetation, equipment, structures, utilities, and other improvements at project site and on adjacent properties, except those indicated to be removed or altered. Damage occurring during the course of construction shall be repaired to condition at the start of the Work.

B. Environmental:

1. Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Project Enclosure:

1. Implement procedures and measures outlined in Temporary Project Enclosure Plan.
2. Project enclosure shall protect materials, construction work, and operations from vandalism, theft, and to exclude the intrusion of the public into the construction area.
3. Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by the Owner from fumes and noise.
4. Maintain security by limiting number of keys and restricting distribution to authorized personnel.

D. Barriers: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades.

E. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.

1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
2. Paint and maintain appearance of walkway for duration of the Work.

3.9 CLEANING

A. Clean in accordance with Specification Section – PROJECT CLOSEOUT.

1. At all times, keep the premises free from accumulations of waste materials or rubbish caused by employees or the Work.
2. Clean all soiled surfaces to remain immediately.
3. At the completion of the Work, remove all rubbish from and about the building and all tools, scaffolding, and surplus materials and shall leave the Work "broom clean" or its equivalent.

END OF SECTION

SECTION 07 42 43 – FIBER-CEMENT PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary for complete installation of Wall, Soffit and Facade Fiber-Cement Panel "Ventilated Rainscreen" System, Water Barrier, Insulation and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. Pre-fabricated Fiber-Cement Panels, engineered support structure, and related accessories.
   2. The Exterior Wall finishes and the water resistant barrier (WRB) shall comply with CBC Code Section 1402.5, 2603.5.5 and NFPA 285. The Rigid Insulation shall have a flame spread index no greater than 25 as determined by ASTM E84 or UL 723

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 07 21 00 INSULATION
   4. 07 40 00 METAL PANELS
   5. 07 40 40 MCM PANELS
   6. 07 60 00 SHEET METAL
   7. 07 92 00 SEALANTS
   8. 08 11 00 METAL DOORS AND FRAMES
   9. 08 41 00 STOREFRONTS
   10. 08 41 23 STOREFRONT TEMPERATURE RISE
   11. 08 63 00 TRANSLUCENT PANELS
   12. 09 22 16 METAL FRAMING
   13. 09 24 00 CEMENT PLASTER
   14. 09 29 00 GYPSUM BOARD
   15. 09 91 00 PAINTING
   16. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. AAMA American Architectural Manufacturers Association
      b. ASTM American Society of Testing and Materials
      c. NFPA National Fire Protection Association

1.3 DEFINITIONS

A. The following definitions apply to this specification section
   1. Panel System: Wall panels, attachment components, miscellaneous framing, and accessories necessary for a complete weathertight wall system.
   2. Weathertight: The ability to prevent water intrusion into the building under normal climatic conditions (including pressure differentials, wind, and snow conditions) for the area where the project is constructed. Also the word “weathertightness" is a variation of the word “weathertight" and shall have the same definition applied.

1.4 SYSTEM DESCRIPTION

A. Design Requirements:
   1. Provide a high performance “Ventilated Rainscreen" Fiber-Cement Panel System.

2. The Fiber-Cement Panel System shall consist of factory-molded, ultra high performance concrete (UHPC) solid exterior panels associated UHPC framing components with engineered support structure (subframe) materials, accessories and other miscellaneous accessories as required for a complete watertight installation.
    a. Any items not specifically noted but necessary for a complete and watertight system shall be provided.
3. The Fiber-Cement Panel System shall be designed to provide controlled drainage to the exterior face of the wall for any leakage of water and condensation taking place within the panel system.

B. Performance Requirements:
1. General: Provide “Ventilated Rainscreen" Fiber-Cement Panel System that comply with performance requirements without failure due to defective manufacture, fabrication, installation or other defects in construction.
    a. Design panel system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Fiber-Cement Panels shall comply to ASTM C 1185, Type A, Grade N requirements.
    a. Density - Thin Panel: 137 lbs./ft³
    b. Flexural Strength (Thin Panel) - Dry: Pass, Mean length direction not less than 3,800 lbs/in2 and width direction 3,600 lbs/in2.
    c. Flexural Strength (Thin Panel) - Wet: Pass, Mean length direction not less than 3,800 lbs/in2 and width direction 3,400 lbs/in2.
    d. Freeze/Thaw (Cladding): Pass. No visible cracks and not less than 90% post-exposure strength retention.
    e. Moisture Content - Thin Panel: less than 1.0%.
    f. Moisture Movement - Thin Panel: 0.00%.
    g. Warm Water: Pass. No visible cracks or structural alteration. Not less than 90.0% ratio of retained post-exposure strength.
    h. Water Absorption - Thin Panel: less than 4.0%.
    i. Water Tightness: Pass. No water droplet formation.
3. Surface Burning Characteristics per ASTM E 84:
    a. Flame Spread: Pass.
    b. Smoke Developed: Pass.
    c. Class A.
4. Fire Resistant per ASTM E 119.
5. Non Combustible per ASTM E 136.
6. Thermal Expansion per ASTM C 531.
    a. 6.41E-06 in/in/degree F (0.01 inches per meter at 40 degree temperature change).
7. Compressive Strength per ASTM C 873: Greater than or equal to 18,332 lbs./in²
8. Tensile Strength per ASTM C 496: Splitting matrix prism: 1,319 lbs./in².
9. Colorfastness & Weathering (500 hours) per ASTM G 155 and ASTM D 2244.
    a. 2.07 delta E. without coating (standard, varies with pigment type, texture and coating (consult with manufacturer for color information).
10. Anchor Pullout Strength per ASTM E 488:
    a. 8.5 mm embed in 13mm thick panel.
    b. Tension (Min. Mean) Peak Load - 386 lbf or greater.
    c. Shear (Min. Mean) Peak Load - 650 lbf or greater,

1.5 SUBMITTALS

A. General: Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data:
1. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
2. Submit manufacturer’s standard color range for selection by the Architect.

3. Manufacturer’s Details: Submit drawings (*.pdf formats), including plans, sections, showing installation details that demonstrate product dimensions, edge/termination conditions/treatments, compression and control joints, corners, openings, and penetrations.

C. Shop Drawings.
   1. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
      a. Panel elevations, sections, and dimensions.
      b. Panel thickness and fastener type and size.
      c. Finishes.
      d. Joint and connection details.
      e. Erection details.
      f. Panel cut-outs for Mechanical, Electrical, Plumbing, and Security devices and items.
      g. Panel frame details for typical panels including sizes, spacings, thicknesses, and yield strengths of various members.
      h. Locations and details of connection hardware attached to structure.
      i. Sizes, locations, and details of flex, gravity, and seismic anchors for typical panels.
      j. Erection sequence for special conditions.
      k. Relationship to adjacent materials.
      l. Shop Drawings for Mockups: Include plans, elevations, sections, full-size details, and attachments to other work.

D. Samples.
   1. Submit samples of each product type proposed for use.
      a. Representative of finished exposed face of solid exterior UHPC panel. For each color and pattern specified, submit a minimum of two samples, each not less than 6 by 6 inches, and of actual thickness. Each sample to be labeled and dated. Approved sample to be stamped approved and returned to manufacturer for reference.

E. Quality Assurance/Control Submittals:
   1. Provide manufacturer's Tolerances and Acceptance Criteria prior to any panel fabrication for the Architect's review.

F. Closeout Submittals in accordance with the following:
   1. Operation and Maintenance Data:
      a. Operation and maintenance data for installed products in accordance with Specification Section - SUBMITTALS.
      b. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
   2. Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
      b. All products listed in this section are to be installed by a single installer trained by manufacturer or representative.
      c. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's written warranty requirements.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

b. All fiber cement panels specified in this section must be supplied by a manufacturer with a minimum of 5 years of experience in fabricating and supplying fiber cement cladding systems.
    1) Products covered under this section are to be manufactured in an ISO 9001 certified facility.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
    a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.

C. Mockups:
1. Build mockup indicated on Drawings to verify selections made under sample submittals, and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
2. Build mockup, including insulation, supports, attachments, and accessories for typical conditions/parts not to exceed one (1) window surround , cornice section and or building corner and not more than 100 square foot area.
3. Approval of mockup does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. The Mock-up shall match the existing Junior High building joints. See drawings for fastener spacing.

D. Meetings:
1. Pre-Installation:
    a. Coordinate the work with other work being performed.
    b. Identify any potential problems, which may impede planned progress and proper installation of work.
    c. Review structural load limitations of existing structure.
    d. Review areas where existing construction is to remain and requires protection.
2. Progress: Scheduled by the Contractor during the performance of the work.
    a. Review for proper work progress.
    b. Identify any problems and acceptable corrective measures.
    c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
    a. Inspect and identify any problems.
    b. Establish method and procedures to maintain protections while progressing to project completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be individually wrapped.
2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Deliver exterior solid UHPC wall panels and support system components packaged to comply with manufacturers' requirements and adequately protected from damage during shipment.
2. Panels are to be stored and handled vertically until installed.
3. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
    a. Protect components from adverse job conditions prior to installation.
    b. Protect components from damage after installation including staining or solvents used in adjacent work, impact damage and abrasion, etc.

c. Panels are to be stored and handled vertically until installed.
d. Store with non-staining resilient spacers between panels, with suitable ventilation.
e. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

A. Environmental requirements:
1. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
2. Burning: No burning will be allowed on-site.
3. Rain: The work under this section shall not be started or maintained under threat of rain unless the work is not affected by the rain.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.
3. Field Measurements:
a. Verify actual measurements/openings by field measurements before material fabrication, and show recorded measurements on approved shop drawings, as required.
b. Coordinate shop drawings and field measurements with adjacent work/assemblies and with associated trades/sub-contractors prior to finalizing shop drawings.
c. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.9 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
1. In accordance with manufacturer's written standard warranty for defects in fiber cement panels:
a. Warranty Period Twenty-Five (25) Years.
b. Manufacturers warranty against manufacturer's defects in panel finish:
1) Warranty Period Fifteen (15) Years.

C. Fabricator's Warranty (Accessories, Clips, other attachments, etc.):
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period Ten (10) years.

D. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period Five (5) years.

1.10 MAINTENANCE

A. Extra Material:
1. Furnish to Owner not less than 5 percent of each color of each pattern of 5' x 1' Fiber-Cement Panels Installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

1. Water Barriers:
    a. Building Wrap (also qualifies as an "Air Barrier"):
        1) TYVEK "Commercial Wrap".
        2) Acceptable alternative manufacturers:
            a) TYPAR "Metro Wrap".
    b. Sealing Tape:
        1) DUPONT 3" wide tape "Tyvek 3".
        2) Acceptable alternative manufacturers:
            a) 3M COMPANY "8086 Construction Sheathing Tape".
            b) CANTECH INDUSTRIES "Clipper Tape".
2. Penetration Flashing:
    a. GRACE CONSTRUCTION PRODUCTS "Vycor V40".
    b. Acceptable alternative manufacturers:
        1) FORTIFIBER "Fort-I-Flash 40".
        2) TYVEK "Flex Wrap" and "Straight Flash".
3. Support Structure:
    a. "Z" Furring Channels, Hat Channels, and Steel Accessories specified product manufacturer:
        1) CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
        2) Acceptable alternative manufacturers:
            a) CEMCO
            b) STUDCO
4. Engineered support structure
    a. Custom Hat Channel Furring and Steel Accessories specified product manufacturer:
        1) KNIGHT WALL SYSTEM.
5. Rigid Board Insulation product manufacturer:
    a. RMAX (a SIKA company) "ECOMAXci FR Air Barrier System".
        1) Tape "R-Seal 3000".
    b. Acceptable Alternative Manufacturers:
        1) ATLAS.
        2) JOHNS MANVILLE CORPORATION.
        3) TREMCO.
6. Fiber-Cement Board product manufacturer:
    a. TAKTL STANDARD ESR 3899.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Continuous Insulation for Wall Panels:

1. ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board", Type 1, Class 1, isocyanurate with front and back aluminum foil-faced (balanced panel), conditioned "R" value of 5.60 per inch minimum, in accordance with ASTM E 84 "Test

Method for Surface Burning Characteristics of Building Materials", and ASTM D 1621 "Test method for Compressive Properties of Rigid Cellular Plastics".

a. Flame Spread Index Maximum, core: 25 or less.
b. Smoke Density Developed Index Maximum, core: 450 or less.
c. Compressive strength: 20 PSI.
d. 4' x 4' or 4' x 8' panels.
e. Thickness: 1".

B. Building Wrap (also qualifies as an "Air Barrier"): Woven and non-woven polyolefin sheets approved per ICC ES Reports for Water-Resistive Barriers for buildings of any construction type and equivalent to Grade D paper with 60 minute water-resistant rating.

C. Sealing Tape (3" wide minimum):

1. Minimum 3" wide tape.
2. Sealing Tape shall be compatible with Building Wrap.

D. Penetration Flashing: Self-adhered and self-healing weather barrier strips, in accordance with FS UU-B-790a, Grade A.

1. 40 mil. minimum thickness, in 9-inch and 12-inch widths as is appropriate for barrier application.

E. Engineered Support Structure:

1. PanelRail
   a. 3/4" depth x 2"
   b. Zinc Coated (ASTM A1046)
   c. Thickenss: 18-Gage.
   d. Finish: Black PVDF
   e. Length: 120"
   f. Vent Holes: 4" on center
2. Reveal-Rail
   a. 3/4" depth x 5 1/8"
   b. Zinc Coated (ASTM A1046)
   c. Thickenss: 18-Gage.
   d. Finish: Black PVDF
   e. Length: 120"

F. Support Structure:

1. Steel Sheet:
   a. Steel sheet for 16 gage and heavier shall comply with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members", structural steel classification, Grade 50 ksi, Class 1 or 2.
   b. Steel sheet for 18 gage shall comply with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members", structural steel classification, Grade 33 ksi, Class 1 or 2.
   c. When hot-rolled steel sheet and strip is used in fabrication of metal members they shall comply with ASTM A1011 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength", structural steel classification, Grade 50 ksi.
2. Coating:
   a. Steel sheet shall be galvanized in accordance with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members", G90 minimum and comply with ASTM A 924 "Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process".
   b. When hot-rolled steel sheet and strip is used in fabrication of metal members, hot-dip galvanize coating shall be in accordance with ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products".

3. Thickness:

Reference Gage	Mils	Minimum Base-Metal Thickness (inch)	Minimum design Thickness (inch)
18	43	0.0428	0.0451
16	54	0.0538	0.0566
14	68	0.0677	0.0713
12	97	0.0966	0.1017
10	118	0.1180	0.1240

G. Rigid Board Insulation:
1. Specified: RMAX "ECOMAXci FR Air Barrier System".
   a. Alternate: ATLAS “Energy Shield Pro Air Barrier System”.
   b. Alternate: HUNTER “XCI Foil Class A Air Barrier System”.
   c. Alternate: JOHNS MANVILLE CORPORATION “AP Foil-Faced Foam Continuous Insulation Air Barrier System”.
2. Properties:
   a. ASTM E2357 and ICC-ES AC71 Acceptance Criteria for Foam Plastic Sheathing Panels Used as Water-Resistive Barrier.
   b. Listed as an Air Barrier Association of America (ABAA) Evaluated Boardstock Air Barrier Assembly.
   c. Polyisocyanurate with front and back aluminum foil-facers.
   d. Rigid Polyisocyanurate: ASTM C1289, Type I, Class 1.
   e. Compressive Strength: ASTM D1261, 25 psi.
   f. R Value: ASTM C518, 6.0 per inch.
   g. Fire Propagation: NFPA 285, Assembly pass.
   h. Surface Burning: ASTM E84, Faced, Flame Spread: <25; Smoke Developed: <450.
   i. Air Permeability: ASTM E2178: 0.004 cfm per sq ft or less.
   j. Water Vapor Permeability: ASTM E96 desiccant method: 0.1 perm or less.
3. System components:
   a. Washers: manufacturer recommended self-sealing for use with Self-drilling screws.
      1) Self-sealing 2 inches diameter polymer washer, UV stabilized, tested, and approved to provide air and water-resistive seal, in combination with compatible self-drilling screw.
4. System Joint Sealants, Joint Tapes, and Flashing Components:
   a. Material Standards:
      1) AAMA 711: For self-adhered flashing and joint materials.
      2) AAMA 714: For liquid applied flashing and joint materials.
   b. Static joints, joining aluminum-faced insulation panels: manufacturer recommended liquid flashing, adhered joint tape, and adhered flashing and transition tape.
   c. Static joints, joining aluminum-faced insulation panels and adjacent elements, including window and wall openings, and items penetrating the insulation: manufacturer recommended liquid flashing and adhered flashing and transition tape.
   d. Dynamic joints: use manufacturer recommended materials and devices specifically designed for such joints.

H. Fiber-Cement Panels:
1. Exterior Panels, factory-formulated with ultra high performance concrete and reinforced with alkali-resistant (AR) glass mesh, factory-mixed and manufactured; complying with ASTM C1186. Type A, Grade IV.
2. Panel Characteristics:
   a. Panel Sizes: 12" H nominal x 60" W nominal. Refer to drawings for variation in sizes.
   b. Panel Dimensional Tolerances:
      1) Panel Thickness: 5/8-inch nominally, thickness variation +/- 0.05-inch.

2) Panel Edges: Open Square Cut at vertical to horizontal transitions and open quirk miter at all vertical corner joints..
3) Panel Weight: 7.2 lbs/ft2, at 5/8-inch thickness.

c. Panel Finishes:

1) Finish exposed, front-facing surface of UHPC as follows, to match approved design reference sample. Panel faces shall be free of joint marks, grain, or other obvious defects.
2) Finish Characteristics:

a) Texture Smooth.
b) Finish Mediablast.
c) Sealer Microseal.

3) Pattern Direction: Horizontal.

d. Panel Color:

1) Panel to be Integrally through colored.
2) Refer to Interior Color Schedule.

I. Accessories:

1. As recommended in UHPC panel manufacturer's written instructions.
2. Adhesives and Sealants:
   a. As recommended in UHPC panel manufacturer's written instructions.
3. Stainless Steel Drill Screws: Of sufficient lengths and sizes to securely fasten support structure to building wall framing members, and as follows:
   a. Screws complying with ASTM C 1002 for fastening to steel members less than 0.033 inches thick.
   b. Screws complying with ASTM C 954 for fastening to steel members from 0.033 to 0.112 inches thick.

J. Support Structure:

1. Components:
   a. Horizontally-oriented attachment system support bracket/angle bracket anchored directly to building structure.
2. "Z" Furring Channels,
   a. 1.25" legs x 1" (depth required for rigid insulation).
   b. 54 Mils (16-Gage), 0.0566" (0.0538" min).
3. Auxiliary Materials:
   a. Panel Anchors: Concealed, undercut type, for attaching UHPC panels to panel-mounted extruded aluminum 'C' clips and substructure support system. Panel anchor holes to be factory pre-drilled by UHPC panel manufacturer.
      1) KEIL Concealed Anchoring System for Façade Panels, provided by panel manufacturer.
   b. Miscellaneous Materials:
      1) Aluminum Extrusions: ASTM B 221, Alloy 6005 T5.
      2) Aluminum Sheet: ASTM B 209, Alloy 6061-T5.
      3) Carbon Steel Shapes and Plates: ASTM A 36, finished as follows:
         a) Hot-Dipped Galvanized.
      4) Stainless Steel Bars and Shapes: ASTM A 276, Type 304 or better.

K. Rigid Board:

1. Wall Board:
   a. In accordance with:
      1) ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board", Type 1, Class 1, isocyanurate with front and back foil-faced (balanced panel), conditioned "R" value of 5.60 per inch minimum, in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building

Materials", and ASTM D 1621 "Test method for Compressive Properties of Rigid Cellular Plastics".

a) Flame Spread Index Maximum, core: 25.
b) Smoke Density Developed Index Maximum, core: 450.
c) Compressive strength: 20 PSI.
d) 4' x 4' or 4' x 8' panels.
e) Thickness: 1".

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affects the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.
   4. Fiber-cement panels can be installed over braced wood, steel studs and sheathing including plywood, OSB, plastic foam or fiberboard sheathing.
      a. Fiber-cement panels can also be installed over Structural Insulated Panels (SIPS), Concrete Masonry Units (CMU's) and Concrete Block Structures 9CBS's) with furring strips, and Pre-Engineered Metal Construction.
   5. Allowable stud spacing: See manufacturer's written installation instructions for details.
   6. A weather resistant barrier is required when installing fiber-cement panels.
      a. Use an approved weather resistive barrier (WRB) as defined by the current CBC.
   7. Appropriate metal flashing shall be used to prevent moisture penetration around all doors, windows, wall bottoms, material transitions and penetrations.
B. Do not install panels or components that appear to be damaged or defective.
C. Do not install wet panels.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
B. Installation of Water Barriers:

1. Install Water Barriers prior to installation of exterior wall, exterior soffit and exterior fascia framing.
2. Water Barriers shall be installed at all exterior walls, exterior soffits and fascias.
3. Install Water Barriers with Penetration Flashing, Metal Accessories, and all other related work in "shingle" or "weatherboard" fashion.
4. Water Barriers shall be installed as required in CBC Sections 1404.2, 1405, and 2510.6 as follows:
    a. Provide two layers of Water Barriers.
        1) One inner layer of Building Wrap (also qualifies as an "Air Barrier"):
            a) Seal all edges, laps and penetrations with a 3" wide minimum Sealing Tape as part of rainscreen system.
        2) One outer layer of Building Wrap.
    b. The Water Barrier shall be applied horizontally, with the upper layer lapped over the lower layer not less than 6 inches and free from holes and breaks.
        1) Where vertical joints occur, barrier shall be lapped not less than 6 inches.
    c. Exposure:
        1) Maximum exposure of Water Barriers shall be 30 days prior to support structure and Rigid Board installation, application or less as required by Water Barrier Manufacturer.
            a) Protect Water Barriers from the elements (both exposure to the sun and water) with a temporary 6-mil visqueen barrier or other material approved by the barrier manufacturer.

C. Installation of Penetration Flashing:
1. Apply Penetration Flashing in conjunction with Water Barriers, Support Structure and all other related work.
2. Install Penetration Flashing at all openings and penetrations at all exterior walls, exterior soffits and exterior fascias.
3. Install Penetration Flashings with Water Barriers, exterior Support Structure and all other related work in "shingle" or "weatherboard" fashion.
4. Penetration Flashings shall be installed as required in CBC Sections 1404 in 9" widths and continuous to 9" past all intersections around all openings, penetrations and termination to other Water Barriers of all related work.
    a. Should any penetration warrant a greater width of wall flashing, provide 12" wide flashing as required.
    b. When an object extends through the Water Barrier, return the edge of the Penetration Flashing 1" and apply to the sides of the penetrating item.
5. Objects such as electrical back-boxes, electrical speaker enclosures, penetrations created by structural members, and the like.

D. Installation of Sheet Metal Transitions:
1. Apply Sheet Metal Transitions in conjunction with Water Barriers, Penetration Flashings and all other related work.
2. Install Sheet Metal Transitions to create water tight barrier and allow drainage of water to the exterior as shown on the drawings.
3. Install Sheet Metal Transitions with Water Barriers, Penetration Flashing Sheets and all other related work in "shingle" or "weatherboard" fashion.
4. Install all Metal Accessories in accordance with manufacturer's written instructions.
    a. All Metal Accessories shall be fully supported in accordance with CBC, secure flanges to framing.
    b. Install in 10 foot lengths wherever possible.
    c. All joints (butt, mitered, bent, continuing around corners, or changing directions) shall be cut accurately, welded, or folded, sealed, pop-riveted and sealed again, for a watertight joint.

E. Support Structure:

1. General:
    a. Complete support structure assembly to support and anchor exterior UHPC wall panels. Support structure to be anchored to building structure.
2. Layout:
    a. Lines shall be straight and true.
    b. Set plumb, level, and square.
    c. Panel layout shall be a running bond pattern.
3. Horizontal support rails (Concealed attachment):
    a. Horizontally-oriented attachment system support bracket/angle bracket anchored directly to building structure.
    b. Rails to be painted black.
    c. Fasteners: Corrosion-resistant stainless steel fasteners and anchors of type, size and spacing required for type of substrate and project conditions.
4. Install wall reinforcements, channel cleats, clips, hangers, and other accessories required for connecting UHPC wall panels to supporting members and backup materials per project/façade engineers approved design.
    a. Horizontally-oriented attachment system support bracket/angle bracket anchored directly to building structure.
    b. Vertical Girts to be painted black.
    c. Fasteners: Corrosion-resistant stainless steel fasteners and anchors of type, size and spacing required for type of substrate and project conditions.
5. Vertical girt cold formed hat channels that fasten to horizontal "Z" furring channels.

F. Rigid Board Insulation:
1. Install per manufacturer's written recommendations.
2. Wrap and Tape all edges as part of rain screen system.
3. Exposed side of rigid boards are to be primed with an appropriate primer and painted black.

G. Fiber-Cement Panels:
1. General:
    a. Install products in accordance with the latest written installation guidelines of the manufacturer and all applicable building codes and other laws, rules, regulations and ordinances.
    b. Review all written manufacturer installation, maintenance instructions, and other applicable documents before installation.
2. Panel Cutting in field if needed:
    a. Field-cut panels and drill face-fastening anchor holes in accordance with the UHPC panel manufacturer's written directions.
    b. Do not field-modify factory-drilled concealed/undercut panel anchor holes.
    c. Special Precautions may include, but not limited to:
        1) Always cut fiber cement panels outside or in a well ventilated area. Do not cut the products in an enclosed area.
        2) Always wear safety glasses and NIOSH/OSHA approved respirator whenever cutting, drilling, sawing, sanding or abrading the products. Refer to manufacturer SDS for more information.
        3) Use a dust-reducing circular saw with a diamond-tipped or carbide-tipped blade.
        4) Silica Dust Warning: Fiber cement products may contain some amounts of crystalline silica, a naturally occurring, potentially hazardous mineral when airborne in dust form. Consult product SDS or visit www.osha.gov/SLTC/silicacrystalline/index.html.
    d. Seal all field cut edges with manufacturer's recommended sealer to match field color of panel.
3. Vertical Control/Expansion Joints and/or Horizontal/Compression Joints may be required. Refer to written installation guide(s).
4. Provide miscellaneous reinforcement of adhered panel parts and unitized panel parts per manufacturer and installation contractor's engineer.

5. Lift UHPC wall panels and install without damage.
6. Install UHPC panels level, plumb, square, and in alignment.
7. Provide temporary supports and bracing as required to maintain position, stability, and alignment of panels until permanent connections are completed.
8. Fasteners to be 12-gage, grade 304 Stainless Steel torx T25 recessed, color matched.

3.4 Erection Tolerances:

A. Erect UHPC panels to comply with the following noncumulative tolerances.
   1. Plan Location from Building Grid Datum: Plus or minus 1/2 inch.
   2. Top Elevation from Nominal Top Elevation: As follows:
      a. Exposed Individual Panel: Plus or minus 1/8 inch.
      b. Exposed Panel Relative to Adjacent Panel: 1/8 inch.
   3. Support Elevation from Nominal Elevation: As follows:
      a. Maximum Low: 1/2 inch.
      b. Maximum High: 1/4 inch.
   4. Maximum Plumb Variation over the Lesser of Height of Structure or 100 Feet: 1 inch.
   5. Plumb in Any 10 Feet of Element Height: 1/4 inch.
   6. Maximum Offset in Alignment of Matching Edges: 1/8 inch.
   7. Face Width of Joint: As follows (governs over joint taper):
      a. Panel Dimension 20 Feet or Less: Plus or minus 1/4 inch.
   8. Maximum Joint Taper in 10 Feet: 1/8 inch.
   9. Differential Bowing, as Erected, between Adjacent Members of Same Design: 1/8 inch.

3.5 CLEANING AND PROTECTION

A. Perform cleaning procedures according to UHPC panel manufacturer's written instructions.

B. Clean soiled UHPC surfaces with water, using soft fiber brushes and sponges, and rinse with clean water. Mild detergent may be used if water alone is not satisfactory. Power washing is permitted, if the spray is not concentrated and nozzle is not held within 5 ft. for the panel surface. Prevent damage to UHPC surfaces and staining of adjacent materials.

C. Prevent damage to UHPC surfaces and staining of adjacent material.

D. The installer is responsible for removing all metal, and UHPC scraps, clips, or fasteners along with crates and packing materials from this work, from the site when the installation is complete.
END OF SECTION

END OF SECTION

SECTION 11 61 23

CHOIR RISERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Services as listed herein and related to the provision of the following systems:
      a. Musician Risers and accessories

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Coordinate with the following sections in carrying out this work:
   1. Division 01 – General Conditions

1.03 REFERENCES

A. Comply with all national, state and local regulations and the procedures and requirements of the local jurisdiction. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.

B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, NEC (National Electrical Code), IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.

C. Labor shall be provided per applicable labor regulations and practices.

1.04 DEFINITIONS

A. Refer to Div. 01 for definitions.

B. Owner Representative: For the scope in this Section, authorized personnel representing the Owner and The Shalleck Collaborative, Inc., Theatre Consultants.

1.05 SYSTEM DESCRIPTION

A. A set of portable choir risers with accessories as noted below.

B. A set of portable band risers with accessories as noted below.

1.06 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the Owner's Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.

B. Documentation for the substitution shall be submitted with supporting material and shall include the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner's Representative shall be the sole evaluator of the fitness of the substitution.

C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

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1.07 SUBMITTALS

A. Submittals shall be made in accordance with Division 1.

B. Submittals shall be made electronically in PDF format.

C. Submittals shall be made in a timely fashion so as to not affect the project schedule, and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.

D. Submittals shall be reviewed prior to commencing acquisition of the work in this section. All services and parts of the work in this section shall be verified through the submittal process. Approval does not relieve the Contractor of the responsibility of providing equipment in accordance with the specifications.

E. Shop Drawings:

1. Submit component and installation drawings and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation.
2. Shop drawing plans and section shall be at ¼" scale minimum. Details shall be larger scales to fully explain the component.
3. Show storage area diagrams for all components un-used in any particular system.
4. Provide clear space on all shop drawings for comments and approval stamps.

F. Product Data:

1. Submit data sheets for all standard component parts, which shall include all information necessary to verify compliance with this Section.
2. Product data shall be properly identifying each components intended use. Any options or variations must be clearly noted.

G. Samples:

1. Upon 14 days of request by the Owner's Representative, submit samples for review.

H. Record Documents:

1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Within 30 days, provide electronic "as built" submittals including shop drawings, product data, flame certifications, operations and instructions manuals for all products provided, care and maintenance instructions, service line and online contacts and warranty documents.

1.08 WARRANTY

A. Warranty shall provide coverage of material and product defects and assembly workmanship for a period of three years following the date of acceptance by the Owner.

B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor, except for safety related items, which shall be corrected within 48 hours of notification.

1.09 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty subcontractors and manufacturers meeting the qualifications listed herein.

B. Specialty subcontractor shall have been continuously engaged in the sales and installation of equipment similar to that specified herein for a minimum of fifteen years.

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C. Specialty suppliers shall have at time of bid and continuously maintain throughout the project and warranty period a Specialty Contractor's license valid in the state of the project and appropriate for the work in this Section.

D. Specialty manufacturers responsible for engineering and manufacturing shall have been continuously engaged in the engineering and manufacturing of equipment similar to that specified herein for a minimum of fifteen years, and shall have provided equipment for at least fifty installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.

E. All equipment shall be UL listed and bear the appropriate labels.

1.10 DELIVERY, STORAGE AND HANDLING

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.

B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.

C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

1.11 PROJECT CONDITIONS

A. Defects in the field which may impact the work in this Section shall be reported to the Owner's Representative and corrected in accordance with the requirements of the applicable Section of work prior to commencement of the work in this Section.

B. Field Conditions: 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.

1.12 MAINTENANCE

A. Provide maintenance stock of any user-serviceable components within the system. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner at time of system commissioning.

PART 2 - PRODUCTS

2.01 PRE-APPROVED MANUFACTURERS

A. The following manufacturers are pre-approved to bid the work in this section:

Wenger Corporation / JR Clancy
555 Park Dr
Owatonna, MN 55060
Contact: Jeff Kirkpatrick
Tel: (503) 648-2463
Email: jeff.kirkpatrick@wengercorp.com

B. Pre-approval to bid does not imply acceptance of the manufacturer. It is the sole responsibility of the contractor for this Section to ensure that any price quotations received and submittals made are for controls systems that meet or exceed the specifications.

2.02 MATERIALS

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A. All components supplied under this Section shall be new. Used or factory reconditioned components shall not be acceptable.

2.03 CHOIR RISERS

A. Provide (5) Wenger Signature Choral Risers with the following attributes:
   1. 3-step model

B. Provide the following accessories:
   1. Siderail Set, Qty (1)
   2. Siderail Kit Reversed, Qty (5)
   3. Backrail Removal Kit, Qty (5)

C. Deliver to the site assembled and ready to use, and discard of all packing materials.

D. Setup the riser system on the stage as directed by the users.

E. Provide (2) hours of training, outlining setup and teardown requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Coordinate scheduling and access with the Contractor and the Owner.

B. Insert operations and maintenance information into the project record documents as specified above in Submittals.

3.02 PERFORMANCE OF THE WORK

A. The Contractor shall be responsible for storage of equipment, tools, and equipment during the period of the installation.

B. Extent: All specified equipment shall be installed by fully trained superintendents and workmen. Equipment shall be installed in a workman like manner, per plans and specifications. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.

C. Standards:
   1. Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes. All welding must be performed in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1).

3.03 CLEAN UP

A. The Contractor shall be responsible for clean up, including removal of packing materials etc. and the protection of surfaces or equipment provided by other trades.

3.04 INSPECTION AND TESTING

A. Upon completion of the installation the Contractor shall notify the Owner's Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Owner’s Representative’s schedule.

B. The Contractor shall arrange for access as necessary for inspection of equipment by the Owner's Representative.

C. In preparation for inspection by the Owner’s Representative system components shall be cleared of dust and debris.

D. All systems shall be complete and will be operated by the Owner’s Representative for approval. Make available for review by the Owner’s Representative:

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1. All components for physical inspection.
    a. Contractor shall make provisions for access as necessary.

E. The Contractor shall be liable for any return visits by the specialty sub-contractor, factory engineer or Owner's Representative as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the related Contractor or Owner's Representative to carry out their work.

3.05 TRAINING

A. Upon final approval of the system by the Owner's Representative, representatives from the Specialty Sub-Contractor shall provide instruction to designated Owner staff or representatives in the safe use and maintenance of all systems specified herein.

B. Training sessions shall be scheduled in advance to the Owner Rrepresentative's schedule.

C. Provide (2) hours of training, minimum.

D. Training shall include, but not be limited to:
    1. An overview of the system and all of its components.
    2. Demonstration of how to switch between various system configurations.
    3. Care and maintenance of the system.
    4. Basic system visual inspections, and proper and safe operation.

END OF SECTION

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SECTION 116123 - PORTABLE SEATING PLATFORMS AND SEAT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Services as listed herein and related to the provision of the following systems:

a. Audience Seating Risers
b. Portable Audience Seats

2. The Platform Contractor shall provide all items necessary for a complete, safe, fully functional system as described herein, including all tools, scaffolding, labor, and supervision, even though they may not be specifically enumerated.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.3 REFERENCES

A. Comply with all national, state and local regulations and the procedures. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, NEC (National Electrical Code), IEEE, and all manufacturer’s recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers’ warranties.
C. Labor shall be provided per applicable labor regulations and practices.

1.4 DEFINITIONS

A. Refer to Div. 01 for definitions.
B. Owner Representative: For the scope in this Section, authorized personnel representing the Owner and The Shalleck Collaborative, Inc., Theatre Consultants.

1.5 SYSTEM DESCRIPTION

A. Modular platform systems, comprised of portable platform decks, ramp, landing, support frames and railings shall be provided.
B. Loose seats with ability to interlock, including storage carts and accessories shall be provided.

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1.6 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the Owner's Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.
B. Documentation for the substitution shall be submitted with supporting material and shall include the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner's Representative shall be the sole evaluator of the fitness of the substitution.
C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.7 SUBMITTALS

A. Submittals shall be made in accordance with Division 1.
B. Submittals shall be made electronically in PDF format.
C. Submittals shall be made in a timely fashion so as to not affect the project schedule, and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.
D. Submittals shall be reviewed prior to commencing acquisition for, and fabrication of the work in this section. All services and parts of the work in this section shall be verified through the submittal process. Approval does not relieve the Contractor of the responsibility of providing equipment in accordance with the specifications.
E. Shop Drawings:

1. Submit component and installation drawings and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation.
2. Shop drawing plans and section shall be at ¼” scale minimum. Details shall be larger scales to fully explain the component.
3. Show storage area diagrams for all components un-used in any particular system.
4. Provide clear space on all shop drawings for comments and approval stamps.

F. Product Data:

1. Submit data sheets for all standard component parts, which shall include all information necessary to verify compliance with this Section.
2. Product data shall be properly identifying each components intended use. Any options or variations must be clearly noted.

G. Samples:

1. Upon 14 days of request by the Owner’s Representative, submit samples for review. Samples may include, but are not limited to:

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a. 1 square foot full scale mock-up of a typical platform deck including project-specific finish.

2. At time of delivery, submit six copies of submittals including product data, flame certifications, operations and instructions manuals for all products provided, care and maintenance instructions, service line and online contacts and warranty documents.

H. Record Documents:

1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Within 30 days, submit six copies of "as built" submittals including shop drawings, product data, flame certifications, operations and instructions manuals for all products provided, care and maintenance instructions, service line and online contacts and warranty documents.
3. Provide (3) 11x17 laminated, assembly instructions for owner use with illustrations or color pictures. Include step by step instructions for each configuration.

a. Instruction sheets may be dual sided.
b. If multiple pages are required, full instruction sets shall be bound together.

1.8 WARRANTY

A. Warranty shall provide coverage of material and product defects and assembly workmanship for a period of three years following the date of acceptance by the Owner.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor, except for safety related items, which shall be corrected within 48 hours of notification.

1.9 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty subcontractors and manufacturers meeting the qualifications listed herein.
B. Specialty subcontractor shall have been continuously engaged in the sales and installation of equipment similar to that specified herein for a minimum of fifteen years.
C. Specialty suppliers shall have at time of bid and continuously maintain throughout the project and warranty period a Specialty Contractor's license valid in the state of the project and appropriate for the work in this Section.
D. Specialty suppliers shall maintain bonds in the amount required for the project.
E. Specialty manufacturers responsible for engineering and manufacturing shall have been continuously engaged in the engineering and manufacturing of equipment similar to that specified herein for a minimum of fifteen years, and shall have provided equipment for at least fifty installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.
F. All equipment shall be UL listed and bear the appropriate labels.

1.10 DELIVERY, STORAGE AND HANDLING

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.
C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

1.11 PROJECT CONDITIONS

A. Defects in the field which may impact the work in this Section shall be reported to the Owner's Representative and corrected in accordance with the requirements of the applicable Section of work prior to commencement of the work in this Section.
B. Field Conditions: 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.

1.12 MAINTENANCE

A. Provide maintenance stock of user-serviceable components within the system. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner at time of system commissioning.

PART 2 - PRODUCTS

2.1 PRE-APPROVED PLATFORM SYSTEM MANUFACTURERS

A. The following manufacturers are pre-approved to bid the platform work in this section:

StageRight, Inc.
495 Pioneer Parkway
Clare, MI 48617
Contact: Kip Weis
Tel.: (800) 438-4499 ext. 349

Sightline Commerical
7008 Northland Drive
Minneapolis, MN 55428
Contact: Courtney Schmitz
Tel.: 662-418-6442

Wenger Corporation
555 Park Drive
Owatonna, MN 55060
Contact : Jeff Kirkpatrick
Tel. : 800-326-8373, ext 260

B. The following manufacturers are pre-approved to bid the portable seating work in this section:

Series Seating
20900 NE 30th Ave, Suite 901
Miami, FL 33180
Tel: 305-932-4626
Contact: Thomas Boyd
Email: tboyd@seriesseating.com

Wenger Corporation
555 Park Drive
Owatonna, MN 55060
Contact : Jeff Kirkpatrick
Tel. : 800-326-8373, ext 260

C. Pre-approval to bid does not imply acceptance of the manufacturer. It is the sole responsibility of the contractor for this Section to ensure that any price quotations received and submittals made are for controls systems that meet or exceed the specifications.

D. All other subcontractors must be approved prior to bid. Other contractors seeking acceptance must submit the following information at least 2 weeks prior to the bid opening date. Approval of contractors will be by addenda. Failure to submit any of the required information will automatically disqualify the contractor from consideration of approval.

1. A listing of five equivalent installations including:

   a. Name, address and telephone number of Owner;
   b. Name, address and telephone number of Theatre Consultant;
   c. Scope of work.
   d. A brief written description of the contractor's operation including facilities, financial capabilities, and experience of key personnel.

2. A statement from a bonding company agreeing to provide the required bonds in the amount required for the project.

2.2 MATERIALS

A. All components supplied under this Section shall be new. Used or factory reconditioned components shall not be acceptable.

B. Materials shall conform to the following ASTM and ANSI standard specifications:

1. A-36 - Specification for structural steel
2. A-47 - Specification for malleable iron casting
3. A-48 - Specification for gray iron casting
4. A-120 - Specification for black and hot-dipped zinc-coated (galvanized) steel pipe for ordinary use
5. B18.2.1&2 - Specification for square and hex bolts and nuts
6. B221-02 - Specification for aluminum alloy

C. Materials, devices, assemblies and installation shall meet or exceed applicable ESTA standards.

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D. In order to establish minimum standards of safety, the following factors shall be used:

1. Steel - per AISC specifications
2. Bearings – Two times required load at full speed for 2000 hours
3. Bolts - Minimum SAE J429 Grade 5 (ISO R898 Class 8.8), zinc plated
4. Standards of workmanship, design, and fabrication for structural steel shall be AISC Code of Standard Practice and ASTM A36.

E. Welding:

1. Execute welding in shop and field in accordance with standards of American Welding Society. All welders shall be qualified in accordance with standard qualification procedure of American Welding Society.
2. Control welding sequence and technique to minimize secondary stresses and distortions.
3. Net effective weld lengths shall be indicated on the shop drawings and approved before fabrication and installation.

F. All items of incidental hardware shall be furnished plated or painted black u.o.n.
G. All nuts shall be new lock nuts or shall be provided with lockwashers. No exceptions.
H. Fabrication:

1. The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall be no burrs or sharp edges to cause a hazard nor shall there be any sharp corners accessible to personnel.
2. All moving parts shall have specified tolerances.
3. All equipment shall be built and installed to facilitate future maintenance and replacement.

I. Finishes:

1. Paint shall be the manufacturer’s standard finish and color except as noted.
2. All items of incidental hardware shall be furnished plated or painted black.
3. Components shall be painted with rust inhibiting primer and finished with black paint.

J. Recommended Working Load: This specification calls for minimum recommended working loads for hardware. The manufacturer’s recommended working load is the maximum load which the manufacturer recommends be applied to properly installed, maintained, and operated new equipment. Manufacturer’s recommended working loads shall be determined by calculations by a Licensed Professional Engineer and destructive testing by an independent testing laboratory. These calculations and reports shall be available for review.

2.3 BLACK BOX AUDIENCE RISERS

A. Platform decking

1. Deck shall be portable and provide a stable surface.
2. Decks shall be a single sided portable platform with 4” high extruded 6005A-T61 aluminum frame, including protective edge, powder coated black finish. Frame shall connect to support system and railings. Subfloor shall be 1” exterior rated group 1 plywood.

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3. Performance: Certified, uniformly distributed live-load capacity of 4800 pounds per 4' x 8' section (150 pounds per sq. foot).
4. Finish

    a. Platforms deck top finish surface shall be carpet.
        1) Color to be selected from standard finishes during the submittal process.

5. Deck shall attach to the Platform Supports by molded corner receptacles, clamps or clips.
6. Decks shall attach to one another with roto-lock clamps.

    a. Provide four (2) T-wrenches for operating roto-locks.

7. Maximum weight of one platform shall be less than 100 lbs

B. Fabric Fascia

1. Provide fabric skirt panels around the platforms and ramp.
2. Fabric shall Commando Cloth black IFR, with 50% fullness. Fascia panels shall be designed to remove in sections and attach with clips.

C. Platform Support Legs

1. Platform support system shall be easy to set up and store and shall provide a stable, robust understructure.

    a. Support legs shall store on bottom of platforms
    b. Support system shall be assembled without tools by as few as two (2) people.
    c. Support system shall be capable of carrying the loads described above for the platforms.

2. Playing height shall be as shown on drawings.

    a. Support legs shall be capable of 2-1/2” of leveling adjustment.
    b. Each screw foot shaft shall have a diameter of no less than 3/4" and have zinc-plated Acme threads. The bottom of the foot shall be molded urethane.

3. Provide support legs in each platform corner and configuration as shown on drawings.

    a. Platform frame shall match deck manufacturer listed above.

D. Railings

1. Provide railings in location as shown on the drawings at the ramp and on three sides of the stage. Railing shall be 2-line black finished 1-1/4” dia aluminum tube with kick plate. Ramp shall have code required hand railing.

E. Carts

1. Provide carts for all equipment as necessary to carry the platforms, platform supports, and any related system accessories.

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a. Minimize quantity of carts and storage footprint as possible.
b. Carts with platforms shall fit through a 3’-0” standard door and into building elevator.
c. Carts shall have swivel casters with soft, non-marking rubber wheels.

F. Product shall be:

1. StageRight All Purpose Deck and Bridging Risers
2. Sightline Commercial SC90 Platform with acoustical infill and adjustable height legs
3. Wenger Stagetek Seated Risers

2.4 BLACK BOX AUDIENCE SEATING

A. Seats shall be of similar envelope to fixed seating shall be of consistent width.

1. Back shape and seat pan shape shall be similar to fixed seats.
2. Seat back and seat pan shall be upholstered.

a. Upholstery shall match the upholstery provided on the adjacent telescopic seats, (see section 12 66 23)

3. Seats shall have armrests.

a. Armrests shall be wood, with a stain matched to the finish of the adjacent telescopic seating.

B. Carts shall be provided for stacking seats.
C. Provide quantity (145) of:

1. Series Seating Model K
2. Wenger Audience Seat

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate scheduling and access with the Contractor and the Owner.
B. Insert operations and maintenance information into the project record documents as specified above in Submittals.

3.2 PERFORMANCE OF THE WORK

A. The Contractor shall be responsible for storage of stage equipment, tools, and equipment during the period of the installation.

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B. Extent: All specified equipment shall be installed by fully trained superintendents and workmen. Equipment shall be installed in a workman like manner, per plans and specifications. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.
C. Standards:

1. Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes. All welding must be performed in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1).
2. Fabricate metal work in accordance with standards of first-class workmanship with ornamental work free of blemishes like tool marks, burrs, scars, and abrasions. All edges shall be smooth. All points, welds, and intersections shall be properly made and fitted to provide a uniform finish.

D. All connection points shall be welded and ground smooth.
E. Fit abutting surfaces closely.

1. Provide slotted holes, as needed, in steel members which require accurate alignment.

F. Accurately align and adjust various frame members before final anchoring.
G. Erect metal work level, plumb, square and in proper alignment with adjacent work. Deformed components shall be remedied.
H. Attachments: All equipment shall be securely attached to the building structure.
I. Finishes:

1. All welds must be touched up to match disturbed finishes.
2. All finishes which are disturbed during shipping and installation shall be touched up to match the original.

3.3 CLEAN UP

A. The Contractor shall be responsible for cleanup, including removal of packing materials etc. and the protection of surfaces or equipment provided by other trades.

3.4 INSPECTION AND TESTING

A. Upon completion of the installation the Contractor shall notify the Owner's Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Owner’s Representative’s schedule.
B. The Contractor shall arrange for access as necessary for inspection of equipment by the Owner's Representative.
C. In preparation for inspection by the Owner’s Representative system components shall be cleared of dust and debris.
D. All systems shall be complete and will be operated by the Owner’s Representative for approval. Make available for review by the Owner’s Representative:

1. All components for physical inspection.

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a. Contractor shall make provisions for access as necessary.

2. Spare parts inventory.

E. The Contractor shall be liable for any return visits by the specialty sub-contractor, factory engineer or Owner's Representative as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the related Contractor or Owner's Representative to carry out their work.

3.5 TRAINING

A. Upon final approval of the system by the Owner's Representative, representatives from the Platforming System Specialty Sub-Contractor shall instruct designated Owner staff or representatives in the safe use and maintenance of all systems specified herein.
B. Schedule training sessions in advance to fit the Owner staff or representatives' schedules.
C. Provide 4 hours of training.
D. Training shall include, but not be limited to:

1. An overview of the platforming system and all components.
2. Full process for setting up and taking down the system, in all of its configurations.
3. Care and maintenance of the platforming system.

END OF SECTION

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SECTION 116133 - PRODUCTION RIGGING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. The Rigging Contractor shall provide all items necessary for a complete, safe, fully functional system as described herein and as shown on drawings, including all tools, scaffolding, labor, and supervision, even though they may not be specifically enumerated.

1.2 RELATED SECTIONS

A. Coordinate with the following sections in carrying out this work:

1. Division 01 – General Conditions
2. Division 05 – Metals
3. Division 6 & 9 - Floor and adjacent architectural finishes
4. Section 11 61 83 – Production Lighting Control
5. Division 21 – Wet Sprinkler Pipe System
6. Division 23 – HVAC and Plumbing
7. Division 26 – Electrical
8. Section 26 05 35 – Production Systems Electrical Installation
9. It shall be under the work in this section to coordinate established clearances to the general contractor and all others trades on the project and maintain necessary clearance requirements for all rigging components and clear zones.

    a. No conduit, raceway, sprinkler pipe, plumbing pipe, duct, any other part of the mechanical systems, or any structural component shall be in a rigging clear zone nor shall they obstruct the operations of the rigging systems nor shall they be within 6” of a moving rigging component, including lift lines.

1.3 REFERENCES

A. Comply with all national, state and local regulations. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.

B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, CEC, IEEE, and all manufacturer’s recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers’ warranties.

C. Labor shall be provided per applicable labor regulations and practices.

1.4 DEFINITIONS

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A. Refer to Div. 01 for definitions.
B. Owner's representative: For the scope in this Section, authorized personnel representing the Owner and The Shalleck Collaborative, Inc., Theatre Consultants.
C. Recommended Working Load: This specification calls for minimum recommended working loads for hardware. The manufacturer's recommended working load is the maximum load which the manufacturer recommends be applied to properly installed, maintained, and operated new equipment. Manufacturer's recommended working loads shall be determined by calculations by a Licensed Professional Engineer and destructive testing by an independent testing laboratory. These calculations and reports shall be available for review.

1.5 SYSTEM DESCRIPTION

A. Blackbox Theatre will have a Tension Wire grid, dead hung battens in the upstage area, and (1) drapery track and bi-part drapery.
B. Drama Classroom will have a pipe grid and perimeter drapery track and draperies.

1.6 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the Owner's Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.
B. Documentation for the substitution shall be submitted with supporting material and shall include the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner's Representative shall be the sole evaluator of the fitness of the substitution.
C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.7 SUBMITTALS

A. Submittals shall be made in a timely fashion so as to not affect the project schedule and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.
B. All submittals shall be made in electronic format.

1. Provide Hard copies if requested by Architect.
2. Files shall be in .pdf format, and submitted electronically.

C. All submittals shall be prepared for review by the CA Division of the State Architect as "deferred approval" items. As such complete shop drawings and relevant calculations shall be fully engineered and bear the stamp of a Structural Engineer licensed in the State of CA.
D. Submittals shall be reviewed, and field dimensions verified prior to commencing acquisition for, and fabrication of the work in this section. All services and parts of the work in this section shall be verified through the submittal process. Approval does not relieve the Contractor of the responsibility of providing equipment in accordance with the specifications.

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E. Shop Drawings:

1. Submit component and installation drawings and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation.
2. Upon approval by the Owner's Representative, submit a dedicated set of drawings, product data and test and compliance certifications regarding all aspects of the proscenium fire safety curtain for review by building officials.
3. Shop drawing plans and sections shall be at 1/4" scale minimum. Details shall be larger scales to fully explain the component.
4. Provide clear space on all shop drawings for comments and approval stamps.

F. Product Data:

1. Submit data sheets for all standard component parts, which shall include all information necessary to verify compliance with this Section.
2. Product data shall properly identify each component's intended use. Any options or variations must be clearly noted.

G. Samples:

1. Upon 14 days of request by the Owner's Representative, submit samples for review. Samples may include, but are not limited to:

    a. Tracks and hardware
    b. 12" x 12" mock-up of a tension grid panel, including any permanent internal framing members
    c. Selected drapery materials, 2 bolt yards minimum
    d. Sewing detail sampler demonstrating drapery top, side and bottom.

H. Record Documents:

1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Within 30 days, submit three (3) paper copies and six (6) electronic copies, in PDF format, of "as built" submittals including shop drawings, product data, flame certifications and listings, operations and instructions manuals for all products provided, care and maintenance instructions, service line and online contacts and warranty documents. Files shall be in .pdf format, and submitted via email, direct FTP download, USB memory stick, CD or DVD.

1.8 WARRANTY

A. Warranty shall provide coverage of material and product defects and assembly workmanship for a period of three years following the date of acceptance by the Owner.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor, except for safety related items, which shall be corrected within 48 hours of notification.

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1.9 MAINTENANCE SERVICE:

A. Provide maintenance service for a period of one (1) year after final acceptance of the installation. This service consists of at least one visit to the site for checking and adjusting of equipment. Perform the visit 11 months after the system has been accepted. Time of visit shall be coordinated with Owner and Owner Representative's schedule.

1.10 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty suppliers and manufacturers meeting the qualifications listed herein.
B. Specialty suppliers and the individuals responsible for installation in the field shall have been continuously engaged in the sales and integration of rigging equipment similar to that specified herein for a minimum of fifteen years and shall have completed at least ten installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.
C. Specialty suppliers shall have at time of bid, and continuously maintain throughout the project and warranty period, a Specialty Contractor's license appropriate for the work in this section as applicable.
D. Specialty suppliers shall maintain bonds in the amount required for the project.
E. Specialty manufacturers responsible for engineering and manufacturing shall have been continuously engaged in the engineering and manufacturing of rigging equipment similar to that specified herein for a minimum of fifteen years and shall have provided equipment for at least fifty installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.
F. All equipment shall be UL listed and bear the appropriate labels.

1.11 DELIVERY, STORAGE AND HANDLING

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect materials from damage during delivery, handling, storage and installation.
C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.
D. Draperies shall be packed and shipped in methods and containers that shall prevent crushing of finished goods.

1.12 PROJECT CONDITIONS

A. Defects in the field which may impact the work in this Section shall be reported to the Owner's Representative and corrected in accordance with the requirements of the applicable Section of work prior to commencement of the work in this Section.
B. Field Conditions: 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.

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1.13 MAINTENANCE

A. Provide maintenance stock of User-serviceable components within the system. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner at time of system checkout.

B. Maintenance stock shall include:

1. For each type in the system provide:

a. One master traveler track carrier for each track type
b. Four intermediate traveler track carriers for each track type
c. Four shackles of each type in the system.
d. Eight wire rope thimbles for each cable size
e. Eight wire rope compression sleeves for each cable size
f. Twenty complete replacement tension grid cable assemblies of each size used throughout the project. All fittings shall be shop applied.
g. Any tools necessary for removal of old tension grid cables and installation of new tension grid cables.

PART 2 - PRODUCTS

2.1 PRE-APPROVED SPECIALTY SUBCONTRACTORS

A. The following production systems specialty subcontractors have been pre-approved for bidding for the work in this section:

LVH Entertainment Systems
300 Irving Drive
Oxnard, CA 93030
Tel. (805) 278-4584

Protech USA
3431 N. Bruce St
N. Las Vegas, NV 89030
Tel. (702) 639.0290
Contact: Will Brants

Stagecraft Industries, Inc.
5051 North Lagoon Ave
Portland, OR 97217
Tel. (503) 286-1600
Contact: Kevin Shetterly

B. All other manufacturers and installers must be approved prior to bid. Other contractors seeking acceptance must submit the following information at least 2 weeks prior to the bid opening date. Approval of contractors will be by addenda. Failure to submit any of the required information will automatically disqualify the contractor from consideration of approval.

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1. A listing of five equivalent installations including:

   a. Name, address and telephone number of Owner
   b. Name, address and telephone number of Theatre Consultant
   c. Scope of work
   d. A brief written description of the contractor's operation including facilities, financial capabilities, and experience of key personnel.
   e. A statement from a bonding company agreeing to provide the required bonds in the amount required for the project.
   f. Documentation necessary to show compliance with Quality Assurance, above.

2. Permission to bid does not imply acceptance of the specialty subcontractors. It is the sole responsibility of the contractor for this Section to ensure that any price quotations received, and submittals made are for systems that meet or exceed the specifications.

2.2 SPECIALTY MANUFACTURERS AND SUPPLIERS

A. The following production systems specialty manufacturers may furnish equipment for the work in this section:

Wenger/J.R.Clancy/Texas Scenic/H&H
7041 Interstate Island Road
Syracuse, NY 13209

Thern Stage Equipment
5712 Industrial Park Road
Winona, MN 55987

Automatic Devices Company
2121 South 12th Street
Allentown, PA 18103

2.3 MATERIALS

A. All components supplied under this Section shall be new. Used or factory reconditioned components shall not be acceptable.
B. Materials shall conform to the following ASTM, ANSI and ESTA standard specifications:

   1. ASTM A36 – Specification for structural steel
   2. ASTM A47 – Specification for malleable iron casting
   3. ASTM A48 – Specification for gray iron casting
   4. ASTM A120 – Specification for black and hot-dipped zinc-coated (galvanized) steel pipe for ordinary use
   5. ASME B18.2.1&2 – Specification for square and hex bolts and nuts
   6. ASTM B221-02 – Specification for aluminum alloy

C. Materials, devices, assemblies and installation shall meet or exceed applicable ESTA standards.
D. In order to establish minimum standards of safety, the following factors shall be used:

1. Cables and fittings – 8:1 Safety Factor
2. Cable bending ratio – Sheave tread diameter is 30 times cable diameter
3. Tread Pressures – 500 lbs. for cast iron; 900 lbs. for Nylatron; 1000 lbs. for steel
4. Maximum fleet angle – 1-1/2 degrees
5. Steel – Per AISC specifications
6. Bearings – Two times required load at full speed for 2000 hours
7. Bolts – Minimum SAE J429 Grade 5 (ISO R898 Class 8.8), zinc plated

E. All turnbuckles, clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted black.

F. All nuts shall be new lock nuts or shall be provided with “split lock” lock washers or nylock nuts. No exceptions.

G. Lift Lines:

1. Diameters as noted on drawings or as required, 7 x 19 construction, galvanized wire rope aircraft cable, with the following breaking strengths:

   a. 3/16” diameter: 4,200 lbs.
   b. 1/4” diameter: 7,000 lbs.
   c. 3/8” diameter: 14,400 lbs.

2. Damaged or deformed cable shall not be used. All wire rope rigging shall be installed so as to prevent abrasion of the wire rope against any part of the building construction or other equipment.

H. Fabrication:

1. The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall be no burrs or sharp edges to cause a hazard nor shall there be any sharp corners accessible to personnel.
2. All moving parts shall have specified tolerances.
3. All equipment shall be built and installed to facilitate future maintenance and replacement.

I. Finishes:

1. Paint shall be the manufacturer’s standard finish and color except as noted.
2. All turnbuckles, clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted black.

2.4 TENSION GRID

A. General:

1. Performance criteria:

   a. The tensioned wire grid shall be designed for a live load capacity of 20 pounds per square foot.
   b. The maximum tension in any one line shall not exceed 650 pounds.

c. The support frame shall be designed so that compression loads caused by tension in the cables do not exceed 5,000 pounds in any member.
d. For each module, the aircraft cable mesh shall not deflect more than two inches under a maximum concentrated load of 250 pounds.
e. A maximum concentrated load of 250 pounds applied within 12" of the edge of the panel frame shall not cause the threaded studs to bend over the edge of the frame.
f. There shall be no horizontal loads imposed upon the building by the design of the grid
   1) Except for sway braces to add lateral stability, as approved by Owner's Representative.
   2) Except for horizontal loads applied to the purpose designed tension grid perimeter frame which is intended to support the grid panels under tension.

g. The total live load and the weight of the grid shall be transmitted through the hangers or attachment structure to the adjacent building steel.

2. Coordinate work with other trades doing adjoining work to assure proper fit, and installation.
3. The scope of work shall include provision of the tension grid panels. Railings to be provided by Architectural.

B. Materials and Components:

1. All materials shall be new and of best quality. Fittings and fasteners shall be painted or galvanized unless otherwise noted and shall conform to applicable industry requirements and codes.
2. Fittings:

   a. Bolts, nuts, washers, lock washers as required for complete fabrication and installation.

C. Workmanship:

1. Fabricate metal work in accordance with standards of first class workmanship, with ornamental work free of blemishes like tool marks, burrs, scars and abrasions. All edges shall be smooth. All points, welds, and intersections shall be properly made and fitted to provide a uniform finish.
2. All connection points shall be welded and ground smooth.
3. Provide slotted holes, as needed, in steel members which require accurate alignment.
4. Fit abutting surfaces closely.
5. Accurately align and adjust various frame members before final anchoring.
6. Erect metal work level, plumb, square and in proper alignment with adjacent work. Deformed components shall be remedied.

   a. Frames shall be installed with adequate clearances to permit replacement and tensioning of cables after the frames are welded in place.

D. Tension Grid Frame Construction:

1. The tension grid shall be constructed of welded steel frames prefabricated at the subcontractor's shop to form the final configurations as shown on the drawings.

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2. Frames shall have mitered welded corners and shall be shipped as individual units. The tension grid assembly shall not be fabricated in place.
3. The frame members shall have cable holes drilled on 2” centers along the length of each side.

    a. The holes shall be located as shown on drawings.
    b. Holes shall be chamfered on the interior face of the channels to allow unimpeded cable movement under vertical deflection.
    c. The live end of the tensioned wires shall only have nuts on the outside of the frame, so the stud is free to move under vertical deflection.

4. Install plate steel web stiffeners that are substantially welded in place and located at quarter points on each side of the frames and centered between two cable holes.
5. The frames shall be painted, black, prior to weaving.
6. Temporary fabrication and shipping struts as described below shall be installed in the frames prior to the tension grid frames being woven at the factory.
7. Weld frames to support structure provided under this scope.
8. Provide plywood or metal covers for any gaps between adjacent panel frames that are larger than 3” in width.

    a. Covers shall be readily removable to allow access from above to maintain or change cable assemblies.

E. Temporary Fabrication and Shipping Struts

1. Provide temporary fabrication and shipping struts (struts) that are installed before the wire rope cables are woven to prevent deformation of the frames.
2. The struts shall be either 2x4 wooden studs or steel angle. Any required mounting assemblies or residue shall be completely removed from the frames once the temporary struts are removed.
3. The temporary fabrication and shipping struts shall be installed in a cross-pattern to stabilize the frames and mitigate deformation during assembly, shipment and installation. The struts shall remain in the frames until all of the frames, perimeter gussets and tension tabs are welded in place. Upon completion of all welding, remove the struts from the jobsite.

F. Cable Assembly

1. Woven wire tension grid shall be fabricated of wire rope that is attached to the frames.
2. Wire rope shall be 1/8" diameter 7 x 19 galvanized aircraft cable, blackened with electrostatically-applied paint.

    a. Acceptable products shall be by Fehr Brothers, or equal

3. Each cable assembly shall include:

    a. The “dead” end shall be secured with two 1/8" Nicopress wire rope stop sleeves bearing on a washer of appropriate size and thickness. A 1/16” indicator gap shall be provided between the two sleeves.
        1) Double Nicopress Stops
        2) Swaged Headed stud

3) Double threaded swaged ends

b. The “live” end shall be a stainless-steel alloy swaged threaded stud fitting bearing on a washer of appropriate size and thickness and locked in place with a nut and a lock nut on the outside of the panel frame. Stud shall be of appropriate length to provide 1” of future tensioning and adjustment after the cables are woven and initially tensioned in the frames.

4. Fittings and their application methods shall not reduce the recommended working load of the cables.

G. Tension tabs and perimeter gussets

1. Tension Tabs shall be provided on both the top and bottom surfaces.
2. Provide 1” wide strap steel tension tabs that are welded between adjacent frames at quarter points along the perimeter frame. Tabs shall be sized and welded to transmit opposing lateral forces between frames.

a. Center the tension tabs between cables for ease of adjustment.

3. Provide plate steel gussets that are installed along the overall perimeter of the tension grid area that connect the tension grid perimeter channel members to the perimeter support steel provided by structural.

a. Substantially weld the perimeter gussets on quarter points and centered between cables.

H. Tension Grid Loading Signage

1. Provide advisory sign listing maximum allowable loads.
2. Sign shall meet ANSI Z535 standard for warning signs.
3. Mount to wall as directed by Owner’s Representative.

2.5 PIPE GRID

A. Pipe Grid shall be installed as indicated on the drawings. Mount Pipe Grid using hardware configuration as shown on drawings.
B. Adjust pipes so that they are aligned straight and level.
C. Pipe Grid shall be fabricated from 1-1/2" nominal I.D. (1.9" o.d.) schedule 40 steel pipe.

1. All edges shall be de-burred.
2. Battens shall be finished with a suitable black rust resistant finish.

D. All pipes less than 21’ in length shall be continuous and not spliced.

1. Where splices are necessary on pipes longer than 21’, all joints shall be sleeve spliced with 18" long tight fitting sleeves (mechanical tube - not pipe) extending 9" into each pipe and held by two 3/8" hex bolts and lock nuts on each side of the joint. Threaded couplers shall not be permitted. Spliced battens shall have at least the same overall capacity, deflection, and strength as the component pipe.

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E. Intersecting pipes shall be joined with a Clancy #015-100 Cross Grid Connector or by an approved equal. The cross grid connector shall have a recommended working load of at least 2,500 lbs.

F. Each pipe which terminates at the wall shall be mounted to the wall using a flange, anchored into structural backing, as shown on drawings.

G. At each hanging point the hanger shall attach to the overhead structure with an appropriate fitting.

H. Pipe Clamps:

1. Pipe clamps shall be made of two strips of 12 Ga. by 2" hot rolled steel formed to encompass and clamp the pipe batten to prevent its rotation. Corners shall be rounded.
2. There shall be a 3/8" x 1" hex bolt with lock nut above and below the batten. A 5/8" hole in the top of each clamp half allows the attachment of cable, chain, or other fittings.

I. Threaded Rod Hanging Assembly:

1. The grid shall be rigidly hung from the overhead steel structures on centers not exceeding 8’-0” feet in either direction.
2. Each hanging point shall be threaded rod, sized appropriately to support the loading conditions shown in the drawings.

J. Compression Strut Hanging Assembly:

1. Use compression struts in place of threaded rod as needed for seismic bracing.
2. Internally routed diagonal braces shall extend from the pipe grid up to the roof structure. Supply sufficient braces to prevent lateral movement of the pipe grid. Provide diagonal bracing as required.

K. Pipe Grid Loading Signage

1. Provide (1) advisory sign listing maximum allowable distributed and point loads.
2. Sign shall meet ANSI Z535 standard for warning signs.
3. Mount to wall as directed by Owner’s Representative.

2.6 MISCELLANEOUS RIGGING EQUIPMENT

A. Loose Pipe Battens

1. Pipe battens shall be fabricated using materials that support the design loads in accordance with the requirements of these specifications.

   a. Pipe battens shall be fabricated from 1-1/2” nominal diameter (1.9” o.d.) schedule 40 black pipe.
   b. All edges shall be de-burred.
   c. Battens shall be finished with a suitable black rust resistant finish.

2. Provide in the following lengths and quantities:

   a. 25 @ 10’-6”, delivered to the tension grid level and installed as shown on the drawings.

b. 11 @ 10’-6”, delivered to the stage right catwalk (Catwalk 211) and strapped together in a neat stack for storage.

3. Provide pipe mounting clamps in the following quantities and types:

a. Provide (60) fixed, right angle “cheeseborough” type clamps
   1) (50) of these are to be used for the installed loose pipe battens described above.
   2) (10) are to be delivered to the stage right catwalk (Catwalk 211).

b. Provide (20) Swivel “cheeseborough” type clamps, delivered to the stage right catwalk (Catwalk 211).
c. All clamps shall be finished black.

4. Mount each pipe as directed by the Owner’s representative.

B. It is under the work in this section to provide miscellaneous guardrails, brackets and other equipment that is called out in the PR drawings and not noted specifically as under the work of other trades. Such equipment shall meet all prevailing codes.

2.7 DRAPERIES

A. Provide in sizes and quantities as noted on the drapery schedules. Verify in field; scheduled areas for drapes are minimum, and drape area is to be maximized as field conditions allow.

1. Install as shown in drawings.

B. Fabric:

1. Fabric shall be as specified below. Weight and color per drapery schedule.

a. “Black” shall be black.
b. Face fabric shall be IFR velour manufactured by KM Fabrics or J.B. Martin.

2. Flame Retardancy: Fabrics must comply with flame retardancy according to the requirements of the National Fire Protection Association’s NFPA #701.

C. Fullness

1. Pleats: Pleats for draperies specified with fullness shall be box sewn on 12" centers.
2. Fullness shall be sewn into the drape as specified per drapery schedule.

D. Seams:

1. Seams between strips shall be single stitched without puckers using thread of matching color. Drapes shall be sewn so pile runs in the same direction. Seams shall be arranged to be concealed by Pleats.

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E. Manufacturer's contact information, flame certifications, material and drape dimensions shall appear on a label sewn to the rear of a bottom offstage corner of each panel. Label shall be black with white lettering.

F. Sewing

1. Nap shall be sewn up, unless otherwise noted on schedule.
2. Provide a 12" square of face and lining fabric to the rear of a top offstage corner of each panel. This panel shall be available as a cutaway sample for testing of flame retardant characteristics over time.
3. Top Finish: 3-1/2" black nylon webbing shall be double stitched to the top of the curtain with 1" of face fabric turned under the webbing.

    a. Brass rustproof grommets shall be inserted in pleat centers or on12" centers on flat curtains. Grommets shall be used as follows: #4 grommets - lined velour, heavy weight fabrics. Grommets shall be black.
    b. All drapes shall have two grommets in top corners and spacing shall coordinate with master carrier chains.
    c. Track Mounted curtains shall be supplied with black powder coated carabineers at all grommets to attachment to carrier chain.

4. Bottom Hems:

    a. All full height curtains shall have 6" bottom hems complete with separate interior chain pockets filled with #8 plated jack chain. Chain pockets shall be stitched so that the chain will ride 2" above the finished bottom edge of the curtain.

5. Side Hems:

    a. Side hems shall be 2". Raw edge of fabric shall be turned under the 2" side hem. Stage drapery bi-part curtains shall have the onstage face fabric turned to the back of the drape running 3 feet on the back side on the onstage edges of the panels.

2.8 DRAPERY TRACK

A. Provide drapery track in locations as shown on the drawings.

1. Provide complete with all necessary accessories.
2. Maximize height of tracks so top of tracks clear under obstructions by maximum of 1/2".
3. Each section of track less than 20 feet shall be in one continuous piece. Splice clamps shall be permitted for section lengths over 20 feet.
4. Track shall have sufficient capacity to carry maximum loaded carrier at minimum spacing.
5. All non-moving/movement bearing parts shall be finished flat black.
6. Carriers:

    a. Carriers shall be constructed of nylon, supported from two heavy-duty neoprene or urethane-tired wheels riveted to steel body with shielded ball bearings. Each carrier shall be equipped with a free-moving swivel and sufficient trim chain to accommodate a curtain.

b. Each carrier shall have rear fold back-pack tabs and rubber washers shall be provided between each back-pack tab and carrier.
c. Provide one carrier for each 12” of track, plus spares.
d. Provide master carriers at the leading and training edge of each stage drapes.
e. The master carrier block shall be constructed of plated steel having two cable clips to clamp the cord to the carrier. Four wheels in pairs identical to the single carrier above shall support the block.
f. Carriers shall have 25# capacity.

7. Live and dead-end pulleys shall 6” diameter, equipped with sealed precision ball bearings on adequately guarded plated steel housings. Provide end stops at each track end, and as necessary to maintain required clearances around door openings.
8. Provide with 6” diameter adjustable, demountable floor pulley.

a. Fasten to stage floor with threaded inserts and wing bolts for quick removal.

9. Stretch-resistant, cable center operating cord shall be 3/8" in diameter.
10. Stage tracks shall be rigged for bi-parting operation with a 48" center overlap. Hanging clamps will be provided for suspension at five-foot maximum intervals.
11. Traveler Tracks shall be provided as follows:

a. For curved tracks with drapery over 10’ tall:
1) H&H 500 Series
2) ADC Patriarc 500 Series

b. For straight tracks with drapery over 10’ tall:
1) H&H 400 Series
2) ADC Silent Steel 280 Series

c. Or equal

PART 3 - EXECUTION

3.1 PERFORMANCE OF THE WORK

A. The Rigging Contractor shall be responsible for storage of stage equipment, tools, and equipment during the period of the installation.
B. Extent: All specified equipment shall be installed by fully trained superintendents and workmen. Equipment shall be installed in a workman like manner, per plans and specifications. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.
C. Standards: Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes. All welding must be performed in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1).
D. Alignment: Mule blocks, cable rollers and guides shall be installed using a precision laser, as required, to provide proper alignment, to maintain minimum fleet angles, and to prevent contact with other surfaces. There shall be no fleet angle where possible, but if required fleet angle shall be no greater than 1½°.

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E. Fabricate metal work in accordance with standards of first class workmanship with ornamental work free of blemishes like tool marks, burrs, scars and abrasions. All edges shall be smooth. All points, welds and intersections shall be properly made and fitted to provide a uniform finish.
F. All connection points shall be welded and ground smooth.
G. Provide slotted holes, as needed, in steel members which require accurate alignment.
H. Fit abutting surfaces closely.
I. Accurately align and adjust various frame members before final anchoring.
J. Erect metal work level, plumb, square and in proper alignment with adjacent work. Deformed components shall be remedied.
K. Attachments: All equipment shall be securely attached to the building structure.
L. Finishes:

1. All welds must be touched up to match disturbed finishes.
2. All finishes which are disturbed during shipping and installation shall be touched up to match the original.

3.2 CLEAN UP

A. The Contractor shall be responsible for clean up, including removal of packing materials etc. and the protection of surfaces or equipment provided by other contractors.

3.3 PRODUCTION RIGGING INSPECTION

A. Third party ESTA ETCP certified production rigger shall be engaged to provide an ANSI rigging inspection and report noting deficiencies and deviations from ANSI E1.47 – 2020 level two for newly installed equipment. The ESTA ETCP certified production rigging inspector shall not be employed by the installing production rigging contractor. General Contractor shall contract this inspector.
B. Report shall be provided with a list all production rigging equipment and individual components in the project.
C. Inspection shall include all items shown on the PR drawings and in this Section.
D. Report shall include the certification and signature of the inspector, a checkoff of individual details of each item and that it has been inspected and the methods of doing so, and the current condition of each item.
E. Report shall be provided to the District’s Representative as a part of Contractor’s indication of system readiness for final review by District’s Representative.

3.4 INSPECTION AND TESTING

A. Upon completion of the installation, and after allowing the draperies to hang out for 2 weeks minimum, the Contractor shall notify the Owner’s Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Owner’s Representative’s schedule.

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1. The Contractor shall be liable for any return visits by the specialty sub-contractor, factory engineer or Owner's Representative as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the related Contractor or Owner's Representative to carry out their work.

B. During the periods where movable systems are operated, the Theatre shall be quiet.
C. In preparation for inspection by the Owner's Representative:

1. Rigging system components cleared of dust and debris.

D. Make available for review by the Owner's Representative:

1. Access to all components for physical inspection.
2. All systems shall be complete and will be operated by the Owner's Representative for approval.
3. Spare parts inventory.

3.5 TRAINING

A. Upon final approval of the system by the Owner's Representative, representatives from the Rigging Specialty Sub-Contractor shall instruct designated Owner staff or representatives in the safe use and maintenance of all systems specified herein.
B. Schedule training sessions in advance to fit the Owner staff or representatives' schedules.
C. Provide 4 hours of training.
D. Training shall include, but not be limited to:

1. An overview of the systems and all components.
2. Care and maintenance of rigging systems.
3. Care and maintenance of drapes including proper folding and storage
4. Basic system visual inspections

END OF SECTION

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SECTION 116183 – PRODUCTION LIGHTING CONTROL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Services as listed herein and related to the furnishing and commissioning of production lighting dimming and control system equipment.
2. Termination of low voltage lighting control network connections, including but not limited to DMX, and all control wire in the system at control outlets, button stations, LC stations, DMX and 0-10v lighting fixtures, relay panels, and architectural control processor, emergency lighting control and as required for a complete and working system.
3. Programing and addressing of DMX controlled architectural lighting fixtures controlled by the production lighting system.

1.2 RELATED SECTIONS

A. Coordinate with the following sections in carrying out this work:

1. Division 1 – General Conditions
2. Division 26 – Electrical
3. Section 11 61 33 – Production Rigging
4. Section 26 05 35 – Production Systems Electrical Installation
5. Section 27 41 16 - AV Systems

1.3 REFERENCES

A. Comply with all national, state and local regulations. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, CEC, IEEE, and all manufacturer’s recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers’ warranties.
C. Labor shall be provided per applicable labor regulations and practices.

1.4 DEFINITIONS

A. Refer to Div. 1 for definitions.
B. Owner: For the scope in this Section, authorized personnel representing the Owner and The Shalleck Collaborative, Inc., Theatre Consultants.

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1.5 SYSTEM DESCRIPTION

A. The project includes a black box theatre, drama classroom and sports arena, as well as support spaces. The following should be provided:

1. DMX controlled relay or breaker panels, as shown in the drawings.
2. Power and data distribution receptacles, as shown in the drawings.
3. Control equipment
4. Racks and enclosures
5. Control devices for architectural lighting, as required.

    a. Note: it is under the work of this section to review the electrical and architectural lighting drawings and to provide all equipment necessary for a fully functional system, as described in this section, even if this equipment is not shown on the production lighting drawings. It is not necessary to provide any equipment which is specifically shown on the lighting drawings to be provided by Div. 26. It is the responsibility of the lighting integrator to obtain the electrical and architectural lighting drawings.

B. The production lighting control system in all spaces shall be new and complete, and shall control the theatrical lighting, and selected work lighting through interface with networked controlled relays.

C. The system shall be comprised of control panels, control electronics, a data network, controlled relays, and circuit wiring devices.

1.6 CURRENT TECHNOLOGY

A. Only the most current hardware and software shall be provided. In no case will discontinued or superseded products be acceptable. If the manufacturer has developed and successfully released products that meet or exceed the criteria within this specification, the Contractor shall notify the Owner's Representative and submit the new product for review. If accepted, the products will be provided at no additional cost to the Owner. Software upgrades and authorized support services for its proper integration into the system shall be provided at no cost to the Owner throughout the warranty period.

B. In the event of known product defaults or recall, the Contractor shall immediately notify the Owner and Owner's Representative and make immediate arrangements for remedy.

C. None of the stipulations herein shall be grounds for revision to the project schedule.

D. See related procedures under Warranties in this Section.

1.7 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the Owner's Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.

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B. Documentation for the substitution shall be submitted with supporting material and shall include the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner's Representative shall be the sole evaluator of the fitness of the substitution.

C. All expenses related to the substitution including, but not limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.8 SUBMITTALS

A. Submittals shall be made in accordance with Division 1.

B. If permitted under Division 1, all submittals shall be made in electronic format.

1. Files shall be in .pdf format, and submitted via email, download, CD or DVD.

C. Submittals shall be made in a timely fashion so as to not affect the project schedule and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.

D. Submittals shall be reviewed, and field dimensions verified prior to commencing acquisition for, and fabrication of the work in this section. All services and parts of the work in this section shall be verified through the submittal process.

E. Conduit, Backboxes and Electrical Systems Verification Letter:

1. Within 30 days of contract award, the lighting integrator shall review all relevant information pertaining to the production lighting control conduit, backboxes, and line voltage electrical work to be performed by Division 26. A formal memo, indicating acceptance (or desired changes) of the Contract Drawings shall be provided. Failure to provide this memo indicates acceptance of, and liability for, the conduit, backboxes and electrical systems as indicated in the Contract Drawings.

F. Shop Drawings:

1. Submit scaled shop drawings that show the following:

a. Installation requirements.
b. Full system riser diagram(s) illustrating interconnection of system components, wiring requirements, back box sizes and any special installation considerations.
c. Detailed relay panel schedules.
d. Detailed circuit and control schedules.
e. Detailed product drawings, as applicable to this Project.
f. Product Data
g. Screenshots of programmed pages for any touchscreen controllers.

2. Submit data sheets for all standard component parts, which shall include all information necessary to verify compliance with this Section.

G. Color Data:

1. Submit color schedule for all equipment and devices, including custom plates & panels, button panels, lighting fixtures, loose cabling, connectors, equipment racks, etc. Room name and number shall be listed.
2. Show standard color options to allow design team to select.
3. Where no option for color is available, indicate as much.

H. Samples:

1. Upon 14 days of request by the Owner's Representative, submit samples for review. Samples may include, but are not limited to: (not electronic)

   a. Connector, panel and cable assemblies
   b. Relay modules
   c. Panel finish samples

I. Record Documents:

1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Within 30 days, submit "as built" submittals including shop drawings, product data, operations and instructions manuals for all products provided, CD(s) of control systems programming, care and maintenance instructions, service line and online contacts and warranty documents.

1.9 WARRANTY

A. Warranty shall provide coverage of material and product defects and assembly workmanship or installation for a period of two years following the date of acceptance by the Owner.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor. If warranty claims are not serviced to the satisfaction of the Owner within the 14-day period, the Contractor shall bear all costs that arise as a result of the delay, including, but not limited to, the use of temporary replacement components, additional Owner's staffing or overtime, shipping, and cancelled uses or performances.

1.10 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty subcontractors and manufacturers meeting the qualifications listed herein.
B. Specialty subcontractors shall have been continuously engaged in the sales and integration of lighting control equipment similar to that specified herein for a minimum of ten years.

1. Manufacturer shall have been continuously engaged in the manufacturing of lighting control equipment similar to that specified herein for a minimum of ten years.

C. Specialty suppliers shall have at time of bid, and continuously maintain throughout the project and warranty period, a specialty Contractor's license appropriate for the work in this Section.
D. Specialty subcontractors shall have within their employ manufacturer's factory authorized field services technicians, within a four-hour travel distance from the Project site.

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E. All equipment shall be UL listed and bear the appropriate labels.

1.11 DELIVERY, STORAGE AND HANDLING

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.

B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible for properly sequencing the work and protecting equipment from damage during delivery, handling, storage and installation.

C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

1. Devices shall not be delivered to the project site until the site is suitably clean and all adjacent finish work that may be painted or produce dust has been completed. The contractor shall provide and maintain complete protection of all devices until the project has been made available for occupancy by the Owner. The Contractor shall thoroughly clean and remove any dirt or dust that infiltrates system components and shall be responsible for timely replacement of any damaged components.
2. Device labels and connectors shall be delivered with temporary dust and paint protection installed.

1.12 PROJECT CONDITIONS

A. Defects in the field which may impact the work in this Section shall be reported to the Owner's Representative and corrected in accordance with the requirements of the applicable Section of work prior to commencement of the work in this Section.

1.13 MAINTENANCE

A. Provide maintenance stock of User-serviceable components within the system. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner at time of system commissioning.

B. Maintenance stock shall include:

1. One spare relay module of each type in the system.
2. Four fuses of each type in the system.
3. Two control device receptacles and connectors of each type in the system.
4. Four circuit distribution connectors of each type in the system.
5. Four cable mount lighting fixture power connectors of each type in the inventory.
6. Six spare keys of each type in the system.
7. Components recommended by the Manufacturer.
8. Any non-standard tools required for User service.

PART 2 - PRODUCTS

2.1 PRE-APPROVED SPECIALTY SUBCONTRACTORS

A. The following production systems specialty subcontractors have been pre-approved for bidding for the work in this section:

Holzmueller Productions
1000 25th St
San Francisco, CA 94107
Tel. (415) 826-8383
Contact: Jim Schelstrate

Musson Theatrical
890 Walsh Ave
Santa Clara, CA 95050
Tel. (408) 986-0210
Contact: Dave Rimerman

LVH Entertainment Systems
1801 Highland Avenue, Unit E
Duarte, CA 91010
Tel. (800) 716-9408
Contact: Jason Davis

4Wall Entertainment
5435 W. San Fernando Rd.
Los Angeles, CA 90039
Tel. (818) 252-7481
Contact: Brent Prichett

Polaris Lighting
624 Irving Ave
Glendale, CA 91201
Tel. (818) 265-0330
Contact: Floyd Payne

Stagecraft Industries, Inc.
5051 North Lagoon Ave
Portland, OR 97217
Tel. (503) 286-1600
Contact: Wendy Hammatt

B. All other specialty subcontractors must be approved prior to bid. Other contractors seeking acceptance must submit the following information at least 2 weeks prior to the bid opening date. Approval of contractors will be by addenda. Failure to submit any of the required information will automatically disqualify the contractor from consideration of approval.

1. A listing of five equivalent installations including:

    a. Name, address and telephone number of Owner;
    b. Name, address and telephone number of Owner Consultant;
    c. Scope of work.
    d. A brief written description of the contractor's operation including facilities, financial capabilities, and experience of key personnel.
    e. A statement from a bonding company agreeing to provide the required bonds in the amount required for the project.
    f. Documentation necessary to show compliance with Quality Assurance, above

C. Permission to bid does not imply acceptance of the specialty subcontractors. It is the sole responsibility of the contractor for this Section to ensure that any price quotations received, and submittals made, are for control systems that meet or exceed the specifications.

2.2 MANUFACTURERS

A. The dimming and control equipment in this Section shall be a cohesive system supplied and warranted as a system by a single manufacturer and shall be the products of the following pre-approved manufacturers, and shall meet the specifications listed herein:

1. Electronic Theatre Controls
2. Doug Fleenor Design (DMX merger/splitter only)
3. Pathway Connectivity (DMX merger/splitter and fader panel only)
4. Or equal. (No known equal. No substitutions.)

2.3 MATERIALS

A. All components supplied under this Section shall be new. Used or factory reconditioned components shall not be acceptable.

2.4 BLACKBOX THEARE CONTROL CONSOLE

A. Provide the following control console:

1. ETC Element 2 – 6K

B. Provide the following accessories:

1. One (1) ETC Pad RFU units, each with the following accessories:

    a. Shoulder Strap
    b. EETi Stylus Pen
    c. Battery Pack with meter
    d. Office Dock

2. One (1) ETC WAP POE wireless access points, configured as noted below:

a. Mount/install access point on steel plate and attach to tension grid in Studio theatre. Plug into network port mounted to tension grid hanger, provide required network cable.
b. Standards 802.11 a/b/g/n/ac
c. Dual band 2.4 and 5 GHz
d. Wireless data rates up to 300Mbps
e. POE – power over ethernet
f. Setup to work with ETC Pad
g. Black in color.
h. Any lights shall be shut off if in view of audience.

3. Control Room Monitors & Keyboards

a. Provide two monitors for the console.
b. Monitors shall be 22" minimum diagonal color (if supported by console) flat panel display monitors. Provide Dell S2240T Touch Screen Monitor or equal.
c. Monitors shall include vertical and tilt adjustment stand.
d. Provide one keyboard & mouse for each console

4. Power supply and surge protector/UPS capable of maintaining the console and monitor for 15 minutes after power is suspended.
5. Console power and all control cables shall be 25' long.
6. Dust covers for console and all monitors.

2.5 PRODUCTION LIGHTING RELAY PANELS

A. Provide wall mounted relay panels for production lighting relay circuits.
B. General

1. Panels shall be UL 508, UL924 and UL67 listed and so labeled.
2. The panels shall receive ESTA DMX512-A control protocol. Addressing shall be set via the user interface button keypad with any circuit patched to any DMX control address.

a. 2,500V of optical isolation shall be provided between the DMX512 inputs and the control electronics as well as between control and power components.

3. Panels shall be provided in 12, 24 or 48 circuits as shown on drawings.

a. Panel shall support dual and three pole circuits at decreased density where each pole constitutes one of the available single pole circuits
b. Single, Dual or three pole circuits shall be mixed as required for the circuiting shown on the drawings.

C. Electrical

1. Breakers and relays shall be rated to 100% electrical load.
2. Branch circuits shall be 20a unless noted otherwise.
3. Breaker output lugs shall accept 10-14 AWG dual conductor wire
4. Panel shall be fed by 120/208v Three phase, 4-wire plus ground input feeder.

5. Panels shall include a main breaker. See electrical drawings for breaker sizing.

D. Mechanical

1. The panels shall be set up for wall or flush mounting and supplied with cover.

E. Function

1. Panel shall be user programmable.
2. Circuits shall be individually addressable.

F. Provide with the following Breaker Panel Accessories

1. Ethernet Option shall provide advanced control of breakers over streaming ACN (sACN) and transmit status, control override, and measured energy usage per branch circuit to web browser-based interface or central monitoring interface
2. A Contact Input Option shall allow 24 dry contact inputs to be linked for direct or group breaker control, to activate a preset, or to activate a sequence. Controller software shall allow for normally open maintained, normally closed maintained or momentary toggle.
3. A RideThru Option shall provide short-term power backup of control electronics by automatically engaging when power is lost, and recharging when normal power is present
4. A Tamperproof Hardware Kit shall include center reject Torx head screws to prevent access to panel interior by unqualified individuals
5. Main Breaker options

G. Panel shall be of the same manufacturer as the architectural control system.

H. The wall mount relay panel shall be the Sensor IQ Relay Panel as manufactured by Electronic Theatre Controls, Inc.

1. Black Box Theatre: provide 120V panel
2. Gymnasium: Provide both 120V and 208V as indicated

I. Provide the following options:

1. Ethernet Option
2. 0-10V Dimming Option
3. Contact Input Option
4. RideThru Option

2.6 ARCHITECTURAL LIGHTING RELAY PANELS

A. Mechanical

1. The panel shall be 16-gauge steel, surface or recess mounted and complete with locking door/cover. Inner cover shall prevent access to live components, breakers and/or relays.
2. Relay subpanel shall accommodate single, dual or triple pole breakers and relays in any combination.
3. Relay output lugs shall accept 6-14AWG copper wire

B. There shall be a graphical display user interface with number, directional selection buttons; testing shortcut button for relays and presets, status readout and LED indicators and USB receptacle for uploads/downloads and software updates.

C. Functional

1. Pack setup shall be user programmable.
2. Each relay circuit shall be programable with the following attributes.

    a. Type, Name, Circuit, DMX address, sACN address, Space, Circuit Modes, Normal Latch-lock, Fluorescent, DALI, “On” threshold level, “Off” threshold level, Include in UL924 emergency activation, Allow Manual

3. The panel shall be capable of switching all relays on or off at once, or in a user-selectable delay period of 0.1 to 60 seconds, in 0.1 second increments, per relay.
4. Control electronics shall report the following information per branch circuit:

    a. Breaker state
    b. Relay state
    c. Current draw
    d. Voltage
    e. Energy usage over time

D. Built in Control shall include:

1. From the control panel, stations, or timed events it shall be possible to record up to 16 presets and 16 zones per space for up to 8 spaces per panel.
2. Indication of an active preset shall be visible on the LCD display.
3. The panel shall receive ESTA DMX512-A control protocol.

E. The panel shall have a UL924-listed contact input for use in Emergency Lighting systems. The panel shall respond to the contact input by setting relays to “on”, while setting non-emergency relays “off”. Each relay can be selected for activation upon contact input.

F. Electrical

1. The panels shall consist of up to (30) single pole standard breakers with (24) relay controllable (Echo)
2. Provide with main circuit breaker, sized as shown on drawings.

G. Provide the following accessories

1. Network Interface
2. Low voltage 0-10V Dimming Control
3. Ride-Thru Option
4. Main Breaker
5. ELV dimmer, as required per architectural lighting design.

H. Provide panels in size capacity for and relays in quantities to support loads as shown on drawings. Provide with appropriate module types for the loads as sch eduled on drawings, it is in the scope of this section to review the electrical drawings and provide the appropriate modes for all installed lighting fixtures circuited to these panels.

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I. The wall mount relay panels shall be ETC Echo Relay Panel

1. Black Box Theatre: provide 277V panel

2.7 DRAMA CLASSROOM – PRODUCTION LIGHTING RELAY PANEL

A. The Relay Panel shall be used to control circuits for all production lighting fixture outlets.
B. No interconnection to architectural lighting and/or emergency systems is required.
C. The Relay Panel shall accept DMX from the wall button/slider controls.

1. Mini Panels shall support Class 2, ANSI E1.11-2008, USITT DMX512A control communications
2. Mini Panels shall provide a DMX512A wiring connection using terminal blocks for #24 AWG wire
3. Terminal blocks for Cat5e or better wire shall also be available

D. The Relay Panel shall be configurable via ANSI E1.20 Remote Device Management (RDM). RDM parameters shall include:

1. Device Label – configure a name for the device
2. DMX Start Address –set the starting DMX address of the Zone Controller to a value from 1-512
3. DMX Fail Mode (Data Loss) – configure the Zone Controller behavior when DMX is lost: Hold last look, Wait and fade, Go to full (default)
4. Packet Delay – configure the number of packets required before the zone controller activates a change of level (relay on/off or 0-10V output)

E. Provide ETC UFMP8 - Foundry Mini Panel, 8-circuit, 120VAC.

2.8 BLACKBOX THEATRE - ARCHITECTURAL CONTROL ELECTRONICS

A. Provide control electronics with memory capacity and performance as required to meet the functions within these specifications.

1. The system shall permit control of any dimmer or relay on the system by the Control Console or any other DMX512 controller, or the Preset Panels as specified below on a last action basis.
2. Racks shall be configured to normally exchange data via the Ethernet network, with all programming capabilities granted therein.
3. Two optically isolated DMX512 inputs shall be provided, allowing overlapping or separation of any control level. 2,500V of optical isolation shall be provided between the DMX512 inputs and the control module.
4. The system shall send control signal to low voltage relay panels as specified. Architectural control electronics may be housed within or external from dimmer racks.
5. Provide options/modules as necessary to accept an RS-232 control connection from the AV control system.
6. Mount unit in rack mount control enclosure ERn in the control equipment racks indicated on the drawing

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7. Products shall be

    a. ETC Paradigm

2.9 EMERGENCY SYSTEMS

A. Provide equipment necessary for emergency lighting systems
B. Emergency Power Transfer Switch

1. All Devices shall be UL1008 listed and labeled.
2. Provide ELTS by Electronic Theatre Controls (ETC), with modules in quantities as required by electrical engineer to support the emergency lighting system.

    a. For local emergency systems serving fewer than 4 circuits, the Branch Circuit ELTS shall be an acceptable alternate.

C. Emergency signal devices

1. All devices shall be UL 924 listed and so labeled.
2. Provide Power loss detection kit

    a. Provide ETC Emergency Bypass Detection Kit (EBDK)
    b. Provide in quantities as required by electrical engineer to support the emergency lighting system

3. Provide DMX emergency signal dedication

    a. Provide DMX Emergency Bypass Controller (DEBC)
    b. Provide in quantities as required to serve discrete emergency DMX lines as required by electrical engineer to support the emergency lighting system.

2.10 BRANCH CIRCUIT EMERGENCY LIGHTING TRANSFER SWITCH (BCELTS)

A. General

1. The BCELTS shall provide automatic transfer of a single branch circuit from normal to emergency power source, when normal power fails
2. The BCELTS shall transfer a lighting load branch circuit from a dimmer/ relay or secondary control output to a second power source in the event of a loss of power to the primary power source, a normal system failure, or activation of a fire alarm
3. The system shall be listed under ANSI / UL1008 Transfer Switch Equipment and comply with ANSI / NFPA 110 Standard for Emergency and Standby Power Systems, and ANSI / NFPA 70 (NEC), including Article 700, 701 and 702 safety standards. Emergency transfer systems that do not comply with the below stated NEC articles and sections shall not be permitted

    a. Satisfies requirements of the National Electrical Code (NFPA 70):
        1) Article 700 – Emergency Systems

2) Article 701 – Legally Required Standby Systems
3) Article 702 – Optional Standby Systems
4) Section 518.3(C) – Assembly Occupancies
5) Section 520.7 – Theatres and Similar Locations
6) Section 540.11(C) – Motion Picture Projection Rooms

4. The BCELTS shall transfer a single circuit at 120V or 277V up to 20 Amperes in capacity

B. Transfer Switch

1. The BCELTS shall be a UL1008 transfer switch listed for Emergency Systems (NEC Articles 700 and 701; UL CCN WPWR)

   a. Transfer switches not listed under UL1008 shall not be acceptable
   b. Transfer switches listed under UL1008 for Optional Standby (NEC Article 702; UL CCN WPXT) applications only shall not be acceptable
   c. Automatic Load Control Relays (ALCR) listed under UL924 shall not be acceptable

2. The switch shall be positively latched and unaffected by voltage variations or momentary outages so that constant contact pressure is maintained and temperature rise at the contacts is minimized
3. The switch shall be electrically interlocked to ensure only one position, either Normal or Emergency, is engaged at any time
4. The switch shall be break-before-make to ensure that normal and emergency sources are never interconnected within the unit
5. Built-in fuses shall provide 10,000 Ampere Short Circuit Current Rating (SCCR) on the connected emergency circuit
6. Switch contacts shall withstand transfer without welding, with 180º phase displacement between normal and emergency power sources if both sources are energized
7. Transfer switch contacts shall be rated for mixed loads, including electric discharge lamps and tungsten filament lamps
8. Transfer switch shall be rated for a minimum of 6,000 cycles at full tungsten load

C. Control Circuitry

1. The control circuitry shall direct the operation of the transfer switch
2. A field-configurable normally closed (NC) or normally open (NO) dry contact closure input shall be provided

   a. Up to (10) BCELTS devices may be connected to a single remote loop

3. The BCELTS shall support transfer of a 0-10V or DALI controlled circuit

   a. Upon activation of emergency transfer the BCELTS shall break the 0-10V or DALI control circuit, driving connected 0-10V circuits to full output and DALI circuits to their default level.

D. Operation

1. Transfer to alternate emergency supply will occur when normal supply sense voltage drops below 80V when used at 120V or 277V

E. Enclosure

1. The BCELTS shall be mounted in a NEMA 1 interior type enclosure finished in fine-textured epoxy paint
2. The enclosure shall be 8.5”H x 10.5”W x 2.75”D
3. The system shall be provided with an approved overlay mounted on the front of the enclosure, stating, “BRANCH CIRCUIT EMERGENCY LIGHTING TRANSFER SWITCH”
4. The enclosure shall be provided with an approved label indicating that the system is UL1008 LISTED for Emergency Systems

F. Accessories

1. Provide sensor tap kits so the system senses power loss directly from room lighting power source.

G. Provide the Branch Circuit Emergency Lighting Transfer Switch (BCELTS) SC1008 as manufactured by ETC, Inc in quantities as required by electrical engineer to support the emergency lighting system.

2.11 LIGHTING CONTROL ETHERNET NETWORK COMPONENTS

A. Network general specifications:

1. The lighting control system shall operate on an Ethernet TCP/IP based network, with all components and procedures meeting IEEE standard specification 802.3af-2003, for Power over Ethernet, 10/100BaseT and/or 10/100Base FL.
2. The network shall support multiple consoles, computers, file servers, printers, and architectural processors with discrete command lines and control. The network shall support multiple venues/systems on the same network.
3. Device configuration selection, manufacturing, installation shall be accomplished to assure a flexible and robust system for the prevention of data interruption and ease of User maintenance and diagnostics.
4. ESTA ACN protocol shall be supported.

B. Network Nodes

1. DMX and other lighting control data shall be inserted and retrieved on the Ethernet network via protocol translation nodes.
2. Each DMX Node shall have LEDs for indication of power, network activity, and DMX port configuration. Those LEDs used for DMX port configuration indication shall also indicate the presence of valid DMX/EDMX signal.

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3. Network configuration shall be via production lighting control manufacturer's configuration software. The software shall permit complete user flexibility allowing the system operator to patch DMX data over Ethernet DMX (EDMX), assign node labels for easy identification, assign RFUs to specific systems in multi-system networks, assign DMX offsets and provide DMX port prioritization. Each node shall have a specific IP address provided automatically by the software. The user may edit this IP address. Systems that do not support simple Windows configuration, or systems that do not allow complete reconfiguration of the above-mentioned features over Ethernet shall not be acceptable.
4. All configuration data for each network device shall be held at the device and system operation shall not require continuous on-line operation of the network configuration software.
5. Systems connected to the same network shall be capable of arbitrating control over EDMX data. The system shall be capable of alternating control of individual dimmer data between architectural and production lighting systems without intervention by the user. The user shall dictate the conditions under which system shall automatically take control and the network shall allow user override of the user selected defaults. Systems which require direct user intervention to allocate control of dimmers between architectural and production lighting systems shall not be allowed.
6. The network shall allow multiple DMX inputs assigned to the same EDMX range to be set at different priorities. This shall allow the user to assign high or low priority to each DMX input port in the network on a port by port basis. The network shall require a valid DMX signal present at the input to initiate prioritization. Systems that do not allow for prioritization shall not be allowed.
7. Each DMX Node shall control up to 2048 DMX addresses, within the confines of up to 64 DMX (32,767 EDMX address) "universes". The specific DMX data input or output by the Node shall be freely configurable by the user. Duplicate outputs of DMX lines (DMX splitter) and discrete outputs shall be fully supported. Multiple sources may be combined, and a priority may be assigned to each source. Each DMX line may have its own start address and offset for ease of use. DMX ports shall be configurable for either input or output.
8. Maximum delay time from input to output shall not be greater than one packet time (approximately 30 mSec.). A minimum DMX update rate of 40Hz shall be sustained under all conditions.
9. Power for the nodes shall be provided over the Cat5 cable, as PoE as specified herein. The node electronics shall be electrically isolated from the power supplied over the Cat5 cable.
10. DMX inputs shall be fully opto-isolated from the node electronics and from each other. DMX outputs shall be earth-ground referenced. DMX Ports shall be capable of withstanding fault voltages of up to 250VAC without damage.

C. Control Equipment Rack

1. Provide racks in quantities and locations as shown on drawings.
2. Rack general assembly:

    a. Provide industry standard 19" equipment rack for all necessary control equipment specified herein.
    b. Wall mounting with fixed back plane swing out front section for access. Hinges shall be placed on the side appropriate to the mounting condition. Verify in field.

c. Mounting brackets shall be 14-gauge steel
d. Engraved label riveted to the case front with the name of the rack as shown on drawings. Rack label characters shall be ½" high.
e. Bottom air vents and rear knockouts for conduit entry.
f. All unused sections shall be covered with vent panels no taller than 2 rack units (R.U.). Racks with more than 2RU of unused sections shall have drawers installed in unused portions.
g. Rack to be configured as shown on Drawings mounted with all controls within wheelchair chair reach as required by the ADA and local codes.
h. Powder coat finish: Black
i. Body and Back pan shall be 18-gauge Steel
j. Rack rail shall be 11-gauge steel
k. Rack shall be height required to fit all required components.
l. Rack shall be Middle Atlantic Products model DWR, or equal

D. Switches

1. Provide Power Over Ethernet (PoE) 24-port and 12-port 1-Gig Ethernet switches in quantities as required, configured appropriately and suitable for lighting system operation.

a. Any switches outside of the Control Equipment Rack shall be provided in a NEMA enclosure
1) Enclosure shall be labeled on the front with an engraved, lamacoid label reading "LIGHTING CONTROL NETWORK SWITCH"

E. Network Patch Bays:

1. Copper: provide RJ45 patch panels for the termination of copper network taps. Leviton Gigamax series patch bays, or similar, to match specified cable type.
2. Labels

a. Patch bay label shall include each patch space number and corresponding field locations. Label as shown on schedule.
b. Provide typed labels in each patch space label insert as shown on schedule.

3. Label each point as shown on drawings.
4. Provide patch space for each Rack, panel or lighting controller that is not shown on the schedule and provide corresponding label.

F. Provide copper and fiber patch cables as required for the inter connection of the system.
G. Fixed Ethernet Node Gateways

1. Fixed nodes shall be provided in quantities and types required for a complete and operational system.
2. CER network patch port number shall be engraved in the faceplate to identify the network port the unit is connected.
3. Provide ETC RSN-DMX1, 2, or 4 for all DMX gateway devices, in quantities and configurations as shown on drawings.

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4. Provide (quantity as needed) ETC RSN-DMX4 Four port gateway with N3GA-RM rackmount kit for LED house light gateway at all control rack locations.

H. Portable Ethernet Nodes

1. Each node shall incorporate two 5-pin XLR type DMX connectors. Output connectors shall utilize female connectors and input connectors shall utilize male connectors, but directionality is re-configurable using the configuration software and connector adapters.
2. Nodes shall incorporate a backlit graphic LCD display for identification (soft-labeling) and status reporting. Labeling shall be user configurable using configuration software.
3. The node faceplate shall be constructed of durable cast aluminum. Faceplates manufactured of plastic shall not be acceptable. Nodes shall be provided in matte black finish.
4. Portable nodes shall be provided mounted in a rugged enclosure with yoke and cast C-clamp for mounting. RJ-45 connector shall be XLR type, Neutrik Ethercon Series Connectors.
5. Each node shall be supplied with one 10’ Cat5 patch cable with XLR type, Neutrik Ethercon Series Connectors.

    a. Provide six (6) portable node assemblies.
    b. Each node shall be supplied with one 10’ Cat5 patch cable with XLR type, Neutrik Ethercon Series Connectors.
    c. Provide industry standard roadcase with casters and handles. Provide with individual compartments for nodes, and storage compartment for cables.
    d. Provide with black safety cable.

2.12 CONTROL RECEPTACLE PANELS

A. General

1. The control receptacle panels shall consist of the appropriate connectors required for the system this Project.

B. Connectors

1. The control receptacle panels shall include for following connector types, per industry standard:

    a. RJ-45 XLR type, Neutrik Ethercon Series Connectors to match specified cable type, configured to accept standard RJ-45 connectors.
    b. 5-Pin male and female XLR connectors for DMX input/output per industry standard
    c. 120VAC Edison convenience power outlets with integral surge-protector.
    d. Other receptacle types as appropriate per manufacturer’s standard features.

C. Physical

1. Faceplates shall be .080” aluminum, edges eased, finished in fine texture, scratch-resistant powder coat, with fasteners countersunk.

a. Panels specified as flush mounted shall overlap back box by 1/2". Surface mounted panels shall match back box size with no gaps or overlap.
b. Provide all back boxes and coordinate mounting with Div. 26.

2. Color shall be black unless otherwise noted.
3. Panels noted as custom color shall be factory powder coated a color selected by the Owner's Representative. Engraving shall be filled a contrasting color.
4. Engraved and filled labels 1/8" high characters minimum, filled shall be white unless otherwise noted.

a. Network taps and node gateways shall be labeled per the patch bay location and point number as shown on schedule.

5. Wall mounted panels shall mount into an industry standard back box, depending on size and quantity of connectors. A terminal block shall be supplied for terminations.
6. Rack mounted panels shall mount within industry standard equipment racks. Provide local breaker for integral AC power receptacle per Code.
7. Panels mounted in floor boxes shall include a clear flexible vinyl dirt guard as shown on drawings. Guard shall cover receptacles but not labels.
8. Provide complete hardware for mounting on gridiron or catwalk hangers where shown per the Drawings.

2.13 ARCHITECTURAL CONTROL PANELS – BLACKBOX THEATRE

A. Architectural control panels shall be able to control any of the following:

1. Theatrical lighting dimmers / relays
2. Architectural lighting dimmers, relays and non-dims

B. Architectural control panel wiring shall be digital, low voltage wiring that shall be topology free. Panels shall be interactive with each other as described herein.

C. Physical

1. Faceplates shall be .080" aluminum, edges eased, finished in fine texture, scratch-resistant powder coat, with fasteners countersunk.

a. Panels specified as flush mounted shall overlap back box by 1/2". Surface mounted panels shall match back box size with no gaps or overlap.
b. Provide back box and coordinate mounting with Div. 26.

2. Color shall be black unless otherwise noted.
3. Panels noted as custom color shall be factory powder coated a color selected by the Owner's Representative. Engraving shall be filled a contrasting color.
4. Engraved and filled labels 1/8" high characters minimum, filled shall be white unless otherwise noted.
5. Wall mounted panels shall mount into an industry standard back box, depending on size and quantity of connectors. Back boxes shall not exceed 4" in recess depth. A terminal block shall be supplied for terminations.
6. Rack mounted panels shall mount within industry standard equipment racks.

D. LCD Touchscreen

1. Rear illuminated LCD touch screen with all standard advertised features.

    a. Acceptable devices:
        1) ETC Unison Paradigm LCD touch screen

2. Provide, immediately adjacent to LCD Panel:

    a. One illuminated, momentary contact "ENTRY PANEL LOCKOUT" pushbutton. The pushbutton shall cause Theatre one-button panels to be inoperative when pressed once and all “LOCKOUT” pilot lights shall illuminate. The pushbutton shall remain lit so long as the "LOCKOUT" status is maintained. “LOCKOUT” status shall be activated or deactivated at any “LOCKOUT” pushbutton, regardless of the last action. Action on an illuminated pushbutton in “LOCKOUT” mode will release the preset panels for operation and the pilot light shall go out. Action on the lockout button shall not cause any change in level status. This button shall have no effect on the controls outside of the Theatre.
    b. One on/off button to turn on general worklights and rehearsal lights to be programmed at time of commissioning

E. LCD Panel Operations

1. The following should be used as a basis for the initial soft programming of the architectural control stations. The configuration shall be verified with the Owner’s Representatives at time of commissioning.
2. Request an updated button programing sheet from the theatre consultant before commissioning.
3. LCD panels shall be programmed with soft pages for access to various areas and levels of control.

    a. Virtual pushbuttons shall indicate state by a change in appearance. Controls shall be though various pages of controls.
    b. Access shall be divided into two security levels minimum. The panels shall “home” to a first level of access which allows the User to play presets changing the levels of the areas shown on the display, without login. The first level of access shall not allow the programming of presets.
    c. The program function shall become available as a “record” button on the same preset playback screens upon login to the second level with a four-digit pass code on a virtual keypad. The pass code shall initially be set as “4100”. The login screen shall be a back page visible as a first level page choice and shall include a “logout” pushbutton which shall return the panel to the first level. “Logout” from the second level shall automatically occur after 30 minutes of inactivity.
    d. The LCD shall be used to program the multi-button and one-button pushbutton preset panels.
    e. The system shall allow the programming of presets and macros through a “snapshot” procedure. Levels shall be set by the control console, by soft sliders at the LCD panel or at the dimmer rack and then captured as a preset to be replayed at any one of the preset buttons.

f. The first page shall be called “House Presets” and shall contain the same number and function of preset buttons as the multi-button preset stations specified herein.
g. The second page shall be called “Work/Reh” and shall have buttons for the various areas of the theatre’s technical areas and the rehearsal groups. The work light buttons shall include control the low voltage relay circuits as well as production circuits selected as rehearsal lights.
h. The third page shall be called “Show Presets” and shall include ten buttons, named as directed by the Owner’s Representative at time of programming.
i. The next page shall only be visible at the second security level and shall be used to program the one-button entry stations.
j. The next pages shall include sliders for each architect control group as listed in the architectural lighting dimming schedule.
k. The general lock screen shall display a “splash” image as provided by the Owner’s Representative.

F. Portable LCD Touchscreen Panel

1. Portable touchscreen shall be a tabletop unit with integral folding cover/stand or protective case.
2. Operations shall be as specified above for LCD or Touchscreen Panels.

    a. Exception: Entry station lockout and on/off button shall not be included in this panel.

3. Power and control data shall be carried in a single CAT cable with RJ45 network connection. Cable shall be detachable.
4. Quantity: Provide (1) panel assembly
5. Cables: Provide one 10’-0” cable, one 25’-0” cable, and one 100’-0” cable.

G. Multi-Button and One-Button Panels

1. Pushbutton stations shall include programmable buttons with integral LED indicators.
2. Multi button panels shall include a card holder with slide-in tags and clear cover for User labeling.

H. Preset Panel Operations

1. The system shall allow the programming of presets and macros through the LCD as described above.
2. Action on any one button shall cause all identical pushbutton indicators on other panels to mimic the preset state.

2.14 DRAMA CLASSROOM – DMX CONTROL

A. Provide a wall-mounted button panel for simple preset recall.
B. Each button shall be able to recall a pre-programmed look. All buttons shall be capable of turning on or off individually, so that several looks may be stacked to create a scene.
C. Locate PSU for unit in same enclosure as DMX merger/splitter.
D. Provide Pathway Connectivity:

1. Vignette Wall Station modules per drawings
2. Vignette Architectural Gateway with DMX output
3. Enclosures/interfaces/accessories as needed for a complete system

2.15 WIRING DEVICES

A. Provide power distribution wiring devices in the quantities, types and configurations as shown on drawings. All back boxes shall be supplied by production lighting contractor and manufacture.

B. Devices shall be fabricated from 18 gauge cold rolled steel with 16 gauge covers, finished with flat black powder coat unless otherwise noted. Devices shall be UL listed and labeled for the use specified herein.

1. Back box shall not exceed 6-1/2” high x 4” deep x the widths as shown on drawings.
2. Panels specified as flush mounted shall overlap back box by 1/2”. Surface mounted panels shall match back box size with no gaps or overlap.

C. Receptacles and connectors shall all be of the same manufacturer and be fully black.

1. Connectors of the same type shall be of the same manufacturer throughout the project to minimize maintenance stock.
2. 120VAC Connector type: Provide 20A theatre industry standard 3-pin connectors throughout for standard devices.
3. 208VAC Connector type: Provide 20A theatre industry standard Twist-Lock connectors throughout for standard devices.

    a. Connectors shall be Bates, Union, Pro-Pin or equal

D. Receptacles and connectors shall be factory pre-wired to internal feed through terminal blocks and grounded. All wiring and terminals shall be factory numbered. Size all lugs as required based on wire size indicated on the Electrical Drawings. Provide for dedicated neutrals within each device and homerun. Terminals shall be clamp-type compression terminals appropriately listed.

1. All parallel circuits, if applicable shall homerun to the dimmer rack or relay panel, unless otherwise noted.

E. Circuits shall be labeled with engraved lamicoid tags with 1/2” high characters securely riveted to the box and plainly visible. Label color shall be:

1. Production lighting circuits, 120VAC: black tags with white core.
2. Production lighting circuits, 208VAC: blue tags with white core.

F. Provide with all necessary mounting hardware as shown on Drawings and as required.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Advise Div. 26 for the proper installation of the dimming and control equipment specified herein.
B. For the commissioning services as listed herein only, coordinate scheduling and access with the Contractor and Owner and provide personnel lifts or ladders as required for access to the lighting equipment.
C. For the commissioning services as listed herein only, remove all packing materials from the jobsite. Insert operations and maintenance information into the project record documents as specified above in Submittals.

3.2 COMMISSIONING AND DEMONSTRATION

A. Coordinate with Division 26.
B. Factory trained and authorized personnel shall review, test, program and otherwise complete the system, providing that the system and all components are fully functional per the Documents and fully covered under the Manufacturer's warranty.

1. It shall be under the work in this section to provide turnkey proper and logical programming of the lighting control systems.
2. It shall be under the work in this section to coordinate the proper and logical programming of the low voltage relay panel supplied under Division 26.

    a. The low voltage panel shall be programmed so the control groups of branch circuits match the control and indication on the architectural control panels provided and programmed under this section.

C. Upon completion of the installation, the Contractor shall notify the Owner's Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Owner's Representative's schedule.
D. Provide to the Owner's Representative the following upon arrival:

1. All Ethernet wiring shall be tested at Category 5 and certified for full bandwidth operation.

E. Make available for review by the Owner's Representative:

1. All components for physical inspection and inventory.
2. All installed controls shall be operational.
3. All portable controls shall be operational at all plug in locations.
4. Demonstration of input and output of lighting control data throughout the data distribution system.
5. All distribution shall be checked for continuity, grounding and polarity.
6. Simulation of dimmer rack failure and power outage conditions.

F. The Contractor shall be liable for any return visits by the Owner's Representative as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the Owner's Representative to carry out their work.

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G. The Contractor shall arrange for access as necessary for inspection of equipment by the Owner's representatives.

H. Upon completion of the commissioning, the factory trained and authorized personnel shall demonstrate operation and maintenance of the system to the Owner's representatives. Coordinate with the Owner's Representative's schedules two weeks in advance minimum.

I. Provide training as follows:

1. Two days during commissioning period for Owner's forces.
2. One day with Owner's forces one month after initial training.
3. One day with Owner's forces one year after initial training, but prior to warranty expiration.

J. Training shall include, but not be limited to:

1. Safety precautions.
2. Identification of all elements provided under this section.
3. Maintenance, diagnostics and trouble shooting.
4. Control operation training of the console, dimming and control electronics.
5. Operations and maintenance manual orientation.

END OF SECTION

SECTION 116193 –PRODUCTION LIGHTING FIXTURES – FF&E

PART 1 - GENERAL

1.1 SUMMARY

A. Services listed herein relate to the following scopes of work:
B. Furnishing, preparing, and delivery of production lighting fixtures, accessories and equipment.
C. Installation of the Lighting fixtures and equipment per the lighting plot in Appendix-B. Light plot shall be programmed for turnkey operation under the direction of the District's Representative.

1.2 RELATED SECTIONS

A. Coordinate with the following sections in carrying out this work:
B. Division 01 – General Conditions.
C. Base Building documentation is available upon request to the district. Bidders may request copies of as built drawings as well as drawings and specification for the current renovation project. This includes the drawings and specification of the production lighting and rigging systems; PL and PR series drawings and specification sections 116133 and 116183.

1.3 REFERENCES.

A. Comply with all national, state and local regulations and the procedures and requirements of the CA Division of the State Architect, if applicable. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, NEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
C. Labor shall be provided per applicable labor regulations and practices.

1.4 DEFINITIONS

A. Refer to Div. 1 for definitions.
B. District Representative: For the scope in this Section, authorized personnel representing the district and The Shalleck Collaborative, Inc., Theatre Consultants.

1.5 SYSTEM DESCRIPTION

A. Provide production lighting fixtures, cable, accessories and other equipment as indicated in the equipment list.
B. It is under the work of this section to provide lighting extension power, data cable, and any adapters, connectors, couplers or accessories required for installation.
C. Fixtures shall be prepared, tested, and delivered to the project site.
D. Lighting cable and accessories will be provided and delivered to the job site in a "ready to hang" state
E. Lighting fixtures shall be installed, circuited, hung, focused, programed, as drawn in the lighting plot and all paperwork shall be provided as described herein.

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1.6 CURRENT TECHNOLOGY

A. Only the most current hardware and software shall be provided. In no case will discontinued or superseded products be acceptable. If the manufacturer has developed and successfully released products that meet or exceed the criteria within this specification, the Contractor shall notify the District's Representative and submit the new product for review. If accepted, the products will be provided at no additional cost to the Theatre. Software upgrades and authorized support services for its proper integration into the system shall be provided at no cost to the Theatre throughout the warranty period.
B. In the event of known product defaults or recall, the Contractor shall immediately notify The school and the representative and make immediate arrangements for remedy.
C. None of the stipulations herein shall be grounds for revision to the project schedule.
D. See related procedures under warranties in this Section.

1.7 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the District's Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.
B. Documentation for the substitution shall be submitted with supporting material and shall include the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The District's Representative shall be the sole evaluator of the fitness of the substitution.
C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.8 SUBMITTALS

A. Submittals shall be made in a timely fashion so as to not affect the project schedule, and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.
B. All submittals shall be made in electronic format.
C. Provide hard copies if requested.
D. Files shall be in .pdf format, and submitted via email or download
E. All submittals shall be complete and submitted as a comprehensive package, including finish selection materials (if required) and samples (if requested), all materials listed in this section, including, but not limited to, bill of all materials, all shop drawings, product data, relevant calculations (as required) and any other information required to review the systems. Incomplete submittals will be rejected without review.
F. Submittals shall be reviewed and field dimensions verified prior to commencing acquisition for, and fabrication of the work in this section. All services and parts of the work in this section shall be verified through the submittal process.
G. Product Data:
H. Submit data sheets for all standard component parts, which shall include all information necessary to verify compliance with this Section.
I. Record Documents:

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J. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
K. Within 10 days of acceptance by District's Representative, submit one (1) electronic copy of record documents and any hard copies required herein.
L. One (1) electronic copy of "as built" submittals including shop drawings, product data, operations and instructions manuals for all products provided, care and maintenance instructions, service line and online contacts and warranty documents.
M. Submit electronic record documents on USB flash drive storage media.
N. Record Documents for Lighting Plot:
O. Record documents shall include circuit assignments and any changes to the lighting plot or paperwork as a result of changes during installation, focus, and programming.

1.9 WARRANTY

A. Warranty shall provide coverage of material and product defects and assembly workmanship or installation for a period of three years following the date of acceptance by the Theatre.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor. If warranty claims are not serviced to the satisfaction of the owner within the 14 day period, the Contractor shall bear all costs that arise as a result of the delay, including, but not limited to, the use of temporary replacement components, additional District's staffing or overtime, shipping, cancelled uses or performances.

1.10 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty suppliers and manufacturers meeting the qualifications listed herein.
B. Specialty supplier shall have been continuously engaged in the sales and integration of lighting equipment similar to that specified herein for a minimum of ten years.
C. Manufacturer shall have been continuously engaged in the manufacturing of lighting fixtures and equipment similar to that specified herein for a minimum of fifteen years.
D. Specialty suppliers shall have at time of bid and continuously maintain throughout the project and warranty period a Contractor's license appropriate for the work in this Section.
E. Specialty suppliers shall maintain bonds in the amount required for the project.
F. Specialty suppliers shall have within their employ, manufacturers factory authorized field services technicians within a four hour driving distance from the project site.
G. All equipment shall be UL listed and bear the appropriate labels.
H. All Specialty Suppliers must be Authorized dealers for the Manufacturer specified.

1.11 DELIVERY, STORAGE AND HANDLING

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.
C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

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D. Devices shall not be delivered to the project site until the project is suitably clean and all adjacent finish work that may be painted or produce dust has been completed. The contract shall provide and maintain complete protection of all devices until the project has been made available for occupancy by the Theatre. The Contractor shall thoroughly clean and remove any dirt or dust that infiltrates system components and be responsible for timely replacement of any damaged components.
E. Device labels and connectors shall be delivered with temporary dust and paint protection installed.

1.12 PROJECT CONDITIONS

A. Defects in the field which may impact the work in this Section shall be reported to the District's Representative and corrected in accordance with the requirements of the applicable section of work prior to commencement of the work in this Section.

PART 2 - PRODUCTS

2.1 SPECIALTY SUPPLIERS

A. Requirements listed in above Quality Assurance Section.
B. The following production systems specialty subcontractors have been pre-approved for bidding for the work in this section:

Holzmueller Productions
1000 25th St
San Francisco, CA 94107
Tel. (415) 826-8383
Contact: Jim Schelstrate
Email: jim@holzmueller.com

Musson Theatrical
890 Walsh Ave
Santa Clara, CA 95050
Tel. (408) 986-0210
Contact: Michael Howden
Email: mhowden@musson.com

C. All other specialty subcontractors must be approved prior to bid. Other contractors seeking acceptance must submit the following information at least 2 weeks prior to the bid opening date. Approval of contractors will be by addenda. Failure to submit any of the required information will automatically disqualify the contractor from consideration of approval.
D. A listing of five equivalent installations including:

1. Name, address and telephone number of Theatre;
2. Name, address and telephone number of Theatre Consultant;
3. Scope of work.
4. A brief written description of the contractor's operation including facilities, financial capabilities, and experience of key personnel.

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5. A statement from a bonding company agreeing to provide the required bonds in the amount required for the project.
6. Documentation necessary to prove compliance with the above Quality Assurance section.

2.2 MANUFACTURERS

A. Lighting fixtures and equipment in this Section shall be the products of the following specialty manufacturers:

1. Electronic Theatre Controls
2. TMB
3. LEX
4. Neutrik
5. City Theatrical
6. BMI
7. The Light Source
8. Other manufacturers as listed in the fixture and equipment schedule.

B. Permission to bid does not imply acceptance of substitutions or alternative manufacturers. It is the sole responsibility of the contractor for this section to ensure that any price quotations received, and submittals made are for lighting fixtures and accessories that meet or exceed the specifications and all product substitutions must be individually authorized prior to bidding, as specified above.

2.3 MATERIALS

A. Provide production lighting fixtures, accessories, equipment and spare parts as shown in Appendix A.
B. All components supplied under this section shall be new. Used or factory reconditioned components shall not be acceptable.
C. All fixtures and accessories shall be the manufacturer and model listed in Appendix A unless a substitution request is approved in writing, or a product has been superseded by a newer model. Equal products may only be substituted by the process outlined above, no exceptions.
D. For items without manufacture and/or model information, contractor shall provide equipment meeting the specification herein.
E. Items necessary for the complete installation of a working system, such as incidental hardware, clamps, extra pipes, etc., shall be provided within bid cost.

2.4 LABELING:

A. General:

1. Labels shall be resistant to wear with heavy use and fading.
2. Labels shall be permanent so that it is resistant to removal in case of theft.
3. Labels shall be resistant to prolonged exposure to high temperatures created by equipment.
4. Labels shall be black with white lettering on an adhesive label.

B. All fixtures, accessories, and equipment shall be labelled with the venue name:

1. “Sanger High School - Theatre”

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C. All fixtures shall be labeled on the fixture body.
D. All cables shall be labeled in the following manner on the male side of the cable:

1. All cables shall be labeled with the name of the venue.
2. In addition to the labels on the cabling, provide ½" colored band (or electrical tape) indicating size. Colored bands compound and combine like roman numerals, such that a 25' cable would have two yellow bands and one red band per the system below.

a. Red= 5'
b. Yellow = 10'
c. Orange = 50'
d. Blue = 100'

3. All cables shall have one shrink wrap piece shall be shrunk over machine printed length label and colored bands.

2.5 PRODUCTION LIGHTING FIXTURES

A. Fixture preparation:

1. As part of base work all fixtures shall all be prepared in the following manner:
2. The connector shall be prewired where applicable.
3. Each fixture yoke shall be provided with requisite hanging hardware as required by relevant manufacturer's specifications.

B. Safety cables installed to fixture yoke.

1. Provide 1/8 x 18", or longer as required, 7x7 black galvanized lighting restraint cable with 5/16" spring hook by Fehr Code 39312-18B or equal.
2. Fixtures with more than one yoke or c-clamp shall be provided with one safety cable per yoke or C-Clamp.

2.6 ACCESSORIES

A. Provide storage for accessories as required: impact resistant plastic bins with integral hand holds- these shall be easily stackable and resist flexing or warping when fully loaded with cable.
B. Provide and affix permanent label with inventory of storage contents on side of container.
C. Provide quantities for all accessories as specified in Appendix-A.
D. All parts shall be black.

2.7 CABLE

A. General

1. It is under the work of this section to calculate and provide all cable necessary for the functional installation of the lighting plot in addition to cable listed in the Appendix-A.
2. Provide cable listed in the Appendix-A.
3. All cable shall have #4, 1/8" uncoated black tie line "installed" on each cable for tying each individual coil of cable or 1/2" x 9" min. black Velcro cable strap that loops cable and stays attached when fully extended.

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B. 20A rated stage extension cable:

1. All connectors of the same manufacturer as those on the fixtures. Connectors shall provide clamping strain relief that tightly engages the cable jacket. Visible leads shall not be acceptable. Stage-Pin connectors shall have a Clear Cover.
2. Strain relief mechanism shall be fully engaged.
3. Cable shall be of neoprene covered, black, heavy duty SO, SOW or better three-wire 12/3 cable. Internal wiring shall be sized to circuit ampacity and shall be rated at 125°C.
4. SJTO is acceptable for PowerCON items.

C. Control cabling

1. Cable assemblies shall be heavy touring grade TMB ProPlex cable or similar.
2. Cable shall have a gold plated, 5 pin XLR type connector.
3. DMX cable shall consist of two pairs of 22 AWG tinned copper stranded 19x34 with Fluorinated ethylene propylene insulation.
4. Cable shall be reinforced with 600# breaking strength Kevlar.
5. The inner shield shall be aluminum/mylar with 100% coverage.
6. The outer shield shall be copper braid with 85% coverage.
7. Outer jacket shall be black polyurethane with 5000psi tensile strength.
8. Outside diameter shall not exceed 0.300".
9. Cable weight, excluding connectors, shall not exceed 50 pounds per 1000’.
10. Cable shall meet or exceed ETL specifications for DMX data transmission.
11. Cable shall be TMB Proplex PC224P or equal.

PART 3 - EXECUTION

3.1 INSTALLATION- DELIVERY

A. Deliver fixtures to the stage in ready to hang/install state.
B. Remove and recycle all packaging from the delivery site.
C. Upon completion of the installation, the contractor shall notify the District Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the District Representative’s schedule.
D. The factory trained and authorized personnel shall demonstrate operation and maintenance of the system to the District Representative. Coordinate with the District Representative’s schedules two weeks in advance minimum.
E. Spare inventory shall be identified for review by District Representative.
F. Arrange all delivered equipment in an easily accessible and secure location within the venue.
G. Contractor shall notify District’s Representative of equipment delivery so that District’s Representative may verify equipment manifest.
H. Arrange all equipment in rows and stacks of similar items so quantities can be easily verified.
I. After quantities are verified and equipment is checked move all equipment to a storage location as identified by the District’s Representative.

3.2 INSTALLATION- LIGHTING PLOT

A. It shall be under the work in this section to:

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1. Deliver all equipment and mount it at lighting positions as shown in the Light Plot.
2. Connect, address, and patch all fixtures.
3. Install all accessories shown in Appendix A: Lighting Fixtures and Equipment List light plot and Appendix B: Light plots-.
4. Provide turnkey setup and logical programming of the lighting patch. Preset effects cues will be programed into the console with the consultant present.

B. Prior to installation, the contractor shall test all circuits and data lines for proper function. Report any identified issues to the District Representative.
C. All lighting fixtures shall be installed following standard industry practices for safety and shall follow all manufacturers requirements and guidelines.
D. All fixtures shall have a minimum of (1) safety cable from the safety cable anchor point of the fixture or yoke, around the lighting batten.
E. Fixtures shall be cabled using a “daisy-chain” method of installation, utilizing PowerCon, PowerCon TRUE TOP 1 and DMX extensions between fixtures.
F. Un-Moulded Two-fers, splitters or receptacles strings are not acceptable.

1. “Two-Fers” or “Three-Fers” are only permitted at the distribution receptacle point, and not within the “daisy-chain.”

G. For the first fixture connection on each chain, a 18” Stagepin or Twistlok to PowerCon TRUE TOP 1 adapter shall be used and may connect directly to the first fixture or extension cable.

1. There shall be no more fixtures per circuit than recommended by manufacturers or where total number of fixtures would exceed wattage/ amperage capacity of circuit or cables used, at 80% derated, whichever is lesser.
2. All cables and connectors in any given chain of fixtures shall be PowerCON TRUE1 TOP. Connector types shall not be mixed within a chain.

H. Cable installation:

1. Cable installation shall be neat and dressed and shall be subject to the approval of the District Representative.
2. "Cables shall be provided in appropriate standard lengths required to install plot. Custom length cables are not required and should not be made. Provide appropriate standard-length cable to avoid unnecessary extra cable, cable swags/drops or excessive coils or bundles.
3. Provide enough spare cable lengths to adjust fixture through it’s full range of motion for focus, also, provide sufficient additional lengths so that any fixture can move up to 24” without needing to add cable.
4. 5’ PowerCon or PowerCon TRUE TOP 1 cables provided with the fixtures may be used for the lighting plot, any unused standard cables shall be provided to the owner in addition to the spares noted on the equipment list.
5. All excess cable shall be mounted to the pipe in a way that minimizes their appearance from the audiences perspective.
6. There shall be no swags of cables or loose cables seen below any of the lighting pipes, except cable slack needed for fixture adjustment.
7. Tie bundles with #4 uncoated black cotton tie line or Velcro, do not use zip ties.

I. Lighting plot and fixture installation:

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1. Provide a completed and revised lighting plot based upon the plot provided in Appendix-B.
2. Fixture power relay and DMX address information shall be recorded at time of installation, documented, and turned over to user for records.
3. Install all fixtures and accessories as shown in the light plot.
4. All DMX fixtures shall be set to address specified in the lighting plot paperwork prior to installation
5. Connect all fixtures and cables to power and data receptacles.
6. Fixtures shall be affixed to hanging position in a consistent orientation

J. All fixtures shall be addressed and programed into the Mosaic Show Control system, provided in the base scope.

K. Provide an additional page of presets labeled “stage light presets” on the touch screen controller with the following:

1. Full stage wash
2. Pre-Curtain presentation
3. Presenter left
4. Presenter right
5. Presenter center
6. Other user defined presets (up to 10)

L. Focus and Programming Schedule:

1. Below is a schedule of days (not date specific) for the focus and programing process. Consecutive days noted.
2. Production Electrician and Console Programmer shall be present at all sessions, except where noted.

M. Schedule:

1. Pre-programing – contractor shall perform all pre-programing and patch work as required to pre-configure all fixtures. All fixtures shall be verified to be working. This shall be completed before focus.
2. Focusing – 1 partial day, with District’s representative, Programmer and Production Electrician + Crew.
3. Cue Programing – presets to be programmed as described above.
4. Final focus and Cue Programming/touch up – Once programming is complete notify District’s Representative that the final installation is ready to be checked. 1 partial day with District’s representative, Programmer and Production Electrician.

3.3 COMMISSIONING AND DEMONSTRATION

A. Factory trained and authorized personnel shall review, test, program and otherwise complete the system, providing that the system and all components are fully functional per the Documents and fully covered under the Manufacturer’s warranty.

B. Upon completion of the installation, the Contractor shall notify the District’s Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the District’s Representative’s schedule.

C. Make available for review by the District’s Representative:

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D. All components for physical inspection and inventory.
E. All installed controls shall be operational.
F. All portable controls shall be operational at all plug in locations.
G. The Contractor shall be liable for any return visits by the District's Representative as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the District's Representative to carry out their work.
H. The Contractor shall arrange for access as necessary for inspection of equipment by the District's representatives.

3.4 TRAINING

A. Upon completion of the commissioning, the factory trained and authorized personnel shall demonstrate operation and maintenance of the system to the District's representatives. Coordinate with the District's Representative's schedules two weeks in advance minimum.
B. Training shall include, but not be limited to:

1. Safety precautions.
2. Identification of all elements provided under this section.
3. Maintenance, diagnostics and trouble shooting.
4. Control operation training of the fixtures.
5. Operations and maintenance manual orientation.
6. Care of equipment.
7. Use of RDM features on LED fixtures.
8. Proper hanging, adjustment, and rigging of lighting fixtures.
9. Lighting fixture focus.
10. Console and Architectural system programming.

C. Provide 4 hours of training.

3.5 APPENDIX

A. Appendix A: Lighting Fixtures and Equipment List.
B. Appendix B: Light Plot.

END OF SECTION

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Sanger HS - Theatre
Production Lighting - FF&E Equipment List
Section 116183A ADDENDUM 8

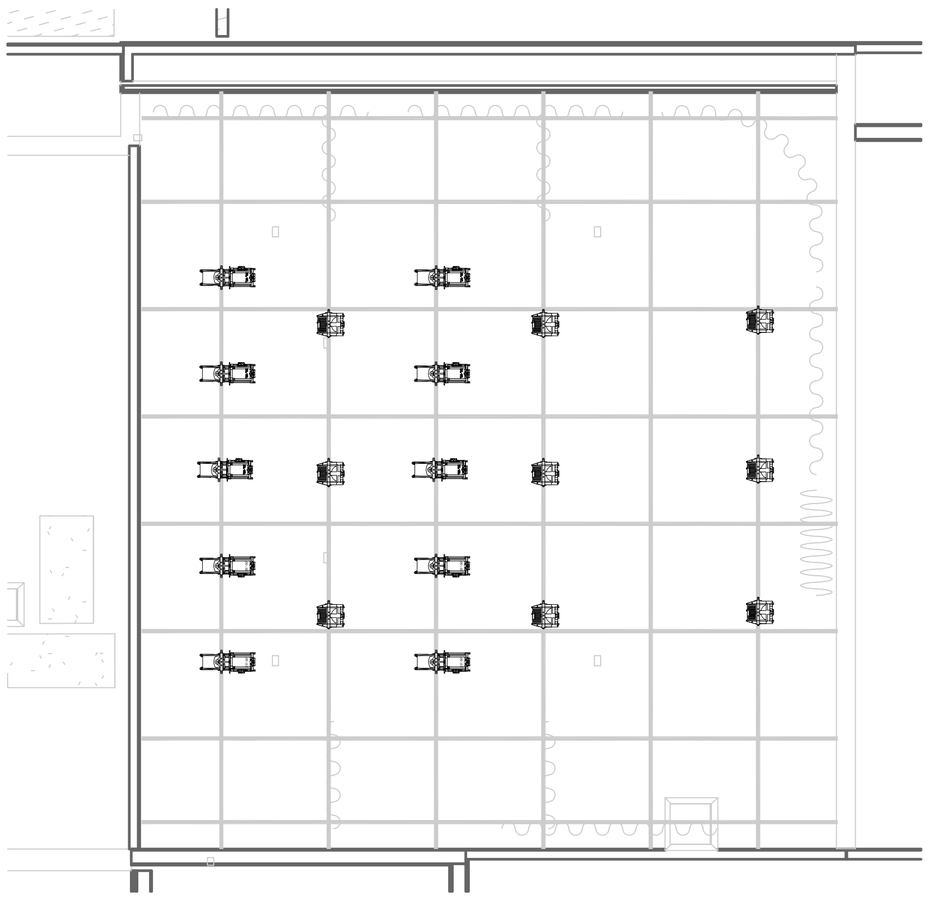
Notes:
1. Conduit, backboxes and electrical power required for A/V systems are provided under division 26 work
2. This list contains key components, but does not list every piece needed for a complete system
   Contractor is responsible to provide a complete and working sytem, regardless of the completeness of this list
3. A/R= As Required
4. OFCI= Owner Furnished, Contractor Installed

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	BLACK BOX THEATRE				
	Production Lighting Fixtures				
1L	Color Source Spot V w/ Shutter Assembly	ETC	CSSPOTMV	48	C-Clamp, PowerCON True 1 to PowerCON True 1 (5'), Pattern Holder, safety cable, Soft Focus Diffuser
2L	ColorSource V Fresnel	ETC	CSFRESVMAXMV	20	C-Clamp, PowerCON True 1 to PowerCON True 1 (5'), safety cable,
3L	ETC Lonestar	ETC	LS-UB-MI2550A1200-B	4	two (2) 107 mm Three-hole Omega brackets, one (1) PowerCON True 1 to PowerCON True 1 (5'), and a safety cable.
	Accessories				
1A	ETC S4 CYC Light Attachment	ETC	S4LEDCYC	10	
2A	15-30° XDLT Zoom Lens Tube with 7.5" Media Frame, Black	ETC	7462A2018-K	12	
3A	25 to 50 Degree Source Four Zoom Lens Tube	ETC	7060A2032-K	36	
4A	Hat Half - 7.5"- City Theatrical Stackers	City Theatrical	CIT-STH-2841	48	
5A	8 Inch Barn Door	ETC	ETC-FRESBD7.5	20	
6A	Smooth Wash Diffuser for Source Four LED- 7.5"	ETC	S4LED-SWD6	48	
	Cables - Power				
1C	PowerCON True 1 to PowerCON True 1 @10'	LEX/TMB	Contractor	50	
2C	PowerCON True 1 to PowerCON True 1 @15'	LEX/TMB	Contractor	25	
3C	PowerCON True 1 to Stagepin' (5')	LEX/TMB	Contractor	25	
	Cables- Data				
1D	5-pin DMX Cable @ 10'	LEX/TMB	Contractor	70	
2D	5-pin DMX Cable @ 15'	LEX/TMB	Contractor	10	
3D	5-pin DMX Cable @ 25'	LEX/TMB	Contractor	4	
4D	CAT5e Cable	LEX/TMB	Contractor	A/R	As required for Spot Track Camera System and Networking for 2 Moving Lights
	Miscellaneous				
1M	Tie Line	Contractor	Contractor	A/R	As required to dress cable
2M	SCHEDULE 40 PIPE	Contractor	Contractor	A/R	As required to complete black box light plot
3M	Rigid Cheeseborough Clamp for 2" OD Sch 40 Pipe	Contractor	Contractor	A/R	As required to complete black box light plot
4M	Super Mega Side Arm 24	The Light Source	SMSA-24	4	With safety cable

Sanger HS - Theatre
Production Lighting - FF&E Equipment List
Section 116183A ADDENDUM 8

Notes:
1. Conduit, backboxes and electrical power required for A/V systems are provided under division 26 work
2. This list contains key components, but does not list every piece needed for a complete system
   Contractor is responsible to provide a complete and working sytem, regardless of the completeness of this list
3. A/R= As Required
4. OFCI= Owner Furnished, Contractor Installed

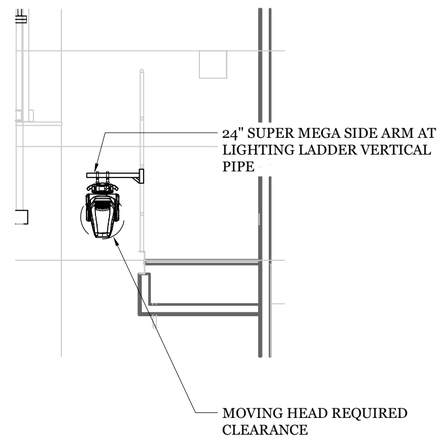
REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	DRAMA CLASSROOM				
	Production Lighting Fixtures				
1L	Color Source Spot V w/ Shutter Assembly	ETC	CSSPOTMV	10	C-Clamp, PowerCON True 1 to PowerCON True 1 (5'), Pattern Holder, safety cable, Soft Focus Diffuser
2L	ColorSource V Fresnel	ETC	CSFRESVMAXMV	10	C-Clamp, PowerCON True 1 to PowerCON True 1 (5'), safety cable,
	Accessories				
1A	25 to 50 Degree Source Four Zoom Lens Tube	ETC	7060A2032-K	10	
2A	Hat Half - 7.5"- City Theatrical Stackers	City Theatrical	CIT-STH-2841	10	
3A	8 Inch Barn Door	ETC	ETC-FRESBD7.5	10	
4A	Smooth Wash Diffuser for Source Four LED- 7.5"	ETC	S4LED-SWD6	10	
	Cables - Power				
1C	PowerCON True 1 to PowerCON True 1 @10'	LEX/TMB	Contractor	20	
2C	PowerCON True 1 to PowerCON True 1 @15'	LEX/TMB	Contractor	10	
3C	PowerCON True 1 to Stagepin' (5')	LEX/TMB	Contractor	10	
	Cables- Data				
1D	5-pin DMX Cable @ 10'	LEX/TMB	Contractor	20	
2D	5-pin DMX Cable @ 15'	LEX/TMB	Contractor	4	
3D	5-pin DMX Cable @ 25'	LEX/TMB	Contractor	2	
	Miscellaneous				
1M	Tie Line	Contractor	Contractor	A/R	As required to dress cable



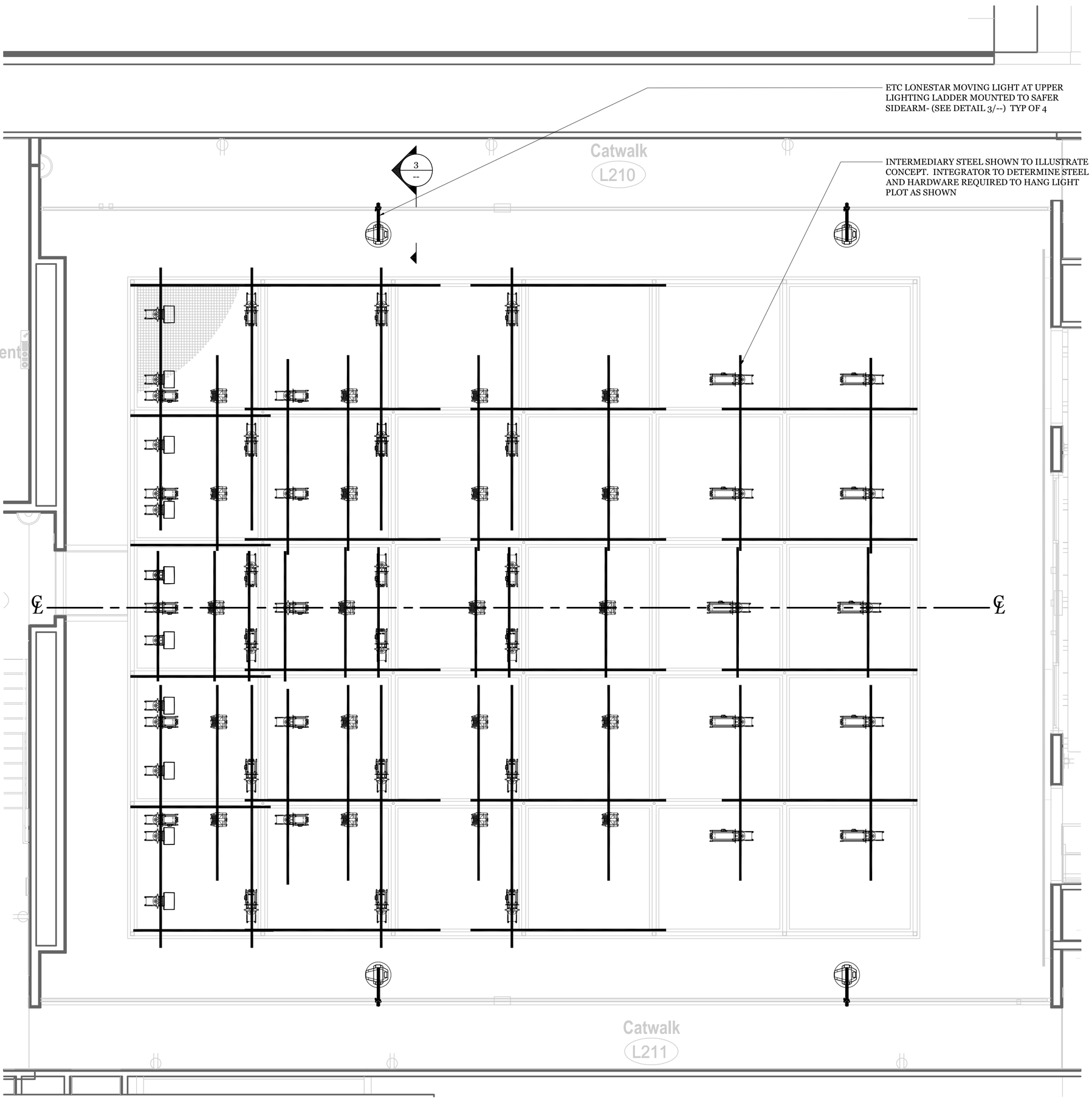
2 DRAMA CLASSROOM LIGHTING PLAN
1/4"=1'-0"

LIGHTING SYMBOL KEY

SYMBOL	FIXTURE TYPE	QTY. SHOWN
	ETC - COLORSOURCE SPOT V 25°-50° ZOOM	10
	ETC - COLORSOURCE V FRESNEL	10



3 ETC LONESTAR MOUNTING, TYP
1/2"=1'-0"



LIGHTING SYMBOL KEY

SYMBOL	FIXTURE TYPE	QTY. SHOWN
	ETC - COLORSOURCE SPOT V 15°-30° ZOOM	10
	ETC - COLORSOURCE SPOT V 25°-50° ZOOM	28
	ETC - COLORSOURCE V FRESNEL	20
	ETC - COLORSOURCE SPOT V CYC	10
	ETC LONESTAR	4
	The Light Source - Super-Mega Side-Arm- 24"	4

1 BLACK BOX LIGHTING PLAN
1/4"=1'-0"

PRODUCTION LIGHTING FF&E

Title: PRODUCTION LIGHTING FF&E LIGHT PLOT ADD 8
Date: 2026-09-22
Scale: AS NOTED
Drawn By: PMM
Drawing Number:
Appendix B

The Shalleck Collaborative Inc.
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SECTION 12 66 23 – TELESCOPIC SEATING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Provision of services as listed herein and related to the manufacturing, delivery and complete installation of a telescoping seating system with integral chairs and matching loose and ganged seats.
2. Coordination with all related sections doing adjacent or integrated work.

1.2 RELATED SECTIONS

A. Coordinate with the following sections, as well as any other related sections, in carrying out this work:
B. Division 01 – General Conditions
C. Floor and adjacent architectural finishes
D. Division 26 – Electrical

1.3 REFERENCES

A. Comply with all national, state and local regulations. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, NEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
C. Labor shall be provided per applicable labor regulations and practices.

1.4 DEFINITIONS

A. Refer to Div. 01 for definitions.
B. Owner's Representative: For the scope in this Section, authorized personnel representing the Owner and The Shalleck Collaborative, Inc., Theatre Consultants.

1.5 SYSTEM DESCRIPTION

A. Telescoping Platform Seating includes electrically operated systems of multiple-tiered seating rows comprising of seats, deck components, understructure that permits closing without requiring dismantling, into a nested configuration for storing.

1. The platform shall have programmed stop positions:

a. Fully Opened

b. Fully Closed
c. Intermediate stop #1 with 4 seatable rows deployed.
d. Intermediate stop #2 as determined in the submittal process.

2. It is in the scope of this section to coordinate any required connections to the building structure.

B. Seating layout:

1. Seating shall be in the configuration as shown in drawings.
2. Seat width combinations shown on drawings may be revised by the Contract only if warranted by actual field dimensions and if approved by the Architect. The Contractor shall submit proposed revisions for review, and any changes should attempt to preserve the following (in descending order of priority):

a. Seats shall stagger in the center seating sections.
b. All row ends shall be aligned at aisles.
c. Seat counts shall be maximized. No row shall have more than 2 chair sizes, and these sizes shall not be more than 1” different.

C. The seating shall be provided with seat uplift devices in order to provide the required passing width in the seating rows.

1.6 CHAIR DESIGN CRITERIA

A. The overall depth of the telescopic rows and the front-to-back envelope dimension of every chair with the seat having risen without assistance shall comply with building code for clear passing widths.
B. Structural Performance:

1. Engineer, fabricate and install telescopic Platform seating systems to the following structural loads without exceeding allowable design working stresses of materials involved, including anchors and connections. Apply each load to produce maximum stress in each respective component of each Platform seat unit.

a. Design Loads: Comply with NFPA 102, 2016 Edition, Chapter 5 for design loads, ICC 300 – 2017, as well as DSA IR 16-5.

C. All submittals shall be prepared for structural review by the CA Division of the State Architect as “deferred approval” items. As such complete shop drawings and relevant calculations shall be filly engineered and bear the stamp of a Structural Engineer licensed in the Sate of CA.
D. Seismic Criteria:

1. Systems shall be designed such that any additional support or bracing required upon deployment shall be integral to the deployment mechanism and shall not require the manual installation of additional bracing or additional attachment to the floor structure.

a. Manufacturer to provide automatic, mechanically deployed seismic anchorage pins from top row of unit to structure above in both the deployed and retracted positions.

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E. Manufacturer's System Design Criteria, and as required by applicable codes:

1. Platform seat assembly & design to support and resist, in addition to its own weight, the following forces:

a. Live load of 120 lbs per linear foot on seats and decking
b. Uniformly distributed live load of not less than 100 lbs per sq. ft. of gross horizontal projection.
c. Parallel sway load of 24 lbs. per linear foot of row.
d. Perpendicular sway load of 10 lbs. per linear foot of row.

2. Hand Railings, Posts and Supports: Engineered to withstand the following forces applied separately:

a. Concentrated load of 200 lbs. applied at any point and in any direction.
b. Uniform load of 50 lbs. per foot applied in any direction.

3. Guard Railings, Post and Supports: Engineered to withstand the following forces applied separately:

a. Concentrated load of 200 lbs. applied at any point and in any direction along top rail.
b. Uniform load of 50 lbs. per foot applied horizontally at top rail and a simultaneous uniform load of 100 lbs. per foot applied vertically downward.

F. Member Sizes and Connections: Design criteria (current edition) of the following shall be the basis for calculation of member sizes and connections:

1. AISC: Manual of Steel Construction
2. AISI: Specification for Design of Cold Formed Steel Structural Members
3. AA: Specification for Aluminum Structures
4. NFOPA: National Design Guide For Wood Construction.

G. Chairs

1. Seats:

a. Seat shall be tested and professionally certified through an independent testing laboratory to support and withstand an evenly distributed 600 lb static load without failure or irregularities that would impair usefulness.
b. Self-lifting seat shall be tested and professionally certified through an independent testing laboratory to withstand 350,000 operating cycles without failure of seat mechanism or measurable component wear.
c. Seat shall be tested and professionally certified to withstand 10,000 impacts of a 40 lb sandbag dropped on the center of the seat from each of the following heights: 6", 8", 10", and 12". The rate of impacts shall be approximately 18 per minute with the total quantity of impacts equaling 40,000.

2. Backs:

a. Back shall withstand an evenly distributed front or rear static load of 450 lbs.

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b. Back shall be tested and professionally certified to withstand, without failure, 40,000 swinging impacts each to the front and rear of the back by means of two opposing 40 lb. sandbags. The sandbags shall be moved horizontally and equally for 10,000 cycles each at the following distances of 6", 8", 10", and 12" at a rate of 35 cycles per minute.
c. Back shall withstand, without failure, an evenly distributed Horizontal Traverse Static Load of 200 lbs. The load shall be applied to the top of the back at a 45-degree angle to the row of seats.

3. Armrests shall be tested and professionally certified to withstand, without failure, a 200 lb. static load applied both perpendicular to and vertically down on the arm.
4. Materials shall satisfy applicable test, codes, standards, or requirements for flammability as follows:

a. Copolymer polypropylene shall have a burn rate of 1 inch per minute or less per ASTM 635.
b. Upholstery materials shall meet requirements as set forth in the state of California Bureau of Home Furnishings Technical Bulletin 117-2013.

1.7 SUBSTITUTIONS

A. There shall be no substitutions unless approved prior to acceptance of bid by owner's representative.

1. Product and component substitutions from basis of design manufacturer shall be submitted for review.
2. Contractor shall provide the following information for review for any alternate manufacturer.

a. Product information including brochures, cut sheets and standard technical details.
b. Submittal drawings from previous projects showing materials and construction of platforms and understructures, similar products and conditions to those specified, technical details of seats, attachment and construction of seats and mounting base, railings, closures and any other information required to fully explain the system.
c. A letter detailing any deviations from the specification. If information regarding deviations is not disclosed, it will indicate that the product is in compliance with the specification. No undisclosed deviations will be accepted during the submittal process.
a. Any information required to prove compliance with section 1.10 below.

B. The owner's representative shall have 10 working days to review product information.

1.8 SUBMITTALS

A. Submittals shall be made in accordance with Division 1.
B. Submittals shall be made in a timely fashion so as to not affect the project schedule and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.

C. All submittals shall be prepared for review by the California Division of the State Architect as "deferred approval" items. As such complete shop drawings and relevant calculations shall be fully engineered and bear the stamp of a Structural Engineer licensed in the state of California.
D. Submittals shall be reviewed, and field dimensions verified prior to commencing acquisition for, and fabrication of the work in this section. All services and parts of the work in this section shall be verified through the submittal process. Approval does not relieve the Contractor of the responsibility of providing equipment in accordance with the specifications.
E. Shop Drawings:

1. Submit scaled shop drawings that show the following:

a. Telescoping mechanism in its entirety, including seat heights, row spacing and rise, aisle widths and locations, assembly dimensions, anchorage to supporting structure, seismic pins, material types and finishes.
b. Detailed seating layout with every seat width indicated
c. Verified field dimensions
d. Required clearances for seat light J-boxes and motor connections.
e. Clear aisle dimensions and exact placement of aisles, in the coordination of other trades. Provide other required clearances
f. Inventory of seat widths required and provided
g. Finish and accessory schedule
h. Contractor shall assume complete responsibility for the accuracy of all chair measurements and field dimensions shown on the shop drawings.
i. Details, product information and Location of all electrical boxes to be mounted to the building.

F. Product Data:

1. Submit data sheets for standard component parts, which shall include all information necessary to verify compliance with this Section.

G. Deviations:

1. List of deviations from these project specifications as described above in section 1.7.

H. Samples:

1. Submit Selection cards for the following:

a. Metal finish selection card.
b. Plastic finish selection card.
c. Wood finishes selection card.
d. Fabric selection cards.
e. Carpet samples for selection

2. Submit real samples of any of the above upon request.

a. Metal, plastic and wood sample chips shall be 2"x2" minimum
b. Fabric and carpet samples shall be 12" x 12" minimum.

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I. Mock-up:

1. Chair

a. Upon review and approval of the shop drawings, data and selection of finishes, provide one complete and operating dual chair mock-up on a solid base.
b. Mock-up shall demonstrate all finishes as selected.
c. Mock-ups shall include one seat of the smallest type in the project and one of the largest.

2. Railing

a. Provide one complete guardrail and one complete handrail of each type in the project.
b. Include hinge and base attachment.

3. Platform step

a. Provide mock-up showing platform intermediate step complete with nosing and working aisle light.
b. Mockup shall have carpet.

4. All components of mockup above shall be attached to a small section of the platform with carpet and shipped folded as a complete singular mockup unit.
5. Mock-up shall be reviewed and approved prior to commencing acquisition for, and fabrication of the work in this section, and shall be retained as a model for comparison to the final installation.
6. All costs for shipping of the mock-up to the to the job site shall be borne by the Contractor. Following approval of the finished installation, the mock-up shall be turned over to the Owner.

J. Certification of Flame Proofing or Flame Resistance: Submit certification, recommendations and instructions for laundering of specific fabrics and maintenance of entire installation.
K. Record Documents:

1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Within 30 days, submit six copies of “as built” submittals including shop drawings, product data, and care and maintenance instructions and warranty documents.

1.9 WARRANTY AND SERVICE

A. Warranty shall provide coverage of material defects, assembly workmanship and installation for a period of five years following the date of acceptance by the Owner.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor.
C. Provide service visits to inspect and adjust the system as required 2 months and 12 months after acceptance by the owner. Service visits shall include a 1-2 hour training/discussion session with the owner.

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1.10 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty suppliers and manufacturers meeting the qualifications listed herein.
B. Specialty suppliers and the individuals responsible for installation in the field shall have been continuously engaged in the sales and integration of telescopic platforming and seating equipment similar to that specified herein for a minimum of ten years and shall have completed at least ten installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.
C. Specialty suppliers shall maintain bonds in the amount required for the project.
D. Specialty manufacturers responsible for engineering and manufacturing shall have been continuously engaged in the engineering and manufacturing of telescopic platforming and seating equipment similar to that specified herein for a minimum of ten years and shall have provided equipment for at least fifty installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.
E. All equipment shall be UL listed and bear the appropriate labels.

1.11 DELIVERY, STORAGE AND HANDLING

A. Materials shall be packed for shipment by personnel qualified in seating installations and shipping. Packing shall prevent damage to the chairs during transit. Costs to repair or replace all chairs damaged during the course of the contract services shall be borne by the Contractor.
B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.
C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

1.12 PROJECT CONDITIONS

A. Contractor shall examine the work in place to ensure their manufacturing and services properly reflect the field conditions.
B. Defects in the field which may impact the work in this Section shall be reported to the Architect and corrected in accordance with the requirements of the applicable Section of work prior to commencement of the work in this Section.

1.13 MAINTENANCE

A. Provide the following spare parts from the same production run as the installed chairs:

1. Spare seat and back covers in a quantity equal to 5% of chairs provided, prorated to sizes of chairs used.
2. Spare LED strips for aisle lights in a quantity equal to 10% of the aisle lights installed.
3. 1 spare railing
4. 2 spare handrails
5. 1 spare seat back or each size, fully upholstered
6. 1 spare seat bottom of each size fully upholstered
7. 2 spare seat mounting arms

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8. Any other manufacturer recommended spare parts

B. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner.

PART 2 - PRODUCTS

2.1 SPECIALTY MANUFACTURERS AND SUPPLIERS

A. The Contractor must have been engaged in the fabrication and installation of equipment of the type indicated herein for no less than 5 full years, with a minimum of two completed relevant installations in the United States at time of bid.

B. The following production systems specialty manufacturers may furnish equipment for the work in this section:

Hussey Seatway
Wiltshire, UK
Represented by Norcon Industries
7717 North Riverwood Way
Eagle Mountain, UT 84005
Contact: Tim Norris, Trevor Nebeker
Tel: (480) 839-2324
Email: tim@norconindustries.net; trevoen@norconindustries.net

Audience Systems
Westbury, Wilshire, BA13 4 JP
United Kingdom
Contact: Jemma Gunning
Tel: (269) 349-1521
Email: jgunning@audiencesystems.com
Represented by Titan Carter Platform Systems
Contact: Walter Dalla Riva
Tel: (905) 301-6712
E-mail: wdallariva@titancarter.com

Jezet Seating
Siberiëstraat 10
3900 Overpelt
Belgium
North American Office:
7140 Albert Einstein
Montreal, QC
H4S 2C, Canada
Contact: Carlos Seara
Tel: (305) 450-1763
Email: carlos@jezet.com

Master Industrie
1 Rue Laennec
85130 La Verrie
France
North American Office :
205 SE Spokane Street, Suite 300
Portland, OR 97202
Contact: Jean Baptiste Cordon
Tel: (503) 984-5904
Email: jbcordon@master-industrie.com

2.2 GENERAL

A. Provide and install all seating and seating components complete with all necessary accessories as described herein.

2.3 MATERIALS

A. In all cases where a device or a part of equipment is referred to in a singular manner within the Contract Documents, it is intended that such a reference shall include all devices required to complete the installation in accordance with the Contract Documents.
B. All Variations from the specified materials and product must be approved by the owner.
C. Fire Performance Characteristics:

1. Flame retardant performance: Upholstery components and the assembly thereof shall be in conformance with flammability standards as set forth in California Technical Bulletin #117-2013.
2. Padding: Provide new (prime manufacture) polyurethane foam with an average burn length not exceeding 8” and average flame time after removal of flame source not exceeding 15 seconds after falling, when tested vertically in compliance with Federal Test Method Standard 191, Method 5903.2.
3. Fabric: provide fabric complying with 16 CFR Part 1610 Class I, State of CA Tech. Bulletin #117-2013 Section E (CS-191-53)
4. Certificates: Certificates shall be provided by manufacturer attesting that the materials provided for theatre seating meet the above fire performance requirements.

D. Gray Iron Castings: ASTM A48, Class 25.
E. Steel Plates, Shapes, and Bars: ASTM A36
F. Steel Sheets for Baked Enamel Finish: ASTM A591, commercial and drawing quality; Class C, galvanized – bonderized; 20-gauge minimum unless otherwise indicated.
G. Expansion Bolts: FS FF-B-588; Type, Class, and Style as recommended by the chair manufacturer.
H. Concealed Plywood: PS 1/ANSI A199.
I. Finish for all exposed metal parts shall be per schedule 12 61 23 A, below.
J. Finish for all exposed plastic parts shall be per schedule 12 61 23 A, below.
K. Seat and inner back upholstery fabric shall be per schedule 12 61 23 A, below.
L. Carpet shall be per schedule 12 61 23 A, below.
M. Fascia/Toe Boards shall be per schedule 12 61 23 A, below.
N. Cushions

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1. Both seat and back cushions must be made of open cell polyurethane foam.

O. Fabrication

1. Fabricate all work in the section in accordance with the owner's direction, specifications, approved shop drawings, pertinent project drawings, established trade practices and applicable code requirements.
2. Machine finish all operating pars to standard trade tolerance, fits and finishes.
3. Carry out shop welding in full accordance with the appropriate sections of "Specifications for the Design, Fabrication and Erection of Structural Steel Buildings" of the American Institute of Steel Construction (AISC).

2.4 TELESCOPIC PLATFORMS

A. Wheels: Minimum 6" diameter with 1-3/8" non-marring soft rubber face, designed to protect wood, synthetic, or carpet tile floor surfaces. Hard faced wheel treads or smaller wheels will not be acceptable.
B. Telescopic Bases: Fitted with not less than 6 wheels under each moving row.
C. Columns: Tube steel of high tensile steel fitted with wide-based diagonal braces to meet design conditions. The columns shall be supported by a full welded gusset from columns to caster horns.
D. Row interlocks: Interlocks shall be provided to adjoin row structures by means of interacting steel connections, and there shall be automatic locks on all rows in all sections.
E. Row Levelers: Leveling devices shall be provided at the front of each row at platform ends.
F. Decking:

1. Shall be fabricated from fully welded tube steel frames with Plywood sheeting and carpet finish.
2. Plywood

a. Plywood sheeting shall be screwed to steel frames at all edges and cross supports with screws on a minimum 6" spacing.
b. /Plywood shall be 7/8" nominal minimum, with exterior glue, all plies Group 1 plugged crossband under face, produced in conformance with PS-1-74 of the National Bureau of Standards.

3. Plywood shall be screwed or through bolted to deck stiffeners, doublers, and frame cantilevers for structural integrity, including transmittance of sway forces to the understructure.
4. Frames

a. Frames shall be fully welded. Bolted connections are not acceptable.
b. Front, rear and exposed side frames shall be tube steel.
c. Decking shall have steel frames spanning in the front to rear direction, welded to steel perimeter frame.
d. Spacing shall not exceed 32"
e. All plywood seams shall be supported by steel framing, no exceptions.
f. Deck supports shall underlie the decking, providing added stiffness and attachment.
g. If mid-aisle handrails are provided. A steel frame shall be provided to support all mid-aisle handrail attachment sleeves.

5. Decking and deck supports shall form a rigid closed deck structure providing positive containment. Deck structure shall be fabricated leaving no opening such that any major human extremity of other items could pass, accidently of deliberately.
6. Decking shall be delivered to the site fully assembled in undivided sections.

    a. Decking may be subdivided only when required for shipping or for installation into the site due to reasonable install path of travel restrictions.
    b. If segmented decks are required, sections shall be welded once assembled.
    c. Segmented decks shall have seams concealed fasteners.

7. Cover decking in carpet.

    a. Carpet may be installed on site to conceal seams from decks delivered in segments.

G. All welds shall be made at the factory by welders that are certified on the equipment and process used.
H. Moving rows shall be equipped with a single molded resin component guide to ensure ease of operation and provide alignment augmentation. Frames shall be interlocked at top and bottom.
I. Fasteners: All structural connection that are not welded shall be made with S.A. E. stress rated bolts and self-locking nuts.
J. Telescopic platforms shall not be required to attached to the floor at any location forward of the leading edge of the storage position. Pins, tie-down bolts, or other forms of forward floor attachment shall not be acceptable. Pins to structure at the rear / top row of fully tracking units are acceptable, provided they automatically interlock to the structure upon platform deployment and storage, and do not require manual actuation.
K. It is in the scope of this section to coordinate any required connections to the building structure.
L. Finish of structure:

    1. Steel: Understructure abraded, cleaned, electrostatically sprayed and finished with low gloss baked enamel.
    2. Steel nosing/risers finished with corrosion resistant bronze anodized finish zinc alloy plating.

2.5 SIDE CLOSURE PANELS

A. Provide Closure panels at the sides of each row.

    1. Panels fabric shall be per schedule 12 61 23 A, below.
    2. Panels shall be attached to the sides of the seating bank and shall not be removed for telescopic seating operation.
    3. Panels shall not abrade each other or surrounding wall finish and shall not bind during unit operation.
    4. Panels shall have a sewn bottom pocket to hold a jack chain counterweight. Chains shall be one continuous length per pocket.
    5. Panels shall have grommits at 6” on center across the top hem, which shall ride on a rod attached to the underside of the telescoping platform. The leading edge shall be solidly attached to the front of its riser platform. A black elastic shall attach the trailing end of each drape to the riser platform above it.

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2.6 ELECTRICAL, MOTOR AND CONTROL

A. Motor

1. Integral automatic “frictionless” propulsion system to open and close telescopic seating to be supplied. Motors to be supplied with a minimum of 1 motor per each section width.

B. Provide all electrical components and connection boxes from the point of building power connection to div 26 electrical for installation.

1. Provide receptacles, back boxes and disconnects as required.

C. Control

1. Unit shall be self-guiding and shall not require operation of multiple motors for course adjustment.
2. Provide pendant for control of seating unit.

a. Unit must operate on a single pendant with a single button control. Operation of multiple pendants or buttons shall not be acceptable.

3. Electrical system to include open/close, and intermediate stop limit switches with operation by pendant control.

a. If seismic pins are required, the electrical control system shall automatically deploy and retract these pins when the top row is moved.

4. Pendant control receptacle to be mounted in the riser of the first row behind a hinged panel with a locking cover to prevent unauthorized access and shall be single outlet for both forward and reverse folding.
5. Operation
6. Safety

a. Provide a visible alarm, such as a strobe light, which shall be placed on the rear wall under the unit and shall operate when the unit is moving.
b. Provide a mushroom style emergency stop button on the rear wall under the unit.

2.7 AISLE LIGHTING

A. Fixture

1. Provide UL approved aisle lighting fixtures for installation under the nosing of each riser. Fixture color temperature shall be between 2500K and 3000K.
2. Fixture shall be protected from damage or breakage by a heavy-duty lens designed to take the load of an adult up to 400#

a. Lens shall be angled to meet requirements of stair nosing code.

B. Provide transformers for aisle lighting in quantities as required.

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1. Transformers shall be provided in a labeled wall mount box and located in the Control Booth to prevent transformer noise from disturbing the audience.
2. Coordinate mounting location with electrical contractor and electrical drawings.
3. Provide junction box with terminal strips for termination connection of aisle lighting behind seating unit.
4. Provide wall mount box with dimmers in quantity necessary for aisle lights. Dimmer shall control setting of aisle lights and shall be manual. Wall mount box may be located either before or after transformers as necessary. Provide in box with labeled locking cover.

C. Aisle lighting shall be configured in zones or on relays such that the aisle lighting in a row will not activate unless that row is deployed.

2.8 GUARDS, HANDRAILS, AND RAILINGS

A. General

1. Guard, handrail, and railing materials and finishes shall be per Schedule 12 61 23 A, below.

    a. All welds on metal guards, handrails, and railings shall be clean and deburred.

2. Guards and handrails shall meet all code and safety regulation as required by local, state and national code as well as by OSHA and CalOSHA and federal law including the Americans with Disabilities Act (ADA).

    a. Guards and rails shall be engineered to strength and resistance in all directions required.
    b. Openings shall meet code and regulatory minimum dimensions.
    c. All members shall meet graspability requirements per code and federal law.

B. Side Folding Guards

1. Provide folding rails at row ends. Rails shall fold over seats and /or aisle steps and shall store beneath the platforms. Guardrails which need to be removed prior to seat storage shall not be acceptable.
2. Side Guards Integral Handrails

    a. Handrails shall be integrated into side guards.
    b. Handrails shall be 34” and 38” tall measured above the riser nose as required by code.
    c. Handrail shall lock into attachment base and be installed or removed for storage position without the use of tools.

C. Front folding railings

1. Provide front railings to protect the edge condition when loose seats are not used on the flat floor.
2. Front railings shall mount to the platform deck and shall fold over the seats for storage.

    a. Railings shall be 30” tall measured from the deck of the first telescopic row.
    b. Railings may be shorter than 30” to allow for folding but shall not be less than 24”.

c. Railing shall extend across the full width of the first row, except the clear aisles.

D. Design of guardrails/handrails shall comply with all local codes with respect to dimensional attributes, handrail grasp ability and diameter/section.

2.9 UPHOLSTERED CHAIRS

A. General:

1. The chair seating system shall be comprised of a system of individual chairs on stanchions with lock/release foot pedal devices.

   a. Beam mounted seats are acceptable up to maximum gangs of (4) four chairs.

2. The dimensional and physical characteristics of the seating and the seating plan shall be in accordance with applicable codes, applicable contract documents and the following specifications.
3. Seats and back shall have internally supported peripheral heavy gauge steel frames. The frames shall support, resist and transmit design loads to the rectangular steel chair stringer without excessive deflection of noise.
4. Chairs shall fully fold for storage between platform decks and shall be supported on gas struts.

B. Seats:

1. Seats shall be finished per schedule 12 61 23 A, below.
2. Seats shall be cantilevered, self-centering, automatic full lift with over-center retract feature for ease of row passage and janitorial access.
3. Provide heavy-duty steel hinges of compensating type, each equipped with noiseless adjustable seat lifting device; provide for each rotation on bushings which do not require lubrication and have a positive internal return stop of rubber or neoprene. Gravity pivots are an acceptable alternative.
4. Seats to be upholstered with a molded, open-cell foam cushion, minimum 2”.

   a. Seat Back shall be 2” of additional foam at lower portion for lumbar support.

5. Fabric covering sewed into box construction with welts and securely attached without use of track, screws, or clips.

C. Backs:

1. Fabricate back as padded, upholstered component.
2. Any exposed fasteners shall be black, tamper –proof hardware.
3. Chairs will lock rigidly into use position without excessive movement once they are in the use position. Chair stringer shall serve as the focal attachment and shall in turn transmit all forces to the standards.

D. Chair Stanchions:

1. The chair stanchions shall be fabricated of continuously welded, closed seam steel tube.

2. Each stanchion will engage in a pivot receiver support bracket mounted directly to the floor structure of the platform. Each chair module will be supported on a single stanchion. The pivot bracket shall automatically lock the chair in the upright use position and shall not unlock unless the stanchion foot pedal is depressed.
3. Stanchion finish shall be as described for Exposed Metal parts in Schedule 12 61 23 A, below.

E. Arm Rests:

1. Provide arm rests at each aisle and between chairs, designed for concealed mounting to the chair stanchion assembly.
2. Finish of armrest shall be per Schedule 12 61 23, below.

F. Row and Seat Identification:

1. Provide plates with etched characters for row and seat identification system as shown in the drawings.

a. It is the responsibility of the contractor to request a number and letter scheme if one is not provided in the drawings.

2. Seat ID number plates shall be affixed to the seat pan and shall be secured with 2 fasteners.
3. Row identification tags shall be located as listed in Schedule 12 61 23 A, below.
4. Finish of plates shall be per Schedule 12 61 23 A, below.

PART 3 - EXECUTION

3.1 PERFORMANCE OF THE WORK

A. The installation is to be performed under the direction of a qualified installation superintendent representing and employed by the Contractor.

3.2 INSTALLATION

A. There shall be no gaps between edges of steps or rows and chair components that would cause a trip hazard greater than 3”.

3.3 ADJUSTING AND CLEANING

A. All work is to be inspected, adjusted as necessary, and cleaned. Touch-up finishes to restore damage or soiled surfaces.
B. Remove from the jobsite all debris and packing materials and dispose of legally.

3.4 DEMONSTRATION

A. Installed seating shall be operated for observation and approval by the Owner’s Representative. Contractor shall make necessary adjustments as required.

B. Final observation shall be scheduled according to the project schedules and based on the availability of the Architect. Contractor shall provide a written declaration that the project is completed and ready for final review.

1. Costs for re-observation due to the Owner's Representative having deemed the installation incomplete and/or the work having been found not in compliance with the specifications shall be borne by the Contractor. These costs include, but are not limited to hourly consulting fees including travel time, travel and other expenses related to the re-inspection.

C. Training

1. Provide training to the owner on the basic use and care of the system.
2. Training shall cover:

a. Use, procedures and safety precautions.
b. Operation of all components.
c. Basic repair and maintenance including motors, controls, aisle lighting and alignment.
d. Trouble shooting and realignment.

3.5 APPENDIX

A. 126623A : Seating System Attributes

PART 4 - BASIS OF DESIGN PRODUCT

A. Basis of design platforming system shall be: Hussey Seatway TP

1. Or equal

B. Basis of design chair shall be: Hussey Seatway Gallery 3

1. Or equal

4.2 CHAIR FINISHES

1. Upholstry Fabric: As described below
2. Back Panel Material: Upholstered inner; stained plywood outer back
3. Under-Pan Material: Fully upholstered
4. Armrest Material: stained hardwood
5. Stain: selected from standard line
6. Finish: selected from standard line

4.3 UPHOLSTERY FABRIC

A. Upholstery fabric shall meet the following requirements:

1. Quality – The finish goods are to be graded “First Quality”. This precludes the use of seconds or of 1st run seconds. No flaws, piercing, or discoloration will be accepted.
2. Width of fabric: 57”
3. Weight: 14.4oz per linear yard
4. Fabric: 77% wool; 12% nylon, 6% acrylic, 5% linen
5. Cleanability: mild, water-free dry cleaning solvent
6. Color Fastness to Light: 40 hours
7. Surface Abrasion: 100,000 double rubs, minimum
8. Flame Resistance (meet or exceed):

a. State of California Technical Bulletin #117-2013

B. Color and style:

1. Manufacture: Maharam
2. Style: Rowan
3. Color: selected from standard line

4.4 EXPOSED METAL EXCEPT HANDRAILS AND GUARDRAILS

A. Metal parts visible from the front, top, sides, or underside of the telescopic seating unit, and any parts visible on the chair shall be:

1. Color: Black

4.5 GUARDS, HANDRAILS, AND RAILINGS

A. Handrails and Guardrails shall be:

1. Material:
2. Design: Guards, Handrails, and Railings shall be from manufacturer's standard line as selected by architect.

    a. Provide edge framing of 3/16"x2" flat steel bar.
    b. Lower portion of the railing shall be:
        1) Perforated metal sheet
        2) Top edge shall be 30" measured above the riser nose of each platform deck and intermediate step.
        3) Upper portion shall be a series of 1.25" round steel tube or bar spaced evenly and set at 34", 38" and 42" above the riser nose of each platform deck and intermediate step.
        4) Front railings shall not have upper round tubes or bars.

3. Finish:Matte or Semi-gloss
4. Color:black

4.6 EXPOSED PLASTIC

A. Exposed plastic parts on the telescopic seating unit and chair shall be:

1. Color: Black

4.7 CARPET

A. Color and style:

1. Manufacture: As selected by architect from platform manufacturer's standard line.
2. Style: As selected by architect from platform manufacturer's standard line.
3. Color: "Charcoal"

4.8 FACIA / TOE BOARDS

1. Fascia panels and toe boards shall be stained plywood.
2. Species: manufacturer's standard
3. Stain: Match Architect's sample
4. Finish: Match Architect's sample

4.9 SIDE CLOSURE PANELS, FABRIC

A. Fabric side closure panels shall be:

1. 22oz IFR velour, installed nap down.
2. Color: Black

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4.10 ROW AND SEAT IDENTIFICATION

1. Provide all aisles with row ID plates, with minimum ½" letters.

    a. Plates shall be inset in carpet
    b. ID plate shall be finished in brushed aluminum with black Raleway characters.

2. Provide all seats with ID numbers, with minimum 5/16" numbers.

    a. Seat ID number plate to be installed on the underside of the seat pan, centered left to right and 1" down from the lip of the pan.
    b. Seat ID number plate to be finished in brushed aluminum with black Raleway characters.

END OF SECTION

SECTION 23 00 01 - HEATING, VENTILATING AND AIR CONDITIONING

PART 1: - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

A. The General Mechanical Provisions, Section 23 00 00, shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
1. Air distribution system.
2. All equipment as shown or noted on the drawings or as specified. Furnish motor starters except where motor control centers are used. Coordinate with Division 26.
3. Circulating water system.
4. Refrigeration system.
5. System energy balance.
6. Coordinate with Section 23 09 23 (Direct Digital Control and Energy Management System) regarding location and installation of system sensors and to provide simultaneous start-up.
7. Coordinate and cooperate with commission agent as required by Section 01 91 13.
8. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, ductwork, braces, supports, housekeeping pads, temperature controls and related items no longer required.

B. Work Specified Elsewhere:
1. Line voltage power wiring, motor starters in motor control centers, disconnect switches and installation of all starters are included in the Electrical Section, unless otherwise noted.
2. Connection of gas, condensate drains and domestic water to equipment.
3. Concrete and reinforcing steel unless specifically called for in the drawings or specifications.
4. Painting unless specifically called for in the drawings or specifications.
5. Carpentry.
6. Direct Digital Control and Energy Management System (DDC/EMS).

PART 2: - PRODUCTS

2.1 PIPING MATERIALS:

A. Hot or Chilled Water Piping:
1. Above Grade:
a. 2" and Smaller: Schedule 40 black steel pipe, ASTM A53. 150 psi black malleable iron screwed fittings, ANSI B16.3.

b. 2-1/2" Through 4": Screwed pipe as above -OR- welded or grooved pipe as below.

c. 6" and Larger: Schedule 40 black steel pipe, ASTM A53. Standard weight carbon steel welding fittings, long radius ells, ANSI B16.9. Joints may be grooved pipe unions, EPDM gaskets. Grinnell, Gruvlok, Victaulic.

2. Underground Chilled and Hot Water Piping:

a. General: Underground chilled and hot water lines shall be Ferro-Therm, as manufactured by Thermacor Process. All straight sections, fittings and other accessories shall be factory-fabricated to job dimensions. Each system layout shall be computer-analyzed by the piping system manufacturer to determine stress on the carrier pipe and anticipated thermal movement of the service pipe. The system design shall be in conformance with ANSI B31.1. Provide manufacturer's shop drawings with dimensioned piping layout and details of all expansion fittings, elbows, building entry points and all other pertinent information needed to verify that the type of materials being offered is in accordance with the specifications.

b. Jacket: Seamless high density polyethylene (HDPE) in accordance with ASTM D1248, Type 3, Class C. Minimum jacket thickness shall be 125 mils.

c. Carrier Pipe: ASTM A-53, Grade B, electric-resistance welded black steel with beveled ends for field welded joints. Schedule 40. Butt welding fittings shall conform to ANSI Standard B16.9.

d. Insulation: Polyurethane foam completely filling the annular space between the carrier pipe and the outer jacket to a minimum thickness of 1.38 inch. The in-place density shall be 2 pounds per cubic foot; the thermal conductivity factor shall be 0.15 BTU/(Hr.)(Sq. Ft.)(°F/In.); and shall have a closed cell content of 90%. Exposed insulation at unit ends shall be sealed with factory applied high temperature elastomer vapor barrier sealant.

e. Fittings: Fittings shall be factory fabricated and preinsulated with polyurethane foam insulation. The insulation shall be protected with a 1-piece, seamless, molded HDPE jacket of the same type, thickness and quality as that of the straight units of preinsulated pipe. Field fabrication, alteration or insulation of fittings is not permitted.

f. Expansion Fittings and Elbows: Prefabricated expansion fittings, elbows and tees shall be furnished and installed where shown. Preinsulated fittings that must provide compensation for pipe expansion and/or contraction shall be externally insulated with flexible polyurethane foam insulation. The straight units adjoining expansion fittings shall also be insulated with flexible polyurethane foam insulation to the extent shown on the drawings. Expansion fittings and elbows shall be properly

designed in accordance with stress limits indicated by ANSI B31.1 Code for Pressure Piping. The pipe manufacturer shall furnish pipe stress calculations and expansion details stamped by a registered professional engineer showing that the piping design meets this code.

3. Valves and Specialties:
   a. Valves:
      (1) General: Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Milwaukee, Nibco, Stockham, Walworth, as well as Grinnell, Gruvlok and Victaulic for grooved joint systems, are acceptable. All valves of a particular type or for a particular service shall be by the same manufacturer. Butterfly valves may be substituted for 2-1/2" and larger gate valves above grade; see specification below.
      (2) Gate Valve: Provide 2" extension necks at insulated pipes, where required. 2" and Smaller: All bronze. Rising stem. Union bonnet. Wedge disk. Screwed connection. Malleable iron handwheel. Class 125. Nibco T-124. 2-1/2" and Larger: Iron body, bronze mounted. Non-rising stem. Resilient wedge. Class 125. Flanged or AWWA hub end as applicable. Nibco F-619-RWS. Underground valves shall have square operating nut. Provide one operating "T" handle for underground valves.
      (3) Butterfly Valve: Iron threaded lug body. Aluminum bronze disk. O-ring seals. Resilient, removable seat. 416 stainless steel shaft. 6" and smaller valves shall have multi-position lever handle. 8" and larger valves shall have gear operator. Provide 2" extension neck at insulated pipes. Demco Series NE, Grinnell, Stockham.
      (4) Plug Valve: Eccentric bronze or nickel plated semi-steel plug, semi-steel body, bronze bushings, Buna-N-rings. 175 psi WOG. KeyPort Valve Series 400.
      (5) Check Valve: Non-slam, lift type. Replaceable bronze seat, disk and bushings. Stainless steel helical spring. Disk guided at top and bottom. Flow area through valve shall exceed cross sectional area of pipe. 150 psi WOG. CPV, Mueller Steam Specialty. 2" and Smaller: Shall be screwed brass with hand lapped bronze disk. 2-1/2" and Larger: Shall be iron body, wafer or flanged with resilient Buna-N or TFE facing on seat.
      (6) Ball Valve: Full port. Bronze body, cap, stem, disk and ball. Screwed connection. Lever handle. TFE seat. O-ring seals. 300 psi WOG. Apollo, Nibco, Jomar.
      (7) Globe Valve: All bronze. Renewable TFE disk. Screwed connection. Malleable iron handwheel. Union bonnet. Class 150. Stockham B-22.
      (8) Valve Box: Pre-cast reinforced concrete. Cast iron lid marked for services. Christy F22 in foot traffic areas; G5 in roadways.
   b. Instruments:
      (1) Pressure Gage: Phosphor bronze tube. Bronze bushed. 1% accuracy. Cast aluminum case. 3-1/2" white dial. Adjustable pointer. Operating pressure at midscale. 1/4" NPT brass socket.

Provide brass porous core pressure snubber and gage cock. Trerice, Weksler, Winters.

(2) Thermometer: 3" dial. Stainless steel case. Back or bottom connected as required. 1/2" NPT. 20-240ºF, 2ºF divisions for hot water, 25-125ºF, 2ºF divisions for chilled water. 2" insertion length. Allowance to be made for insulation thickness. Marshalltown, Moeller, Taylor, Tel Tru, Winters.

(3) Thermometer Well: Brass well. Suitable for 3" dial thermometer above. Provide 2" extension at insulated pipes.

(4) Gage Cock: Lever handle brass cock. 1/4" NPT connections. Provide 2" extension at insulated pipes.

(5) Instrument Well: Suitable for temperature sensing element. Coordinate with supplier of temperature controls.

(6) Flow Switch: Paddle type. McDonnell No. FS4-3.

c. Miscellaneous Specialties:

(1) Pressure Relief Valve: ASME rated fully automatic, reseating pressure relief valve sized in accordance with energy input. Watts.

(2) Union: 2" and Smaller: AAR malleable iron, bronze to iron ground seat. 300 psi. Grinnell. Size 2-1/2" and Larger: Grooved pipe, synthetic gasket, malleable iron housing. Victaulic Style 77, type "E" gasket, Grinnell.

(3) Combination Reducing/Relief Valve: Iron body. Diaphragm operated. Brass internal parts. Reducing valve shall have a built-in strainer and check valve and have a field adjustable range of 10-25 psi and a 125 psi maximum working pressure. Relief valve shall be set at 30 psi. Bell and Gossett No. F-3.

(4) Balancing Cock: Calibrated all bronze balancing/shutoff valve or cock. Screwed connections. Memory stop. Position indicator. Drain connection. Taps for differential pressure gage, with check valves or shutoffs. 125 psi working pressure. Internal seals. Preformed insulation block. Armstrong, FlowSet by Flow Design, Inc., Grinnell, Tour and Andersson, Victaulic.

(5) Strainer: "Y" type, 125 psi. Machined seats. Stainless steel screens. Provide gate valve blowoff with hose threads. Bailey, Mueller Steam Specialty.
2" and Smaller: Screwed bronze body. Perforation size 0.057".
2-1/2" and Larger: Flanged iron body, perforation size as follows:

Pipe Size	Perforation Dia.
2-1/2" - 3"	1/16"
4" - 6"	3/32"
8" and Larger	1/8"

(6) Dielectric Coupling: Insulating union, flange or waterway fitting rated for 250 psig. EPCO, Clearflow.

(7) Suction Diffuser: Cast iron angle type body with inlet vanes and combination diffuser/strainer/orifice cylinder with 3/16" openings. Provide fine mesh start-up strainer (to be removed after 30 days of operation). Strainer free area to be not less than five times the sectional area of pump connection. Adjustable support foot, drain tapping and gage tapping. Bell and Gossett, Taco, Thrush.

(8) Expansion Tank: Pressurized diaphragm type or bladder type, as shown on drawings. Welded steel, ASME code construction with ASME stamp and certification, 125 psi, 240ºF. Sealed elastomer diaphragm or heavy duty butyl bladder. Pre-charged with air to initial fill pressure of system. Base or saddle as required for mounting. Removable access cover for bladder type. Sight glass for diaphragm type (hot water service only). Amtrol, Taco.

(9) Flexible Connection: 2" and Smaller: Screwed connection. Corrugated bronze core covered with high tensile bronze tubular braid. 150 psi working pressure. Flexonics, Keflex. 2-1/2" and Larger: Contoured, molded Teflon bellows. Minimum of three convolutions. Monel reinforcing rings. Limit bolts. Flanged connection. 100 psi working pressure. Belmont, Resistoflex. -Or- Multiple laminations of 321 stainless steel. 150 psi working pressure. Limit bolts. Flanged connection. Hyspan Series 5500.

(10) Air/Dirt Separator: Full flow coalescing type combination air eliminator and dirt separator. Separator shall be fabricated steel, rated for 150 psig working pressure, stamped and registered in accordance with ASME Section VIII, Division 1 for unfired pressure vessels, and include two equal chambers above and below the inlet / outlet nozzles. Unit shall include internal elements filling the entire vessel to suppress turbulence and provide air elimination efficiency of 100% free air, 100% entrained air, and 99.6% dissolved air at the installed location. The elements must consist of a copper core tube with continuous wound copper medium permanently affixed to the core. Internal coalescing elements consisting of plastic, perforated steel plate/tubes or loosely filled steel rings will not be accepted. Dirt separation efficiency shall be a minimum of 80% of all particles 30 micron and larger within 100 passes. Basis of design for the air eliminator / dirt separator shall be the Spirovent® Series VDT or VHT as manufactured by Spirotherm, Inc., Glendale Heights, Illinois or approved equal as noted*. Optional Series VDN or VHN by Spirotherm, Inc. shall include removable lower head for internal inspection if so noted on the drawings and schedule.

B. Condenser Water Piping:
1. 4" and Smaller: Schedule 40 galvanized steel pipe, ASTM A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3.
2. 6" and Larger: Schedule 40 black steel pipe, ASTM A53. Standard weight carbon steel welding fittings, long radius ells, ANSI B16.9. Joints above grade may be grooved pipe unions, EPDM gaskets. Grinnell, Victaulic.
3. Valves and Specialties: Same as for chilled water piping.

C. Refrigerant Piping: Hard drawn Type ACR copper, dried and capped, ASTM B280. Wrought copper fittings, silver alloy brazed, 1100ºF, Silfos.

D. Flue Piping:

1. Gas Flue Piping: AL29-4C alloyed stainless steel, double wall metal flue pipe. Factory fittings. UL listed to UL 1738. Heat Fab model Saf-T CI.
2. Flue Cap: Designed to properly ventilate flue regardless of wind direction. Storm proof, bird proof. Heat Fab.

E. Miscellaneous Piping Items:
1. Pipe Support:
a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendations. Felt liner for copper piping. Hanger and rod shall have galvanized finish. B-Line, Anvil, Unistrut.
b. Insulation Support: Calcium silicate insulation, 100 psi, or heavy density fiberglass, 100 psi. Insulation thickness equal to adjoining pipe insulation. Steel support shield or saddle. Provide vapor barrier for chilled water piping. Insulation and/or vapor barrier shall extend 1" beyond steel support. Pipe hanger in accordance with paragraph 1 above. Increase hanger size per manufacturer's recommendation. B-Line, Pipe Shields, Inc., Uni-Grip.
c. Isolating Shield: Galvanized steel shell and reinforcing ribs. 1/4" non-conducting hair felt pad. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Semco.
d. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Anvil, Unistrut.
2. Flashing: Flashing for piping through roof shall be prefabricated galvanized steel roof jacks with 16" square flange around pipe. Provide clamp-on storm collar and seal water tight with mastic. Maintain dielectric separation between copper and galvanized materials. For cold process built-up roof, material shall be 4 lb/ft2 lead instead of galvanized steel. For single-ply roofing, use the roofing manufacturer’s recommended flashing material.

2.2 PIPING INSULATION MATERIALS:

A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.

B. Pre-Molded Fiberglass: Heavy density sectional pre-molded fiberglass with vapor barrier laminated all service jacket and pressure sealing vapor barrier lap. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-ºF at a mean temperature of 50ºF. Perm rating 0.02, ASTM E96. Puncture rating 50 Beach units, ASTM D781. Provide 3" (min.) wide tape of same material as lap for butt joints. 1" thickness for chilled water piping. For hot water piping 140ºF and less, thickness shall be 1" for pipe sizes less than 1”, 1-1/2" thickness for pipe sizes 1" and larger. For hot water piping over 140ºF, thickness shall be 1-1/2" for pipe sizes less than 1-1/2”, 2” thickness for pipe sizes 1-1/2" and larger. CSG Insulation Corp., Knauf, Johns-Manville, Owens-Corning. See Title 24, Part 6 “California Energy Code” for temperatures above 250ºF.

C. Fiberglass Blanket: Unfaced, 1-1/2" thick. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-ºF at a mean temperature of 50ºF. Knauf, Johns-Manville, Owens-Corning.

D. PVC Jacket (for pipe, fittings and valves): Pre-molded polyvinyl chloride (PVC) jackets, 0.020" thickness. Size to match application. Provide solvent weld adhesive and PVC vapor barrier pressure sealing tape by same manufacturer. Zeston.

E. Reinforcing Mesh: 10 x 10 strands per square inch. Polyester or fiberglass. Mast-a-Fab, Vimasco Elastafab or Childers Chil Glas #10.

F. Vapor Barrier Coating: Childers CP-34, Foster 30-65. Permeance shall be 0.08 perms or less at 45 mils dry as tested by ASTM F1249.

G. Lagging Adhesive: Childers CP-50A MV1, Foster 30-36.

H. Aluminum Jacketing: Aluminum pipe and fitting jacketing, 0.016" thickness for straight pipe. 0.024" thickness for fittings. Integral moisture barrier. Stucco-Embossed finish. Provide pre-fabricated aluminum strapping and seals by same manufacturer. ITW or RPR.

I. Outdoor Weather Barrier Mastic: Childers CP-10/11, Foster 46-50.

J. Metal Jacketing/Flashing Sealant: Childers CP-76, Foster 95-44.

K. Insulating Tape: Ground virgin cork and synthetic elastomeric. Black, odorless, and non-toxic. K factor 0.43 Btu-in/hr-ft2-ºF or less. Non-shrinking. For outdoor use, provide protective finish by same manufacturer. Halstead.

L. Foamed Plastic: Rubber based elastomeric preformed pipe insulation. Thermal conductivity shall not exceed 0.27 Btu-in/hr-ft2-ºF at a mean temperature of 70ºF. 1/2" thick. Provide adhesive by same manufacturer. Armacell Armaflex.

2.3 DUCTWORK MATERIALS:

A. General: All ductwork materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50. Shall comply with 2019 CMC.

B. Metal Ductwork: Metal ductwork shall be galvanized sheet steel, lock forming quality, ASTM A-653, with gage and construction to match SMACNA Standard for pressure required (26 gage minimum).
   1. Moisture Bearing Exhaust Ductwork: Exhaust ductwork bearing moisture such as exhaust ducts from showers, dishwashers, clothes driers, etc. shall be constructed of aluminum sheets (unless shown otherwise on drawings), with gage and construction to match SMACNA Standard for pressure required.
   2. Grease Bearing Exhaust Ductwork: Exhaust ducts from Type I grease hoods shall be constructed in accordance with Chapter 5 of the California Mechanical Code with 16 gage galvanized steel or 18 gage stainless steel. All joints shall be made with a continuous weld. Exposed ducts shall be stainless steel.

C. Flexible Ductwork: Insulated flexible ductwork. One pound per cubic foot glass fiber insulation, 1-1/2" thick (R-6), 2” thick (R-8) where ductwork is outside the building thermal insulation envelope. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft^2-ºF at a mean temperature of 75ºF. Seamless metalized reinforced polyester vapor barrier jacket. Continuous internal liner bonded to galvanized steel wire helix. Duct shall be capable of continuous operation at 1-1/2" of positive water static pressure and 4,000 ft/min air velocity. Duct shall be capable of continuous operation at 1-1/2" of positive water static pressure and 4,000 ft/min air velocity. Steel connection collars. Duct shall comply with NFPA 90A. JP Lamborn.

D. Duct Sealants: All Joints Exposed to Weather: Sealant shall be G.E. "Silglaze II" or Silimax Multipurpose Silicone Sealant, without substitution. Joints Not Exposed to Weather: Fiber reinforced. White in color. Design Polymerics DP1030, Hardcast Versa-Grip 181, Hardcast CCWI-181. Joints Not Exposed to Weather and Exposed to View in Finished Areas: Non fibrated. Gray in color. Foster 32-19, Childers CP-146, Design Polymerics DP 1010, or United Duct Sealer WB.

E. Spiral Wound Metal Ductwork: Spiral wound factory fabricated galvanized steel, gages in accordance with the CMC. All fittings shall be factory fabricated. Fittings exposed to view shall have all seams fully welded. Tees and laterals shall be conical type. Connections to plenums shall be with bell-mouth fittings. 12" and smaller ells shall be two piece die-stamped. Ells larger than 12" shall be five piece. McGill Airflow. Shop fabricated fittings are not acceptable.

F. Underground Duct: Ductwork shall be closed cell plastic material that is recyclable, does not emit volatile organic compounds, and conforms to ASTM-D2412. Ductwork shall be resistant to mildew, mold (UL 181B), and radon gas (BSS 7239-88). Ductwork shall not rust or crack under external stress or strain. Ductwork shall have integral R-10 equivalent thermal insulation value, without the use of external insulation, per NSF's P374 Protocol and verified by a NSF Thermal Testing Report. Provide elbows, duct, diffusers, plenum, clamp & gasket, boots, saddle registers and caulk as required by drawings for underground installation. All joints shall be sealed via gasket or bolts and sealant. Clamps and gaskets shall be used on ductwork without flanges. Clamps shall be polyethylene with stainless steel plates and stainless steel screws. Gaskets shall comprise of ¼” thick butyl rubber sealant tape that is water and UV resistant and shall not stain. Gaskets shall comply with ASTM-E84 for flame and smoke spread. Flanged joints and duct branches shall use a co-polymer adhesive caulking sealant that is water and UV resistant. Flanges shall be connected with stainless steel bolts. Duct system performance shall exceed SMACNA’s Leakage Class 3 requirements at the system design static pressure. Complete duct system (including: plenums, round duct, run-outs, diffuser boots, etc.) must be from one manufacturer and be of the same material, construction and connection method throughout. Field made duct components are NOT acceptable. Include the complete underground duct system including plenums and diffuser boots. Unless otherwise noted, all duct and fittings shall be constructed per SMACNA’s Duct Construction Standards (+10 w.g.). Duct system shall carry a 10 year Limited Warranty. Duct system shall be installed by an AQC Industries’ trained installer. BlueDuct® by AQC Industries.

2.4 AIR TERMINALS AND DUCT FITTINGS:

A. Grilles: (Grilles, Registers, Diffusers and Louvers)

1. Information on Drawings: Refer to Grille Schedule on the drawings for the list of grilles. Manufacturer's model numbers are listed to complete the description Titus. Equivalent models of Anemostat or Krueger are acceptable. Refer to the floor plans for neck size, CFM, air diffusion pattern and fire damper, if required.
2. Performance: Submit complete performance data (throw, pressure drop, noise level, etc.) for all grilles proposed, other than those scheduled. Testing shall be in accordance with ANSI/ASHRAE 70-1991. If, according to the certified data of the manufacturer of the proposed units, the sizes indicated on the drawings will not perform satisfactorily, the units shall be reselected by the Contractor for the proper diffusion, spread, pressure drop, throw and noise level.
3. Frame and Accessories: All supply, return, and exhaust grilles shall not have an opposed blade volume control damper unless otherwise noted. All surface mounted grilles shall have a perimeter gasket and flanged edge. All grilles shall have frames suitable for mounting in the surfaces designated by the architectural drawings. Key or screwdriver operated, no slide bars.
4. Finish: All ceiling and wall grilles and all louvers shall have a paintable white finish unless otherwise noted. Interior components (everything behind the face plate) shall be flat black. Floor grilles shall have an anodized aluminum finish unless otherwise noted.

B. Branch Duct Volume Damper: Volume control damper (VCD) in rectangular ducts shall be as follows: Opposed blade, 6" maximum blade width, 16-gage blade, 48" maximum length, nylon or oil impregnated bronze bearings, 1/2" diameter pin shaft, 16-gage channel frame, actuating rod and linkage out of air stream. VCD in round duct shall be as follows: Damper blade full height of branch and 1" less than branch width. All branch dampers shall have regulator with stamped steel handle, spring loaded shaft nut, cast body and serrated self-locking die cast core. Regulator for horizontal ducts overhead shall be mounted on sides or bottom of ducts. Secure a 12" length of brightly colored plastic ribbon to handle for ease of location. Where rectangular or round ductwork is insulated, slit insulation to allow handle to protrude. Ventlok 641 (with 607 end bearing for round ducts).

C. Extractor: Curved blade turns in adjustable position rigid frame. Tuttle and Bailey Deflectrol.

D. Turning Vanes: Double wall, hollow metal, air foil shape. Spacing in accordance with manufacturer's recommendations. Aero Dyne HEP.

E. Flexible Connection: UL listed neoprene coated 30 ounce fiberglass cloth. 3" metal, 3" fabric, 3" metal. Ventglas.

F. Fire/Smoke Damper: California State Fire Marshal approved. UL listed and labeled indicating fire rating. Hour rating as required by the rating of the wall, ceiling, floor, etc. in which it is installed. Combination fire/smoke dampers shall have normally-closed, non-stall factory electric actuator rated for 250ºF (min.) and shall be Leakage Class II.

G. Duct Access Door:
1. Rectangular: Insulated double wall door. Full piano hinge. Cam latch. Pressure rating to match application. Air Balance, Ductmate.

2. Round: Three layers of stamped steel. Inside panel shall consist of two layers of metal which are spotwelded together along the rim, encapsulating high density fiberglass insulation (25/50 rated). Closed cell neoprene gasket bonded to the inside of the door. Zinc plated conical springs installed between the inner and outer door. Polypropylene molded knobs with threaded metal inserts. Knobs shall be easily turned by hand and shall be UL94HB listed. Zinc plated carriage bolts, clinched and sealed to the inner door. Provide self adhesive template for the exact size of duct opening. Pressure rating to match application. Ductmate.

H. Variable Air Volume Terminal (VAV/VVH):
1. General: Pressure independent, single-duct electric powered variable volume terminal. Scheduled pressure drop is maximum allowable at inlet static at design conditions. Provide integral flow taps and calibration chart on each unit. Performance testing shall be in accordance with ARI Standards. Enviro-Tec, Titus.
2. Casing: Welded 24-gage galvanized steel. Provide hanger holes on four corners. Interior insulation shall be 1/2" thick, 1-1/2 lb. density glass fiber with high density facing. Insulation shall be UL listed and in compliance with NFPA 90A. Maximum allowable leak rate 2% at 3" WC.
3. Controls: Provide integral cross flow velocity sensor furnished and installed at the factory.
4. Coils: Units specified with hot water coils shall have factory installed access panel upstream of the coil and shall have coil with 1/2" O.D. seamless copper tube with 0.017" tube wall. Fin tube expanded into fin collar for permanent bond. Leak tested at 300 psig.
5. Sound Performance Data: Discharge sound and radiated sound levels shall not exceed the published sound levels of the terminals which were used as the basis of design. The manufacturer shall submit discharge sound and radiated sound data in both sound power level (ref: 10-12 watts) in octave bands and noise criteria (NC) ratings. Testing shall be in accordance with ARI Standards.

I. Sound Trap:
1. General: Dimensions as shown on plans. 22-gage galvanized steel construction suitable for a differential air pressure of 8" of water. Filler material shall be in accordance with NFPA 90A. Maximum pressure drop as scheduled. Air flow measurements shall be made in accordance with applicable portions of ADC, AMCA and ASME airflow test codes. Buensod-Agitair, Environmental Elements Corp., Industrial Acoustics Company, Vibro-Acoustics.
2. Sound Performance Data: The dynamic insertion loss and self-generated noise levels shall meet or better the published sound data of the sound traps which were used as the basis of design. Acoustic ratings shall be determined in a test facility which provides for airflow in both directions. The test set-up and procedure shall be such that all effects due to end reflection, directivity, flanking transmission, standing waves and test chamber sound absorption are eliminated. Acoustic ratings shall include dynamic insertion loss and self-generated noise levels for each octave band both for forward flow (air and noise in same direction) and reverse flow (air and noise in opposite directions) with air flow of at least 2000 fpm entering face velocity. Ratings shall be certified by an independent testing laboratory.

2.5 DUCTWORK INSULATION MATERIALS:

A. General: All ductwork insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.

B. Fiberglass Blanket: **Installed** thermal resistance at a mean temperature of 75ºF shall not exceed indicated value. 3/4 lb/ft^3 or 1 lb/ft^3, **R-6** where ductwork is within the building thermal insulation envelope. 3/4 lb/ft^3 **R-8** where ductwork is outside the building thermal insulation envelope and/or above the roof. Faced with glass reinforced foil laminated to Kraft paper. Certainteed, Knauf, Johns-Manville, Owens-Corning.

C. Acoustic Lining: Glass fiber. **Installed** thermal resistance at a mean temperature of 75ºF shall meet or exceed indicated value. One side coated to prevent fiber erosion up to 6000 ft/min. Average noise reduction coefficient of 0.80. 1.5 lb/ft3 density. 1" thick (**R-4.2**) where ductwork is within the building thermal insulation envelope. 2" thick (**R-8**) where ductwork is outside the building thermal insulation envelope and/or above the roof. Certainteed, Knauf, Johns-Manville, Owens-Corning.

D. Bonding Adhesive: Design Polymerics DP2501, Foster 85-60.

E. Fire Resistive Duct Wrap: Nominal 1-1/2” thick, 6 lb/ft3 high-temperature fiber blanket thermal insulation encapsulated in a fiberglass-reinforced aluminized polyester foil. Grease Duct Listing Standards (Double Wrap) ASTM E 2336 / ICC-ES AC101. Ventilation Duct Listing Standard (Single Wrap) – ISO 6944. 3M Fire Barrier Duct Wrap 615+.

2.6 EQUIPMENT:

A. General Requirements:
1. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
2. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Where Architectural screening is indicated, equipment shall not extend above or beyond screening. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
3. Ratings:
   a. Gas: Gas burning equipment shall be furnished with 100% safety gas shut-off, intermittent pilot ignition, and be CSA (US) certified, except that boilers shall be CSA (US) certified or UL listed.
   b. Electrical: Electrical equipment shall be in accordance with NEMA Standards and UL or ETL listed where applicable standards have been established.
4. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.

5. Electrical:
   a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be manual reset, shall have H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.
   b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.
   c. Motors: Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be open drip proof, NEMA B design on pumps and fans, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction unless otherwise noted. Design shall limit starting inrush current and running current to values shown on drawings. Motors 1 horsepower and larger shall be the premium efficiency type, tested according to IEEE Standard 112, Method B. Motors exposed to weather shall be TEFC. Motors in a fan air stream shall be TEFC or TEAO. Vertical motors outdoors shall be ODP or TEFC and shall have rain caps.
   d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.
   e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.
   f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.
6. Fan Selection - Static Pressure: Unless otherwise noted, pressure scheduled as external static pressure (ESP) includes all ductwork and accessory losses external to the unit housing. Unless otherwise noted, pressure scheduled as total static pressure includes all ductwork, filter, coil, cabinet, damper and other accessory losses. Unless otherwise noted, pressure scheduled as duct static pressure includes all supply and return ductwork and accessory losses external to the unit housing and plenum (as applicable). The allowance for filter losses is 0.3" WC, unless otherwise noted. Submit itemized static pressure losses for all components.
7. Filters:
   a. General: Tested and rated in accordance with ASHRAE Standard 52.2 and Title 24, C.C.R. Furnish and install one complete change of all filters after air balance is completed and prior to acceptance.

b. Filter Media: 2" media. MERV-13. Clean filter resistance 0.41" water at 500 fpm. Throw away frame. Class 2. Camfil AP-Thirteen.

8. Screens: All duct or louver openings to the outside shall be covered with 1/2", 16-gage, galvanized wire mesh screen.
9. Mixing Dampers: Opposed blade, 16-gage. Six-inch maximum blade width, 48" maximum length. Nylon or oil impregnated bronze bearings. One-half inch diameter pin shaft. 16-gage channel frame. One percent maximum leakage at 4" WC in accordance with AMCA 500 for outside air dampers. Actuating rod out of air stream. Arrow.
10. Sound Ratings: Shall be in accordance with ASHRAE 36 - 72. Sound ratings shall not exceed scheduled values.
11. Drives: Unless noted as direct connected, drives shall be V-belt, rated at 150% of motor horsepower. Multiple drive belts shall be matched set. Drive sheaves shall be dynamically balanced, adjustable, range +/- 10%, selected at mid range. Adjustable relative movement shall be lockable to shaft. Belts shall be aligned within 1-1/2 degrees at all times. Open drives shall be provided with OSHA approved open mesh belt guards. Belt guards exposed to weather shall be weatherproof enclosure with louvered face for adequate ventilation. Driving motor shall be mounted on adjustable rails. T.B. Woods, Browning. Submit RPM range of driven machine with drive selection.
12. Coils:
    a. Construction: Copper tube. Copper or aluminum 0.0075" min. thickness fins hydraulically or mechanically bonded to tube. 16-gage galvanized steel rigid channel coil casing. Rated working pressure 200 psig min. All coils shall have connections at the same end. Wherever two or more coils are being controlled by a single control valve, each coil shall be installed with a separate balancing cock and a Pete's Plug at each outlet.
    b. Capacity: Ratings certified by ARI in accordance with ARI Standard 410. Cooling coil face velocity shall not exceed manufacturer's published ratings or 600 fpm. Heating coil face velocity shall not exceed 1000 fpm. Include coil selection calculations in shop drawings.
    c. Hot or Chilled Water Coils: Copper or cast iron headers, brazed or spun to tube. Tube wall minimum thickness 0.024". 10 fins/inch maximum.
    d. Direct Expansion Coils: Copper suction header silver brazed to tubes, distributing tubes and expansion valve. Working pressure 250 psig minimum. 10 fins/inch maximum.

B. Air Cooled Chiller (WC-1A, 1B, 1C):
1. General: Refer to paragraph 2.6A for general requirements. The contractor shall furnish and install water chiller(s) as shown and scheduled in the plans and specifications. Units are leak tested, pressure tested, then evacuated and charged. All chillers are factory tested prior to shipment. Units ship with a full operating charge of oil and refrigerant as standard. Units can also be shipped with a nitrogen charge if required. Unit panels, structural elements and control boxes are constructed of galvanized steel and mounted on a bolted galvanized steel base. Unit panels, control boxes and the structural base are finished with a baked-on powder paint. Trane ACX.
2. Certified AHRI Performance Trane air-cooled chillers are rated within the scope of the Air-Conditioning, Heating & Refrigeration Institute (AHRI) Certification Program and display the AHRI Certified® mark as a visual confirmation of

conformance to the certification sections of AHRI Standard 550/590 (I-P) and ANSI/AHRI Standard 551/591 (SI).

3. Refrigeration Circuits All chiller sizes are designed with two refrigerant circuits. Each refrigeration circuit includes two or three scroll compressors, a compressor suction and discharge service valve, liquid line shutoff valve, removable core filter, liquid line sight glass with moisture indicator, charging port and an electronic expansion valve.
4. Evaporator Braze plate heat exchanger is made of stainless steel with copper as the braze material. It is designed to withstand a refrigerant side working pressure of 460 psig and a waterside working pressure of 150 psig. Evaporator is tested at 1.1 times maximum allowable refrigerant side working pressure and 1.5 times maximum allowable water side working pressure. Immersion heaters protect the evaporator to an ambient of -20°F (-29°C). The evaporator is covered with factory-installed 0.75 inch (19.05 mm)Armaflex II or equal (k=0.28) insulation. Foam insulation is used on the suction line.
5. Condenser and Fans For ACSA units, the air-cooled microchannel condenser coils are used with all aluminum brazed fin construction. For ACXA units, the round tube plate fin (RTPF) coils are used with aluminum fin constructions. The condenser coil has an integral subcooling circuit. The maximum allowable working pressure of the condenser is 650 psig. Condensers are factory proof and leak tested at 1.1 times maximum allowable refrigerant side working pressure. Coils can be cleaned with high pressure water. Direct-drive vertical-discharge airfoil condenser fans are dynamically balanced. The condenser fan motors are permanent magnet motors with integrated drive to provide variable speed fan control for all fans. Chillers are equipped with EC condenser fan motors with permanently lubricated ball bearings and internal thermal and overload protection.
6. Compressor The unit is equipped with two or more hermetic, direct-drive, 3600 rpm 60 Hz (3000 rpm 50 Hz) suction gas-cooled scroll compressors with intermediate discharge valve to increase seasonal efficiency. Overload protection is included. The compressor includes: centrifugal oil pump, oil level sight glass and oil charging valve. Each compressor will have compressor heaters installed and properly sized to minimize the amount of liquid refrigerant present in the oil sump during off cycles.
7. Unit Controls All unit controls are housed in an outdoor rated weather tight enclosure with removable plates to allow for customer connection of power wiring and remote interlocks. All controls, including sensors, are factory mounted and tested prior to shipment. Microcomputer controls provide all control functions including startup and shut down, leaving chilled water temperature control, evaporator flow proving, compressor staging, electronic expansion valve modulation, condenser fan sequencing and speed control, anti-recycle logic, automatic lead/lag compressor starting, and load limiting.
8. Symbio™ 800 The Symbio™ 800 unit control module, utilizing Adaptive Control™ microprocessor, automatically takes action to avoid unit shut-down due to abnormal operating conditions associated with low refrigerant pressure, high condensing pressure, low oil return or low suction superheat, and high compressor discharge temperature. Should the abnormal operating condition continue until a protective limit is violated, the unit will be shut down. Unit protective functions of the Symbio™ 800 include: loss of chilled water flow,

evaporator freezing, loss of refrigerant, low refrigerant pressure, high refrigerant pressure, high compressor motor temperature, and loss of oil to the compressor.

9. AdaptiView TD7 Display A full color AdaptiView™ TD7 touch screen display indicates all important unit and circuit parameters, in logical groupings on various screens. The parameters including chilled water set point, leaving chilled water temperature, demand limit set point, evaporator and condenser refrigerant temperatures and pressures, compressor and fan speeds, and all pertinent electrical information. The display also provides “on screen” trending graphs of predefined parameters as well as customizable trend graphs based on user defined parameters from a list of all available parameters. The display also provides indication of the chiller and circuits’ top level operating modes with detailed sub-mode reports available with a single key press, as well as diagnostics annunciation and date and time stamped diagnostic history. The color display is fully outdoor rated, and, can be viewed in full daylight without opening any control panel doors.
10. Standard power connections include main three phase power to the compressors, condenser fans and control power transformer and optional connections are available for the 115 volt/60 Hz single phase power for the thermostatically controlled evaporator heaters for freeze protection.
    - Outdoor capable: – Removable Cover – UV Resistant Touchscreen – -40°C to 70°C Operating Temperature – IP56 rated (Power Jets of Water from all directions)
    - RoHS Compliant
    - UL 916 Listed
    - CE Certification
    - Emissions: EN55011 (Class B)
    - Immunity: EN61000 (Industrial)
    - Display: Mechanical Specifications AC-PRC002E-EN 37 – 7 inch diagonal – 800x480 pixels – TFT LCD @ 600 nits brightness – 16 bit color graphic display
    - Display Features: – Alarms – Reports – Unit Settings – Display Settings
    - Graphing
    - Global Application with Support for 27 Languages
11. Chilled Water Reset Control logic and factory installed sensors are provided to reset leaving chilled water temperature. The set point can be reset based on ambient temperature or return evaporator water temperature.
12. Factory Mounted Flow Proving and Flow Control The factory installed evaporator water flow switch is provided with the control logic and relays to turn the chilled water flow on and off as the chiller requires for operation and protection. This function is a requirement on the chiller.
13. Pump Package The pump package contains a single pump or dual pumps (one redundant), drain valves, service isolation valves, pressure ports, pressure relief, and fluid strainer. Pump package applications include short water loops, decoupled systems and service for an entire loop volume. Because the fluid distribution system beyond the chiller is unknown, Trane Select Assist reports Available Head as the head leaving the brazed plate evaporator. Head leaving the evaporator includes the evaporator head loss, pump package piping frictional effects head losses, valve head losses, and strainer head loss summation. The pump package should not be operated at NPSHR. Operartion at this suction head will cause cavitation. NPSHA should be at least 1.5 to 2.5 times NPSHR.

Ambient freeze protection down to -4°F (-20° C) for water is included. Dependent on the freeze inhibitor solution, the freeze protection ambient temperature decreases accordingly. The pump skid contains an independent pump motor starter panel. The pump starter panel's power supply is prewired into the chiller's control panel assembly, an independent pump motor power supply is not required. Variable pump speed command is integrated with the chiller controller allowing variable flow functionality.

14. BACnet Communications Interface Allows the user to easily interface with BACnet® via a single twisted pair or Ethernet wiring to a factory-installed Symbio™ 800 controller.
15. Isolators — Elastomeric Elastomeric Isolators provide isolation between chiller and structure to help eliminate vibration transmission.
16. Manufacturer's Field Services:
    a. All Startup, maintenance and monitoring functions shall be performed by a manufacturer's commercial agent to confirm, (in writing), that equipment has been correctly installed and passes specification checklist prior to equipment becoming operational and covered under OEM warranty.
    b. Applied chiller manufacturers shall maintain service capabilities no more than 100 miles from the job site.
    c. The manufacturer shall furnish complete submittal wiring diagrams of the chiller(s) starter(s) and associated components like cooling towers, pumps, interlocks, etc. as applicable for field maintenance and service.
17. Warranty: Chiller manufacturer shall provide a whole unit parts, labor and refrigerant warranty for a period of 10 years from start-up. The warranty must be provided by the manufacturer; third party insurance/warranty coverage is not acceptable. The chiller manufacturer shall provide an original factory warranty certificate for each chiller listing as a minimum chiller model, serial number, and warranty information as specified.
18. Maintenance Services:
    a. All inspections and service of units shall be accomplished by factory trained and authorized servicing technicians.
    b. All labor for leak checking the chiller according to the manufacturer's IOM and documentation must be included.
    c. In conjunction with and supporting Factory warranty OEM shall furnish complete factory authorized service and maintenance for applied chillers for 5 year from the Date of Substantial Completion. All work shall be done by factory service department.
    d. OEM shall provide and report quarterly, semiannual, and annual maintenance in compliance with or better than ASHRAE Standard 180-2008.
    e. Submit copy of service call work orders and summary report to the owner, including description of work performed, operating performance status and noted exceptions.

C. Air Cooled Chiller (WC-2A, 2B):
1. General: Refer to paragraph 2.6A for general requirements. The contractor shall furnish and install water chiller(s) as shown and scheduled in the plans and specifications. Units are leak tested, pressure tested, then evacuated and charged. The air-cooled modular chiller system shall consist of individual chiller modules

that are assembled on site. Each chiller module shall be completely factory wired and tested prior to shipment. Each module shall include a compressor, evaporator, air cooled condenser, and controls. Controls shall be designed on a distributed primary control system that allows the primary microprocessor to operate remaining secondary modules in the event of a malfunction of any secondary controller. The controls shall also be designed to allow each individual secondary microprocessor to operate on its own temperature sensor if there is a failure of the primary microprocessor.

2. Certified AHRI Performance: Trane air-cooled chillers are rated within the scope of the Air-Conditioning, Heating and Refrigeration Institute (AHRI) Certification Program and display the AHRI Certified® mark as a visual confirmation of conformance to the certification sections of AHRI Standard 550/590 (I-P) and ANSI/AHRI Standard 551/591 (SI).
3. Refrigeration Circuits: The Manhattan Gen II Chiller uses dual independent refrigeration circuits in each module using hermetically sealed scroll compressors each with Rotalock connections, oil level sight glass, suction gas-cooled motor with solid-state sensors in the windings for overload protection, and circuit breaker protection. There shall be two independent compressors and refrigerant circuits per module. Compressors shall be mounted to the formed sheet metal frame with rubber-in-shear vibration isolators. The SuperMod Chiller uses a hermetically sealed tandem scroll compressor set with a true variable speed lead compressor motor and a fixed speed lag compressor. The tandem set shall include an oil level sight glass, suction gas-cooled motor with solid-state sensors in the windings for overload protection, and in-line circuit breaker protection. There shall be two compressors per tandem set and one refrigerant circuit per module. Compressors shall be mounted to the formed sheet metal frame with rubber-in-shear vibration isolators.
4. Evaporator: The Manhattan Gen II chiller uses a dual circuit, brazed plate evaporator on each module constructed of 316 stainless steel plates and copper brazing. The supply and return fluid piping connections to each evaporator shall include an electronic and a manual isolation valve to allow servicing of each module individually while the remaining modules continue to operate, and to allow for variable flow. The fluid connections to each evaporator shall use roll grooved couplings for service convenience and ease of installation. Each evaporator shall be insulated with ¾ inch closed cell insulation. The maximum working pressure shall be 650 psi. Evaporator piping fluid velocity shall not exceed 10 fps at any point in the system. The SuperMod chiller uses a brazed plate, single circuit evaporator in each module constructed of 316 stainless steel plates and copper brazing. The supply and return fluid piping connections to each of the evaporator shall include an electronic and a manual isolation valve to allow servicing of each module individually while the remaining modules continue to operate, and to allow for variable flow. The fluid connections to each evaporator shall use roll grooved couplings for service convenience and ease of installation. Evaporators shall be insulated with ¾ inch closed cell insulation.
5. Condenser and Fans: The air-cooled condenser coils have aluminum fins mechanically bonded to copper tubes with integral subcooling circuits. The coils shall be sized to provide full heat of rejection at a maximum 25°F temperature difference between the condensing temperature and ambient air ARTC-PRC001A-EN 33 temperature at jobsite elevation above sea level. The coils shall

be factory tested to a minimum of 600 psig. The condenser fan motors shall be maintenance free, high efficient Electronically Commutated Motors (ECM) with energy reduction capabilities of up to 35%. The fan motors shall vary speed to maintain the refrigeration head pressure.

6. Compressor: The Manhattan Gen II chiller uses a hermetically sealed, scroll compressor on each refrigeration circuit. The Copeland scroll compressor is a state-of-the-art compressor with relay and overload monitoring capabilities designed to accommodate liquids (both oil and refrigerant) without causing compressor damage. The SuperMod chiller uses a tandem set of fixed speed and variable speed compressors by Copeland. The variable speed compressor is the latest development by Copeland using brushless permanent magnet motors. The Copeland compressor uses CoreSense technology as a sensor to unlock advanced capabilities such as protection, diagnostics, communication, and verification. Technicians can make faster, more accurate decisions resulting in improved compressor performance and reliability.
7. Variable Speed Drive (SuperMod): SuperMod's tandem variable speed compressors also include the Emerson Copeland Scroll EVC1150B/1185B Variable Frequency Drive (VFD) which delivers maximum machine performance with sensorless permanent magnet motor control, for dynamic and efficient machine operation. The drive is designed to control a compressor in one of two modes. The analog / digital control mode and the Modbus control mode.
8. Unit Controls: The primary chiller module shall incorporate the primary microprocessor controller. The primary microprocessor shall communicate with the remaining secondary microprocessors in each module via a local network communications protocol. The primary microprocessor shall include a phase monitor to protect against low voltage, phase unbalance, phase loss, and phase reversal conditions. The primary controller shall read all analog and fault port values from all secondary module controllers and shall pass these values to the Building Automation System via BACnet®, Modbus™ or LONWORKS® protocols. Each chiller control system shall include operational switches for each compressor; high- and low-pressure transmitters to provide indication of refrigeration pressures in each circuit; high and low refrigeration pressure alarms including shutting shut down the faulty compressor(s); anti-short cycling compressor timers; minimum compressor run timers; connection to Building Automation System (if required).
9. Carel c.pCO Controller: The chillers employ a Carel c.pCO all-digital data control system which is assigned to all primary and secondary modules to control and report key system settings and indicators. Key features include: Processes all communications, IOs, and executes programs in tens of milliseconds; Online debugging for prompt programming code troubleshooting; Includes 3 serial ports, 2 ethernet ports and 1 USB port.
10. EXOR eSmart07 HMI: An operator 7–inch touch screen interface panel with graphical display shall be installed on the primary module to allow chiller operation monitoring, adjustment of user set points, and alarm monitoring. Key features include:
    - Resistive touchscreen
    - Remote monitoring and control with primary-secondary functionality Mechanical Specifications

- Wide selection of communication drivers available with multiple-driver communication capability
- Data display in numerical, text, bar graph, analog gauges, and graphic image formats.

11. Heat Recovery Operation: The modular heat recovery chiller system is equipped with a brazed plate condenser in each module each with, a thermal dispersion flow switch plus valves and controls for heat recovery operation.
12. Manufacturer's Field Services:
    a. All Startup, maintenance and monitoring functions shall be performed by a manufacturer's commercial agent to confirm, (in writing), that equipment has been correctly installed and passes specification checklist prior to equipment becoming operational and covered under OEM warranty.
    b. Applied chiller manufacturers shall maintain service capabilities no more than 100 miles from the job site.
    c. The manufacturer shall furnish complete submittal wiring diagrams of the chiller(s) starter(s) and associated components like cooling towers, pumps, interlocks, etc. as applicable for field maintenance and service.
13. Warranty: Chiller manufacturer shall provide a whole unit parts, labor and refrigerant warranty for a period of 10 years from start-up. The warranty must be provided by the manufacturer; third party insurance/warranty coverage is not acceptable. The chiller manufacturer shall provide an original factory warranty certificate for each chiller listing as a minimum chiller model, serial number, and warranty information as specified.
14. Maintenance Services:
    a. All inspections and service of units shall be accomplished by factory trained and authorized servicing technicians.
    b. All labor for leak checking the chiller according to the manufacturer's IOM and documentation must be included.
    c. In conjunction with and supporting Factory warranty OEM shall furnish complete factory authorized service and maintenance for applied chillers for 5 year from the Date of Substantial Completion. All work shall be done by factory service department.
    d. OEM shall provide and report quarterly, semiannual, and annual maintenance in compliance with or better than ASHRAE Standard 180-2008.
    e. Submit copy of service call work orders and summary report to the owner, including description of work performed, operating performance status and noted exceptions.

D. Boiler:
1. General: Refer to paragraph 2.6A for general requirements. Each boiler size is designed for a Maximum Allowable Working Pressure (MAWP) of 125 psig (8.6 Bar), constructed in accordance with the ASME Code Section IV and bear the "H" stamp. The insulated boiler is mounted on a base and powder coated steel casing provided. A drain valve connection is provided at the front bottom for

field piping of a boiler drain valve, which can be furnished as an option. Cleaver-Brooks.

2. Boiler Trim and Controls: The following items are furnished:
   a. Probe Type Low Water Cutoff control, manual reset.
   b. Excess Water Temperature Cutoff, manual reset.
   c. NTC (negative temp. coefficient) sensor for hot water supply temperature.
   d. NTC sensor for hot water return temperature.
   e. ASME Safety Relief Valve set @ 125 psig. (8.6 Bar)
   f. Combination Temperature/Pressure Gauge.
3. Burner Control: The CB Falcon is an integrated burner management and modulation control with a touch-screen display/operator interface. Its functions include the following:
   a. Two (2) heating loops with PID load control.
   b. Burner sequencing with safe start check, pre-purge, direct spark ignition, and post purge.
   c. Electronic ignition.
   d. Flame Supervision.
   e. Safety shutdown with time-stamped display of lockout condition.
   f. Variable speed control of the combustion fan.
   g. Supervision of low and high gas pressure, air proving, stack back pressure, high limit, and low water.
   h. First-out annunciator.
   i. Real-time data trending.
   j. (3) pump/auxiliary relay outputs.
   k. Modbus communication capability.
   l. Outdoor temperature reset.
   m. Remote firing rate or setpoint control
   n. Setback/time-of-day setpoint
   o. Lead/Lag for up to 8 boilers
4. Forced Draft Burner
   a. The burner is a "Pre-mix" design consisting of a unitized venturi, single body dual safety gas valve, blower, and burner head.
   b. Full modulation is accomplished with a variable speed fan for 5:1 turndown ratio.
   c. For near flameless combustion, the burner utilizes a Fecralloy-metal fiber head.
   d. Noise level at maximum firing is less than 70 dBA regardless of boiler size.
   e. Operating on Natural Gas, NOx emissions will be less than 20 PPM regardless of boiler size and the boiler is certified for California and Texas for Low NOx emissions.
   f. As an option, the burner is capable of direct vent combustion.
   g. Ignition of the main flame is via direct spark, utilizing high voltage electrodes and a separate electrode for flame supervision.
   h. To ensure adequate combustion air is present prior to ignition, and to ensure the fan is operating, a combustion air proving switch is furnished.
   i. A High Air Pressure Switch is provided to ensure burner lockout if excessive back pressure due to a blocked stack occurs.

j. For ease of maintenance and inspection, the burner is furnished with hydraulic rods and easy opening lockdown nuts, which permit the burner to swing up (except 500 and 750, which are hinged only). This provides full access to the burner and electrodes, as well, to the tube sheet and tubes.

5. Burner Gas Train: The standard gas train is equipped in accordance with UL certification and complies with ASME CSD-1. Each burner gas train includes:
   a. Low Gas Pressure Interlock, manual reset.
   b. High Gas Pressure Interlock, manual reset.
   c. ASME CSD-1 Test Cocks.
   d. Downstream manual ball type shutoff cock.
   e. Single body dual safety shutoff gas valve.
6. Optional Equipment:
   a. Dual gas train for quick and easy fuel switchover.
   b. Reusable air filter.
   c. Condensate neutralization tank assembly - consists of neutralizing media, filter, and PVC condensate holding tank with integral drain trap.
   d. Outside air intake for direct vent combustion.
   e. Outdoor temperature sensor for indoor/outdoor control.
   f. Header temperature sensor for multiple boiler Lead/Lag operation.
   g. Auxiliary Low Water Control (shipped loose) for field piping by others into the system piping.
   h. Alarm Horn for safety shutdown.
   i. Relays for output signal for burner on, fuel valve open.
   j. Stack Thermometer.
   k. Stack temperature limit-sensor.
   l. Auto air vent.
   m. Boiler drain valve.
7. Manufacturer’s Field Services:
   a. General: The boiler supplier’s factory authorized service organization shall be responsible for performance of inspections, start up and testing of the package boiler, and accessory equipment and materials furnished under this Section. A detailed written record of the startup performance, including burner setting data over the entire load range shall be furnished to the engineer before final acceptance. All labor, equipment, and test apparatus shall be furnished by the authorized service organization. All equipment defects discovered by the tests shall be rectified either by the service organization or boiler manufacturer.
   b. Equipment Inspection: Boiler representative to provide jobsite assistance to inspect boilers and other equipment upon arrival, verifying completeness of equipment supplied and potential damages. All shipped loose components, such as casing, to be mounted on boiler by boiler provider after contractor has set boiler in building.
   c. Pre Start-up Walk Through: Boiler representative shall visit jobsite reviewing installation with mechanical contractor to be conducted approximately 1 week prior to startup.
   d. Start-up shall be conducted by experienced and factory authorized technician in the regular employment of the authorized service organization, and shall include:

e. Demonstrate that boiler, burner, controls, and accessories comply with requirements of this Section as proposed by the boiler and accessories supplier. Pre-test all items prior to scheduling the final testing that will be witnessed by the test engineer.

f. Readings at different firing rates (20, 50, 75 and 100%) of load for the modulating burner shall be taken with a written report of the tests submitted to the engineer. The reports shall include readings for each firing rate tested and include stack temperatures, O2, CO, NOx, and overall boiler efficiency.

g. Auxiliary Equipment and Accessories: Observe and check all valves, draft fans, electric motors and other accessories and appurtenant equipment during the operational and capacity tests for leakage, malfunctioning, defects, and non compliance with referenced standards or overloading as applicable.

h. Commissioning Requirements:
   1) Fireside inspection
   2) Set up fuel train and combustion air system
   3) Set up operating set points
   4) Check all safeties, including Flame safeguard, LWCO, Airflow, Fuel pressures, High limits.
   5) Set up and verify efficiencies at 20%, 50%, 75%, and 100%
   6) Set up and verify burner turndown.

i. Training to include all safety procedures, maintenance procedures, control operations, and diagnostic procedures. Training to be provided in a single 8 hour (max) continuous session to accommodate operator's availability on site.

j. Source Test: Source test services shall be provided by manufacturer representative. Contractor shall be required to place full load on boilers for source testing throughout the firing range. Source testing shall be in accordance with SJVUAPCD protocol: three 30 minute test runs on each boiler, certified source test equipment, SJVUAPCD inspector on site during testing. All permits shall be by contractor.

8. Warranty Data:
   a. The pressure vessel shall be guaranteed against thermal shock for 20 years when utilized in a closed loop hydronic heating system with a temperature differential of 120 °F or less. The boiler pressure vessel shall be guaranteed accordingly without a minimum flow rate or return water temperature requirement. The boiler shall not require the use of flow switches or other devices to ensure minimum flow.
   b. The pressure vessel, tubes and tube sheets (heat exchanger) shall be guaranteed against flue gas corrosion and materials/workmanship for a period of 10 years. The condensate collection box shall be guaranteed for 20 years. The burner cylinder shall be warranted for a period of 5 years.
   c. All parts not covered by the above warranties shall carry a 1 year warranty from startup, or 18 months from shipment, whichever occurs first. This shall include all electrical components and burner components.

9. Field Testing:
   a. The manufacturer's representative shall test all boiler and burner interlocks, actuators, valves, controllers, gauges, thermometers, pilot

lights, switches, etc. Any malfunctioning component shall be replaced at the time of initial start-up if found to be inoperative.

b. All adjustments to boiler, burner, and boiler control system shall be performed by the manufacturer's authorized service representative.

10. Start-Up, Instruction and Warranty Service:

a. The manufacturer's representative shall provide start-up and instruction of each new boiler, including burner and boiler control system as specified herein. Start-up and instruction shall cover all components assembled and furnished by the manufacturer whether or not of his own manufacture.

b. Warranty service shall be in accordance with the manufacturer's warranty statement unless other provisions have been agreed to during project bidding.

E. Pumps:

1. General: Refer to Paragraph 2.6A for general requirements. Pumps shall be selected to be non-overloading at any point on the pump curve. Contractor shall include all costs required to field trim or change pump impeller, if necessary, to match design conditions. All motors 1 horsepower and larger shall be the high efficiency type. Bell and Gossett, Grundfos, PACO, Peerless, Taco.

2. Materials and Components: Enclosed bronze impeller hydraulically and dynamically balanced on shaft. Renewable bronze wear rings. Mechanical seals unless otherwise noted. Stainless steel shaft or steel shaft with bronze sleeve. Gray iron casing. Suction and discharge connections shall be 125 psi flanges tapped for pressure readings.

3. In Line Centrifugal: In line single stage, end suction centrifugal pump close coupled to motor. Pipe supported or cast iron support stand as indicated on drawings.

F. Air Handling Unit:

1. General: Pressure classification, type, and accessories/options as indicated on schedules. Refer to Paragraph 2.6A for general requirements. All units will be shipped with an integral base frame designed with the necessary number of lift points for safe installation. The lift points will be designed to accept standard rigging devices and be removable after installation. Units shipped in sections will have a minimum of four points of lift. Sizes 3-30 will also be shipped with a shipping skid designed for forklift transport. Units will be shipped with a shipping skid designed for forklift transport and the integral base will be designed with the necessary number of lift points for safe installation. The lift points will be designed to accept standard rigging devices and removable after installation. Units shipped in sections will have a minimum of four points of lift. Per ASHRAE 62.1 recommendation, units will be shipped stretch-wrapped to protect unit from intransit rain and debris. Unit shall be UL and C-UL Listed. Air-handling performance data shall be certified in accordance with AHRI Standard 430. Unit sound performance data shall be provided using AHRI Standard 260 test methods and reported as sound power. Coil performance shall be certified in accordance with AHRI Standard 410. Trane.

2. Unit Construction: All unit panels shall be 2-inch solid, double-wall construction to facilitate cleaning of unit interior. Unit panels shall be provided with a mid-span, no through metal, internal thermal break. Casing thermal performance shall

be such that under 55°F supply air temperature and design conditions on the exterior of the unit of 81°F dry bulb and 73°F wet bulb, condensation shall not form on the casing exterior. All exterior and interior AHU panels will be made of G40 galvanized steel. Optionally, all interior AHU casing panels will be made of 201 stainless steel. The casing shall be able to withstand up to 8 inches w.g. positive or negative static pressure. The casing shall not exceed 0.0042 inch deflection per inch of panel span at 1.5 times design static pressure up to a maximum of +8 inches w.g. in all positive pressure sections and -8 inches w.g. in all negative pressure sections. The unit floor shall be of sufficient strength to support a 300-lb. load during maintenance activities and shall deflect no more than 0.0042 inch per inch of panel span. The casing air leakage shall not exceed leak class 9 (CL = 9) per ASHRAE 111 at 1.25 times maximum casing static pressure (P in inches w.g.), up to a maximum of +8 inches w.g. in all positive pressure sections and -8 inches w.g. in all negative pressure sections, where maximum casing leakage (cfm/100 ft2 of casing surface area) = CL x P0.65. Optionally, the casing air leakage shall not exceed leak class 6 (CL = 6) per ASHRAE 111 at 1.25 times maximum casing static pressure (P in inches w.g.), up to a maximum of +8 inches w.g. in all positive pressure sections and -8 inches w.g. in all negative pressure sections, where maximum casing leakage (cfm/100 ft2 of casing surface area) = CL x P0.65.

3. Insulation: Panel insulation shall provide a minimum thermal resistance (R) value of 13 ft²•h•ºF/Btu throughout the entire unit. Insulation shall completely fill the panel cavities in all directions so that no voids exist and settling of insulation is prevented. Panel insulation shall comply with NFPA 90A.
4. Drain Pans: All cooling coil sections shall be provided with an insulated, double-wall, galvanized or stainless steel drain pan. To address indoor air quality (IAQ), the drain pan shall be designed in accordance with ASHRAE 62.1 being of sufficient size to collect all condensation produced from the coil and sloped in two planes promoting positive drainage to eliminate stagnant water conditions. The outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition. All drain pan threaded connections shall be visible external to the unit. Drain connections shall be of the same material as the primary drain pan and shall extend a minimum of 2 1/2 inches beyond the base to ensure adequate room for field piping of condensate drain traps. Coil support members inside the drain pan shall be of the same material as the drain pan and coil casing. Heating coil, access, and mixing sections may be provided with an optional IAQ drain pan.
5. Access Doors: Access doors shall be 2-inch double-wall construction. Interior and exterior door panels shall be of the same construction as the interior and exterior wall panels, respectively. All doors downstream of cooling coils shall be provided with a thermal break construction of door panel and door frame. Gasketing shall be provided around the full perimeter of the doors to prevent air leakage. Surface-mounted handles shall be provided to allow quick access to the interior of the functional section and to prevent through-cabinet penetrations that could likely weaken the casing leakage and thermal performance. Handle hardware shall be designed to prevent unintended closure. Access doors shall be hinged and removable for quick, easy access. Hinges shall be interchangeable with the door handle hardware to allow for alternating door swing in the field to minimize access interference due to unforeseen job site obstructions. Door handle hardware shall be adjustable and visually indicate locking position of door

latch external to the section. All doors shall be a minimum of 60 inches high when sufficient height is available, or the maximum height allowed by the unit height. Door handles will be provided for each latching point of the door necessary to maintain the specified air leakage integrity of the unit. Optionally, a single-handle door shall be provided for all outward swinging doors linked to multiple latching points necessary to maintain the specified air leakage integrity of the unit. An optional shatterproof window for viewing, capable of withstanding unit operating pressures, shall be provided in the door.

6. Marine Lights: A factory-mounted, weather-resistant (enclosed and gasketed to prevent water and dust intrusion), light emitting diode (LED) fixture shall be provided in sections of the unit as specified for maintenance and service visibility. Fixture shall be complete with aluminum die cast housing, polycarbonate lens designed for maximum light output, and LEDs wired to a single switch within a factory-provided service module. LED lighting shall provide instant-on white light and have a minimum 50,000 hour life. Fixtures shall be designed for flexible positioning during maintenance and service activities for optimal location. All lights within the unit shall be wired to a single switch within the factory provided service module. The service module shall have an optional GFCI receptacle separate from the load side of the equipment. Electrical contractor shall be required to provide a 120V supply to the factory mounted service module for the marine light circuit (unless single-point power is provided) and always for the GFCI receptacle circuit per NEC. The service module shall be provided in the fan section, unless a controls section is provided. In which case, the service module will be provided in the controls section. The light switch is always on the supply fan.

7. Fans: The fan type shall be provided as required for stable operation and optimum energy efficiency. The fan shall be statically and dynamically balanced at the factory as a complete fan assembly (fan wheel, motor, drive, and belts). The fan shaft shall not exceed 75 percent of its first critical speed at any cataloged speed. Fan wheels shall be keyed to the fan shaft to prevent slipping. The fan shafts shall be solid steel. The fan section shall be provided with an access door on the drive side of the fan. The fan shall be a single-width, single-inlet plenum fan. The fan blades shall be aluminum backward-inclined airfoil. Plenum fan shall be direct-driven. Fan sections containing multiple fans shall be controlled using a common control signal, such as the duct static control signal, to modulate the fan speed. The fan and motor assembly (on sizes 10 to 120) shall be internally isolated from the unit casing with 2-inch (50.8-mm) deflection spring isolators, furnished and installed by the unit manufacturer. The isolation system shall be designed to resist loads produced by external forces, such as earthquakes, and conform to the current IBC seismic requirements. The motor shall be integrally mounted to an isolated fan assembly furnished by the unit manufacturer. The motor shall be mounted inside the unit casing on an adjustable base to permit adjustment of drive-belt tension. The motor shall meet or exceed all NEMA Standards Publication MG1 requirements and comply with NEMA Premium efficiency levels when applicable. The motor shall have T-frame, squirrel cage with size, type, and electrical characteristics as shown on the equipment schedule. The motor shall be open and drip-proof, 460 volt, 3-phase, 60 Hz. The fan section shall have motor leads extended to a factory-installed external junction box to facilitate motor wiring and to maintain air leakage integrity of the casing. The fan motor wiring shall be factory-wired to the

external motor junction box within flexible metal conduit of adequate length so that the fan vibration isolation will not be restricted. On units supplied with plenum fans, expanded metal door guard(s) shall be supplied on the access door(s) to the fan, and those downstream access door(s) where unintended access to the plenum fan could occur. Door guard in intended to deter unauthorized entry and incidental contact with rotating components. Refer to the Product Data section for fans with access door guard(s).

8. Coils: Refer to paragraph 2.6, A, 12.
9. Filters: Filter sections shall have filter racks, at least one access door for filter removal, and filter blockoffs to prevent air bypass around filters. The filter sections shall be supplied with 2-inch filters. The filters shall be 2-inch, made with 100 percent synthetic fibers that are continuously laminated to a supported steel-wire grid with water repellent adhesive. Filters shall be capable of operating up to 625-fpm face velocity without loss of filter efficiency and holding capacity. The filters shall have a MERV 13 rating when tested in accordance with the ANSI/ASHRAE Standard 52.2.
10. Mixing Section: A functional section shall be provided to support the damper assembly for outdoor, return, and/ or exhaust air. Dampers shall modulate the volume of outdoor, return, or exhaust air. The dampers shall be of double-skin airfoil design with metal, compressible jamb seals and extruded-vinyl blade-edge seals on all blades. The blades shall rotate on stainless-steel sleeve bearings. Airfoil dampers shall be rated for a maximum leakage rate of 3 cfm/ft² at 1 in. w.g. complying with ASHRAE 90.1 maximum damper leakage. All leakage testing and pressure ratings shall be based on AMCA Standard 500-D. Dampers may be arranged in a parallel or opposed-blade configuration.
11. Outdoor Unit Paint: External surface of unit casing shall be prepared and coated with a minimum 1.5 mil enamel finish or equal. Units supplied with casing exterior factory-painted shall be able to withstand a salt spray test in accordance with ASTM B117 for a minimum of 500 consecutive hours. Unit casing exterior will be provided with manufacturer’s standard color, or alternative color when required.
12. Outdoor Unit Roof: Trane engineered inner roofs incorporate mid-span, internal thermal breaks to eliminate thermal conduction paths from the interior of the air handler to the exterior (2-inch R13 foam-insulated). Inner/ Indoor/ roof will be installed in such a manner as to prevent air bypass between internal components. A single layer Outer/Outdoor roof is utilized above the inner roof and will be sloped at a minimum 0.125 inches per foot either from one side of unit to other, or from center to sides of the unit. Roof assembly will overhang all walls of units by a 1.5-inch minimum.
13. Access/Inspection Sections: A section shall be provided to allow additional access/inspection of unit components and space for field-installed components as needed. The section length shall be variable to accommodate specific access, spacing, or dimensional requirements. An access door shall be provided for easy access. All access sections shall be complete with a double-wall, removable door downstream for inspection, cleaning, and maintenance. Interior and exterior door panels shall be of the same construction as the interior and exterior wall panels, respectively. All doors downstream of cooling coils shall be provided with a thermal break construction of door panel and door frame.
14. Controls: Field supplied VFD shall be mounted externally on the fan section in a NEMA Type 1 enclosure (unit sizes 3-120) or internally in a NEMA Type 4

equivalent unit casing (unit sizes 3-120) within a dedicated controls section or housed fan section. The internal enclosure shall be an integral part of the unit casing to allow for thermal venting to casing interior, but shall be accessible from unit exterior through access door. Internally mounted starters/VFDs shall have doors with the same construction as other doors on unit. An external disconnect shall be mounted through the access door to the starter or VFD to disconnect full power from starter/VFD, lights, or control power.

15. Start-up: Provide equipment startup by factory or factory trained technicians.

G. Exhaust Fan:

1. General: All exhaust fans shall be tested and rated in accordance with AMCA Standard 210. Fans exposed to weather shall have ventilated weatherproof housing over motor and drive assembly. Refer to Paragraph 2.6A for general requirements. All direct drive fans shall be provided with unit mounted speed controllers. All exhaust fans shall have a disconnect switch. All motors 1 horsepower and larger shall be the premium efficiency type.
2. Roof Fan (Direct, Downblast): Spun aluminum, roof mounted, direct driven, downblast centrifugal exhaust ventilator. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners and stainless steel fasteners on cap. Spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base shall have continuously welded curb cap corners for maximum leak protection. Discharge baffle shall have a rolled bead for added strength. An integral conduit chase shall be provided through the curb cap and into the motor compartment to facilitate wiring connections. Motor shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Unit shall bear an engraved aluminum nameplate. Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. An aerodynamic aluminum inlet cone shall be provided for maximum performance and efficiency. Motor shall be heavy duty type with permanently lubricated sealed bearings and furnished at the specified voltage, phase and enclosure. Backdraft damper. Greenheck.
3. Roof Fan (Belt, Downblast): Spun aluminum, roof mounted, belt driven, downblast centrifugal exhaust ventilator. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners and stainless steel fasteners on cap. Spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base shall have continuously welded curb cap corners for maximum leak protection. Discharge baffle shall have a rolled bead for added strength. A two piece top cap shall have stainless steel quick release latches to provide access into the motor compartment without the use of tools. An integral conduit chase shall be provided through the curb cap and into the motor compartment to facilitate wiring connections. The motor, bearings and drives shall be mounted on a minimum 14 gauge steel power assembly, isolated from the unit structure with rubber vibration isolators, and enclosed in a weather-tight compartment, separated from the exhaust airstream. Lifting lugs shall be provided to help prevent damage from improper lifting. Unit shall bear an engraved aluminum nameplate. Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Motor shall be heavy duty type with

permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure. Bearings shall be heavy duty regreasable ball type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed. Belts shall be oil and heat resistant, non-static Type 4L. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150 percent of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM. Backdraft damper. Greenheck.

4. Rook Fan (Direct, Upblast): Spun aluminum, roof mounted, direct driven, upblast centrifugal exhaust ventilator. Fan shall be UL 705 listed. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners and stainless steel fasteners on cap. Spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base shall have a one piece inlet spinning and continuously welded curb cap corners for maximum leak protection. Windband shall have a rolled bead for added strength. A two piece top cap shall have stainless steel quick release latches to provide access into the motor compartment without the use of tools. An integral conduit chase shall be provided into the motor compartment to facilitate wiring connections. The motor shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Unit shall bear an engraved aluminum nameplate. Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. An aerodynamic aluminum inlet cone shall be provided for maximum performance and efficiency. Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure. Exhaust fan shall have roof curb and hinged base with lock hasp and galvanized aircraft cable supports. Weep hole. Greenheck.
   Kitchen Hood Fans shall be UL 762 listed and shall have grease trough.

5. Roof Fan (Belt, Upblast): Spun aluminum, roof mounted, belt driven, upblast centrifugal exhaust ventilator. Fan shall be UL 705 listed. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners and stainless steel fasteners on cap. Spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base shall have a one piece inlet spinning and continuously welded curb cap corners for maximum leak protection. Windband shall have a rolled bead for added strength. A two piece top cap shall have stainless steel quick release latches to provide access into the motor compartment without the use of tools. An integral conduit chase shall be provided into the motor compartment to facilitate wiring connections. The motor, bearings and drives shall be mounted on a minimum 14 gauge steel power assembly, isolated from the unit structure with rubber vibration isolators, and shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Lifting lugs shall be provided to help prevent damage from improper lifting. Unit shall bear an engraved aluminum nameplate. Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure. Bearings shall be heavy duty regreasable ball type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed. Belts

shall be oil and heat resistant, non-static Type 4L. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150 percent of the installed motor horsepower. Exhaust fan shall have roof curb and hinged base with lock hasp and galvanized aircraft cable supports. Weep hole. The variable pitch motor drive must be factory set to the specified fan RPM. Greenheck.
Kitchen Hood Fans shall be UL 762 listed and shall have grease trough.

H. Split System Heat Pump (IDU/ODU):
1. General: Refer to Paragraph 2.6A for General Requirements. Completely assembled and factory tested. Provide all starters and relays required for operation. All components by same manufacturer. Trane-Mitsubishi.
2. Outdoor Unit:
a. Compressor: Sealed hermetic rotary compressor with vibration isolator mountings. Crankcase heater, suction line accumulator, recycling timer. High and low head pressure/temperature protection. Motor overload protection, low ambient feature to 20F cooling mode. High and low side service valves. Recycling timer. Single phase start assist kit. 5-year extended warranty.
b. Fan and Coil: Finned tube non-ferrous coil. Propeller type fan, 1200 RPM maximum, direct drive. Totally enclosed motor, overload protected, permanently lubricated, resiliently mounted.
c. Cabinet: Weatherproof, factory paint.
3. Indoor Unit:
a. Supply Fan: Direct drive, multi-speed forward curve, centrifugal fan, resiliently mounted. Thermally protected motor.
b. Indoor Coil: Copper tube, aluminum fin, DX coil.
c. Electric Heaters: Integral part of unit, complete with all operational and safety controls, single point wiring terminal, 5-year factory warranty, UL listed as a complete unit.
d. Condensate Pan: Install under complete coil area with drain connections.
e. Filter: Washable media. Class 2 or better.
4. Controls: Microprocessor control containing temperature selection, room temperature indication, automatic cooling/heating changeover, malfunction alarm, power failure automatic restart safety, and emergency operation function.

PART 3: - EXECUTION

3.1 PIPING INSTALLATION:

A. General:
1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Architect. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or

equipment. Vertical lines shall be installed to allow for building settlement without damage to piping. Lines shall be adequately braced against vertical and lateral movement. Pipe sizes indicated on the drawings are nominal sizes unless otherwise noted. Pipe sizes shall not decrease in direction of flow, unless otherwise noted.

2. Joints:
   a. Threaded: Pipe shall be cut square, and reamed to full size. Threads shall be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
   b. Welded or Brazed: Filler rod shall be of suitable or the same alloy as pipe. Brazing filler metal shall have a minimum melting point of 1100ºF. Welding or brazing shall be performed by a Certified Welder or Brazer as certified by an organization/institution that uses standards recognized by the American Welding Society (AWS) and meets the requirements of the ASME Boiler and Pressure Vessels Code, Section 9.
   c. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.
   d. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards.
3. Fittings and Valves:
   a. Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.
   b. Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
   c. Unions: A union shall be installed on the leaving side of each valve, at all sides of automatic valves, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.
   d. Valves: All valves shall be full line size. At equipment connections, valves shall be full size of upstream piping. Provide a shut-off valve at each point of connection to existing piping.
   e. Valve Accessibility: All valves shall be located so that they are easily accessible. Valves located above ceilings shall be installed within 24" of the ceiling. For situations where this is not practical or where valves are greater than 10' above floor, chain wheel operators shall be provided. Chain shall extend down to 7' above the floor. All such installations must have prior review by the Engineer.
4. Pipe Support:
   a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural system. Refer to drawings for additional requirements and attachment to structure. Side beam clamps shall be provided with retaining straps to secure the clamp to the opposite side of the beam. Vertical piping shall be supported with riser clamp at 20' on center (maximum). Support pipe within 12" of all changes in direction.

Pipe Size (In.)	Maximum Spacing Between Supports (Ft.)*		
	Copper	Sch. 40 Steel	Plastic

1/2	6	6	4
3/4	6	8	4
1	6	8	4
1-1/4	6	8	4
1-1/2	6	10	4
2	10	10	4
2-1/2	10	10	4
3	10	10	4
4	10	10	4
6	10	10	4
8	10	10	4

*Based on straight lengths of pipe with couplings only. Provide additional supports for equipment, valves or other fittings. Plastic piping shall be supported per the manufacturer's recommendations. Seismic requirements may reduce maximum spacing.

b. Hot Water Piping: Support individual pipes with insulation support and pipe hanger. Install per manufacturer's recommendations.

c. Chilled Water Piping: Support individual pipes with insulation support and pipe hanger. Install per manufacturer's recommendations. Piping shall have complete vapor seal.

d. Refrigerant Piping: Support insulated refrigerant line with construction channel and sheet metal support saddle or Cooper B-Line Armafix clamps. 5' spacing. Use isolation shield for uninsulated pipe. When using pre-charged tubing, all changes of direction shall be made with bending tools producing neat uniform bends. Free hand bends will not be accepted.

e. Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for review.

5. Miscellaneous:

a. Escutcheons: Provide chrome plated escutcheons where piping penetrates walls, ceilings, or floors in finished areas.

b. Pipe Sleeves: All piping passing through concrete or concrete block shall be provided with pipe sleeves. Allow 1" (nominal) clearance between sleeve and pipe or pipe insulation. Piping through walls or footings below grade shall be sealed with Link Seal. Pipes passing between floors shall have Holdrite HydroFlame water/firestop sleeves, UL listed.

c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe or pipe insulation sealed with fire rated materials in accordance with the requirements of 2019 CBC Section 714. Pipes passing between fire rated floors shall have Holdrite HydroFlame water/firestop sleeves, UL listed.

d. Thermometer or Pressure Gage Tap: Provide tee for instrument well. Minimum size of pipe surrounding well shall be 1-1/2". Mount on side of pipe.

e. Dielectric Couplings: Dielectric couplings shall be installed wherever piping of dissimilar metals are joined, except that bronze valves may be installed in ferrous piping without dielectric couplings.

B. Hot or Chilled Water Piping: Provide shut-off valve for each building and at each connection to equipment. Before threading, welding or grooving any pipe, it shall have a cloth material of the proper size pulled through pipe to clean out any foreign material, and then a visual inspection through pipe to verify it is clean. Any process done to pipe end will require that pipe end be inspected inside before a fitting is fitted to pipe (to insure that cutting oil or pipe burrs are removed). Always have pipe threading machine sloped to prevent cutting oil from running into the pipe. Branch lines leaving horizontal lines shall leave on the horizontal or at an upslope of 45°, unless they are rising up to another horizontal line which will insure the pipe to remain air free. All high points in any part of the system shall have the means to purge air. Unless otherwise noted all vents shall be 1/4" petcocks with 1/4" copper tube discharge. Route tube to condensate pan, floor sink, etc. If a drain point is not available, terminate tube with a return bend to allow water to be collected. Before connection to equipment, all piping shall be thoroughly flushed with water. Only equipment mounted on vibration isolators shall be connected with flexible connection. The manufacturer of the underground piping system shall instruct the installer regarding the manufacturer's required installation procedures. The manufacturer shall also provide sufficient job-site inspection to insure that the work is being accomplished in accordance with the plans, specifications and manufacturer's requirements. Upon completion of the installation, a certificate shall be furnished to the Architect by the manufacturer of the system, certifying the installation was made in accordance with his requirements and in compliance with the plans and specifications.

C. Condenser Water Piping: Provide shut off valve at each connection to equipment. Before installing, all pipe shall be rapped along entire length to loosen sand, mill scale, etc. Pipe 2" and larger shall be cleaned internally with wire brush. Before connection to equipment, all piping shall be thoroughly flushed with water. Do not install strainers between tower sump and pump suction. Connections to equipment mounted on vibration isolators shall be made with flexible connection.

D. Refrigerant Piping: Pipe shall be cut square. Joint surfaces shall be thoroughly cleaned, fitted and erected before brazing. Continuously purge with Nitrogen during brazing. After installation, evacuate to 29 inches of mercury, ambient temperature during evacuation shall not be less than 70ºF. After evacuation, fill with dry nitrogen to 250 psi and maintain for two-hour period without additional charge. After nitrogen test, purge with refrigerant charged through dryer and maintain holding charge in system and equipment. Refrigerant piping below grade shall be run in 4" (min.) PVC conduit with long radius ells. Seal ends of conduit watertight.

E. Flue Piping: Flue piping shall be installed in accordance with its UL listing and the manufacturer's instructions.

3.2 PIPING INSULATION INSTALLATION:

A. Chilled and Hot Water Supply and Return:
1. General: All chilled and hot water supply and return piping (including all fittings and accessories) and all chilled water equipment shall be insulated. Insulate a sufficient length of make-up water piping to prevent condensation.
2. Pipe: Apply pre-molded fiberglass sections to pipe using integral pressure sealing lap adhesive in accordance with manufacturer's recommendations. Stagger longitudinal joints. Seal butt joints with factory supplied pressure sealing tape.

3. Fittings and Valves:
   a. Wrap all fittings and valves with pre-cut fiberglass blanket to thickness matching adjoining insulation. Cover blanket with PVC jacket, solvent welded. Seal all joints with factory supplied pressure sealing vapor barrier tape with a 1-1/2" (min.) overlap on both sides of joint. Insulate all flanges, unions and valves except stems and operators. All joints on chilled water piping shall be sealed with vapor barrier coating in addition to the vapor barrier tape.
   b. For miscellaneous fittings and accessories for which PVC jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the fiberglass blanket with reinforcing mesh, one coat of lagging adhesive, and a final coat of vapor barrier coating.
4. Vapor Barrier Continuity: All exposed ends of insulation and all gaps or voids in vapor barrier shall be sealed with reinforcing mesh, one coat of lagging adhesive and a final coat of vapor barrier coating. Build up all horizontal areas to prevent water accumulation.
5. Pipe Hangers: Seal all joints at pipe hangers with vapor barrier tape. Joints on chilled water piping shall be sealed with vapor barrier coating in addition to the vapor barrier tape.
6. Piping Exposed to Weather:
   a. All piping and fittings exposed to weather shall have, in addition to the above described insulation, an aluminum jacketing. Insulation at grooved pipe couplings shall be covered with aluminum flange fitting covers. Secure in place with factory supplied straps. Install all joints and seams to prevent water entry, seal with 1/8” bead of gray metal jacketing sealant.
   b. For miscellaneous fittings for which aluminum jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the insulation with reinforcing mesh and at least two coats of outdoor mastic. Plastic fitting covers shall not be used where exposed to weather.
7. Additional Finish for Exposed Piping and Equipment: All piping and equipment exposed to view but protected from the weather shall be given an additional finish of PVC jackets. Do not install this jacket where it will be subjected to a temperature of 150ºF or more such as immediately adjacent to boilers. In these locations install reinforcing mesh, one coat of lagging adhesive and a final coat of vapor barrier coating.
8. Equipment: Chilled water equipment with continuous circulation (pumps, heat exchanger, etc.), shall be insulated with materials similar to those described in Paragraph 2-02. It shall be the Contractor's responsibility to provide adequate insulation to prevent condensation, a complete vapor barrier, weatherproofing for equipment exposed to the weather, and a neat-appearing installation. Insulate hot water equipment same as above except no vapor barrier. Submit materials and method of installation to Engineer for review.

B. Refrigerant Piping: Cover piping with foamed plastic insulation. Longitudinal and end seams shall be thoroughly cemented with adhesive in accordance with manufacturer's recommendations. Cover all fittings, unions, valves and connections. Piping exposed to view shall be covered with PVC jacketing. Piping exposed to weather shall be covered

with aluminum jacketing, install all joints and seams to prevent water entry, seal with 1/8” bead of gray metal jacketing sealant.

3.3 DUCTWORK INSTALLATION:

A. General:
1. Standards: Unless otherwise noted, all ductwork shall be constructed and installed in accordance with current SMACNA Standards. Ductwork shall be built to a pressure classification equal to or greater than the maximum operating pressure at that point in the ductwork. A copy of these standards shall be maintained at the job site at all times. Duct work and accessories shall be installed in a manner to prevent vibration and rattling.
2. Access: Provide duct access doors as required to adjust equipment and dampers. Provide wall or ceiling access panels, or remote actuators as required where equipment and dampers are not otherwise accessible. Remote regulator shall be as detailed on drawings.
3. Flanges and Escutcheon: Where ductwork penetrates walls, ceilings, or floors, furnish and install flange or escutcheon of same material as duct.
4. Flexible Connections: Connection of ductwork to any vibrating equipment shall be with 3" (min.) flexible connection. Install with ample slack and uniform gap. There shall be no metal to metal contact across flexible connection. Flexible connections exposed to weather shall have a protective sheet metal cover.
5. VAV/VVH System: For all variable air volume (VAV) systems, the supply ductwork between the fan discharge and the VAV boxes shall be constructed per SMACNA standards to a pressure level equal to the maximum shut-off pressure the fan can generate. All joints in this ductwork shall be sealed with duct sealant in accordance with manufacturer's recommendations. Install VAV boxes with four diameters of straight duct on up-stream side.

B. Low Velocity-Low Pressure (up to 2,000 ft/min and up to 2.0 in water):
1. Sheet Metal Ductwork:
a. Ells: Ells with less than standard radius and square ells shall be fitted with turning vanes.
b. Tees: Tees in supply ductwork shall be straight tap-in with extractor or 45 degree take-off as shown on drawings. Grilles or branches in supply ductwork shall be a minimum of 8 duct diameters downstream of tees.
c. Duct Joints and Seams: All joints and seams which are not exposed to weather shall be sealed airtight with duct sealant. All joints and seams exposed to weather shall be sealed air and water tight with outdoor sealant. (See Part 2 of this Specification). All joints on metal ductwork exposed to view inside building shall be sealed air tight with grey duct sealant.
d. Dampers: Install volume control damper and damper regulator in all branch ducts.
2. Flexible Glass Fiber Ductwork: The use of flexible duct is limited to the last 5 feet of each branch duct (i.e. one 5 foot section of flexible duct may be used to connect the grille to the sheet metal branch duct). No joints are permitted in this 5' length. Hangers shall be 4" wide metal straps spaced to prevent sagging, 42" spacing maximum. Insert 6" wide fiberglass pad between duct and hanging strap. Joints shall be installed with stainless steel or nylon draw bands, Duro Dyne

Dyn-O-Tie. Minimum turn radius shall be in accordance with SMACNA Standards (turn radius of duct centerline not less than 1.5 times the duct diameter).

3. Spiral Wound Metal Ductwork: At side duct grilles, the grille shall be cut directly into the spiral duct. Duct to duct joints shall be made with the spiral seam rotated so that the seam forms a continuous helical pattern across the joint.
4. Moisture Bearing Exhaust Ductwork: Joints shall be made with male end in direction of airflow and shall be sealed watertight with mastic. Unless otherwise indicated, the ducts shall slope down towards the source of moisture (grille, hood, drier, etc.). Sheet metal screws or any other device that protrudes into the duct shall not be used for clothes drier exhaust ducts.
5. Grease Bearing Exhaust Ductwork: Horizontal portions of the duct shall slope down towards the hood at 1/4" per foot (min.) unless the total horizontal length exceeds 75 feet, then the slope shall be 1" per foot (min.). Provide access panels at changes of direction as required by CMC. Drains shall be provided at low points in horizontal ducts per 2016 CMC 510.1.3. Horizontal ducts shall be provided with access in accordance with 2016 CMC Section 510.3.3.
6. Underground Ductwork: Install ducts with constant slope up to grilles. All ducts and fittings shall be anchored to prevent floating as slab is poured. Any rectangular metal duct or fitting which is not protected with a polyvinyl chloride coating shall be encased in 3" (min.) concrete. Polyethylene ductwork installation shall comply with the manufacturer’s installation instructions.

3.4 AIR TERMINALS AND DUCT FITTINGS INSTALLATION:

A. General: Unless otherwise noted, all air terminals and duct fittings shall be installed in accordance with current SMACNA Standards. Terminals and fittings shall be installed in a manner to prevent vibration and rattling. Metal surfaces exposed to view behind grilles and registers shall be painted flat black.

B. Fire/Smoke Damper: Shall be installed in accordance with the manufacturer's recommendations. Provide access doors as required, label per CBC. Manufacturer's instructions shall be available to the inspecting authorities. Shall be tested according to State Fire Marshal requirements.

3.5 DUCTWORK INSULATION INSTALLATION:

A. General: Insulate all sheet metal supply, return and outside air intake ductwork except as noted below. Insulation shall be continuous through walls and floors except at fire dampers.

B. Where Insulation Is Not Required: Do not insulate factory-insulated ducts or casings, acoustic lined ducts, fibrous glass ducts, underground ductwork, supply or return ductwork exposed to view in the space that it serves, or exhaust ductwork.

C. Concealed Ductwork: Wrap concealed ductwork including outside air intakes with fiberglass blanket lapped 2" minimum. Secure with staples 4" on centers maximum on straight runs and 3" maximum at elbows and fittings. Insulation on bottom of ducts wider than 36" shall also be secured with mechanical fasteners at 24" on center.

D. Acoustic Lining: Unless otherwise indicated, all supply and return ductwork in equipment rooms, all ductwork exposed to weather and other ducts as indicated on drawings, shall have acoustic lining. Do not acoustic line outside air intakes. Where acoustic lining is installed, increase each sheet metal dimension to accommodate lining and maintain clear inside duct dimensions shown on drawings. Apply lining with bonding adhesive in accordance with manufacturer's recommendations and also secure with mechanical fasteners in accordance with SMACNA Standards. Seal exposed edges of lining with bonding adhesive.

E. Fire Resistive Wrapped Ducts: Where indicated on drawings, ductwork shall be covered with fire resistive duct wrap. Install in accordance with it’s UL or Omega Point Laboratories Design number (as applicable) and the Manufacturer’s Installation Instructions.

3.6 EQUIPMENT INSTALLATION:

A. General: It shall be the responsibility of the equipment installer to ensure that no work done under other specification sections shall in any way block or otherwise hinder the equipment. All equipment shall be securely anchored in place. All equipment shall be installed level.

B. Air Handling Units: Spring isolators shall be adjusted to allow movement to maximum free spring length. Piping support shall be designed so that piping weight does not bear on equipment. Hot water coil shall be mounted upstream of chilled water coil.

C. Gage Taps: Gage taps, such as Pete's Plugs, shall be installed immediately adjacent to all heat exchanger and pump connections (i.e. inlet and outlet of all pumps, boilers, chillers, condensers, coils, etc.). Taps shall be installed to allow for a pressure gage or thermometer to be easily inserted and read. Provide 1 set of gages (pressure gage with Pete's Plug adapter, chilled water thermometer and hot water thermometer). Deliver to Owner.

D. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

E. Pumps: Install pumps with a minimum of 8 diameters of straight pipe at the pump suction unless a suction diffuser is installed. Sufficient clearance to wall or other obstructions shall be provided so that motor and rotating parts can be removed without disassembly of volute or piping. Anchor bolt configuration shall be compatible with this method of removal. Pedestal mounted pumps shall have their bases grouted. Realign pump and motor according to Hydraulic Institute Standards after grouting and connection of piping.

F. Boiler: Installation shall be in accordance with California Code of Regulations, Title 8, Industrial Relations. Where required, permit for system operation shall be obtained and permanently posted at installation.

G. Equipment Platforms: Shall be as shown on drawings and as follows: Flashing and platform cover shall be 22 gage (min.) sheet metal. All joints and seams shall be soldered with 2" (min.) overlaps. Provide 3/4" gap around perimeter between roofing and platform

cover to facilitate re-roofing. Extend drip lip down 3" (min.). Provide 30# felt under platform cover.

3.7 TESTS AND ADJUSTMENTS:

A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Architect. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested.

B. Piping Tests:
1. General: Tests may be made in sections, however, all connections between sections previously tested and new section must be included in the new test. There shall be no drop in pressure during test except that due to ambient temperature changes. All components of system not rated for test pressure shall be isolated from system before test is made.
2. Water Piping: Maintain 100 psig water pressure for 4 hours.

3.8 SYSTEM ENERGY BALANCE:

A. Scope: Provide the services of an independent test and balance agency to test, adjust and balance, retest and record performance of the system to obtain design quantities as specified. The agency must prove that they have no affiliation with any equipment manufacturer, design engineer, installing contractor, or any other party which might lead to a conflict of interest, in order to provide an unbiased, third party system balance and report.

B. Qualifications: Prior to commencing work, the agency shall be reviewed by the Engineer and shall be certified by the Associated Air Balance Council, National Environmental Balancing Bureau or Testing, Adjusting and Balancing Bureau. The agency shall provide documentation of having successfully completed at least five projects of similar size and scope.

C. Instruments: All instruments shall be accurately calibrated; calibration histories shall be available for examination. Application of instrumentation shall be in accordance with AABC, NEBB or TABB standards.

D. Submittals: Include in shop drawings copies of forms to be used for testing and balancing showing all data which is to be recorded. Three copies of completed balance report shall be submitted to and reviewed by the Mechanical Engineer prior to the final mechanical construction review.

E. Procedure - General: Procedure shall be in accordance with Associated Air Balance Council's "National Standards for Field Measurements and Instrumentation - Total System Balance", Volume Two, No. 12173, or equivalent NEBB or TABB standards. System shall be in full, continuous operation during test. Balanced quantities shall be plus 10%, minus 0% of design quantities. All nameplate data, manufacturer, model and serial numbers shall be recorded for each item tested.

F. Extended Warranty: The test and balance agency shall include an extended warranty of 90 days after completion of test and balance work, during which time the Engineer, at his discretion, may request a recheck or resetting of any item or items in test report. The agency shall provide technicians to assist the Engineer in making any tests he may require during this period of time.

G. Air Balance Procedure (For Each Air Handling System):
1. All air filters shall be clean when air balance is performed.
2. Provide a sketch of the equipment showing exactly where all pressure readings were taken.
3. Adjust blower RPM to design requirements.
4. Record motor full load amperes.
5. Make pitot tube traverse of main supply and return ducts and obtain design CFM at fans.
6. Record system static pressures, inlet and discharge.
7. Record filter quantity, size(s) and pressure drop across filter(s) at each filter bank.
8. Adjust system for design CFM recirculated air.
9. Adjust system for design CFM outside air.
10. Record entering air temperatures. (DB heating, DB and WB cooling.)
11. Record leaving air temperatures. (DB heating, DB and WB cooling.)
12. Adjust all main supply and return air ducts to design CFM.
13. Adjust all zones to design CFM, supply and return.
14. Adjust all diffusers, grilles and registers to plus 10%, minus 0% of design requirements.
15. Adjust CFM at all exhaust fans, make-up units, etc. (high and low speed, where applicable). Record applicable data from items 1 through 11 above.
16. Each grille, diffuser and register shall be identified as to location.
17. Verify proper diffusion pattern for all ceiling grilles and that all sidewall grilles are set for 5 degrees upward deflection unless otherwise noted. Make a notation of any that are not set properly.
18. Size, type and manufacturer of diffusers, grilles, registers and all tested items shall be identified and listed. Manufacturer's ratings shall be used to make required calculations on all items.
19. Readings and tests of diffusers, grilles, and registers shall include required FPM velocity and test resultant velocity, required CFM and test resultant CFM after adjustments.
20. In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified. Testing agency shall check all controls for proper calibrations and list all controls requiring adjustment by control installers.
21. All diffusers, grilles and registers shall be adjusted for required air patterns and to minimize drafts.
22. As a part of the work of this contract, THE AIR CONDITIONING CONTRACTOR shall make any changes in pulleys, belts and dampers or the addition of dampers required for correct balance as recommended by air balance agency, at no additional cost to Owner.
23. Set, test and adjust packaged heating/cooling unit economizer operation in cooperation with controls contractor. Record minimum and maximum outside and exhaust airflows.

H. Water Balance Procedure (For Each Pumping System):
1. Set valves for maximum coil flow.
2. Remove and clean all strainers.
3. Examine water in system and determine if water has been treated and cleaned.
4. Check expansion tanks to determine that they are properly charged and that the system is completely full of water. Bleed air from system.
5. Set operating temperatures of all equipment to design requirements.
6. Air balance must be complete before water balance begins.
7. Adjust pumps to design flow by use of differential pressure gage calibrated in feet of water.
8. Adjust water flow through all equipment to design flow.
9. Record leaving and return water temperatures at all equipment. Reset to correct design temperature.
10. Record water temperatures at inlet side of coils. Record rise or drop of temperatures from source.
11. Balance all coils for design flow and mark settings on flow controllers.
12. After coils are balanced, recheck settings at all equipment and readjust if required.
13. Record pressure drop through coils, and reset to design flow. Set pressure drop across bypass valve to match coil full flow pressure drop.
14. Record the following at each coil:
    a. Inlet water temperatures.
    b. Leaving water temperatures.
    c. Pressure drop across coil.
    d. Pressure drop across bypass valve.
15. Record pump suction and discharge pressures at operating condition and also with pump discharge valve completely closed.
16. Record running amperage of pump motor at operating condition and also with pump discharge valve completely closed.
17. Record water metering device readings.

3.9 WATER TREATMENT:

A. General: All new HVAC equipment and auxiliary water piping systems shall be cleaned, passivated and treated as herein specified. Chemical compound identifications are from San Joaquin Chemicals, Inc., a State of California Contractor, License #461677. A written generic formula including active ingredients percentages must be submitted for review to be accepted as equivalent. Provide treatment as required to control scale, corrosion, biological growth, foaming and general fouling. Chemical treatments indicated below are generic in nature, actual formulations, dosages and application shall be determined by analysis of the make-up water to be treated with consideration for the system metallurgy, type of treatment equipment employed and operating units characteristics. Initial cleaning, preparation and start-up shall be supervised by the water treatment company's field service application specialist having a minimum of ten (10) years' experience with these type applications. The water treatment contracting company shall have not less than fifteen (15) years' experience with these type applications.

B. Cleaning and Initial Preparations:
1. Initial Fill: As the first water is introduced into the system, add not less than 10 gallons for each 1,000 gallons of contained water volume of a liquid blend of

alkaline detergent; SANASOLV ® 6103 for closed systems, SANACOR ® 2605 - WR metal passivator as a white rust inhibitor for open galvanized systems, and SANACOR ® CUI for metal passivator as an enhanced copper tube corrosion inhibitor, comprised of the following ingredients:

Closed (Hot, Chilled, Non-Galvanized Open Systems):
- Sodium Silicate Penta-hydrate
- Sodium Tri-Polyphosphate
- Tri-Sodium Phosphate
- Dispersing Polymers
- Wetting Agent, non-ionic

Open (Galvanized Passivator):
- Ortho-phosphate
- Poly-phosphate
- Dispersing Polymers
- Azole
- Buffered at pH 7.2-7.8

Open (Enhanced Copper Tube Passivator):
- Azole in solution (pH 7.5 to 8.5)

2. Circulation: The above closed loop detergent shall be re-circulated for not less than twelve (12) hours/not more than forty-eight (48) hours after which the system shall be rapidly dumped with re-circulating pumps operating to provide maximum practical motion, and whenever possible, with simultaneously adding or chasing with rinse water. It is important that make-up water rate exceed water discharge rate. In either case, the system shall be flushed until neutral to phenolphthalein, reaches the same pH and TDS levels as the clean flushing water and is free from suspended material and color. Provide circulating pumps as required. If existing main circulating pumps are utilized for flushing the system, the entire system shall be flushed and re-treated.
   a. After flushing, all strainers shall be removed and cleaned. If the system contained a significant level of suspended solids, recirculating pump seal replacement may be required as requested by the project engineer as recommended by the water treatment field service application specialist. These functions will be the responsibility of the mechanical contractor with supervision by the water treatment applications specialist.
   b. Be sure that all heating and/or cooling coils are kept open during the cleaning and flushing process and that cleaning solution is re-circulating through them and totally flushed from the entire system. These functions will be the responsibility of the mechanical contractor with supervision by the water treatment applications specialist.
   c. After flushing cleaner/metal passivator from the open galvanized system, immediately re- passivate galvanized systems with SANACOR® 2605-WR at 10 gallons/1,000 gallons contained water and leave the passivator in the system to naturally deplete during normal operating blowdown cycles.
   d. After flushing cleaner/metal passivator from the open condenser water system, immediately re-passivate these enhanced copper alloy tube systems with SANACOR® 2605-CUI at 10 gallons/1,000 gallons contained water and leave the passivator in the system to naturally deplete during normal operating blowdown cycles.
3. Initial Treatment Closed Loop: As soon as possible after flushing (within two hours), and with clean water in the systems, introduce 800 to 1,200 parts per

million of sodium nitrite, pH buffer, yellow metal inhibitor and anti-scalants, (SANACOR® 2301-A) and adjust system water pH to 8.5 - 10.5. Maintain treatment concentration in all closed systems using by-pass feeders; (two-gallon feeders for less than 1,000 gallons contained water and five or twelve-gallon feeder for larger systems.

4. Initial Treatment Open System: Introduce 500-1000 parts per million recommended SANACOR® 2600 series antiscalant/antifoulant/metal passivator/inhibitor to open recirculating water systems. Allow this inhibitor to fall naturally within control limits as recommended by the water treatment applications specialist. This inhibitor does not replace the galvanized or enhanced copper tube passivators that should already be in the systems and allowed to dissipate through normal system bleed-off.

C. Certification Before Start-Up: Equipment shall not be started until the water sides of all units have been cleaned and treated per these specifications under the supervision of the water treatment company's applications specialist. The field service applications specialist or their designate shall prepare a letter and submit it to the mechanical contractor and/or consulting engineer indicating that all piping systems have been properly cleaned and treated and are ready to be put into operation.

D. Continuation of Supervision: The water treatment service company shall provide supervision of the water treatment program for a period of not less than one year from commencement of the water treatment program which shall consist of analysis of all treated systems and the submittal of a written analytical report stating the current conditions and recommendations for maintaining optimal controls. This service shall be performed monthly or more frequently as specified or required.

E. Chemical Supply: Provide a one year (12 months) supply of chemicals from commencement of the water treatment program to maintain the following criteria based on 17 hours operation per day, 7 days a week, at 75% loading capacity. Water treatment contractor must allow for one year supply of chemicals, (including biocides) regardless of the system operating conditions. The only exception: if a closed water system is dumped or takes on more than 10% make-up of its total water volume during the first year, additional required chemicals cost over the 10 % will be reimbursed with proper documentation. Part of this documentation requires water treatment contractors proposed closed system use rate requirements to be supplied with Submittals.

1. Chilled Closed System: Provide and maintain an excess sodium nitrite concentration of 800-1200 ppm by addition of SANACOR® 2301-A. Consider ≅ 10% per year water loss by volume.
2. Hot Water Closed System: Provide and maintain an excess sodium nitrite concentration of 800-1200 ppm by addition of SANACOR® 2301-A. Consider ≅ 10% per year water loss by volume.
3. Condenser Cooling Water: Provide and maintain between 200 and 500 ppm total treatment concentration of recommended SANACOR® 2600 series inhibitor. Inhibitor selection and feed rate will be based on make-up water quality, system metallurgy, projected cycles of concentrations, type of system and environmental compliance requirements.
4. Condenser Cooling Water: Provide biocide (SANATOX® 2080) pelletized bromine/chlorine hydantoin (must be over sixty (60%) percent active as Bromine) to be fed via bypass pot feeder specifically designed for this type oxidizing product. A second and sometimes third liquid non-oxidizing biocide and/or bio-dispersant may be considered based on location, environment, system size and type, etc.

5. Responsibility: It is the responsibility of the water treatment service company to guarantee biological control of each treated system for the first year warranty period. In addition to maintaining corrosion rates less than 1.0 mpy for steel, 0.1 mpy for yellow metals, with no pitting, and total elimination of scaling and/or fouling of all treated systems.

F. Equipment and Accessories:

1. Water Meter: A properly sized pressure regulated back-flow preventer shall be installed in any make-up water line where chemicals may be injected. A properly sized contacting head water meter or a paddle wheel flow sensor (in-line or wall mount with pulse counter) which will signal a chemical pump with both internal and external operating characteristics for feeding inhibitor chemical proportional to real-time system make-up. Seametric MJNR-200 1 pulse/10gal
2. Controller: Controller shall continuously monitor the conductivity of an open cooling water stream via a remote or attached sensor. As the conductivity rises above a pre-set conductivity level as established by the water treatment company, the controller shall signal a N/C motorized bleed valve to open, evacuating high TDS recirculating water. The valve shall remain open until the conductivity drops two to five percent below the pre-set level. The conductivity level shall be adjustable from 100-5,000 micro siemens. Controller shall have operating mode indicator lights, connections for chemical pump, N/C bleed-off valve and shall have a conductivity sensor flow switch and flange for wall mounting, Advantage, Aqua Track, Wal-Chem, Lakewood, Pulsatron, models or approved equal. Walchem WCTT600PSNNM-BN
3. Chemical Pump: Positive displacement pump with variable stroke and frequency, 2.0 gph - 250 PSI, both external and internal input function, acrylic or PVC head as appropriate for the chemical proposed with reinforced, thermoplastic housing. Provide foot valve with strainer, 4-function discharge valve, polyethylene tubing. Advantage, Liquid Metronics, Inc., Walchem or approved equal. Walchem1XB-007TCN-U
4. Biocide/Bio-dispersant Pump: Positive displacement Pump with variable stroke frequency, 2.0 gph – 250 PSI with input function from the controller timer, acrylic or PVC head as appropriate for the biocide, thermoplastic housing, provide foot valve with strainer, 4 function discharge valve, polyethylene tubing. Advantage, Liquid Metronics, Inc., Walchem or approved equal. One pump is required, a second pump will be supplied at the discretion of the water treatment company with E.4. Walchem 1XB-007TCN-U
5. Solenoid/Motorized Bleed Valve: Normally closed, pilot operated diaphragm valve or normally closed motorized, ¾” to 2” pipe size based on projected line pressure and bleed-off rate.Griswold Controls, Model 4160, 115 volt coil, Erie N/C motorized valve or approved equal. GTP-MGV10B/WP
6. Chemical Tank: 65-110-250 gallon polyethylene double walled containment or chemicals resistant powder-coated steel or stainless steel overlay containment of polypropylene chemical bulk container. Proper selection of tank capacity must assure a minimum of three (3) months chemical supply.
   1-DW65-BLUE (INHIBITOR)
   1-DW65-BLUE (BIOCIDE)
7. Brominator: Properly sized for tower capacity to maintain not less than 60 days supply of briquettes during the optimum use period. Include all necessary valves, air vent, calibrated outlet valve, inlet ball valve, calibrated slotted ball valve, drain

line, flow meter (2-10 g.p.m. or as required). GTP/BR-40-HP W/MGV10B/WP CPV Moto Valve

G. Analytical Equipment and Reagents:
Test Master Jr. Test Cabinet, complete or equal
Myron L 6PIIFC pH/Conductivity/ORP meter
Sodium Nitrite Drop Test Set
Open Recirculating Inhibitor Drop Test Set (T. S. 260 or approved equal)
Bromine/Chlorine Test Set, Color Comparator Type
Total Alkalinity Drop Test Set
SANACHECK Bio-Stick Testing
*All reagents supplied for first year of operation

H. Installation: Install all equipment and accessories per the piping diagrams on drawings and the manufacturer's recommendations as approved by the consulting engineer and under the direction of the water treatment contractor.

I. Electrical: Work in this section must be performed by the electrical contractor under the supervision of the water treatment contractor.

J. Submittal Acceptance: Submittals will not be accepted without annual chemical and biocide use calculations and these calculations must illustrate proper chemical double-walled bulk containment tanks selection and brominator selection based on the water treatment company’s submitted use rate calculation, referring to operating load as specified under E. “Chemical Supply”. The water treatment supplier is obligated to supply items specified for one year regardless of their calculations as submitted, with exception under E for closed loop systems.

END OF SECTION

SECTION 260535 - PRODUCTION SYSTEMS ELECTRICAL INSTALLATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Provision of services as listed within Div. 26 related to the installation of production systems and electrical infrastructure including:

    a. Production lighting control systems
    b. Production AV systems
    c. Telescopic seating units
    d. Production power “company switches”
    e. Coordination with all related sections doing adjacent or integrated work.

B. It shall be under the work in this section to provide electrical infrastructure, accommodations and connections to systems in other Sections.

1. It shall be under the work of a specialty sub-contractor for Section 11 61 83 – Production Lighting Control to furnish equipment only to the jobsite. It is under the work in this Div. 26 Section to coordinate with, receive, install all equipment (line voltage and low voltage) and provide all power infrastructure, conduit, raceway, wire, connectors, hardware and other incidental items, terminations for both line voltage and testing to provide a complete and working system. Reference PL Documents for other electrical requirements.
2. It shall be under the work of a specialty sub-contractor for Section 12 66 23 – Telescopic Seating to furnish equipment to the jobsite. It is under the work in this Div. 26 Section to coordinate with, receive, install all equipment and connection panels (line voltage and low voltage) mounted to the building, and provide all power infrastructure, conduit, raceway, wire, connectors, hardware and other incidental items, terminations for both line voltage and low voltage and testing to provide a complete and working system, including low voltage aisle lighting accommodations. Reference PS Documents for other electrical requirements.
3. It shall be under the work of a specialty sub-contractor for Section 27 41 16 – AV Systems to provide and install equipment, including low-voltage wire pull. It is under the work in this Div. 26 section to provide and install a complete and working line-voltage isolated-ground power infrastructure. It is also under the scope of Div. 26 to provide and install all low-voltage conduit, raceway, and standard backboxes. Specialty backboxes will be provided by the 27 41 16 contractors to Div. 26 for installation. Reference AV Documents for other electrical requirements.

C. It is under the work of this section to provide all conduit and backboxes to all Production Lighting and AV systems.

1. Exception: Surface and rail mounted Production Lighting backboxes will be furnished by Div 11 Production Lighting Control Systems.

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2. Exception: Floor boxes and specialty (non-standard or NEMA) backboxes will be furnished by Div 27 AV Systems.

1.2 RELATED SECTIONS

A. Coordinate with the following sections in carrying out this work:

1. Division 1 General Conditions
2. Section 11 61 33 – Production Rigging
3. Section 11 61 83 – Production Lighting Control
4. Section 12 66 23 – Telescopic Seating
5. Other Division 26 Sections
6. Section 27 41 16 - AV Systems

1.3 REFERENCES

A. Comply with all national, state and local regulations. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.

B. All production system design drawings and specifications assume 100% above-grade, above-slab EMT conduit.

1. At the contractor's option, Rigid PVC and/or Rigid Metal Conduit (RMC) may be used at in-slab/on-grade, under-slab/in-grade, or in-slab/not on-grade conditions, so long as the requirements referenced below are met.

1.4 SYSTEM DESCRIPTION

A. Production Lighting Control System

1. The system shall be designed for the control of production lighting and shall consist of factory pre-wired dimming and processing rack enclosures containing dimmers, relay panels, power supplies, breakers, terminals and/or control electronics.
2. Dimmed and Relay circuits shall be connected to factory pre-wired wiring devices.
3. System shall work in conjunction with specified low-voltage control and receptacle stations.
4. All equipment is furnished as equipment only and must be installed and connected by the electrical contractor.

B. AV Systems- Electrical Power

1. The IG power system will be designed to provide clean power with reduced susceptibility to EMI/RFI, using an isolated ground and a dedicated isolation transformer.

C. AV Systems- Low Voltage Conduit

1. The conduit system is designed to reduce susceptibility to EMI/RFI, using EMT metallic conduit and physical separation.

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D. "Company Switches" are cabinets and receptacles specially designed for temporary production power connections.

E. Fixed Seating

1. The fixed audience seating is furnished with aisle lighting fixtures pre-wired into the chairs. The seats come with pigtails that must be terminated into cast in slab junction boxes and conduit provided by division 26. Some of the seats are demountable, and the connection must be made removable via plug-and-socket.
2. The fixed audience seating contractor shall furnish a low voltage transformer and manual dimmer(s) for aisle light intensity adjustment to be installed and connected by division 26.

F. Telescopic Seating System

1. A motorized telescopic seating system is being furnished and installed by the specialty sub contractor for Section 126623 – Telescopic Seating System. The Seating contractor will also provide any specialty or proprietary connector panels and face plates for device connection.
2. The seating contractor will provide all connectors, cable or flexible conduit and wire required for connections to the seating systems at wall box locations.
3. Motor connections:

    a. The seating manufacture will provide Motor power terminations and/or receptacles and any disconnects required for installation.
    b. Mounting and terminations to the building are under the work of the div 26 contractor.

4. Aisle lighting

    a. The seating contractor will provide transformers for aisle lights mounted in a wall box with a labeled cover plate as well as manual dimmer(s) for aisle lighting intensity adjustment, mounted in a labeled wall box with a locking cover.
    b. It is under the work of the Div 26 electrical contractor to mount equipment and provide terminations for all aisle lights.

5. It is under the work of this section to provide:

    a. All conduit, boxes to furnish devices related to seating systems.
    b. Any common receptacles panels or connections and any black face plates for pull boxes.
    c. Terminations for all line and low voltage connections including motor power and aisle light power.

1.5 DESIGN CRITERIA

A. Production Lighting System

1. Branch production lighting wiring and infrastructure shall provide 115VAC +/-3% at all wiring devices under a 575w lighting load.

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2. Production dimming shall be rated for 100% continuous operation. Branch wire size and conduit/raceway shall be sized for the full rated loads of the dimmers and 100% continuous operation of every circuit without deration on any part of the circuit or system, subject to the maximum overall feeder and protection devices as listed in Drawings. For 20A loads, assume 10AWG wire unless otherwise noted. Splices in the wire are not acceptable, the wire shall be continuous from dimmer rack connection to distribution device wire connector strip without any connections or splices in the wire between.
3. Control wiring shall be installed per the related trade and regulatory guidelines including but not limited to UL, NEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
4. In-slab/on-grade and under-slab/in-grade conditions: At the contractor's option, Rigid PVC and/or Rigid Metal Conduit (RMC) may be used, so long as the following conditions are met:

    a. Contractor must use the "wet location" cable as identified in the Production Lighting wiring key.
    b. "Wet Location" cable is larger in diameter, so the contractor must calculate the conduit sizes to maintain compliance with NEC fill ratios. Submit calculations for review.
    c. "Wet Location" cable is more expensive. The project will not accept a cost increase due to lack of communication between electrical contractor and Production Lighting contractor.

B. AV Systems: Isolated Ground and Isolation Transformer

1. All power to AV systems must be on a dedicated K-13 rated transformer, combined with an isolated ground system. AV power will be identified with orange outlets throughout the facility.
2. All orange IG outlets shall be identified with a label indicating load center and circuit. "P-Touch" style labels are acceptable.
3. The isolated ground system shall be a "star" configuration, meaning that all AV power system grounds ultimately reference the building ground at only one point, typically located in the main electrical service room. This location shall be in a separate junction box and shall be clearly labeled as to its function with a screw-on lamicoid label.
4. The main branches for the IG system (from main electrical room to branch AV power panels) will be fed with #3/0 AWG insulated ground cable. From these main points, branch load circuits connect to an IG busbar using standard-size (12 or 14 AWG) conductors. In addition, a #3/0 AWG IG conductor must be brought to the AV equipment racks, for termination to an equipment rack busbar, provided by the AV contractor.

C. AV Systems: Motorized Breaker Panel with Sequencing Card

1. Provide Lyntec Manufacturing Model RPC with the following options:

    a. Sequencing from contact closure and network control connection
    b. Integrated IG buss bar in attached separate cabinet.
    c. Bolt-On Breakers.

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d. Panelboard style
e. Circuit and main breakers as shown in electrical panel schedules
f. Provide control boards for all breakers in the panel.

2. In cases where one panelboard services circuits in two different spaces, configure panel with multiple sequencer control cards, so the panel may act as separate systems.
3. The AV systems contractor will provide the low-voltage control panel that will activate and de-activate the sequencing unit. Coordinate with AV systems contractor for connection and proper configuration of sequencing and timing.
4. The Fire Alarm system contractor will provide a contact closure for instantly shutting down power to all circuits. Connect to emergency terminals on Lyntec sequencing board. Coordinate with Fire Alarm systems contractor for connection and configuration.

D. AV Systems: Low-voltage conduit system

1. All low-voltage AV conduit shall be as indicated in the AV drawings, using a 100% EMT conduit pathway.
2. In-slab/on-grade and under-slab/in-grade conditions: At the contractor's option, Rigid PVC and/or Rigid Metal Conduit (RMC) may be used, so long as the following conditions are met:

   a. Contractor must use the "wet location" cable as identified in the AV cable schedule.
   b. "Wet Location" cable is larger in diameter, so the contractor must re-calculate the conduit sizes to maintain compliance with NEC fill ratios. Submit calculations for review.
   c. "Wet Location" cable is more expensive. The project will not accept a cost increase due to lack of communication between electrical contractor and AV contractor.
   d. Contractor must maintain stated separation and grouping requirements.

3. In-slab/not on-grade conditions, such as metal deck or floors not on grade: Rigid PVC and/or Rigid Metal Conduit (RMC) may be used, so long as the following conditions are met:

   a. Contractor must maintain stated separation and grouping requirements.

4. All AV wiring shall be installed per the related trade and regulatory guidelines including but not limited to UL, NEC, IEEE, and all manufacturer's recommendations and requirements.

   a. Contractor shall be responsible if work under their control voids or jeopardizes manufacturers' warranties.
   b. The following shall be met:
      1) NEC Article 725 and 800

5. The AV conduit system is comprised of five different signal types, A thru F:

   a. Mic
   b. Line

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c. Video/Communication/Data
d. Loudspeaker
e. Empty
f. Fiber

6. Each signal type (A thru F) is a separate system of conduits. A typical system will have five conduits exiting each on-stage multi-box.
7. The following conduit separation tables shall be observed:

SEPARATION OF AV CONDUIT TO AC

	AV CONDUIT
AC- BRANCH LOAD	36”
AC- FEEDER	48”
AC- BRANCH DIMMED LOAD	36”
TEL/DATA	12”
CONTROL (OTHER)	12”

AV CONDUIT TYPE SEPARATION

		A	B	C	D	E/F
A		--	12”	12”	12”	12”
B		12”	--	6”	6”	6”
C		12”	6”	--	6”	6”
D		12”	6”	6”	--	6”
E		12”	6”	6”	6”	--

1.6 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the Owner’s Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.
B. Documentation for the substitution shall be submitted with supporting material and shall including the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner’s Representative shall be the sole evaluator of the fitness of the substitution.
C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.7 SUBMITTALS

A. Reference applicable sections for submittal requirements. Final wire types and electrical installation requirements shall be indicated on final approved shop drawings for each discipline. The final approved shop drawings shall supersede the contract documents.
B. Shop Drawings:

1. Submit full-size (minimum 30” x 42”) scaled shop drawings that show the following:

a. All production systems conduits or devices to be included in-slab, under-slab, or in concrete/CMU walls.
b. Dimensioned locations of in-floor trenchduct, floor boxes, or any other production systems device that will be cast in concrete, including conduit sizes and entry points.
c. Dimmer rack and relay panel mounting
d. Floor pocket mounting

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2. Submit manufacturer cut sheets or product data for the following devices:

    a. Motorized Breaker Panel Board
    b. Company Switches
    c. Overhead Cable Tray
    d. Floor Pockets
    e. NEMA-1 Raceway

3. Contractor is responsible for any repair or remediation necessary due to failure to receive approval for production systems conduit or devices placed in-slab, under-slab, or in CMU walls.
4. Conduit, Backboxes and Electrical Systems Verification Letter:

    a. Within 30 days of contract award, the contractor shall review all relevant information pertaining to the production lighting control systems low-voltage conduit, backboxes, and line-voltage electrical work to be performed by division 26. A formal memo, outlining acceptance (or desired changes) of the contract drawing shall be provided. Failure to provide this memo indicates acceptance of, and liability for, the conduit, backboxes and electrical systems as indicated in the contract drawings.
    b. If the contractor chooses to exercise the option to place conduit in-slab and on-grade or under-slab and in-grade, the contractor shall submit a revised AV conduit riser with new conduit size calculations using cables from the “wet-rated” AV cable schedule.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Components and types per referenced specification sections except where manufacturer’s recommendations and requirements vary.

    1. Refer to final, approved production systems manufacturers or specialty sub contractor’s shop drawings for final control wiring types, counts and routes, which shall govern over drawings. Coordinate with manufacturer or specialty sub-contractor for alternate routes and wire counts in case of field limitations.

2.2 PRODUCTION LIGHTING

A. All power and control wiring shall be labeled at each end and connected per circuit assignments as shown on the PL drawings and approved shop drawings, as applicable.
B. Provide excess tails at ends as recommended by the manufacturer.
C. Control wiring shall be continuous with no splices per the applicable industry standards.
D. Wiring device wiring:

    1. Branch load wiring shall include a dedicated neutral for each circuit, sized as a current carrying conductor. No common neutrals will be accepted.

2. Provide one ground wire for every 6 circuits within each wiring device with a minimum of one ground wire per wiring device, homerun to and terminated at the dimmer rack or relay panel, sized per applicable regulatory requirements.
3. Any and all parallel circuits shall be home run to the dimmer racks unless otherwise noted.
4. Coordinate circuit management for proper landing on device lugs. Coordination shall include, but not be limited to verifying with the manufacturer during the submittal process and prior to manufacturing, provision of the appropriate lug sizes within the devices.
5. Branch circuit load wiring shall be continuous no splices will be acceptable between dimmer lugs and wiring device terminal strip.
6. Coordinate with manufacturer for the provision of properly sized terminals and lugs, as appropriate for compliant wiring. Wire size reductions or spliced leaders used for stepping down wire size to fit manufactures' terminals is not acceptable.
7. All power and control wiring for production systems shall be pulled in metal raceway. This shall include empty raceway provided for future production systems wiring.
8. Production lighting conduit shall be no smaller than 1" diameter, or the greater of what is required by either the applicable code, Drawings or the final, approved equipment shop drawings.

2.3 AV SYSTEMS

A. All low-voltage AV conduits shall have the following:

1. Clear and permanent labels at each end.
2. Pull strings installed. Pull strings shall be the type with distance markings to indicate length of conduit.

B. Overhead cable tray

1. Provide Cooper B-Line Series One, three dividers with four compartments, non-ventilated (solid) bottom, solid removable lids and associated clips, 18" width, 6-8" depth.
2. Provide in locations as shown in the drawings.

C. Floor Pockets

1. Install floor pockets at locations as shown on the drawings. Floor pockets will be provided by the AV and PL contractors.

    a. At locations where pocket is to be located on grade, provide "pour pan" below floor pocket backbox. Pour pan will provide at least 1" of concrete between grade and backbox to prevent corrosion.
    b. Floor pocket backbox shall be placed in flooring material to yield a finished product that is flush with the finish floor, including floor box cover.

2.4 MOTORIZED & SEQUENCED BREAKER PANELS

A. See related panelboard section. Provide motorized and sequenced breaker panels with the following features:

1. All A.C. power for the AV system shall be supplied from a time sequenced source capable of being remote controlled from multiple locations.
2. A means of visual operator feedback shall provide an indication of the progress of the power turn-on or turn-off sequence at each control point.
3. Time between sequence steps shall be adjustable from 1/8 second to 1 second.
4. Sequencing shall have a time delay adjustable between the low-level equipment circuits and the power amplifier circuits. The delay time shall have a field adjustable range from 1 second to 8 minutes.
5. The sequencing system shall be capable of shedding the load within 3 seconds after a power failure and automatically re-sequencing when power resumes and remains above 105 volts for more than 5 seconds without operator intervention.
6. The sequencing system shall have brownout protection; monitoring the line voltage and triggering an automatic shutdown if the line voltage drops below 95 volts for more than 2 seconds.
7. The sequencing system shall have emergency shutdown capability triggered by external contacts.
8. Un-sequenced circuits, as required, shall be supplied from the same A.C. source so that a single lever main circuit breaker is dedicated to the sound system.
9. Three phase sequenced panelboards shall have 200% neutrals.
10. All sequenced panelboards shall have a separate and attached isolated technical ground section.
11. All branch circuit breakers shall be bolt-on.

B. Provide panel size & circuits as indicated on the plans.

C. Provide LynTec Manufacturing model RPC series Sequencing Panelboard. Contact information: 800-724-4047. www.lyntec.com

2.5 COMPANY SWITCHES

A. 200A & 400A, 120/208VAC, 3-phase company switches shall have the following features:

1. Unit shall be UL Listed and labeled, and NEC Article 520 compliant.
2. The unit shall have a wiring chamber that contains both direct wire lugs and single pole industry standard “Camlok E1016” output connectors. Provide six cam-lock connectors. Individual connectors of appropriate sex per regulations and industry standard.
3. Cam and lug cables shall enter and exit the wiring chamber from access holes in the bottom of the enclosure.
4. A lockable hinged access door shall provide access to the wiring chamber, denying access to the connections when mated.
5. Outside of door shall have safety precautions dominantly displayed.
6. The access door shall engage the shunt trip mechanism of the main circuit breaker whenever it is not fully closed, so that connections cannot be made or broken under load.
7. Output lug connections shall accommodate a maximum of 250mcm cable.
8. The unit shall contain (1) 100% rated 3 pole main circuit breaker with a 65K AIC rating.
9. Breaker shall be recessed beneath the plane of the front panel of the unit to prevent accidental operation.

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10. Breaker shall be equipped with an OSHA compliant lockout and tagout padlock attachment to lock the handle in the off position when not in use.
11. The unit shall be equipped with light emitting diode indicator lights for each supply phase, labeled with NEC specified color-codes and alphabetic names of phases.
12. Contractor connections to the main circuit breaker shall accept up to 500mcm wire.
13. Enclosure shall be fabricated from 14 gauge steel and shall have (4) welded mounting tabs.
14. Special Accommodations:

    a. For the production lighting company switch, provide dual neutral connections.
    b. For the AV systems company switch, provide both isolated ground and building ground connections.

15. Acceptable units, subject to the specifications herein:

    a. Lex Products Powergate Company Switch
    b. ESL Power Systems Show Switch
    c. Or equal

B. Provide company switches in locations as shown on drawings. 120/208VAC, 3-phase, 100A company switches shall have the following features:

1. 3-phase, 120/208VAC safety mechanical interlocked pin and sleeve 4-pole 5-wire connector

    a. Mechanical interlock shall prevent the switch from being turned on –when nothing is plugged in and shall prevent something from being unplugged – when something is turned on.

2. Unit shall be UL Listed and labeled with safety interlocked outlet containing an integral 100A circuit breaker.
3. Ul Listed circuit breaker rated 65kAIC @ 208VAC provide short circuit and overcurrent protection.
4. Indicator lights for power on
5. 5100R9W pin and sleeve receptacle with protective cover.
6. Actuator rod allows user to turn on/off and reset tripped breaker.
7. Powder coated wrinkle black galvanneal enclosure, type 1
8. Certified for current interrupting at full rated current and voltage.
9. Rated for 10,000 mechanical cycles and 6,000 electrical cycles.
10. 21” x 11” x 10.5”
11. Acceptable units, subject to the specifications herein:

    a. ESL Power Systems – CSPS-100C-208Y/120-65-311-55-CW1

PART 3 - EXECUTION

3.1 INSTALLATION

A. Production Lighting Control System

1. It is under the work in this Div. 26 Section to receive and store the necessary materials and equipment for installation of the dimmer system. It is the intent of these specifications and plans to include everything required for proper and complete installation and operation of the dimming system, even though every item may not be specifically mentioned. The contractor shall deliver on a timely basis to other trades any equipment that must be installed during construction.
2. It is under the work in this Div. 26 Section to be responsible for field measurements and coordinating physical size of all equipment with the architectural requirements of the spaces into which they are to be installed.
3. It is under the work in this Div. 26 Section to install all lighting control and dimming equipment in accordance with final, approved manufacturer's approved shop drawings.

3.2 CONDUIT/RACEWAY INSTALLATION

A. Conduit/raceway shall not be placed where it obstructs production functions or the proper installation of other production systems.

1. No conduit/raceway is permitted on lighting pipes or rigging grids used for performance. Crossing pipes or grids used for performance shall only be allowed where authorized by the District's Representative. This restriction includes all horizontal catwalk railings. Vertical conduit/raceway shall be placed on vertical structural hangers or where otherwise permitted by the District's Representative.
2. No conduit/raceway is permitted within stage rigging wells.
3. No devices are permitted below 6" above bottom of fly tower rigging/roof beams.
4. No conduit/raceway is permitted on the fly tower gridiron walking surface.
5. No conduit/raceway is permitted on tension grid hangers below 6'-8" above walking surface of tension grid.
6. Clear zones shall be maintained where noted on Drawings and on specialty sub-contractors approved shop drawings. Violations shall be corrected as required by the District's Representative at no additional cost to the District.

B. Any conduit required to be placed in concrete slab or in grade shall be approved by the consultant. See requirements above.

C. Coordinate with related contractors and District's Representative.

3.3 COMMISSIONING

A. Production Lighting Control System

1. All branch load circuits shall be live tested before connecting the loads to the dimmer system load terminals.
2. All branch load circuits shall be live tested after termination for proper wiring, continuity and polarity. Irregularities shall be corrected before arrival of manufacturer's factory-trained personnel and Owner's Representative checkout.
3. Upon completion of the installation, including testing of load circuits, the contractor shall notify the dimming system manufacturer that the system is available for formal checkout.

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4. Notification shall be provided in writing, two weeks prior to the time factory-trained personnel are needed on the job site.
5. No power is to be applied to the dimming system unless specifically authorized by written instructions from the manufacturer.

B. Isolated Ground System

1. Upon final checkout, the contractor shall demonstrate the integrity of the isolation grounding system by removing the IG connection to the main building ground at the central connection point, and metering ground at various IG outlets throughout the space.

C. The Div. 26 Contractor shall be liable for any return visits by the specialty sub-contractor, factory engineer or Owner's Representative as a result of incomplete or incorrect wiring, or erroneous representation that the Systems are complete and ready for the related Contractor or Owner's representative to carry out their work.

END OF SECTION

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SECTION 274116 – PRODUCTION AV SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes: Services as listed herein and related to the furnishing, installation, and commissioning of audio, video and communications equipment.
B. Related Documents: The Conditions of the Contract and Division 01 – General Requirements apply to this section as fully as if repeated herein.
C. Related Sections: Coordinate with the following sections in carrying out this work:
   1. Section 11 61 33 – Stage Rigging Systems
   2. Section 11 61 83 – Production Lighting Control Systems
   3. Section 26 05 35 – Production Systems Electrical Installation
   4. Division 26 – Electrical

1.2 REFERENCES:

A. Comply with all national, state and local regulations and the procedures and requirements of the local authorities. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
B. Equipment shall be provided in accordance with the related trade and regulatory guidelines including but not limited to UL/ETL, NEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
C. Labor shall be provided in accordance with applicable labor regulations and practices.

1.3 DEFINITIONS:

A. Refer to the General Conditions for definitions.
B. Architect: For the scope in this Section, authorized personnel representing Owner and the Theater Consultant.

1.4 SYSTEM DESCRIPTION:

A. Black Box Theatre
   1. Audio- Reinforcement
      a. The reinforcement audio system is comprised of a digital mixer for events requiring a live operator, and an automatic mixing system for events that do not require a live operator. The digital mixer shall also be provided with expansion cards and accessories, as well as a rolling road case with doghouse as indicated in the equipment list and Drawings.
      b. Remote input devices with accessories as indicated shall be provided.

c. The internal programming of the DSP is under the scope of this work and shall be submitted for approval during the shop drawing process. The contractor is responsible to provide standard & customary DSP blocks, including necessary EQ, protection limiting, etc.
d. The system will use a digital audio snake, utilizing Dante protocol.
e. The DSP/matrix shall be capable of providing multiple inputs & outputs. All DSP programming is the responsibility of the AV contractor. DSP programming shall be carried out by a factory-certified programmer.
f. Dedicated network switches and associated patchbays shall be provided to support audio network systems.
g. One media player with theatre-specific functionality shall be provided for events requiring audio playback.
h. A rack-mounted Apple Macintosh computer with Apple keyboard and mouse shall be provided for multi-channel audio recording and playback. The computer shall be configured per audio playback software manufacturer recommendation. The computer shall have the following minimum options (or better at time of purchase):

ADD8

1) Apple M6 chip with 12-core, 12-GPU, and 16-core Neural Engine
2) 32.0 GB unified memory
3) 1.0 TB SSD hard drive
4) 10GB Ethernet
5) Wired Mouse & Keyboard
6) Mac and Windows OS installed (via Parallels)
7) Software & accessories per equipment list

i. Four channels of wireless microphone shall be provided with handheld transmitters, complete with antenna combiner, remote-mount active antennas, and accessories as noted.
j. The reinforcement and playback loudspeaker system is comprised of a left/right system with subwoofers. Connection points for patchable amplifiers are provided.
k. Provide all required mounting hardware and engineering for all AV devices, and coordinate exact mounting conditions with architect, structural engineer & general contractor.
l. Audio, data, and loudspeaker patchbays and patchcords shall be provided. See patchbay section below.
m. Equipment racks and accessories shall be provided as shown on the drawings. See equipment rack section below for additional information.
n. UPS units shall be provided as indicated.
o. A motorized, sequencing breaker panel shall be provided under electrical. It is in the scope of this section to program the sequencing panel and configure both hard button (at booth) and touchscreen controls to properly sequence the circuits up and down.
    1) All equipment shall shut down when the system is powered down, except for the control processor and associated network switch.

2. Video - Presentation
    a. A presentation video switching and routing system with scaling shall be provided to handle signals from all video devices, including on-stage laptop computer inputs, DVD/blu-ray, and other inputs as indicated on the Drawings. All input and output devices shall use CATx cable as the means of transport to the control booth. The switcher shall be fully HDCP compliant and support EDID.

b. Video scalers shall be properly configured to accept any common aspect ratio or resolution and modify the image for proper viewing on the projection screen. This function shall be automatic and require no additional configuration from user.
c. Provide projector, lens, mount and complete installation for video projector.
d. The projection screen shall be provided with the following:
    1) Motorized
    2) External Low Voltage Control Unit (LVC-IV)
    3) 1.6:1 aspect ratio
    4) Front projection surface with black backing per equipment list
    5) Black Case
    6) Additional black drop shall be provided as necessary to allow the bottom of the screen to hang at 4'-0" above floor in regular use.
    7) An extra 12" of black drop beyond that required shall be provided to accommodate unforeseen field conditions.
    8) Sized as indicated in the 274116-A equipment list.
e. Control booth video monitoring shall be via HDCP-compliant HDMI and SDI rack-mount monitor/receiver.
f. A production SDI video router shall be provided for routing SDI signals throughout the facility. Control shall be possible via the front of the router and remote-control panels. Additional control system macros may be required. Refer to Control System Programming and Client preferences.
g. Video patchbays and patchcords for 12G-SDI video shall be provided. See patchbay specification section below.
h. A fixed-mount color SDI camera shall be provided for a fixed stage shot. The stage shot shall feed a QAM modulator via SDI router for back-of-house feed. Both shall be normalled to the stage manager panel locations on the video patchbay.
i. A modulated television (MATV/CATV) system shall be provided, in conjunction with the building-wide system. Two HD modulators and integrated streaming engine shall be provided. Coordinate channel selection with any incoming campus CATV services.
j. The ability to mute the program video via CATV modulator shall be provided from the touchpanel. The modulator shall be switched (via IP control) to the CV input, which has a video black signal present.
k. Dual 7" LCD panels shall be provided in the portable stage manager's rack and control booth racks, for viewing fixed camera SDI video signals.
l. Rackmount 16"-19" video monitors shall be provided at the main racks and control booth racks for both SDI Multiview monitoring as well as for KVM or presentation monitoring. This monitor shall be located for standing operation. Provide a wired keyboard and mouse at operable distance below the monitor.
m. Provide backboxes for flat panel displays as noted in the drawings.

3. Video - Broadcast
    a. A compact broadcast video switcher shall be provided with local and modular I/O. The switcher shall be capable of format conversion and frame synchronization, graphics/text layering, effects, Multiview, stereo audio input and output, as well as AV-over-IP source and endpoint distribution. The switcher shall have a 10GBE live stream output.

b. The switcher shall be mounted in the equipment racks, with local monitoring, as well as having remote monitoring and control capabilities. The video and USB monitoring shall be over IP and patchable at any AV panel location.
c. A compact video switcher control surface shall be provided for remotely controlling video switcher functions.
d. Three PTZ cameras with SDI and AV-over-IP outputs shall be provided. Provide mounts as shown in the drawings.
e. Modular AV-over-IP to SDI converters shall be provided for sending and receiving SDI video through the video router, as indicated.
f. A sync generator shall be included as well as required accessories. Sync should be sent to all Black Box devices that can accept sync and reference signals.
g. A 46" LCD monitor (Multiview) and wired keyboard/mouse shall be provided for use with KVM extensions to the video operator position.
h. A streaming encoder with YouTube/Facebook/etc capabilities shall be provided.
i. An SD-card recording device with media shall be provided.
j. Provide a complete Winsted E-SOC work surface & rack system as indicated in the drawings. The system should generally include the following items:
    1) One Base unit w/ continuous laminate work surface w/ "comfort edge"
    2) Two 6RU turret-style rack cabinets
    3) One pull-out keyboard shelf
    4) Versa-trak system
    5) One 46" multiview LCD monitor mount
    6) Two Loudspeaker shelves
    7) Caster wheel option
    8) Removable access panels to allow access to wall and in-wall panels & power connections located behind furniture system from front side. This is required so the furniture system doesn't need to be moved to access wall connections otherwise obscured.
    9) Covers, doors, rack rails, stringers, data/power cable management, and other accessories as needed for a complete system.
    10) Laminate finishes shall be selected from the manufacturer's standard line. Submit options for review.

4. Assistive Listening
    a. An ADA-compliant FM-based assistive listening system shall be provided.
    b. Receivers and accessories will be provided under separate package.
5. Production Intercom
    a. A two-channel production intercom system shall be provided to allow communications between the control booth and stage platform/backstage areas.
    b. The production intercom main station shall be capable of firing an outboard relay, in conjunction with the program override/duck system.
    c. The production intercom station shall be capable of outputting a line-level signal from a microphone mounted on the front panel.
    d. All intercom connections shall be homerun and terminated at a WAGO-style DIN-rail terminal strip with internal bussing. Wire jumper bussing between blocks is not acceptable.
6. Program/Paging

a. A program listen and back-of-house (BOH) / front-of-house (FOH) paging system shall be provided. The program listen system shall be fed either from a shotgun microphone mounted in the hall, or directly from the mixing console. The selection of source shall happen automatically in the DSP unit, based on a gate. If no signal is available from the console, the input source will change to the shotgun microphone. The selection shall also be available from the control system, using an "auto", "console" or "shotgun" selector.
b. All GPIO connections shall be made as shown on the drawings.
c. A panel with momentary, non-latching, illuminated control buttons shall be provided, allowing for MUTE functions at FOH and BOH, as well as activation of the HOUSE PAGE function.
    1) The mute buttons shall illuminate RED to provide system-wide status of the mute function.
    2) The house page button shall illuminate GREEN to provide status of the house page function. This button shall also have a safety cover to prevent accidental activation.
    3) When the "house page" is pressed at the same time as the "announce" button on the intercom base station, the audio from the intercom base station microphone shall be routed to the paging loudspeakers in the theatre.
d. An announcement recorder / player shall be provided as part of the main DSP unit, with remote triggering from the house manager's station.
    1) Triggering shall be from the house manager's panel touchscreen. When busy, the touchscreen button shall reflect status.
    2) The contractor shall provide a recording of chimes for initial use as the audience recall.
    3) The contractor shall show the user how to manage recordings via the system software.
e. A program override system shall be provided. Each support space is fed via individual 70V amplifier channel and includes a **local volume control with priority override**. When a page is active, the system shall allow any BOH page to be heard, regardless of local volume level. Additional paging controls such performed from the main control touchpanels for the theatre, as required by the Consultant or Client.

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f. A paging loudspeaker shall be provided, at locations indicated on the Drawings. The loudspeaker shall activate when both "announce" (intercom unit) and "house page" (custom panel) are pressed at the same time.
g. A custom portable stage manager's panel shall be provided, with remote intercom station and paging, custom button panel and rack-mounted light.
h. A house manager panel shall be provided at locations shown in the drawings. From the panel, the house manager may activate the audience recall playback device, make a voice page to the lobby, control volume at all FOH zones, play music in the lobby zones from a portable device, and communicate with the stage personnel via production intercom.

7. Control System
    a. A touch screen-based control system shall be provided for control over all applicable AV devices.
    b. Color touchscreens shall be provided at locations shown on the drawings.

c. The control system shall connect via IP to the architectural lighting system for preset recall. Coordinate with theatrical lighting contractor for necessary information.

d. All control system programming is the responsibility of the AV contractor, and shall be submitted during the shop drawing phase for approval.

8. **Broadcast System**

a. **A complete system for live streaming/broadcasting shall be provided in the theatre.**

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b. **Provide a switcher with control surface, remote-controlled PTZ cameras with controllers, and streaming encoder.**

c. **Provide SD card recorder and accessories as noted.**

d. **Provide control furniture with the following accessories:**

1) Finish from manufacturer's standard line
2) Accessories as needed for a complete system
3) 46" video monitor mount
4) (2) 4RU turrets
5) Keyboard Tray
6) Entire system on casters

9. Control System Programming – Main Theatre

a. Touchpanels shall be configured with the most often-used device functions. Do not attempt to put every possible device function on the touchpanel.

b. The touchpanel shall be configured to work in two modes: manual and automatic.

1) When in manual mode, all functions shall be "single function" buttons.
2) A password must be entered to access manual mode.
3) In manual mode, access to advanced controls shall be possible, such as:
   a) Automixer, Wireless Mic, Video Source & Main System Volume
   b) System On/Off
   c) Projector On/Off/Mute
   d) Projection Screen Up/Down/Stop
   e) Subwoofer mix/separate select (for aux-fed subs)
   f) CATV Modulator Audio/Video Mute
   g) Architectural Lighting Preset Recall (coordinate with 116183)
   h) Program audio feed (auto, console, shotgun mic)
   i) Audience Recall Chime
   j) Lobby Flat Panel Display Power, Input & Tuner

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   k) **Paging override enable/disable (by space)**
   l) Other functions as required
4) In Automatic mode, the user shall choose either "presentation with audio and video" or "presentation with audio only". After choosing, the system shall activate the appropriate macros to enable the system to display the chosen source. In either event, the automix jacks and wireless microphones shall be active.
5) Volume controls for "video playback" and "mic level" shall be always accessible.
6) A projector mute function shall be provided, utilizing the projector's mechanical dowser (if available). If no mechanical dowser is available, mute image.

c. Touchpanel programming is the responsibility of the contractor. An outline has been made above but does not include all functions required. The contractor is responsible to design a graphic user interface using the following guidelines:
   1) In automatic mode, use must be able to complete any function within two button presses.
   2) More important functions shall be more prominent on the interface.
   3) Like functions shall appear at the same place on every screen.
   4) Nesting menus are not allowed.

d. The base template for the touchpanel shall be from the stock manufacturer's line, with customization as necessary. The template colors shall be modified to match School colors, and the splash screen shall show the School's logo.

10. Control System Programming – House Manager
    a. Touchpanels shall be configured with the most often-used device functions. Do not attempt to put every possible device function on the touchpanel.
    b. Provide the following controls:
       1) Lobby & Restroom Volume & audio feed select
       2) Paging volume
       3) Chime volume
       4) Audience Recall Chime, programs 1-4
       5) Lobby Flat Panel Display Power, Input & Tuner
       6) Other functions as required
    c. Touchpanel programming is the responsibility of the contractor. An outline has been made above but does not include all functions required. The contractor is responsible to design a graphic user interface using the following guidelines:
       1) User must be able to complete any function within two button presses.
       2) More important functions shall be more prominent on the interface.
       3) Like functions shall appear at the same place on every screen.
       4) Nesting menus are not allowed.
    d. The base template for the touchpanel shall be from the stock manufacturer's line, with customization as necessary. The template colors shall be modified to match School colors, and the splash screen shall show the School's logo.

B. Drama Classroom
   1. Audio
      a. The reinforcement audio system is comprised of a rack mounted DSP with local i/o, playback devices, and wall-mounted powered speakers.
      b. One media player with theatre-specific functionality shall be provided for events requiring audio playback. The media player shall accept SD/USB drives, Bluetooth, as well as have a 3.5mm stereo aux input.
      c. The playback loudspeaker system is comprised of two portable powered speakers, each with yokes, two theatre-style c-clamps and one safety cable, and power/signal cables.
      d. Provide all required mounting hardware and engineering for all AV devices mounted overhead.

C. Recording Studio
   1. Audio
      a. The Contractor shall deliver a fully functional "turn-key" recording studio.

b. The recording studio shall support the digital recording of audio from the adjacent studio live room, or from any of the production spaces via Dante connection.
c. A multi-track capable digital recording system shall be provided, complete with digital controller and computer-based recording software with necessary input/output devices.
    1) The Contractor shall be responsible for ensuring that necessary parameters of the recording software are accessible and controllable via the digital portion of the recording console.
d. A Dante-based system shall be provided, including both mic and line level interfaces, as well as a thunderbolt to Dante interface for CPU connectivity.
e. An recording computer shall be Apple Mac Studio and shall be configured based on the recording software manufacturer's typical hardware requirements. Additional requirements include:

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    1) Apple M5 Max chip with 18-core CPU, 40-core GPU, and 16-core Neural Engine
    2) 64.0 GB unified memory
    3) 2.0 TB SSD hard drive
    4) 10GB Ethernet
    5) Wired Mouse & Keyboard
    6) Software & accessories per equipment list
f. A BT/SD/USB/CD media player and 6-ch rackmount DI shall be provided.
g. A 5.1 mid-field audio monitoring system with subwoofer shall be provided in the control room.
    1) Configure the monitor controller as needed for monitoring switching and controlling.
    2) Configure the Genelec SAM system for bass management and delay.
h. A 2.0 audio monitoring system shall be provided in the live room.
i. A digital musician-monitoring system shall be provided and allow for each musician to have control over their own multi-track mix using local mixing devices and headphones. The system shall receive signal via Dante connection.

2. Video
    a. A pair of 27", 4k resolution digital video monitors on articulating arms shall be used for local video monitoring of computer & console functions.
    b. A pair of 55", 4k resolution monitors shall be positioned above the desk so that all class members may see.
    c. A single 55", 4k resolution monitor shall be provided in the studio for instructional use and shall also include a local HDMI input with soundbar and button controller.
    d. The monitors shall each be fed with a discreet digital video signal from the CPU.
3. Control System
    a. A local button panel shall be provided for control over the live room flat panel display.
    b. All control system programming is the responsibility of the AV Contractor and shall be submitted during the shop drawing phase for approval.
4. Network
    a. Network switches shall be provided to support all IP protocols in use. Configure VLANs as needed. Provide support for Primary and Secondary Dante networks, using separate switches.
    b. A master clock / sync generator shall be provided with PTP option. Connect to all units, and set all units to receive grand master clock information from this unit.

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1) This unit shall also serve as the master clock for the Dante system.

c. Copper patchbays and patchcords shall be provided. See patchbay section below.

5. Utility
   a. A talkback/listenback system shall be provided, using a panel mic in the studio and an integral console mic in the control room.
   b. Bantam/TT audio patchbays and patchcords shall be provided. See patchbay section below.
   c. Several DC-powered recording lights shall be provided, with control from a button on a rack-mounted panel.
   d. A motorized, sequencing breaker panel shall be provided under electrical. It is in the scope of this section to program the sequencing panel and configure both hard button and touchscreen controls to properly sequence the circuits up and down.
   e. Power distribution shall be provided as indicated in the specs.
   f. Several UPS (Uninterruptable Power Supply) units shall be provided for all processor-based equipment. The units shall be fanless, and rackmounted.
6. Custom panels shall be provided as shown in the drawings. Provide panels in colors to match architectural direction, including custom colors where noted.
   a. Reference architectural finish schedule, and provide color submittal as indicated in submittal section below.
7. Equipment Rack
   a. Equipment racks and accessories shall be provided as shown on the drawings. See equipment rack section below for additional information.
   b. UPS units shall be provided as indicated.
8. Furniture
   a. Provide a complete work surface & rack system as indicated in the drawings. The system should generally include the following items:
      1) Base units w/ continuous laminate work surface with standard edge
      2) (2) 27” LCD video display stands & mounts as shown
      3) (3) Speaker Shelves
      4) (5) 4RU Turret-style rack cabinets
      5) (1) Pull-out keyboard shelf
      6) Rear track system
      7) Casters for entire system
      8) Covers, doors, rack rails, stringers, data/power cable management, and other accessories as needed for a complete system.
      9) Laminate finishes shall be selected from the manufacturer’s standard line. Submit options for review.
      10) Provide manufacturer delivery and installation services.

D. Band & Choral Rooms
1. The music classroom system is comprised of a main AV switcher and signal transport unit located at the equipment rack, along with a control panel located near the front of the room.
2. Provide video projector with lens and ceiling mount.
3. Provide motorized projection screen and install complete.
4. A rack-mounted media player shall be provided with Bluetooth, USB/SD, and 3.5mm stereo auxiliary inputs.
5. Install an owner-provided BYOD device and connect complete.

6. The system will provide local inputs for connecting HDMI laptop computers. Laptop computers & portable video players will be provided by owner.
7. Provide a rack-mount DSP/matrix for playback functions, along with local I/O on a rack panel.
8. Loudspeakers are active wall-mount type. Mount as required to clear lighting and other obstructions, while providing even audio coverage in the student seating area.
9. Provide a simple audio recording system, with hanging mics, a mixer, and USB/Flash recorder.
10. Provide a pull-out rack for all equipment. Coordinate with casework to confirm proper fit.
11. Provide and install all necessary equipment and accessories for a complete and working system.
12. See architectural & electrical sheets for proper placement of AV devices.

E. Network Configuration
1. AV systems that operate on IP-based networks shall be properly configured, using manufacturer-recommended settings.
2. AV systems shall be separated into one VLAN per sub-system.

F. **Portable Equipment - Theatre**

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1. **Provide loose equipment as shown in the equipment list.**
   a. **Assemble wireless mic system into rack and configure for use.**
   b. **Load all equipment into the work box and trunk.**
   c. **Discard all packing and configure all equipment in a ready-to-use state.**
2. **On all loose cables, provide a color heatshrink label or engraved shell reading "Sanger HS Theatre", and an affixed Velcro cable tie. Color of heatshrink or connector boot shall determine length. Patchcords need not be labeled. Use the following color scheme:**
   a. **10' or less: White**
   b. **25': Orange**
   c. **50': Green**
   d. **100': Red**

G. **Portable Equipment – Recording Studio**

ADD8

1. **Provide loose equipment as shown in the equipment list.**
   a. **Discard all packing and configure all equipment in a ready-to-use state.**
2. **On all loose cables, provide a color heatshrink label or engraved shell reading "Sanger HS Recording", and an affixed Velcro cable tie. Color of heatshrink or connector boot shall determine length. Patchcords need not be labeled. Use the following color scheme:**
   a. **10' or less: White**
   b. **25': Orange**
   c. **50': Green**
   d. **100': Red**

1.5 CURRENT TECHNOLOGY:

A. Only the most current hardware and software shall be provided. In no case will discontinued or superseded products be acceptable. If the manufacturer has developed and successfully released products that meet or exceed the criteria within this specification, the Contractor shall notify the Architect and submit the new product for review. If accepted, the products shall be provided at no additional cost to the Owner. Software upgrades and authorized support services for its proper integration into the system shall be provided at no cost to the Owner throughout the warranty period.
B. In the event of known product defaults or recall, the Contractor shall immediately notify the Architect and make immediate arrangements for remedy.
C. None of the stipulations herein shall be grounds for revision to the Project schedule.
D. See related procedures under Warranties in this Section.

1.6 SUBSTITUTIONS:

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by Architect in accordance with Section 01 – Substitution Procedures. Requests shall be made in a timely fashion so as to not affect the Project schedule in either case of the substitution being accepted or rejected.
B. Documentation for the substitution shall be submitted with supporting material and shall including the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Architect shall be the sole evaluator of the fitness of the substitution.
C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.7 SUBMITTALS:

A. If permitted under Section 01– Submittal Procedures, all submittals shall be made in electronic format.
   1. Files shall be in .pdf format and submitted via CD or DVD.
   2. Clearly indicate submittal number and description in the file name of the document.
   3. Each document shall be a separate file.
   4. Markups will be made electronically, and the submittal returned via electronic means.

B. Submittals shall be made in a timely fashion so as to not affect the Project schedule and shall allow for adequate time for review and resubmittal. Partial submittals will not be acceptable and will be returned without review.
C. Submittals shall be reviewed, and field dimensions verified prior to commencing acquisition for, and fabrication of the Work in this section. All services and parts of the work in this section shall be verified through the submittal process.
D. Prior to commencing work on shop drawings, the contractor shall facilitate a meeting between the contractor and Architect and his consultant to “walk through” the AV systems.
E. Conduit, Backboxes and Electrical Systems Verification Letter:

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1. Within 30 days of contract award, the AV contractor shall review all relevant information pertaining to the AV systems low-voltage conduit, backboxes, and line voltage electrical work to be performed by Division 26. A formal memo, outlining acceptance (or desired changes) of the contract drawing shall be provided. Failure to provide this memo indicates acceptance of, and liability for, the conduit, backboxes and electrical systems as indicated in the Drawings.

F. Shop Drawings:
   1. Submit full-size (minimum 30" x 42") scaled shop drawings that show the following:
      a. Installation requirements and mounting conditions.
      b. Provide stamped structural drawings by a structural engineer licensed in the state in which the project takes place showing complete mounting details for all devices over 20 pounds.
      c. Full system riser diagram(s) illustrating interconnection of system components, wiring requirements, back box sizes and any special installation considerations.
      d. Block diagrams, showing equipment interconnection.
      e. Internal DSP programming
      f. IP table, showing all connected devices with IP address, subnet, VLAN info, MAC address, and any other related network information.
         1) Coordinate with Owner for proper IP configuration.
      g. Equipment rack and patchpanel drawings.
      h. Full-scale drawings of custom plates
      i. Color schedule for each device, including plates, speakers, and all equipment with room name and number.
      j. Run sheets or field wiring drawings.
      k. Equipment modification drawings, including statement of purpose for modification and agreement to provide full manufacturer warranty, if modifications cause a voided warranty.
      l. Final schematic drawings of any custom circuitry.
      m. Detailed equipment list, including quantity, manufacturer and model.
      n. Detailed product drawings, as applicable to the project.
      o. Copies of contract drawings will not be accepted as shop drawings and will be returned without review.
   2. AV Control System Touchpanels:
      a. Provide an electronic file for approval of working touchpanel files. File shall be in a format that both consultant and Owner can use on any windows-based computer (with required software installation.)
      b. Provide any required viewing software.
      c. Touchpanel design subcontractor is responsible for design of touchpanel layouts but shall be subject to consultant and Architect approval.
      d. A separate file for each touchscreen shall be provided.
   3. Acceptance of any submitted data or shop drawings for material, equipment, apparatus, devices, arrangement and layout shall not relieve contractor from responsibility of furnishing same of proper dimensions and weight, capacities, sizes, quantity, and installation details to perform efficiently the requirements and intents of the systems design. Such acceptance shall not relieve the contractor from responsibility for error, omissions or inadequacies of any sort on submitted data or shop drawings.

G. Product Data:

1. Submit a detailed equipment list, including manufacturer, model number, description and quantity for each item.
2. Do not submit equipment cut sheets, except for custom or non-standard devices.

H. Samples:
1. Submit samples for review if requested. Samples may include, but are not limited to:
   a. Connector, panel and cable assemblies
   b. Panel finish samples
   c. Custom switch, button or similar assemblies

I. **Training Documentation:**
1. **Submit a training syllabus for review prior to conducting training. Syllabus shall include, at minimum:**

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   a. **Training topics and learning objectives.**
   b. **Proposed sequence and duration of training topics.**
   c. **Equipment, systems, and software to be covered.**
   d. **Hands-on exercises and demonstrations.**
   e. **Training materials and reference resources to be provided.**
   f. **Method for verifying participant competency.**
2. **Submit electronic "quick-start guide" including basic functions, such as:**
   a. **System startup / shutdown.**
   b. **Signal routing.**
   c. **Volume control.**
   d. **Special uses.**
   e. **Basic troubleshooting guide.**
   f. **Contact information for service.**
3. **Training documentation shall comply with the requirements of the Training section**.

J. Record Documents: Submit record documents in accordance with Section 01.
1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Submit copies of "as-builts" including:
   a. Shop drawings, product data, operations and instructions manuals for all products provided.
   b. Equipment list, with manufacturer, model number, serial number, IP address and MAC address for all installed devices.
   c. Electronic backup on Compact Disc of control systems and DSP systems programming.
   d. Care and maintenance instructions, service line and online contacts.
   e. Warranty documents.
   f. Key list, showing the following for all keys in the system: device name and model number, system controlled, key model number or other replacement identifier, tech support number for equipment manufacture, and thumbnail picture of device.

K. Submittal procedures and quantities are specified in Section 01– Submittal Procedures.

1.8 WARRANTY:

A. Warranty shall provide coverage of material and product defects and assembly workmanship or installation for a period of two years following the date of acceptance by the Architect.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor.
C. The Contractor shall bear all costs that arise as a result of the warranty claim, including, but not limited to, the use of temporary replacement components, additional Owner staffing or overtime, shipping, cancelled uses or performances.
D. Activate all manufacturers' warranties in the name of the Owner, within one week of the date of acceptance.
E. Provide two return visits following system acceptance to fine tune or repair any items requested by the Owner:
   1. 30-40 days following acceptance
   2. 1 year following acceptance
   3. 2 years following acceptance

1.9 QUALITY ASSURANCE:

A. Equipment in this Section shall be provided by specialty subcontractors and manufacturers meeting the qualifications listed herein.
B. Specialty subcontractor shall have been continuously engaged in the sales and integration of audio, video and communications equipment similar to that specified herein for a minimum of 10 years.
C. Specialty subcontractors shall have at time of bid and continuously maintain throughout the project and warranty period a low voltage Specialty Contractor's license appropriate for the work in this Section, and in the state in which the project takes place.
D. Specialty subcontractors shall employ field service technicians within a four-hour driving distance from the Project site.
E. Specialty subcontractors shall employ personnel with the following minimum certifications:
   1. Avixa/Infocomm CTS-I Certification
   2. QSC – QSYS Level 2 Certification
   3. **QSC – QSYS Control 201 Certification**
   4. L'Acoustics Level 2 Certification
   5. Dante Level 3 Certification
   6. **Netgear Networks – AV Certification Level 1**

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F. All equipment shall be UL or ETL listed and bear the appropriate labels.

1.10 DELIVERY, STORAGE AND HANDLING:

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.
C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

1. Devices shall not be delivered to the project site until the project is suitably clean and all adjacent finish work that may be painted or produce dust has been completed. The contract shall provide and maintain complete protection of all devices until the Project has been made available for occupancy by the Owner. The contractor shall thoroughly clean and remove any dirt or dust that infiltrates system components and be responsible for timely replacement of any damaged components.
2. Device labels and connectors shall be delivered with temporary dust and paint protection installed.

1.11 PROJECT CONDITIONS:

A. Defects in the field which may impact the work in this Section shall be reported to the Architect and corrected in accordance with the requirements of the applicable Section of Work prior to commencement of the Work in this Section.

1.12 MAINTENANCE:

A. Provide maintenance stock of User-serviceable components within the system. Maintenance stock shall be packaged in weather resistant box labeled “spare parts for AV system” and turned over to the owner at time of system commissioning.
B. Maintenance stock shall include:
1. Four fuses of each type in the system.
2. Five connectors of each type in the system.
3. Six spare keys of each type in the system.
4. Components recommended by the manufacturer.
5. Any non-standard tools required for Owner service.
6. Four spare lamps for each type in the system.

PART 2 - PRODUCTS

2.1 PRE-APPROVED SPECIALTY SUBCONTRACTORS

A. The following AV systems contractors are pre-approved to complete the work in this section:

AMT Systems
Attn: Tim Carlson
26810-A Oak Ave.
Santa Clarita, CA 91351
Tel: (661) 251-4206

Diversified
Attn: Adam Lopez
3275 Edward Avenue
Santa Clara, CA 95054
Phone: (408) 969-1972

ICS Integration, Inc.
Attn: Mark Berlo
550 Parrott Street, Unit #40
San Jose, California 95112
Phone: (408) 491-6000

PCD, Inc.
Attn: John Rudolph
1032 Maxwell Drive
Santa Rosa, CA 95401
Phone: (707) 546-3633

Solotech
Attn: Derek Lewis
11060 Randall Street
Sun Valley, CA 91352
Tel: 818-765-3800

Sound Image
Attn: Michael Martin
2425 Auto Park Way
Escondido, CA 92029
Tel: (760) 737-3900

B. Those not listed above shall submit qualifications for review. In order to qualify, the contractor shall submit the following information to the Architect for review:
   1. Meet all qualifications and requirements of Section 1.9 – Quality Assurance.
   2. List of personnel who will be working on this Project, including skills, experience, and accreditations.
   3. List of union affiliations, contractor licenses, and other applicable trade certifications.
   4. List of projects completed within the past 5 years, with references. Provide phone and/or e-mail addresses for reference contacts.
   5. Proof that at least 5 jobs in the past 5 years have a minimum contract value equal to or greater than the project listed herein, and are of similar type.
   6. Proof of bonding and insurance.

C. Permission to bid does not imply acceptance of the specialty subcontractors. It is the sole responsibility of the contractor for this Section to ensure that any price quotations received, and submittals made are for systems that meet or exceed the specifications.

2.2 MANUFACTURERS:

A. AV equipment in this Section shall be provided by specialty manufacturers providing products meeting the specifications herein.
B. Provide all equipment as listed in 274116-A, equipment list.

2.3 SYSTEMS:

A. Audio Systems General Requirements:
   1. Grounding: All grounding in racks is the responsibility of the AV contractor. All devices shall be appropriately grounded to the isolated grounding system busbar.
   2. Un-Balanced Devices: Provide a balancing transformer for any unbalanced device, at both input and output.
   3. Loudspeaker Rigging: All loudspeaker rigging shall be reviewed and stamped by a licensed structural engineer, licensed in the state in which the project takes place. The contractor is responsible to secure the structural stamp, including all expenses associated therein.

B. Video Systems General Requirements:
   1. Reference SMPTE standard for specified SDI video type.

C. Modulated (CATV) Video Systems General Requirements:
   1. Cable Distribution System: The cable distribution system shall consist of coaxial cables, user interfaces, signal taps, splitters, RF amplifiers, signal equalizers, power supplies, and ancillary hardware as required to meet the system requirements specified below.
   2. The signal level of each channel at each TV outlet shall be +5 dBmV, plus or minus 3 dBmV.
   3. The system shall meet the following minimum parameters at each TV outlet:
      a. Signal-To-Noise Ratio: 43 dB
      b. Cross Modulation: -46 dB
      c. Hum Modulation: -55 dB
      d. Return Loss: 14 dB
      e. Isolation (outlet-outlet): 24 dB
      f. Aural Carrier Level: 13 dB to 17 dB below visual
      g. Impedance: 75 ohm

2.4 MATERIALS:

A. All components supplied under this Section shall be new. Used or factory reconditioned components will not be acceptable.

B. Cabling
   1. Provide cabling as indicated in the drawings.

C. **Portable Equipment – Recording Studio**

ADD8

   1. **Provide Middle Atlantic BGR series. See drawings for exact size.**
   2. **Provide with solid rear locking door.**
   3. **Provide with rear rails.**
   4. **3,000 pound weight capacity.**
   5. **All structural elements shall be finished in black powder coat.**
   6. **Rack shall be UL listed.**
   7. **Rack shall be OSHPD listed.**
   8. **Provide the following options:**
      a. **Removable keylocked side panels, model # BSPN-xxx. As required.**
      b. **9 RU soild top panel, model #BGR-STPxx. One per rack.**
      c. **Vertical Lacer strip, heavily perforated, 77" long, model # LACE-xx-OP. Two per rack.**

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d. **Horizontal Lacer Bars, model #LBP series. Ten per rack, or as needed.**
e. **Brush Grommet panel, model #BRxx series. As needed.**
f. **Copper Bus Bar, model #BB-xx. One per rack.**
g. **Utility Drawer, model D4. One per rack group.**
h. **Blank & Vent panels, as needed to fill rack.**
i. **Ganging hardware, model #GANG-10, as needed.**
j. **Full height utility light, white w/ dimmer, model FWD-LT-UTL-xxx-D. One set per rack. Provide maximum length allowed by rack size.**
k. **Custom rack mounts for equipment without rack ears, model #RSH-series.**

9. **Mount racks as necessary to meet Zone 4, Seismic Design Category (SDC) "D" and Seismic Use Group III Upper Floor Essential Equipment rating and have an Ip rating of 1.5, based on manufacturer recommendations.**
   a. **Provide model #BGR-ISO-Z4 seismic brackets, one set per rack.**
10. **Provide the following for thermal management:**
   a. **552 CFM Fan Top with controller, model #BGR-552FT-FC. One per rack.**
   b. **Vent panels at bottom of rack, model VT-series. As required.**
11. **Provide the following for power management:**
   a. **Modular power raceway, model #MPR-8A. One per rack.**
   b. **Dual 20A Isolated Ground outlets, model #M-2x20IGA. Fill MPR raceway.**
   c. **Single-Circuit 15A power strip for UPS power distribution, model # PD-2415SC-NS.**
   d. **DC power distribution, model PD-DC series or equal. Provide best model to match specified equipment. Provide in quantities as needed. No "wall wart" power supplies are allowed.**
   e. **Non-switching front-mounted convenience outlets. Provide one unit per rack group. Model #PD-2015R-NS or equal.**

D. Floor Standing Swing-Out 19" Equipment Rack:
1. Provide Middle Atlantic SR-series. See drawings for exact sizes.
2. 500 lb. weight capacity.
3. All structural elements shall be finished in black powder coat.
4. Rack shall be UL Listed.
5. Provide the following options:
   a. Solid Front Door, model #FD-xx.
   b. Vertical Lacer strip, heavily perforated, 77" long, model # LACE-xx-OP. Two per rack.
   c. Horizontal Lacer Bars, model #LBP series. Ten per rack, or as needed.
   d. Brush Grommet panel, model #BRxx series. As needed.
   e. Rear rail kit, 10-32 threaded, model # DWR-RRxx. One per rack.
   f. Copper Bus Bar, model #BB-xx. One per rack.
   g. Utility Drawer, model D4. One per rack group.
   h. Blank & Vent panels, as needed to fill rack.
   i. Full height utility light, white w/ dimmer, model FWD-LT-UTL-xxx-D. One set per rack. Provide maximum length allowed by rack size.
   j. Custom rack mounts for equipment without rack ears, model #RSH-series.
   k. If two SR racks are specified next to each other, provide zero-clearance latch, model #DWRSR-ZL. One per pair.
6. Provide the following for power management:

a. Modular power raceway, model #MPR-x. One per rack. Provide maximum length allowed by rack size. Provide jumpers, junction box, terminals and accessories as required for a complete system.
b. Dual 20A Isolated Ground outlets, model #M-2x20IGA. Fill MPR raceway.
c. If UPS is specified: provide single-circuit 15A power strip for UPS power distribution, model #PD-2415SC-NS.
d. DC power distribution, model PD-DC series or equal. Provide best model to match specified equipment. Provide in quantities as needed. No "wall wart" power supplies are allowed.
e. Non-switching front-mounted convenience outlets. Provide one unit per rack group. Model #PD-2015R-NS or equal.

7. Provide the following for thermal management:
   a. 4.5" fan, model #QFAN. Two per rack.
   b. 4.5" fan guard, model #GUARD. Two per rack.
   c. Vent Blockers, model VBK-xxx. As required.
   d. Thermostatic Fan Control for MPR raceway, model #FC-4A. One per rack group.
   e. Vent panels at bottom of rack, model VT-series. As required.

E. Wall-Mounted Swing-Out 19" Equipment Rack
1. Provide Middle Atlantic DWR Series.
2. Useable height shall be as required to fit equipment, useable depth shall be 26".
3. 250 lb. weight capacity.
4. All structural elements shall be finished in black powder coat.
5. Rack shall be UL Listed.
6. Follow attachment methods as described in the drawings, which meet structural criteria provided by the project structural engineer.
7. Provide the following options:
   a. Solid Front Door with keylock, model #FD-xx.
   b. Custom rack mounts for equipment without rack ears, model #RSH-series.
   c. Other items as shown in the equipment list.
8. Provide the following for power management:
   a. Provide rack-mounted power distribution & sequencing device as indicated in the equipment list.
9. Provide the following for thermal management:
   a. Dual 6" fan kit with accessories, model #DWR-FK6-26. One per rack.
   b. Thermostatic Fan Control, model #FC-4-1CA. One per rack.
   c. Vent panels at bottom of rack, model VT-series. One per rack.

F. Casework-Mounted Pull-out 19" Equipment Rack
1. Provide Middle Atlantic SRSRX-XX series.
2. Useable height shall be determined by casework allowances, useable depth shall be 23".
3. 200 lb. weight capacity.
4. All structural elements shall be finished in black powder coat.
5. Rack shall be UL Listed.
6. Provide the following options:
   a. Custom rack mounts for equipment without rack ears, model #RSH-series.
7. Provide the following for power management:
   a. Provide a rack-mounted, sequenced power distribution panel per specification.

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8. Provide the following for thermal management:
    a. Coordinate with casework provider to ensure proper ventilation.
    b. Provide Middle Atlantic UQFP series fan panels.

G. Connectors:
1. Microphone and Line Level Audio
    a. XLR-M, 3-pin:
        1) For panel-mount, Provide Neutrik NC3MD-L-1, 3-pole male XLR connector in black.
        2) For cable-end, provide Neutrik NC3MXX, 3-pole male connector.
    b. XLR-F, 3-pin, Standard
        1) For panel-mount, Provide Neutrik NC3FD-L-1, 3-pole female XLR connector in black.
        2) For cable-end, provide Neutrik NC3FXX, 3-pole female connector.
    c. XLR-F, 3-pin, Automixing (BLUE)
        1) Provide BLUE trim ring, Neutrik SCDP-FX-6.
    d. 1/4” Tip/Ring/Sleeve
        1) For panel-mount, Provide Neutrik NJ3FP6C, locking tip/ring/sleeve connector.
        2) For cable-end, provide Neutrik NP3X, tip/ring/sleeve connector.
    e. Phono
        1) For panel-mount, Provide Neutrik NF-2D series, with appropriate color isolation washer.
        2) For cable-end, provide Neutrik NF2C-B-2 “Profi” connector.
2. Production Intercom:
    a. XLR-M, 3-pin, Intercom (RED)
        1) Provide RED trim ring, Neutrik SCDP-FX-2.
3. Integrated Control Systems:
    a. For panel-mount in configurations using legacy data and power bus (AxLink or Cresnet), provide Neutrik NC4FD-L-1, 4-pole female XLR connector.
    b. For panel-mount in configurations using networked control bus, refer to RJ-45 data information below.
    c. Cable-end configurations are project dependent. See drawings.
4. Loudspeaker:
    a. For panel-mount in 2 or 4-conductor applications, use Neutrik Speakon NL4MP 4-pole connector.
    b. For panel-mount in 8-conductor applications, use Neutrik Speakon NL8MPR 8-pole connector.
    c. For cable-end in 2 or 4-conductor applications, use Neutrik Speakon NL4FC 4-pole connector.
    d. For cable-end in 8-conductor applications, use Neutrik Speakon NL8FC 8-pole connector.
5. Video:
    a. Production Video/12G:
        1) For panel-mount, Provide Neutrik NBB75DFIX, recessed bulkhead jack, feed through, isolated connector.
        2) For cable-end, provide Neutrik NBNC75B-series, push-pull style connector. Use appropriate connector for cable specified.
    b. “F” Connector:

1) For panel-mount, provide Holland G-F81F* inline barrel connector with 3.0 GHz minimum performance.
2) For cable-end, provide Holland Superlok G-series compression connector with 3.0 GHz minimum performance.

6. RF Antenna – 50-ohm
   a. For panel-mount, Provide Canare BJ-JRUD, recessed bulkhead jack, feed through, isolated connector.
   b. For cable-end, provide Canare BP-C series. Use appropriate connector for cable specified.
7. Data:
   a. RJ-45
      1) For panel-mount, provide Neutrik Ethercon NE8 series punch-down connector in black to match cable type.
      2) For cable end, provide Neutrik Ethercon NE8-series connectors in black to match cable type.
   b. Fiber
      1) For panel-mount, provide Neutrik Opticalcon NO2-4FD feed-thru panel mount connectors.
      2) For cable end, provide Neutrik Opticalcon cables in quantities shown in 274116-A equipment list.

H. Patchbays:
1. Microphone and Line Level Audio:
   a. Provide Bittree 489 programmable series with 3-pin molex style termination with the following options:
      1) Longframe ¼”-style connectors
      2) 2x26 jacks with 12” deep chassis
      3) 2 designation strips in over/under configuration
      4) Mono spacing, 2 RU
      5) Isolated Grounding
      6) Normals per Drawings
      7) Black in color
      8) Paper designation strips. Provide .doc file to Owner for future use.
      9) Provide Middle Atlantic “CLAW” patchcord holder, one per rack.
   b. Patchbay layout shall be in standard “output at top, inputs at bottom” scheme with clear method for showing normals. Contractor shall be responsible for exact patchbay layout.
   c. Labeling shall be as follows:
      1) All labeling shall exactly match circuit in field.
      2) Labeling shall be sequential per circuit type, beginning at 1.
   d. Patchbays by AVP, Inc are also acceptable.
2. Microphone and Line Level Audio (Bantam/TT):
   a. Provide Bittree 969 programmable series with 3-pin molex style termination with the following options:
      1) Bantam (TT) style connectors
      2) 2x48 jacks with 12” deep chassis
      3) 2 designation strips in over/under configuration
      4) Mono spacing, 2 RU
      5) Isolated Grounding

6) Normals per Drawings
7) Black in color
8) 6” deep rear lacing bar
9) Digital AES internal wire
10) Paper designation strips. Provide .doc file to Owner for future use.
11) Provide Middle Atlantic “CLAW” patchcord holder, one per rack.

b. Patchbay layout shall be in standard “output at top, inputs at bottom” scheme with clear method for showing normals. Contractor shall be responsible for exact patchbay layout.

c. Labeling shall be as follows:
1) All labeling shall exactly match circuit in field.
2) Labeling shall be sequential per circuit type, beginning at 1.

d. Patchbays by AVP, Inc are also acceptable.

3. Bulkhead Type XLR/BNC
a. Provide AVP, Inc. WKM-US216E3-Z-B81 series with solder termination and the following options:
1) 2x16 jacks with 6” cable bar
2) 2 designation strips in over/under configuration
3) 3 RU
4) Black in color
5) Paper designation strips. Provide .doc file to Owner for future use.

4. Loudspeaker:
a. Provide AVP, Inc. WK-U212E3-NL4MP series with solder termination and the following options:
1) 2x12 jacks with 12” deep chassis
2) 2 designation strips in over/under configuration
3) 2 RU
4) Black in color
5) Paper designation strips. Provide .doc file to Owner for future use.

b. Provide 2 output jacks from each amplifier channel. Configure as follows:
1) Amplifier “A”, Channel One Jacks:
2) Pins 1+/1- : Amp Channel One
3) Pins 2+/2-: Amp Channel Two
4) Amplifier “A”, Channel Two Jacks:
5) Pins 1+/1- : Amp Channel Two
6) Pins 2+/2-: No Connection
7) See Drawings for additional information.
8) Provide Middle Atlantic “CLAW” patchcord holder, one per rack.

5. 12G-SDI Production Video:
a. Provide Bittree Video MINI-WECO 12G+ series patchbay.
b. Provide the following configuration:
1) WECO-style connectors
2) 2x32 jacks with 12” deep chassis
3) 2 designation strips in over/under configuration
4) 2 RU
5) Normals per Drawings. Provide looping plugs in quantities needed.
6) Black in color
7) Paper designation strips. Provide .doc file to Owner for future use.
8) Provide Middle Atlantic “CLAW” patchcord holder, one per rack.

c. Patchbays by AVP, Inc. in are also acceptable.

6. Data - Copper:
   a. Provide Belden REVConnect Series Flush-Mount Modular Keystone Panel.
   b. Provide with the following configuration:
      1) CAT 6A Shielded
      2) RJ45 jack with shielding to match 10GX cable type
      3) 1x24 jacks with 6” deep removeable rear lacing bar
      4) 1 designation strip in over configuration
      5) 1 RU
      6) Black in color
      7) Paper designation strips. Provide .doc file to Owner for future use.
      8) Provide Middle Atlantic “CLAW” patchcord holder, one per rack.
7. Data - Fiber
   a. Provide Corning CCH Series fiber optic patching systems.
   b. Provide housing, LC patchpanels, and required accessories for a complete installation.

2.5 PANELS:

A. General: The control receptacle panels shall consist of the appropriate connectors required for the system.

B. Physical:
1. Faceplates shall be 0.080” aluminum, edges eased, finished in fine texture, scratchresistant powder coat, with fasteners countersunk.
   a. Panels specified as flush mounted shall overlap back box by 1/2”. Surface mounted panels shall match back box size with no gaps or overlap.
   b. Coordinate back box type, size and mounting with Division 26 - Electrical.
2. Color shall match the finished wall color of the wall onto which it will be mounted, unless otherwise noted. Submit color table for review.
3. Panels noted as custom color shall be factory powder coated a color selected by the Architect. Legends shall be laser etched.
4. Laser etched labels 1/4” high characters minimum, unless otherwise noted.
   a. Labeling shall be as indicated on the Drawings.
   b. Use Arial font.
5. Wall mounted panels shall mount into an industry standard back box, depending on size and quantity of connectors.
6. Rack mounted panels shall mount within industry standard equipment racks.
7. Panels mounted in floor boxes shall include a translucent flexible vinyl dirt guard as indicated on Drawings.
8. Provide complete hardware for mounting on gridiron hangers where indicated on the Drawings.
9. Provide aluminum cable tie-off bars in matching color on all panels 8” wide and larger, as indicated on the Drawings.
   a. Keystone Electronics Corporation “Aluminum Oval Instrumentation Handles”, part number 546, 5” wide x 2” deep handle. www.keyelco.com; 800-221- 5510.
   b. Color: To match panel
10. At keyswitch locations for “SAK” devices:
   a. Provide same key for all locations.

b. Key must be removeable in both “on” and “off” positions.
c. See drawings for make & model number.
d. Provide (6) additional keys for future use, above the keys supplied with the locks.
e.

C. Floor Pockets:
1. Provide flush, floor mounted pockets with cover and cable slot. Lid finish and lid type to be determined during submittal period from manufacturer’s standard line.
2. Provide interior, flexible translucent PVC dirt guard to cover receptacles. Labels shall remain visible.
3. Provide floor pocket backboxes and pour pans (if conditions warrant) to Division 26 - Electrical for installation.

PART 3 - EXECUTION

3.1 INSTALLATION- GENERAL:

A. Coordinate with Division 26 - Electrical for the proper installation of the conduit, backboxes, and electrical service as specified herein.
B. Coordinate scheduling and access with the Contractor and provide personnel lifts or ladders as required for access to the AV equipment.
C. Remove all packing materials from the Project Site. Insert operations and maintenance information into the Project record documents as specified above in Submittals.
D. Provide a label on the back of each piece of network-connected equipment indicating it’s IP address.
E. Record Block Diagram: Post a laminated 11x17 as-built block diagram of the entire system (split into multiple sheets as necessary), and physically attached to the equipment rack in a logical location for Owner reference.

3.2 CABLE INSTALLATION:

A. Mark cables, regardless of length, with permanent, non-handwritten number or letter cable markers within 6-inches of both ends. There shall be no unmarked cables in the system. Marking codes used on cables shall correspond to codes used on Drawings and schedules.
B. As indicated on the Drawings, group cables according to signal type. Up to 6 separate conduit systems may be in place, divided as follows:
1. A: Microphone Level Audio
2. B: Line Level Audio
3. C: Video and Communication Level
4. D: Loudspeaker Level
5. E: Empty/Future expansion
6. F: Fiber Optic Level

C. As much as possible, maintain separation of signal types when outside of conduit.
D. No cable shall be installed with a bend radius less than recommended by the manufacturer.
E. Cables types shall be as indicated on the Drawings. In plenum spaces, provide the plenum version of the specified cable type.

F. No cable splicing is allowed, except for systems that are daisy-chained.

3.3 PROTECTION OF PROPERTY:

A. Contractor is responsible to provide protection for all equipment, tools and materials delivered to the Project Site prior to final acceptance by Owner. Any loss or damage is the responsibility of the contractor, until final acceptance by Owner.

3.4 SEQUENCING:

A. The contractor shall not install any electronic equipment until the room where the equipment shall be located has been finally painted or otherwise finished, and cleaned by the Contractor or Owner's Representative. Any damage to equipment resulting from failure to follow this requirement will result in the contractor replacing the damaged equipment at their cost.

3.5 COMMISSIONING AND DEMONSTRATION:

A. Coordinate with Division 26 - Electrical.
B. Appropriately trained personnel shall review, test, program and otherwise complete the system, following completion of installation.
C. Upon completion of the installation, the Contractor shall notify the Architect that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Architect's schedule.
D. Audio System Tuning:
   1. Following complete system installation, each device shall be set for correct gain-staging.
      a. This is best accomplished with an oscilloscope and a 400Hz tone generator, but other methods may be used.
      b. If the system has been set correctly, the console's VU meters will be at zero when the system is accomplishing the specified dB-SPL level. Every device in the audio signal path should clip at the same level, maximizing headroom and keeping the noise floor to a minimum.
   2. System shall be tuned prior to final checkout by contractor, using a computer-based audio analysis program, such as SMAART, TEF, or SIMM. A factory-certified individual shall carry out the tuning.

E. Cable Television System Tuning:
   1. Following complete installation, each device in the CATV system shall be tuned to exact an output of +5 dBmV, +/- 3 dBmV at the television output.
   2. Audio input at the modulator shall be set in accordance with the gain staging requirements covered in the audio sections.
   3. Video input at the modulator shall be set per manufacturer's guidelines.

F. Provide to the Architect and or his Consultant the following upon arrival:
   1. Measurements of impedance of each loudspeaker prior to connecting it to an amplifier.
   2. Measurements confirming the polarity of each loudspeaker, from output of console through entire system.

3. Measurements showing all Ethernet wiring complies with Category 6A requirements for full bandwidth operation.
4. Verification that every line has been sweep tested and conforms to standard requirements per signal level.
5. Measurements showing CATV output voltage at each TV outlet.
6. Demonstration of input and output of signal throughout the entire system.

G. Make available for review by the Architect and or his Consultant:
1. All components for physical inspection and inventory.
2. A computer to access any DSP units.
3. All installed devices in full operation, with no temporary equipment in place.
4. All portable devices, fully complete, and available to test at all plug-in locations.
5. Test equipment, including:
   a. High quality media for every presentation source
   b. Portable TV with CATV receiver input
   c. Sound level meter
   d. Portable amplified loudspeaker
   e. Waveform monitor (oscilloscope)
   f. Audio analysis equipment (provides real time display, pink noise source, test oscillator, level and THD+N measurements)
   g. Cablesets, adapters, and connectors for inserting the test equipment into and out of the system's user interfaces and connector plates.

H. The Contractor shall be liable for any return visits by the Architect and/or his consultant as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the Architect to carry out its work.

I. The Contractor shall arrange for access as necessary for inspection of equipment by the Architect and or his consultant

J. Upon completion of the commissioning, Contractor shall demonstrate operation and maintenance of the system to the Owner. Coordinate with the Owner's schedules two weeks in advance minimum.

3.6 TRAINING:

A. Do not provide training until final checkout is complete, and all punch items have been resolved. Contractor will be responsible to conduct training again if provided prior to completion of checkout and punch items.

B. **Provide training as follows:**

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1. **16 Hours during commissioning period for maintenance staff.**
2. **16 Hours with user group one week prior to initial handover to users.**
3. **8 Hours with user group and maintenance staff one month after initial training.**
4. **8 Hours with user group and maintenance staff one year after initial training, but prior to warranty expiration.**
   a. **Training hours may be divided into multiple training sessions conducted over multiple days. The total training hours specified for each training period shall be provided regardless of the number or duration of individual training sessions.**

C. **Training shall include, but not be limited to, the following topics as applicable to the systems provided.**

1. **System Overview and Signal Flow: System organization and tracing of audio, video, control, and network signal paths.**
2. **Connections, Cabling and Patching: Identification and use of cables, connectors, signal types, inputs, outputs, and patching systems.**
3. **System Startup, Shutdown and Control: Proper startup and shutdown procedures and operation of touchscreens and other system control interfaces.**
4. **Audio Mixing Fundamentals: Channel setup, gain structure, equalization, dynamics, effects, mixes, groups, phantom power, and preset or scene operation.**
5. **Audio Routing and Distribution: Routing audio to loudspeakers, monitors, subwoofers, surround systems, recording systems, paging systems, and other destinations.**
6. **Microphones and Wireless Audio: Setup and operation of wired and wireless microphones, RF frequencies, antennas, wireless systems, and automatic microphone mixing.**
7. **Loudspeakers and System Gain: Loudspeaker types and zones, appropriate operating levels, gain structure, and prevention and correction of audio feedback.**
8. **Video Sources, Routing and Displays: Connection and routing of video sources and operation of projectors, displays, screens, and associated video systems.**
9. **AV Networking: Basic AV network concepts, networked audio and video, virtual soundcards, signal routing, and basic network troubleshooting.**
10. **Playback, Recording and Computer Audio: Operation of playback and recording systems and routing of audio and video between computers and AV systems.**
11. **Intercom, Paging and Communications: Operation of intercom stations, wired and wireless belt packs, paging systems, and communications between designated locations.**
12. **Assistive Listening and Accessibility: Purpose, setup, routing, operation, and verification of assistive listening systems and associated accessibility features.**
13. **System Documentation: Use of record drawings, signal-flow diagrams, rack elevations, connection drawings, and operation and maintenance documentation.**
14. **Troubleshooting and Problem Isolation: Identification and diagnosis of common audio, video, control, power, connection, routing, and configuration problems.**
15. **AV Safety and Equipment Protection: Hearing and sound-level safety, projector and laser safety, phantom power precautions, and practices for safe operation and protection of equipment.**
16. **Independent System Setup: Hands-on application of patching, routing, mixing, control, documentation, and troubleshooting skills to accomplish typical system operating tasks.**

D. **TRAINING DOCUMENTATION**

1. **Document each training session, including the date, duration, training topics provided, name of trainer, and names and signatures of trainees in attendance.**
2. **At completion of each training session, each trainee shall sign documentation acknowledging the training topics received.**
3. **Trainees may elect to omit or discontinue training on individual topics. Any topic not received at the trainee's election shall be identified on the training documentation and acknowledged by the trainee's signature.**
4. **Submit completed training documentation to the following each training session**.

3.7 PROJECT CLOSEOUT:

A. See submittal section above for required closeout documents.

3.8 APPENDIX:

A. 27 41 16-A Equipment List

Sanger HS
AV Systems Equipment List
Section 274116

Notes:
1. **Conduit, backboxes and electrical power required for A/V systems are provided under division 26 work.**
2. **This list contains key components, but does not list every piece needed for a complete system. Contractor is responsible to provide a complete and working sytem, regardless of the completeness of this list.**
3. **A/R= As Required**
4. **OFCI= Owner Furnished, Contractor Installed**
5. **OFOI= Owner Furnished, Owner Installed**

REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
		BLACKBOX THEATRE				
		Audio System				
		Mixer/MultiChannel				
ADD 8	1MA	Digital Mixer	Allen & Heath	**SQ5 Plus**	1	
	2MA	Dante I/O Card	Allen & Heath	SQ Dante 64	1	
	3MA	Dust Cover	Allen & Heath	SQ-5 Dust Cover	1	
	4MA	Tablet Bracket	Allen & Heath	SQ Bracket	1	
	5MA	Mixer case w/ doghouse & wheels	Anvil Style ATA	A/R	1	
	6MA	Effects Add-Ons	Allen & Heath	Compressor Pack 1	1	
	7MA	Effects Add-Ons	Allen & Heath	Dynamic Trio Pack	1	
	8MA	Effects Add-Ons	Allen & Heath	GEQ Pack	1	
	9MA	*Remote I/O - Amp Room*				
	10MA	Digital Audio Mixer, Remote Input, 16x8	Allen & Heath	DT168	1	
	11MA	Digital Audio Mixer, Remote Input, 16x8 Rack Kit	Allen & Heath	AB168-RK10	1	
	12MA	*Remote I/O- Portable*				
	13MA	Digital Audio Mixer, Remote Input, 16x8	Allen & Heath	DT168	2	
	14MA	Ruggedized CAT6A STP cable w/ Ethercon, 25'-0"	Whirlwind	ENC6ASE-25	2	ethercon both ends
	15MA	Ruggedized CAT6A STP cable w/ Ethercon, 50'-0"	Whirlwind	ENC6ASE-50	2	ethercon both ends
	16MA	*Automixer/DSP*				
ADD 8	17MA	Audio DSP matrix / automixer	QSC	**Core 24F**	1	
	18MA	Audio expansion	QSC	QIO-ML2X2	1	
	19MA	Audio expansion	QSC	QIO-ML4i	1	
	20MA	Ctrl expansion - GPIO	QSC	QIO-GP8x8	1	
	21MA	QIO rackmount & PSU for (4) modules	QSC	QIO-RMK / QIO-PSU	1	
	22MA	32x32 Dante License	QSC	SLDAN-32-P	1	
	23MA	UCI Deployment License	QSC	SL-QUD-110-P	1	
	24MA	Scripting Engine License	QSC	SL-QSE-110-P	1	

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	25MA	*Outboard Equipment Rack*				
	26MA	Rackmount Light/Power Unit	Furman	PL-8C	1	
	27MA	UPS, 500VA, Fanless	Middle Atlantic	UPS-S500R	1	
ADD 8	28MA	CD/Media Playback	**Tascam**	**CD-400U**	1	
	29MA	Computer-Based Effects Playback Computer	Apple	Mac Mini	1	see specs for further info, provide key/mouse
	30MA	Wireless keyboard & mouse	Apple	A/R	1	
	31MA	Mac Mini Rackmount	Sonnettech	RackMac mini	1	
	32MA	Thunderbolt to SDI I/O converter	Blackmagic Design	Ultrastudio 4K Mini	1	
	33MA	Computer-Based Audio/Video Playback Software	Figure 53	Q-Lab Pro Bundle	1	
	34MA	Computer-Based Recording Software	Avid	ProTools	0	OFE
	35MA	Dante Virtual Soundcard Software	Audinate	Virtual Soundcard	1	
	36MA	Rack Mounted Keyboard shelf	Middle Atlantic	KB-SS	1	
	37MA	27" LCD Monitor, 4k	Samsung	Syncmaster Series	1	
	38MA	Monitor Mount, desktop style	Ergotron	A/R	1	bolt to top of rolling rack
	39MA	Custom Snake, 25'-0"	Whirlwind	A/R	1	
	40MA	Rack Mounted Drawer	Middle Atlantic	A/R	1	fill empty spaces
	41MA	Rolling Rack Case, 20RU	Anvil Style ATA	A/R	1	no SKB
	42MA	*Wireless Mic System*				
	43MA	Wireless Mic RX, Quad Channel, Dante	Shure	ULXD4Q	1	
	44MA	Wireless Mic Handheld TX	Shure	ULXD2/B58	2	
	45AV	Wireless Mic Bodypack TX	Shure	ULXD1	2	
	46AV	Wireless Mic Bodypack - Lavaliere Mic	Countryman	B3	4	
	47AV	Rechargeable Battery	Shure	SB900B	8	
	48AV	2-port Battery Charger, Drop-In w/ PSU	Shure	SBC-200	2	
	49AV	Antennas, Powered	Shure	UA 874	2	
	50AV	Antenna Rack Panel	Contractor	Custom	1	
	51AV	*Loudspeaker System*				
	52AV	Main Loudspeaker	L-Acoustics	X12	2	
	53AV	Main Loudspeaker Bracket	L-Acoustics	X-UL12	2	
	54AV	Subwoofer Loudspeaker	L-Acoustics	SB15M	2	
	55AV	Audio Amplifier, 4-ch, AVB	L-Acoustics	LA4X	1	
	56AV	Loudspeaker Mounting/Rigging	Custom	Contractor	A/R	Per drawings
	57AV	Audio Amplifier, 4-ch, 500W @ 8 ohm, Patchable	QSC	CX-Q 2K4	1	
	58AV	*Utility*				
	59AV	Audio Patchbay	Bittree	489 Series	A/R	see specs for further info
	60AV	Audio Patch Cable, Red, 3'	Bittree	LPC3602-110	20	
	61AV	Audio Combining Networks	Radio Design Labs	STD-600	2	
	62AV	Audio Isolation Transformers	Radio Design Labs	TX-AT1	2	
	63AV	Data Patchbay / RJ-45 / CAT6A STP	Belden	REV Connect Series	A/R	see specs for further info
	64AV	RJ-45 to RJ-45 CAT6A STP Patch Cable, 3'	Comprehensive	CAT6A-3BLU	20	
	65AV	Loudspeaker Patchbay	AVP	WK-U212E3-NL4MP	A/R	see specs for further info
	66AV	Loudspeaker Patch Cable, 4-cond, Black, 3'	Whirlwind	NL4-003	10	
	67AV	Loudspeaker Y Cable, 4-cond.	Whirlwind/Custom	Custom	2	
	68AV	XLR Bulkhead Patchbay	AVP	Maxxum Series	A/R	see specs for further info
	69AV	*Equipment Racks*				

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
ADD 8	70AV	Equipment Racks & Accessories, Amp	Middle Atlantic	**BGR Series**	**2**	see specs for further info
	71AV	Equipment Racks & Accessories, Booth	Middle Atlantic	SR Series	1	see specs for further info
	72AV	Power Controller	Lyntec	SS2-LRP	1	connect to Lyntec panel (by elec)
ADD 8	73AV	Power raceway & accessories	Middle Atlantic	**MPR-8A + accessories**	1	1/rack
	74AV	Power modules	Middle Atlantic	M-2X20IGA	8	8/rack
	75AV	UPS, 1000VA, Fanless	Middle Atlantic	UPS-S1000R	2	Amp, Booth
ADD 8	76AV	**UPS Power Distribution**	**Middle Atlantic**	**PD-2415SC-NS**	**2**	**1/rack**
ADD 8	77AV	Ethernet Switch, 10/100/1000, 10G up, Power Over Ethernet	**Netgear**	**M4250 Series**	**A/R**	see specs for further info
	78AV					
	79AV					
	80AV	Miscellaneous Hardware				
	81AV	Wire & Cable				
	82AV	Labor				
		Video Systems				
		Switching/Transport				
	1AV	Presentation Switcher	Extron	IN1808	1	
ADD 8	2AV	HDMI Transmitter, Decora	Extron	**DTP T HWP 4K 331 D**	1	
	3AV	HDMI Output	Extron	DTP HDMI 4K 330 Rx	1	Projector
	4AV	Local Input Panel (HDMI, 1/8")	Contractor	Custom	1	
	5AV	*Projection*				
ADD 8	6AV	Video Projector, 15k lumen, 1920x1200, DLP, Laser	**Sharp**	**XP-A155U-B**	1	
ADD 8	7AV	Video Projector Lens	**Sharp**	**A/R**	1	
	8AV	Video Projector Ceiling Mount	Chief Mfg	A/R	1	
	9AV	Motorized Projection Screen, 16:10 ratio, non-tensioned	Draper	Paragon E	1	see drawings for size + black drop
	10AV	Projection Screen, Low Voltage Control	Draper	LVC	1	
	11AV	*Monitoring / Playback*				
	12AV	19" Color Monitor & Receiver, HDCP, Tuner	Totevision	LED-1906HDMTR	1	Amp room
	13AV	15.6" rackmount SDI/HDMI monitor	Lilliput	BM-150-4KS	1	Booth
	14AV	*Utility*				
ADD 8	15AV	HD Color Camera, Fixed	Marshall	**CV348**	1	
	16AV	HD Color Camera Lens	A/R	A/R	1	provide full stage shot
	17AV	Camera Mount	Contractor	A/R	1	
	18AV	Video router	Black Magic Design	Smart Videohub 20x20	1	
	19AV	Router control panel	Black Magic Design	Master Control Pro	1	
	20AV	Video Patchbay	Bittree	12G+ Mini-WECO	A/R	
	21AV	Video Patch Cable, Blue, 3'	Bittree	VPCMK3606-75	10	
	22AV	Video Looping Plug	Bittree	LPMK7505	10	
	23AV	*Portable SM Station*				
	24AV	Dual 7" LCD Monitor, Rackmount, SDI	Black Magic Design	Smart View DUO	1	SM Station
	25AV	Portable Case for 7" Color monitor	SKB	A/R	1	

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	26AV	*Cable TV*				
	27AV	CATV Modulator, Clear QAM & IP, 2-ch	Contemporary Research	QMOD-SDI2	1	provide rack mount
	28AV	CATV Amplifier & Combiner	Contemporary Research	QDA4-45	1	
	29AV	CATV Accessories	Blonder Tongue	As Required	A/R	taps, splitters, etc.
	30AV	Composite Blackburst Generator	Black Magic Design	MC Generator	1	
	31AV	*Flat Panels - BOH*				
	32AV	32" LCD TV, QAM Tuner	Samsung/LG	A/R	6	
	33AV	Flat Panel Mount - 32" Flat Panel	Chief	TS218TU	6	
	34AV	*Flat Panels - FOH*				
	35AV	65" LCD Monitor, 4K, LAN control, QAM Tuner	Samsung/LG	A/R	1	Lobby
	36AV	Wall Mount for Monitor w/ Swing- Recessed	Chief Mfg	PNRIW Series + PSB	1	
	37AV	In-Wall Junction Box	Chief Mfg	PAC-501	1	
	38AV	55" LCD Monitor, 4K, LAN control, Vertical	Samsung/LG	A/R	3	Lobby
	39AV	Wall Mount for Monitor - Pull Out	RP Visuals	RPWM-16B-XM-TNV-NB	3	
	40AV	In-Wall Junction Box	RP Visuals	RPWM-16B-BOX	3	
	41AV	Digital Signage Player	OFCI	OFCI	0	<QTY: 4 - OFCI>
	42AV					
	43AV					
	44AV	Miscellaneous Hardware				
	45AV	Wire & Cable				
	46AV	Labor				
		Assistive Listening				
	1AL	FM Transmitter	Listen Technologies	LT-800	1	
	2AL	FM Transmitter Rackmount	Listen Technologies	LA-326	1	
	3AL	FM Transmitter Antenna	Listen Technologies	LA-125	1	
	4AL	FM Receiver w/ Rechargeable Battery	Listen Technologies	LR-4200-072	12	
	5AL	12-unit Charger Case	Listen Technologies	LA-380	1	
	6AL	Inductive Loop	Listen Technologies	LA-430	4	
	7AL	Earphone	Listen Technologies	LA-402	12	
	8AL					
	9AL					
	10AL	Miscellaneous Hardware				
	11AL	Wire & Cable				
	12AL	Labor				
		Production Intercom				
	1PI	Remote Station, 2 ch	Clear-Com	RM-702	1	Portable SM
	2PI	Master Station, 2 ch	Clear-Com	MS-702	1	Booth
	3PI	Custom Button Panel	Custom	Custom	2	
	4PI	Gooseneck Mic	Clear-Com	GM-9	2	
	5PI	Wall Station	Clear-Com	HB-702	2	Green & HM
	6PI	Handset w/ Cradle & earset kill switch	Clear-Com	HS-6	2	For HB-702; use right-angle XLR.

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	7PI	Din Rail Terminal Strip w/ 3-conductor bussing	Wago	A/R	A/R	home run all PL, combine @ TS
	8PI					
	9PI					
	10PI	Miscellaneous Hardware				
	11PI	Wire & Cable				
	12PI	Labor				
		Program & Paging				
	1PM	Microphone for PGM system	Audio-Technica	AT8035	1	
	2PM	Shock Mount for PGM Mic	Audio-Technica	AT8415	1	Provide c-clamp; mount to catwalk rail
ADD 8	3PM	Audio Amplifier, 4-ch, 250 watt @ 70v	**QSC**	**MPA-Q 4x250**	1	
ADD 8	4PM	Audio Amplifier, 8-ch, 250 watt @ 70v	**QSC**	**MPA-Q 8x250**	1	
	5PM	Program/Paging Speakers- Ceiling (SC)	JBL	Control 45 C/T	20	
	6PM	Program/Paging Speakers- High Ceiling (SHC)	JBL	Control 47 HC	2	
	7PM	Program/Paging Speakers- Pendant (SHP)	JBL	Control 65 P/T	8	
	8PM	Paging Speakers, Coax, 70V, Black	Community	R.15 COAX-B	1	provide yoke mount & c-clamp
ADD 8	**9PM**	**70V Volume Control with Priority Override (SAD)**	**Atlas**	**AT100-PARM**	**5**	
ADD 8	**10PM**	**70V Volume Control (SA)**	**Atlas**	**AT100-RM**	**1**	
ADD 8	**11PM**	**GPIO Expander**	**QSC**	**QIO-GP8x8**	**1**	
ADD 8	**12PM**	**QIO Rack Mount Kit**	**QSC**	**QIO-RMK**	**1**	
ADD 8	**13PM**	**24VDC Power Supply**	**RDL**	**PS-24V3A**	**1**	
ADD 8	**14PM**	***Control Booth Rack***				
ADD 8	**15PM**	**Audio Expander, 4-ch line input**	**QSC**	**QIO-ML4i**	**1**	
ADD 8	**16PM**	**GPIO Expander**	**QSC**	**QIO-GP8x8**	**1**	
ADD 8	**17PM**	**QIO Power Supply**	**QSC**	**QIO-PSU**	**1**	
ADD 8	**18PM**	**QIO Rack Mount Kit**	**QSC**	**QIO-RMK**	**1**	
ADD 8	**19PM**	***Portable SM Station***				
ADD 8	**20PM**	**Rackmount Light/Power Unit**	**Furman**	**PL-8C**	**1**	
ADD 8	**21PM**	**Portable Case, Shallow, 4RU**	**SKB**	**1SKB-R4S**	**1**	
ADD 8	**22PM**	**Audio Expander**	**QSC**	**QIO-ML4i**	**1**	
ADD 8	**23PM**	**GPIO Expander**	**QSC**	**QIO-GP8x8**	**1**	
ADD 8	**24PM**	**QIO Power Supply**	**QSC**	**QIO-PSU**	**1**	
ADD 8	**25PM**	**QIO Rack Mount Kit**	**QSC**	**QIO-RMK**	**1**	
ADD 8	**26PM**	***House Manager Panel***				
ADD 8	**27PM**	**Custom Button Panel**	**Custom**	**Custom**	**1**	**see drawings**
ADD 8	**28PM**	**Switched Handheld Mic w/ coil cord & right-angle XLR**	**Shure**	**SM-58S**	**1**	**provide panel mounted clip**
ADD 8	**29PM**	**Bluetooth to Dante**	**RDL**	**DB-BTN21**	**1**	
ADD 8	**30PM**	**Dual Mic Input to Dante**	**RDL**	**DB-RN22**	**1**	
	31PM					

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	32PM					
	33PM	Miscellaneous Hardware				
	34PM	Wire & Cable				
	35PM	Labor				
		Control System				
	1CS	Touchpanel, Wired, 7" (CSP-1)	QSC	TSC-70-G3	2	Control Booth, Stage
	2CS	Rackmount accessory	A/R	A/R	1	
	3CS	Touchpanel, Wired, 5"	QSC	TSC-50-G3	1	HM Panel
	4CS	Ethernet Switch, 10/100/1000, 10G up, Power Over Ethernet	Refer to Audio System	Add'l swithes, A/R	1	see specs for further info
	5CS	Control link to lighting system via IP to ETC Paradigm	Contractor	Custom	1	coordinate with production lighting
	6CS	Control System Accessories	A/R	A/R	A/R	psu, blocks, etc…
	7CS	Control System Programming	Custom	Custom	1	Use certified programmer
	8CS					
	9CS					
	10CS	Miscellaneous Hardware				
	11CS	Wire & Cable				
	12CS	Labor				
		Plates & Panels				
	1PP	Gang Panel	Contractor	Contractor	A/R	
	2PP	Multi-I/O Panel	Contractor	Contractor	A/R	
	3PP					
	4PP					
	5PP	Wire & Cable				
	6PP	Labor				

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
		BLACKBOX THEATRE - BROADCAST				
		Video System - Production/Streaming				
		Video Switcher				
	1VP	Production Video Switcher	Newtek	Tricaster Mini X	1	Include rack kit, keyboard, and mouse
	2VP	NDI /SDI converters	Newtek	Spark Plus I/O 3GSDI Converter	5	Include rack shelf and power
	3VP	Switcher - 1 year warranty professional	Newtek	PTUTCMXHDMI	3	year
	4VP	Control Surface - 1 year warranty professional	Newtek	PTUTCTCMCS	3	year
	5VP	*Cameras*				
	6VP	PTZ Camera, NDI, Low Light, Black	Panasonic	AW-UE80	3	
	7VP	PTZ Camera, Wall Mount, Black	Panasonic	FEC-40WM	1	
	8VP	PTZ Camera, Pole Clamp, 1.5" pipe, Black	Global Truss	Mini 360 1.5 BLK	2	attach to camera & lighting pipe
	9VP	*Video Operator Position*				
	10VP	Video Switcher Control Panel	Newtek	Tricaster MiniCS	1	
	11VP	KVM extender with USB 2.0	Adder	XD641	1	Includes Rx and Tx; include rackmount
	12VP	Multiview monitor, 46" LCD	Samsung/LD	A/R	1	mount in furniture
	13VP	Dual 7" LCD Monitor, Rackmount, SDI	Black Magic Design	Smart View DUO	1	
	14VP	PTZ Controller	Panasonic	AW-RP60	1	
	15VP	*Streaming & Recording*				
	16VP	Streaming Encoder	Aja	HELO Plus	1	
	17VP	SD Card Recorder	Black Magic Design	HyperDeck Studio HD Plus	1	
	18VP	SD Card Media, 256GB	ProGrade Digital	256GB UHS-II SDXC Memory Card	4	
	19VP	*Utility*				
	20VP	Sync Generator	AJA	Gen10	1	Sync at 59.94; format 1080p
	21VP	*Furniture*				
ADD 8	22VP	Modular Broadcast Furniture	**Laguna Design**	**Zephyr**	1	see specs for requirements
	23VP					
	24VP					
	25VP	Miscellaneous Hardware				
	26VP	Wire & Cable				
	27VP	Labor				

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
		DRAMA CLASSROOM				
		Audio System - Production				
	1AV	Audio DSP matrix / automixer, 8x8 Dante	QSC	Core 8 Flex	1	provide UCI & Scripting Licenses
	2AV	Touchpanel, Wired, 5"	QSC	TSC-50-G3	1	
	3AV	Rackmount for TP	QSC	A/R	1	
ADD 8	4AV	Bluetooth Receiver - Media Player	**Tascam**	**CD-400U**	1	
	5AV	Main Loudspeaker, Powered	Yamaha	DZR10	2	
	6AV	Main Loudspeaker Yoke Bracket	Yamaha	UB-DZR10H	2	
	7AV	Theatre-Style C-Clamps	ETC	400CC	4	install two per yoke
	8AV	Theatre-Style Safety Cable	ETC	400SC	2	install one per yoke
	9AV	Mic / Intercom Cable, 25'	Whirlwind	MK425	2	
	10AV	Power Cable, 12AWG, 25'-0" black, Rugged Jacket	Contractor	A/R	2	
ADD 8	11AV	Audio over IP/Control Switch, Gigabit, Q-SYS/Dante, 1G up	**Netgear**	**M4250 Series**	1	
	12AV	*Utility*				
	13AV	Power Distribution & Sequencing	Middle Atlantic	PDS-615R	1	
	14AV	AV Rack, Pull-Out Mount	Middle Atlantic	SRSR Series	1	
	15AV	Rack Fan	Middle Atlantic	A/R	1	
	16AV	*Classroom System - NIC*				
	17AV	Flat panel & mount, HDMI input	OFOI	OFOI	0	(Qty: 1 - OFOI)
	18AV					
	19AV					
	20AV	Miscellaneous Hardware				
	21AV	Wire & Cable				
	22AV	Labor				

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
		RECORDING STUDIO				
		Audio Recording- Control Room				
		Mix/Interface				
ADD 8	1AV	Desktop Control Surface- 8 fader Section	SSL	UF8	2	
ADD 8	2AV	Desktop Control Surface - Master Section	SSL	UC1	1	
ADD 8	3AV	Desktop Control Surface - DAW Section	SSL	UF1	1	
ADD 8	4AV	*Audio Interface - Local*				
ADD 8	5AV	Line In/Out, 16-ch, Dante	Focusrite	A16R	1	
ADD 8	6AV	Microphone Preamp, 8-ch, Dante	Focusrite	RedNet MPR8	2	
ADD 8	7AV	Thunderbolt / Dante Interface (128x128)	Focusrite	RedNet TNX	1	
ADD 8	8AV	*Recording - CPU*				
ADD 8	9AV	Recording Computer w/ kybd & mouse	Apple	Mac Studio	1	
ADD 8	10AV	Mac Studio Rack Mount	Sonnet Tech	Rack Mac Studio	1	
ADD 8	11AV	TB5 to HDMI adapter	A/R	A/R	4	
ADD 8	12AV	USB 2.0 Extender	Icron	Ranger 2304	1	
ADD 8	13AV	Recording Software	OFE	OFE	0	(Qty: 1- OFCI)
ADD 8	14AV	Dante Controller Software	Audinante	Dante Controller	1	
ADD 8	15AV	Focusrite Software	Focusrite	Rednet Control	1	
ADD 8	16AV	Genelec Software	Genelec	SAM	1	
ADD 8	17AV	Computer-Based Recording Software, Setup & Training	Certified Technician	4 Hrs Setup & 4 Hrs Training	1	
ADD 8	18AV	*Playback - I/O*				
ADD 8	19AV	CD/BT/SD/USB Player	Tascam	CD-400U	1	
ADD 8	20AV	6-CH DI, rackmount	Radial	JD6	1	
ADD 8	21AV	*Monitoring-Audio Control (5.1)*				
ADD 8	22AV	Control Room Monitoring Loudspeaker, Mains, Powered	Genelec	8340A SAM Studio Monitor	5	Control Room
ADD 8	23AV	Monitoring Loudspeaker, Wall Mount	Genelec	8000-402B Adjustable Mount	2	
ADD 8	24AV	Control Room Monitoring Loudspeaker, Sub, Powered	Genelec	7370A SAM Studio Sub	1	Control Room
ADD 8	25AV	Control Room Monitor Calibration Kit & USB Interface	Genelec	GLM SAM	1	
ADD 8	26AV	GLM Hub Manager	Genelec	MAI0137	1	
ADD 8	27AV	Control Room Monitor Controller, Dante	Focusrite	R1	1	
ADD 8	28AV	*Monitoring-Audio Live Room*				
ADD 8	29AV	Studio Room Monitoring Loudspeaker L/R, Powered	Genelec	8340A SAM Studio Monitor	2	Studio
ADD 8	30AV	Monitoring Loudspeaker, Wall Mount	Genelec	8000-402B Adjustable Mount	2	Studio
ADD 8	31AV	*Monitoring-Audio Musician*				
ADD 8	32AV	Musician Monitoring System- Base Unit, Dante	Digital Audio Labs	LMPro16	1	
ADD 8	33AV	Musician Monitoring System, User Unit	Digital Audio Labs	LMPro Duo	4	
ADD 8	34AV	Musician Monitoring System, User Unit Mic Stand Mount	Digital Audio Labs	MT-1	4	
ADD 8	35AV	Musician Monitoring System, 25' CAT6A cable, Ethercon > RJ45	ProCo Sound	DURASHIELD-25NB45	8	4 spare
ADD 8	36AV	Headphones	AKG	K 240	8	
ADD 8	37AV					

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
ADD 8	38AV	***VIDEO***				
ADD 8	39AV	*Monitoring - Control Room*				
ADD 8	40AV	27" LED Monitor, HDMI Input, 4k resolution, VESA	LG/Samsung	A/R	2	mounts in furniture
ADD 8	41AV	55" LCD Monitor, HDMI Input, 232 control, 4k resolution	LG/Samsung	A/R	2	
ADD 8	42AV	In-Wall Junction Box	Chief Mfg	PAC-501	2	
ADD 8	43AV	Wall Mount for Monitor w/ Swing- Recessed	Chief Mfg	PNRIW Series + PSB	2	
ADD 8	44AV	Long-Length Fiber HDMI Cable	Extron	Pro Plenum	4	size TBD in field
ADD 8	45AV	*Monitoring - Live Room*				
ADD 8	46AV	55" LCD Monitor, HDMI Input, 232 control, 4k resolution	LG/Samsung	A/R	1	
ADD 8	47AV	In-Wall Junction Box	Chief Mfg	PAC-501	1	
ADD 8	48AV	Wall Mount for Monitor w/ Swing- Recessed	Chief Mfg	PNRIW Series + PSB	1	
ADD 8	49AV	Long-Length Fiber HDMI Cable	Extron	Pro Plenum	1	size TBD in field
ADD 8	50AV	Bulkhead HDMI - Decora, White	Crestron	MP-WP152-W	1	
ADD 8	51AV	Powered Soundbar	JBL	PSB-1	1	
ADD 8	52AV	Button Panel	Extron	MLC Plus 100	1	
ADD 8	53AV					
ADD 8	54AV	***UTILITY***				
ADD 8	55AV	*Talkback*				
ADD 8	56AV	Talkback Microphone for LIVE room	Audix	GS1	1	
ADD 8	57AV	Patching				
ADD 8	58AV	Audio Patchbay, TT Type	Bittree	969A Series	A/R	
ADD 8	59AV	Audio Patch Cable, Red, 3', TT Type	Bittree	BPC3602-110	40	
ADD 8	60AV	Audio Combining Networks	Radio Design Labs	STD-600	2	
ADD 8	61AV	Audio Isolation Transformers	Radio Design Labs	TX-AT1	2	
ADD 8	62AV	Data Patchbay / RJ-45 / CAT6A STP	Belden	REVConnect Series	A/R	see specs for further info
ADD 8	63AV	RJ-45 to RJ-45 CAT6A STP Patch Cable, 3'	Comprehensive	CAT6A-3BLU	10	
ADD 8	64AV	*Network / Clock*				
ADD 8	65AV	Gigabit LAN switch, POE	Netgear	M4250 Series	1	
ADD 8	66AV	Sync/PTP/NTP/LTC Generator	Brainstorm	DXD-8	1	With PTP option
ADD 8	67AV	*Recording Lights*				
ADD 8	68AV	RECORDING light, 12VDC, LED	Punchlight	Recording Display (Black)	3	
ADD 8	69AV	Recod Light GPIO Interface & PSU	Punchlight	GPI-UNI	1	
ADD 8	70AV	Recording Light Switch in Rack Panel	Contractor	Custom	1	
ADD 8	71AV	*Utility*				
ADD 8	72AV	UPS Unit, Fanless	Middle Atlantic	UPS-S1000R	2	Desk & Rack
ADD 8	73AV	Power Distribution	Middle Atlantic	PD-915R	4	Desk & Rack
ADD 8	74AV	Rack Drawer	Middle Atlantic	D2/D3/D4	A/R	Fill empty spaces in side racks
ADD 8	75AV	Gang Panel	Contractor	Contractor	A/R	
ADD 8	76AV	Multi-I/O Panel	Contractor	Contractor	A/R	

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
ADD 8	77AV	*Equipment Rack*				
ADD 8	78AV	Equipment Racks & Accessories	Middle Atlantic	BGR Series	1	see specs for further info
ADD 8	79AV	Power Controller	Lyntec	SS2-LRP	1	connect to Lyntec panel (by elec)
ADD 8	80AV	Power raceway & accessories	Middle Atlantic	MPR-8A + accessories	1	1/rack
ADD 8	81AV	Power modules	Middle Atlantic	M-2x20IGA	6	6/rack
ADD 8	82AV	UPS Unit, 2200VA	Middle Atlantic	UPS-S2200R	1	Rack
ADD 8	83AV	UPS Power Distribution	Middle Atlantic	PD-2415SC-NS	1	1/rack
ADD 8	84AV	*Furniture*				
ADD 8	85AV	Custom Studio Furniture	Laguna Design	Echo Custom	1	finish determined by architect
ADD 8	86AV	Power Distribution	Middle Atlantic	PD-815R-PL	2	Desk
ADD 8	87AV	UPS Unit, 1000VA, Brick Type	Eaton/APC	A/R	1	Desk
ADD 8	88AV					
ADD 8	89AV					
ADD 8	90AV	Miscellaneous Hardware				
ADD 8	91AV	Wire & Cable				
ADD 8	92AV	Labor				
		BAND/ORCH & CHORAL ROOMS	**(QTY: 2)**			
		AV System				
		Video		***Qty Per Room***		
	1AV	AV Switcher	Extron	IN1808 IPCP	1	
	2AV	HDMI Receiver	Extron	DTP HDMI 4K 330 Rx	1	Projector
	3AV	BYOD Device	OFCI	OFCI	0	(Qty: 1 - OFCI)
ADD 8	4AV	Video Projector, 8.5k lumen, 1920x1200, DLP, Laser	**Sharp**	**XP-A824U-W**	1	
ADD 8	5AV	Video Projector Lens	**Sharp**	**A/R**	1	
	6AV	Video Projector Ceiling Mount	Chief Mfg	A/R	1	
	7AV	Motorized Projection Screen, 16:10, Matte White	Draper	Acumen V	1	size per drawings + black drop
	8AV	Projection Screen, Low Voltage Control	Draper	LVC	1	
	9AV	*Audio Playback*				
	10AV	4x4 line mixer	Extron	DMP44LC	1	
	11AV	Bluetooth Receiver	**Tascam**	**CD-400U**	1	mount antenna outside rack
	12AV	Main Loudspeaker, Powered, White	Martin Audio	CDD-LIVE12	2	
	13AV	Loudspeaker Wall Mounting, Mains, white	Martin Audio	WB12	2	
	14AV	*Audio Recording*				
	15AV	USB/Flash Recorder, 2-ch Mic Preamp, Dante	**Tascam**	**SS-CDR250N**	1	recording
ADD 8	**16AV**	**USB/Flash/CD Recorder, Dante Card**	**Tascam**	**IF-DA2**	**1**	
	17AV	Hanging Choir Mics, White	Audix	M1255BW	2	recording
	18AV	*Control Systems*				
	19AV	Touchpanel Controller	Extron	TLP PRO 725M	1	
	20AV	Control System Accessories	Extron	A/R	1	
	21AV	Audio over IP/Control Switch, Gigabit, Q-SYS/Dante, 1G up	**Netgear**	**M4250 Series**	1	

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	22AV	*Utility*				
	23AV	Power Distribution	Middle Atlantic	PD-915R	1	
	24AV	Custom I/O rack panel	Contractor	Custom	1	
	25AV	AV Rack, Pull-Out Mount	Middle Atlantic	SRSR Series	1	
	26AV	Rack Fan	Middle Atlantic	A/R	1	
	27AV	In-Wall Junction Box with cover, white	Chief Mfg	PAC-526-FCW	2	future flat panels
	28AV					
	29AV					
	30AV	Miscellaneous Hardware				
	31AV	Wire & Cable				
	32AV	Labor				
	LOOSE EQUIPMENT - THEATRE					
		Production Intercom - Wired				
ADD 8	1AV	Heavy-Duty Headset	Clear-Com	CC-300	8	
ADD 8	2AV	Light-Duty Headset	Clear-Com	CC-110	4	
ADD 8	3AV	Handset	Clear-Com	HS-6	1	
ADD 8	4AV	Wired Beltpack, Analog PL, 1-ch	Clear-Com	RS-701	12	
ADD 8	5AV	Call Signal Flasher	Clear-Com	FL-7	1	
ADD 8	6AV	*Portable Wireless Mics - One 16-channel System*				
ADD 8	7AV	Rackmount Light/Power Unit	Furman	PL-8C	1	
ADD 8	8AV	Wireless Mic RX, Receiver, Base Unit	Shure	ANX4	1	
ADD 8	9AV	Wireless Mic RX, 4-ch License	Shure	ANX4-4CL	4	
ADD 8	10AV	Wireless Mic Handheld TX	Shure	ULXD2/B58	16	
ADD 8	11AV	Wireless Mic Bodypack TX	Shure	ULXD1	16	
ADD 8	12AV	Body Pack Microphone, Headworn	Point Source Audio	CO-8WH	16	color tbd
ADD 8	13AV	Beltpac for body mic	wirelessmicbelts.com	BP-SH-ULXD-x	30	(10) Black, (10) Tan, (10) White
ADD 8	14AV	Belt Package, 20-pack	wirelessmicbelts.com	BELT-20PACK-x	3	(1) Black, (1) Tan, (1) White
ADD 8	15AV	Rechargeable Battery	Shure	SB900B	32	
ADD 8	16AV	8-port Battery Charger	Shure	SBC-800	2	
ADD 8	17AV	Antenna, Dual	RF Venue	DFIN	1	
ADD 8	18AV	Antenna Rack Panel	Contractor	Custom	1	
ADD 8	19AV	Slide-Out drawer for Battery Chargers, 1RU	Middle Atlantic	SSL	1	mount chargers to shelf
ADD 8	20AV	Wireless Mic Antenna Coax Cable, 25'-0"	Shure	UA825	2	
ADD 8	21AV	Portable Case, Anvil/ATA style, wheels, 24RU	ProX	A/R	1	
ADD 8	22AV	Rack Drawer with foam bottom	Middle Atlantic	D2/D3/D4	A/R	fill empty with rack drawers
ADD 8	23AV	25' XLR-F to XLR-M Snake, 16-ch	Whirlwind	A/R	1	

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
ADD 8	24AV	*Microphones & DI*				
ADD 8	25AV	Handheld Microphone	Shure	SM58	4	
ADD 8	26AV	Handheld Microphone, switched	Shure	SM58 Switched	1	
ADD 8	27AV	Handheld Microphone	Shure	SM57	4	
ADD 8	28AV	Handheld Microphone, condenser	Shure	Beta 87a	2	
ADD 8	29AV	Hanging Choir Mic w/ hanger & 50' cable	Audix	1255B + MC Hanger + 50' cable	2	
ADD 8	30AV	Podium Mic w/ weighted base	Audio Technica	U857QL / AT8615	2	
ADD 8	31AV	DI Box, passive	Radial	ProDI	2	
ADD 8	32AV	Dual DI Box, passive, PC	Radial	ProAV2	2	
ADD 8	33AV	Mic Case, 12-hole with cable storage	SKB	1SKB-1200	1	
ADD 8	34AV	Extra Mic Clip for SM58, 10-pack	Shure	A25DM	1	10 pack
ADD 8	35AV	*Test Gear*				
ADD 8	36AV	Cable Multi-Tester	Whirlwind	MCT-7	1	
ADD 8	37AV	*Portable Speakers*				
ADD 8	38AV	Powered Loudspeaker, Booth Monitor	JBL	LSR 305	2	
ADD 8	39AV	Desk Stand for Booth Monitor	IsoAcoustics	ISO-L8R130	2	
ADD 8	40AV	Main Loudspeaker, Powered	Yamaha	DZR10	2	
ADD 8	41AV	Portable Effects Speakers, small	JBL	AC16	4	
ADD 8	42AV	Portable Effects Speakers, large	JBL	AC18/95	4	
ADD 8	43AV	U-Bracket for small speaker	JBL	MTU16	4	(1) C-Clamp per unit
ADD 8	44AV	U-Bracket for large speaker	JBL	MTU18	4	(1) C-Clamp per unit
ADD 8	45AV	Safety Cable for Yoke Bracket	ETC	400SC	8	
ADD 8	46AV	C-Clamp for Yoke Bracket	ETC	400CC	8	Mount to yoke bracket
ADD 8	47AV	Table-top mic stand, round base	Atlas Sound	DMS-7E	4	
ADD 8	48AV	*Mic Stands*				
ADD 8	49AV	Standard round-base mic stand, Black	Atlas Sound	MS10CE	4	
ADD 8	50AV	Tripod mic stand w/ boom, Black	K & M	210/8	4	
ADD 8	51AV	Audio Adapter Kit	Remote Audio	APPKI PRO	1	
ADD 8	52AV	*Accessories*				
ADD 8	53AV	BNC Barrel Adapter	Canare	BCJ-JK	4	
ADD 8	54AV	XLR-M/M Barrel Adapter	Neutrik	NA3MM-B	4	
ADD 8	55AV	XLR-F/F Barrel Adapter	Neutrik	NA3FF-B	4	
ADD 8	56AV	CAT6A STP Barrel Adapter	Neutrik	NE8FFX6-W	4	
ADD 8	57AV	Cotton Tie Line, Black, 600' roll, 1/8" black, unglazed	Musson Theatrical	A/R	1	
ADD 8	58AV	Headphones	Sony	MDR-7506	1	
ADD 8	59AV	5-Drawer Work Box w/ table	ProCases	AC-WB5MT	1	or equal
ADD 8	60AV	ATA-style rolling cable/stand trunk	ProCases	AC-MTP2	1	or equal

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
ADD 8	61AV	*Cables*				
ADD 8	62AV	*NOTE: Provide color heatshink label on all cables reading "Sanger West HS Theatre". Color denotes length.*				
ADD 8	63AV	*NOTE: Provide hook & loop type black velcro ties on each cable, permanently affixed for use when storing cable. No zip-tie type.*				
ADD 8	64AV	Mic / Intercom Cable, 10'	Whirlwind	MK4-10	10	
ADD 8	65AV	Mic / Intercom Cable, 25'	Whirlwind	MK4-25	20	
ADD 8	66AV	Mic / Intercom Cable, 50'	Whirlwind	MK4-50	4	
ADD 8	67AV	Mic / Intercom Cable, 100'	Whirlwind	MK4-100	2	
ADD 8	68AV	1/4" to 1/4" instrument cable, 6'-0"	Whirlwind	L-6	4	
ADD 8	69AV	Loudspeaker Cable, 5'	Whirlwind	NL4-005	10	
ADD 8	70AV	Loudspeaker Cable, 10'	Whirlwind	NL4-010	10	
ADD 8	71AV	Loudspeaker Cable, 25'	Whirlwind	NL4-025	4	
ADD 8	72AV	Loudspeaker Cable, 50'	Whirlwind	NL4-050	4	
ADD 8	73AV	Edison Power Cable, 12AWG, 25'-0" black, SJOOW	Lex Products	PE700J-25-515	6	
ADD 8	74AV	Edison Power Cable, 12AWG, 50'-0" black, SJOOW	Lex Products	PE700J-50-515	6	
ADD 8	75AV	BNC Video Cable, 10'	Canare	CAL55CUHD010	4	
ADD 8	76AV	BNC Video Cable, 25'	Canare	CAL55CUHD025	4	
ADD 8	77AV	BNC Video Cable, 50'	Canare	CAL55CUHD050	2	
ADD 8	78AV	Audio Patch (longframe) to XLR-M, 3', Red	Bittree	LPCXM3602-110	2	
ADD 8	79AV	Audio Patch (longframe) to XLR-F, 3', Red	Bittree	LPCXF3602-110	2	
ADD 8	80AV	Video Patch (Mini-WECO) to BNC Cable, 3', Blue	Bittree	VPBM3600-75	2	
ADD 8	81AV	F CATV Video Cable, 25'	A/R	A/R	4	
ADD 8	82AV	HDMI Extension Cables, 25'	Extron	HDMI Pro/25	4	
ADD 8	83AV	Ruggedized CAT6A STP cable w/ Ethercon, 25'-0"	Whirlwind	ENC6ASE-25	8	ethercon both ends
ADD 8	84AV	Ruggedized CAT6A STP cable w/ Ethercon, 50'-0"	Whirlwind	ENC6ASE-50	8	ethercon both ends
ADD 8						
ADD 8		**LOOSE EQUIPMENT - RECORDING STUDIO**				
ADD 8						
ADD 8		*Microphones & DI- Audio Recording*				
ADD 8	1AV	Microphone, Large Condenser, Matched Pair	AKG	C414 XLS/ST	1	pair
ADD 8	2AV	Microphone, Dynamic	Shure	SM57	4	
ADD 8	3AV	Microphone, Dynamic	Shure	SM58	4	
ADD 8	4AV	Microphone, Large Diaphragm Condenser	Shure	KSM32	1	
ADD 8	5AV	Microphone, Matched Pair Small Condenser, pair	Studio Projects	C4	1	matched pair
ADD 8	6AV	Microphone, Drum Kit, 5 pc	Shure	PGDMK6-XLR	1	
ADD 8	7AV	Microphone, Large Dynamic	AKG	D112	1	
ADD 8	8AV	DI Box, 1-ch	Radial	Pro D1	2	
ADD 8	9AV	DI Box, Stereo	Radial	Pro D2	2	
ADD 8	10AV	DI Box, SansAmp	Tech 21	SansAmp Bass Driver V2	2	
ADD 8	11AV	Portable Padded Case for Microphones	Gator	GTSA-MIC15	1	

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
ADD 8	12AV	*Miscellaneous*				
ADD 8	13AV	Table-top mic stand, round base	Atlas Sound	DMS-7E	8	
ADD 8	14AV	Standard round-base mic stand, Black	Atlas Sound	MS10CE	8	
ADD 8	15AV	Boom Stand, Studio, Wheels	Atlas	SB36WE	2	
ADD 8	16AV	Boom Stand, Studio, Wheels	Triad-Orbit	Starbird SB-1	2	
ADD 8	17AV	Audio Adapter Kit	Remote Audio	APPKI PRO	1	
ADD 8	18AV	XLR-M/M Barrel Adapter	Neutrik	NA3MM-B	10	
ADD 8	19AV	XLR-F/F Barrel Adapter	Neutrik	NA3FF-B	10	
ADD 8	20AV	CAT6A STP Barrel Adapter	Neutrik	NE8FFX6-W	10	
ADD 8	21AV	*Cables*				
ADD 8	22AV	*NOTE: Provide color heatshink label on all cables reading "Sanger West HS - Recording". Color denotes length.*				
ADD 8	23AV	*NOTE: Provide hook & loop type black velcro ties on each cable, permanently affixed for use when storing cable. No zip-tie type.*				
ADD 8	24AV	Mic / Intercom Cable, 10'	Whirlwind	MK410	10	
ADD 8	25AV	Mic / Intercom Cable, 25'	Whirlwind	MK425	10	
ADD 8	26AV	Mic / Intercom Cable, 50'	Whirlwind	MK450	4	
ADD 8	27AV	Mic / Intercom Cable, 100'	Whirlwind	MK4100	4	
ADD 8	28AV	1/4" to 1/4" instrument cable, 6'-0", TS	Whirlwind	L-6	10	
ADD 8	29AV	Audio Patch (TT) to XLR-M, 3', Red	Bittree	BPCXM3602-110	2	
ADD 8	30AV	Audio Patch (TT) to XLR-F, 3', Red	Bittree	BPCXF3602-110	2	
ADD 8	31AV	HDMI Extension Cables, 15', Ultra Flexible	Extron	HDMI Ultra/15	2	
ADD 8	32AV	Ruggedized CAT6A STP cable, 25'	Whirlwind	ENC6ASE-25	4	
ADD 8	33AV	Ruggedized CAT6A STP cable, 50'	Whirlwind	ENC6ASE-50	4	
ADD 8	34AV	Edison Power Strip	Furman	SS-6B	4	
ADD 8	35AV	Edison Power Cable, 12AWG, 25'-0" black, SJOOW	Lex Products	PE700J-25-515	4	
			END OF SECTION			

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DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- Concrete Masonry Unit Wall. 8" wide
- Concrete Wall, or Column. Size as indicated.
- Stud Wall, Studs and Interior Wall materials continuous from floor to underside of floor or roof deck. Studs at 16" o.c. unless otherwise noted. Interior Wall materials shall include Batt Insulation, Sound Deadening Board, Plywood Sheathing, Gypsum Board, and Cement Plaster/ Ceramic Tile setting bed where occurs.
- Stud Wall, Studs and finish material continuous from floor to minimum 6" above ceiling. Studs to be braced to underside of roof framing or deck if not required to be continuous to roof framing or deck. Studs at 16"o.c. Unless Otherwise Noted. See Structural for bracing and extent of Structural Sheathing.
- 1 Hr. Corridor Wall - Fire Partition (1 Hr. Fire Resistive Construction, 20 Min. Door Assemblies, 45 Min. Window Assemblies)
- 1 Hr. Fire Barrier - (1 Hr. Fire Resistive Construction, 60 Min. Door / Window Assemblies)
- 2 Hr. Fire Barrier - (1 Hr. Fire Resistive Construction, 90 Min. Door / Window Assemblies)
- LANDSCAPING, Planter with CAST-IN-PLACE CONCRETE Walls with LANDSCAPING, Topsoil and amendments. See A11 X/A511 H11 X/A511
- A / ### — Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 0 — Reference Grid
- 101 / a — Opening Group No. Refer to Door or Window Opening Schedules
- Room name / 101 — Room Designation
- ## / # — Wall Assembly Symbols. Refer to Sheet X/A101
- Reference Point
- Indicates 48" x 30" Clear floor or ground space
- Indicates 60" clear turning space

MINIMUM DOOR CLEARANCES

ABBREVIATIONS

FEBC FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Type FEBC-#, Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls, See A7 X/A605

FEC-# FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, Type FEC-#, Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls, See A7 X/A605

EQ	Equal	FOM	Face of Masonry	UNO	Unless Noted Otherwise
DS	Downspout	FOS	Face of Stud	RO	Rough Opening
FF	Face of Finish	FS	Floor Sink	Typ	Typical
FOC	Face of Concrete	HB	Hose Bib	Sim	Similar
FD	Floor Drain	MO	Masonry Opening	OH	Opposite Hand

NOTES

1. All Exterior Walls shall be Wall Assembly Type 6.B E.M Unless Noted Otherwise.
2. All Interior Walls shall be Wall Assembly Type 6.D I.M Unless Noted Otherwise.
3. All Dimensions are to Face of Stud (FOS) or Center Line, Unless Noted Otherwise.
4. All Elevation Dimensions are above Finish Floor at each floor level, Unless Noted Otherwise.
5. Dimensions noted as "+/-" are nominal.
6. Floor Drains (FD) and Floor Sinks (FS) shall be set -3/4" and a min. of 3'-0" from nearest wall, Unless Noted Otherwise. Floor slopes to drain shall not exceed 1.9% in any direction.
7. For room signage refer to the SIGNAGE SCHEDULE AND PLANS
8. FIRE RESISTIVE ASSEMBLIES:
   a. All Through Penetrations and Wall Membrane Penetrations through Walls of Fire Resistive Construction shall be protected in accordance with their Fire Resistive Ratings.
   b. All walls of fire and/or smoke resistive construction shall be permanently identified with signs or stenciling in lettering not less than 3 inches (76 mm) in. height with a minimum 3/8 inch (9.5 mm) stroke in a contrasting color incorporating the following wording: FIRE AND/OR SMOKE BARRIER "#" HOUR RATED, PROTECT ALL OPENINGS, signs or stenciling shall be located above ceilings on both sides of the wall, located 15'-0" from ends of wall and at intervals not to exceed 30'-0" horizontally along the wall or partition. Note: "#" indicates the hourly rating of the wall or partition.
9. FIRE RESISTIVE CONSTUCTION: Refer to X/A101 through X/A105 for Typical Details. Refer to to the Regulatory Floor Plans for the Rated Horizontal Assembly location(s).
10. FIRE ASSEMBLIES FOR STRUCTURAL STEEL: Refer to detail A7 - X/A102 for fire assembly requirements for all concealed and exposed horizontal, vertical and diagonal structural steel members.

F18 — Floor Plan Legend

No Scale



Area A Key Plan - Building L

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
FIRST FLOOR PLAN - AREA A
Drawing

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LICENSED ARCHITECT MEGHAN K. FERNO No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

Designed By: -
Drawn By: -
Checked By: MF
Reviewed By: MF

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Scale: As indicated
Project Number: 2171
Date: 12/22/22

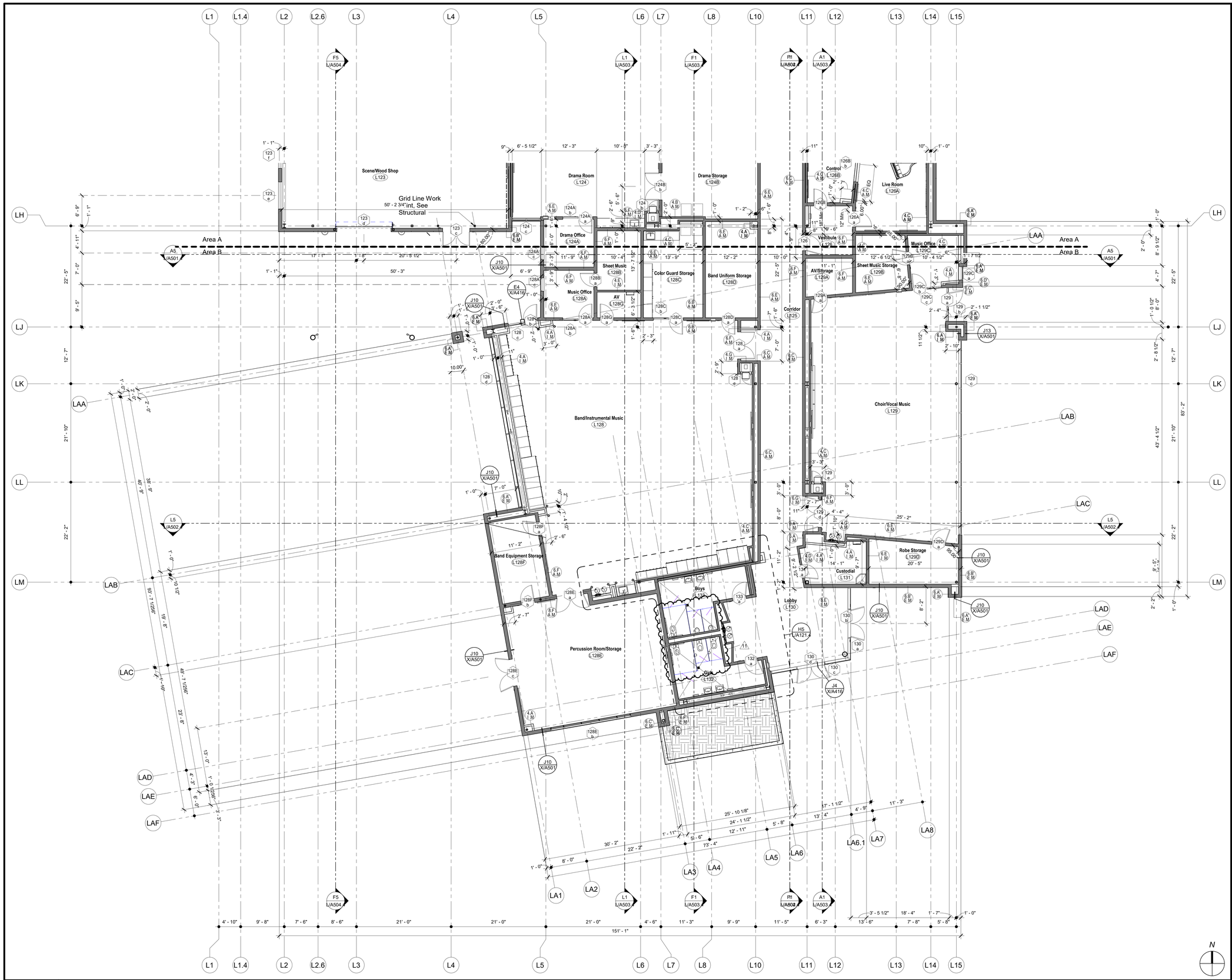
L/A102.4
AD8

A1
1/8" = 1'-0"

Floor Plan- First Floor Area A

Refer to F18 for Symbols, Abbreviations and Notes

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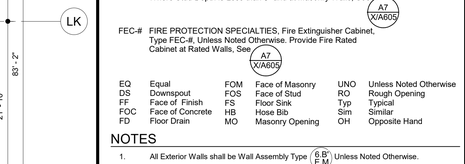
DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- Concrete Masonry Unit Wall. 8" wide
- Concrete Wall, or Column. Size as indicated.
- Stud Wall, Studs and Interior Wall materials continuous from floor to underside of floor or roof deck. Studs at 16" o.c. unless otherwise noted. Interior Wall materials shall include Batt Insulation, Sound Deadening Board, Plywood Sheathing, Gypsum Board, and Cement Plaster/ Ceramic Tile setting bed where occurs.
- Stud Wall. Studs and finish material continuous from floor to minimum 6" above ceiling. Studs to be braced to underside of roof framing or deck if not required to be continuous to roof framing or deck. Studs at 16"o.c. Unless Otherwise Noted. See Structural for bracing and extent of Structural Sheathing.
- 1 Hr. Corridor Wall - Fire Partition (1 Hr. Fire Resistive Construction, 20 Min. Door Assemblies, 45 Min. Window Assemblies)
- 1 Hr. Fire Barrier - (1 Hr. Fire Resistive Construction, 60 Min. Door / Window Assemblies)
- 2 Hr. Fire Barrier - (1 Hr. Fire Resistive Construction, 90 Min. Door / Window Assemblies)
- LANDSCAPING, Planter with CAST-IN-PLACE CONCRETE Walls with LANDSCAPING, Topsoil and amendments. See A11 X/A511, H11 X/A511
- A / ### — Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 0 — Reference Grid
- 101 / a — Opening Group No. Refer to Door or Window Opening Schedules
- Room name / 101 — Room Designation
- ## / # — Wall Assembly Symbols. Refer to Sheet X/A101
- Reference Point



ABBREVIATIONS

FEBC FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Type FEBC-#, Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls, See A7 X/A605

FEC-# FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, Type FEC-#, Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls, See A7 X/A605

EQ	Equal	FOM	Face of Masonry	UNO	Unless Noted Otherwise
DS	Downspout	FOS	Face of Stud	RO	Rough Opening
FF	Face of Finish	FS	Floor Sink	Typ	Typical
FOC	Face of Concrete	HB	Hose Bib	Sim	Similar
FD	Floor Drain	MO	Masonry Opening	OH	Opposite Hand

NOTES

1. All Exterior Walls shall be Wall Assembly Type (6.8" E.M) Unless Noted Otherwise.
2. All Interior Walls shall be Wall Assembly Type (6.D I.M) Unless Noted Otherwise.
3. All Dimensions are to Face of Stud (FOS) or Center Line, Unless Noted Otherwise.
4. All Elevation Dimensions are above Finish Floor at each floor level, Unless Noted Otherwise.
5. Dimensions noted as "+/-" are nominal.
6. Floor Drains (FD) and Floor Sinks (FS) shall be set -3/4" and a min. of 3'-0" from nearest wall, Unless Noted Otherwise. Floor slopes to drain shall not exceed 1.9% in any direction.
7. For room signage refer to the SIGNAGE SCHEDULE AND PLANS
8. FIRE RESISTIVE ASSEMBLIES:
   a. All Through Penetrations and Wall Membrane Penetrations through Walls of Fire Resistive Construction shall be protected in accordance with their Fire Resistive Ratings.
   b. All walls of fire and/or smoke resistive construction shall be permanently identified with signs or stenciling in lettering not less than 3 inches (76 mm) in. height with a minimum 3/8 inch (9.5 mm) stroke in a contrasting color incorporating the following wording: FIRE AND/OR SMOKE BARRIER "#" HOUR RATED, PROTECT ALL OPENINGS, signs or stenciling shall be located above ceilings on both sides of the wall, located 15'-0" from ends of wall and at intervals not to exceed 30'-0" horizontally along the wall or partition. Note: "#" indicates the hourly rating of the wall or partition.
9. FIRE RESISTIVE CONSTUCTION: Refer to X/A101 through X/A105 for Typical Details. Refer to to the Regulatory Floor Plans for the Rated Horizontal Assembly location(s).
10. FIRE ASSEMBLIES FOR STRUCTURAL STEEL: Refer to detail A7 - X/A102 for fire assembly requirements for all concealed and exposed horizontal, vertical and diagonal structural steel members.

F18 — Floor Plan Legend
No Scale



Area B Key Plan - Building L

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
FIRST FLOOR PLAN - AREA B
Drawing

darden architects
ARCHITECTURE PLANNING INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051
LICENSED ARCHITECT MICHAEL K. FENLON No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

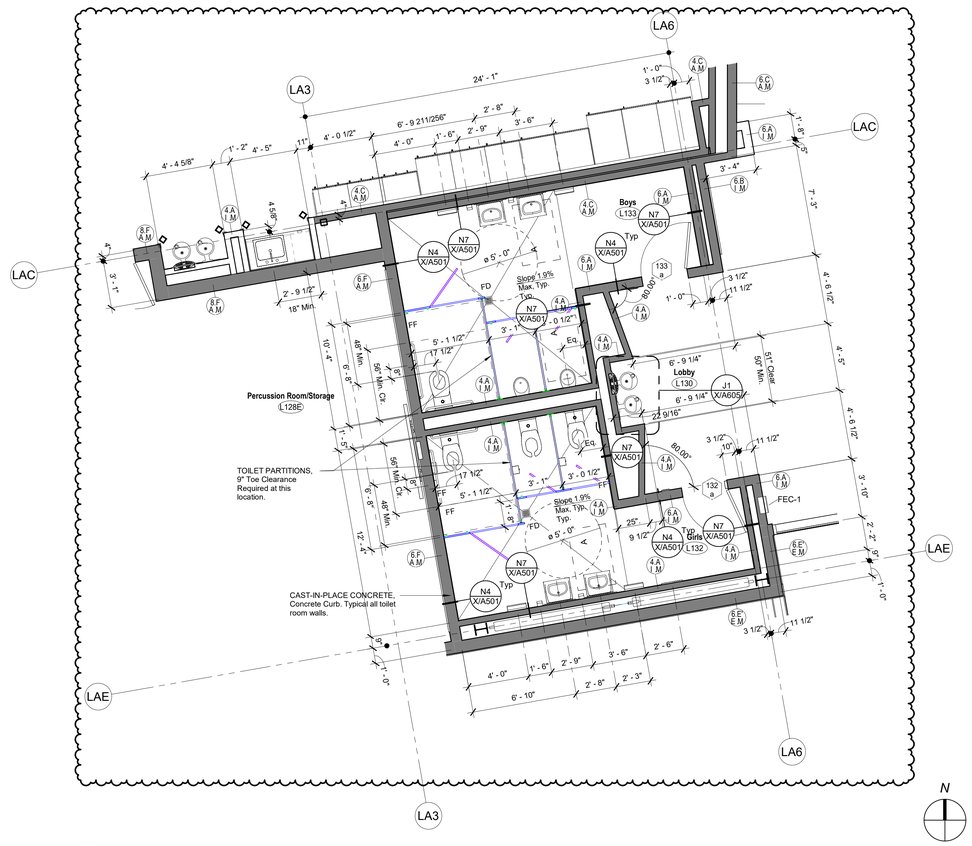
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Scale: As indicated	Drawn By: -	
Project Number: 2171	Checked By: MF	
Date: 12/22/22	Reviewed By: MF	

L/A103.4
AD8

A1
1/8" = 1'-0"

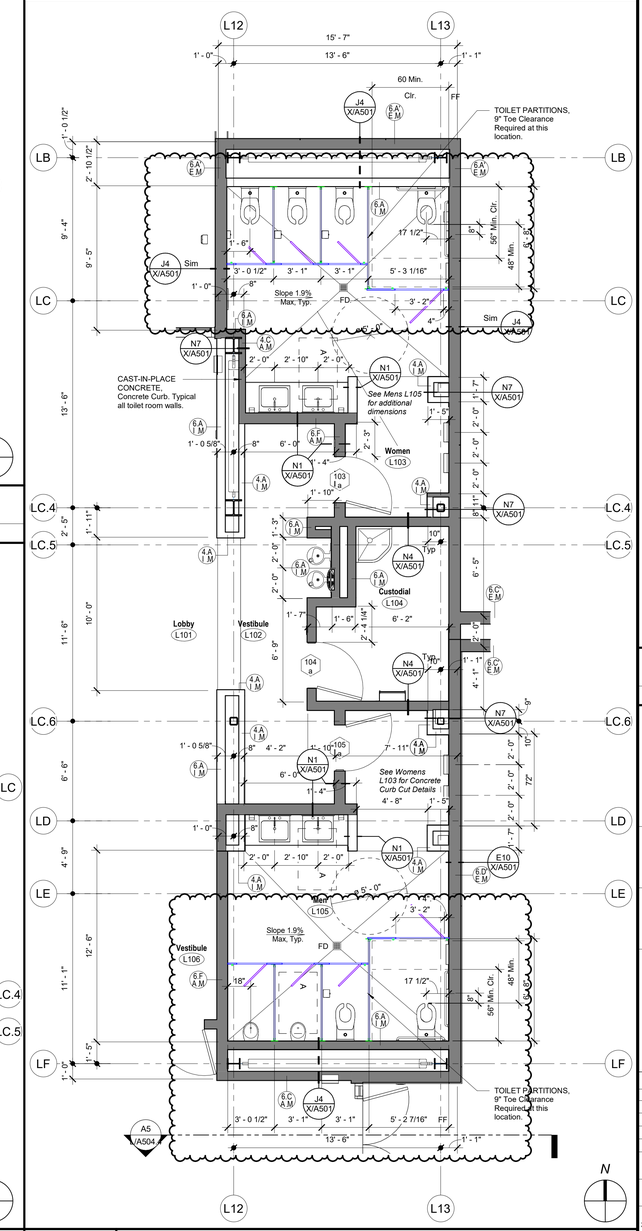
Floor Plan- First Floor Area B
Refer to F18 for Symbols, Abbreviations and Notes

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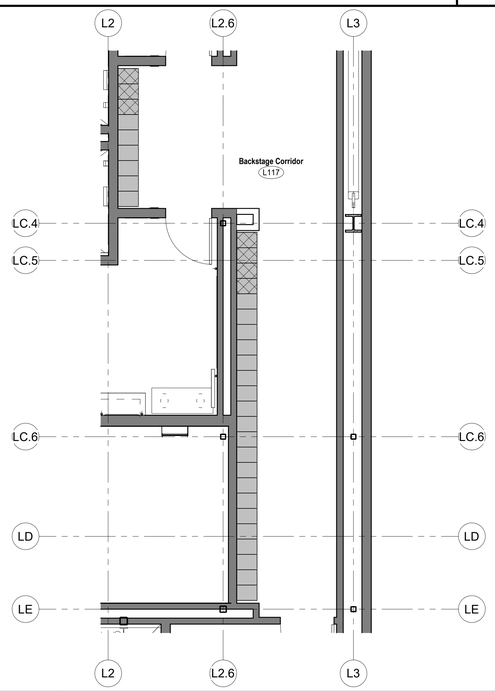
H5 — Enlarged Toilet Plan - 132 and 133

1/4" = 1'-0"



A13 — Enlarged Toilet Plan - 103, 104 & 105

1/4" = 1'-0"



Enlarged Locker Room Legend

- Accessible Locker
- 3 - Tier Locker - Locker Room

Accessible Locker Room Requirements

Backstage Corridor - L117 - Locker

North Locker
- 9 Lockers in a Row
- 9 x 3 Tier Lockers = 27 Lockers
- 27 x 5% = 2 Accessible Gym Lockers Required
- **2 Accessible Lockers Provided**

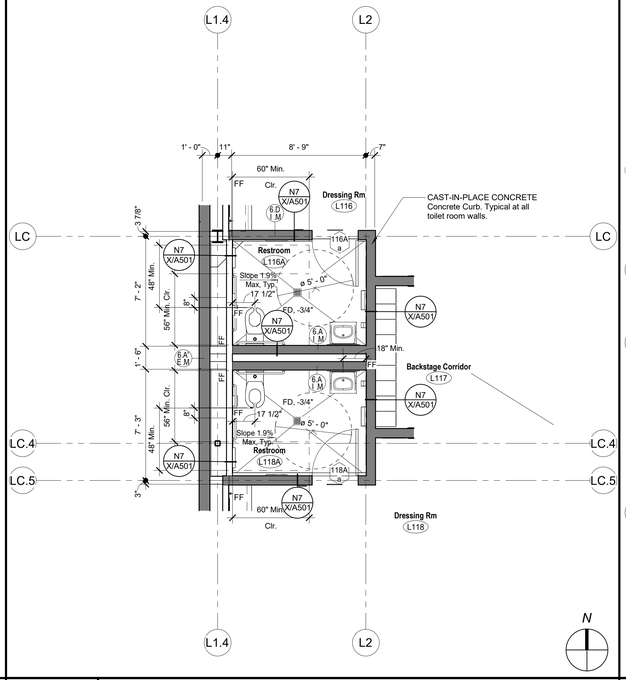
South Locker
- 24 Lockers in a Row
- 24 x 3 Tier Lockers = 72 Lockers
- 72 x 5% = 4 Accessible Gym Lockers Required
- **4 Accessible Lockers Provided**

Notes

1. Accessible lockers with the back wall deeper than 10" and max 24" shall have a clothes hook located max 46" a.f.f. (11B-308.3.2)
2. Locker Bench Base, See Detail A1 M/A140

A1 — Enlarged Locker Plan - L117

1/4" = 1'-0"



A8 — Enlarged Toilet Plan - 116A and 118A

1/4" = 1'-0"

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- Concrete Masonry Unit Wall. 8" wide
- Concrete Wall, or Column. Size as indicated.
- Stud Wall, Studs and Interior Wall materials continuous from floor to underside of floor or roof deck. Studs at 16" o.c. unless otherwise noted. Interior Wall materials shall include Batt Insulation, Sound Deadening Board, Plywood Sheathing, Gypsum Board, and Cement Plaster/ Ceramic Tile setting bed where occurs.
- Stud Wall. Studs and finish material continuous from floor to minimum 6" above ceiling. Studs to be braced to underside of roof framing or deck if not required to be continuous to roof framing or deck. Studs at 16"o.c. Unless Otherwise Noted. See Structural for bracing and extent of Structural Sheathing.
- 1 Hr. Corridor Wall - Fire Partition (1 Hr. Fire Resistive Construction, 20 Min. Door Assemblies, 45 Min. Window Assemblies)
- 1 Hr. Fire Barrier - (1 Hr. Fire Resistive Construction, 60 Min. Door / Window Assemblies)
- 2 Hr. Fire Barrier - (1 Hr. Fire Resistive Construction, 90 Min. Door / Window Assemblies)
- LANDSCAPING, Planter with CAST-IN-PLACE CONCRETE Walls with LANDSCAPING, Topsoil and amendments. See A11 X/A511 H11 X/A511
- A ### — Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 0 — Reference Grid
- 101 a — Opening Group No. Refer to Door or Window Opening Schedules
- Room name 101 — Room Designation
- # # # — Wall Assembly Symbols. Refer to Sheet X/A101
- Reference Point
- Indicates 48" x 30" Clear floor or ground space
- Indicates 60" clear turning space

MINIMUM DOOR CLEARANCES

ABBREVIATIONS

FEBC FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Type FEBC-#, Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls, See A7 X/A605

FEC-# FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, Type FEC-#, Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls, See A7 X/A605

EQ	Equal	FOM	Face of Masonry	UNO	Unless Noted Otherwise
DS	Downspout	FOS	Face of Stud	RO	Rough Opening
FF	Face of Finish	FS	Floor Sink	Typ	Typical
FOC	Face of Concrete	HB	Hose Bib	Sim	Similar
FD	Floor Drain	MO	Masonry Opening	OH	Opposite Hand

NOTES

1. All Exterior Walls shall be Wall Assembly Type 6.B* E.M Unless Noted Otherwise.
2. All Interior Walls shall be Wall Assembly Type 6.D I.M Unless Noted Otherwise.
3. All Dimensions are to Face of Stud (FOS) or Center Line, Unless Noted Otherwise.
4. All Elevation Dimensions are above Finish Floor at each floor level, Unless Noted Otherwise.
5. Dimensions noted as "+/-" are nominal.
6. Floor Drains (FD) and Floor Sinks (FS) shall be set -3/4" and a min. of 3'-0" from nearest wall, Unless Noted Otherwise. Floor slopes to drain shall not exceed 1.9% in any direction.
7. For room signage refer to the SIGNAGE SCHEDULE AND PLANS
8. FIRE RESISTIVE ASSEMBLIES:
   a. All Through Penetrations and Wall Membrane Penetrations through Walls of Fire Resistive Construction shall be protected in accordance with their Fire Resistive Ratings.
   b. All walls of fire and/or smoke resistive construction shall be permanently identified with signs or stenciling in lettering not less than 3 inches (76 mm) in. height with a minimum 3/8 inch (9.5 mm) stroke in a contrasting color incorporating the following wording: FIRE AND/OR SMOKE BARRIER "#" HOUR RATED, PROTECT ALL OPENINGS, signs or stenciling shall be located above ceilings on both sides of the wall, located 15'-0" from ends of wall and at intervals not to exceed 30'-0" horizontally along the wall or partition. Note: "#" indicates the hourly rating of the wall or partition.
9. FIRE RESISTIVE CONSTUCTION: Refer to X/A101 through X/A105 for Typical Details. Refer to to the Regulatory Floor Plans for the Rated Horizontal Assembly location(s).
10. FIRE ASSEMBLIES FOR STRUCTURAL STEEL: Refer to detail A7 - X/A102 for fire assembly requirements for all concealed and exposed horizontal, vertical and diagonal structural steel members.

F18 — Floor Plan Legend

No Scale

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
ENLARGED FLOOR PLANS
Drawing

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LICENSED ARCHITECT REGISTERED U.S. PATENT OFFICE No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

Designed By: -
Drawn By: -
Checked By: MF
Reviewed By: MF

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Scale: As indicated
Project Number: 2171
Date: 12/22/22

L/A121.4
AD8

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DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- MECHANICAL, Air Supply Grill
- MECHANICAL, Air Return Grill
- MECHANICAL, Strip Grill
- MECHANICAL, Exhaust Fan
- FIRE PROTECTION, Fire Sprinkler Head. Refer to Fire Protection Drawings.
- OD PLUMBING, Overflow Drain
- PLUMBING, Roof Drain, Refer to Plumbing.
- SD ELECTRICAL, Fire Alarm Device
- SV ELECTRICAL, Fire Alarm Device, Audio/Visual
- (RA) ROOF ACCESSORIES, Roof Hatch
- ACOUSTICAL CEILINGS, Suspended Ceiling Compression Strut/ Splay Wire location
- ELECTRICAL, Light Fixture, Recessed, Unless Noted Otherwise. (p) = Pendant Mounted (s) = Surface Mounted
- ELECTRICAL, Light Fixture. Wall Mounted
- ELECTRICAL, Light Fixture, Linear
- STEEL AND FABRICATIONS, Access Ladder
- VS ELECTRICAL, Vape Sensor. Refer to ELECTRICAL for Data outlet. Device to be OFOI .
- CEMENT PLASTER, Cement Plaster System
- GYPSUM BOARD, Refer to Interior Finish Schedule. Support Gyp. Bd. from METAL FRAMING. See Structural detail **16-X/S603** for typical soffit framing and metal framing attachment to Metal deck.
- FIBER-CEMENT PANELS
- ACOUSTICAL CEILINGS, ACT-II, ACT-IV, ACT-IX, ACT XV, ACT-XVII
- ACOUSTICAL CEILINGS, ACT-III
- ACOUSTICAL CEILINGS, ACT-X
- ACOUSTICAL CEILINGS, ACT-XII
- ACOUSTICAL CEILINGS, ACT-XIII
- INSULATION, Acoustical Blanket, 1" Thick, Stick Pinned to Metal Deck
- METAL DECK/ ACOUSTICAL METAL DECK, Open to above. Refer to Interior Finish Schedule for Deck type. See Interior Finish Schedule for INSULATION, Black Faced Acoustic Insulation locations.
- MCM, Metal Panels @ Canopy
- PERFORATED METAL PANELS See Roof Plan for more information. See Detail A4 X/A513, A11 X/A513, A1 X/A513
- TRANSLUCENT PANELS, Skylight Panel System, See Detail A9 X/A514, F4 X/A514, F11 X/A514, F14 X/A514, L14 X/A514
- ACOUSTICAL CEILINGS, ACT-XI
- ACOUSTICAL CEILINGS, ACT-XVI
- ACCESS DOORS AND FRAMES, Ceiling Access. 20" x 30" minimum. Contractor to field verify clear headroom of not less than 30 inches.
- 1 Hr. Corridor Wall - (1 Hr. Fire Resistive Construction, 20 Min. Door Assemblies, 45 Min. Window Assemblies)
- 1 Hr. Fire Barrier - (1 Hr. Fire Resistive Construction, 60 Min. Door Assemblies)
- 1 Hr. Occupancy Separation / Fire Partition - (1 Hr. Fire Resistive Construction, 45 Min. Door Assemblies, 45 Min. Window Assemblies)
- MISCELLANEOUS SPECIALTIES, Unistrut Support System Refer to Drawing X/A606 for details
- Reference Point

ABBREVIATIONS

Clg.	Ceiling	OF	Over Flow
Ht.	Height	UNO	Unless Noted Otherwise
LO	Louver Opening	ACT	ACOUSTICAL CEILINGS, Tile, Suspended,
Typ.	Typical	CP	CEMENT PLASTER, System
Sim.	Similar	GB	GYPSUM BOARD, Type "X", UNO
OH	Opposite hand	GLB	GLUE-LAMINATED CONSTRUCTION, Beam
DS	Downspout	MD	METAL DECK

NOTES

1. ACOUSTICAL CEILINGS, For typical suspended ceiling support and bracing. Refer to N11 X/A603, A1 X/A603, N1 X/A603, J14 X/A603, A11 X/A603, A14 X/A603, E18 X/A602
2. Gypsum Board Ceilings Noted As "CLG HT Varies", Gypsum Board is attached to bottom side of framing/ joists, UNO
3. Ceiling Heights indicated are above Finish Floor at each floor level, UNO.
4. Where Fire Sprinklers occur at Acoustic Tile, Sprinkler Heads shall be centered in the Tile.
5. Not all fire Sprinkler Head locations are shown to provide code required coverage. But locations shown are intended to convey design intent. Coordinate with FIRE PROTECTION.
6. See Structural drawings and details for the framing of soffits and ceilings.
7. Single Lights or Single Rows of Lights at Soffits/ Ceilings shall be centered, UNO.
8. For ACOUSTICAL CEILINGS at Unistrut Grid Support Refer to Sheet X/A606
9. MCM PANELS, For Typical attachment, See, J11 X/A504, E14 X/A504, J14 X/A504, N11 X/A504, A11 X/A504

E18 — Reflected Ceiling Legend
No Scale

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
FIRST REFLECTED CEILING PLAN - AREA A
Drawing

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LICENSED ARCHITECT REGISTERED K. K. FONG No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

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Designed By: -
Drawn By: -
Checked By: MF
Reviewed By: MF

Scale: 1/8" = 1'-0"
Project Number: 2171
Date: 12/22/22

L/A202.4
AD8

A1 — Reflected Ceiling Plan- First Floor Area A
1/8" = 1'-0"
Refer to E18 for Symbols, Abbreviations, and Notes.

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DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

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ABBREVIATIONS

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Ht.	Height	UNO	Unless Noted Otherwise
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Typ.	Typical	CP	CEMENT PLASTER, System
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DS	Downspout	MD	METAL DECK

NOTES

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E18 — Reflected Ceiling Legend

No Scale

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1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
FIRST REFLECTED CEILING PLAN - AREA B
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LICENSED ARCHITECT MICHAEL K. FENNELL No. C23724 REN. 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

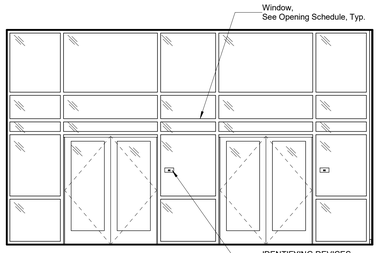
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Date: 12/22/22

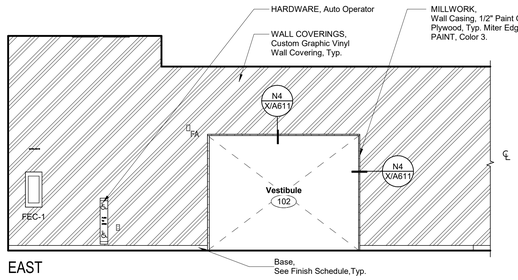
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AD8

A1
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Reflected Ceiling Plan- First Floor Area B
Refer to E18 for Symbols, Abbreviations, and Notes.

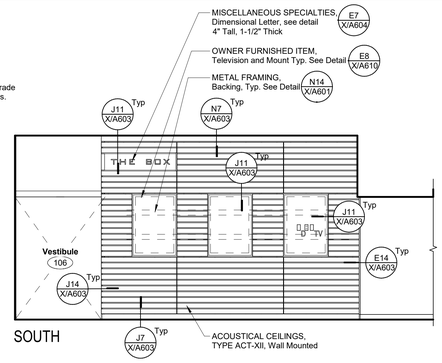
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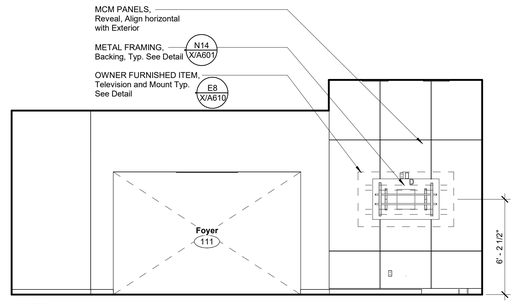
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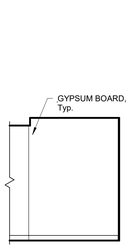


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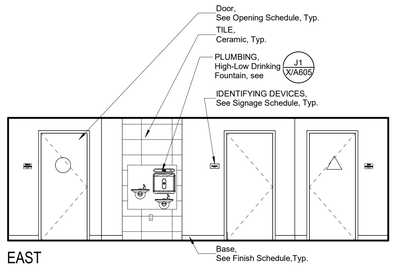


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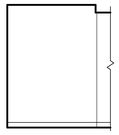
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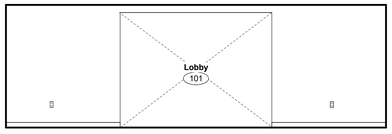
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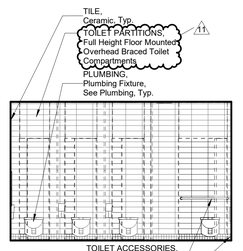


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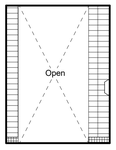


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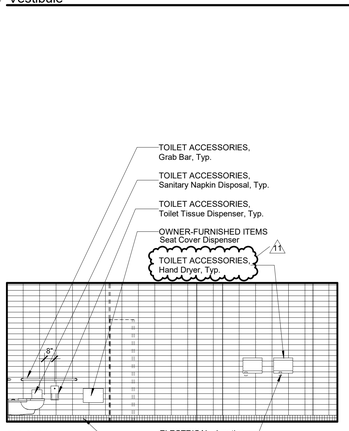


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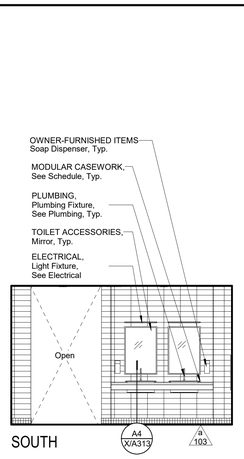


NORTH Partial

L103 Women



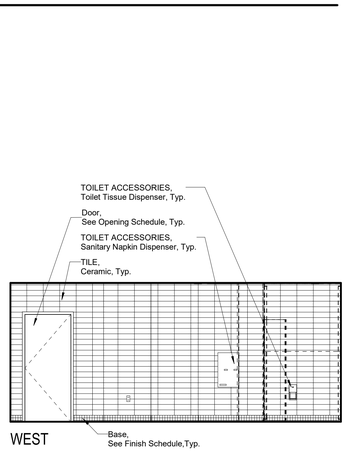
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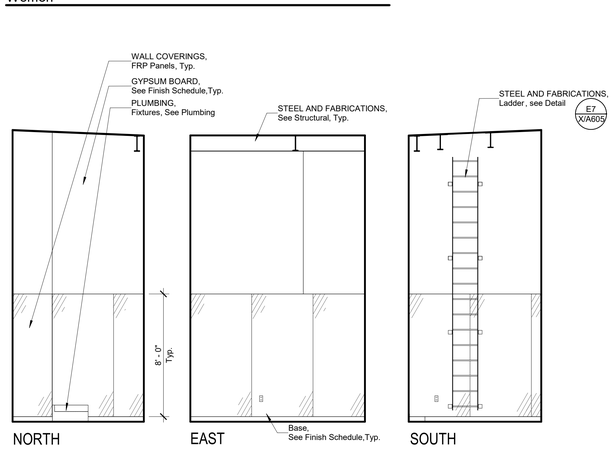


PARTIAL SOUTH



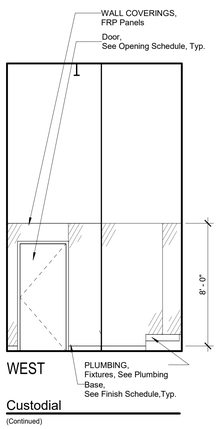
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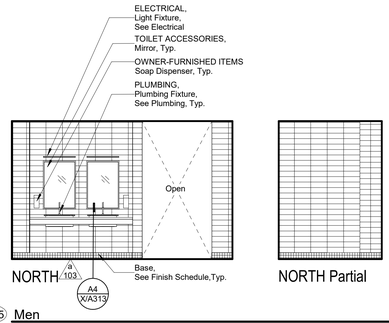


NORTH EAST SOUTH

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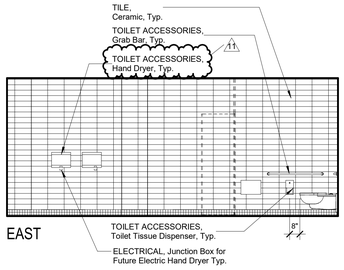


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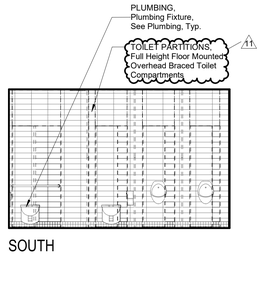


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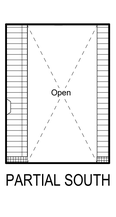
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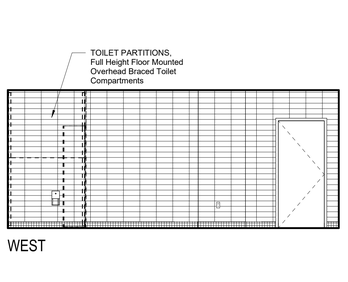
EAST



SOUTH



PARTIAL SOUTH



WEST

L105 Men

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- a / ### — Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 10 — Equipment Item No. Refer to Equipment Schedule.
- FEC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, See A7 X/A605. Provide Fire Rated Cabinet at Rated Walls
- FEBC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Top of Cabinet @ +5'-0", Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls. See FEC for detail.
- ELECTRICAL, Speaker @ +7'-6" to center of device, Unless Noted Otherwise.
- ELECTRICAL, Clock/Speaker @ +7'-6" to center of device, Unless Noted Otherwise. Refer to Specification Section OWNER FURNISHED ITEMS.
- ELECTRICAL, Outlet
- ELECTRICAL, Light Switch
- SV — ELECTRICAL, Audible/Visual Alarm
- V — ELECTRICAL, Volume Control
- TV — ELECTRICAL, Television Outlet
- T — MECHANICAL, Thermostat
- HB — PLUMBING, Hose Bib
- D — ELECTRICAL, Data Outlet
- IS — ELECTRICAL, Intrusion Sensor
- MS — ELECTRICAL, Motion Sensor
- ELECTRICAL, Telephone Outlet Wall Phones +46" top of outlet box.
- GLASS -or- WALL COVERINGS, Glass Marker Wall System
- WALL COVERINGS, FRP Panels -or- WALL COVERING, Acoustical Panel
- WALL COVERINGS, Vinyl Covered Tackboard Panels -or- VISUAL DISPLAY BOARDS, Tack Board Panel
- TILE, Ceramic

ABBREVIATIONS

Gl.	Glass	Sim.	Similar
KS	Knee Space	Dia.	Diameter
OH	Opposite Hand	UNO	Unless Noted Otherwise
Typ.	Typical	Min	Minimum

NOTES

1. All Details, Materials and Finishes shall be considered typical for all similar conditions Unless Noted Otherwise.
2. Refer to Plumbing, Mechanical, Telecommunications, Food Service, and Electrical for all wall mounted devices and coordinate location and heights with Architectural (ie. casework, equipment, etc.)
3. Locate and mount TOILET ACCESSORIES and PLUMBING per detail A1 X/A605 Unless Noted Otherwise.
4. Provide backing at all TOILET ACCESSORIES, TOILET PARTITIONS, and IDENTIFYING DEVICES per detail N14 X/A601 Unless Noted Otherwise.
5. Provide Backing for TOILET ACCESSORIES, Grab Bars per detail E1 X/A605 Sim.
6. Locate and mount IDENTIFYING DEVICES per detail A1 X/A604 Unless Noted Otherwise.
7. Provide backing at all MODULAR CASEWORK per detail N14 X/A601
8. Attach all MODULAR CASEWORK per details L7 X/A310 E7 X/A310
9. WALL COVERINGS, Vinyl Covered Tackboard, See detail E4 X/A601 Where single Board is adjacent to TV, coordinate custom cutout with TV Mount location. Verify TV height with Owner.
10. WALL COVERINGS, FRP Panels, See detail A7 X/A601
11. GYPSUM BOARD, Control Joints, see details J7 X/A601 and J11 X/A601 E7 X/A601 Typ
12. GYPSUM BOARD, Metal Accessories, see details
13. VISUAL DISPLAY BOARDS, Liquid Markerboard/Tack Board, See detail N1 X/A604
14. METAL FRAMING, Backing, See detail N14 X/A601
15. WALL AND CORNER GUARDS, Corner Guard, see detail A1 X/A601
16. WALL AND CORNER GUARDS, Wall Protection, see detail J1 X/A604
17. METAL PANELS, Interior Acoustical Wall Liner Panel, see detail G4 M/A140 Typ
18. Mounting height of all television monitors to be coordinated with owner prior to commencement of work.
19. Refer to Interior Finish Schedule for TILE type and Interior Design Sheets for Pattern, where occurs.
20. For GYPSUM BOARD Horizontal and Vertical Expansion Joint, see A1 X/A102
21. For CEMENT PLASTER Horizontal and Vertical Joints, see A11 X/A505 E8 X/A610
22. OWNER FURNISHED ITEMS, Television Monitor and Mount, see

E18 — Interior Elevation Legend

No Scale

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
INTERIOR ELEVATIONS L101-L105
Drawing

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ARCHITECTURE
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INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051
LICENSED ARCHITECT MICHAEL K. FENLON No. C23724 Rev. 4-30-27 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date
5	ADDENDUM 5	12-13-23
11	ADDENDUM 8	9-25-2026

Revision

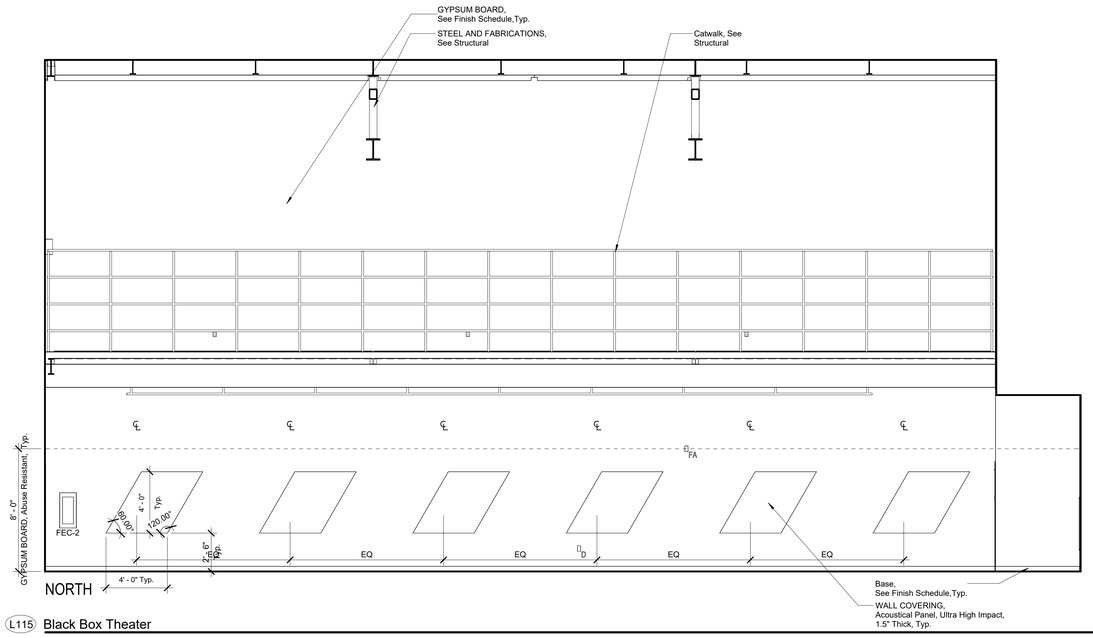
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A1 — Interior Elevations
1/4" = 1'-0"
See E18 for Interior Elevation Legend

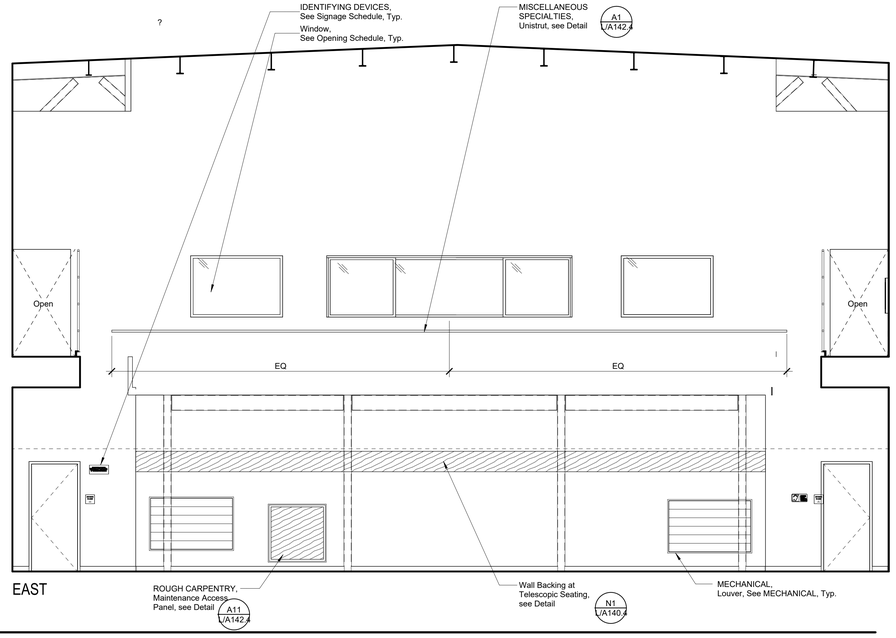
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Project Number: 2171
Date: 12/22/22

L/A601.4
AD8

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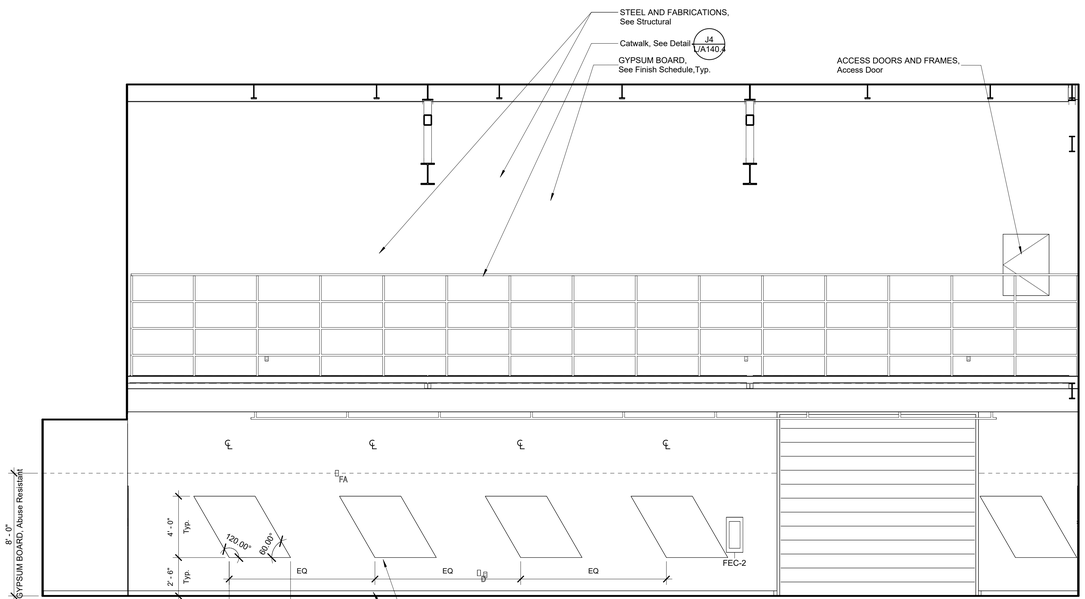


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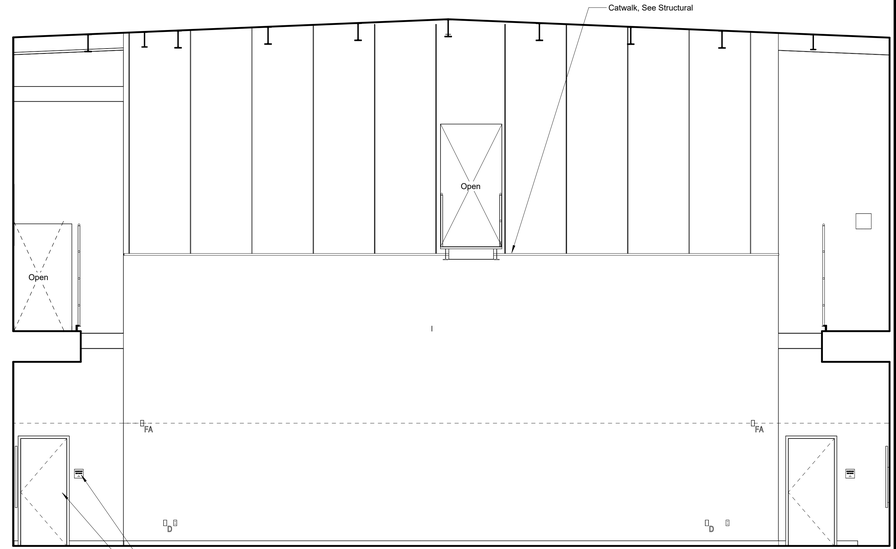


EAST

L115 Black Box Theater

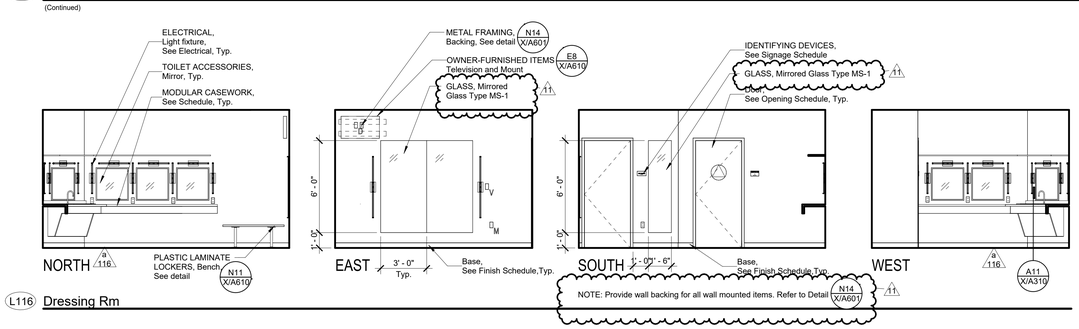


SOUTH



WEST

L115 Black Box Theater
(Continued)



L116 Dressing Rm

A1
1/4" = 1'-0"

Interior Elevations

See E18 for Interior Elevation Legend

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- Equipment Item No. Refer to Equipment Schedule.
- FEC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, See A7 /A605. Provide Fire Rated Cabinet at Rated Walls
- FEBC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Top of Cabinet @ +5'-0", Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls. See FEC for detail.
- ELECTRICAL, Speaker @ +7'-6" to center of device, Unless Noted Otherwise.
- ELECTRICAL, Clock/Speaker @ +7'-6" to center of device, Unless Noted Otherwise. Refer to Specification Section OWNER FURNISHED ITEMS.
- ELECTRICAL, Outlet
- ELECTRICAL, Light Switch
- SV — ELECTRICAL, Audible/Visual Alarm
- V — ELECTRICAL, Volume Control
- TV — ELECTRICAL, Television Outlet
- T — MECHANICAL, Thermostat
- HB — PLUMBING, Hose Bib
- D — ELECTRICAL, Data Outlet
- IS — ELECTRICAL, Intrusion Sensor
- MS — ELECTRICAL, Motion Sensor
- ELECTRICAL, Telephone Outlet Wall Phones +46" top of outlet box.
- GLASS -or- WALL COVERINGS, Glass Marker Wall System
- WALL COVERINGS, FRP Panels -or- WALL COVERING, Acoustical Panel
- WALL COVERINGS, Vinyl Covered Tackboard Panels -or- VISUAL DISPLAY BOARDS, Tack Board Panel
- TILE, Ceramic

ABBREVIATIONS

Gl.	Glass	Sim.	Similar
KS	Knee Space	Dia.	Diameter
OH	Opposite Hand	UNO	Unless Noted Otherwise
Typ.	Typical	Min	Minimum

NOTES

1. All Details, Materials and Finishes shall be considered typical for all similar conditions Unless Noted Otherwise.
2. Refer to Plumbing, Mechanical, Telecommunications, Food Service, and Electrical for all wall mounted devices and coordinate location and heights with Architectural (ie. casework, equipment, etc.)
3. Locate and mount TOILET ACCESSORIES and PLUMBING per detail A1 /A605. Unless Noted Otherwise.
4. Provide backing at all TOILET ACCESSORIES, TOILET PARTITIONS, and IDENTIFYING DEVICES per detail N14 /A601. Unless Noted Otherwise.
5. Provide Backing for TOILET ACCESSORIES, Grab Bars per detail E1 /A605 Sim.
6. Locate and mount IDENTIFYING DEVICES per detail A1 /A604. Unless Noted Otherwise.
7. Provide backing at all MODULAR CASEWORK per detail N14 /A601
8. Attach all MODULAR CASEWORK per details L7 /A310 E7 /A310
9. WALL COVERINGS, Vinyl Covered Tackboard, See detail E4 /A601. Where single Board is adjacent to TV, coordinate custom cutout with TV Mount location. Verify TV height with Owner.
10. WALL COVERINGS, FRP Panels, See detail A7 /A601
11. GYPSUM BOARD, Control Joints, see details J7 /A601 and J11 /A601 Typ
12. GYPSUM BOARD, Metal Accessories, see details E7 /A601
13. VISUAL DISPLAY BOARDS, Liquid Markerboard/Tack Board, See detail N1 /A604
14. METAL FRAMING, Backing, See detail N14 /A601
15. WALL AND CORNER GUARDS, Corner Guard, see detail A1 /A601
16. WALL AND CORNER GUARDS, Wall Protection, see detail J1 /A604
17. METAL PANELS, Interior Acoustical Wall Liner Panel, see detail G4 /M/A140 Typ
18. Mounting height of all television monitors to be coordinated with owner prior to commencement of work.
19. Refer to Interior Finish Schedule for TILE type and Interior Design Sheets for Pattern, where occurs.
20. For GYPSUM BOARD Horizontal and Vertical Expansion Joint, see A1 /A102
21. For CEMENT PLASTER Horizontal and Vertical Joints, see A11 /A505
22. OWNER FURNISHED ITEMS, Television Monitor and Mount, see E8 /A610

E18 — Interior Elevation Legend
No Scale

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
INTERIOR ELEVATIONS L115-L116
Drawing

darden architects
ARCHITECTURE
PLANNING
INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051
LICENSED ARCHITECT — MICHAEL K. FONG — No. C23724 — Exp. 4-30-27 — STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

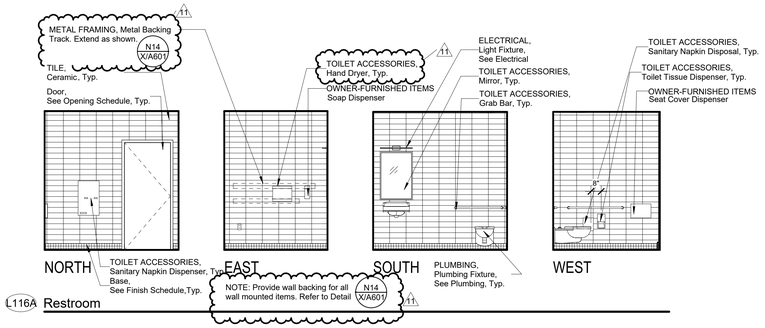
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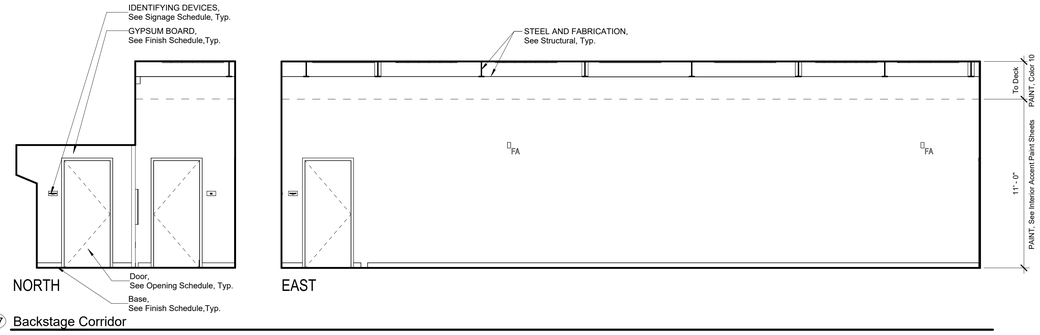
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L/A603.4
AD8

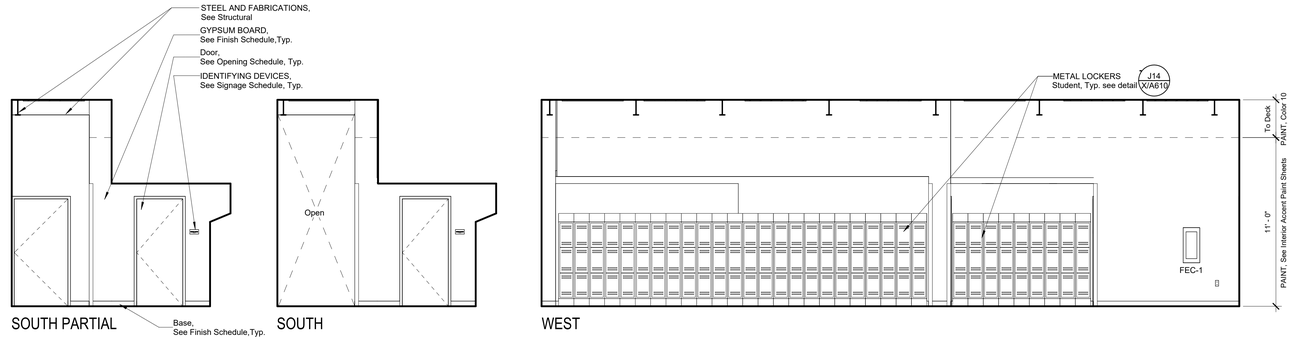
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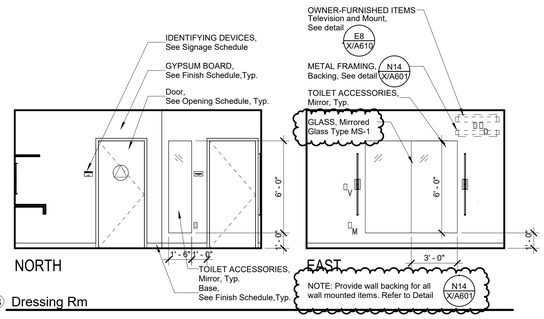
L116A Restroom



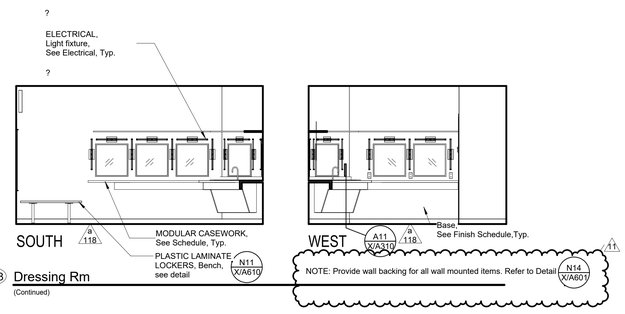
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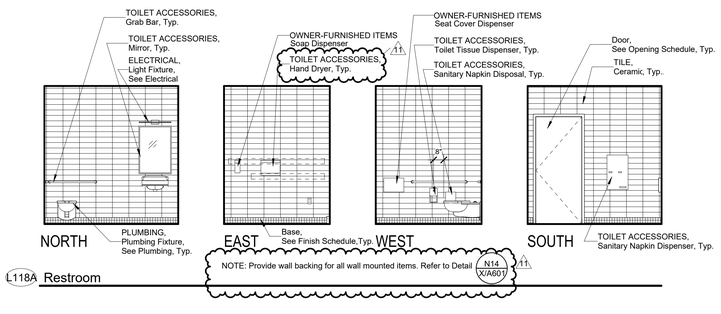
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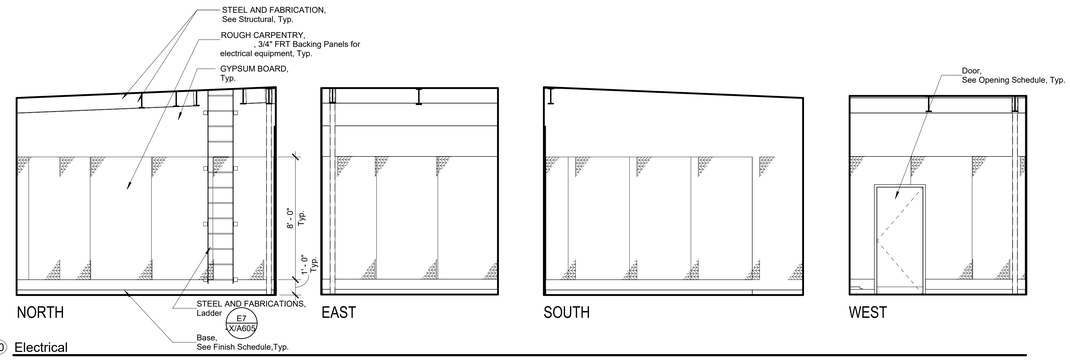
L118 Dressing Rm



L118 Dressing Rm
(Continued)



L118A Restroom



L120 Electrical

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 10 — Equipment Item No. Refer to Equipment Schedule.
- FEC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, See Provide Fire Rated Cabinet at Rated Walls (A7 X/A605)
- FEBC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Top of Cabinet @ +5'-0", Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls. See FEC for detail.
- ELECTRICAL, Speaker @ +7'-6" to center of device, Unless Noted Otherwise.
- ELECTRICAL, Clock/Speaker @ +7'-6" to center of device, Unless Noted Otherwise Refer to Specification Section OWNER FURNISHED ITEMS.
- ELECTRICAL, Outlet
- ELECTRICAL, Light Switch
- SV — ELECTRICAL, Audible/Visual Alarm
- V — ELECTRICAL, Volume Control
- TV — ELECTRICAL, Television Outlet
- T — MECHANICAL, Thermostat
- HB — PLUMBING, Hose Bib
- D — ELECTRICAL, Data Outlet
- IS — ELECTRICAL, Intrusion Sensor
- MS — ELECTRICAL, Motion Sensor
- ELECTRICAL, Telephone Outlet Wall Phones +46" top of outlet box.
- GLASS -or- WALL COVERINGS, Glass Marker Wall System
- WALL COVERINGS, FRP Panels -or- WALL COVERING, Acoustical Panel
- WALL COVERINGS, Vinyl Covered Tackboard Panels -or- VISUAL DISPLAY BOARDS, Tack Board Panel
- TILE, Ceramic

ABBREVIATIONS

Gl.	Glass	Sim.	Similar
KS	Knee Space	Dia.	Diameter
OH	Opposite Hand	UNO	Unless Noted Otherwise
Typ.	Typical	Min	Minimum

NOTES

1. All Details, Materials and Finishes shall be considered typical for all similar conditions Unless Noted Otherwise.
2. Refer to Plumbing, Mechanical, Telecommunications, Food Service, and Electrical for all wall mounted devices and coordinate location and heights with Architectural (ie. casework, equipment, etc.)
3. Locate and mount TOILET ACCESSORIES and PLUMBING per detail (A1 X/A605) Unless Noted Otherwise.
4. Provide backing at all TOILET ACCESSORIES, TOILET PARTITIONS, and IDENTIFYING DEVICES per detail (N14 X/A601) Unless Noted Otherwise.
5. Provide Backing for TOILET ACCESSORIES, Grab Bars per detail (E1 X/A605) Sim.
6. Locate and mount IDENTIFYING DEVICES per detail (A1 X/A604) Unless Noted Otherwise.
7. Provide backing at all MODULAR CASEWORK per detail (N14 X/A601)
8. Attach all MODULAR CASEWORK per details (L7 X/A310) (E7 X/A310)
9. WALL COVERINGS, Vinyl Covered Tackboard, See detail (E4 X/A607) Where single Board is adjacent to TV, coordinate custom cutout with TV Mount location. Verify TV height with Owner.
10. WALL COVERINGS, FRP Panels, See detail (A7 X/A601)
11. GYPSUM BOARD, Control Joints, see details (J7 X/A601) and (J11 X/A601) Typ
12. GYPSUM BOARD, Metal Accessories, see details (E7 X/A601) Typ
13. VISUAL DISPLAY BOARDS, Liquid Markerboard/Tack Board, See detail (N1 X/A604)
14. METAL FRAMING, Backing, See detail (N14 X/A601)
15. WALL AND CORNER GUARDS, Corner Guard, see detail (A1 X/A601)
16. WALL AND CORNER GUARDS, Wall Protection, see detail (J1 X/A604)
17. METAL PANELS, Interior Acoustical Wall Liner Panel, see detail (G4 M/A140) Typ
18. Mounting height of all television monitors to be coordinated with owner prior to commencement of work.
19. Refer to Interior Finish Schedule for TILE type and Interior Design Sheets for Pattern, where occurs.
20. For GYPSUM BOARD Horizontal and Vertical Expansion Joint, see (A1 X/A102)
21. For CEMENT PLASTER Horizontal and Vertical Joints, see (A11 X/A505) (E8 X/A610)
22. OWNER FURNISHED ITEMS, Television Monitor and Mount, see

E18 — Interior Elevation Legend
No Scale

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
INTERIOR ELEVATION L116A-L120
Drawing

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ARCHITECTURE
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INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

LICENSED ARCHITECT MICHAEL K. FERNOW No. C23724 Ren. 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

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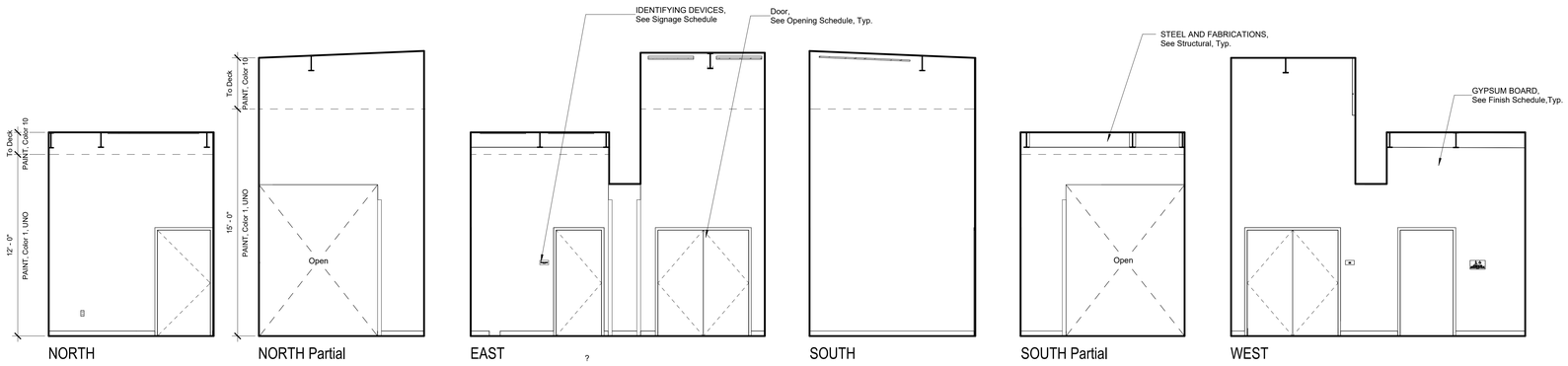
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Project Number: 2171
Date: 12/22/22

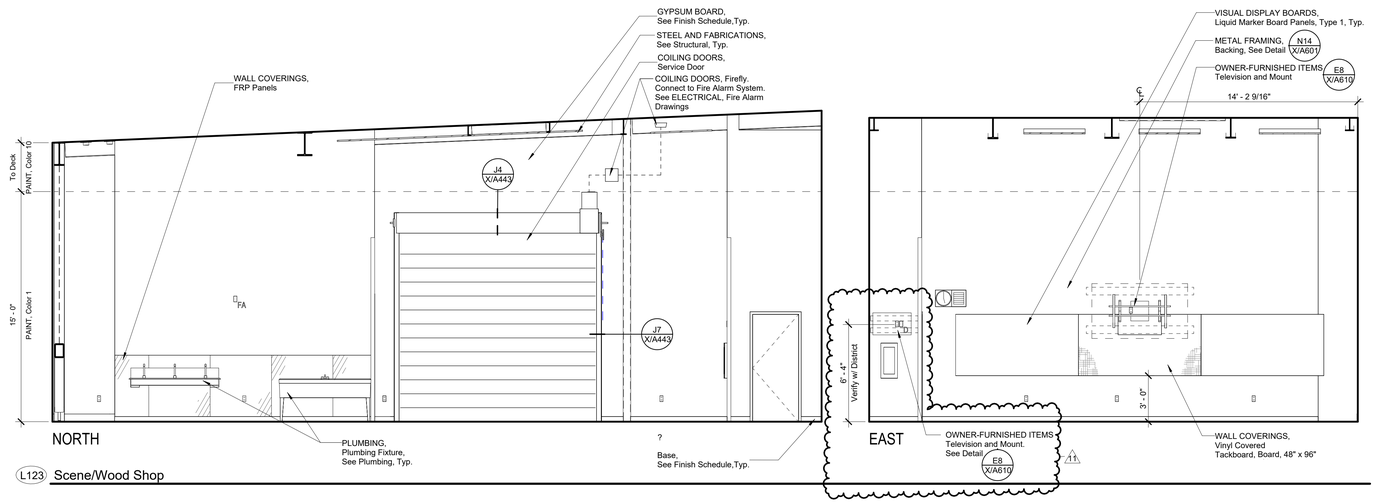
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A1 — Interior Elevations
1/4" = 1'-0"
See E18 for Interior Elevation Legend

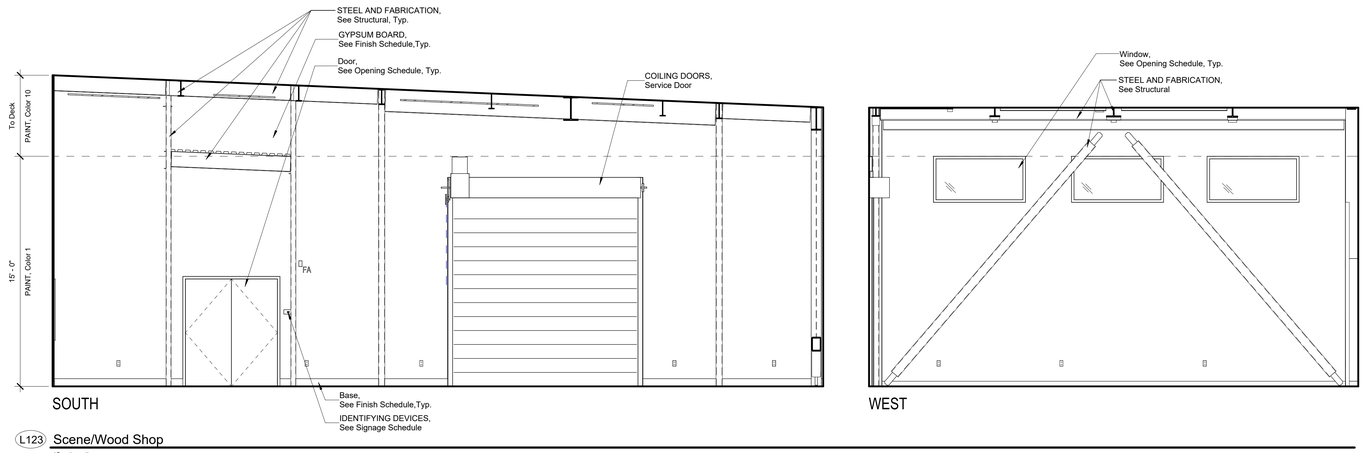
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L122B Corridor



L123 Scene/Wood Shop



L123 Scene/Wood Shop
(Continued)

SYMBOLS

- Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 10 — Equipment Item No. Refer to Equipment Schedule.
- FEC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, See A7 X/A605. Provide Fire Rated Cabinet at Rated Walls
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ABBREVIATIONS

Gl.	Glass	Sim.	Similar
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OH	Opposite Hand	UNO	Unless Noted Otherwise
Typ.	Typical	Min	Minimum

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4. Provide backing at all TOILET ACCESSORIES, TOILET PARTITIONS, and IDENTIFYING DEVICES per detail N14 X/A601 Unless Noted Otherwise.
5. Provide Backing for TOILET ACCESSORIES, Grab Bars per detail E1 X/A605 Sim.
6. Locate and mount IDENTIFYING DEVICES per detail A1 X/A604 Unless Noted Otherwise.
7. Provide backing at all MODULAR CASEWORK per detail N14 X/A601
8. Attach all MODULAR CASEWORK per details L7 X/A310 E7 X/A310
9. WALL COVERINGS, Vinyl Covered Tackboard, See detail E4 X/A601 Where single Board is adjacent to TV, coordinate custom cutout with TV Mount location. Verify TV height with Owner.
10. WALL COVERINGS, FRP Panels, See detail A7 X/A601
11. GYPSUM BOARD, Control Joints, see details J7 X/A601 and J11 X/A601
12. GYPSUM BOARD, Metal Accessories, see details E7 X/A601 Typ
13. VISUAL DISPLAY BOARDS, Liquid Markerboard/Tack Board, See detail N1 X/A604
14. METAL FRAMING, Backing, See detail N14 X/A601
15. WALL AND CORNER GUARDS, Corner Guard, see detail A1 X/A601
16. WALL AND CORNER GUARDS, Wall Protection, see detail J1 X/A604 Typ
17. METAL PANELS, Interior Acoustical Wall Liner Panel, see detail G4 M/A140
18. Mounting height of all television monitors to be coordinated with owner prior to commencement of work.
19. Refer to Interior Finish Schedule for TILE type and Interior Design Sheets for Pattern, where occurs.
20. For GYPSUM BOARD Horizontal and Vertical Expansion Joint, see A1 X/A102
21. For CEMENT PLASTER Horizontal and Vertical Joints, see A11 X/A505 E8 X/A610
22. OWNER FURNISHED ITEMS, Television Monitor and Mount, see

E18 — Interior Elevation Legend
No Scale

DSA File No.: *10-H15*

DSA Application No.: *02-120779*

Agency Approval

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
INTERIOR ELEVATIONS L122B, L123
Drawing

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LICENSED ARCHITECT RODNEY K. K. FENG No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

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Designed By: -
Drawn By: -
Checked By: MF
Reviewed By: MF

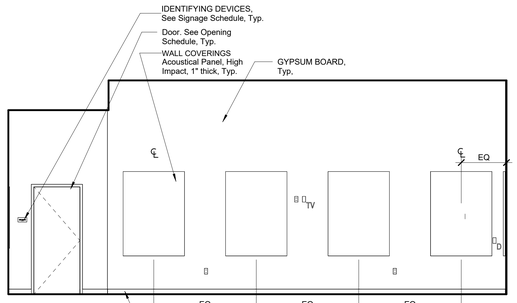
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Project Number: 2171
Date: 12/22/22

L/A606.4
AD8

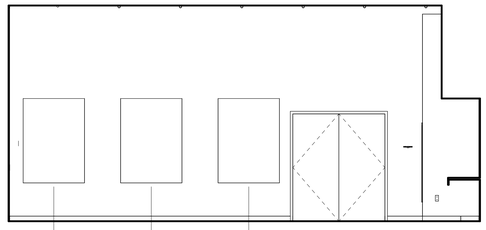
A1 — Interior Elevations
1/4" = 1'-0"
See E18 for Interior Elevation Legend

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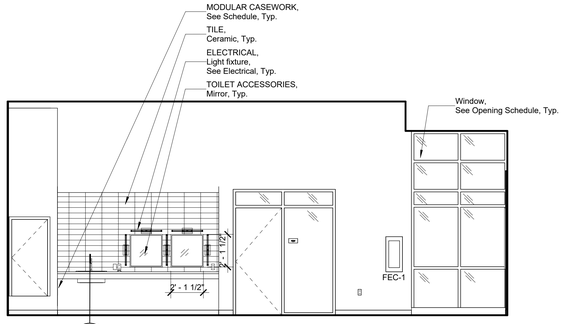
L124 Drama Room



NORTH

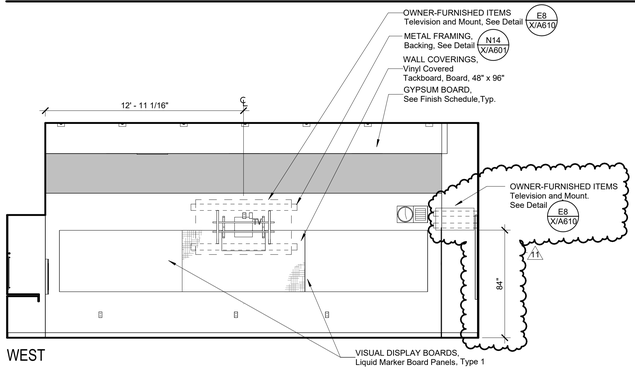


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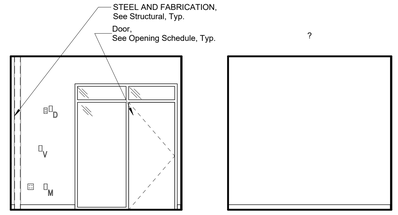
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L124 Drama Room



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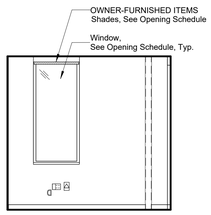
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NORTH

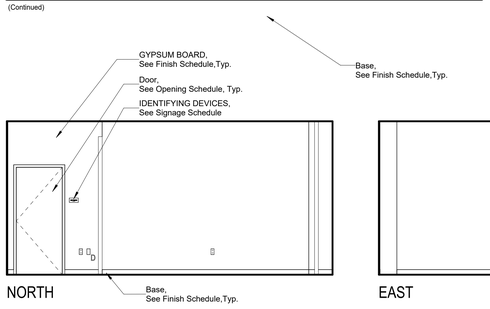
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SOUTH ?

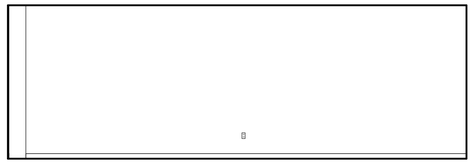


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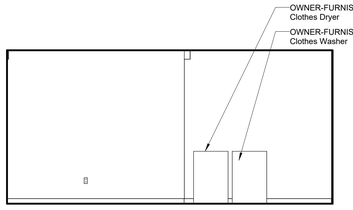
L124 Drama Room
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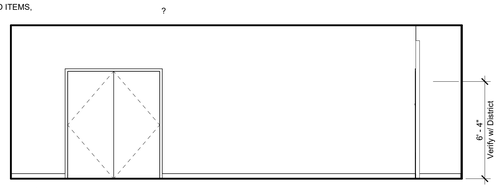
NORTH



EAST



SOUTH



WEST

L124B Drama Storage

E8 X/A610

SYMBOLS

- a ### — Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 10 — Equipment Item No. Refer to Equipment Schedule.
- FEC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, See A7 X/A605. Provide Fire Rated Cabinet at Rated Walls
- FEBC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Top of Cabinet @ +5'-0", Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls. See FEC for detail.
- ELECTRICAL, Speaker @ +7'-6" to center of device, Unless Noted Otherwise.
- ELECTRICAL, Clock/Speaker @ +7'-6" to center of device, Unless Noted Otherwise Refer to Specification Section OWNER FURNISHED ITEMS.
- ELECTRICAL, Outlet
- ELECTRICAL, Light Switch
- SV — ELECTRICAL, Audible/Visual Alarm
- V — ELECTRICAL, Volume Control
- TV — ELECTRICAL, Television Outlet
- T — MECHANICAL, Thermostat
- HB — PLUMBING, Hose Bib
- D — ELECTRICAL, Data Outlet
- IS — ELECTRICAL, Intrusion Sensor
- MS — ELECTRICAL, Motion Sensor
- ELECTRICAL, Telephone Outlet Wall Phones +46" top of outlet box.
- GLASS -or- WALL COVERINGS, Glass Marker Wall System
- WALL COVERINGS, FRP Panels -or- WALL COVERING, Acoustical Panel
- WALL COVERINGS, Vinyl Covered Tackboard Panels -or- VISUAL DISPLAY BOARDS, Tack Board Panel
- TILE, Ceramic

ABBREVIATIONS

Gl.	Glass	Sim.	Similar
KS	Knee Space	Dia.	Diameter
OH	Opposite Hand	UNO	Unless Noted Otherwise
Typ.	Typical	Min	Minimum

NOTES

1. All Details, Materials and Finishes shall be considered typical for all similar conditions Unless Noted Otherwise.
2. Refer to Plumbing, Mechanical, Telecommunications, Food Service, and Electrical for all wall mounted devices and coordinate location and heights with Architectural (ie. casework, equipment, etc.)
3. Locate and mount TOILET ACCESSORIES and PLUMBING per detail A1 X/A605 Unless Noted Otherwise.
4. Provide backing at all TOILET ACCESSORIES, TOILET PARTITIONS, and IDENTIFYING DEVICES per detail N14 X/A601 Unless Noted Otherwise.
5. Provide Backing for TOILET ACCESSORIES, Grab Bars per detail E1 X/A605 Sim.
6. Locate and mount IDENTIFYING DEVICES per detail A1 X/A604 Unless Noted Otherwise.
7. Provide backing at all MODULAR CASEWORK per detail N14 X/A601
8. Attach all MODULAR CASEWORK per details L7 X/A310 E7 X/A310
9. WALL COVERINGS, Vinyl Covered Tackboard, See detail E4 X/A601 Where single Board is adjacent to TV, coordinate custom cutout with TV Mount location. Verify TV height with Owner.
10. WALL COVERINGS, FRP Panels, See detail A7 X/A601
11. GYPSUM BOARD, Control Joints, see details J7 X/A601 and J11 X/A601
12. GYPSUM BOARD, Metal Accessories, see details E7 X/A601 Typ
13. VISUAL DISPLAY BOARDS, Liquid Markerboard/Tack Board, See detail N1 X/A604
14. METAL FRAMING, Backing, See detail N14 X/A601
15. WALL AND CORNER GUARDS, Corner Guard, see detail A1 X/A601
16. WALL AND CORNER GUARDS, Wall Protection, see detail J1 X/A604
17. METAL PANELS, Interior Acoustical Wall Liner Panel, see detail G4 M/A140 Typ
18. Mounting height of all television monitors to be coordinated with owner prior to commencement of work.
19. Refer to Interior Finish Schedule for TILE type and Interior Design Sheets for Pattern, where occurs.
20. For GYPSUM BOARD Horizontal and Vertical Expansion Joint, see A1 X/A102
21. For CEMENT PLASTER Horizontal and Vertical Joints, see A11 X/A505 E8 X/A610
22. OWNER FURNISHED ITEMS, Television Monitor and Mount, see

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

E18 — Interior Elevation Legend
No Scale

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
INTERIOR ELEVATIONS L124-L124B
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Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

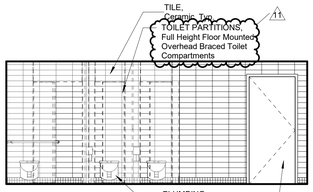
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A1 — Interior Elevations
1/4" = 1'-0"
See E18 for Interior Elevation Legend

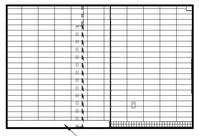
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Drawn By: -
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Reviewed By: MF
Scale: 1/4" = 1'-0"
Project Number: 2171
Date: 12/22/22

L/A607.4
AD8

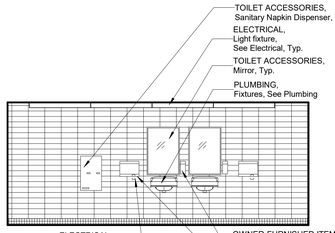
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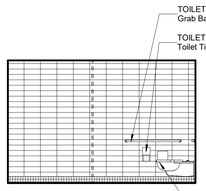
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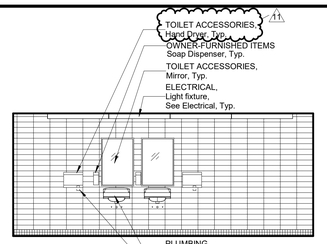


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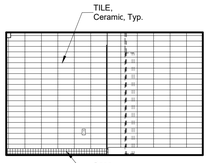


WEST

L132 Girls

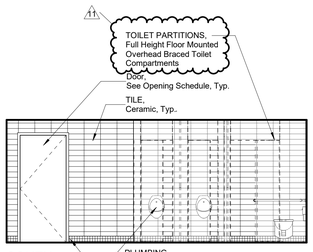


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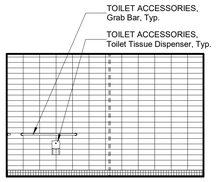


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L133 Boys

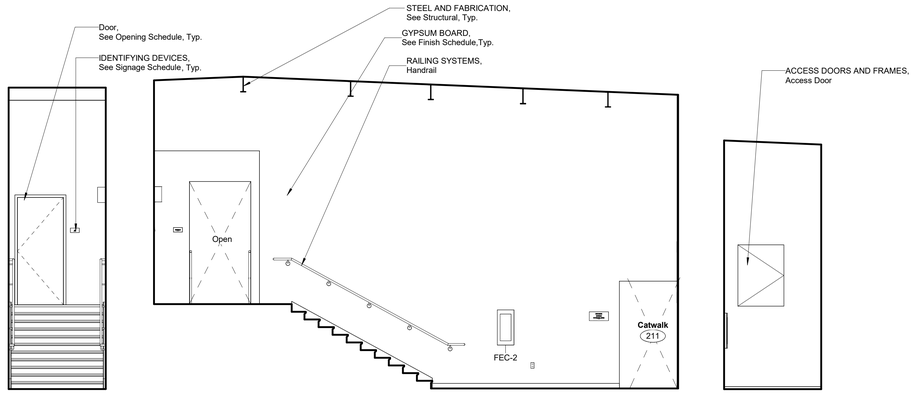


SOUTH



WEST

L133 Boys
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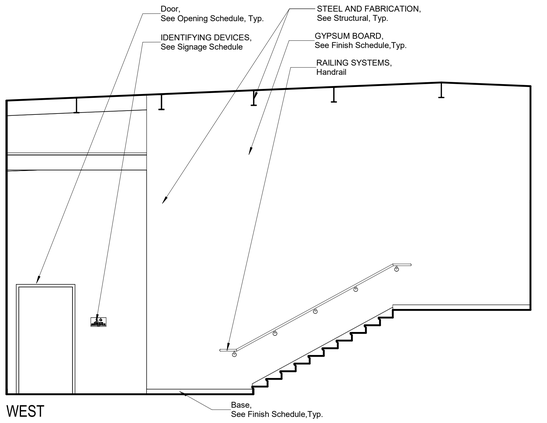


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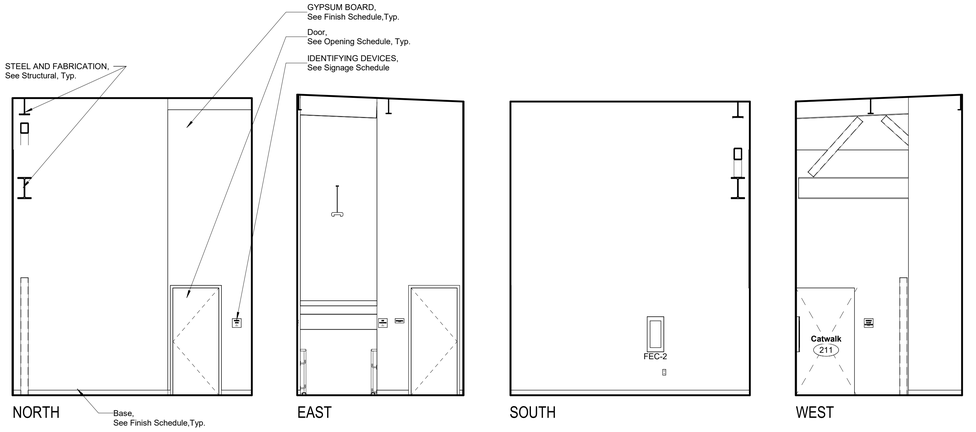
SOUTH

L201 Vest



WEST

L201 Vest
(Continued)



NORTH

EAST

SOUTH

WEST

L202 Vest

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- a / ### — Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 10 — Equipment Item No. Refer to Equipment Schedule.
- FEC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, See Provide Fire Rated Cabinet at Rated Walls (A7 / X/A605)
- FEBC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Top of Cabinet @ +5'-0", Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls. See FEC for detail.
- ELECTRICAL, Speaker @ +7'-6" to center of device, Unless Noted Otherwise.
- ELECTRICAL, Clock/Speaker @ +7'-6" to center of device, Unless Noted Otherwise Refer to Specification Section OWNER FURNISHED ITEMS.
- ELECTRICAL, Outlet
- ELECTRICAL, Light Switch
- SV — ELECTRICAL, Audible/Visual Alarm
- V — ELECTRICAL, Volume Control
- TV — ELECTRICAL, Television Outlet
- T — MECHANICAL, Thermostat
- HB — PLUMBING, Hose Bib
- D — ELECTRICAL, Data Outlet
- IS — ELECTRICAL, Intrusion Sensor
- MS — ELECTRICAL, Motion Sensor
- ELECTRICAL, Telephone Outlet Wall Phones +46" top of outlet box.
- GLASS -or- WALL COVERINGS, Glass Marker Wall System
- WALL COVERINGS, FRP Panels -or- WALL COVERING, Acoustical Panel
- WALL COVERINGS, Vinyl Covered Tackboard Panels -or- VISUAL DISPLAY BOARDS, Tack Board Panel
- TILE, Ceramic

ABBREVIATIONS

Gl.	Glass	Sim.	Similar
KS	Knee Space	Dia.	Diameter
OH	Opposite Hand	UNO	Unless Noted Otherwise
Typ.	Typical	Min	Minimum

NOTES

1. All Details, Materials and Finishes shall be considered typical for all similar conditions Unless Noted Otherwise.
2. Refer to Plumbing, Mechanical, Telecommunications, Food Service, and Electrical for all wall mounted devices and coordinate location and heights with Architectural (ie. casework, equipment, etc.)
3. Locate and mount TOILET ACCESSORIES and PLUMBING per detail (A1 / X/A605) Unless Noted Otherwise.
4. Provide backing at all TOILET ACCESSORIES, TOILET PARTITIONS, and IDENTIFYING DEVICES per detail (N14 / X/A601) Unless Noted Otherwise.
5. Provide Backing for TOILET ACCESSORIES, Grab Bars per detail (E1 / X/A605) Sim.
6. Locate and mount IDENTIFYING DEVICES per detail (A1 / X/A604) Unless Noted Otherwise.
7. Provide backing at all MODULAR CASEWORK per detail (N14 / X/A601)
8. Attach all MODULAR CASEWORK per details (L7 / X/A310) (E7 / X/A310)
9. WALL COVERINGS, Vinyl Covered Tackboard, See detail (E4 / X/A601) Where single Board is adjacent to TV, coordinate custom cutout with TV Mount location. Verify TV height with Owner.
10. WALL COVERINGS, FRP Panels, See detail (A7 / X/A601)
11. GYPSUM BOARD, Control Joints, see details (J7 / X/A601) and (J11 / X/A601)
12. GYPSUM BOARD, Metal Accessories, see details (E7 / X/A601) Typ
13. VISUAL DISPLAY BOARDS, Liquid Markerboard/Tack Board, See detail (N1 / X/A604)
14. METAL FRAMING, Backing, See detail (N14 / X/A601)
15. WALL AND CORNER GUARDS, Corner Guard, see detail (A1 / X/A601)
16. WALL AND CORNER GUARDS, Wall Protection, see detail (J1 / X/A604)
17. METAL PANELS, Interior Acoustical Wall Liner Panel, see detail (G4 / W/A140) Typ
18. Mounting height of all television monitors to be coordinated with owner prior to commencement of work.
19. Refer to Interior Finish Schedule for TILE type and Interior Design Sheets for Pattern, where occurs.
20. For GYPSUM BOARD Horizontal and Vertical Expansion Joint, see (A1 / X/A102)
21. For CEMENT PLASTER Horizontal and Vertical Joints, see (A11 / X/A505)
22. OWNER FURNISHED ITEMS, Television Monitor and Mount, see (E8 / X/A610)

E18 — Interior Elevation Legend
No Scale

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
INTERIOR ELEVATIONS L132-L202
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LICENSED ARCHITECT — MICHAEL K. FENTON — No. C23724 — Exp. 4-30-27 — STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

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Designed By: -
Drawn By: -
Checked By: MF
Reviewed By: MF

Scale: 1/4" = 1'-0"
Project Number: 2171
Date: 12/22/22

L/A614.4
AD8

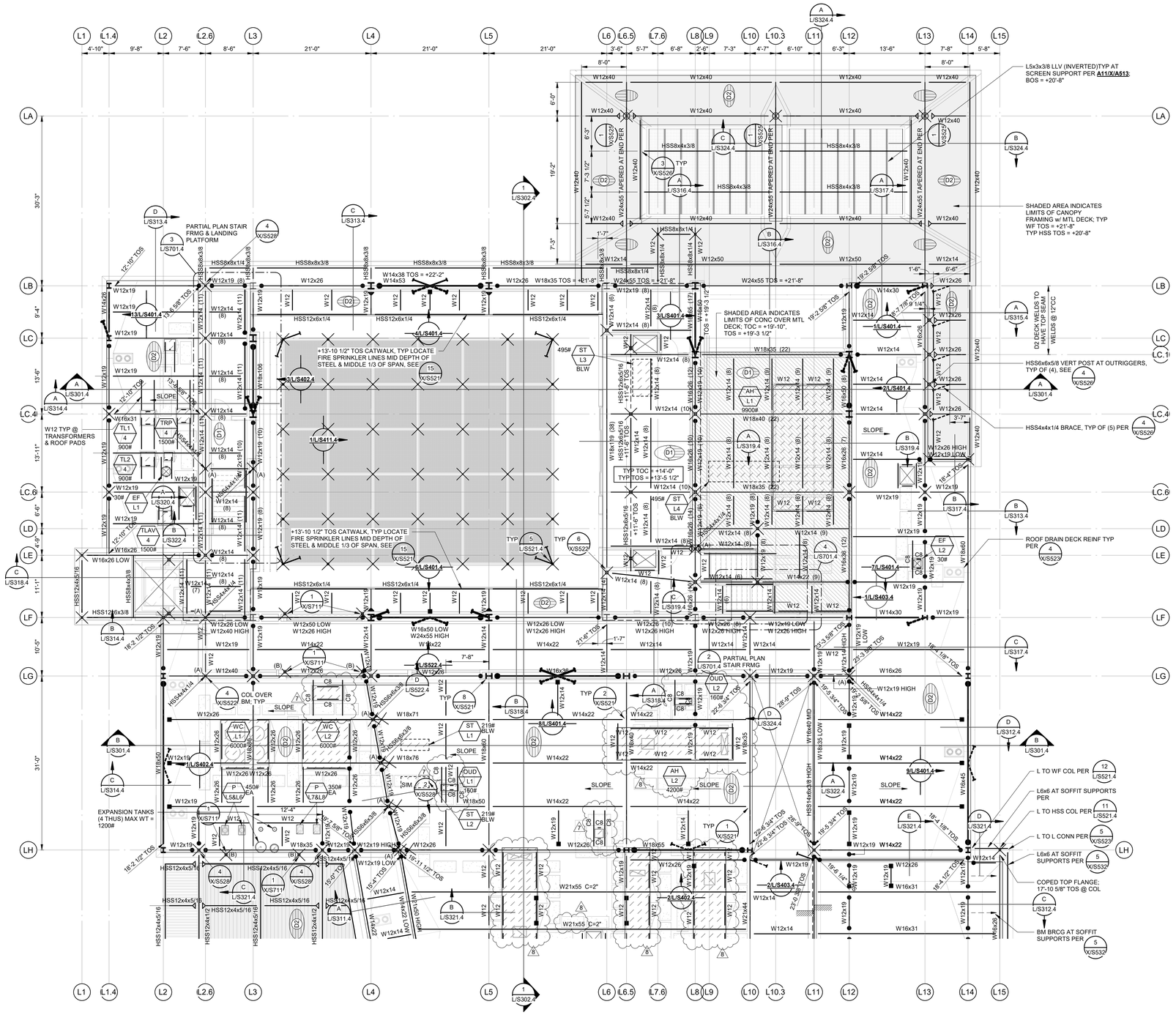
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1/4" = 1'-0"
See E18 for Interior Elevation Legend

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DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval



FLOOR AND LOW ROOF FRAMING PLAN BLDG L - AREA A

1/8" = 1'-0"

BUEHLER
600 Q STREET, SUITE 200
SACRAMENTO, CA 95811
916 443 0303

Consultant

SANGER EDUCATION COMPLEX - PHASE 3

Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727

Project

BUILDING L

FLOOR AND LOW ROOF FRAMING PLAN - AREA A

Drawing

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Architect

No.	Revision/Submission	Date
7	ADDENDUM 7	9/10/2026
8	ADDENDUM 8	9/25/2026

Revision

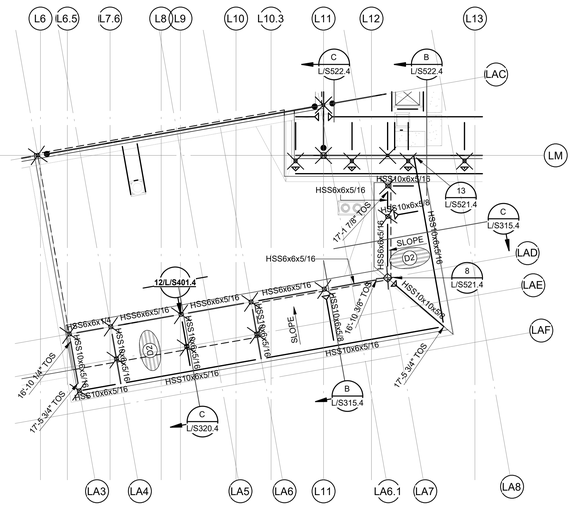
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Scale: 1/8" = 1'-0"	Drawn By: RAZ	L/S202A.4
Project Number: 2171	Checked By: AAS	AD8
Date: 12/20/2022	Reviewed By: AAS	

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FLOOR FRAMING PLAN BLDG L - AREA B

1/8" = 1'-0"



PARTIAL PLAN SOUTH OVERHANG 2 L/S202B.4 1/8" = 1'-0"

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

BUEHLER
600 Q STREET, SUITE 200
SACRAMENTO, CA 95811
916 443 0303

Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727

Project

BUILDING L
LOW ROOF FRAMING PLAN - AREA B

Drawing

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No.	Revision/Submission	Date
7	ADDENDUM 7	9/10/2026
8	ADDENDUM 8	9/25/2026

Revision

	Designed By: NY	Copyright 2021 Darden Architects
Scale: 1/8" = 1'-0"	Drawn By: RAZ	
Project Number: 2171	Checked By: AAS	L/S202B.4
Date: 12/20/2022	Reviewed By: AAS	AD8

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N

ENLARGED PLUMBING SITE PLAN

SCALE: 1"=20'-0"

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

General Notes

LAWRENCE ENGINEERING GROUP
4910 E. Clinton Way, Suite 101 Fresno, CA 93727
(559) 431-6181 FAX (559) 431-1342
22040

REGISTERED PROFESSIONAL ENGINEER MICHAEL D. CAMPBELL No. M 25886 Exp. 6/30/26 MECHANICAL STATE OF CALIFORNIA

Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

SITE DEVELOPMENT
ENLARGED PLUMBING SITE PLAN
Drawing

darden architects
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LICENSED ARCHITECT MICHAEL K. FONG No. C23724 Renewal 4-30-27 STATE OF CALIFORNIA

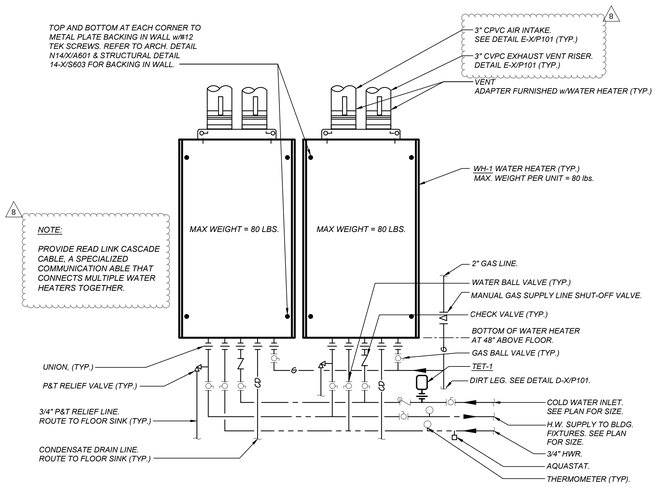
Architect

No.	Revision/Submission	Date
8	Addendum #8	9/25/2026

Revision

	Designed By:	Copyright 2021 Darden Architects
Scale:	Drawn By: LEG	
Project Number: 2171	Checked By:	SD/P101.4
Date: 08/11/23	Reviewed By:	AD8

15 September 2026 5:24 PM P:\2022\22040 Sanger USD Ed Center Phase 3\4-Drawings\5 CP\SDP101.4 - ENLARGED PLUMBING SITE PLAN.dwg ryanf

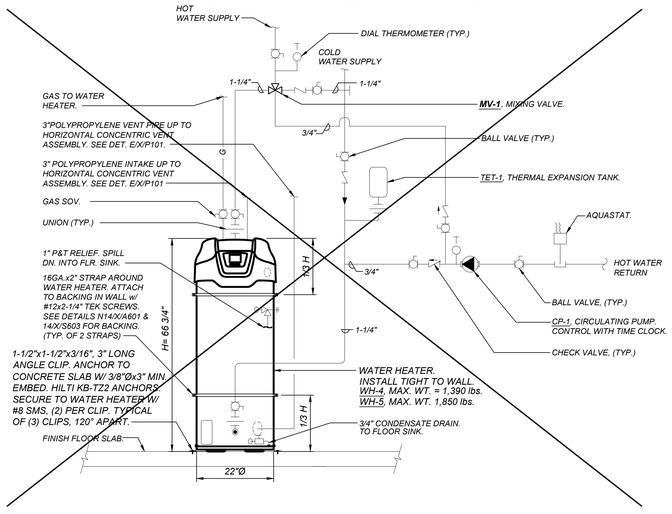


(2) TANKLESS WATER HEATERS (WH-2)

A X/P102

SCALE: NONE

OMIT - FROM PREVIOUS PHASE

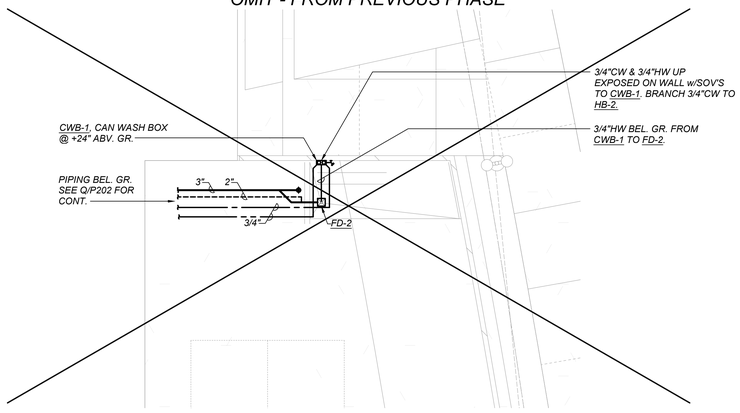


GAS WATER HEATER (WH-4 & WH-5)

C X/P102

SCALE: DIAGRAMATIC

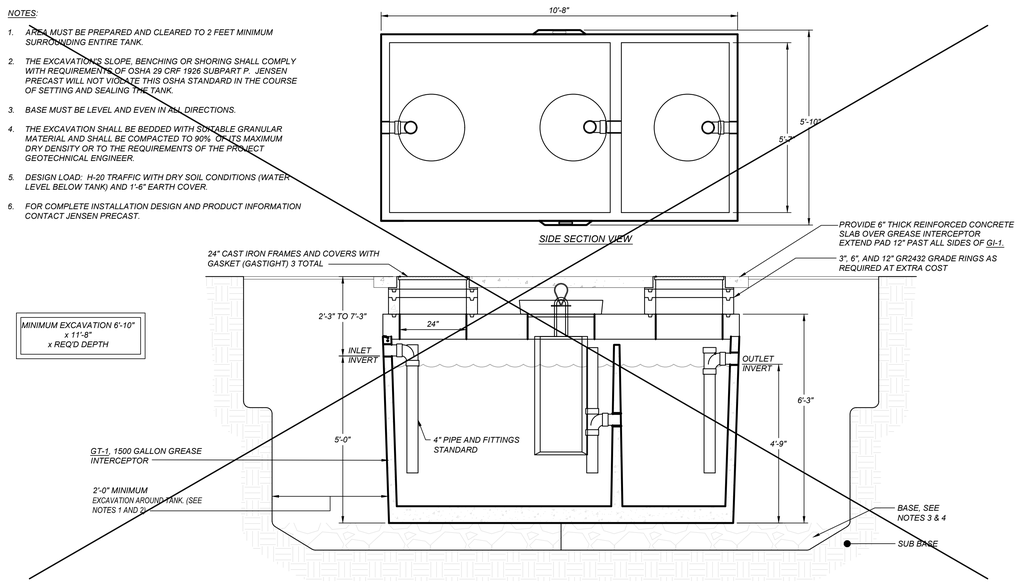
OMIT - FROM PREVIOUS PHASE



ENLARGED PLUMBING PLAN - BLDG. Q CAN WASH

F X/P102

SCALE: 1/8"=1'-0"



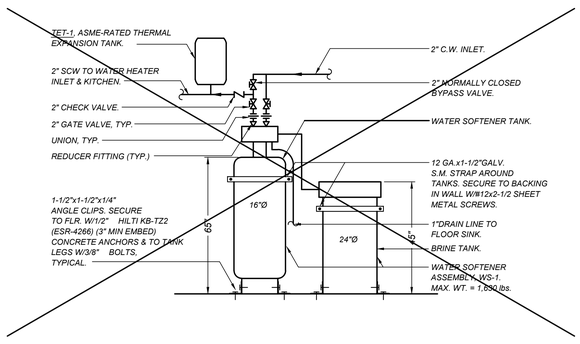
OMIT - FROM PREVIOUS PHASE

GREASE INTERCEPTOR DETAIL

B X/P102

SCALE: NONE

OMIT - FROM PREVIOUS PHASE

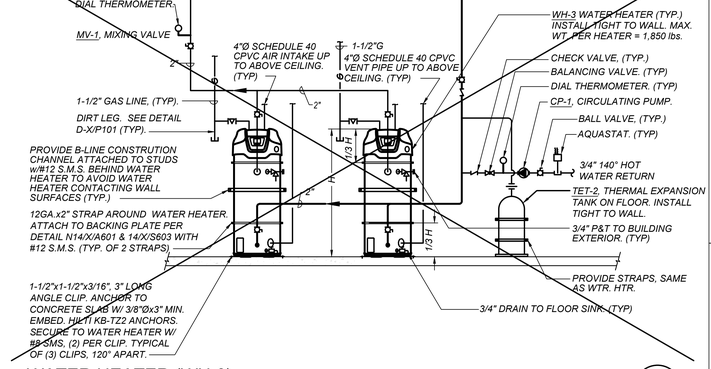


WATER SOFTENER DETAIL

D X/P102

SCALE: NONE

OMIT - FROM PREVIOUS PHASE



WATER HEATER (WH-3)

E X/P102

SCALE: NONE

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

General Notes

LAWRENCE ENGINEERING GROUP
4910 E. Clinton Way, Suite 101 Fresno, CA 93727
(559) 431-6181 22040 FAX (559) 431-1342

REGISTERED PROFESSIONAL ENGINEER MICHAEL D. CAMPBELL Exp. 6-30-25 MECHANICAL STATE OF CALIFORNIA

Consultant

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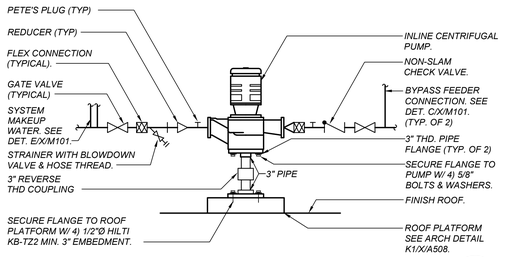
Architect

No.	Revision/Submission	Date
8	Addendum #8	9/25/2026

Revision

	Designed By:	Copyright 2021 Darden Architects
Scale:	Drawn By: LEG	X/P102
Project Number: 2171	Checked By:	
Date: 08/11/23	Reviewed By:	AD8

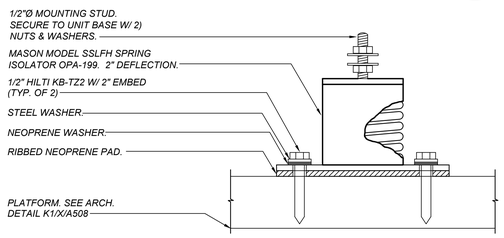
15 September 2026 5:25 PM P:\2022\22040 Sanger USD Ed Center Phase 3\4-Drawings\5 P\X/P102 – DETAILS.dwg ryanf



INLINE PUMP ON BASE PIPING DETAIL

K X/M102

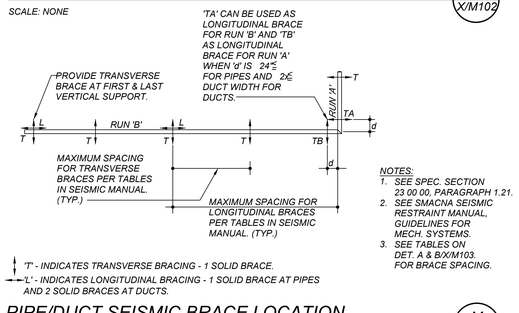
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SPRING ISOLATOR ON PLATFORM DETAIL

L X/M102

SCALE: NONE



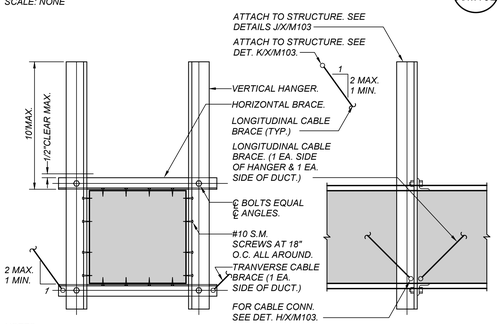
'T' - INDICATES TRANSVERSE BRACING - 1 SOLID BRACE.
'L' - INDICATES LONGITUDINAL BRACING - 1 SOLID BRACE AT PIPES AND 2 SOLID BRACES AT DUCTS.

NOTES:
1. SEE SPEC. SECTION 23 00 00, PARAGRAPH 1.21.
2. SEE SMACNA SEISMIC RESTRAINT MANUAL, GUIDELINES FOR MECH. SYSTEMS.
3. SEE TABLES ON DET. A & B/X/M103. FOR BRACE SPACING.

PIPE/DUCT SEISMIC BRACE LOCATION

M X/M102

SCALE: NONE

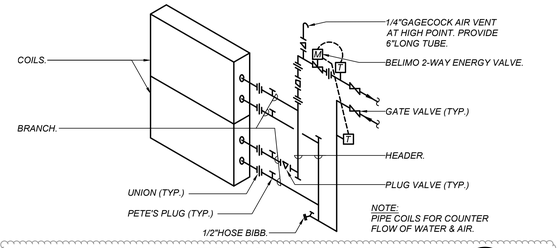


NOTES:
1. SEE SPEC SECTION 23 00 00.
2. FOR DUCT 6 FT. & LARGER.
3. SEE TABLES ON DETAILS A,B,C/X/M103.

SEISMIC RESTRAINT RECT. DUCT SUPPORT

N X/M102

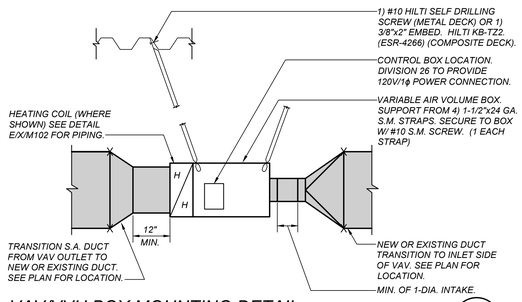
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AHU-L1: 2-WAY MULTIPLE COIL PIPING DETAIL

P X/M102

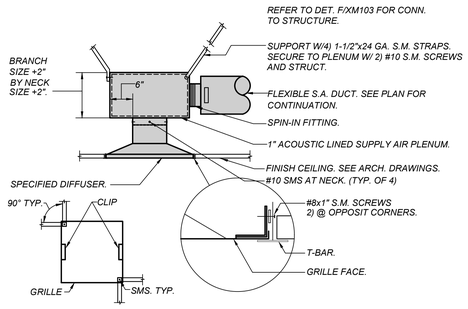
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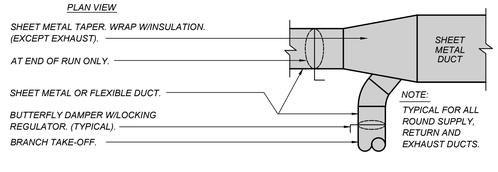


VAV/VVH BOX MOUNTING DETAIL

F X/M102

SCALE: NONE MM090

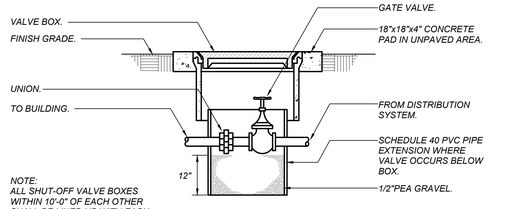




TYPICAL S.A. DEVICE-BRANCH DUCT DETAIL

G X/M102

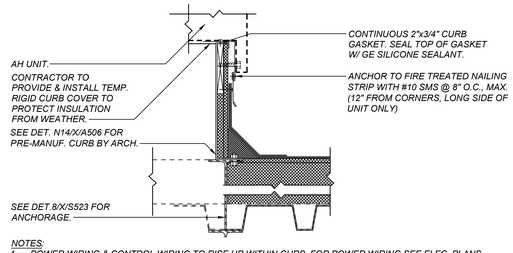
SCALE: NONE



SHUT-OFF VALVE IN BOX DETAIL

H X/M102

SCALE: NONE

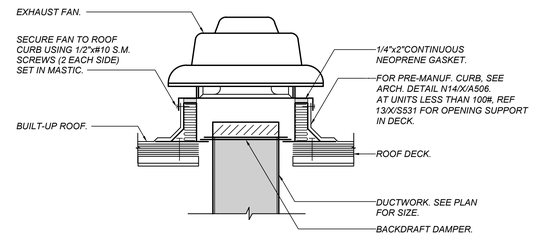


NOTES:
1. POWER WIRING & CONTROL WIRING TO RISE UP WITHIN CURB. FOR POWER WIRING SEE ELEC. PLANS.
2. MAX. WT. = 23,000 LBS.
3. HUSHCORE MODEL DS-41 FOR BUILDING M&Q. HUSHCORE MODEL DS-45 FOR BUILDING L. REFER TO SPEC SECTION 018123 PART 2.1D.

AIR HANDLER MOUNTING ON ROOF CURB

J X/M102

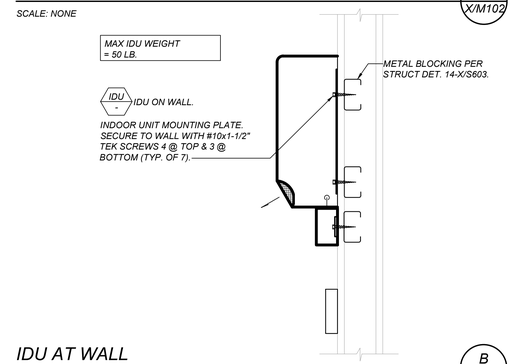
SCALE: NONE MM138



ROOF EXHAUST FAN MOUNTING DETAIL

A X/M102

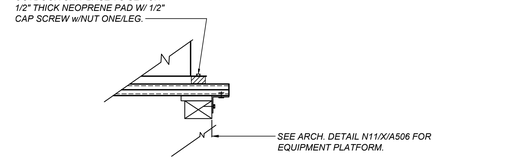
SCALE: NONE



IDU AT WALL

B X/M102

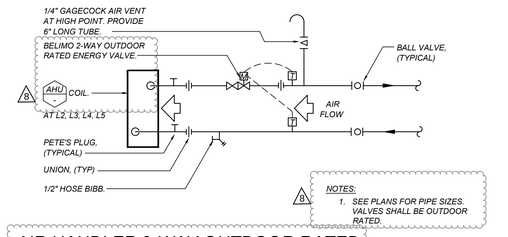
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WC / ODU MTG. DETAIL

C X/M102

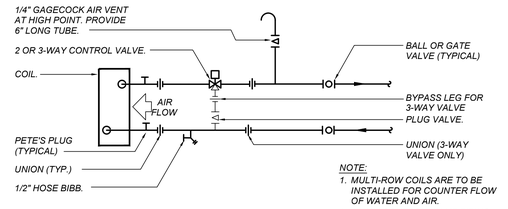
SCALE: NONE



AIR HANDLER 2-WAY OUTDOOR RATED "ENERGY VALVE" COIL PIPING DETAIL

D X/M102

SCALE: NONE



2 OR 3 WAY COIL PIPING DETAIL AT VVH BOXES

E X/M102

SCALE: NONE

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

General Notes

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4910 E. Clinton Way, Suite 101 Fresno, CA 93727
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LICENSED PROFESSIONAL ENGINEER MICHAEL D. CANTRELL No. ME 20588 Exp. 6-30-25 MECHANICAL STATE OF CALIFORNIA

Consultant

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LICENSED ARCHITECT MEGHEET K. PATWARDHAN No. C23724 Ren. 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
5	*Addendum #5*	*12/13/23*
8	Addendum #8	9/25/2026

Revision

	Designed By:	Copyright 2021 Darden Architects
Scale:	Drawn By: LEG	X/M102
Project Number: 2171	Checked By:	
Date: 08/11/23	Reviewed By:	AD8

15 September 2026 10:45 AM P:\2022\22040 Sanger USD Ed Center Phase 3\4-Drawings\4 M\XM102 – DETAILS.dwg david s

GRILLE SCHEDULE

MARK	DUTY	DESCRIPTION
A	CEILING SUPPLY	TITUS TDC (TYPE 3) LOUVER FACE SQUARE OR RECTANGULAR NECK DIFFUSER FOR STD. LAY-IN CEILING, AND NO. 26 OFF-WHITE FINISH. (18"X18" NECK ADAPTER SIZE SHOWN).
B	CEILING SUPPLY	TITUS TDC (TYPE 1) LOUVER FACE SQUARE OR RECTANGULAR NECK DIFFUSER FOR SURFACE MOUNTING, AND NO. 26 OFF-WHITE FINISH.
C	CEILING SUPPLY	TITUS PAS (TYPE 3) PERFORATED FACE ROUND NECK DIFFUSER FOR STD. LAY-IN CEILING, FLAT BLACK INTERIOR, AND NO. 26 OFF-WHITE FINISH.
D	WALL SUPPLY	TITUS MODEL 1707 REGISTER WITH REMOVABLE CORE, O.B.D., 5 DEGREE UPWARD DEFLECTION, AND NO. 26 OFF-WHITE FINISH.
F	CEILING SUPPLY	PRICE MODEL SHP-CF, PARALLELOGRAM SHAPED CUSTOM FLOW SLOT DIFFUSER, WITH 24" BEAM SPACING X 24" BASE FOR LAY-IN CEILING, TOP INLET 5A PLENUM, EXTRUDED ALUMINUM FRAME, ADJUSTABLE STEEL BLACK PATTERN CONTROLLER, ALUMINUM CENTER PANEL, PLASTIC LOCKING PINS, COATED STEEL FASTENERS, AND ARMSTRONG WHITELUME FINISH. PRIOR TO ORDERING, CONTRACTOR SHALL FIELD VERIFY INSTALLED CEILING PATTERN FOR DIFFUSER PLACEMENT AND ORIENTATION: INDICATE LEFT HANDED OR RIGHT HANDED ORIENTATION WHEN ODERING.
G	CEILING SUPPLY	TITUS FL-25 HIGH THROW (TYPE 66) EXTRUDED ALUMINUM SLOT DIFFUSER. TWO SLOTS, 2 CRA BORDER, PATTERN CONTROLLER, FLAT BLACK INTERIOR, AND NO. 26 WHITE FINISH. IN LIEU OF #26 WHITE FINISH, PROVIDE #84 BLACK FINISH BEING USED ON WOOD VENEER STYLE CEILINGS.
H	CEILING RETURN OR EXHAUST	TITUS CORE 50F (TYPE 1) ALUMINUM EGG CRATE REGISTER WITH 1/2" x 1/2" GRID, FOR SURFACE MOUNTING WITH NO. 26 OFF-WHITE FINISH.
I	CEILING RETURN OR EXHAUST	TITUS PAR (TYPE 3) PERFORATED FACE SQUARE OR RECTANGULAR NECK REGISTER FOR STD. LAY-IN CEILING , FLAT BLACK INTERIOR, AND NO. 26 OFF-WHITE FINISH.
J	WALL RETURN	TITUS CORE 25RL (TYPE 1) STEEL RETURN REGISTER, , AND NO. 26 OFF-WHITE FINISH.
K	WALL, CEILING OR DUCT RETURN	TITUS CORE 4FL (TYPE 1) ALUMINUM RETURN REGISTER WITH NO. 26 WHITE FINISH.
L	CEILING SUPPLY	TITUS FL-15 HIGH THROW (TYPE 66) EXTRUDED ALUMINUM SLOT DIFFUSER. TWO SLOTS, 2 CRA BORDER, PATTERN CONTROLLER, FLAT BLACK INTERIOR, AND NO. 26 WHITE FINISH. IN LIEU OF #26 WHITE FINISH, PROVIDE #84 BLACK FINISH BEING USED ON WOOD VENEER STYLE CEILINGS.
M	CEILING SUPPLY	TITUS MODEL OMNI SQUARE PLAQUE ROUND NECK DIFFUSER FOR STD. LAY-IN CEILING , FLAT BLACK INTERIOR, AND NO. 26 OFF-WHITE FINISH, DUCT RADIUS WITH AIR SCOOP.
N	WALL SUPPLY	TITUS MODEL CT-481 (FRAME TYPE 5) LINEAR BAR DIFFUSER w/1/8" BARS AT 1/4" SPACING AND 15 DEGREE DEFLECTION AND NO. 26 WHITE FINISH.
P	CEILING SUPPLY	TITUS MODEL MLTZ-38 w/Z AND CAP 2 SLOT, TO FIT ARMSTRONG DESIGN FLEX CEILING SYSTEMS. 3/4" TYPE 4 INSTALL BETWEEN CEILING SLATS. FINISH TO MATCH ARCH. CEILING.
R	WALL SUPPLY	TITUS MODEL TBF-AA ALUMINUM TURBOFUSER NOZZEL DIFFUSER w/ADJUSTABLE RINGS, PAINTED FLAT BLACK.
S	WALL RETURN (HEAVY DUTY)	TITUS CORE 33RF HEAVY DUTY GRILLE, AND NO. 26 OFF-WHITE FINISH.
T	CEILING RETURN OR EXHAUST	TITUS CORE 50F (TYPE 3) ALUMINUM EGG CRATE REGISTER WITH 1/2" x 1/2" GRID, FOR LAY-IN CEILING, AND NO. 26 OFF-WHITE FINISH.
U	CEILING SUPPLY	TITUS PAS (TYPE 3) PERFORATED FACE ROUND NECK DIFFUSER FOR STD. LAY-IN CEILING, FLAT BLACK INTERIOR, AND NO. 26 OFF-WHITE FINISH.
V	WALL RETURN	TITUS MODEL CT-481 (FRAME TYPE 5) LINEAR BAR DIFFUSER w/1/8" BARS AT 1/4" SPACING AND NO. 26 WHITE FINISH.
W	DUCT SUPPLY	TITUS MODEL TMR ROUND NECK, ROUND DIFFUSER WITH THREE INNER CONES, REMOVABLE INNER CONES, EQUALIZING GRID, NO. 26 OFF-WHITE FINISH.
X	CEILING SUPPLY	TITUS ML-40 1-1/2" SLOT DIFFUSER WITH CONTINUOUS PLENUM, BOARDER TYPE 2A. FINISH TO MATCH CEILING.

AIR HANDLER SCHEDULE

	DESIGNATION	AH M1	AH M2 / AH M3	AH M4	AH M5	AH M6	AH M7	AH Q1	AH Q2	AH Q3	AH Q4	AH Q5	AH L1	AH L2	AH L3	AH L4	AH L5
SUPPLY FAN	AIR FLOW (CFM)	14,500	30,000	12,425	12,700	9,000	8,300	12,150	8,000	14,000	9,000	8,500	19,320	5,060	6,475	2,890	5,000
	TOTAL SP (IN WC)	5.6	5.3	4.5	4.4	4.6	4.3	4.5	4.3	4.9	4.6	5.2	4.2	4.3	4.7	4.15	4.3
	ESP (IN WC)	2.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.3	2.0	2.0	2.0	2.0
	MIN. OSA (CFM)	4,535	12,320	4,575	7,600	3,485	1,760	8480	2,250	4,940	2,650	2,975	7,100	1,200	200	700	750
	HP/BRAKE HP TOTAL	2@15 / 24.3	4@15 / 41.0	2@7.5 / 12.8	2@7.5 / 13.7	2@7.5 / 10.4	2@5 / 9.5	2@ 7.5 / 13.9	2@5 / 8.6	2@10 / 18.3	2@7.5 / 11.3	2@7.5 / 10.5	2@ 10 / 9.7	7.5 / 5.5	10 / 7.4	5 / 2.95	7.5 / 5.39
	VOLTS/PHASE	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3
	FAN TYPE/CLASS	SWSI / H	SWSI / M	SWSI / H	SWSI / H	SWSI / M	SWSI / H	SWSI / M	SWSI / M	SWSI / M	SWSI / M	SWSI / M	SWSI / I	SWSI / I	SWSI / I	SWSI / I	SWSI / I
	ISOLATOR DEFL. (IN)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	UNIT MCA / MOCP / FLA	71 / 110 / 61	140.6 / 200 / 120.65	41 / 60 / 35.7	41 / 60 / -	36 / 50	28 / 40 / -	41 / 60	28 / 40 / -	57 / 80 / -	36.1 / 50	40 / 60 / 35	63 / 90 / 56	18.6 / 25 / 15.8	25.7 / 35 / 22.2	13.6 / 20 / 11.6	18.6 / 25 / 15.8
	LIGHTS/RECEPTACLE	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1
	LIGHT/REC. MCA/MOCP/FLA	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6
RETURN FAN	AIR FLOW (CFM)	14,500	30,000	9,125	12,700	9,000	8,300	12,150	8,000	14,000	9,000	8,500	19,320	5,060	6,475	2,890	5,000
	ESP (IN WC)	1.5	1.0	1.5	1.5	1.5	1.0	1.5	1.5	1.5	1.5	1.5	1.0	1.0	1.0	1.0	1.0
	HP/BRAKE HP TOTAL	2@7.5 / 13.05	4@7.5 / 20.75	2@5 / 7.6	2@5 / 7.8	2@5 / 5.9	2@3 / 4.2	2@5 / 7.3	2@ 3 / 4.7	2@7.5 / 11.6	2@ 3 / 5.9	2@5 / 6.15	2@ 7.5 / 5.4	3 / 2.11	5 / 3.03	1.5 / 1.0	3 / 2.1
	VOLTS/PHASE	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3
	FAN TYPE/CLASS	SWSI / M	SWSI / M	SWSI / H	SWSI / H	SWSI / M	SWSI / M	SWSI / H	SWSI / M	SWSI / M	SWSI / M	SWSI / M	SWSI / I	SWSI / M	SWSI / M	SWSI / M	SWSI / M
	ISOLATOR DEFL. (IN)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
COOLING COIL	SENSIBLE (MBH)	430.62	1093	409	475	341	234	510	239	447	272	289.2	670	166.1	212.6	96.6	155.4
	TOTAL (MBH)	438.24	1109	427	500	312	254	535	254	475	292	303.8	822.5	214.4	277.1	126.7	211.0
	COIL SIZE/ROWS	25 / 6	65.6SF / 4	29.6 / 6	29.6 / 6	20.5 / 6	20.8 / 4	28.6 / 6	20.0 / 6	28.6 / 6	20.5 / 6	16.8 / 6	48.3 / 6	12.3 / 6	13.44 / 6	7.99 / 6	12.3 / 6
	AIR PD (IN WC)	0.652	0.4	0.24	.4	.4	0.3	.4	.33	.47	.44	.576	0.42	0.49	0.65	0.38	0.49
	EADB/EAWB (°F)	85.7 / 65.5	92 / 67	85 / 65.5	89.1 / 66.5	86 / 65.3	80.7 / 64	93.3 / 67.8	82.3 / 64.4	84 / 65	82.6 / 64.5	86 / 65.5	86.5 / 68	84.8 / 68	84.8 / 68	85 / 68	83.2 / 68
	LADB/LAWB (°F)	57 / 55.57	57 / 55	55 / 53.4	55 / 53	54.3 / 52.5	54.5 / 53.6	55 / 54	55 / 54	55 / 53	55 / 53	55 / 53.55	55 / 54.3	55 / 54.4	55.0 / 54.25	54.7 / 53.9	55 / 54.5
	GPM/PD (FT)	87.34 / 3.0	221 / 6.3	85 / 5.3	100 / 7.0	63 / 5.7	52 / 7.9	106 / 8	50 / 2.3	94 / 6.4	59 / 5.1	60.55 / 5.7	164.0 / 3.4	42.7 / 4.9	55.2 / 6.9	25.2 / 10.9	30.68 / 2.85
	EWT/LWT (°F)	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55
	BRANCH SIZE	2.5	4	3	3	2.5	2.5	3	2.5	3	2.5	2.5	3	2	2.0	1.5	2.0
	VALVE TYPE	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	3-WAY	2-WAY	2-WAY	2-WAY	3-WAY
HEATING COIL	CAPACITY (MBH)	345.96	715	316	375	257	244	263	198	340	225	193.4	737.5	166.1	202.8	141.0	156.3
	COIL SIZE/ROWS	24SF / 2	65.6SF / 2	28.7 / 2	29 / 2	21 / 2	19.3SF / 2	29.9 / 2	19.8 / 2	28.7 / 2	20.8 / 2	16.8 / 2	49.1 / 2	12.3 / 2	13.65 / 2	7.99 / 2	12.3 / 2
	AIR PD (IN WC)	0.186	.16	.059	.2	.15	.07	.15	.1	.13	.12	.14	0.09	0.11	0.14	0.09	0.11
	GPM/PD (FT)	34.66 / 0.48	72 / 5.8	32 / 1.0	38 / 1.8	26 / 1.1	25 / 1.0	26 / 3.1	20 / .2	34 / .5	23 / 1.0	19.38 / 0.41	73 / 13.9	16.6 / 2.1	20.3 / 3.2	14.1 / 1.5	15.7 / 0.36
	EAT/LAT (F)	70 / 92	70 / 92	70 / 93.4	70 / 97.2	70 / .96	70 / 97	70 / 90	70 / 92	70 / 92	70 / 93	70 / 90.98	57 / 76	62.4 / 92.7	62 / 91.3	70 / 92.7	62 / 91.2
	EWT/LWT (F)	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120
	BRANCH SIZE	2.5	2.5	2	2	2	2	2	1.5	2	1.5	2.5	1.5	1.5	1.5	1.5	1.5
	VALVE TYPE	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY
FILTER	QUANTITY/SIZE	3@12"x24"	4@16"x20"	3@12"x24"	3@12"x24"	4@16"x25"	4@16"x25"	3@12"x24"	4@16"x25"	3@12"x24"	4@16"x25"	2@20"x20"	(36) 20"x 20"x2"	(6) 16"x 20"x2"	(4) 16"x 20"x2"	(1) 20"x 24"x2"	(6) 16"x 20"x2"
		2@16"x20"	2@20"x24"	2@16"x20"	2@16"x20"	3@20"x25"	3@20"x25"	2@16"x20"	3@20"x25"	2@16"x20"	3@20"x25"	4@20"x24"	-	-	(2) 16"x 25"x2"	(1) 24"x 24"x2"	-
		6@20"x20"	-	6@20"x24"	6@20"x24"	-	-	6@20"x24"	-	6@20"x24"	-	-					
	FINAL PD (IN WC)	1.00	.50	.50	.50	.50	.50	.50	.50	.50	.50	1.0	1.00	1.00	1.00	1.00	1.00
	EFFICIENCY (MERV)	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13
HUMIDIFIER	STEAM CBS/HR	-	244.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AIR TEMP (°F) GAIN	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ENTERING DB (°F)	-	59.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AIR FLOW CFM	-	30,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	MANUFACTURER	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE
	TYPE	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	INDOOR	OUTDOOR	OUTDOOR	OUTDOOR	OUTDOOR
	MODEL NUMBER	CSAA025	CSAA066	CSAA030	CSAA030	CSAA021	CSAA021	CSAA030	CSAA021	CSAA030	CSAA021	CSAA017	CSAA050	CSAA012	CSAA014	CSAA008	CSAA012
	SERVICE	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. Q	BLDG. Q	BLDG. Q	BLDG. Q	BLDG. Q	BLDG L - MECH RM	BLDG L - ROOF	BLDG L - ROOF	BLDG L - ROOF	BLDG L - ROOF
	OPER. WT. (LBS)	9,000	23,000	10,000	10,000	9,000	8,000	10,000	9,000	10,000	9,000	9,000	9,900	4,201	4,420	3,291	4,206
	ACCESSORIES	2,3,4,5	1,2,3,4,5	1,2,3,4,5	2,3,4,5	2,3,4,5	2,3,4,5	2,3,4,5,6	2,3,4,5	2,3,4,5	2,3,4,5	2,3,4,5	2,3,4	3,4,5	3,4,5	3,4,5	3,4,5

1. AHU-M2 & AHU-M3 SHALL HAVE FACTORY INSTALLED REVERSE OSMOSIS HUMIDIFIERS.
2. AHU-M1 THRU AHU-L1 TO BE PROVIDED WITH BACKDRAFT DAMPERS ON THE SUPPLY AND RETURN FANS.
3. SUPPLY DUCT SMOKE DETECTOR FOR AUTOMATIC FAN SHUT-DOWN UPON SMOKE DETECTION.
4. LOW LEAK, DOUBLE WALL CONSTRUCTION WITH CURB READY BASE RAIL, HINGED ACCESS PANELS, TREADPLATE UNIT FLOOR AND SINGLE POINT POWER CONNECTION.
5. ROOF CURB BY ARCH. SEE ARCH. SPECS AND DETAILS. WEIGHT INCLUDES CURB, CONT. SHALL COORDINATE.
6. PROVIDE SUPPLY FAN VFD CONTROLLED BY FOOD SERVICE DEMAND CONTROL SYSTEM.

OMIT - FROM PREVIOUS PHASE

CEILING FAN SCHEDULE

DESIGNATION	CF Q1 THRU CF Q3
NO. OF BLADES	3
VOLTS (AC) / PHASE	115 / 1
MAX RPM	158
MOCP	10
DRIVE	DIRECT
MOUNTING	BEAM
MANUFACTURER	BIG ASS FANS
DIAMETER (FT.)	12
MODEL NUMBER	ESSENCE
CONTROL	WALL SWITCH
SERVICE	MPR 100
OPER. WT. (LBS)	100
ACCESSORIES	1, 2

1. 3' MIN EXTENSION TUBE FOR COMPLIANCE WITH NFPA 13 11.1.7(3).
2. INTERLOCK W/ FIRE ALARM SYSTEM FOR AUTO-MATIC SHUT-DOWN UPON ALARM.

OMIT - FROM PREVIOUS PHASE

OMIT - FROM PREVIOUS PHASE

EXHAUST FAN SCHEDULE

DESIGNATION	EF M1	EF M2	EF M3	EF M4	EF M5 THRU EF M6	EF M7	EF M8	EF M9	EF M10	EF M11	EF M12
CFM	1700	1065	325 - 350	1065	325 - 350	4280	700	325 - 350	3100	700	3100
ESP (IN WC)	1.0	1.2	0.35	1.2	0.35	1.75	0.4	0.35	1.5	0.4	1.5
HP / WATTS / BHP	.75 / - / .51	.75 / - / .38	.25 / - / .04	.75 / - / .38	.25 / - / .04	3 / - / 1.95	.25 / - / .04	.25 / - / .04	2 / - / 1.3	.25 / - / .04	2 / - / 1.3
VOLTS/PHASE	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	460 / 3	120 / 1	120 / 1	208 / 1	120 / 1	208 / 1
RPM	1334	1374	953	1374	953	1055	1093	953	1302	1093	1302
TIP SPEED/SONES	5804 / 12.2	5262 / 10.3	2791 / 5.2	5262 / 10.3	2791 / 5.2	6766 / 18.1	3184 / 4.6	2791 / 5.2	6305 / 16.8	3184 / 4.6	6305 / 16.8
DRIVE	DIRECT	DIRECT	DIRECT	DIRECT	DIRECT	DIRECT	DIRECT	DIRECT	DIRECT	DIRECT	DIRECT
MOUNTING	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF
MANUFACTURER	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK
TYPE	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL
MODEL NUMBER	CUE-160HP-VG	CUE-140-VG	G-099-VG	CUE-140-VG	G-099-VG	CUE-240HP-VGD	G-100-VG	G-099-VG	CUE-180-VG	G-100-VG	CUE-180-VG
CONTROL	EMS	EMS	EMS	EMS	EMS	EMS	EMS	EMS	EMS	EMS	EMS
SERVICE	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M
OPER. WT. (LBS)	125	100	50	100	50	300	50	50	150	50	150
ACCESSORIES	1	1	1	1	1	1	1	1	1	1	1

1. PROVIDE WITH BACKDRAFT DAMPER, VARI GREEN CONTROL SYSTEM W/ EMS INTERFACE AND SPEED CONTROL DIAL ON MOTOR.

OMIT - FROM PREVIOUS PHASE

EXHAUST FAN SCHEDULE (CONT.)

DESIGNATION	EF Q1	EF Q2	EF Q3 THRU EF Q5	EF Q6	EF Q7	EF Q8	EF Q9	EF L1	EF L2 AND EF L3	EF L4
CFM	150	1200	1874	1796	2075	1118	425	220	600	150
ESP (IN WC)	0.4	2.0	2.0	2.0	1.2	3.25	0.35	0.4	0.4	0.4
HP / WATTS / BHP	1/15 / - / .02	1.0 / - / .04	3.0 / - / 1.23	2.0 / - / 1.19	1.0 / - / .73	3.0 / - / 1.54	.25 / - / .04	1/15 / - / .02	1/10 / - / .08	1/15 / - / .02
VOLTS/PHASE	120 / 1	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	120 / 1	120 / 1	120 / 1	120 / 1
RPM	1549	1,715	1,770	1,770	1,176	2,101	953	1549	1642	1549
TIP SPEED/SONES	3295 / 4.4	6,565 / 9.9	8,535 / 19.7	8,439 / 19.5	5,746 / 12.7	10,038 / 33	2791 / 5.2	3295 / 4.4	4674 / 8.1	3295 / 4.4
DRIVE	DIRECT	DIRECT	BELT	BELT	BELT	BELT	DIRECT	DIRECT	DIRECT	DIRECT
MOUNTING	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF
MANUFACTURER	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK
TYPE	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL
MODEL NUMBER	G-070-VG	CUE-160XP-VG	CUBE-240XP-VGD-30	CUBE-240XP-VGD-30	GB-200HP-VGD-10	CUBE-240XP-VGD-30	G-099-VG	G-070-VG	G-090-VG	G-070-VG
CONTROL	EMS	KIT. HOOD CONTROL	KIT. HOOD CONTROL	KIT. HOOD CONTROL	EMS	KIT. HOOD CONTROL	EMS	EMS	EMS	EMS
SERVICE	BLDG. Q	BLDG. Q	BLDG. Q	BLDG. Q	BLDG. Q	BLDG. Q	BLDG. Q	BLDG. L	BLDG. L	BLDG. L
OPER. WT. (LBS)	30	100	175	175	125	300	50	30	30	30
ACCESSORIES	1	1,2	1,2,3	1,2,3	1	1,2	1	1	1	1

1. PROVIDE WITH BACKDRAFT DAMPER, VARI GREEN CONTROL SYSTEM W/ EMS INTERFACE AND SPEED CONTROL DIAL ON MOTOR.
2. PROVIDE WITH CLEAN-OUT PORT, SS BIRD SCREEN, UL 705 LISTED, VENTILATED CURB EXTENSION WITH HINGED CURB CAP & GREASE TRAP; FACTORY DISCONNECT SWITCH WITH PIGTAIL.
3. PROVIDE WITH AUTO BELT TENSIONER, GRIP NOTCH BELTS.

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

General Notes

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4919 E. Clinton Way, Suite 101 Fresno, CA 93727
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REGISTERED PROFESSIONAL ENGINEER MICHAEL D. CONTI No. M024888 Exp. 9-30-25 MECHANICAL STATE OF CALIFORNIA

Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727

Project

TYPICAL INFORMATION
MECHANICAL SCHEDULES

Drawing

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Architect

No.	Revision/Submission	Date
5	*Addendum #5*	*12/13/23*
7	*RFI 004*	*04/11/24*
8	Addendum #8	9/25/2026

Revision

	Designed By:	Copyright 2021 Darden Architects
Scale:	Drawn By: LEG	
Project Number: 2171	Checked By:	X/M201
Date: 08/11/23	Reviewed By:	AD8

15 September 2026 10:45 AM P:\2022\22045 Sanger USD Ed Center Phase 3\14-Drawings\X M\M201 - SCHEDULES.dwg dovid s

OMIT - FROM PREVIOUS PHASE

VARIABLE AIR VOLUME BOX WITH HEAT SCHEDULE (BUILDING Q)

DESIGNATION	VVH Q1	VVH Q2	VVH Q3	VVH Q4	VVH Q5	VVH Q6	VVH Q7	VVH Q8	VVH Q9	VVH Q10	VVH Q11	VVH Q12	VVH Q13	VVH Q14	VVH Q15	VVH Q16	VVH Q17	VVH Q18	VVH Q19	VVH Q20
CFM (MAX)	2,160	550	600	2,360	700	4,350	900	2,800	1,200	1,100	650	1,050	2,195	2,015	790	350	1,150	2,300	700	300
CFM (MIN)	713	182	198	779	231	1,436	297	924	396	363	215	347	724	665	261	116	380	759	231	99
CFM (HEATING)	1,080	275	300	1,180	350	2,175	450	1,400	600	550	325	525	1,098	1,008	395	175	575	1,150	350	150
VOLTAGE/PHASE	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1
POWER (WATTS)	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
INLET PRESSURE (IN. WC)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
INTERNAL PD (IN. WC)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
MAX NC (DISCHARGE)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEATING CAPACITY (MBH)	46.9	11.9	13.0	51.2	15.2	94.4	19.5	60.8	26.0	23.9	14.1	22.8	47.6	43.7	17.1	7.6	25.0	49.9	15.2	6.5
GPM	4.7	1.2	1.3	5.2	1.5	9.5	2.0	6.1	2.6	2.4	1.4	2.3	4.8	4.4	1.7	0.8	2.5	5.0	1.5	0.7
PD (FT.)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
EADB (°F)	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
EWT (°F)	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
LWT (°F)	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
BRANCH SIZE (IN.)	1	3/4	3/4	1	3/4	1	3/4	1	3/4	3/4	3/4	3/4	3/4	1	3/4	3/4	3/4	1	3/4	3/4
VALVE TYPE	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	3 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY
MANUFACTURER	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS
MODEL	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV
SIZE	14	7	7	14	8	24X16	9	14	10	10	7	10	14	14	9	5	10	14	6	10
LOCATION	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q
OPER. WT. (LBS)	60	45	45	60	50	85	50	60	50	50	45	50	60	60	50	40	50	60	50	45
ACCESSORIES	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2

1. PROVIDE WITH 2 ROW HOT WATER COIL, STERILOC INTERNAL LINER
2. REFER TO EMS/102 FOR CONTROLS.

8 8 8 8

OMIT - FROM PREVIOUS PHASE

VARIABLE AIR VOLUME BOX WITH HEAT SCHEDULE (BUILDING M)

DESIGNATION	VVH M1	VVH M2	VVH M3	VVH M4	VVH M5	VVH M6	VVH M7	VVH M8	VVH M9	VVH M10	VVH M11	VVH M12	VVH M13	VVH M14	VVH M15	VVH M16	VVH M17	VVH M18
CFM (MAX)	1,225	500	1750	1450	690	1300	2050	1200	1630	1920	1725	2880	1200	1200	2250	900	2250	2800
CFM (MIN)	404	165	578	380	228	429	677	396	538	634	569	950	396	396	743	297	743	924
CFM (HEATING)	613	250	875	575	345	650	1,025	600	815	960	863	1,440	600	600	1,125	450	1,125	1,400
VOLTAGE/PHASE	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1
POWER (WATTS)	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
INLET PRESSURE (IN. WC)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
INTERNAL PD (IN. WC)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
MAX NC (DISCHARGE)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEATING CAPACITY (MBH)	26.6	10.9	38.0	25.0	15.0	28.2	44.5	26.0	35.4	41.2	37.4	62.5	26.0	26.0	48.8	19.5	48.8	60.8
GPM	1.8	0.7	2.6	1.7	1.0	1.9	3.0	1.8	2.4	2.8	2.5	4.2	1.8	1.8	3.3	1.3	3.3	4.1
PD (FT.)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
EADB (°F)	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
EWT (°F)	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
LWT (°F)	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110
BRANCH SIZE (IN.)	3/4	3/4	1	1	3/4	1	1	1	1	3/4	3/4	1	3/4	3/4	3/4	3/4	1	1
VALVE TYPE	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	3 WAY	2 WAY	3 WAY	2 WAY	3 WAY	2 WAY	2 WAY	3 WAY	2 WAY	2 WAY	2 WAY	3 WAY
MANUFACTURER	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS
MODEL	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV
SIZE	10	8	12	10	8	10	14	10	12	12	12	16	12	12	14	9	14	16
LOCATION	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M
OPER. WT. (LBS)	50	50	60	50	50	50	60	50	60	60	60	85	60	60	60	50	60	85
ACCESSORIES	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2

1. PROVIDE WITH 2 ROW HOT WATER COIL, STERILOC INTERNAL LINER
2. REFER TO EMS/102 FOR CONTROLS.

8 8 8

SOUND TRAP SCHEDULE

DESIGNATION	ST L1	ST L2	ST L3	ST L4
AIR FLOW (CFM)	3,400	3,400	11,000	11,000
FACE VELOCITY (FPM)	750	750	1,070	1,070
PRESS. DROP (IN. W.C.)	0.07	0.07	0.25	0.25
SIZE (W" x H" x L")	24 x 24 x 84	24 x 24 x 84	42 x 34 x 84	42 x 34 x 84
DYNAMIC INSERTION LOSS				
63 hz	6	6	12	12
125 hz	11	11	16	16
250 hz	21	21	30	30
500 hz	43	43	51	51
1000 hz	47	47	38	38
2000 hz	42	42	22	22
4000 hz	28	28	17	17
8000 hz	21	21	14	14
MANUFACTURER	I.A.C.	I.A.C.	I.A.C.	I.A.C.
	RECTANGULAR	RECTANGULAR	RECTANGULAR	RECTANGULAR
MODEL NUMBER	7LFM	7LFM	7LFM	7LFM
LOCATION	WOOD SHOP L123	WOOD SHOP L123	CONTROL L203	CONTROL L203
	SUPPLY	RETURN	SUPPLY	RETURN
OPER. WT. (LBS)	219	219	495	495
ACCESSORIES	1,2	1,2	1,2	1,2

1. PROVIDE WITH 22 GAUGE GAL. STEEL CASING, 26 GAUGE GAL. PERFORATED STEEL PARTITIONS, INORGANIC GLASS FIBER FILLER MATERIAL PACKED 5% COMPRESSION, ASTM E84 FLAME/SMOKE RATING OF 20/20.
2. ASTM E477 RATED.
3. SUPPORT UNITS OVER 250 LBS FROM BEAMS OR UNISTRUTS PER 3/X/E203 OR 13/X/S532.

8

OMIT - FROM PREVIOUS PHASE

VARIABLE AIR VOLUME BOX WITH HEAT SCHEDULE (BUILDING M)

DESIGNATION	VVH M19	VVH M20	VVH M21	VVH M22	VVH M23	VVH M24	VVH M25	VVH M26	VVH M27	VVH M28	VVH M29	VVH M30
CFM (MAX)	2550	845	845	2600	2850	900	1350	2495	1910	800	1200	400
CFM (MIN)	842	295	279	858	941	297	446	823	630	264	396	132
CFM (HEATING)	1,275	448	423	1,300	1,425	450	675	1,248	955	400	600	200
VOLTAGE/PHASE	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1
POWER (WATTS)	75	75	75	75	75	75	75	75	75	75	75	75
INLET PRESSURE (IN. WC)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
INTERNAL PD (IN. WC)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
MAX NC (DISCHARGE)	-	-	-	-	-	-	-	-	-	-	-	-
HEATING CAPACITY (MBH)	55.3	19.4	18.3	56.4	61.8	19.5	29.3	54.1	41.4	17.4	26.0	8.7
GPM	3.7	1.3	1.2	3.8	4.2	1.3	2.0	3.6	2.8	1.2	1.8	0.6
PD (FT.)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
EADB (°F)	55	55	55	55	55	55	55	55	55	55	55	55
EWT (°F)	140	140	140	140	140	140	140	140	140	140	140	140
LWT (°F)	110	110	110	110	110	110	110	110	110	110	110	110
BRANCH SIZE (IN.)	1	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
VALVE TYPE	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	3 WAY	3 WAY	3 WAY	2 WAY	2 WAY	2 WAY	3 WAY
MANUFACTURER	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS
MODEL	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV
SIZE	14	8	8	14	14	9	12	14	14	9	9	6
LOCATION	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M
OPER. WT. (LBS)	60	50	50	60	60	50	60	60	60	50	50	45
ACCESSORIES	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2

1. PROVIDE WITH 2 ROW HOT WATER COIL, STERILOC INTERNAL LINER
2. REFER TO EMS/102 FOR CONTROLS.

8

VARIABLE AIR VOLUME BOX WITH HEAT SCHEDULE (BUILDING L)

DESIGNATION	VVH L1	VVH L2	VVH L3	VVH L4	VVH L5	VVH L6	VVH L7	VVH L8	VVH L9	VVH L10	VVH L11
CFM (MAX)	1,010	200	2,400	2,400	640	600	470	575	340	1,200	350
CFM (MIN)	333	66	792	792	211	198	155	190	112	396	116
CFM (HEATING)	505	100	1,200	1,200	320	300	235	288	170	600	175
VOLTAGE/PHASE	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1
POWER (WATTS)	75	75	75	75	75	75	75	75	75	75	75
INLET PRESSURE (IN. WC)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
INTERNAL PD (IN. WC)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
MAX NC (DISCHARGE)	-	-	-	-	-	-	-	-	-	-	-
HEATING CAPACITY (MBH)	21.9	4.3	52.1	52.1	13.9	13.0	10.2	12.5	7.4	26.0	7.6
GPM	2.2	0.4	5.3	5.3	1.4	1.3	1.0	1.3	0.7	2.6	0.8
PD (FT.)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
EADB (°F)	55	55	55	55	55	55	55	55	55	55	55
EWT (°F)	140	140	140	140	140	140	140	140	140	140	140
LWT (°F)	120	120	120	120	120	120	120	120	120	120	120
BRANCH SIZE (IN.)	1	3/4	1	3/4	3/4	1	3/4	3/4	3/4	1	3/4
VALVE TYPE	3 WAY	3 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	3 WAY	3 WAY	2 WAY
MANUFACTURER	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS
MODEL	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV
SIZE	14	7	16	16	8	8	7	8	7	14	7
LOCATION	L117	L114	L101	L101	L103	L124B	L126B	L126A	L129B	L128E	L203
OPER. WT. (LBS)	60	45	60	60	50	50	45	50	45	60	45
ACCESSORIES	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2

1. PROVIDE WITH 2 ROW HOT WATER COIL, STERILOC INTERNAL LINER
2. REFER TO EMS/102 FOR CONTROLS.

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

General Notes

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REGISTERED PROFESSIONAL ENGINEER MICHAEL D. CANTRELL No. M029888 Exp. 6-30-25 MECHANICAL STATE OF CALIFORNIA

Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
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Project

MECHANICAL SCHEDULES

Drawing

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LICENSED ARCHITECT MICHAEL K. FENNO No. C23724 Renewal 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
5	*Addendum #5*	*12/13/23*
	RFI 004	*04/11/24*
8	Addendum #8	9/25/2026

Revision

Designed By:
Drawn By: LEG
Checked By:
Reviewed By:

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Scale:
Project Number: 2171
Date: 08/11/23

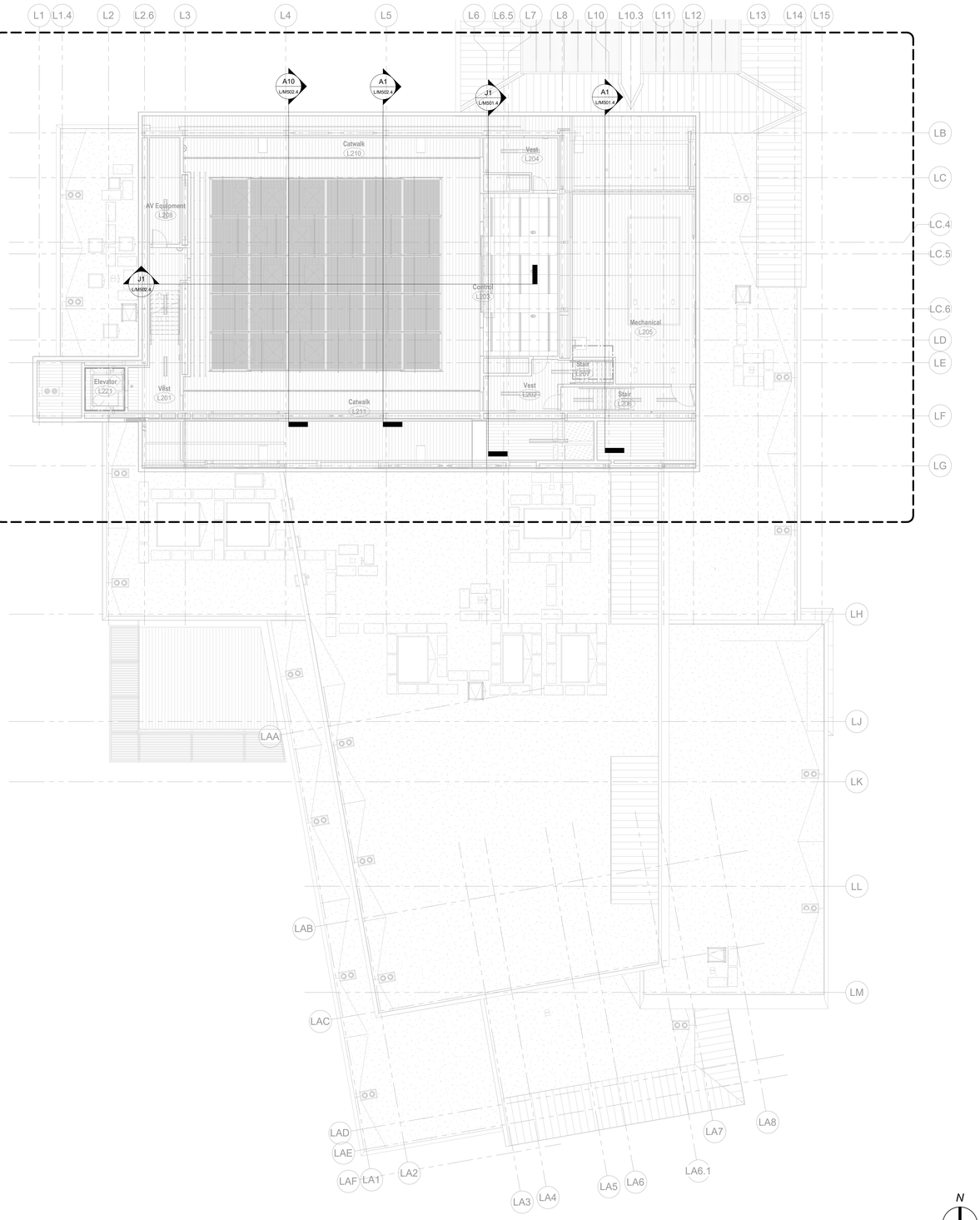
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AD8

15 September 2026 10:45 AM P:\2022\22040 Sanger USD Ed Center Phase 3\4-Drawings\4 M\XM202 – SCHEDULES.dwg david s

FOR MECHANICAL WORK TO BE ACCOMPLISHED IN THIS AREA REFER TO SHEET L/M203.4.

8

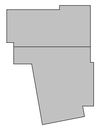


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DSA File

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Overall Key Plan - Building L

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Consultant

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Project

BUILDING L
SECOND FLOOR OVERALL MECHANICAL PLAN
Drawing

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No.	Revision/Submission	Date
8	Addendum #8	9/25/2026

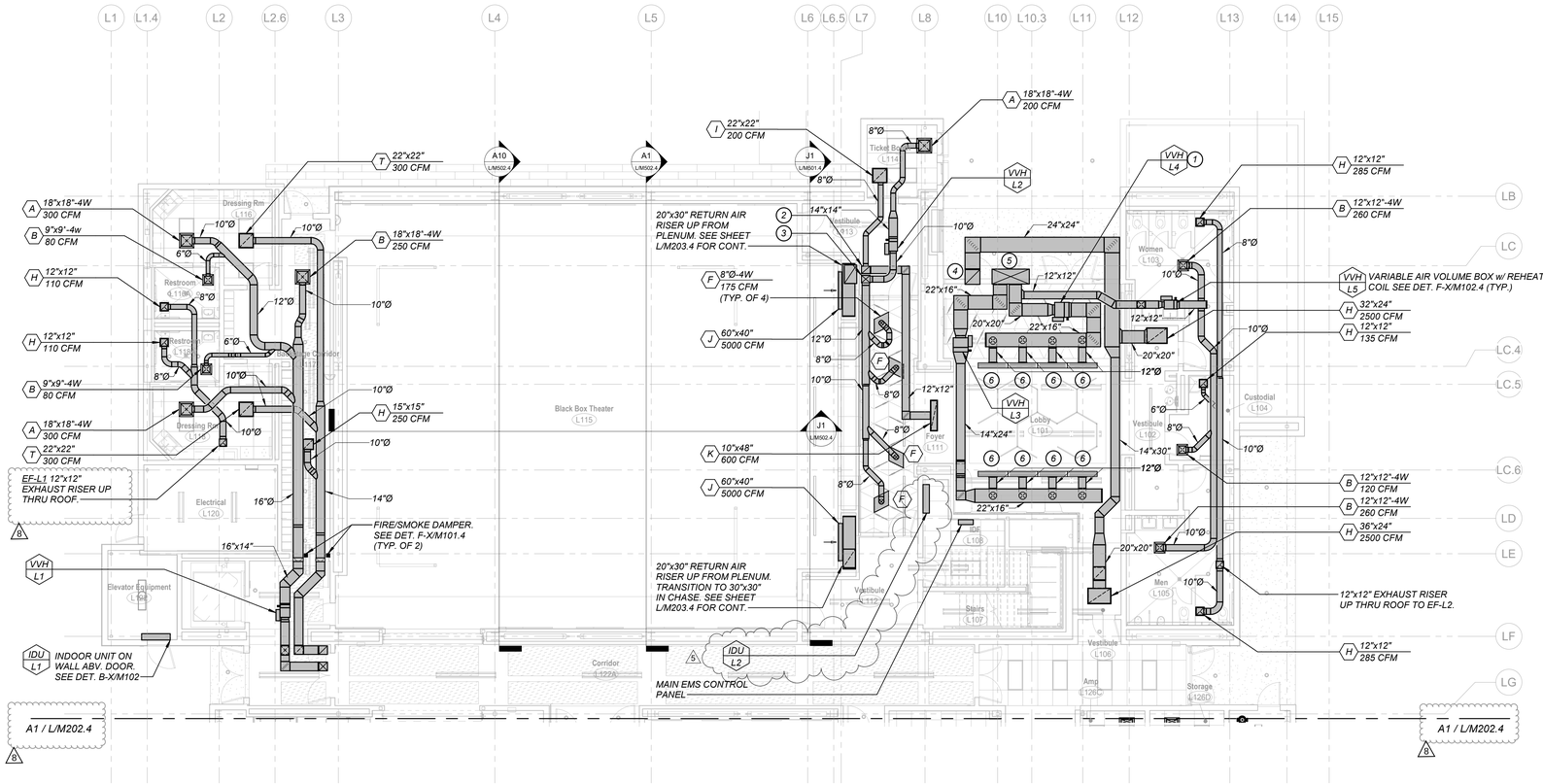
Revision

	Designed By: AB	Copyright 2022 Darden Architects
Scale: As indicated	Drawn By: Author	L/M102.4
Project Number: 22040	Checked By: AB	
Date: 08/11/2023	Reviewed By: AB	AD8

A1
3/32" = 1'-0"

SECOND FLOOR OVERALL MECHANICAL PLAN

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DSA File

DSA Application No.:
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KEYNOTES: (THIS SHEET ONLY)

1. *UNLESS OTHERWISE NOTED, ALL DUCTWORK DOWNSTREAM OF VAV BOXES SHALL HAVE 1" ACOUSTIC LINING. (TYP.)*
2. *14"x12" RETURN AIR RISER UP TO CONTROL ROOM.*
3. *14"x12" SUPPLY AIR DROP FROM CONTROL ROOM.*
4. *24"x24" RETURN AIR RISER UP TO MECHANICAL ROOM.*
5. *24"x60" SUPPLY AIR DROP FROM MECHANICAL ROOM.*
6. *G 12"Ø / 800 CFM*

Overall Key Plan - Building L

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BUILDING L
FIRST FLOOR MECHANICAL PLAN - AREA A
Drawing

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LICENSED ARCHITECT MICHAEL K. FERNANDEZ No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA

Architect

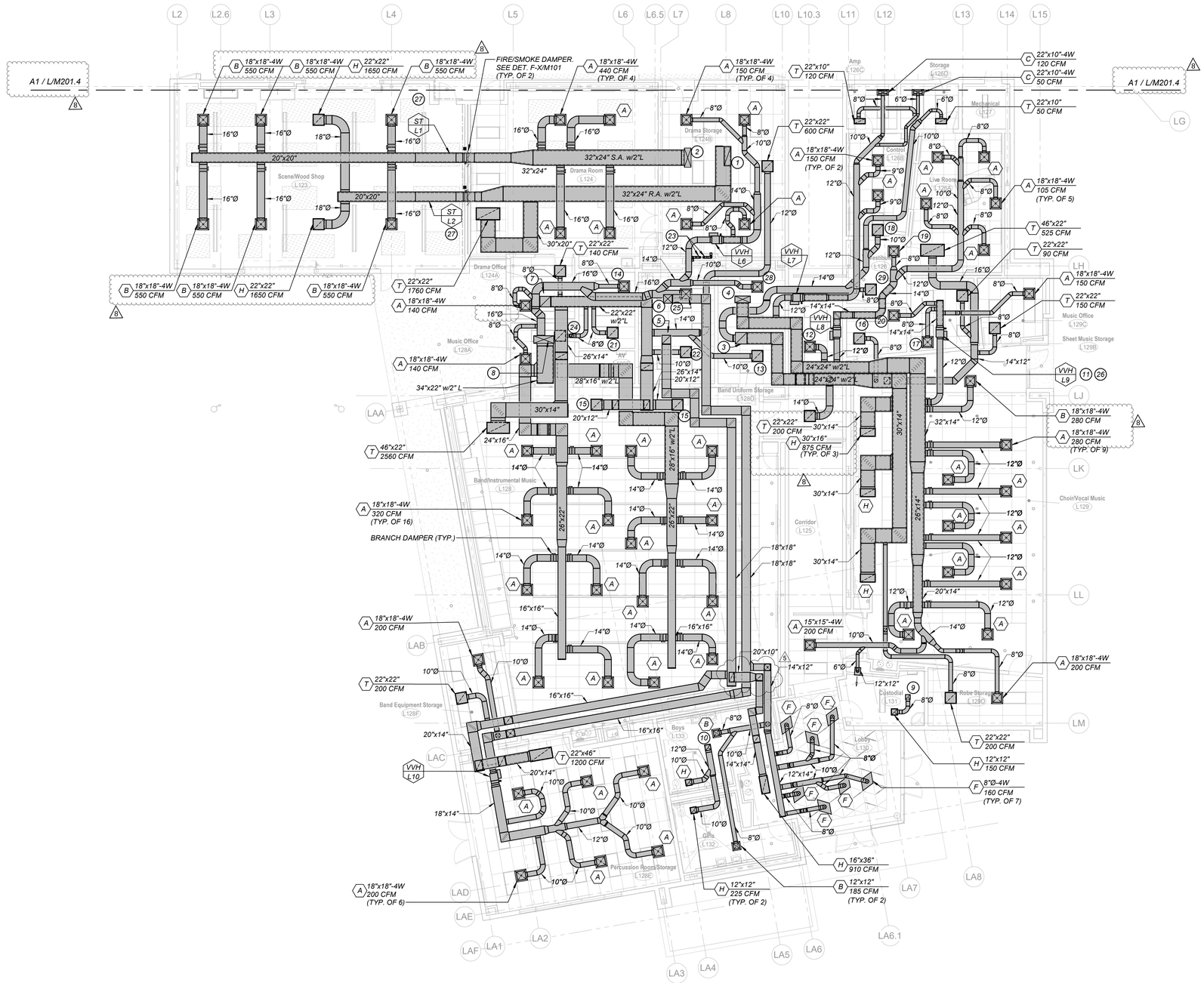
No.	Revision/Submission	Date
5	Addendum #5	12/13/23
8	Addendum #8	9/25/2026

Revision

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Scale: As indicated	Drawn By: Author	*L/M201.4*
Project Number: 22040	Checked IChecker	
Date: 08/11/2023	Reviewed Approver	AD8

A1
1/8" = 1'-0"
FIRST FLOOR MECHANICAL PLAN - AREA A

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DSA File No.:
DSA File

DSA Application No.:
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Agency Approval

KEYNOTES: (THIS SHEET ONLY)

1. *14"x40" RETURN AIR RISER UP TO AH-L2 ON ROOF.*
2. *14"x40" SUPPLY AIR DROP FROM AH-L2 ON ROOF.*
3. *24"x24" RETURN AIR RISER UP TO AH-L5 ON ROOF.*
4. *14"x32" SUPPLY AIR DROP FROM AH-L5 ON ROOF.*
5. *18"x18" RETURN AIR RISER UP TO AH-L4 ON ROOF.*
6. *18"x18" SUPPLY AIR DROP FROM AH-L4 ON ROOF.*
7. *22"x22" RETURN AIR RISER UP TO AH-L3 ON ROOF.*
8. *16"x42" SUPPLY AIR DROP FROM AH-L3 ON ROOF.*
9. *12"x12" EXHAUST AIR RISER UP TO EF-L4 ON ROOF.*
10. *12"x12" EXHAUST AIR RISER UP TO EF-L3 ON ROOF.*
11. *UNLESS OTHERWISE NOTED, ALL DUCTWORK DOWNSTREAM OF VAV BOXES SHALL HAVE 1" ACOUSTIC LINING. (TYP.)*
12. *A 15"x15"-4W 300 CFM*
13. *A 18"x18"-4W 75 CFM*
14. *T 22"x22" 75 CFM*
15. *T 22"x22" 1280 CFM*
16. *T 22"x22" 100 CFM*
17. *A 18"x18"-4W 90 CFM*
18. *T 22"x22" 300 CFM*
19. *B 18"x18"-4W 50 CFM*
20. *A 18"x18"-4W 100 CFM*
21. *T 22"x22" 75 CFM*
22. *T 22"x22" 250 CFM*
23. *4" DRYER VENT RISER UP TO ROOF. TERMINATE WITH ROOF CAP. SEE DET. J8-X/A506 (TYP. OF 2)*
24. *T 22"x22" 140 CFM*
25. *A 18"x18"-4W 250 CFM*
26. *SEE DETAIL F/X/M102 FOR SUPPORT.*
27. *SOUND TRAP SUPPORT, TYP. OF STD. DUCT SUPPORT.*
28. *A 18"x18"-4W 150 CFM*
29. *T 15"x15"-4W 50 CFM*

Overall Key Plan - Building L

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22040
Exp. 6-30-25
MECHANICAL
Consultant

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BUILDING L
FIRST FLOOR MECHANICAL PLAN - AREA B
Drawing

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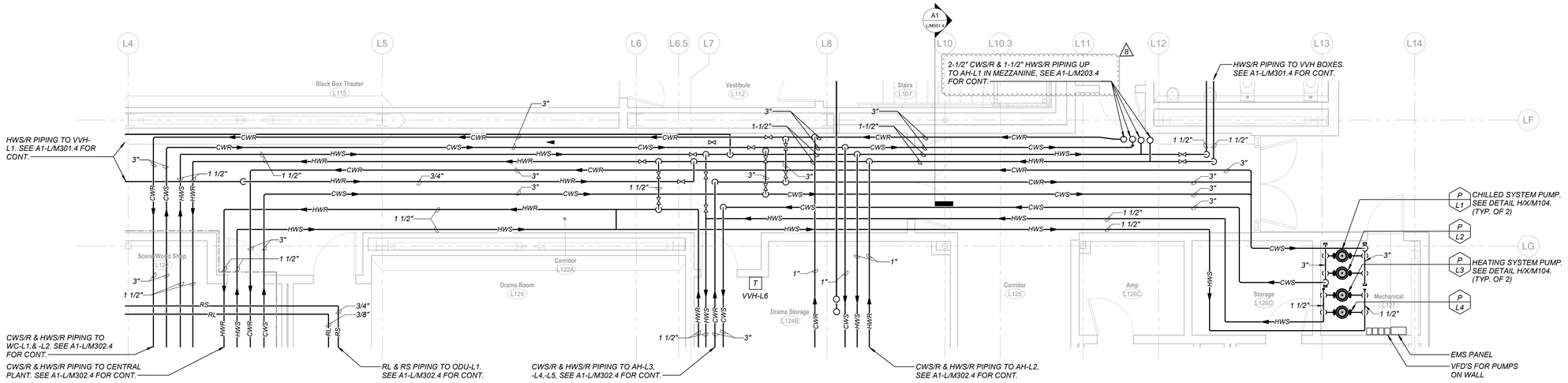
No.	Revision/Submission	Date
5	Addendum #5	12/13/23
8	Addendum #8	9/25/2026

Revision

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Project Number: 22040	Checked Checker	AD8
Date: 08/11/2023	Reviewed Approver	

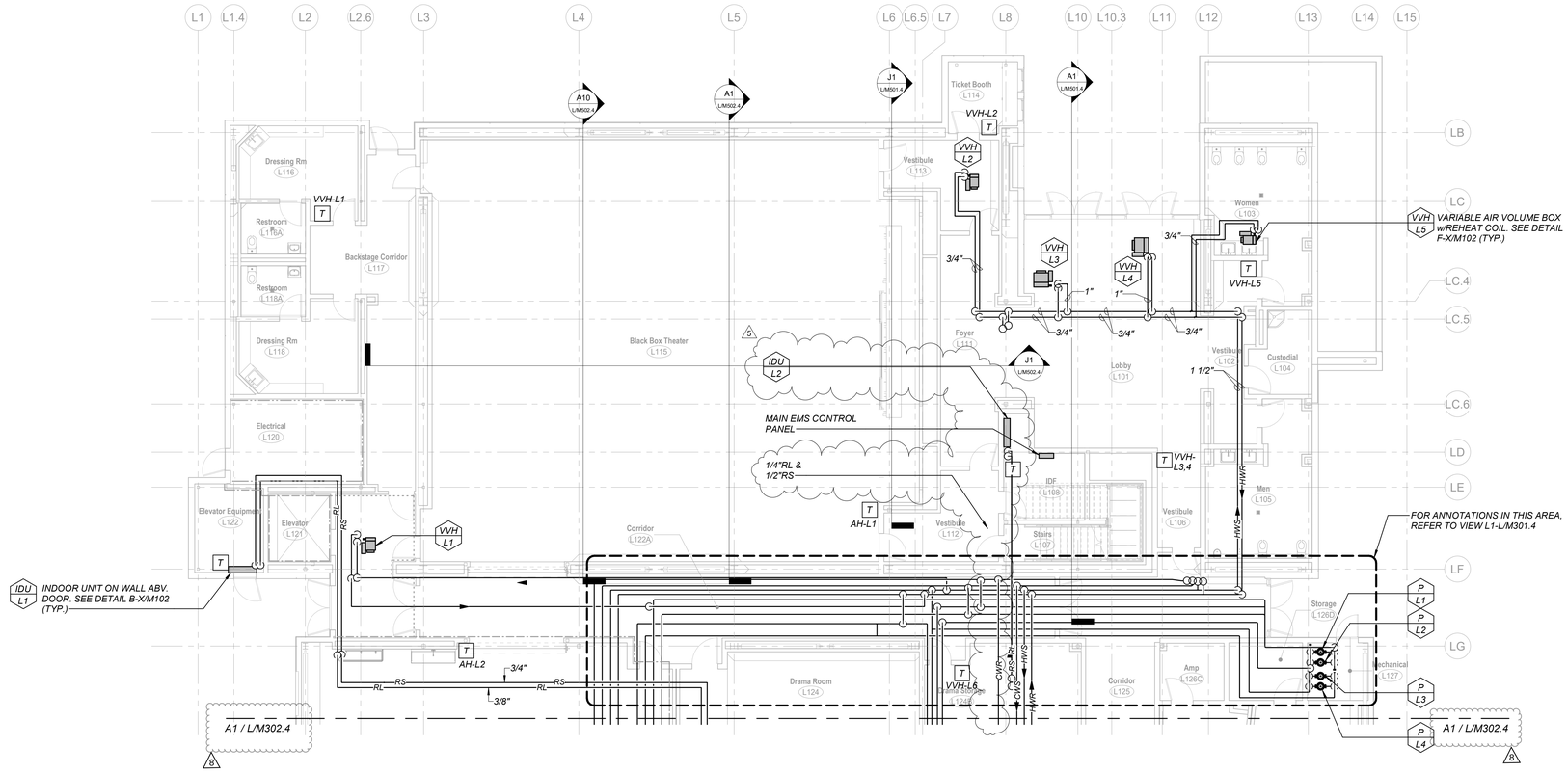
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1/8" = 1'-0"
ENLARGED FIRST FLOOR MECHANICAL PLAN - AREA B

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L1 — ENLARGED MECHANICAL PIPING PLAN - L122A

1/4" = 1'-0"



A1 — 1/8" ENLARGED FIRST FLOOR PIPING - AREA A

1/8" = 1'-0"

N

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DSA File

DSA Application No.:
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Overall Key Plan - Building L

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BUILDING L
FIRST FLOOR MECHANICAL PIPING PLAN - AREA A

Drawing

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5	Addendum #5	12/13/23
8	Addendum #8	9/25/2026

Revision

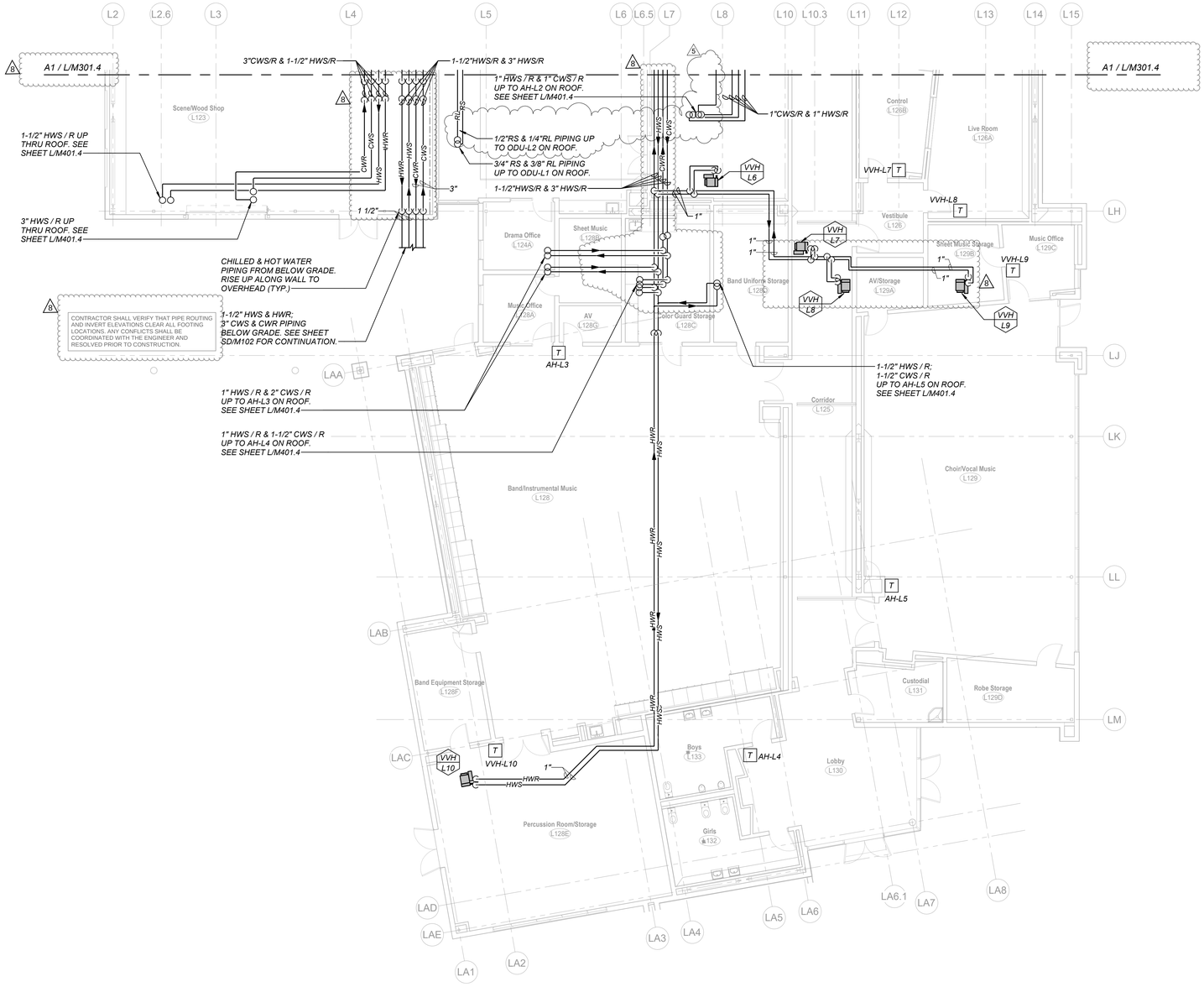
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Drawn By: Author
Checked Checker
Reviewed Approver

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Scale: As indicated
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Date: 08/11/2023

L/M301.4
AD8

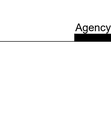
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DSA File

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Overall Key Plan - Building L

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22040

Exp. 9-30-25

Consultant

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Sanger Unified School District
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BUILDING L
FIRST FLOOR MECHANICAL PIPING PLAN - AREA B
Drawing

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Architect

No.	Revision/Submission	Date
5	Addendum #5	12/13/23
8	Addendum #8	9/25/2026

Revision

Designed Designer
Drawn By: Author
Checked Checker
Reviewed Approver

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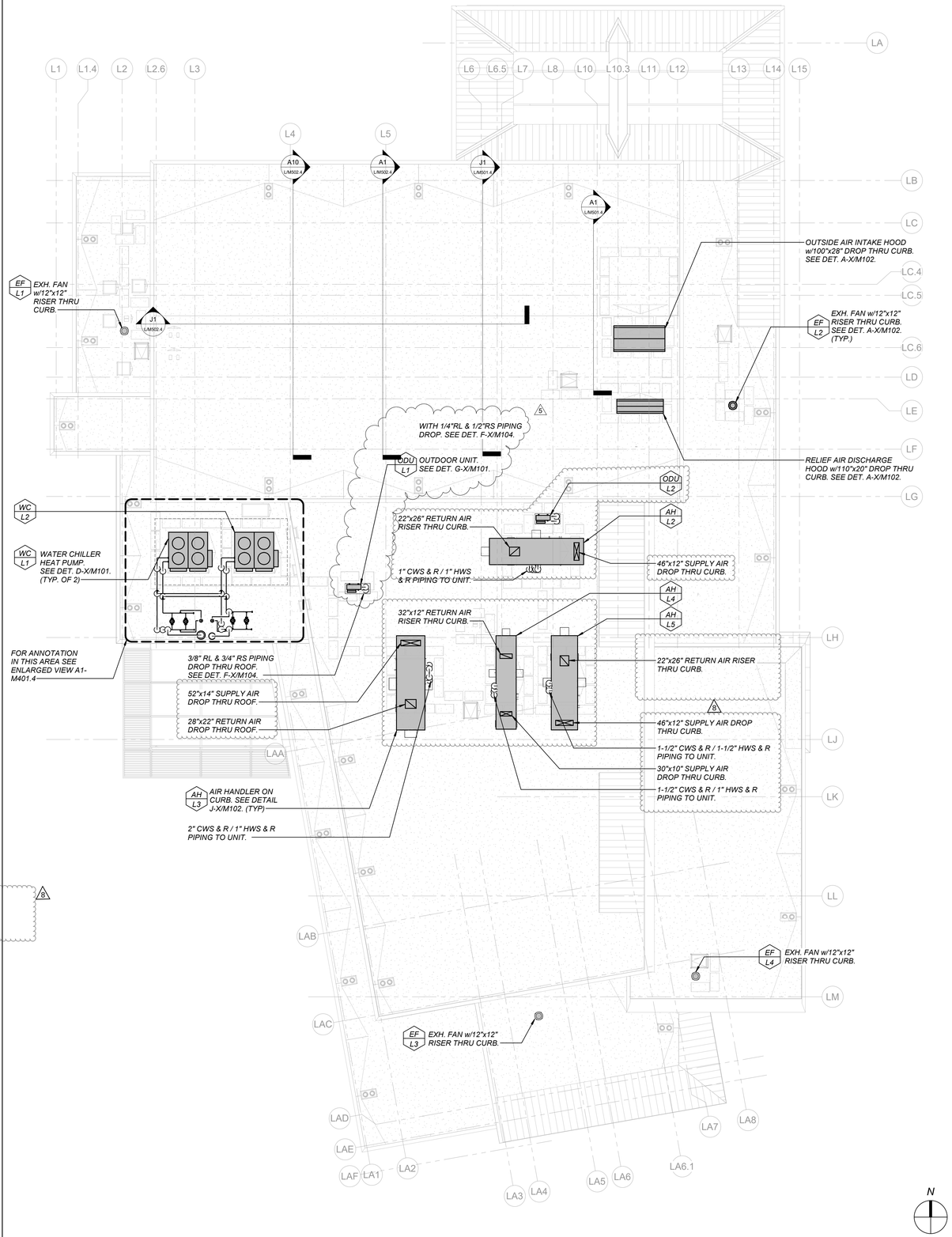
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Date: 08/11/2023

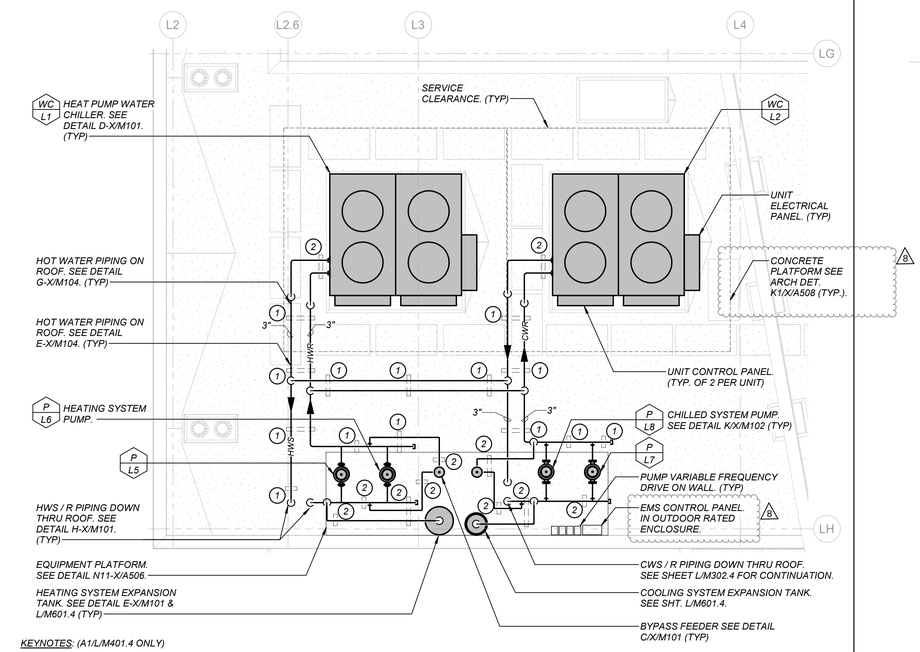
L/M302.4
AD8

A1
1/8" = 1'-0"

ENLARGED FIRST FLOOR PIPING - AREA B

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KEYNOTES: (A1/L/M401.4 ONLY)

1. PIPING SUPPORT AT ROOF, SEE DETAIL E/X/M104.
2. PIPING SUPPORT AT CONCRETE PLATFORM, SEE DETAIL J/X/M105.

A1 ENLARGED MECHANICAL ROOF PLAN
1/4" = 1'-0"

A8 MECHANICAL ROOF PLAN
3/32" = 1'-0"

DSA File No.:
DSA File

DSA Application No.:
DSA App

Agency Approval



Overall Key Plan - Building L

LAWRENCE ENGINEERING GROUP
4910 E. Clinton Way, Suite 101 Fresno, CA 93727
(559) 431-8161 22040 FAX (209) 431-1562

Exp. 6-30-26

Consultant

SANGER EDUCATION COMPLEX - PHASE 3

Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727

Project

BUILDING L

OVERALL MECHANICAL ROOF PLAN

Drawing

darden architects
ARCHITECTURE PLANNING INTERIORS
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6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

Exp. 4-30-27

Architect

No.	Revision/Submission	Date
5	Addendum #5	12/13/23
8	Addendum #8	9/25/2026

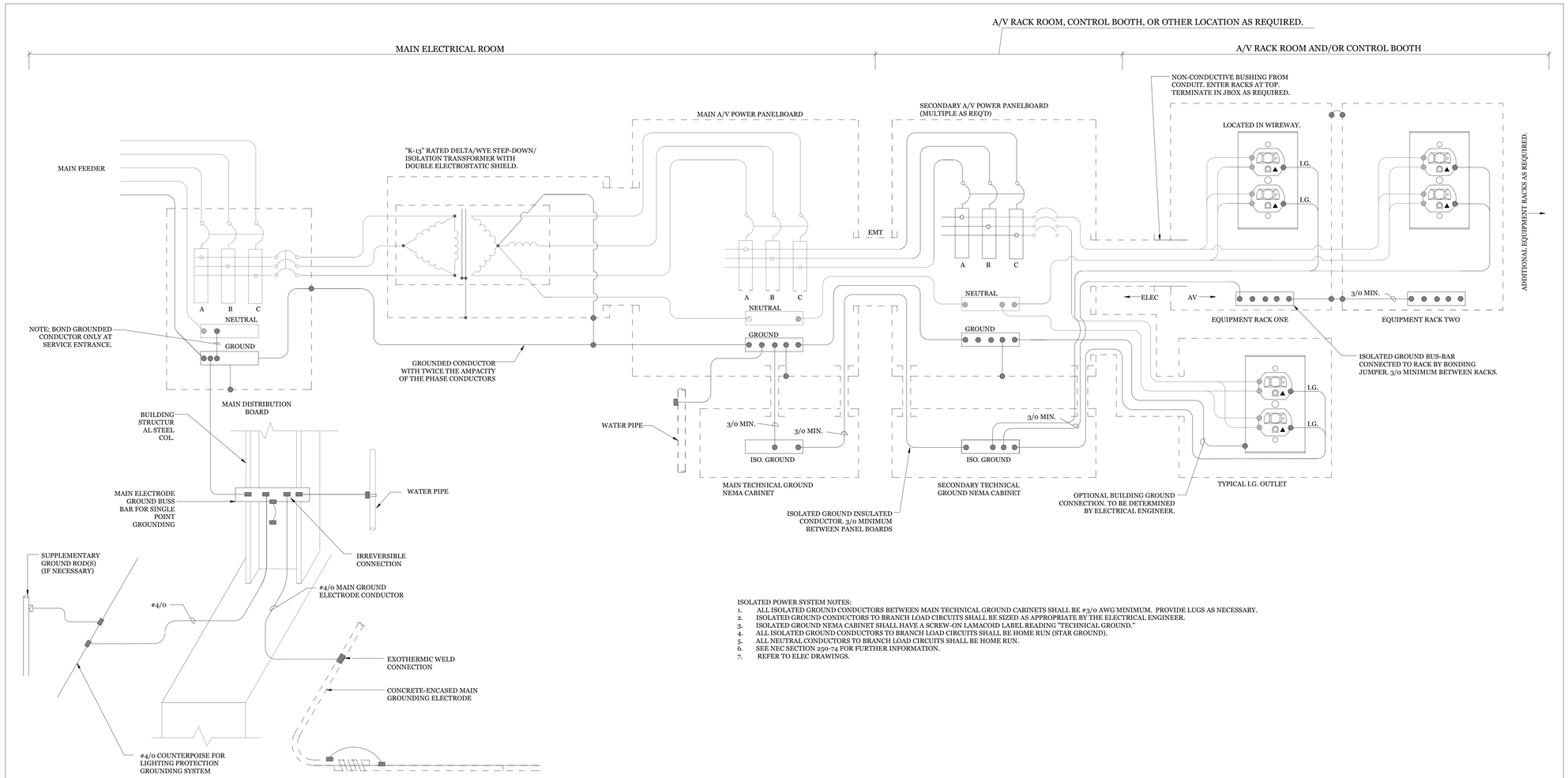
Revision

Designed Designer
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Scale: As indicated
Drawn By: Author
Project Number: 22040
Checked Checker
Date: 08/11/2023
Reviewed Approver

L/M401.4
AD8

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ISOLATED POWER SYSTEM NOTES:
1. ALL ISOLATED GROUND CONDUCTORS BETWEEN MAIN TECHNICAL GROUND CABINETS SHALL BE #3/0 AWG MINIMUM. PROVIDE LUGS AS NECESSARY.
2. ISOLATED GROUND CONDUCTORS TO BRANCH LOAD CIRCUITS SHALL BE SIZED AS APPROPRIATE BY THE ELECTRICAL ENGINEER.
3. ISOLATED GROUND NEMA CABINET SHALL HAVE A SCREW-ON LAMACOID LABEL READING "TECHNICAL GROUND."
4. ALL ISOLATED GROUND CONDUCTORS TO BRANCH LOAD CIRCUITS SHALL BE HOME RUN (STAR GROUND).
5. ALL NEUTRAL CONDUCTORS TO BRANCH LOAD CIRCUITS SHALL BE HOME RUN.
6. SEE NEC SECTION 250-74 FOR FURTHER INFORMATION.
7. REFER TO ELEC DRAWINGS.

3 TYPICAL ISOLATED GROUND SYSTEM DIAGRAM
NTS

PRODUCTION SYSTEMS SCOPE MATRIX

AV: AUDIO-VISUAL CONTRACTOR EC: ELECTRICAL CONTRACTOR	PROVIDED BY		INSTALLED BY	
SCOPE	**EC**	**AV**	**EC**	**AV**
POWER SYSTEMS (COMPLETE)	Yes	No	Yes	No
COMPANY SWITCHES	Yes	No	Yes	No
CONDUIT FOR AV SYSTEM	Yes	No	Yes	No
STANDARD GANG & DIMENSIONAL BACKBOXES	Yes	No	Yes	No
FLOOR & WALL SPECIALTY BACKBOXES	No	Yes	Yes	No
WIRE & PULL FOR AV SYSTEMS (LOW-VOLTAGE ONLY)	No	Yes	No	Yes
WIRE TERMINATION FOR AV SYSTEMS	No	Yes	No	Yes
EQUIPMENT RACKS FOR AV	No	Yes	No	Yes
AV EQUIPMENT & INSTALLATION	No	Yes	No	Yes
AV TESTING, TUNING, CONFIGURATION	No	Yes	No	Yes

2 PRODUCTION SYSTEMS SCOPE MATRIX
NTS

CBC-ASSISTIVE LISTENING CODE REFERENCES

NOTE: ALL ALS SYSTEMS PROVIDED SHALL COMPLY WITH CURRENT CBC AND BE APPROVED BY AHJ

11B-216.10 ASSISTIVE LISTENING SYSTEMS:
EACH ASSEMBLY AREA REQUIRED BY SECTION 11B-219 TO PROVIDE ASSISTIVE LISTENING SYSTEMS SHALL PROVIDE SIGNS INFORMING PATRONS OF THE AVAILABILITY OF THE ASSISTIVE LISTENING SYSTEM. THE SIGN SHALL INCLUDE WORDING THAT STATES "ASSISTIVE-LISTENING SYSTEM AVAILABLE" AND SHALL BE POSTED IN A PROMINENT PLACE AT OR NEAR THE ASSEMBLY AREA ENTRANCE. ASSISTIVE LISTENING SIGNS SHALL COMPLY WITH SECTION 11B-703.5 AND SHALL INCLUDE THE INTERNATIONAL SYMBOL OF ACCESS FOR HEARING LOSS COMPLYING WITH SECTION 11B-703.7.2.4.
EXCEPTION:
WHERE TICKET OFFICES OR WINDOWS ARE PROVIDED, SIGNS SHALL NOT BE REQUIRED AT EACH ASSEMBLY AREA PROVIDED THAT SIGNS ARE DISPLAYED AT EACH TICKET OFFICE OR WINDOW INFORMING PATRONS OF THE AVAILABILITY OF ASSISTIVE LISTENING SYSTEMS.

11B-219 ASSISTIVE LISTENING SYSTEMS:
11B-219.1 GENERAL:
ASSISTIVE LISTENING SYSTEMS SHALL BE PROVIDED IN ACCORDANCE WITH SECTION 11B-219 AND SHALL COMPLY WITH SECTION 11B-706.
11B-219.2 REQUIRED SYSTEMS:
AN ASSISTIVE LISTENING SYSTEM SHALL BE PROVIDED IN ASSEMBLY AREAS, INCLUDING CONFERENCE AND MEETING ROOMS.
EXCEPTION: THIS SECTION DOES NOT APPLY TO SYSTEMS USED EXCLUSIVELY FOR PAGING, BACKGROUND MUSIC, OR A COMBINATION OF THESE TWO USES.
11B-219.3 RECEIVERS:
THE MINIMUM NUMBER OF RECEIVERS TO BE PROVIDED SHALL BE EQUAL TO 4 PERCENT OF THE TOTAL NUMBER OF SEATS, BUT IN NO CASE LESS THAN TWO. TWENTY-FIVE PERCENT MINIMUM OF RECEIVERS PROVIDED, BUT NO FEWER THAN TWO, SHALL BE HEARING-AID COMPATIBLE IN ACCORDANCE WITH SECTION 11B-706.3.
EXCEPTIONS:
1. WHERE A BUILDING CONTAINS MORE THAN ONE ASSEMBLY AREA AND THE ASSEMBLY AREAS REQUIRED TO PROVIDE ASSISTIVE LISTENING SYSTEMS ARE UNDER ONE MANAGEMENT, THE TOTAL NUMBER OF REQUIRED RECEIVERS SHALL BE PERMITTED TO BE CALCULATED ACCORDING TO THE TOTAL NUMBER OF SEATS IN THE ASSEMBLY AREAS IN THE BUILDING PROVIDED THAT ALL RECEIVERS ARE USABLE WITH ALL SYSTEMS.
2. WHERE ALL SEATS IN AN ASSEMBLY AREA ARE SERVED BY AN INDUCTION LOOP ASSISTIVE LISTENING SYSTEM, THE MINIMUM NUMBER OF RECEIVERS REQUIRED BY SECTION 11B-219.3 TO BE HEARING-AID COMPATIBLE SHALL NOT BE REQUIRED TO BE PROVIDED.

11B-219.4 LOCATION:
IF THE ASSISTIVE-LISTENING SYSTEM PROVIDED IS LIMITED TO SPECIFIC AREAS OR SEATS, THEN SUCH AREAS OR SEATS SHALL BE WITHIN A 50-FOOT (15240 MM) VIEWING DISTANCE OF THE STAGE OR PLAYING AREA AND SHALL HAVE A COMPLETE VIEW OF THE STAGE OR PLAYING AREA.
11B-219.5 PERMANENT AND PORTABLE SYSTEMS:
PERMANENTLY INSTALLED ASSISTIVE-LISTENING SYSTEMS ARE REQUIRED IN AREAS IF (1) THEY ACCOMMODATE AT LEAST 50 PERSONS OR IF THEY HAVE AUDIO-AMPLIFICATION SYSTEMS, AND (2) THEY HAVE FIXED SEATING. IF PORTABLE ASSISTIVE-LISTENING SYSTEMS ARE USED FOR CONFERENCE OR MEETING ROOMS, THE SYSTEM MAY SERVE MORE THAN ONE ROOM. AN ADEQUATE NUMBER OF ELECTRICAL OUTLETS OR OTHER SUPPLEMENTARY WIRING NECESSARY TO SUPPORT A PORTABLE ASSISTIVE-LISTENING SYSTEM SHALL BE PROVIDED.

11B-706 ASSISTIVE LISTENING SYSTEMS
11B-706.1 GENERAL:
ASSISTIVE LISTENING SYSTEMS REQUIRED IN ASSEMBLY AREAS, CONFERENCE AND MEETING ROOMS SHALL COMPLY WITH SECTION 11B-706.
11B-706.2 RECEIVER JACKS:
RECEIVERS REQUIRED FOR USE WITH AN ASSISTIVE LISTENING SYSTEM SHALL INCLUDE A 1/8 INCH (3.2 MM) STANDARD MONO JACK.
11B-706.3 RECEIVER HEARING-AID COMPATIBILITY:
RECEIVERS REQUIRED TO BE HEARING-AID COMPATIBLE SHALL INTERFACE WITH TELECOILS IN HEARING AIDS THROUGH THE PROVISION OF NECKLOOPS.
11B-706.4 SOUND PRESSURE LEVEL:
ASSISTIVE LISTENING SYSTEMS SHALL BE CAPABLE OF PROVIDING A SOUND PRESSURE LEVEL OF 110 DB MINIMUM AND 118 DB MAXIMUM WITH A DYNAMIC RANGE ON THE VOLUME CONTROL OF 50 DB.
11B-706.5 SIGNAL-TO-NOISE RATIO:
THE SIGNAL-TO-NOISE RATIO FOR INTERNALLY GENERATED NOISE IN ASSISTIVE LISTENING SYSTEMS SHALL BE 18 DB MINIMUM.
11B-706.6 PEAK CLIPPING LEVEL:
PEAK CLIPPING SHALL NOT EXCEED 18 DB OF CLIPPING RELATIVE TO THE PEAKS OF SPEECH.

11B-219.3 ASSISTIVE LISTENING RECEIVERS

CALIFORNIA BUILDING CODE (2022)

Capacity of Seating in Assembly Area	Minimum Number of Required Receivers	Minimum Number of Required Receivers to be Hearing-Aid Compatible
1-50 Seats	Two	Two
51+ Seats	4% of the Total Amount of Seating	25%

ASSISTIVE LISTENING-CBC

AV SYSTEM	# SEATS	# RECEIVERS REQUIRED	# HEARING-AID COMPATIBLE REQUIRED	TYPE	NOTES
BLACKBOX	248	10	3	FM	
TOTAL:	248	10	3		

NOTE: THE TABLE ABOVE SHOWS THE MINIMUM REQUIRED QUANTITY OF RECEIVERS AND HEARING-AID COMPATIBLE RECEIVERS. QUANTITY PROVIDED IN THIS PROJECT MAY EXCEED THOSE SHOWN IN THIS TABLE

1 ASSISTIVE LISTENING CALCULATIONS & REFERENCES
NTS

DSA File No.:
10-H15

DSA Application No.:
02-119023

Agency Approval

The Shalleck Collaborative Inc.
Planning and Design of Theatres Production Systems | AV
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Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727

Project

Audio-Visual - Typical Information
AV ISO GROUND, ALS, & CONDUIT INFO

Drawing

darden architects
ARCHITECTURE PLANNING INTERIORS
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LICENSED ARCHITECT RICHARD K. FEDNEY No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
	100CD	12/15/22
	DSA BACKCHECK	08/11/23
B	ADD 8	09/22/2026

Revision

Designed By: IDH
Drawn By: GTEH
Checked By: STK
Reviewed By: IDH

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Scale: 12" = 1'-0"
Project Number: 2771
Date: 08/11/23

AV001
AD8

9/24/2026 7:09:55 AM
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AV PANEL SCHEDULE

DEVICE TYPE	LOCATION	DEVICE DESCRIPTION	PANEL SIZE - FLUSH MOUNT	PANEL SIZE - SURFACE MOUNT	BOX TYPE - FLUSH MOUNT	BOX TYPE - SURFACE MOUNT	WIRING CONNECTION
AV-B1	BLACK BOX	MULTI I/O PANEL	13 X 13	12 X 12	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
AV-B2	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B3	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B4	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B5	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B6	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B10	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B11	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B12	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B13	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B14	BLACK BOX	MULTI I/O PANEL	13 X 13	12 X 12	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
AV-B15	BLACK BOX	MULTI I/O PANEL	13 X 13	12 X 12	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
AV-B16	BLACK BOX	MULTI I/O PANEL	13 X 17	12 X 16	NEMA TYPE 1 12X16X6	NEMA TYPE 1 12X16X6	HOME RUN TO AV RACK
AV-R1	RECORDING STUDIO	MULTI I/O PANEL	13 X 13	12 X 12	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
AV-R2	RECORDING STUDIO	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-R3	RECORDING STUDIO	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-R4	RECORDING STUDIO	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-R5	RECORDING STUDIO	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
CM-2	SEE DRAWINGS	PRODUCTION INTERCOM CONNECTIONS	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
CM-W	SEE DRAWINGS	PRODUCTION INTERCOM WALL STATION	PRE-MADE DEVICE	PRE-MADE DEVICE	2-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 2-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
CSP-1	BLACK BOX	REMOTE CONTROL PANEL	PRE-MADE DEVICE	PRE-MADE DEVICE	2-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 2-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
CSP-B	SEE DRAWINGS	REMOTE CONTROL PANEL	PRE-MADE DEVICE	PRE-MADE DEVICE	2-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 2-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
FM	SEE DRAWINGS	FM ASSISTIVE LISTENING ANTENNA	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
FPD-F	SEE DRAWINGS	FLAT PANEL DISPLAY	N/A	N/A	MFR: CHIEF MFR MODEL: PAC-526	N/A	HOME RUN TO AV RACK
FPD-P	SEE DRAWINGS	FLAT PANEL DISPLAY	N/A	N/A	MFR: CHIEF MFR MODEL: PAC-501	N/A	HOME RUN TO AV RACK
FPD-V	SEE DRAWINGS	FLAT PANEL DISPLAY WITH PULL OUT MOUNT	N/A	N/A	MFR: RPVISUALS MODEL: WALLMATE 16	N/A	HOME RUN TO AV RACK
HDMI	SEE DRAWINGS	HDMI INPUT	2-GANG	2-GANG	2-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 2-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
HM	BLACK BOX	HOUSE MANAGER PANEL	16X16 W/ STANDOFFS	16X16 W/ STANDOFFS	NEMA TYPE 1 18X18X8	NEMA TYPE 1 18X18X8	HOME RUN TO AV RACK
JB-1	BLACK BOX	J-BOX	13 X 13 W/ GROMMET	12 X 12 W/GROMMET	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
JB-2	RECORDING STUDIO	J-BOX	13 X 13 W/ GROMMET	12 X 12 W/GROMMET	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
JB-3	RECORDING STUDIO	J-BOX	13 X 13 W/ GROMMET	12 X 12 W/GROMMET	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
LCC	SEE DRAWINGS	LIGHTING CONTROL CONNECTION	2-GANG W/ GROMMET	2-GANG W/ GROMMET	2-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 2-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
MC-1	SEE DRAWINGS	MICROPHONE CONNECTIONS	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
MC-2	SEE DRAWINGS	MICROPHONE CONNECTIONS	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
PTZ	BLACKBOX	PAN TILT ZOOM CAMERA	N/A DIRECT CONNECT	N/A DIRECT CONNECT	2-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 2-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
PTZ-C	BLACK BOX	CEILING PAN TILT ZOOM CAMERA	1-GANG W/ GROMMET	1-GANG W/ GROMMET	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
RK-1	BLACK BOX	EQUIPMENT RACK J-BOX	N/A	N/A	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
RK-2	BAND ROOM	EQUIPMENT RACK J-BOX	N/A	N/A	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
RK-3	CHOIR ROOM	EQUIPMENT RACK J-BOX	N/A	N/A	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
RK-4	DRAMA ROOM	EQUIPMENT RACK J-BOX	N/A	N/A	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
RL	RECORDING STUDIO	RECORDING LIGHT	PRE-MADE DEVICE	PRE-MADE DEVICE	2-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 2-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
SA	SEE DRAWINGS	70V VOLUME CONTROL	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
SAD	SEE DRAWINGS	70V VOLUME CONTROL	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK

AV PANEL SCHEDULE

DEVICE TYPE	LOCATION	DEVICE DESCRIPTION	PANEL SIZE - FLUSH MOUNT	PANEL SIZE - SURFACE MOUNT	BOX TYPE - FLUSH MOUNT	BOX TYPE - SURFACE MOUNT	WIRING CONNECTION
SC	SEE DRAWINGS	CEILING MOUNTED 70V LOUDSPEAKER	1-GANG BLANK	1-GANG BLANK	1-GANG W/ FLEX CONDUIT TO LOUDSPEAKER	1-GANG W/ FLEX CONDUIT TO LOUDSPEAKER	FROM AV RACK - CONTINUES TO OTHER SIMILAR DEVICES IN AREA
SCRC	SEE DRAWINGS	MOTORIZED SCREEN CONTROL	2-GANG	2-GANG	2-GANG DOUBLE-DEPTH BOX	2-GANG DOUBLE-DEPTH WEATHERPROOF BOX	HOME RUN TO AV RACK
SHC	SEE DRAWINGS	HIGH-CEILING MOUNTED 70V LOUDSPEAKER	1-GANG BLANK	1-GANG BLANK	1-GANG W/ FLEX CONDUIT TO LOUDSPEAKER	1-GANG W/ FLEX CONDUIT TO LOUDSPEAKER	FROM AV RACK - CONTINUES TO OTHER SIMILAR DEVICES IN AREA
SHP	SEE DRAWINGS	PENDANT MOUNTED 70V LOUDSPEAKER	1-GANG BLANK	1-GANG BLANK	1-GANG W/ FLEX CONDUIT TO LOUDSPEAKER	1-GANG W/ FLEX CONDUIT TO LOUDSPEAKER	FROM AV RACK - CONTINUES TO OTHER SIMILAR DEVICES IN AREA
SP-1	RECORDING STUDIO	SELF-POWERED LOUDSPEAKER CONNECTIONS	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
SP-1	SEE DRAWINGS	SELF-POWERED LOUDSPEAKER CONNECTIONS	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
TB	RECORDING STUDIO	TALKBACK MICROPHONE	PRE-MADE DEVICE	PRE-MADE DEVICE	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
V-4	BLACKBOX	VIDEO I/O CONNECTIONS	3-GANG	3-GANG	3-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 3-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
VPJ	SEE DRAWINGS	VIDEO PROJECTOR	7 X 7 W/ GROMMET	6 X 6 W/ GROMMET	NEMA TYPE 1 6X6X6	NEMA TYPE 1 6X6X6	HOME RUN TO AV RACK
VTV	SEE DRAWINGS	CATV OUTLET	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
WX	SEE DRAWINGS	WIRELESS MICROPHONE ANTENNA	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK

1 AV PANEL SCHEDULE
NTS

B

DSA File No.:
10-H15

DSA Application No.:
02-119023

Agency Approval

The Shalleck Collaborative Inc.
Planning and Design of Theatres
Production Systems | AV
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Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

Audio-Visual - Typical Information
AV PANEL SCHEDULE
Drawing

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ARCHITECTURE
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6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051
LICENSED ARCHITECT MICHAEL K. FERNEZIAN No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date
	100CD	12/15/22
	DSA BACKCHECK	08/11/23
B	ADD 8	09/22/2026

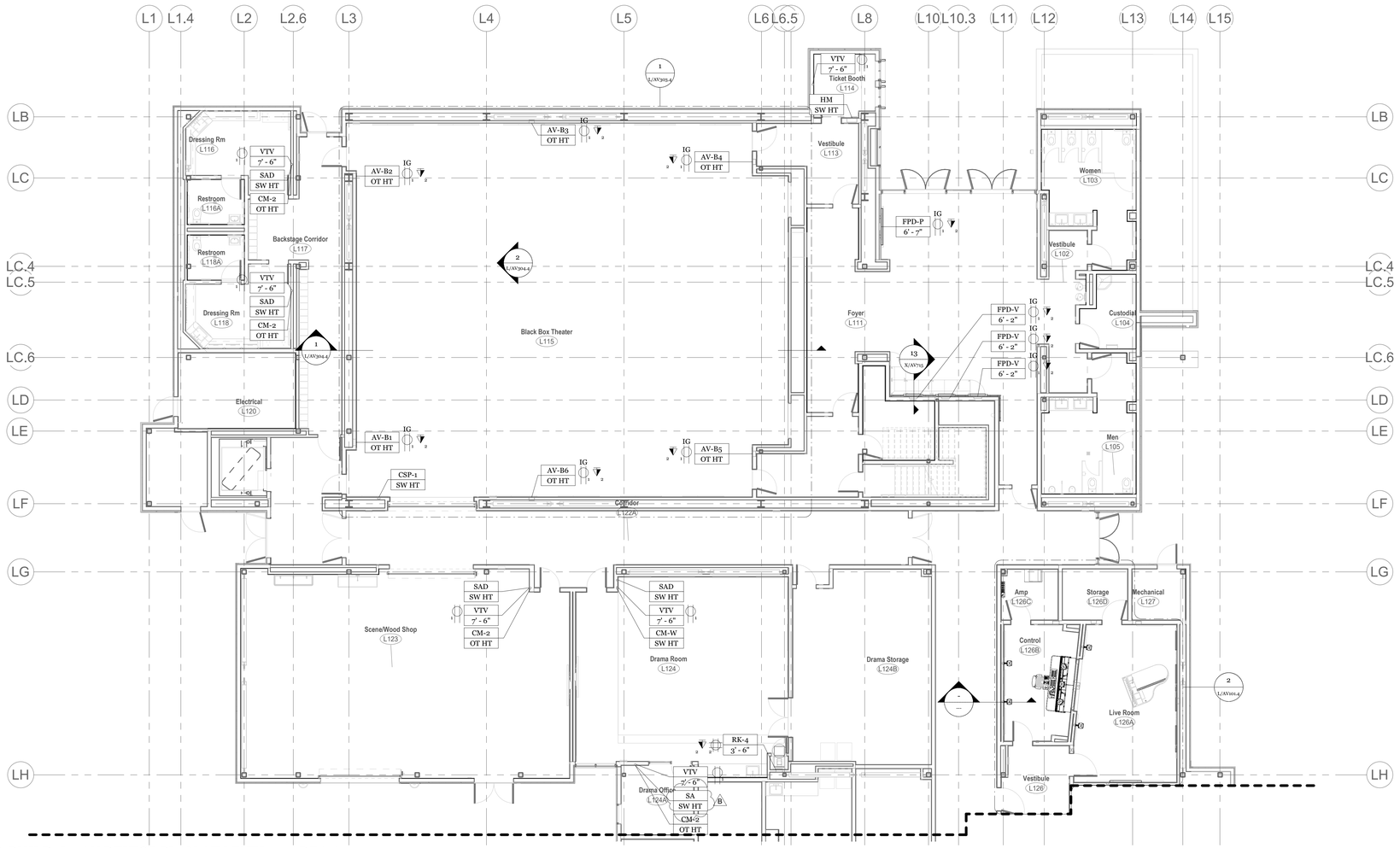
Revision

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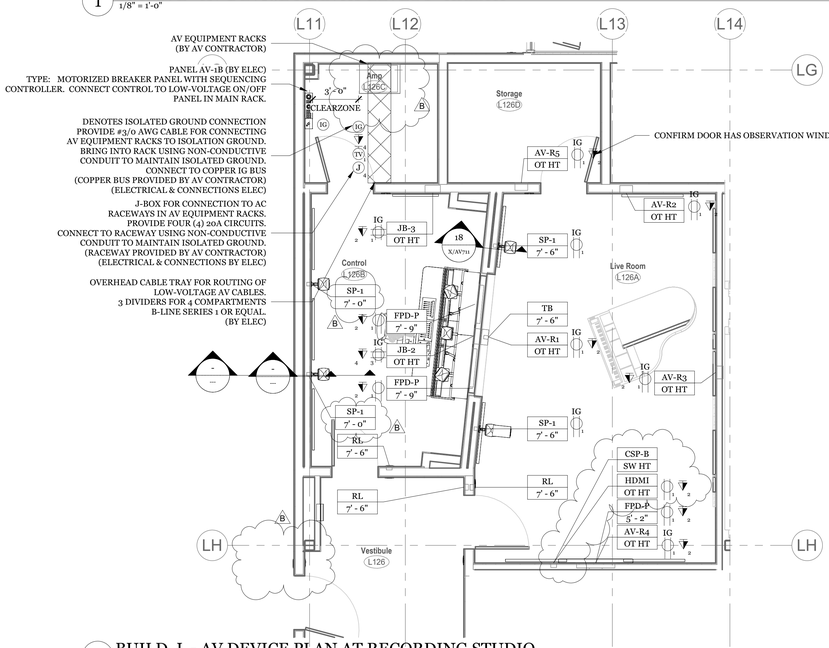
Designed By: IDH
Drawn By: GTEH
Checked By: STK
Reviewed By: IDH
Scale: 12" = 1'-0"
Project Number: 2771
Date: 08/11/23

AV003
AD8

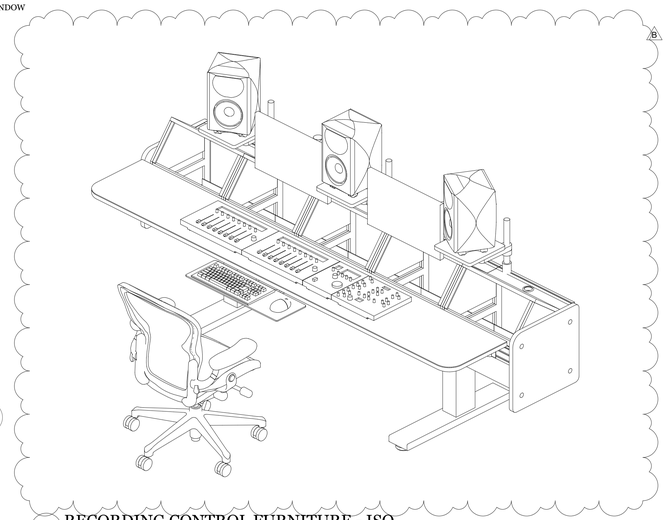
9/24/2026 7:09:56 AM
Autodesk Docs://Sanger High School/SangerHS - AV.rvt



1 BUILD. L - AV DEVICE PLAN AT LEVEL 1 - AREA A
1/8" = 1'-0"



2 BUILD. L - AV DEVICE PLAN AT RECORDING STUDIO
1/4" = 1'-0"



3 RECORDING CONTROL FURNITURE - ISO

AV SYMBOL KEY

DEVICE LOCATION
AV PANEL TYPE
XXX
X'-X"
MOUNTING CONDITION OR HEIGHT ABOVE IMMEDIATE FINISHED FLOOR BELOW TO CENTER OR BACKBOX

OT HT: PROJECT STANDARD OUTLET HEIGHT
SW HT: PROJECT STANDARD SWITCH HEIGHT
CLNG: CEILING MOUNTED

AUDIO
- AV-XX: CUSTOM AV PANEL & LOCATION
- MC-#: MICROPHONE INPUT & JACK QUANTITY
- FM: FM ASSISTIVE LISTENING ANTENNA
- WX: WIRELESS MICROPHONE ANTENNA
- TB: TALKBACK MICROPHONE

VIDEO
- V-#: VIDEO I/O & JACK QUANTITY
- VPJ: VIDEO PROJECTOR
- VTV: CATV OUTLET
- FPD-#: FLAT PANEL DISPLAY & TYPE
- PTZ: PAN TILT ZOOM CAMERA
- BCAST: BROADCAST CAMERA CONNECTION
- CAM: FIXED COURT CAMERA CONNECTION

LOUDSPEAKER
- LS-#: LOUDSPEAKER & JACK QUANTITY
- SAD: DIGITAL VOLUME CONTROL
- SC: CEILING MOUNT 70V LOUDSPEAKER
- SHC: HIGH CEILING MOUNT 70V LOUDSPEAKER
- SHP: PENDANT MOUNT 70V LOUDSPEAKER
- SP-#: SELF-POWERED LOUDSPEAKER & JACK QUANTITY

INTERCOM
- CM-#: INTERCOM OUTLET & JACK QUANTITY
- CM-W: INTERCOM WALL STATION
- HM: HOUSE MANAGER PANEL

CONTROL
- CSP-#: REMOTE CONTROL PANEL & TYPE
- SCRC: MOTORIZED ROLL-DOWN SCREEN CONTROL
- LCC: LIGHTING CONTROL CONNECTION

OTHER
- JB-#: JUNCTION BOX & TYPE
- RK-#: EQUIPMENT RACK & LOCATION
- RL: "RECORDING" LIGHT

LOOSE CONNECTION TO PANEL
AV EQUIPMENT TYPE
XXX
XXX
MOUNTING CONDITION

AUDIO
- MIC: MICROPHONE

VIDEO
- PTZ: PAN TILT ZOOM CAMERA
- VCAM: VIDEO CAMERA
- VDWL: VIDEO WALL

LOUDSPEAKER
- LS: LOUDSPEAKER
- SUB: SUBWOOFER
- SP: SELF-POWERED LOUDSPEAKER
- PH: PAGING HORN

ELECTRICAL

IG — IG DUPLEX OUTLET, 120V / 20A & QTY (BY ELEC)
IG — IG QUAD OUTLET, 120V / DUAL 20A & QTY (BY ELEC)
DUPLEX OUTLET, 120V / 20A & QTY (BY ELEC)
QUAD OUTLET, DUAL 120V / 20A & QTY (BY ELEC)
SPECIALTY OUTLET & QTY (SEE DESCRIPTION) (BY ELEC)
J — JUNCTION BOX & QTY (SEE DESCRIPTION) (BY ELEC)
TV — BUILDING CATV OUTLET (SEE AV DRAWINGS)
TEL/DATA OUTLET & QTY (BY ELEC)
IG — ISOLATED GROUND CONNECTION (BY ELEC)

GENERAL NOTES

1. ALL AC OUTLETS, CONDUIT & BACKBOXES BY ELEC.
2. REQUIRED STRUCTURAL BACKING BY ARCH.
3. AV CONTRACTOR TO COORDINATE WITH ELEC TO DETERMINE EXACT LOCATION OF AV BACKBOXES.

DSA File No.:
10-H15

DSA Application No.:
02-119023

Agency Approval

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Project

Audio-Visual - Building L
AV DEVICE PLAN AT LEVEL 1
Drawing

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	100CD	12/15/22
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B	ADD 8	09/22/2026

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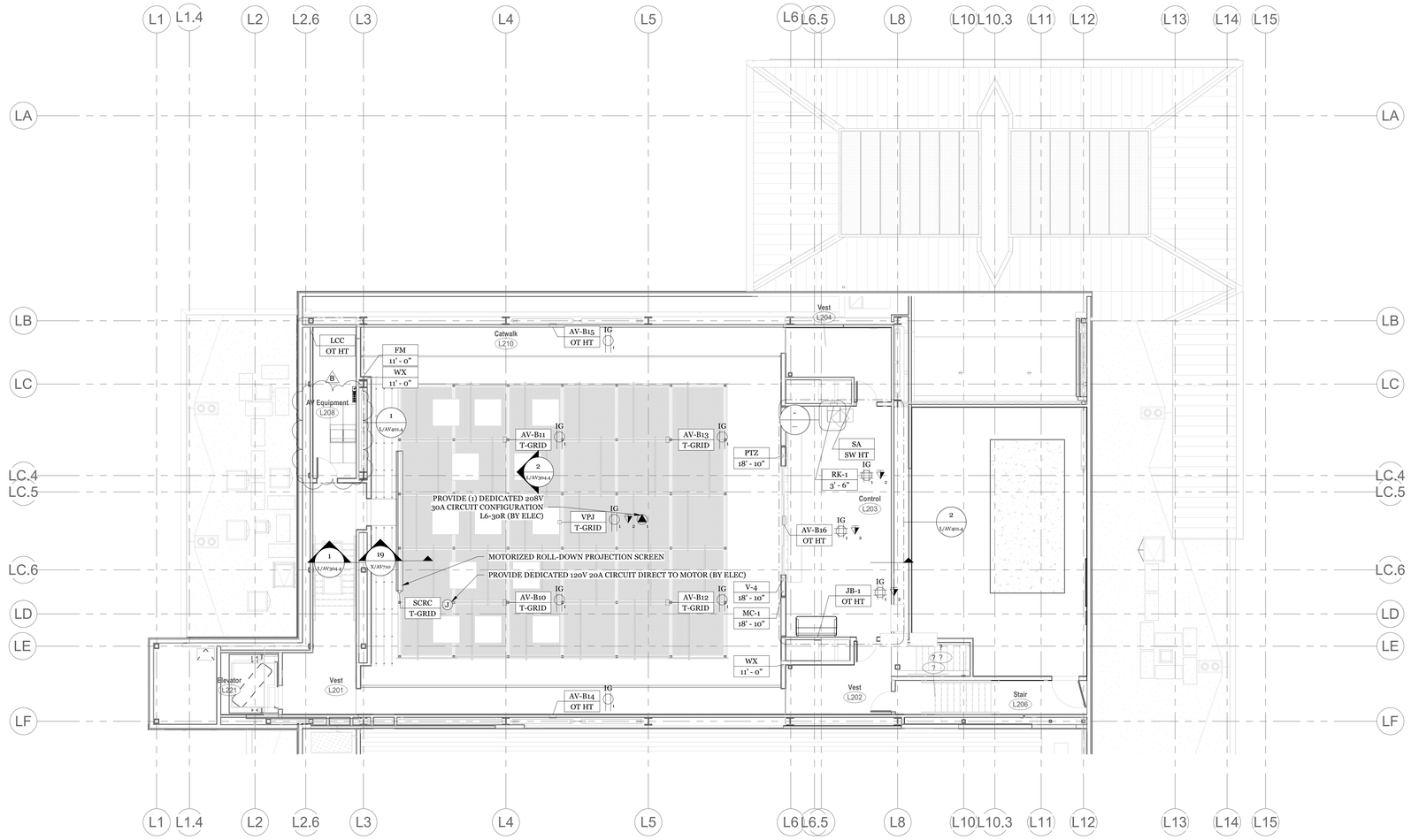
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1 BUILD. L - AV DEVICE PLAN AT LEVEL 2 - AREA A
1/8" = 1'-0"

AV SYMBOL KEY

DEVICE LOCATION
AV PANEL TYPE
XXX
X'-X"
MOUNTING CONDITION OR HEIGHT ABOVE IMMEDIATE FINISHED FLOOR BELOW TO CENTER OR BACKBOX

OT HT: PROJECT STANDARD OUTLET HEIGHT
SW HT: PROJECT STANDARD SWITCH HEIGHT
CLNG: CEILING MOUNTED

AUDIO
- AV-XX: CUSTOM AV PANEL & LOCATION
- MC-#: MICROPHONE INPUT & JACK QUANTITY
- FM: FM ASSISTIVE LISTENING ANTENNA
- WX: WIRELESS MICROPHONE ANTENNA
- TB: TALKBACK MICROPHONE

VIDEO
- V-#: VIDEO I/O & JACK QUANTITY
- VPJ: VIDEO PROJECTOR
- VTV: CATV OUTLET
- FPD-#: FLAT PANEL DISPLAY & TYPE
- PTZ: PAN TILT ZOOM CAMERA
- BCAST: BROADCAST CAMERA CONNECTION
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LOOSE CONNECTION TO PANEL
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XXX
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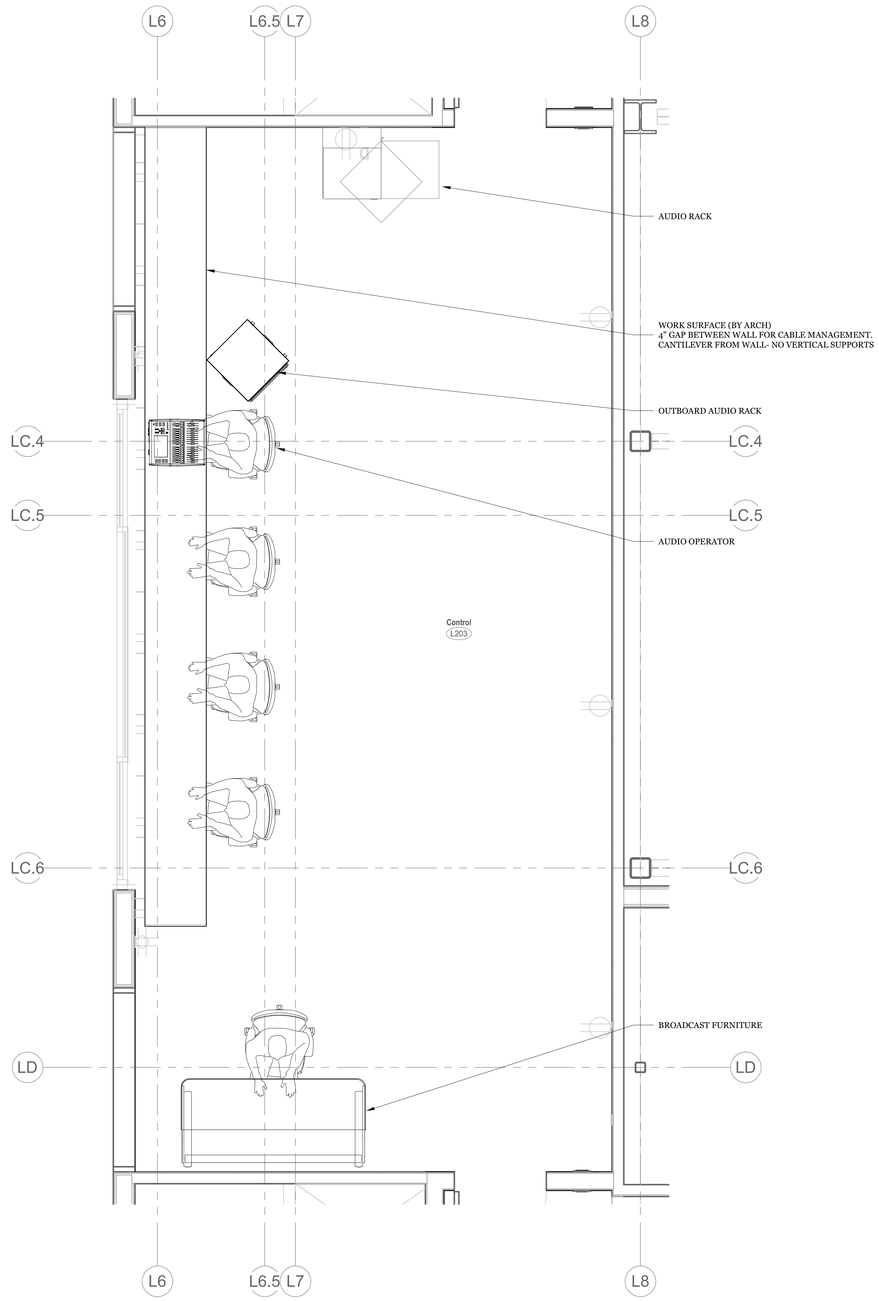
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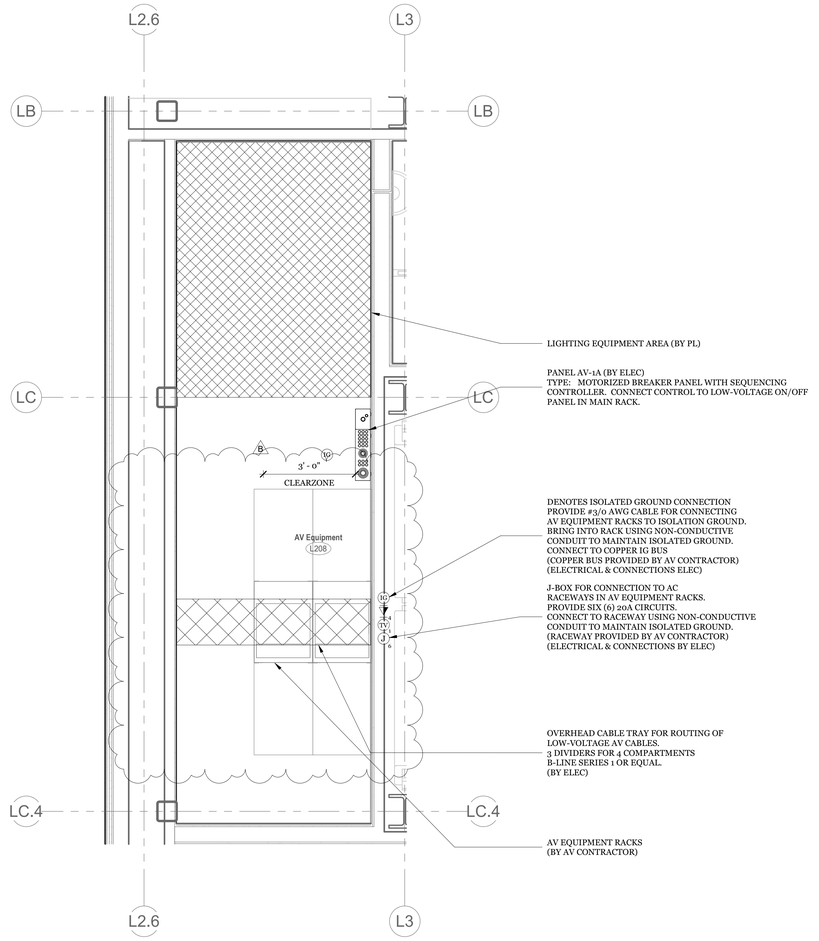
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2 BUILD. L - AV ENLARGED PLAN AT CONTROL 203
1/2" = 1'-0"



1 BUILD. L - AV ENLARGED PLAN AT AV 208
1/2" = 1'-0"

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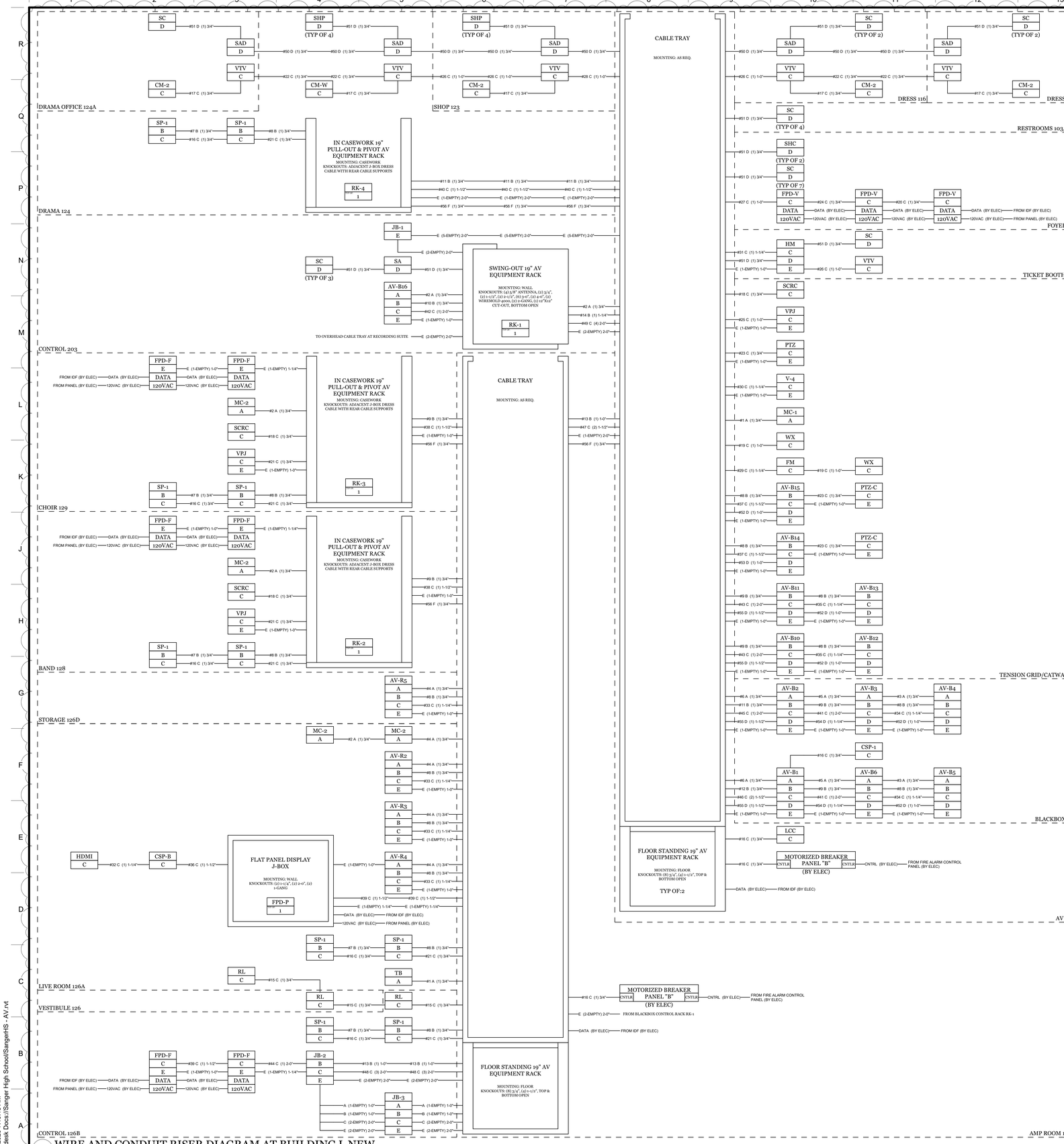
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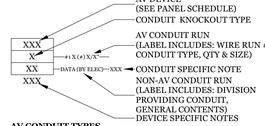
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1 WIRE AND CONDUIT RISER DIAGRAM AT BUILDING L NEW
NTS

AV WIRE & CONDUIT KEY



AV CONDUIT TYPES
A: MIC LEVEL
B: LINE LEVEL
C: VIDEO, NETWORK, & RF LEVEL
D: LOUDSPEAKER LEVEL
E: EMPTY CONDUIT
F: FIBER OPTIC LEVEL

NON-AV CONDUIT TYPES
120VAC: LINE VOLTAGE (BY ELEC)
208VAC: LINE VOLTAGE (BY ELEC)
DATA: BUILDING DATA (BY ELEC/TECH)
CATV: TELEVISION COAX (BY ELEC/TECH)
CNTRL: EXTERNAL CONTROL (BY ELEC/TECH/FA)

AV CONDUIT SIZES
3/4", 1-0", 1-1/4", 1-1/2", 2-0"

NOTES:
1. WIRES OF SIMILAR WIRETYPE CLASSIFICATION (A, B, C, D, E, OR F) MAY BE COMBINED INTO A SINGLE CONDUIT.
2. MINIMUM CONDUIT SIZE IS 3/4".
3. ALL CONDUITS ARE DRAWN ASSUMES DRY CABLE. IF WET CABLE MUST BE USED RECALCULATE CONDUIT SIZE.
4. ALL CONDUIT SIZES TO BE VERIFIED IN WRITING BY AV CONTRACTOR WITHIN 30 DAYS OF CONTRACT AWARD.
5. ALL CONDUIT & BACKBOXES BY ELEC.
6. FOLLOW CONDUIT SEPARATION TABLES AS INDICATED ON KEY SHEET & IN SPECIFICATIONS.
7. INCREASE CONDUIT TO NEXT SIZE UP FOR RUNS GREATER THAN 50'-0" WITHOUT A JUNCTION BOX.
8. SEE WIRE SCHEDULE FOR CONDUIT CONTENTS

WIRE SCHEDULE

CONDUIT RUN #	CONDUIT TYPE	A1 QTY	B1 QTY	C2 QTY	C5 QTY	C7 QTY	C8 QTY	C9 QTY	C10C QTY	C12 QTY	HDMI	D2 QTY	D3 QTY	D4 QTY	F3 QTY
1	A	1													
2	A	2													
3	A	3													
4	A	4													
5	A	6													
6	A	9													
7	B		1												
8	B		2												
9	B		4												
10	B		5												
11	B		6												
12	B		8												
13	B		16												
14	B		28												
15	C			0	0	1	0	0	0	0	0				
16	C			0	1	0	0	0	0	0	0				
17	C			1	0	0	0	0	0	0	0				
18	C			0	0	0	1	0	0	0	0				
19	C			0	0	0	0	0	0	1	0				
20	C			0	1	0	0	1	0	0	0				
21	C			0	2	0	0	0	0	0	0				
22	C			1	0	0	0	1	0	0	0				
23	C			0	1	1	0	0	1	0	0				
24	C			0	2	0	0	1	0	0	0				
25	C			0	2	0	0	0	1	0	0				
26	C			2	0	0	0	1	0	0	0				
27	C			0	3	0	0	1	0	0	0				
28	C			3	0	0	0	1	0	0	0				
29	C			0	0	0	0	0	0	2	0				
30	C			0	1	1	0	0	3	0	0				
31	C			1	3	0	0	1	0	0	0				
32	C			0	0	0	0	0	0	0	1				
33	C			0	6	0	0	0	0	0	0				
34	C			1	2	0	0	1	2	0	0				
35	C			1	3	0	0	0	2	0	0				
36	C			0	1	1	0	0	0	0	1				
37	C			1	4	1	0	0	3	0	0				
38	C			1	4	0	0	0	4	0	0				
39	C			0	1	0	0	0	0	0	1				
40	C			0	6	0	0	0	4	0	0				
41	C			2	4	0	0	2	4	0	0				
42	C			2	5	0	0	1	4	0	0				
43	C			2	6	0	0	0	4	0	0				
44	C			0	2	0	0	0	0	0	2				
45	C			3	6	0	0	3	6	0	0				
46	C			3	10	0	0	3	8	0	0				
47	C			2	16	0	0	0	8	0	0				
48	C			0	5	0	0	0	0	5	0				
49	C			3	33	0	1	1	15	2	0				
50	D											0	0	1	
51	D											0	1	0	
52	D											2	0	0	
53	D											3	0	0	
54	D											4	0	0	
55	D											6	0	0	
56	F														1

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AV WIRE & CONDUIT RISER DIAGRAM
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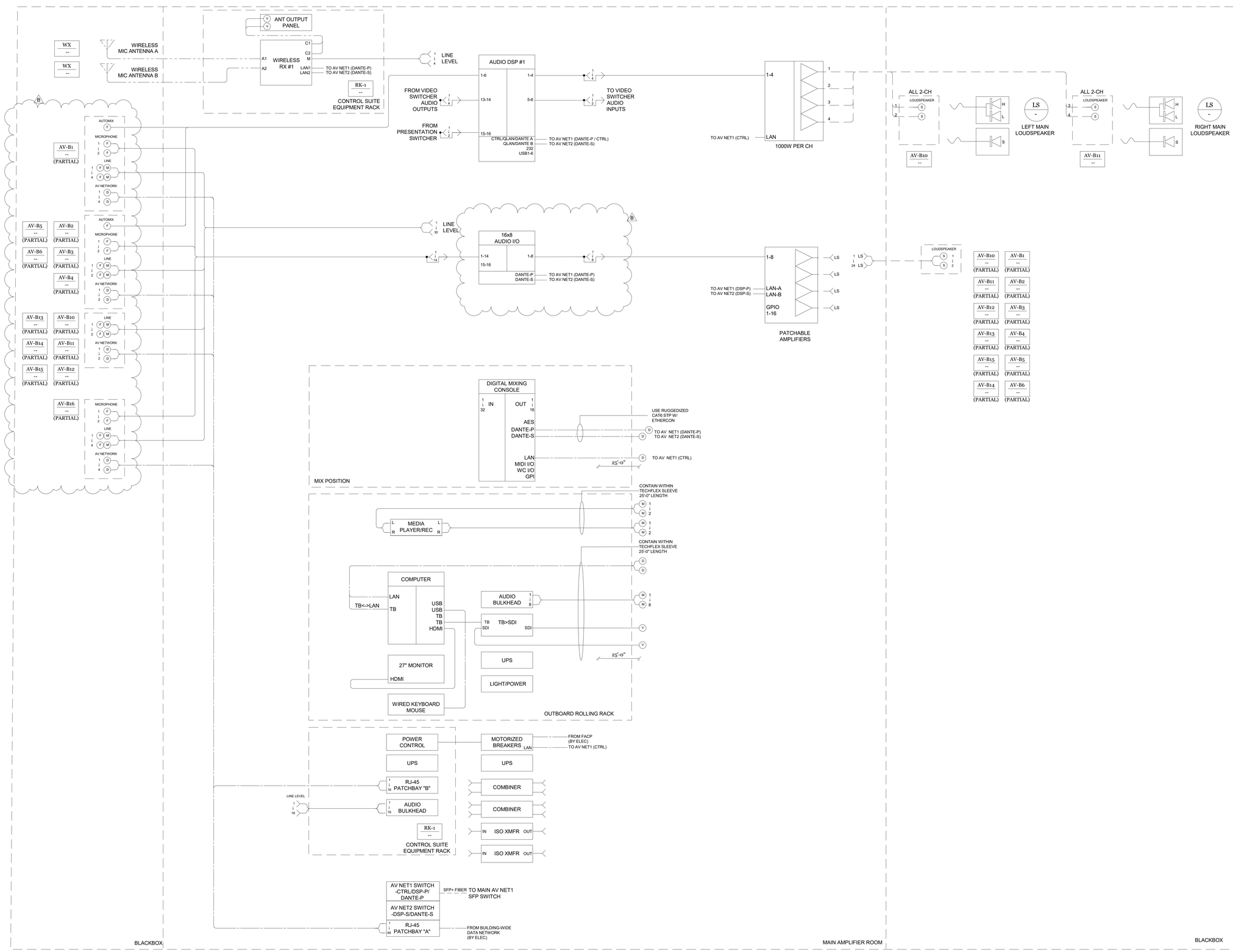
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1 AUDIO BLOCK DIAGRAM AT BLACKBOX
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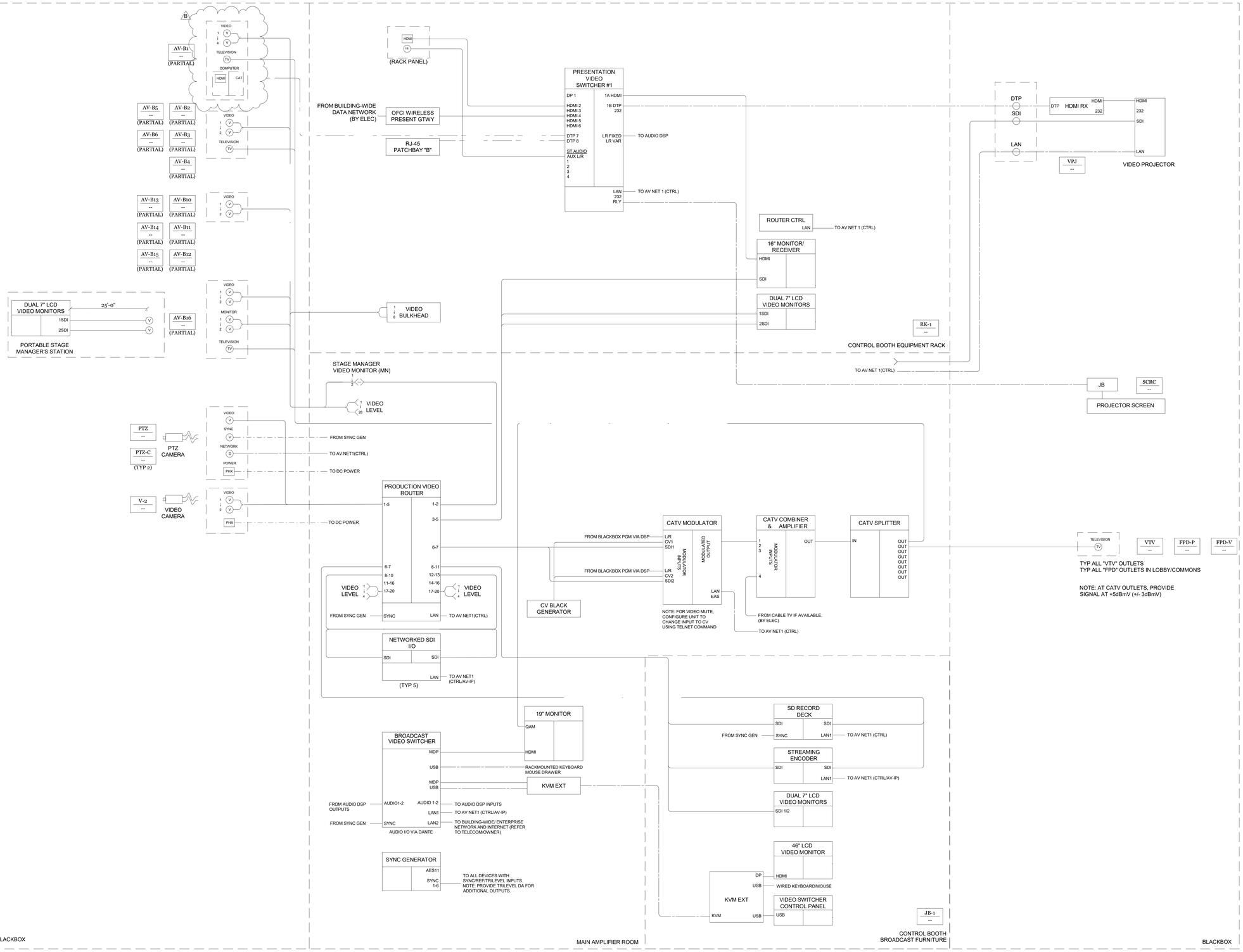
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1 VIDEO BLOCK DIAGRAM AT BLACKBOX
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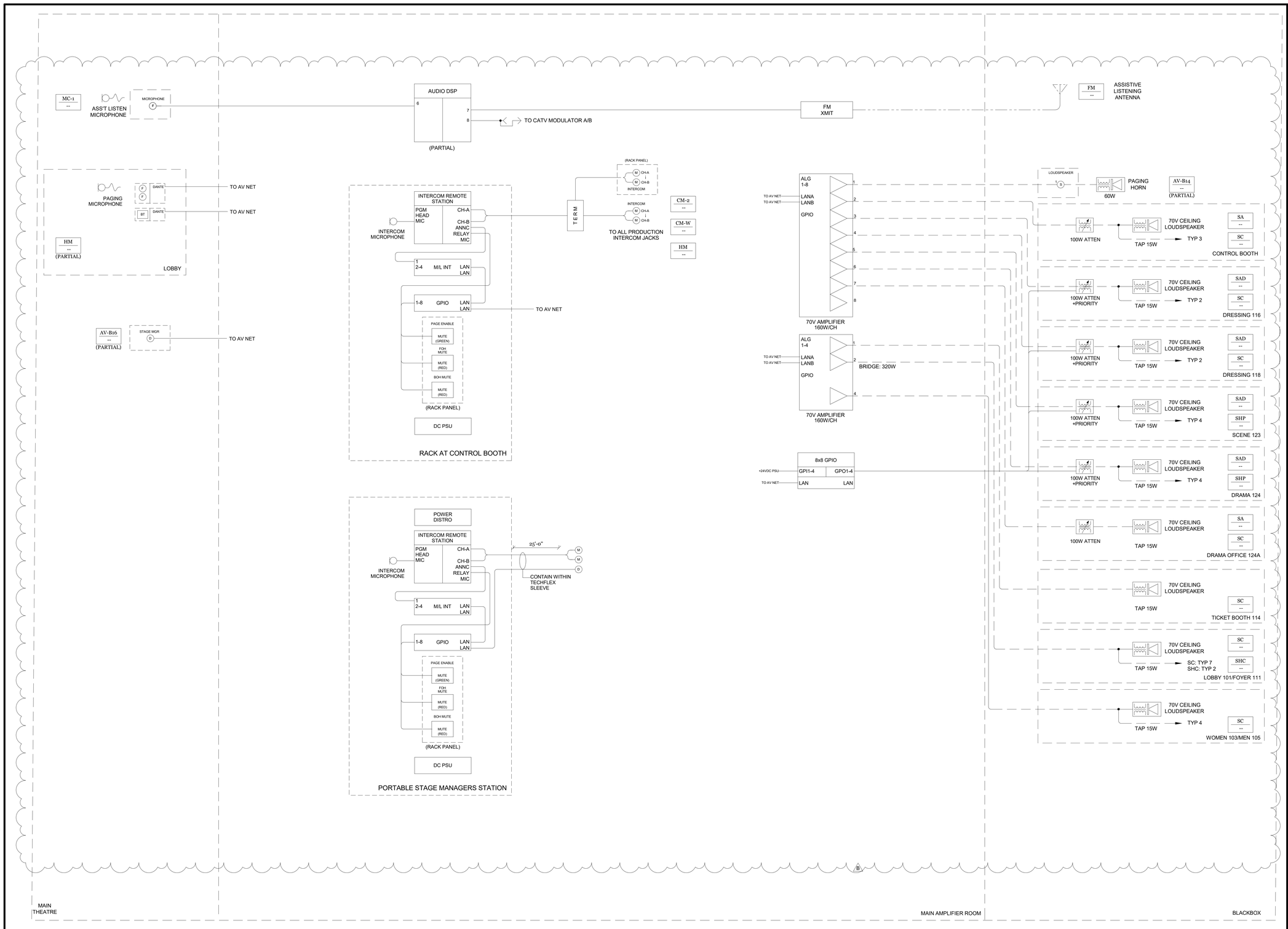
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1 PROGRAM/PAGING BLOCK DIAGRAM AT BLACKBOX
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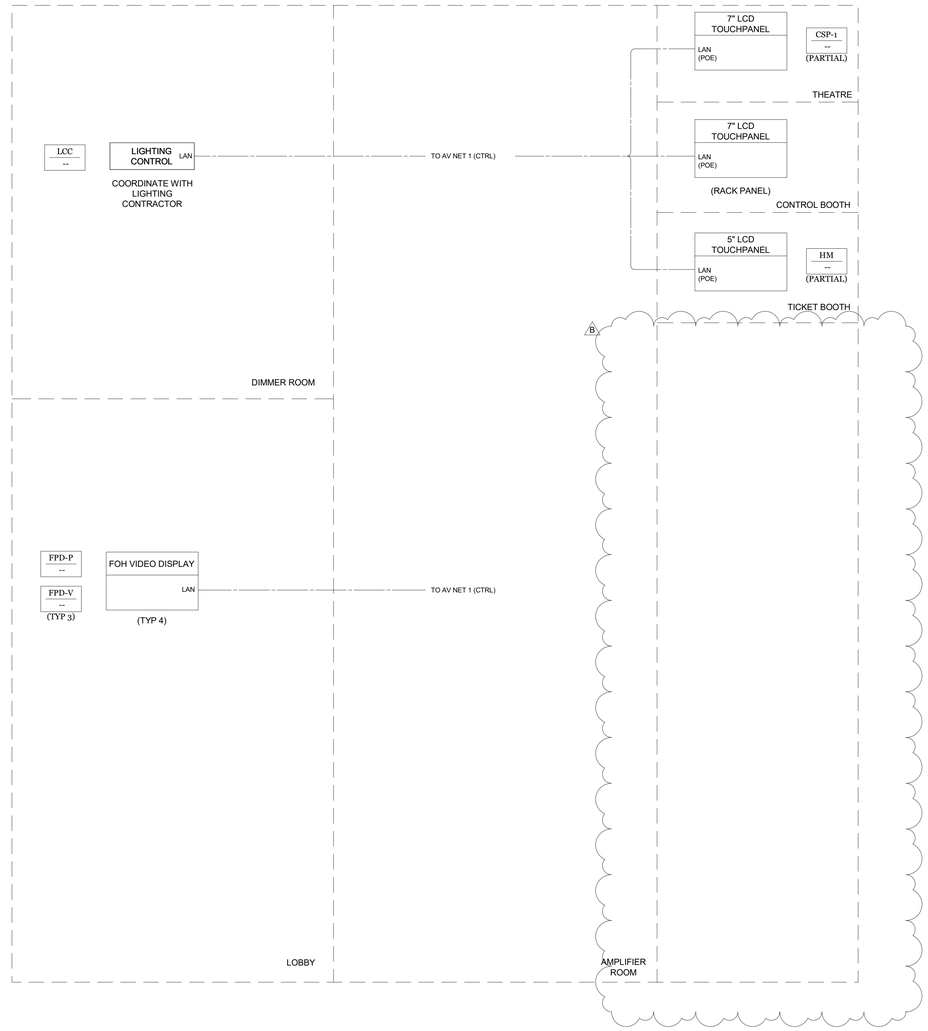
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1 CONTROL BLOCK DIAGRAM AT BLACKBOX
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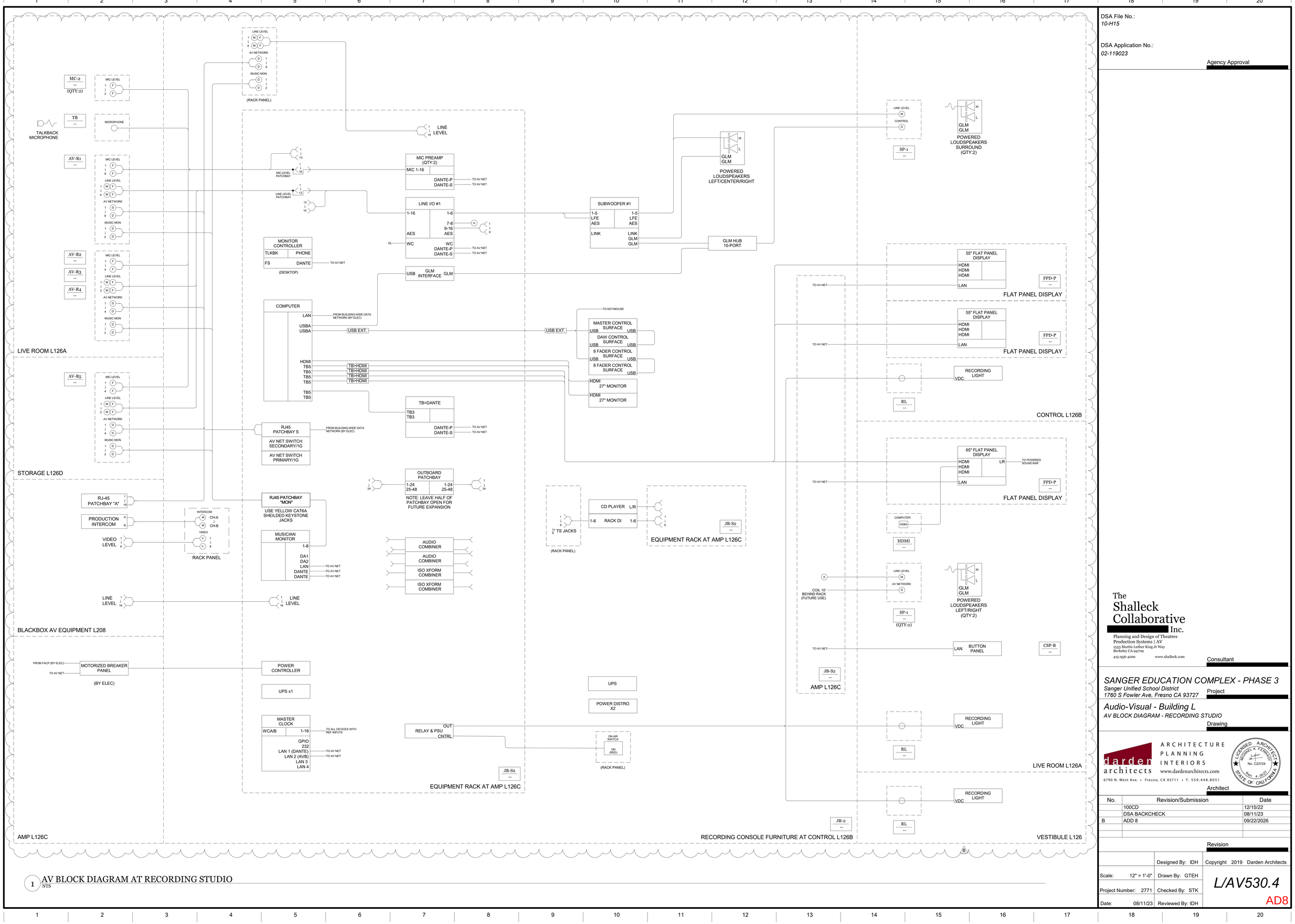
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1 AV BLOCK DIAGRAM AT RECORDING STUDIO
NTS

DSA File No.:
10-H15

DSA Application No.:
02-119023

Agency Approval

The Shalleck Collaborative Inc.
Planning and Design of Theatres
Production Systems | AV
1553 Martin Luther King Jr Way
Berkeley CA 94709
415-956-4100 www.shalleck.com

Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727

Project

Audio-Visual - Building L
AV BLOCK DIAGRAM - RECORDING STUDIO

Drawing

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LICENSED ARCHITECT RICHARD K. FERNO No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
	100CD	12/15/22
	DSA BACKCHECK	08/11/23
B	ADD 8	09/22/2026

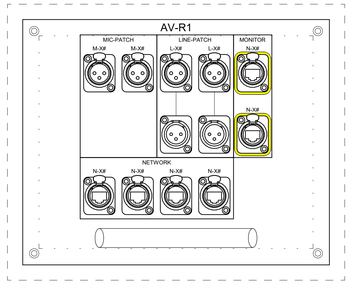
Revision

	Designed By: IDH	Copyright 2019 Darden Architects
Scale: 12" = 1'-0"	Drawn By: GTEH	*L/AV530.4*
Project Number: 2771	Checked By: STK	AD8
Date: 08/11/23	Reviewed By: IDH	

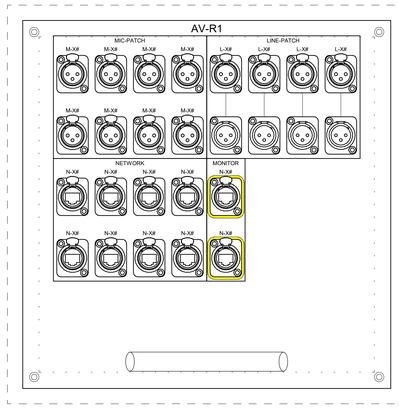
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9 AV PANEL CSP-1
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



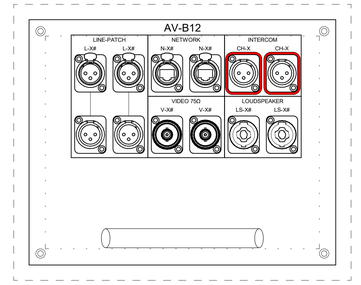
8 AV PANEL AV-R2,3,4
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



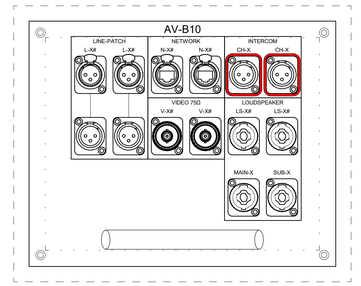
7 AV PANEL AV-R1
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.

6 AV PANEL AV-B14
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.

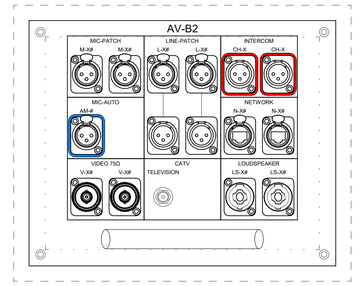
5 AV PANEL AV-B16
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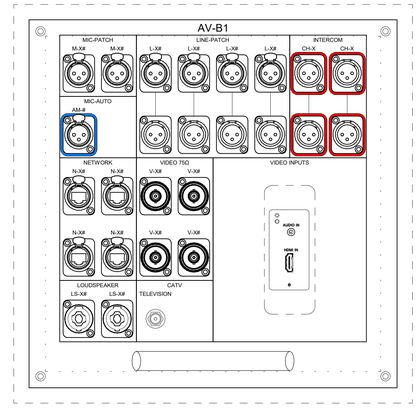
4 AV PANEL AV-B12,13,15
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



3 AV PANEL AV-B10,11
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



2 AV PANEL AV-B2,3,4,5,6
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



1 AV PANEL AV-B1
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.

GENERAL NOTES

1. ALL AC OUTLETS, CONDUIT & BACKBOXES BY ELEC.
2. REQUIRED STRUCTURAL BACKING BY ARCH.
3. AV CONTRACTOR TO COORDINATE WITH ELEC TO DETERMINE EXACT LOCATION OF AV BACKBOXES.

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Reviewed By: IDH

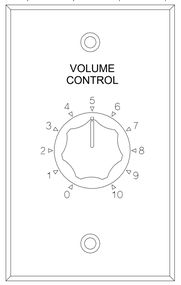
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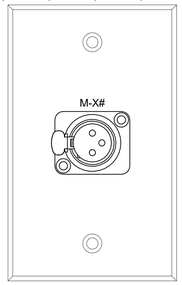
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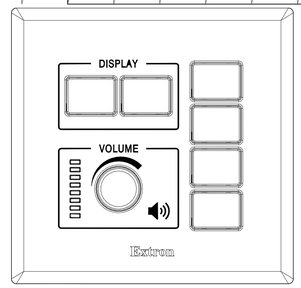
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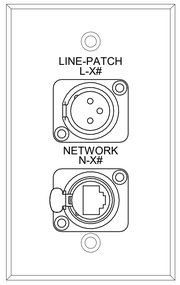
12 AV PANEL SA,SAD
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



8 AV PANEL MC-1
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



5 AV PANEL CSP-B
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



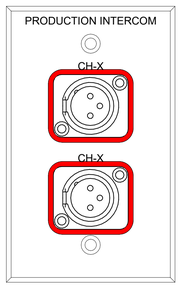
16 AV PANEL SP-1
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



15 AV PANEL WX
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



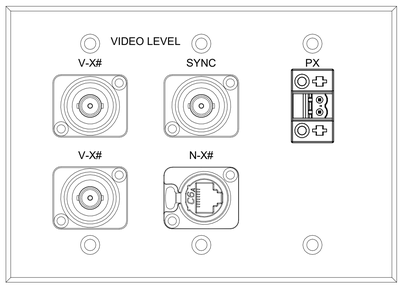
3 AV PANEL FM
12" = 1'-0"
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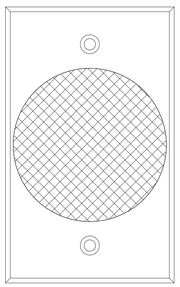
17 AV PANEL CM-2
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



14 AV PANEL VTV
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



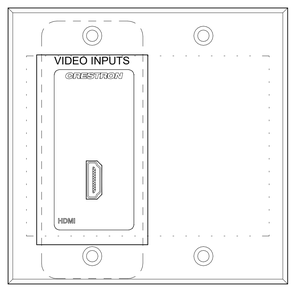
2 AV PANEL V-4
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



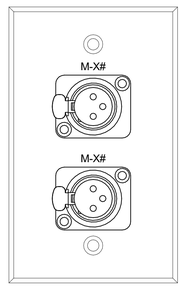
19 AV PANEL TB
12" = 1'-0"



13 AV PANEL V-1
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



4 AV PANEL HDMI
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



1 AV PANEL MC-2
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.

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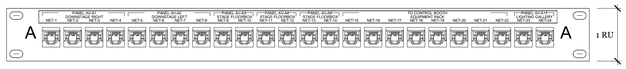
Revision

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Scale: 12" = 1'-0"	Drawn By: GTEH	*X/AV702*
Project Number: 2771	Checked By: STK	
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GENERAL NOTES

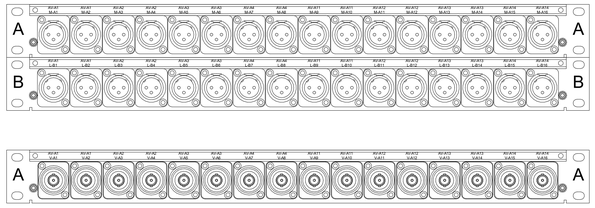
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NOTES:
- SEE SPECIFICATIONS FOR FURTHER INFO ON TERMINATION, GROUNDING, ETC.
- NUMBER SIGNAL TYPES SEQUENTIALLY. FIELD PLATE LEGENDS SHALL EXACTLY MATCH PATCHBAY.

11 TYPICAL NETWORK PATCHBAY
6" = 1'-0"

THIS ITEM WEIGHS LESS THAN 20 LBS.

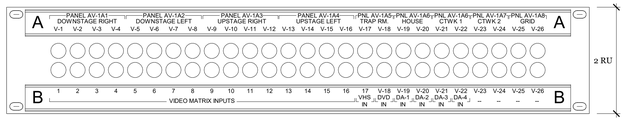


10 RACK PANEL XLR & BNC BULKHEAD PATCHBAY
6" = 1'-0"

THIS ITEM WEIGHS LESS THAN 20 LBS.



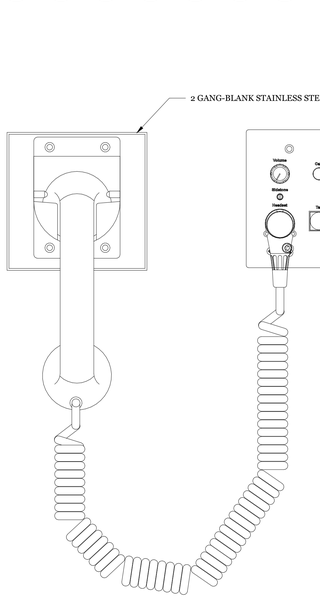
9 WIRELESS MICROPHONE ANTENNA CONNECTION PANEL
6" = 1'-0"



NOTES:
- USE PAPER LEGENDS. PROVIDE COMPUTER FILE TO USER FOR FUTURE MODIFICATIONS.
- DENOTE NORMALS WITH HORIZONTAL LINE ABOVE & BELOW AT LEGEND (AS SHOWN ABOVE).
- SEE SPECIFICATIONS FOR FURTHER INFO ON TERMINATION, GROUNDING, ETC.
- NUMBER SIGNAL TYPES SEQUENTIALLY. FIELD PLATE LEGENDS SHALL EXACTLY MATCH PATCHBAY.

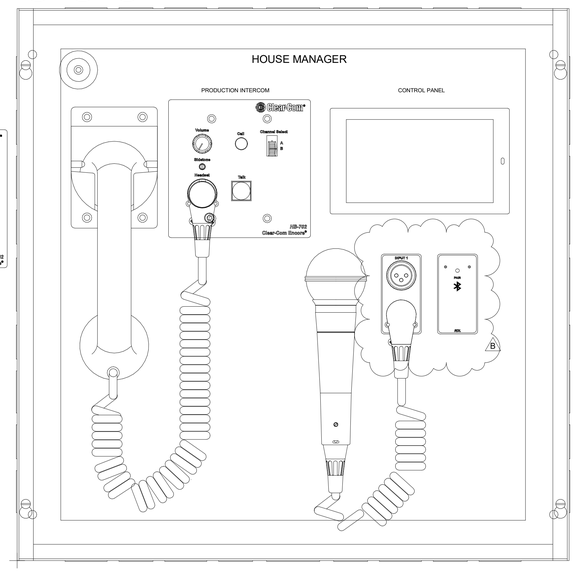
8 TYPICAL VIDEO PATCHBAY
6" = 1'-0"

THIS ITEM WEIGHS LESS THAN 20 LBS.



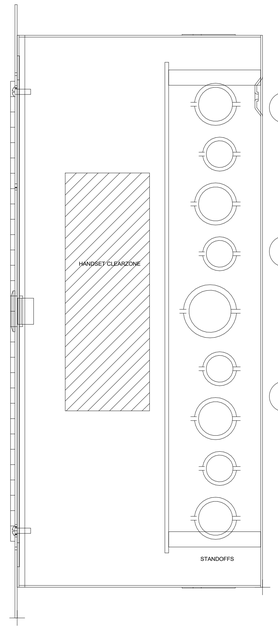
12 AV PANEL CM-W
6" = 1'-0"

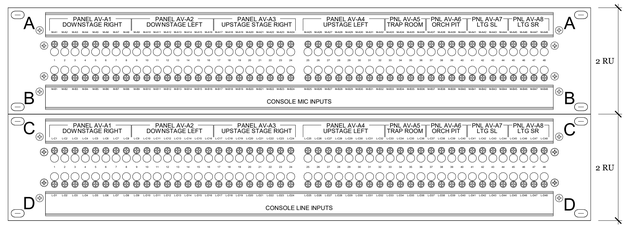
THIS ITEM WEIGHS LESS THAN 20 LBS.



7 AV PANEL HM
6" = 1'-0"

THIS ITEM WEIGHS LESS THAN 20 LBS.

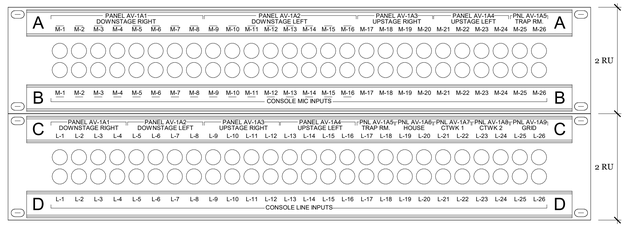




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6 TYPICAL MIC / LINE PATCHBAY
6" = 1'-0"

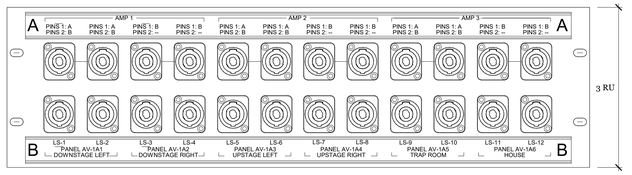
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5 TYPICAL MIC / LINE PATCHBAY
6" = 1'-0"

THIS ITEM WEIGHS LESS THAN 20 LBS.



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4 TYPICAL LOUDSPEAKER PATCHBAY
6" = 1'-0"

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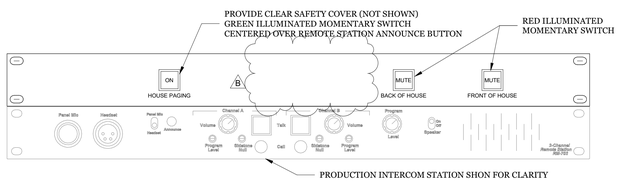


3 PRODUCTION INTERCOM RACK PANEL
6" = 1'-0"

THIS ITEM WEIGHS LESS THAN 20 LBS.



2 LOCAL VIDEO INPUT PANEL
6" = 1'-0"



1 CUSTOM PAGING RACK PANEL
6" = 1'-0"

THIS ITEM WEIGHS LESS THAN 20 LBS.

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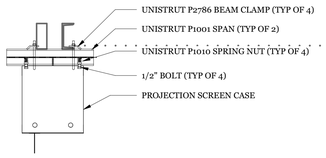
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Drawn By: GTEH
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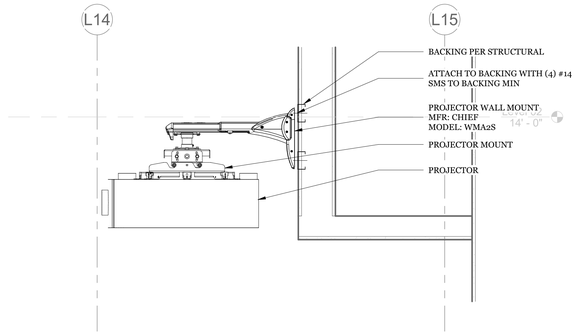
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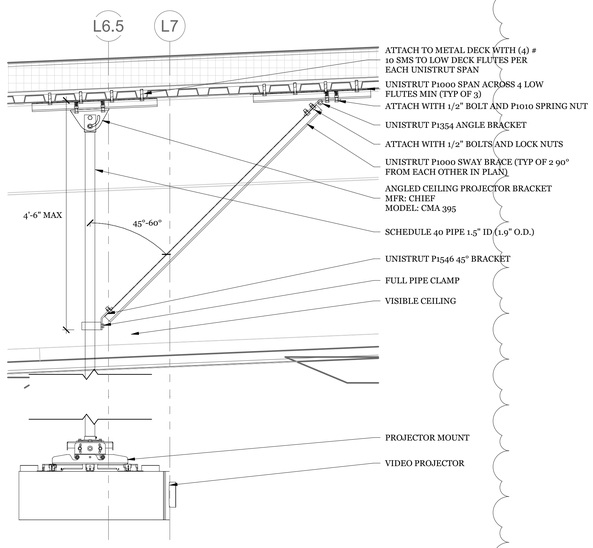
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19 PROJECTION SCREEN AT BLACKBOX MOUNTING
1" = 1'-0"
MAX TOTAL WEIGHT: 650 LBS.



15 PROJECTOR AT CHOIR MOUNTING
1" = 1'-0"
MAX TOTAL WEIGHT: 70 LBS.



13 PROJECTION AT BAND MOUNTING
1" = 1'-0"
MAX TOTAL WEIGHT: 70 LBS.

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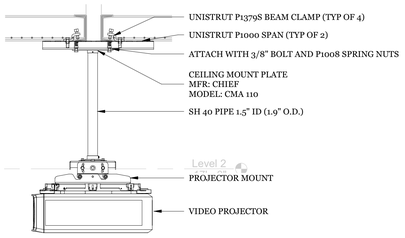
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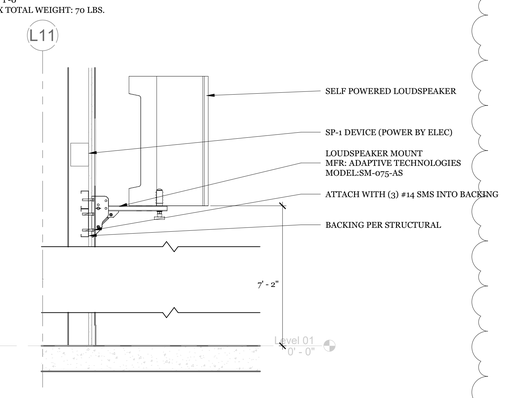
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1 PROJECTOR AT BLACKBOX MOUNTING

1" = 1'-0"

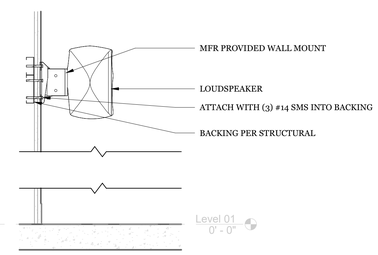
MAX TOTAL WEIGHT: 70 LBS.



19 LOUDSPEAKER AT MUSIC ROOMS MOUNTING

1" = 1'-0"

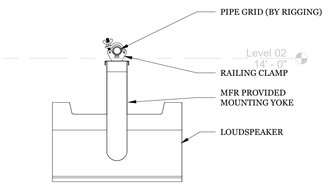
MAX TOTAL WEIGHT: 50 LBS.



18 LOUDSPEAKER AT LIVE ROOM MOUNTING

1" = 1'-0"

MAX TOTAL WEIGHT: 20 LBS.



17 LOUDSPEAKER AT DRAMA ROOM

1" = 1'-0"

MAX TOTAL WEIGHT: 50 LBS.

DSA File No.:
10-H15

DSA Application No.:
02-119023

Agency Approval

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Collaborative
Inc.
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415-956-4100 www.shalleck.com

Consultant

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Project

Audio-Visual - Details
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LICENSED ARCHITECT
MICHAEL K. FENN
No. C23724
Exp. 4-30-27
STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
	100CD	12/15/22
	DSA BACKCHECK	08/11/23
B	ADD 8	09/22/2026

Revision

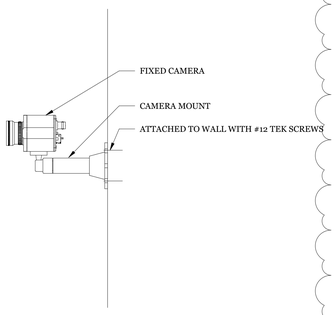
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Drawn By: GTEH
Checked By: STK
Reviewed By: IDH

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Scale: 1" = 1'-0"
Project Number: 2771
Date: 08/11/23

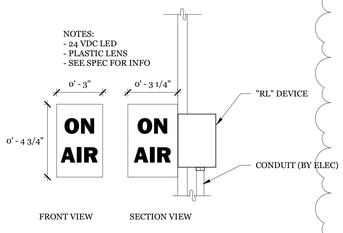
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9/24/2026 7:10:15 AM
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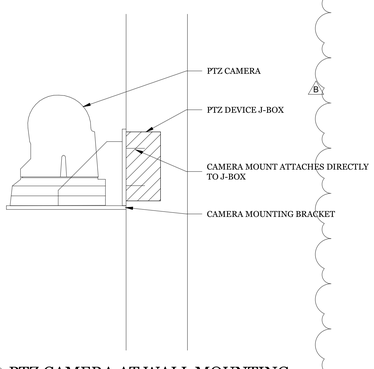
20 V-2 FIXED VIDEO CAMERA MOUNTING

3" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



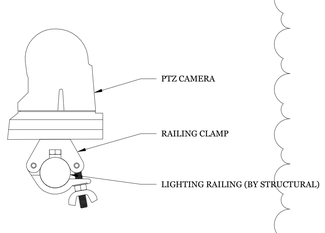
19 ANCHORAGE DETAIL

3" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



18 PTZ CAMERA AT WALL MOUNTING

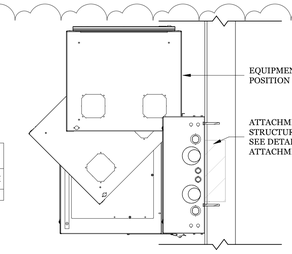
3" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



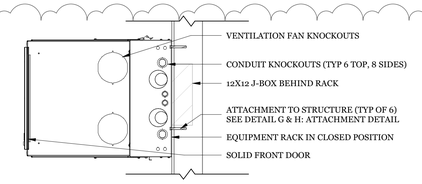
17 PTZ CAMERA AT RAILING MOUNTING

3" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.

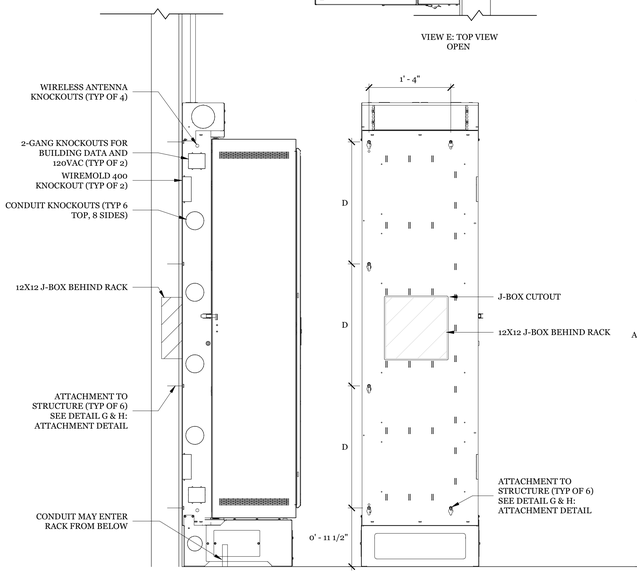
SWING-OUT AV RACKS				
LOCATION	MODEL	"A"OVERALL HEIGHT	"B" OVERALL WIDTH	"C" OVERALL DEPTH
CONTROL 203	SR-46-28	8' - 5 1/4"	1' - 11 9/16"	2' - 4 11/32"



VIEW E: TOP VIEW OPEN



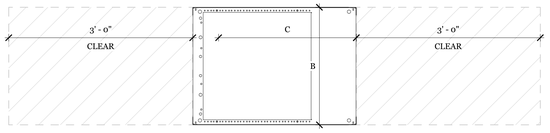
VIEW F: TOP VIEW CLOSED



VIEW D: SIDE VIEW 2 | VIEW A: FRONT VIEW BACKPAN ONLY | VIEW B: FRONT VIEW WITH DOOR | VIEW C: SIDE VIEW2

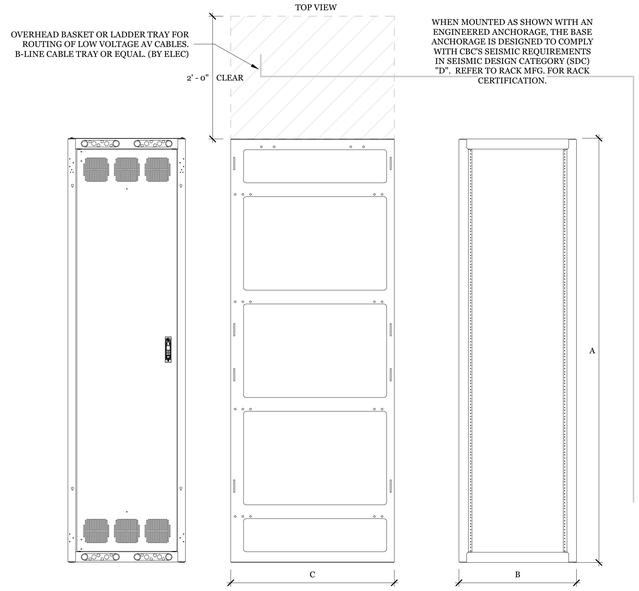
2 WALL MOUNTED SWING-OUT EQUIPMENT RACK DETAIL

1" = 1'-0"
EMPTY WEIGHT: 270 LB?
EQUIPMENT WEIGHT: 335 LBS.
TOTAL MAX WEIGHT: 605 LBS.

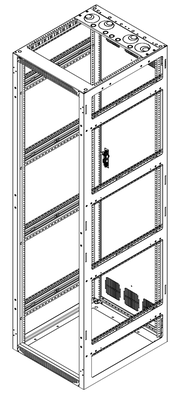


TOP VIEW

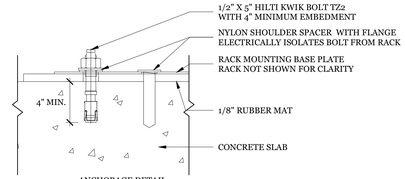
FIXED AV RACKS (BGR)					
LOCATION	QTY	MODEL	"A"OVERALL HEIGHT	"B" OVERALL WIDTH	"C" OVERALL DEPTH
AMP 126C	1	BGR-4532	6' - 10 7/8"	1' - 11"	2' - 8"
AV 208	2	BGR-4532	6' - 10 7/8"	1' - 11"	2' - 8"



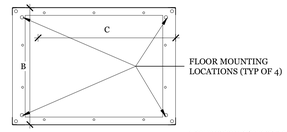
REAR VIEW | SIDE VIEW (PANELS OMITTED FOR CLARITY) | FRONT VIEW (DOOR OMITTED FOR CLARITY)



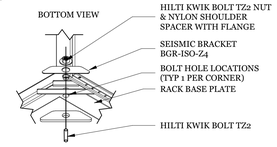
ISOMETRIC VIEW (NOT TO SCALE)



ANCHORAGE DETAIL SCALE: 6" = 1'-0"



BOTTOM VIEW



CORNER ISOMETRIC VIEW (NOT TO SCALE)

1 FLOOR MOUNTED STANDING EQUIPMENT RACK DETAIL

1" = 1'-0"
EMPTY WEIGHT: 320 LBS.
EQUIPMENT WEIGHT: 980 LBS.
TOTAL MAX WEIGHT: 1200 LBS.

GENERAL NOTES

1. ALL AC OUTLETS, CONDUIT & BACKBOXES BY ELEC.
2. REQUIRED STRUCTURAL BACKING BY ARCH.
3. AV CONTRACTOR TO COORDINATE WITH ELEC TO DETERMINE EXACT LOCATION OF AV BACKBOXES.

DSA File No.:
10-H15

DSA Application No.:
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Agency Approval

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Architect

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B	ADD 8	09/22/2026

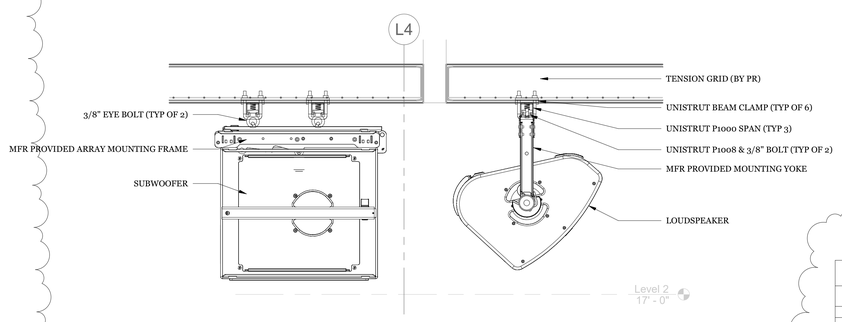
Revision

Designed By: IDH
Drawn By: GTEH
Checked By: STK
Reviewed By: IDH
Scale: As indicated
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Date: 08/11/23

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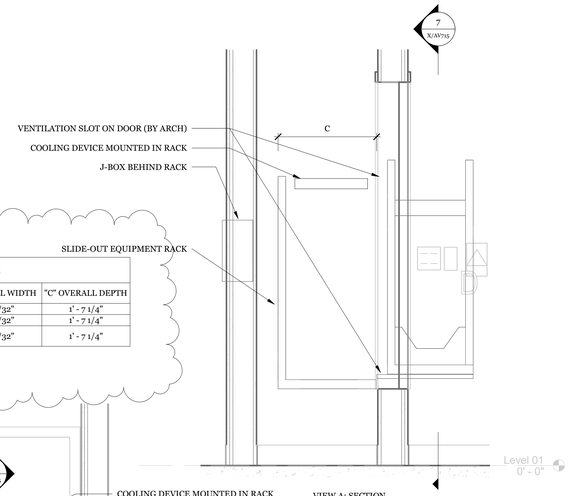
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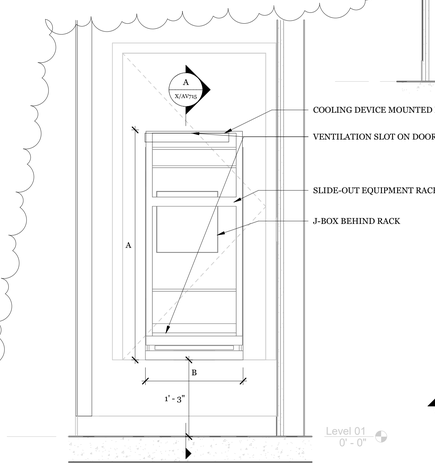
16 LOUDSPEAKER AT BLACKBOX MOUNTING

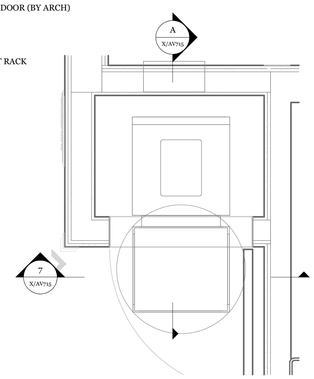
1 1/2" = 1'-0"
SUBWOOFER MAX TOTAL WEIGHT: 80 LBS.
LOUDSPEAKER MAX TOTAL WEIGHT: 80 LBS.

SLIDE-OUT AV EQUIPMENT RACK				
LOCATION	MODEL	"A"OVERALL HEIGHT	"B" OVERALL WIDTH	"C" OVERALL DEPTH
BAND 128	SRSR-4-24	3' - 9"	1' - 7 3/32"	1' - 7 1/4"
CHOIR 129	SRSR-4-24	3' - 9"	1' - 7 3/32"	1' - 7 1/4"
DRAMA ROOM 124	SRSR-4-24	3' - 9"	1' - 7 3/32"	1' - 7 1/4"



VIEW A: SECTION

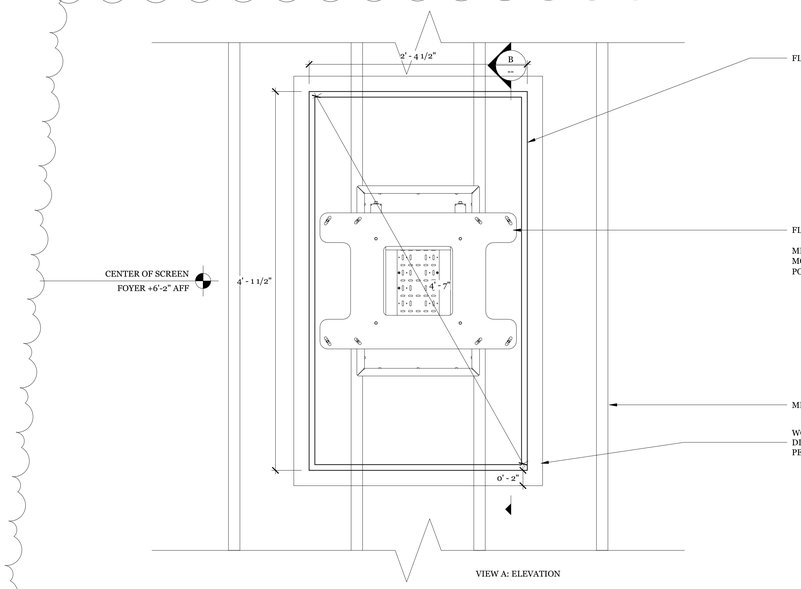




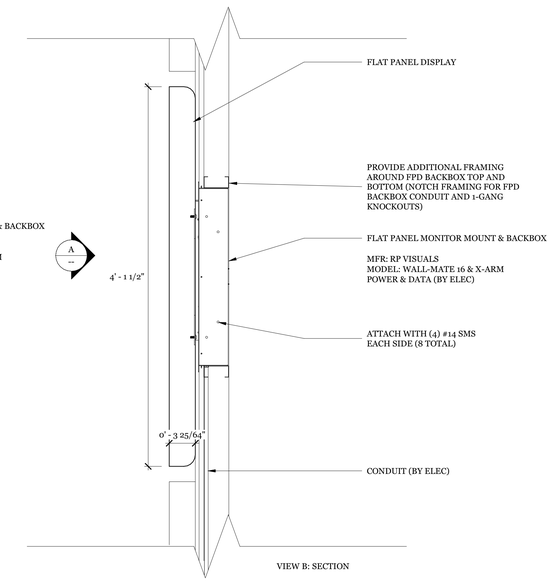
VIEW B: PLAN

7 SRSR EQUIPMENT RACK MOUNTING

1" = 1'-0"
EMPTY WEIGHT: 70 LBS.
EQUIPMENT WEIGHT: 130 LBS.
TOTAL MAX WEIGHT: 250 LBS.



VIEW A: ELEVATION



VIEW B: SECTION

13 FPD-V FLAT PANEL DISPLAY MOUNTING

1 1/2" = 1'-0"
MAX TOTAL WEIGHT: 125 LBS.

DSA File No.:
10-H15

DSA Application No.:
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Agency Approval

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	DSA BACKCHECK	08/11/23
B	ADD 8	09/22/2026

Revision

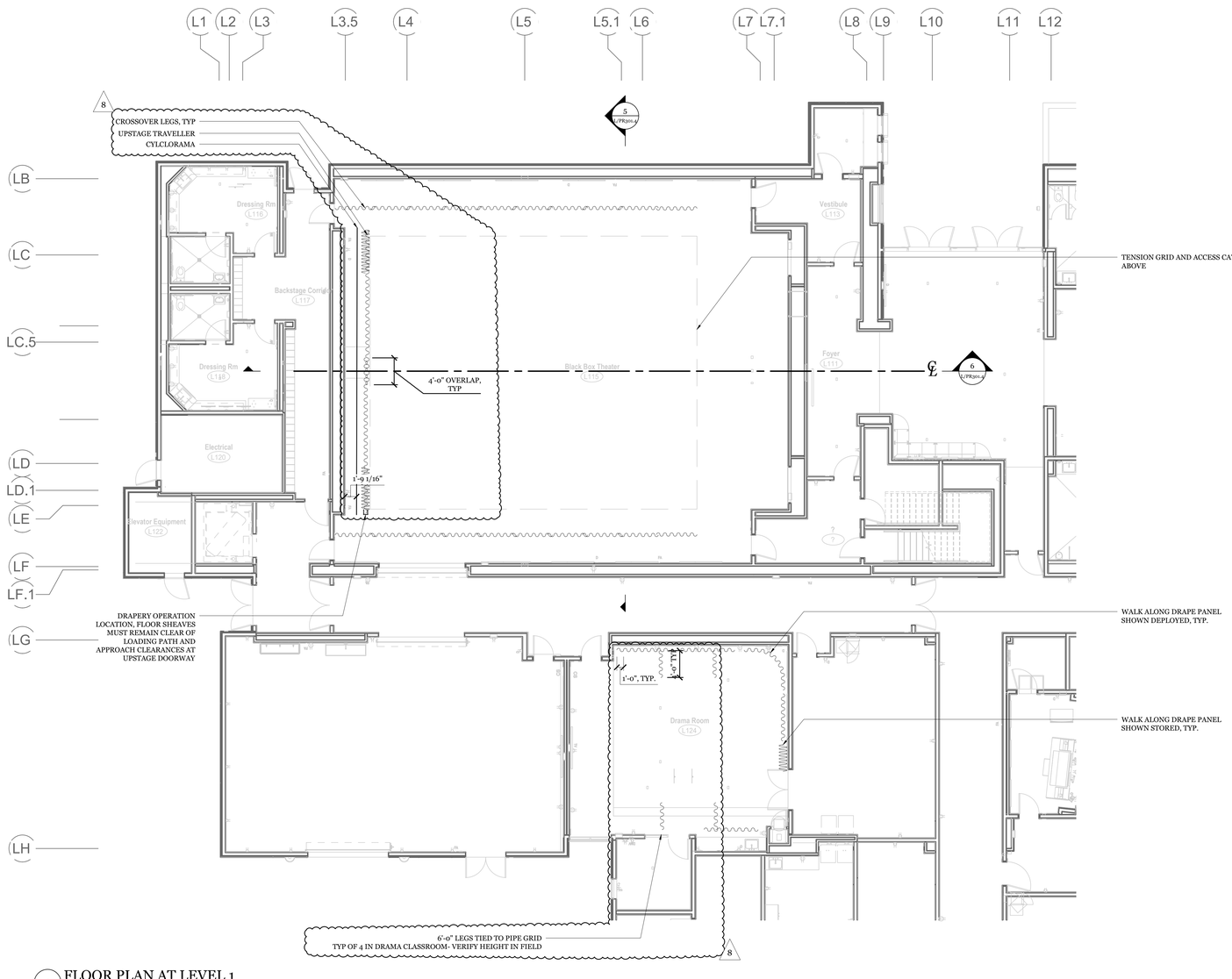
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1 FLOOR PLAN AT LEVEL 1
1/8"=1'-0"

RIGGING GENERAL NOTES

1. THIS SHEET IS INTENDED TO PROVIDE RIGGING AND DRAPERY INFORMATION ONLY. REFERENCE OTHER ARCHITECTURAL AND ENGINEERING DOCUMENTS FOR RELATED AREAS.
2. SHOW ATTACHMENT BACKING REQUIREMENTS ON SHOP DRAWINGS.
3. COORDINATE WITH ALL RELATED TRADES TO MAINTAIN CLEARANCES FOR RIGGING SYSTEMS INSTALLATION AND SAFE AND EFFECTIVE USE. NO PIPE, CONDUIT, RACEWAY, DUCT, NOR ANY OTHER OBSTRUCTION SHALL BE PERMITTED IN RIGGING CLEAR ZONES, OR WITHIN 6" OF ANY MOVING COMPONENT OF RIGGING SYSTEMS, INCLUDING LIFT LINES.
4. SEE SPECIFICATIONS FOR PRODUCT AND INSTALLATION CRITERIA.
5. PRODUCTION SYSTEMS SHOWN ARE DEFERRED APPROVAL. INSTALLATION OF ALL DEFERRED APPROVAL ITEMS SHALL NOT BE STARTED UNTIL CONTRACTORS DRAWINGS, SPECIFICATIONS AND ENGINEERING CALCULATIONS FOR THE ACTUAL SYSTEMS TO BE INSTALLED HAVE BEEN ACCEPTED AND SIGNED BY THE ARCHITECT AND APPROVED BY THE DIVISION OF THE STATE ARCHITECT

ABBREVIATIONS

# = POUNDS	PL = PRODUCTION LIGHTING
AFF = ABOVE FINISHED FLOOR	PR = PRODUCTION RIGGING
CLR = CLEAR	PS = PRODUCTION SEATING
DIV = SPECIFICATIONS DIVISION	RWL = RECOMMENDED WORKING LOAD
EC = ELECTRICAL CONTRACTOR	SAD = SEE ARCHITECTURAL DRAWINGS
EE = ELECTRICAL ENGINEER	SED = SEE ELECTRICAL DRAWINGS
FM = FLUSH MOUNT	SF = SQUARE FEET
HL = HOUSE LEFT	SIM = SIMILAR
HR = HOUSE RIGHT	SL = STAGE LEFT
HT = HEIGHT	SM = SURFACE MOUNT
LF = LINEAR FEET	SMD = SEE MECHANICAL DRAWINGS
MAX = MAXIMUM	SR = STAGE RIGHT
MIN = MINIMUM	SSD = SEE STRUCTURAL DRAWINGS
NIC = NOT IN CONTRACT	TYP = TYPICAL
NTS = NOT TO SCALE	VIF = VERIFY IN FIELD
OPP = OPPOSITE	UON = UNLESS OTHERWISE NOTED

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BUILDING L - PLAN AT LEVEL 1

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Architect

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A	ADDENDUM 8	09/21/26

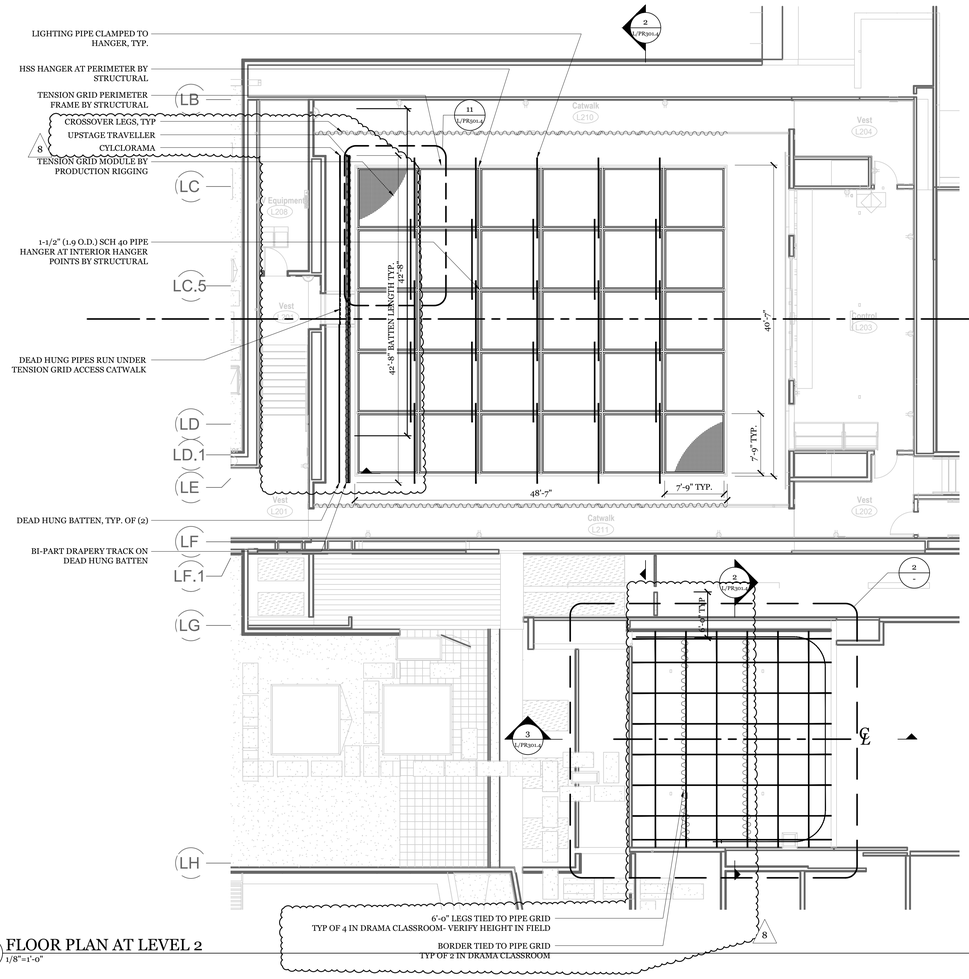
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Drawn By: RC
Checked By:
Reviewed By: IDH

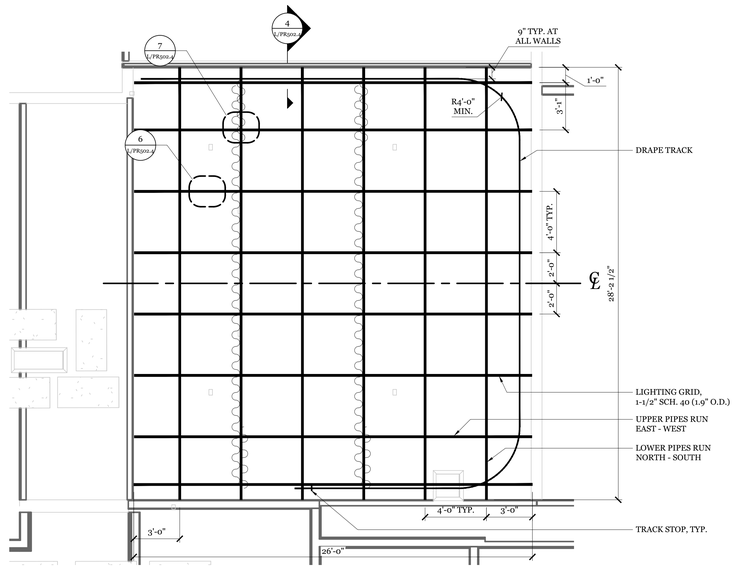
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Date: xx/xx/xx

L/PR101.4
AD8



1 FLOOR PLAN AT LEVEL 2
1/8"=1'-0"



2 DETAIL PLAN AT CLASSROOM PIPE GRID
1/8"=1'-0"

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Architect

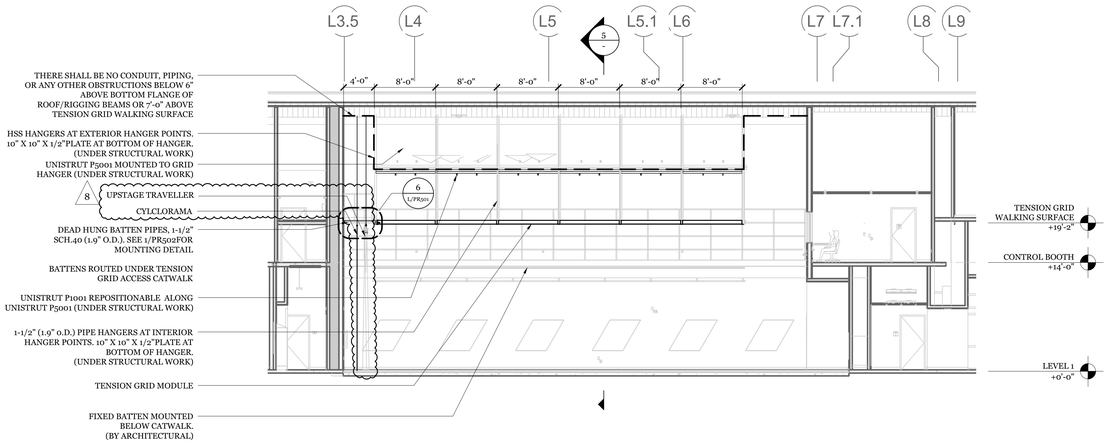
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8	ADDENDUM 8	09/21/26

Revision

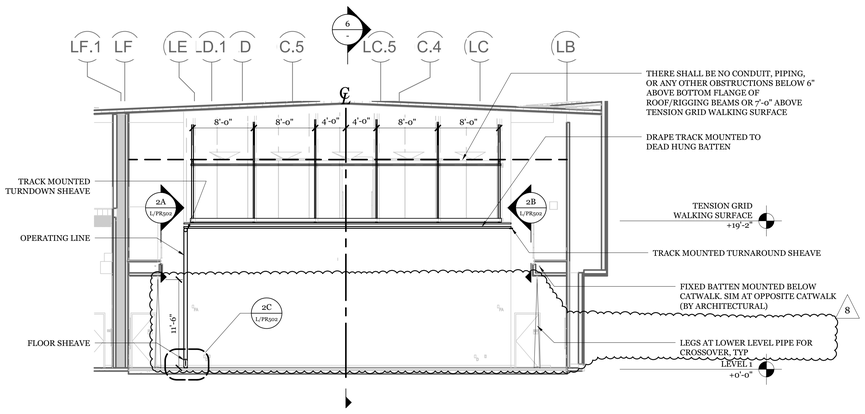
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Checked By:
Reviewed By: IDH
Scale:
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6 CENTERLINE SECTION AT THEATER
1/8"=1'-0"



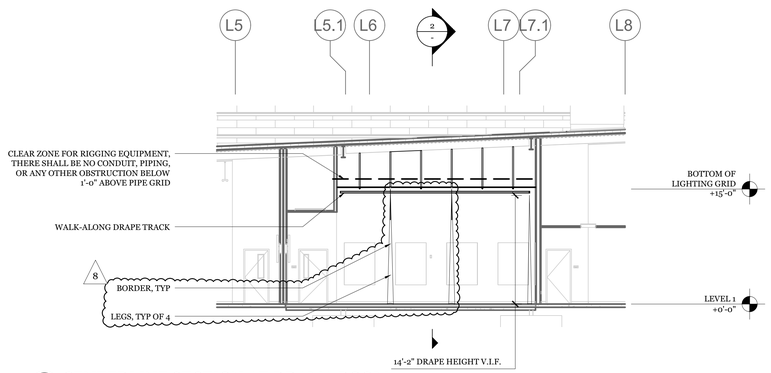
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1/8"=1'-0"

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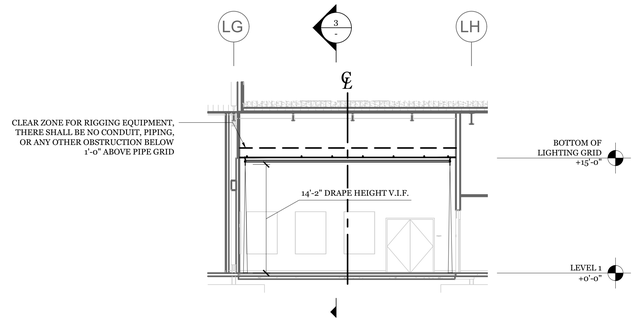
BLACK BOX DRAPERY FF&E SCHEDULE									
DRAPE NAME	WIDTH	HEIGHT	# OF PANELS	FULLNESS	WEIGHT	LINER	COLOR	OPERATION	NOTES
UPSTAGE TRAVELER	42-8"	18'-9"	2	50%	20 OZ	NO	BLACK	BI-PART	DRAPERY TRACK
CYCLORAMA	42'-8"	18'-9"	1	0%	LINO	NO	WHITE	N/A	WITH 3/4" BOTTOM PIPE
LEGS #1	6'-0"	11'-6"	20	50%	20 OZ	NO	BLACK	N/A	NAP DOWN, IFR VELOUR

** ALL DRAPERY HEIGHTS ARE TO BE VERIFIED IN FIELD AND MAXIMIZED**

4 BLACK BOX DRAPERY SCHEDULE
NOT TO SCALE



3 CENTERLINE SECTION AT DRAMA ROOM
1/8"=1'-0"



2 TRANSVERSE SECTION AT DRAMA ROOM
1/8"=1'-0"

8

DRAMA CLASSROOM DRAPERY FF&E SCHEDULE									
DRAPE NAME	WIDTH	HEIGHT	# OF PANELS	FULLNESS	WEIGHT	LINER	COLOR	OPERATION	NOTES
BORDER #1	26'-0"	3'-6"	1	50%	20 OZ	NO	BLACK	N/A	NAP DOWN, IFR VELOUR
LEGS #1	4'-0"	14'-2"	2	50%	20 OZ	NO	BLACK	N/A	NAP DOWN, IFR VELOUR
BORDER #2	26'-0"	3'-6"	1	50%	20 OZ	NO	BLACK	N/A	NAP DOWN, IFR VELOUR
LEGS #2	4'-0"	14'-2"	2	50%	20 OZ	NO	BLACK	N/A	NAP DOWN, IFR VELOUR
CURVED DRAPE	8'-0"	14'-2"	6	50%	18-20 OZ	NO	BLACK	WALK-ALONG	NAP DOWN, IFR VELOUR

** ALL DRAPERY HEIGHTS ARE TO BE VERIFIED IN FIELD AND MAXIMIZED**

1 DRAMA ROOM DRAPERY SCHEDULE
NOT TO SCALE

RIGGING GENERAL NOTES

1. THIS SHEET IS INTENDED TO PROVIDE RIGGING AND DRAPERY INFORMATION ONLY. REFERENCE OTHER ARCHITECTURAL AND ENGINEERING DOCUMENTS FOR RELATED AREAS.
2. SHOW ATTACHMENT BACKING REQUIREMENTS ON SHOP DRAWINGS.
3. COORDINATE WITH ALL RELATED TRADES TO MAINTAIN CLEARANCES FOR RIGGING SYSTEMS INSTALLATION AND SAFE AND EFFECTIVE USE. NO PIPE, CONDUIT, RACEWAY, DUCT, NOR ANY OTHER OBSTRUCTION SHALL BE PERMITTED IN RIGGING CLEAR ZONES, OR WITHIN 6" OF ANY MOVING COMPONENT OF RIGGING SYSTEMS, INCLUDING LIFT LINES.
4. SEE SPECIFICATIONS FOR PRODUCT AND INSTALLATION CRITERIA.
5. PRODUCTION SYSTEMS SHOWN ARE DEFERRED APPROVAL. INSTALLATION OF ALL DEFERRED APPROVAL ITEMS SHALL NOT BE STARTED UNTIL CONTRACTORS DRAWINGS, SPECIFICATIONS AND ENGINEERING CALCULATIONS FOR THE ACTUAL SYSTEMS TO BE INSTALLED HAVE BEEN ACCEPTED AND SIGNED BY THE ARCHITECT AND APPROVED BY THE DIVISION OF THE STATE ARCHITECT

ABBREVIATIONS

# = POUNDS	PL = PRODUCTION LIGHTING
AFF = ABOVE FINISHED FLOOR	PR = PRODUCTION RIGGING
CLR = CLEAR	PS = PRODUCTION SEATING
DIV = SPECIFICATIONS DIVISION	RWL = RECOMMENDED WORKING LOAD
EC = ELECTRICAL CONTRACTOR	SAD = SEE ARCHITECTURAL DRAWINGS
EE = ELECTRICAL ENGINEER	SED = SEE ELECTRICAL DRAWINGS
FM = FLUSH MOUNT	SF = SQUARE FEET
HL = HOUSE LEFT	SIM = SIMILAR
HR = HOUSE RIGHT	SL = STAGE LEFT
HT = HEIGHT	SM = SURFACE MOUNT
LF = LINEAR FEET	SMD = SEE MECHANICAL DRAWINGS
MAX = MAXIMUM	SR = STAGE RIGHT
MIN = MINIMUM	SSD = SEE STRUCTURAL DRAWINGS
NIC = NOT IN CONTRACT	TYP = TYPICAL
NTS = NOT TO SCALE	VIF = VERIFY IN FIELD
OPP = OPPOSITE	UON = UNLESS OTHERWISE NOTED

DSA File No.:
10-H15

DSA Application No.:
02-119023

Agency Approval

The Shalleck Collaborative Inc.
Planning and Design of Theatres
Production Systems | AV
1533 Martin Luther King Jr Way
Berkeley CA 94709
415-956-4100 www.shalleck.com

Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727

Project

PRODUCTION RIGGING
BUILDING L - SECTIONS

Drawing

darden architects
ARCHITECTURE PLANNING INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

LICENSED ARCHITECT GEORGE K. FEE No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
	100CD	12/15/22
	DSA BACKCHECK	08/11/23
8	ADDENDUM 8	09/21/26

Revision

Designed By: IDH
Drawn By: RC
Checked By:
Reviewed By: IDH

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Scale:
Project Number: 2771
Date: xx/xx/xx

L/PR301.4
AD8

SECTION 01 11 13 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Construction of the work for SANGER EDUCATION COMPLEX - PHASE III, Sanger, California. The work is defined as all material, labor, equipment and services necessary to do all work shown on the drawings and called for in the Specifications.

B. This Section includes the following:

1. Summarizes the Work of the Contract.
2. Establishes requirements governing the Work.
3. Identifies the Work that will be performed under separate contracts and the coordination.
4. Project Site access.
5. Restrictions under which the project will be constructed.

C. Related Sections: The following Project Manual Sections contain requirements that relate to this section:

1. ALL DIVISION 00 SPECIFICATION SECTIONS.
2. ALL DIVISION 01 SPECIFICATION SECTIONS.
3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUMMARY OF WORK

A. The following information defines the scope of work of this Bid.

B. Building:

1. This project is for the development of a new building, Building L.
2. Building L is a Performing Arts Building that offers Drama, Music, Choir and Band Classes.

C. Site Development:

1. This project also includes the development of utility connections, concrete walks, landscaping, and other site improvements to support the new building.

D. Alternate Bids:

1. Alternate Bid 1: Construct the north parking lot expansion; 180 stalls.

E. Note: Building L was Alternate Bid #4 under a prior bid. Any reference to Alternate Bid #4 in the Bid Documents shall be BASE BID.

1.3 DEFINITIONS

A. The words "OWNER" and "DISTRICT" are synonymous and interchangeable, when used throughout this Project Manual.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.

1. Quality Assurance/Control Submittals:
   a. Certificates:
      1) Submit three (3) copies of certificates indicating compliance with the Asbestos Hazard Emergency Regulations Act.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Contractor's Qualifications:
   a. Contractor shall have experience and have successfully completed three (3) projects of similar scope and size to that indicated for this project.

b. Contractor shall have demonstrated that they have the resources to perform all of the requirements of this project.

B. Regulatory Requirements:

1. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of Work, and in accordance with Specification Section - REGULATORY REQUIREMENTS:

a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.

C. Certifications:

1. The Contractor shall certify in writing that no materials containing Asbestos are incorporated in the work, in accordance with the Asbestos Hazard Emergency Regulations Act.

D. Contractor's Duties:

1. Except as specifically noted, provide and pay for:

a. Labor, material and equipment.
b. Tools, construction equipment and machinery.
c. Heat and utilities required for construction. See Specification Section - TEMPORARY FACILITIES AND CONTROLS.
d. Other facilities and services necessary for proper execution and completion of Work.

2. Pay legally required sales, consumer and use taxes.
3. Secure and pay for all site specific as necessary for proper execution and completion of Work.

a. Licenses.
b. Permits and Fees.
c. Government Fees .
d. Royalties.

4. Give required notices.
5. Promptly submit written notice to Architect of observed variance.
6. Enforce strict discipline and good order among employees. Do not employ on Work:

a. Unfit persons.
b. Persons not skilled in assigned task.

1.6 WORK UNDER OTHER CONTRACTS

A. General Requirements:

1. Work under separate contracts will occur throughout the duration of the project. The work being installed under separate contracts will occur around adjacent to the Contract project site.
2. Contractor shall coordinate its work with the work under separate Contracts and shall cooperate with the Contractors of these separate Contracts as they occur.
3. Should the Contractor damage and/or otherwise alter work installed under separate contracts, the Contractor is responsible for the repair and/or correction of installed work.
4. Prior to the installation of the Work, coordinate the work installed or to be installed by separate contracts relative to this project scope of work.

B. Work by Owner:

1. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this contract or work by Owner. Coordinate the work of this Contract with work performed by Owner.
2. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be constructed simultaneously with work under this Contract.

a. Items that are Owner Furnished Contractor Installed and Owner Furnished Owner Installed as indicated on the Contract Drawings and as defined in Specification Section - OWNER FURNISHED ITEMS.

3. Security and Intrusion Alarm System: Owner's Vendor will design the Intrusion Alarm System and identify pathways that need to be provided under the Contractor's Construction Contract.

C. Work Under Separate Contracts by Others:
   1. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the work of this Contract with work performed under separate contracts.
   2. Concurrent Work: Owner will award a separate contract(s) for the following construction operations at the Project Site. Those operations will be conducted simultaneously with work under this Contract.
      a. Off-Site Development: Construction of the Streets Improvements, City of Fresno Municipal Street Utilities and Public Utilities along Fowler Avenue and Church Avenue.
      b. Off-Site Electrical: The Relocation of Off-Site Electrical Transmission and Distribution lines will be provided by PG & E adjacent to the boundaries of the site.

D. Future Work:
   1. The Contract Documents include requirements that will allow the Owner to carry out future work following completion of this Project; provide for the following future work:
      a. Alternate Bids not accepted as part of this construction contract.
         1) Sizing, Routing and Stub outs of underground utility lines.
         2) Earthwork and Grading.
      b. Construction of Future Buildings and associated site improvements per Master Site Plan.
         1) Sizing, Routing and Stub outs of underground utility lines.
         2) Earthwork and Grading.

1.7 PROJECT CONDITIONS OR SITE CONDITIONS

A. Access to Site:
   1. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of the Project.
   2. Contractor shall be responsible for coordinating access to and from the site throughout the duration of the project. Access to and from the site may vary, based upon timing and duration of separate contracts.
   3. The Contractor shall not use the Off-Site areas, with the exception of the Site Access per Specification Section - TEMPORARY FACILITIES AND CONTROLS, and shall not interfere with the work in these areas.

B. Contractor Use of Premises:
   1. Confine operations at sites to areas permitted by:
      a. Laws.
      b. Ordinances.
      c. Permits.
      d. Contract Documents.
   2. Do not unreasonably encumber site with materials or equipment.
   3. Assume full responsibility for protection and safekeeping of Contractor's and Owner's material stored on premises, and keep the site and building secure at all times.
   4. Obtain and pay for use of additional storage Work areas needed for operations.
   5. Limit use of Site Work and storage.

1.8 SCHEDULING

A. The Work of this Project will be constructed under a single contract.
   1. It is anticipated that the start of construction will be around:
      a. January 2027.

1.9 SCHEDULE, ADVERSE WEATHER, EXCAVATION PROTECTION, SOIL STABILIZATION, AND TEMPORARY WORKING SURFACE REQUIREMENTS

A. Adverse Weather Planning: The Contractor shall include within the Contract Time and Contract Sum an allowance for 2.5 months of cumulative rain delays and associated impacts. The Project is anticipated to experience significant and prolonged wet weather conditions during the construction period.

1. The Contractor shall be solely responsible for planning and executing all operations necessary to maintain progress during wet weather. Refer to Specification Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Temporary Utilities, Support Facilities, and Protection Facilities materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Shop Drawings:
      a. Project Sign.
   2. Quality Assurance/Control Submittal:
      a. Copy of Application to APCD for Dust Prevention and Control Plan.
      b. Copy of approved Application to APCD for Dust Prevention and Control Plan.
      c. Copy of Application to local City or County Engineer for Traffic Control.
      d. Copy of approved Application to local City or County Engineer for Traffic Control.
      e. Temporary Project Enclosure Plan.
      f. Site Safety Plan prior to initial filing of Construction Start Notice/Inspection Card Request.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB — Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
      b. CAL/OSHA — California Division of Occupational Safety and Health Administration
      c. CF — County of Fresno, Codes and Ordinances
      d. EPA — Environmental Protection Agency

B. Dust Prevention and Control Plan:
   1. Prior to commencing the Work, prepare a Dust Prevention and Control Plan and obtain review and approval of the Air Pollution Control District (APCD) in the area where the project is located.
      a. Prepare application and file with appropriate fees to APCD upon completion of Dust Prevention and Control Plan.
   2. The Dust Prevention and Control Plan shall specify the methods of control that will be utilized, demonstrate the availability of needed equipment and personnel, and identify a responsible individual who, if needed, can authorize implementation of additional measures.
   3. All construction shall comply with applicable elements of the APCD's regulations.
   4. The Dust Prevention and Control Plan shall include, but not be limited to, the following:

a. Contractor's name and project identification information.
b. Procedures and measures to be implemented, but not be limited to:
    1) All material excavated or graded shall be sufficiently watered to prevent excessive amounts of dust.
    2) During periods of high winds, all clearing, grading, earth moving, or excavation shall cease when dust control measures are unable to avoid visible plumes.
    3) All dust producing material transported off site shall be either sufficiently watered or securely covered to prevent excessive amounts of dust.
    4) The area disturbed by clearing, earth moving, or excavation activities shall be minimized at all times.
    5) All watering of areas shall be only to the extent required to keep the soil particles in a moist condition and not to the extent that erosion of surface soil occurs.
    6) To control general fugitive dust, on-site vehicle speed shall be limited to 15 mph.
    7) All areas with vehicle traffic shall be watered periodically for stabilization of dust emissions.
    8) Periodically streets adjacent to the project site shall be cleaned as required to remove silts which may have accumulated from construction activities.

C. Traffic Control Plan:
1. Prior to commencing the Work, prepare a Traffic Control Plan and obtain approval of the local City or County Engineer in the area where the project is located.
    a. Prepare application and file with appropriate fees to the local City or County Engineer upon completion of Traffic Control Plan.
2. The Traffic Control Plan shall include information on construction timing and phasing and proposed methods of alleviating potential hazardous and/or inconvenient conditions. Such methods can include, but are not limited to, the use of flagmen, barricades, signs, warning lights, detours, phased lane closures, coordination with adjacent property owners, and coordination with law enforcement, fire protection and other emergency service agencies.

1.4 SITE SAFETY PLAN

A. Contractor shall be responsible for the development, implementation, and maintenance of a written plan establishing a site safety plan at the project site applicable throughout all phases of the construction, repair, alteration, or demolition work.

B. It is the Contractor's responsibility to contact local Fire Authority to discuss the plan.
1. A copy of the report should be made available to the Project Inspector and local Fire Authority.
2. Plan will be turned over to the Owner and AHJ in compliance with rules and regulations, but will not be reviewed.

C. Regulatory References:
1. DSA BU 24-05 Bulletin: Fire Safety During Construction and Demolition.
2. CFC Chapter 33, Section 3308 and sub-sections.

D. Plan shall address at a minimum:
1. Project Phases.
    a. Describe each phase of the construction, repair, alteration, or demolition work.
2. Site Security Provisions.
3. Site Safety Director.
    a. Designate responsible program superintendent per CFC 3308.2.
    b. Include name and contact information.
4. Training Documentation.
    a. Document training of site safety director and fire watch personnel.
5. Emergency Reporting Procedures.
6. Fire Department Vehicle Access Routes.
7. Locations of fire protection equipment.

a. Include portable fire extinguishers, standpipes, fire department connections and fire hydrants.

8. Smoking and Cooking Policies.
   a. Include designated area to be used where approved, and signage locations in accordance with CFC Section 3305.8.
9. Temporary Heating Equipment.
   a. Location and safety considerations.
10. Hot Work Operations.
11. Control Plan for Combustible Waste.
12. Control Plan for Flammable and Combustible Materials.
    a. Locations and methods for storage and use of flammable and combustible liquids and other hazardous materials.
13. Renovation Work Procedures.
    a. Procedure for impairment of fire protection systems.
    b. Procedure for temporary covering of fire protection devices.
14. Procedure for Changes.

1.5 TEMPORARY PROJECT ENCLOSURE PLAN

A. Prior to commencing the Work, prepare a Temporary Project Enclosure Plan indicating the protection of people, animals, and partial and fully completed work until occupancy by the Owner.

B. Identify temporary egress from existing occupied facilities and as required by authorities having jurisdiction.

C. The Temporary Project Enclosure Plan shall include, but not be limited to, the following:
   1. Contractor’s name and project identification information.
   2. Indicate the duration of the proposed measures based on the completion of the work as a whole and if any phases of work are identified.
   3. Indicate proposed temporary fencing and potential exit and entry paths.
      a. Show gate and door locations and indicate who has access.
   4. Indicate proposed temporary wall location(s) and potential exit and entry paths.
      a. Show door location(s) and indicate who has access.
   5. Indicate type of material used for temporary fencing, walls, gates, and doors.
   6. Indicate proposed temporary roads and paved areas.
   7. Indicate proposed temporary offices and storage areas.

1.6 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Heating and Cooling:
      a. Provide temporary heating and cooling required by construction activities for curing, acclimating the building or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed, and is maintained prior, during and after the installation in accordance with the exterior or interior building materials temperature and humidity guidelines.
         1) Do not use heating units that contribute moisture to the enclosed spaces under construction.
   2. Ventilation and Humidity Control:
      a. Provide temporary ventilation required by construction activities for curing, acclimating the building or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1) Exterior Moisture Control:
   a) Perform the installation of all exterior building cladding only after the substrate to which they are being applied is dry and ready to receive them. Do not apply any cladding if it will trap moisture inside a wall or roof cavity (i.e. insulation that has become wet for whatever reasons).
2) Interior Moisture Control:
   a) Perform the installation of all interior moisture sensitive building materials only after the building or space is acclimated to the final environmental conditions under which the building is to be operated in accordance within the Owner's humidity control guidelines.

b. Maintain a consistent humidity in accordance with the guidelines for those materials in the space at least seven (7) days prior to installation of any moisture sensitive materials (i.e. Veneer Plaster, Gypsum Board, Ceiling Tiles, Wood Sensitive Floors, other Flooring sensitive to moisture levels, Interior Painting, etc.).
c. Maintain the same levels or temperature and humidity during the installation of those materials, and after the installation of those materials until the building's own mechanical systems can be turned on to maintain the facility within the Owner's temperature and humidity control guidelines.
d. Replace any materials that have become wet and damaged due to the Contractor not properly protecting installed building materials at no additional cost to the Owner.

3. Dust control:
   a. Perform work in a manner as to minimize the spread of dust and flying particles.
   b. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
4. Burning: No burning will be allowed on-site.
5. Noise Control:
   a. Stationary noise sources shall be of a low-noise emission design, consistent with the best available noise reduction technology.
   b. The hours of operation of noise-generating equipment shall be restricted to 6:00 a.m. to 7:00 p.m. Monday through Friday, and to 8:00 a.m. to 6:00 p.m. on Saturday and Sunday.
   c. Mufflers shall be required on all gas and diesel-powered equipment.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.7 SCHEDULE, ADVERSE WEATHER, EXCAVATION PROTECTION, SOIL STABILIZATION, AND TEMPORARY WORKING SURFACE REQUIREMENTS

A. Adverse Weather Planning: The Contractor shall include within the Contract Time and Contract Sum an allowance for 2.5 months of cumulative rain delays and associated impacts. The Project is anticipated to experience significant and prolonged wet weather conditions during the construction period.
   1. The Contractor shall be solely responsible for planning and executing all operations necessary to maintain progress during wet weather, including but not limited to:
      a. Temporary drainage systems.
      b. Dewatering operations.
      c. Soil stabilization.
      d. Erosion and sediment control measures.
      e. Access road maintenance.
      f. Protection of excavations.
      g. Pumping, diversion, and removal of stormwater.
      h. Rehandling of materials affected by weather.

2. No additional compensation or time extension shall be granted for normal seasonal rainfall, wet soil conditions, groundwater management, or other foreseeable weather-related impacts included within this allowance.

B. Foundation Excavation Protection and Slurry Cap: All building foundations shall be excavated 3 inches deeper than the elevations shown on the Contract Documents.
   1. Immediately upon approval of the foundation bearing surface, the Contractor shall place a 3-inch-thick lean concrete slurry cap (mud slab) over the entire footing excavation bottom. The slurry cap shall:
      a. Protect the approved bearing surface from disturbance.
      b. Prevent degradation of foundation subgrade due to rain and groundwater.
      c. Allow removal of sloughed or softened material without disturbing approved bearing soils.
      d. Facilitate cleanout of foundation excavations following storm events.
   2. Any sloughed, softened, or otherwise unsuitable material deposited above the slurry cap shall be removed immediately prior to footing construction. The Contractor shall maintain excavations in a dry and stable condition at all times.

C. Excavation Sidewall Stabilization: Where foundation excavations are anticipated to remain open during rainy periods, the Contractor shall provide temporary sidewall protection to minimize erosion, sloughing, and sediment migration into excavations.
   1. Acceptable methods include:
      a. Burlap lining.
      b. Jute matting.
      c. Erosion control blankets.
      d. Geotextile fabrics.
      e. Other approved temporary stabilization systems.
   2. The stabilization material shall be securely anchored and maintained throughout the duration of the excavation. Excavation sidewalls shall be inspected following each rain event and repaired as necessary prior to continuation of work.

D. Utility Trench Operations: Utility trench work shall be sequenced to minimize the duration of open trench conditions.
   1. Except where specifically approved by the Owner or Engineer, the Contractor shall:
      a. Excavate, install utilities, test, and backfill within the same work shift whenever practical.
      b. Minimize the total length of open trench exposed at any one time.
      c. Prevent surface water from entering excavations.
      d. Maintain trenches free of standing water.
      e. Restore all disturbed areas immediately following utility installation.
   2. Open utility trenches shall not be left exposed during forecasted rain events unless specifically approved and adequately protected. Following rain events, all trenches shall be inspected, cleaned, reconditioned, and restored to design grade prior to utility installation or backfilling. Water accumulation and saturated trench conditions require corrective measures and reinspection before work proceeds.

E. Temporary Working Surface and Soil Stabilization: The Contractor shall provide and maintain temporary soil stabilization sufficient to support construction traffic, deliveries, equipment operations, emergency access, and the work of all trades throughout the Project duration. Areas exhibiting rutting, pumping, excessive moisture, loss of bearing capacity, or unstable soil conditions shall be stabilized at the Contractor's expense.
   1. At a minimum, the Contractor shall provide temporary all-weather construction access roads, staging areas, crane pads, and building pad working surfaces consisting of:
      a. Nonwoven geotextile separator fabric placed directly on prepared subgrade.
      b. Geogrid reinforcement where pumping, yielding, or unstable subgrade conditions are encountered.
      c. A minimum of 12 inches of compacted Class II aggregate base, crushed rock, or approved equivalent working platform material.

2. The Contractor shall increase section thickness and geogrid reinforcement as necessary to maintain a stable, trafficable surface for construction operations. Alternative stabilization methods may include:
    a. Lime treatment.
    b. Cement treatment.
    c. Chemical stabilization products.
    d. Aggregate working platforms.
    e. Geotextile reinforcement systems.
    f. Geogrid reinforced working surfaces.
    g. Other Engineer-approved methods.
3. The intent of this requirement is that construction operations remain functional during periods of wet weather and that trade contractors are able to perform work without excessive delays resulting from muddy, pumping, or unstable soil conditions.

F. Contractor Responsibility: The Contractor shall be solely responsible for all means and methods associated with temporary works, weather protection, excavation protection, dewatering, soil stabilization, access maintenance, erosion control, sediment control, and maintenance of suitable working conditions.
1. Claims for additional compensation associated with foreseeable wet-weather impacts, unstable soil conditions, excavation deterioration, trench collapse, groundwater management, access maintenance, pumping soils, or insufficient temporary stabilization measures shall not be considered. The Contractor shall include all costs associated with these requirements in its bid.

G. Acknowledgment of Anticipated Conditions: The Contractor acknowledges that the Project will be constructed during the rainy season and that periods of prolonged precipitation, saturated soils, difficult excavation conditions, groundwater intrusion, pumping subgrades, and reduced site accessibility are anticipated conditions and have been included in the Contractor's bid and schedule.

H. Coordination with Related Sections: This Article supplements, and shall be coordinated with, the Project's Geotechnical Investigation Report and Division 31 – Earthwork specification sections for this Project. Where a conflict occurs between this Article and those references, the more stringent requirement shall govern.

I. Building Protection & Weather-Tight Construction: The Contractor shall protect all existing facilities, newly constructed work, partially completed construction, installed materials, equipment, building systems, and finishes from damage caused by rain, wind, groundwater, surface runoff, dust, temperature extremes, and other environmental conditions throughout the duration of the Project.
1. The Contractor shall continuously implement and maintain temporary protection measures necessary to prevent water intrusion and deterioration of the Work. Protection measures shall include, but not be limited to, temporary roofing, waterproof coverings, weatherproof enclosures, temporary walls, protection of openings, stormwater diversion measures, tarping, shrink-wrap systems, pumping, dehumidification, and other measures required to maintain the Work in a dry and protected condition.
2. Materials and equipment stored on-site shall be elevated above grade, adequately covered, and protected from weather exposure, standing water, and moisture accumulation. Moisture-sensitive materials shall not be installed until substrates and surrounding conditions comply with manufacturer requirements.
3. The Contractor shall maintain all newly constructed buildings, additions, renovated areas, and partially completed construction in a weather-tight condition as Work progresses. No portion of the Work shall be enclosed, covered, or concealed while moisture is present within assemblies or construction materials beyond manufacturer-recommended limits.
4. The Contractor shall take all necessary precautions to prevent water intrusion into occupied areas, completed construction, concealed spaces, wall assemblies, ceiling assemblies, electrical rooms, communication rooms, mechanical spaces, and areas designated to receive moisture-sensitive finishes or equipment.
5. Following each storm event, the Contractor shall inspect the Project and immediately repair deficiencies in temporary protection systems. Any water intrusion, moisture damage, mold

growth, corrosion, deterioration, staining, warping, contamination, or damage resulting from inadequate protection shall be corrected by the Contractor at no additional cost to the Owner.

6. Any materials, finishes, equipment, systems, or completed Work determined to be damaged as a result of weather exposure or inadequate protection shall be removed and replaced with new materials meeting the Contract Documents. Drying, cleaning, repair, and restoration efforts shall not relieve the Contractor of the obligation to provide new materials where damage or deterioration has occurred.
7. The Contractor shall include all costs associated with temporary weather protection, moisture control, inspections, temporary enclosures, dehumidification, drying operations, repairs, replacement of damaged materials, and maintenance of a weather-tight structure within the Contract Sum. No additional compensation or extension of Contract Time shall be granted for failure to adequately protect the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.

B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized-steel bases for supporting posts.

C. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain-link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.

D. Wood Barrier Fence: Plywood, 8 feet high, framed with four 2-by-4-inch rails, with preservative-treated wood posts spaced not more than 8 feet apart.

E. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.

F. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.

G. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Field Offices:

1. General Note: Provide one (1) 2A:10B:C Wall Surface Mounted Fire Extinguisher in each field office as a minimum per the CSFM.
2. Contractor's Field Office:
    a. Size: Nominal 10 feet wide minimum, approximately 400 square feet minimum (half of this office is to be reserved for a conference room for job site meetings).
    b. Equipment:
        1) Table for review of Drawings.
        2) Files, rack and shelves as required to store Contract Drawings and Project Record Drawings in a neat, orderly manner.
        3) One copy of each code listed in Specification Section - REGULATORY REQUIREMENTS.
        4) Telephone.
        5) Internet Connection.
        6) Plain Paper Copier / FAX Machine.
        7) Conference room table and chairs for at least 10 people.
    c. Facilities:
        1) Adequate light and power.
        2) Adequate heating, ventilation and air conditioning.

d. Control and Access:
   1) Door shall be lockable and key shall be supplied to Architect and access shall be limited to Owner, Architect, Inspector and Contractor.
e. All of the above items shall be subject to Architect's approval.

3. Project Inspector's Field Office:
   a. Size: Nominal 10 feet wide minimum, approximately 400 square feet minimum (sized for two (2) Owner's Inspectors, and a desk for the Architects use).
   b. Equipment:
      1) Three (3) 48" x 96" layout tables for review of the drawings by each Inspector.
      2) Three (3) 30" x 60" standard desks with two drawers on one side of each desk (the third desk will be used by the Architect when visiting the site).
      3) Three (3) secretarial task chairs with five point rolling bases.
      4) Three (3) 4-drawer legal size, full suspension, lockable file cabinets.
      5) Three (3) 60" high x 36" wide x 12" deep free standing bookcases with four (4) adjustable shelves for each bookcase.
      6) Three (3) 12-capacity rolling, vertical "Plan Holds" with adjustable brackets for 30" x 42" wide drawings.
      7) Three (3) 36" x 48" tackboards mounted to walls as directed by the Owner's Inspector.
      8) Three (3) drafting stools.
      9) Space for one copy of each code listed in Specification Section - REGULATORY REQUIREMENTS.
      10) Two telephones.
      11) Internet Connection.
      12) One Plain Paper Copier / FAX Machine.
   c. Facilities:
      1) Adequate light and power.
      2) Adequate heating, ventilation and air conditioning (ducted central HVAC).
      3) Electric water cooler with both hot and cold water.
   d. Control and Access:
      1) Door shall be lockable and key shall be supplied to Architect and access shall be limited to Owner, Architect, Inspectors and Contractor.
   e. All of the above items shall be subject to Architect's approval.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

D. Project Sign:
   1. The Contractor shall furnish and erect at location as directed by the Architect one sign board approximately 4 feet x 8 feet, fabricated of 3/4 inch exterior grade plywood with a sturdy frame attached to 4 inch x 4 inch x 14 foot redwood posts set 4 feet in the ground minimum, and substantially braced.

2. The sign to be painted on signboard shall be of design in 4 colors as directed by the Architect.
3. Lettering shall be of style shown, neatly executed by a skilled sign painter.
4. The information to be lettered on sign shall be as furnished by the Architect.
5. Sign will include the names of the Contractor, Owner, Architect, and the project designation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   2. Execution of work under this specification section shall constitute acceptance of existing conditions.
   3. Obtain all necessary permits and authorizations by regulatory agencies required to perform the work under this section.

3.2 PREPARATION

A. Coordination:
   1. Before proceeding, verify plans match existing conditions.
   2. Coordinate work under this specification with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. The Contractor shall verify and protect existing landscaping, asphalt area, concrete walkways, and other site improvements to remain on the site before proceeding with the Work.
   2. Prior to starting Work, hose bibbs, utility lines, etc., to be abandoned and removed within the construction area shall be stubbed off outside the limits of construction.
   3. Verify and protect utilities to remain within the construction area and provide special construction for their protection.

3.3 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
   1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.4 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
   1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
   1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with coordination drawings.
      a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
      b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

3.5 IMPLEMENTATION

A. General:
   1. Perform Work and provide and maintain Temporary Utilities and Temporary Facilities in accordance with the requirements of all regulatory authorities having jurisdiction.
   2. Contractors shall cooperate with other contractors and the Owner in the use of the site, Temporary Utilities, Temporary Facilities and shall adjust their operations to maintain harmonious relations and uninterrupted progress of the Work.
   3. The Contractor shall assume all responsibility for the provision and maintenance of these Temporary Utilities and Temporary Facilities and for the provisions of public safety where the operations under this Contract interface with public areas.
   4. Relocate and modify Temporary Utilities and Temporary Facilities, as required by progress of the Work.
   5. Remove Temporary Utilities and Temporary Facilities upon completion of the Project.
   6. Temporary Utilities and Temporary Facilities are to be provided and maintained from commencement of Work until final acceptance.
      a. The Contractor shall pay all charges required of him for the duration of the project, including a 3 month period following the date of the Notice of Substantial Completion.

3.6 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

B. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
   1. Install temporary service or connect to existing service.

C. Sewers: Provide temporary service to remove effluent lawfully.

D. Storm Drainage: Provide temporary service as necessary to remove storm water. Work shall be performed in accordance with the requirements of the Storm Water Pollution Prevention Plan (SWPPP), if any. If no SWPPP is required, then follow local authorities having jurisdiction requirements.

E. Water:
   1. The Contractor will arrange and pay for all water supply for all purposes of construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.
   2. The Owner will pay for all water supply for all purposes of construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.

F. Electrical:
   1. The Contractor shall provide and pay for all electrical facilities and services for all purposes of power and lighting for construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.
      a. The Contractor shall pay for cost of electrical energy required in connection with the testing of such equipment as generators, transformers, power machinery, and similar equipment installed in the work.
   2. The Owner will pay and the Contractor shall provide for all electrical facilities and services for all purposes of power and lighting for construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.

a. The Contractor shall pay for cost of electrical energy required in connection with the testing of such equipment as generators, transformers, power machinery, and similar equipment installed in the work.

3. The Contractor will provide electrical energy to all subcontractors as required on or about the premises.
4. The Contractor will provide power outlets having adequate electrical characteristics and lighting of adequate intensity for the use of other contractors within reasonable distances from their needs and within a reasonable period of time after the other contractors have requested them.

G. Telephone:

1. The Contractor shall provide and pay for all telephone service and telephone equipment in the Field Offices until completion of the Work.
   a. Provide an additional dedicated phone line for modem/network connection in the Project Inspector's Field Office for use by the Architect's representative.

H. Heating:

1. Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity.
2. Select UL or FM approved equipment that will not have a harmful effect on completed installations or elements being installed.
   a. Except where use of the permanent heating system is authorized, provide temporary units that do not introduce moisture into the newly constructed building spaces.
   b. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.
3. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

3.7 SUPPORT FACILITIES INSTALLATION

A. Offices and Storage:

1. Provide temporary offices and storage facilities located within the construction area.
2. Protect materials, construction work and their operations from weather, vandalism, and theft.

B. Sanitary Facilities:

1. Provide adequate, self-contained toilets as required for all persons employed on the Project.
2. In no case shall the permanent plumbing fixtures of the Project be used for this purpose.

C. Temporary Roads and Paved Areas:

1. Construct and maintain temporary roads and paved areas adequate for construction operations and fire protection during construction.

D. Traffic Controls:

1. Implement procedures and measures outlined in the local jurisdiction’s approved Traffic Control Plan.
2. Maintain access for fire-fighting equipment and access to fire hydrants.
3. Conduct work and comply with applicable building codes and regulations regarding the use of public streets and sidewalks and the proper barricading and lighting of public thoroughfares surrounding the construction activities.
4. Provide and maintain access as required to perform work.
5. Repair all damage as a result of work performed on the project to adjacent roads, streets, drives and walks. Restore to condition as good as existed at commencement of the Work.

E. Project Sign:

1. Install project sign as submitted and approved.
2. No other signs will be allowed on the project.

F. Existing Elevator Use:

1. Use of Owner’s existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to the Owner.

2. Do not load elevators beyond their rated weight capacity.

G. Existing Stair Use:

1. Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to the Owner.

3.8 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Existing Facilities:

1. Protect existing vegetation, equipment, structures, utilities, and other improvements at project site and on adjacent properties, except those indicated to be removed or altered. Damage occurring during the course of construction shall be repaired to condition at the start of the Work.

B. Environmental:

1. Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Project Enclosure:

1. Implement procedures and measures outlined in Temporary Project Enclosure Plan.
2. Project enclosure shall protect materials, construction work, and operations from vandalism, theft, and to exclude the intrusion of the public into the construction area.
3. Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by the Owner from fumes and noise.
4. Maintain security by limiting number of keys and restricting distribution to authorized personnel.

D. Barriers: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades.

E. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.

1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
2. Paint and maintain appearance of walkway for duration of the Work.

3.9 CLEANING

A. Clean in accordance with Specification Section – PROJECT CLOSEOUT.

1. At all times, keep the premises free from accumulations of waste materials or rubbish caused by employees or the Work.
2. Clean all soiled surfaces to remain immediately.
3. At the completion of the Work, remove all rubbish from and about the building and all tools, scaffolding, and surplus materials and shall leave the Work "broom clean" or its equivalent.

END OF SECTION

SECTION 07 42 43 – FIBER-CEMENT PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary for complete installation of Wall, Soffit and Facade Fiber-Cement Panel "Ventilated Rainscreen" System, Water Barrier, Insulation and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. Pre-fabricated Fiber-Cement Panels, engineered support structure, and related accessories.
   2. The Exterior Wall finishes and the water resistant barrier (WRB) shall comply with CBC Code Section 1402.5, 2603.5.5 and NFPA 285. The Rigid Insulation shall have a flame spread index no greater than 25 as determined by ASTM E84 or UL 723

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 07 21 00 INSULATION
   4. 07 40 00 METAL PANELS
   5. 07 40 40 MCM PANELS
   6. 07 60 00 SHEET METAL
   7. 07 92 00 SEALANTS
   8. 08 11 00 METAL DOORS AND FRAMES
   9. 08 41 00 STOREFRONTS
   10. 08 41 23 STOREFRONT TEMPERATURE RISE
   11. 08 63 00 TRANSLUCENT PANELS
   12. 09 22 16 METAL FRAMING
   13. 09 24 00 CEMENT PLASTER
   14. 09 29 00 GYPSUM BOARD
   15. 09 91 00 PAINTING
   16. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. AAMA American Architectural Manufacturers Association
      b. ASTM American Society of Testing and Materials
      c. NFPA National Fire Protection Association

1.3 DEFINITIONS

A. The following definitions apply to this specification section
   1. Panel System: Wall panels, attachment components, miscellaneous framing, and accessories necessary for a complete weathertight wall system.
   2. Weathertight: The ability to prevent water intrusion into the building under normal climatic conditions (including pressure differentials, wind, and snow conditions) for the area where the project is constructed. Also the word “weathertightness" is a variation of the word “weathertight" and shall have the same definition applied.

1.4 SYSTEM DESCRIPTION

A. Design Requirements:
   1. Provide a high performance “Ventilated Rainscreen" Fiber-Cement Panel System.

2. The Fiber-Cement Panel System shall consist of factory-molded, ultra high performance concrete (UHPC) solid exterior panels associated UHPC framing components with engineered support structure (subframe) materials, accessories and other miscellaneous accessories as required for a complete watertight installation.
    a. Any items not specifically noted but necessary for a complete and watertight system shall be provided.
3. The Fiber-Cement Panel System shall be designed to provide controlled drainage to the exterior face of the wall for any leakage of water and condensation taking place within the panel system.

B. Performance Requirements:
1. General: Provide “Ventilated Rainscreen" Fiber-Cement Panel System that comply with performance requirements without failure due to defective manufacture, fabrication, installation or other defects in construction.
    a. Design panel system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Fiber-Cement Panels shall comply to ASTM C 1185, Type A, Grade N requirements.
    a. Density - Thin Panel: 137 lbs./ft³
    b. Flexural Strength (Thin Panel) - Dry: Pass, Mean length direction not less than 3,800 lbs/in2 and width direction 3,600 lbs/in2.
    c. Flexural Strength (Thin Panel) - Wet: Pass, Mean length direction not less than 3,800 lbs/in2 and width direction 3,400 lbs/in2.
    d. Freeze/Thaw (Cladding): Pass. No visible cracks and not less than 90% post-exposure strength retention.
    e. Moisture Content - Thin Panel: less than 1.0%.
    f. Moisture Movement - Thin Panel: 0.00%.
    g. Warm Water: Pass. No visible cracks or structural alteration. Not less than 90.0% ratio of retained post-exposure strength.
    h. Water Absorption - Thin Panel: less than 4.0%.
    i. Water Tightness: Pass. No water droplet formation.
3. Surface Burning Characteristics per ASTM E 84:
    a. Flame Spread: Pass.
    b. Smoke Developed: Pass.
    c. Class A.
4. Fire Resistant per ASTM E 119.
5. Non Combustible per ASTM E 136.
6. Thermal Expansion per ASTM C 531.
    a. 6.41E-06 in/in/degree F (0.01 inches per meter at 40 degree temperature change).
7. Compressive Strength per ASTM C 873: Greater than or equal to 18,332 lbs./in²
8. Tensile Strength per ASTM C 496: Splitting matrix prism: 1,319 lbs./in².
9. Colorfastness & Weathering (500 hours) per ASTM G 155 and ASTM D 2244.
    a. 2.07 delta E. without coating (standard, varies with pigment type, texture and coating (consult with manufacturer for color information).
10. Anchor Pullout Strength per ASTM E 488:
    a. 8.5 mm embed in 13mm thick panel.
    b. Tension (Min. Mean) Peak Load - 386 lbf or greater.
    c. Shear (Min. Mean) Peak Load - 650 lbf or greater,

1.5 SUBMITTALS

A. General: Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data:
1. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
2. Submit manufacturer’s standard color range for selection by the Architect.

3. Manufacturer’s Details: Submit drawings (*.pdf formats), including plans, sections, showing installation details that demonstrate product dimensions, edge/termination conditions/treatments, compression and control joints, corners, openings, and penetrations.

C. Shop Drawings.
   1. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
      a. Panel elevations, sections, and dimensions.
      b. Panel thickness and fastener type and size.
      c. Finishes.
      d. Joint and connection details.
      e. Erection details.
      f. Panel cut-outs for Mechanical, Electrical, Plumbing, and Security devices and items.
      g. Panel frame details for typical panels including sizes, spacings, thicknesses, and yield strengths of various members.
      h. Locations and details of connection hardware attached to structure.
      i. Sizes, locations, and details of flex, gravity, and seismic anchors for typical panels.
      j. Erection sequence for special conditions.
      k. Relationship to adjacent materials.
      l. Shop Drawings for Mockups: Include plans, elevations, sections, full-size details, and attachments to other work.

D. Samples.
   1. Submit samples of each product type proposed for use.
      a. Representative of finished exposed face of solid exterior UHPC panel. For each color and pattern specified, submit a minimum of two samples, each not less than 6 by 6 inches, and of actual thickness. Each sample to be labeled and dated. Approved sample to be stamped approved and returned to manufacturer for reference.

E. Quality Assurance/Control Submittals:
   1. Provide manufacturer's Tolerances and Acceptance Criteria prior to any panel fabrication for the Architect's review.

F. Closeout Submittals in accordance with the following:
   1. Operation and Maintenance Data:
      a. Operation and maintenance data for installed products in accordance with Specification Section - SUBMITTALS.
      b. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
   2. Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
      b. All products listed in this section are to be installed by a single installer trained by manufacturer or representative.
      c. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's written warranty requirements.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

b. All fiber cement panels specified in this section must be supplied by a manufacturer with a minimum of 5 years of experience in fabricating and supplying fiber cement cladding systems.
    1) Products covered under this section are to be manufactured in an ISO 9001 certified facility.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
    a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.

C. Mockups:
1. Build mockup indicated on Drawings to verify selections made under sample submittals, and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
2. Build mockup, including insulation, supports, attachments, and accessories for typical conditions/parts not to exceed one (1) window surround , cornice section and or building corner and not more than 100 square foot area.
3. Approval of mockup does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. The Mock-up shall match the existing Junior High building joints. See drawings for fastener spacing.

D. Meetings:
1. Pre-Installation:
    a. Coordinate the work with other work being performed.
    b. Identify any potential problems, which may impede planned progress and proper installation of work.
    c. Review structural load limitations of existing structure.
    d. Review areas where existing construction is to remain and requires protection.
2. Progress: Scheduled by the Contractor during the performance of the work.
    a. Review for proper work progress.
    b. Identify any problems and acceptable corrective measures.
    c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
    a. Inspect and identify any problems.
    b. Establish method and procedures to maintain protections while progressing to project completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be individually wrapped.
2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Deliver exterior solid UHPC wall panels and support system components packaged to comply with manufacturers' requirements and adequately protected from damage during shipment.
2. Panels are to be stored and handled vertically until installed.
3. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
    a. Protect components from adverse job conditions prior to installation.
    b. Protect components from damage after installation including staining or solvents used in adjacent work, impact damage and abrasion, etc.

c. Panels are to be stored and handled vertically until installed.
d. Store with non-staining resilient spacers between panels, with suitable ventilation.
e. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

A. Environmental requirements:
1. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
2. Burning: No burning will be allowed on-site.
3. Rain: The work under this section shall not be started or maintained under threat of rain unless the work is not affected by the rain.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.
3. Field Measurements:
a. Verify actual measurements/openings by field measurements before material fabrication, and show recorded measurements on approved shop drawings, as required.
b. Coordinate shop drawings and field measurements with adjacent work/assemblies and with associated trades/sub-contractors prior to finalizing shop drawings.
c. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.9 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
1. In accordance with manufacturer's written standard warranty for defects in fiber cement panels:
a. Warranty Period Twenty-Five (25) Years.
b. Manufacturers warranty against manufacturer's defects in panel finish:
1) Warranty Period Fifteen (15) Years.

C. Fabricator's Warranty (Accessories, Clips, other attachments, etc.):
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period Ten (10) years.

D. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period Five (5) years.

1.10 MAINTENANCE

A. Extra Material:
1. Furnish to Owner not less than 5 percent of each color of each pattern of 5' x 1' Fiber-Cement Panels Installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

1. Water Barriers:
    a. Building Wrap (also qualifies as an "Air Barrier"):
        1) TYVEK "Commercial Wrap".
        2) Acceptable alternative manufacturers:
            a) TYPAR "Metro Wrap".
    b. Sealing Tape:
        1) DUPONT 3" wide tape "Tyvek 3".
        2) Acceptable alternative manufacturers:
            a) 3M COMPANY "8086 Construction Sheathing Tape".
            b) CANTECH INDUSTRIES "Clipper Tape".
2. Penetration Flashing:
    a. GRACE CONSTRUCTION PRODUCTS "Vycor V40".
    b. Acceptable alternative manufacturers:
        1) FORTIFIBER "Fort-I-Flash 40".
        2) TYVEK "Flex Wrap" and "Straight Flash".
3. Support Structure:
    a. "Z" Furring Channels, Hat Channels, and Steel Accessories specified product manufacturer:
        1) CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
        2) Acceptable alternative manufacturers:
            a) CEMCO
            b) STUDCO
4. Engineered support structure
    a. Custom Hat Channel Furring and Steel Accessories specified product manufacturer:
        1) KNIGHT WALL SYSTEM.
5. Rigid Board Insulation product manufacturer:
    a. RMAX (a SIKA company) "ECOMAXci FR Air Barrier System".
        1) Tape "R-Seal 3000".
    b. Acceptable Alternative Manufacturers:
        1) ATLAS.
        2) JOHNS MANVILLE CORPORATION.
        3) TREMCO.
6. Fiber-Cement Board product manufacturer:
    a. TAKTL STANDARD ESR 3899.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Continuous Insulation for Wall Panels:

1. ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board", Type 1, Class 1, isocyanurate with front and back aluminum foil-faced (balanced panel), conditioned "R" value of 5.60 per inch minimum, in accordance with ASTM E 84 "Test

Method for Surface Burning Characteristics of Building Materials", and ASTM D 1621 "Test method for Compressive Properties of Rigid Cellular Plastics".

a. Flame Spread Index Maximum, core: 25 or less.
b. Smoke Density Developed Index Maximum, core: 450 or less.
c. Compressive strength: 20 PSI.
d. 4' x 4' or 4' x 8' panels.
e. Thickness: 1".

B. Building Wrap (also qualifies as an "Air Barrier"): Woven and non-woven polyolefin sheets approved per ICC ES Reports for Water-Resistive Barriers for buildings of any construction type and equivalent to Grade D paper with 60 minute water-resistant rating.

C. Sealing Tape (3" wide minimum):

1. Minimum 3" wide tape.
2. Sealing Tape shall be compatible with Building Wrap.

D. Penetration Flashing: Self-adhered and self-healing weather barrier strips, in accordance with FS UU-B-790a, Grade A.

1. 40 mil. minimum thickness, in 9-inch and 12-inch widths as is appropriate for barrier application.

E. Engineered Support Structure:

1. PanelRail
   a. 3/4" depth x 2"
   b. Zinc Coated (ASTM A1046)
   c. Thickenss: 18-Gage.
   d. Finish: Black PVDF
   e. Length: 120"
   f. Vent Holes: 4" on center
2. Reveal-Rail
   a. 3/4" depth x 5 1/8"
   b. Zinc Coated (ASTM A1046)
   c. Thickenss: 18-Gage.
   d. Finish: Black PVDF
   e. Length: 120"

F. Support Structure:

1. Steel Sheet:
   a. Steel sheet for 16 gage and heavier shall comply with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members", structural steel classification, Grade 50 ksi, Class 1 or 2.
   b. Steel sheet for 18 gage shall comply with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members", structural steel classification, Grade 33 ksi, Class 1 or 2.
   c. When hot-rolled steel sheet and strip is used in fabrication of metal members they shall comply with ASTM A1011 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength", structural steel classification, Grade 50 ksi.
2. Coating:
   a. Steel sheet shall be galvanized in accordance with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members", G90 minimum and comply with ASTM A 924 "Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process".
   b. When hot-rolled steel sheet and strip is used in fabrication of metal members, hot-dip galvanize coating shall be in accordance with ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products".

3. Thickness:

Reference Gage	Mils	Minimum Base-Metal Thickness (inch)	Minimum design Thickness (inch)
18	43	0.0428	0.0451
16	54	0.0538	0.0566
14	68	0.0677	0.0713
12	97	0.0966	0.1017
10	118	0.1180	0.1240

G. Rigid Board Insulation:
1. Specified: RMAX "ECOMAXci FR Air Barrier System".
   a. Alternate: ATLAS “Energy Shield Pro Air Barrier System”.
   b. Alternate: HUNTER “XCI Foil Class A Air Barrier System”.
   c. Alternate: JOHNS MANVILLE CORPORATION “AP Foil-Faced Foam Continuous Insulation Air Barrier System”.
2. Properties:
   a. ASTM E2357 and ICC-ES AC71 Acceptance Criteria for Foam Plastic Sheathing Panels Used as Water-Resistive Barrier.
   b. Listed as an Air Barrier Association of America (ABAA) Evaluated Boardstock Air Barrier Assembly.
   c. Polyisocyanurate with front and back aluminum foil-facers.
   d. Rigid Polyisocyanurate: ASTM C1289, Type I, Class 1.
   e. Compressive Strength: ASTM D1261, 25 psi.
   f. R Value: ASTM C518, 6.0 per inch.
   g. Fire Propagation: NFPA 285, Assembly pass.
   h. Surface Burning: ASTM E84, Faced, Flame Spread: <25; Smoke Developed: <450.
   i. Air Permeability: ASTM E2178: 0.004 cfm per sq ft or less.
   j. Water Vapor Permeability: ASTM E96 desiccant method: 0.1 perm or less.
3. System components:
   a. Washers: manufacturer recommended self-sealing for use with Self-drilling screws.
      1) Self-sealing 2 inches diameter polymer washer, UV stabilized, tested, and approved to provide air and water-resistive seal, in combination with compatible self-drilling screw.
4. System Joint Sealants, Joint Tapes, and Flashing Components:
   a. Material Standards:
      1) AAMA 711: For self-adhered flashing and joint materials.
      2) AAMA 714: For liquid applied flashing and joint materials.
   b. Static joints, joining aluminum-faced insulation panels: manufacturer recommended liquid flashing, adhered joint tape, and adhered flashing and transition tape.
   c. Static joints, joining aluminum-faced insulation panels and adjacent elements, including window and wall openings, and items penetrating the insulation: manufacturer recommended liquid flashing and adhered flashing and transition tape.
   d. Dynamic joints: use manufacturer recommended materials and devices specifically designed for such joints.

H. Fiber-Cement Panels:
1. Exterior Panels, factory-formulated with ultra high performance concrete and reinforced with alkali-resistant (AR) glass mesh, factory-mixed and manufactured; complying with ASTM C1186. Type A, Grade IV.
2. Panel Characteristics:
   a. Panel Sizes: 12" H nominal x 60" W nominal. Refer to drawings for variation in sizes.
   b. Panel Dimensional Tolerances:
      1) Panel Thickness: 5/8-inch nominally, thickness variation +/- 0.05-inch.

2) Panel Edges: Open Square Cut at vertical to horizontal transitions and open quirk miter at all vertical corner joints..
3) Panel Weight: 7.2 lbs/ft2, at 5/8-inch thickness.

c. Panel Finishes:

1) Finish exposed, front-facing surface of UHPC as follows, to match approved design reference sample. Panel faces shall be free of joint marks, grain, or other obvious defects.
2) Finish Characteristics:

a) Texture Smooth.
b) Finish Mediablast.
c) Sealer Microseal.

3) Pattern Direction: Horizontal.

d. Panel Color:

1) Panel to be Integrally through colored.
2) Refer to Interior Color Schedule.

I. Accessories:

1. As recommended in UHPC panel manufacturer's written instructions.
2. Adhesives and Sealants:
   a. As recommended in UHPC panel manufacturer's written instructions.
3. Stainless Steel Drill Screws: Of sufficient lengths and sizes to securely fasten support structure to building wall framing members, and as follows:
   a. Screws complying with ASTM C 1002 for fastening to steel members less than 0.033 inches thick.
   b. Screws complying with ASTM C 954 for fastening to steel members from 0.033 to 0.112 inches thick.

J. Support Structure:

1. Components:
   a. Horizontally-oriented attachment system support bracket/angle bracket anchored directly to building structure.
2. "Z" Furring Channels,
   a. 1.25" legs x 1" (depth required for rigid insulation).
   b. 54 Mils (16-Gage), 0.0566" (0.0538" min).
3. Auxiliary Materials:
   a. Panel Anchors: Concealed, undercut type, for attaching UHPC panels to panel-mounted extruded aluminum 'C' clips and substructure support system. Panel anchor holes to be factory pre-drilled by UHPC panel manufacturer.
      1) KEIL Concealed Anchoring System for Façade Panels, provided by panel manufacturer.
   b. Miscellaneous Materials:
      1) Aluminum Extrusions: ASTM B 221, Alloy 6005 T5.
      2) Aluminum Sheet: ASTM B 209, Alloy 6061-T5.
      3) Carbon Steel Shapes and Plates: ASTM A 36, finished as follows:
         a) Hot-Dipped Galvanized.
      4) Stainless Steel Bars and Shapes: ASTM A 276, Type 304 or better.

K. Rigid Board:

1. Wall Board:
   a. In accordance with:
      1) ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board", Type 1, Class 1, isocyanurate with front and back foil-faced (balanced panel), conditioned "R" value of 5.60 per inch minimum, in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building

Materials", and ASTM D 1621 "Test method for Compressive Properties of Rigid Cellular Plastics".

a) Flame Spread Index Maximum, core: 25.
b) Smoke Density Developed Index Maximum, core: 450.
c) Compressive strength: 20 PSI.
d) 4' x 4' or 4' x 8' panels.
e) Thickness: 1".

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affects the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.
   4. Fiber-cement panels can be installed over braced wood, steel studs and sheathing including plywood, OSB, plastic foam or fiberboard sheathing.
      a. Fiber-cement panels can also be installed over Structural Insulated Panels (SIPS), Concrete Masonry Units (CMU's) and Concrete Block Structures 9CBS's) with furring strips, and Pre-Engineered Metal Construction.
   5. Allowable stud spacing: See manufacturer's written installation instructions for details.
   6. A weather resistant barrier is required when installing fiber-cement panels.
      a. Use an approved weather resistive barrier (WRB) as defined by the current CBC.
   7. Appropriate metal flashing shall be used to prevent moisture penetration around all doors, windows, wall bottoms, material transitions and penetrations.
B. Do not install panels or components that appear to be damaged or defective.
C. Do not install wet panels.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
B. Installation of Water Barriers:

1. Install Water Barriers prior to installation of exterior wall, exterior soffit and exterior fascia framing.
2. Water Barriers shall be installed at all exterior walls, exterior soffits and fascias.
3. Install Water Barriers with Penetration Flashing, Metal Accessories, and all other related work in "shingle" or "weatherboard" fashion.
4. Water Barriers shall be installed as required in CBC Sections 1404.2, 1405, and 2510.6 as follows:
    a. Provide two layers of Water Barriers.
        1) One inner layer of Building Wrap (also qualifies as an "Air Barrier"):
            a) Seal all edges, laps and penetrations with a 3" wide minimum Sealing Tape as part of rainscreen system.
        2) One outer layer of Building Wrap.
    b. The Water Barrier shall be applied horizontally, with the upper layer lapped over the lower layer not less than 6 inches and free from holes and breaks.
        1) Where vertical joints occur, barrier shall be lapped not less than 6 inches.
    c. Exposure:
        1) Maximum exposure of Water Barriers shall be 30 days prior to support structure and Rigid Board installation, application or less as required by Water Barrier Manufacturer.
            a) Protect Water Barriers from the elements (both exposure to the sun and water) with a temporary 6-mil visqueen barrier or other material approved by the barrier manufacturer.

C. Installation of Penetration Flashing:
1. Apply Penetration Flashing in conjunction with Water Barriers, Support Structure and all other related work.
2. Install Penetration Flashing at all openings and penetrations at all exterior walls, exterior soffits and exterior fascias.
3. Install Penetration Flashings with Water Barriers, exterior Support Structure and all other related work in "shingle" or "weatherboard" fashion.
4. Penetration Flashings shall be installed as required in CBC Sections 1404 in 9" widths and continuous to 9" past all intersections around all openings, penetrations and termination to other Water Barriers of all related work.
    a. Should any penetration warrant a greater width of wall flashing, provide 12" wide flashing as required.
    b. When an object extends through the Water Barrier, return the edge of the Penetration Flashing 1" and apply to the sides of the penetrating item.
5. Objects such as electrical back-boxes, electrical speaker enclosures, penetrations created by structural members, and the like.

D. Installation of Sheet Metal Transitions:
1. Apply Sheet Metal Transitions in conjunction with Water Barriers, Penetration Flashings and all other related work.
2. Install Sheet Metal Transitions to create water tight barrier and allow drainage of water to the exterior as shown on the drawings.
3. Install Sheet Metal Transitions with Water Barriers, Penetration Flashing Sheets and all other related work in "shingle" or "weatherboard" fashion.
4. Install all Metal Accessories in accordance with manufacturer's written instructions.
    a. All Metal Accessories shall be fully supported in accordance with CBC, secure flanges to framing.
    b. Install in 10 foot lengths wherever possible.
    c. All joints (butt, mitered, bent, continuing around corners, or changing directions) shall be cut accurately, welded, or folded, sealed, pop-riveted and sealed again, for a watertight joint.

E. Support Structure:

1. General:
    a. Complete support structure assembly to support and anchor exterior UHPC wall panels. Support structure to be anchored to building structure.
2. Layout:
    a. Lines shall be straight and true.
    b. Set plumb, level, and square.
    c. Panel layout shall be a running bond pattern.
3. Horizontal support rails (Concealed attachment):
    a. Horizontally-oriented attachment system support bracket/angle bracket anchored directly to building structure.
    b. Rails to be painted black.
    c. Fasteners: Corrosion-resistant stainless steel fasteners and anchors of type, size and spacing required for type of substrate and project conditions.
4. Install wall reinforcements, channel cleats, clips, hangers, and other accessories required for connecting UHPC wall panels to supporting members and backup materials per project/façade engineers approved design.
    a. Horizontally-oriented attachment system support bracket/angle bracket anchored directly to building structure.
    b. Vertical Girts to be painted black.
    c. Fasteners: Corrosion-resistant stainless steel fasteners and anchors of type, size and spacing required for type of substrate and project conditions.
5. Vertical girt cold formed hat channels that fasten to horizontal "Z" furring channels.

F. Rigid Board Insulation:
1. Install per manufacturer's written recommendations.
2. Wrap and Tape all edges as part of rain screen system.
3. Exposed side of rigid boards are to be primed with an appropriate primer and painted black.

G. Fiber-Cement Panels:
1. General:
    a. Install products in accordance with the latest written installation guidelines of the manufacturer and all applicable building codes and other laws, rules, regulations and ordinances.
    b. Review all written manufacturer installation, maintenance instructions, and other applicable documents before installation.
2. Panel Cutting in field if needed:
    a. Field-cut panels and drill face-fastening anchor holes in accordance with the UHPC panel manufacturer's written directions.
    b. Do not field-modify factory-drilled concealed/undercut panel anchor holes.
    c. Special Precautions may include, but not limited to:
        1) Always cut fiber cement panels outside or in a well ventilated area. Do not cut the products in an enclosed area.
        2) Always wear safety glasses and NIOSH/OSHA approved respirator whenever cutting, drilling, sawing, sanding or abrading the products. Refer to manufacturer SDS for more information.
        3) Use a dust-reducing circular saw with a diamond-tipped or carbide-tipped blade.
        4) Silica Dust Warning: Fiber cement products may contain some amounts of crystalline silica, a naturally occurring, potentially hazardous mineral when airborne in dust form. Consult product SDS or visit www.osha.gov/SLTC/silicacrystalline/index.html.
    d. Seal all field cut edges with manufacturer's recommended sealer to match field color of panel.
3. Vertical Control/Expansion Joints and/or Horizontal/Compression Joints may be required. Refer to written installation guide(s).
4. Provide miscellaneous reinforcement of adhered panel parts and unitized panel parts per manufacturer and installation contractor's engineer.

5. Lift UHPC wall panels and install without damage.
6. Install UHPC panels level, plumb, square, and in alignment.
7. Provide temporary supports and bracing as required to maintain position, stability, and alignment of panels until permanent connections are completed.
8. Fasteners to be 12-gage, grade 304 Stainless Steel torx T25 recessed, color matched.

3.4 Erection Tolerances:

A. Erect UHPC panels to comply with the following noncumulative tolerances.
   1. Plan Location from Building Grid Datum: Plus or minus 1/2 inch.
   2. Top Elevation from Nominal Top Elevation: As follows:
      a. Exposed Individual Panel: Plus or minus 1/8 inch.
      b. Exposed Panel Relative to Adjacent Panel: 1/8 inch.
   3. Support Elevation from Nominal Elevation: As follows:
      a. Maximum Low: 1/2 inch.
      b. Maximum High: 1/4 inch.
   4. Maximum Plumb Variation over the Lesser of Height of Structure or 100 Feet: 1 inch.
   5. Plumb in Any 10 Feet of Element Height: 1/4 inch.
   6. Maximum Offset in Alignment of Matching Edges: 1/8 inch.
   7. Face Width of Joint: As follows (governs over joint taper):
      a. Panel Dimension 20 Feet or Less: Plus or minus 1/4 inch.
   8. Maximum Joint Taper in 10 Feet: 1/8 inch.
   9. Differential Bowing, as Erected, between Adjacent Members of Same Design: 1/8 inch.

3.5 CLEANING AND PROTECTION

A. Perform cleaning procedures according to UHPC panel manufacturer's written instructions.

B. Clean soiled UHPC surfaces with water, using soft fiber brushes and sponges, and rinse with clean water. Mild detergent may be used if water alone is not satisfactory. Power washing is permitted, if the spray is not concentrated and nozzle is not held within 5 ft. for the panel surface. Prevent damage to UHPC surfaces and staining of adjacent materials.

C. Prevent damage to UHPC surfaces and staining of adjacent material.

D. The installer is responsible for removing all metal, and UHPC scraps, clips, or fasteners along with crates and packing materials from this work, from the site when the installation is complete.
END OF SECTION

END OF SECTION

SECTION 11 61 23

CHOIR RISERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Services as listed herein and related to the provision of the following systems:
      a. Musician Risers and accessories

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Coordinate with the following sections in carrying out this work:
   1. Division 01 – General Conditions

1.03 REFERENCES

A. Comply with all national, state and local regulations and the procedures and requirements of the local jurisdiction. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.

B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, NEC (National Electrical Code), IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.

C. Labor shall be provided per applicable labor regulations and practices.

1.04 DEFINITIONS

A. Refer to Div. 01 for definitions.

B. Owner Representative: For the scope in this Section, authorized personnel representing the Owner and The Shalleck Collaborative, Inc., Theatre Consultants.

1.05 SYSTEM DESCRIPTION

A. A set of portable choir risers with accessories as noted below.

B. A set of portable band risers with accessories as noted below.

1.06 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the Owner's Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.

B. Documentation for the substitution shall be submitted with supporting material and shall include the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner's Representative shall be the sole evaluator of the fitness of the substitution.

C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

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1.07 SUBMITTALS

A. Submittals shall be made in accordance with Division 1.

B. Submittals shall be made electronically in PDF format.

C. Submittals shall be made in a timely fashion so as to not affect the project schedule, and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.

D. Submittals shall be reviewed prior to commencing acquisition of the work in this section. All services and parts of the work in this section shall be verified through the submittal process. Approval does not relieve the Contractor of the responsibility of providing equipment in accordance with the specifications.

E. Shop Drawings:

1. Submit component and installation drawings and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation.
2. Shop drawing plans and section shall be at ¼" scale minimum. Details shall be larger scales to fully explain the component.
3. Show storage area diagrams for all components un-used in any particular system.
4. Provide clear space on all shop drawings for comments and approval stamps.

F. Product Data:

1. Submit data sheets for all standard component parts, which shall include all information necessary to verify compliance with this Section.
2. Product data shall be properly identifying each components intended use. Any options or variations must be clearly noted.

G. Samples:

1. Upon 14 days of request by the Owner's Representative, submit samples for review.

H. Record Documents:

1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Within 30 days, provide electronic "as built" submittals including shop drawings, product data, flame certifications, operations and instructions manuals for all products provided, care and maintenance instructions, service line and online contacts and warranty documents.

1.08 WARRANTY

A. Warranty shall provide coverage of material and product defects and assembly workmanship for a period of three years following the date of acceptance by the Owner.

B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor, except for safety related items, which shall be corrected within 48 hours of notification.

1.09 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty subcontractors and manufacturers meeting the qualifications listed herein.

B. Specialty subcontractor shall have been continuously engaged in the sales and installation of equipment similar to that specified herein for a minimum of fifteen years.

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C. Specialty suppliers shall have at time of bid and continuously maintain throughout the project and warranty period a Specialty Contractor's license valid in the state of the project and appropriate for the work in this Section.

D. Specialty manufacturers responsible for engineering and manufacturing shall have been continuously engaged in the engineering and manufacturing of equipment similar to that specified herein for a minimum of fifteen years, and shall have provided equipment for at least fifty installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.

E. All equipment shall be UL listed and bear the appropriate labels.

1.10 DELIVERY, STORAGE AND HANDLING

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.

B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.

C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

1.11 PROJECT CONDITIONS

A. Defects in the field which may impact the work in this Section shall be reported to the Owner's Representative and corrected in accordance with the requirements of the applicable Section of work prior to commencement of the work in this Section.

B. Field Conditions: 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.

1.12 MAINTENANCE

A. Provide maintenance stock of any user-serviceable components within the system. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner at time of system commissioning.

PART 2 - PRODUCTS

2.01 PRE-APPROVED MANUFACTURERS

A. The following manufacturers are pre-approved to bid the work in this section:

Wenger Corporation / JR Clancy
555 Park Dr
Owatonna, MN 55060
Contact: Jeff Kirkpatrick
Tel: (503) 648-2463
Email: jeff.kirkpatrick@wengercorp.com

B. Pre-approval to bid does not imply acceptance of the manufacturer. It is the sole responsibility of the contractor for this Section to ensure that any price quotations received and submittals made are for controls systems that meet or exceed the specifications.

2.02 MATERIALS

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A. All components supplied under this Section shall be new. Used or factory reconditioned components shall not be acceptable.

2.03 CHOIR RISERS

A. Provide (5) Wenger Signature Choral Risers with the following attributes:
   1. 3-step model

B. Provide the following accessories:
   1. Siderail Set, Qty (1)
   2. Siderail Kit Reversed, Qty (5)
   3. Backrail Removal Kit, Qty (5)

C. Deliver to the site assembled and ready to use, and discard of all packing materials.

D. Setup the riser system on the stage as directed by the users.

E. Provide (2) hours of training, outlining setup and teardown requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Coordinate scheduling and access with the Contractor and the Owner.

B. Insert operations and maintenance information into the project record documents as specified above in Submittals.

3.02 PERFORMANCE OF THE WORK

A. The Contractor shall be responsible for storage of equipment, tools, and equipment during the period of the installation.

B. Extent: All specified equipment shall be installed by fully trained superintendents and workmen. Equipment shall be installed in a workman like manner, per plans and specifications. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.

C. Standards:
   1. Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes. All welding must be performed in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1).

3.03 CLEAN UP

A. The Contractor shall be responsible for clean up, including removal of packing materials etc. and the protection of surfaces or equipment provided by other trades.

3.04 INSPECTION AND TESTING

A. Upon completion of the installation the Contractor shall notify the Owner's Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Owner’s Representative’s schedule.

B. The Contractor shall arrange for access as necessary for inspection of equipment by the Owner's Representative.

C. In preparation for inspection by the Owner’s Representative system components shall be cleared of dust and debris.

D. All systems shall be complete and will be operated by the Owner’s Representative for approval. Make available for review by the Owner’s Representative:

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1. All components for physical inspection.
    a. Contractor shall make provisions for access as necessary.

E. The Contractor shall be liable for any return visits by the specialty sub-contractor, factory engineer or Owner's Representative as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the related Contractor or Owner's Representative to carry out their work.

3.05 TRAINING

A. Upon final approval of the system by the Owner's Representative, representatives from the Specialty Sub-Contractor shall provide instruction to designated Owner staff or representatives in the safe use and maintenance of all systems specified herein.

B. Training sessions shall be scheduled in advance to the Owner Rrepresentative's schedule.

C. Provide (2) hours of training, minimum.

D. Training shall include, but not be limited to:
    1. An overview of the system and all of its components.
    2. Demonstration of how to switch between various system configurations.
    3. Care and maintenance of the system.
    4. Basic system visual inspections, and proper and safe operation.

END OF SECTION

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SECTION 116123 - PORTABLE SEATING PLATFORMS AND SEAT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Services as listed herein and related to the provision of the following systems:

a. Audience Seating Risers
b. Portable Audience Seats

2. The Platform Contractor shall provide all items necessary for a complete, safe, fully functional system as described herein, including all tools, scaffolding, labor, and supervision, even though they may not be specifically enumerated.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.3 REFERENCES

A. Comply with all national, state and local regulations and the procedures. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, NEC (National Electrical Code), IEEE, and all manufacturer’s recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers’ warranties.
C. Labor shall be provided per applicable labor regulations and practices.

1.4 DEFINITIONS

A. Refer to Div. 01 for definitions.
B. Owner Representative: For the scope in this Section, authorized personnel representing the Owner and The Shalleck Collaborative, Inc., Theatre Consultants.

1.5 SYSTEM DESCRIPTION

A. Modular platform systems, comprised of portable platform decks, ramp, landing, support frames and railings shall be provided.
B. Loose seats with ability to interlock, including storage carts and accessories shall be provided.

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1.6 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the Owner's Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.
B. Documentation for the substitution shall be submitted with supporting material and shall include the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner's Representative shall be the sole evaluator of the fitness of the substitution.
C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.7 SUBMITTALS

A. Submittals shall be made in accordance with Division 1.
B. Submittals shall be made electronically in PDF format.
C. Submittals shall be made in a timely fashion so as to not affect the project schedule, and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.
D. Submittals shall be reviewed prior to commencing acquisition for, and fabrication of the work in this section. All services and parts of the work in this section shall be verified through the submittal process. Approval does not relieve the Contractor of the responsibility of providing equipment in accordance with the specifications.
E. Shop Drawings:

1. Submit component and installation drawings and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation.
2. Shop drawing plans and section shall be at ¼” scale minimum. Details shall be larger scales to fully explain the component.
3. Show storage area diagrams for all components un-used in any particular system.
4. Provide clear space on all shop drawings for comments and approval stamps.

F. Product Data:

1. Submit data sheets for all standard component parts, which shall include all information necessary to verify compliance with this Section.
2. Product data shall be properly identifying each components intended use. Any options or variations must be clearly noted.

G. Samples:

1. Upon 14 days of request by the Owner’s Representative, submit samples for review. Samples may include, but are not limited to:

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a. 1 square foot full scale mock-up of a typical platform deck including project-specific finish.

2. At time of delivery, submit six copies of submittals including product data, flame certifications, operations and instructions manuals for all products provided, care and maintenance instructions, service line and online contacts and warranty documents.

H. Record Documents:

1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Within 30 days, submit six copies of "as built" submittals including shop drawings, product data, flame certifications, operations and instructions manuals for all products provided, care and maintenance instructions, service line and online contacts and warranty documents.
3. Provide (3) 11x17 laminated, assembly instructions for owner use with illustrations or color pictures. Include step by step instructions for each configuration.

a. Instruction sheets may be dual sided.
b. If multiple pages are required, full instruction sets shall be bound together.

1.8 WARRANTY

A. Warranty shall provide coverage of material and product defects and assembly workmanship for a period of three years following the date of acceptance by the Owner.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor, except for safety related items, which shall be corrected within 48 hours of notification.

1.9 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty subcontractors and manufacturers meeting the qualifications listed herein.
B. Specialty subcontractor shall have been continuously engaged in the sales and installation of equipment similar to that specified herein for a minimum of fifteen years.
C. Specialty suppliers shall have at time of bid and continuously maintain throughout the project and warranty period a Specialty Contractor's license valid in the state of the project and appropriate for the work in this Section.
D. Specialty suppliers shall maintain bonds in the amount required for the project.
E. Specialty manufacturers responsible for engineering and manufacturing shall have been continuously engaged in the engineering and manufacturing of equipment similar to that specified herein for a minimum of fifteen years, and shall have provided equipment for at least fifty installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.
F. All equipment shall be UL listed and bear the appropriate labels.

1.10 DELIVERY, STORAGE AND HANDLING

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.
C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

1.11 PROJECT CONDITIONS

A. Defects in the field which may impact the work in this Section shall be reported to the Owner's Representative and corrected in accordance with the requirements of the applicable Section of work prior to commencement of the work in this Section.
B. Field Conditions: 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.

1.12 MAINTENANCE

A. Provide maintenance stock of user-serviceable components within the system. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner at time of system commissioning.

PART 2 - PRODUCTS

2.1 PRE-APPROVED PLATFORM SYSTEM MANUFACTURERS

A. The following manufacturers are pre-approved to bid the platform work in this section:

StageRight, Inc.
495 Pioneer Parkway
Clare, MI 48617
Contact: Kip Weis
Tel.: (800) 438-4499 ext. 349

Sightline Commerical
7008 Northland Drive
Minneapolis, MN 55428
Contact: Courtney Schmitz
Tel.: 662-418-6442

Wenger Corporation
555 Park Drive
Owatonna, MN 55060
Contact : Jeff Kirkpatrick
Tel. : 800-326-8373, ext 260

B. The following manufacturers are pre-approved to bid the portable seating work in this section:

Series Seating
20900 NE 30th Ave, Suite 901
Miami, FL 33180
Tel: 305-932-4626
Contact: Thomas Boyd
Email: tboyd@seriesseating.com

Wenger Corporation
555 Park Drive
Owatonna, MN 55060
Contact : Jeff Kirkpatrick
Tel. : 800-326-8373, ext 260

C. Pre-approval to bid does not imply acceptance of the manufacturer. It is the sole responsibility of the contractor for this Section to ensure that any price quotations received and submittals made are for controls systems that meet or exceed the specifications.

D. All other subcontractors must be approved prior to bid. Other contractors seeking acceptance must submit the following information at least 2 weeks prior to the bid opening date. Approval of contractors will be by addenda. Failure to submit any of the required information will automatically disqualify the contractor from consideration of approval.

1. A listing of five equivalent installations including:

   a. Name, address and telephone number of Owner;
   b. Name, address and telephone number of Theatre Consultant;
   c. Scope of work.
   d. A brief written description of the contractor's operation including facilities, financial capabilities, and experience of key personnel.

2. A statement from a bonding company agreeing to provide the required bonds in the amount required for the project.

2.2 MATERIALS

A. All components supplied under this Section shall be new. Used or factory reconditioned components shall not be acceptable.

B. Materials shall conform to the following ASTM and ANSI standard specifications:

1. A-36 - Specification for structural steel
2. A-47 - Specification for malleable iron casting
3. A-48 - Specification for gray iron casting
4. A-120 - Specification for black and hot-dipped zinc-coated (galvanized) steel pipe for ordinary use
5. B18.2.1&2 - Specification for square and hex bolts and nuts
6. B221-02 - Specification for aluminum alloy

C. Materials, devices, assemblies and installation shall meet or exceed applicable ESTA standards.

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D. In order to establish minimum standards of safety, the following factors shall be used:

1. Steel - per AISC specifications
2. Bearings – Two times required load at full speed for 2000 hours
3. Bolts - Minimum SAE J429 Grade 5 (ISO R898 Class 8.8), zinc plated
4. Standards of workmanship, design, and fabrication for structural steel shall be AISC Code of Standard Practice and ASTM A36.

E. Welding:

1. Execute welding in shop and field in accordance with standards of American Welding Society. All welders shall be qualified in accordance with standard qualification procedure of American Welding Society.
2. Control welding sequence and technique to minimize secondary stresses and distortions.
3. Net effective weld lengths shall be indicated on the shop drawings and approved before fabrication and installation.

F. All items of incidental hardware shall be furnished plated or painted black u.o.n.
G. All nuts shall be new lock nuts or shall be provided with lockwashers. No exceptions.
H. Fabrication:

1. The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall be no burrs or sharp edges to cause a hazard nor shall there be any sharp corners accessible to personnel.
2. All moving parts shall have specified tolerances.
3. All equipment shall be built and installed to facilitate future maintenance and replacement.

I. Finishes:

1. Paint shall be the manufacturer’s standard finish and color except as noted.
2. All items of incidental hardware shall be furnished plated or painted black.
3. Components shall be painted with rust inhibiting primer and finished with black paint.

J. Recommended Working Load: This specification calls for minimum recommended working loads for hardware. The manufacturer’s recommended working load is the maximum load which the manufacturer recommends be applied to properly installed, maintained, and operated new equipment. Manufacturer’s recommended working loads shall be determined by calculations by a Licensed Professional Engineer and destructive testing by an independent testing laboratory. These calculations and reports shall be available for review.

2.3 BLACK BOX AUDIENCE RISERS

A. Platform decking

1. Deck shall be portable and provide a stable surface.
2. Decks shall be a single sided portable platform with 4” high extruded 6005A-T61 aluminum frame, including protective edge, powder coated black finish. Frame shall connect to support system and railings. Subfloor shall be 1” exterior rated group 1 plywood.

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3. Performance: Certified, uniformly distributed live-load capacity of 4800 pounds per 4' x 8' section (150 pounds per sq. foot).
4. Finish

    a. Platforms deck top finish surface shall be carpet.
        1) Color to be selected from standard finishes during the submittal process.

5. Deck shall attach to the Platform Supports by molded corner receptacles, clamps or clips.
6. Decks shall attach to one another with roto-lock clamps.

    a. Provide four (2) T-wrenches for operating roto-locks.

7. Maximum weight of one platform shall be less than 100 lbs

B. Fabric Fascia

1. Provide fabric skirt panels around the platforms and ramp.
2. Fabric shall Commando Cloth black IFR, with 50% fullness. Fascia panels shall be designed to remove in sections and attach with clips.

C. Platform Support Legs

1. Platform support system shall be easy to set up and store and shall provide a stable, robust understructure.

    a. Support legs shall store on bottom of platforms
    b. Support system shall be assembled without tools by as few as two (2) people.
    c. Support system shall be capable of carrying the loads described above for the platforms.

2. Playing height shall be as shown on drawings.

    a. Support legs shall be capable of 2-1/2” of leveling adjustment.
    b. Each screw foot shaft shall have a diameter of no less than 3/4" and have zinc-plated Acme threads. The bottom of the foot shall be molded urethane.

3. Provide support legs in each platform corner and configuration as shown on drawings.

    a. Platform frame shall match deck manufacturer listed above.

D. Railings

1. Provide railings in location as shown on the drawings at the ramp and on three sides of the stage. Railing shall be 2-line black finished 1-1/4” dia aluminum tube with kick plate. Ramp shall have code required hand railing.

E. Carts

1. Provide carts for all equipment as necessary to carry the platforms, platform supports, and any related system accessories.

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a. Minimize quantity of carts and storage footprint as possible.
b. Carts with platforms shall fit through a 3’-0” standard door and into building elevator.
c. Carts shall have swivel casters with soft, non-marking rubber wheels.

F. Product shall be:

1. StageRight All Purpose Deck and Bridging Risers
2. Sightline Commercial SC90 Platform with acoustical infill and adjustable height legs
3. Wenger Stagetek Seated Risers

2.4 BLACK BOX AUDIENCE SEATING

A. Seats shall be of similar envelope to fixed seating shall be of consistent width.

1. Back shape and seat pan shape shall be similar to fixed seats.
2. Seat back and seat pan shall be upholstered.

a. Upholstery shall match the upholstery provided on the adjacent telescopic seats, (see section 12 66 23)

3. Seats shall have armrests.

a. Armrests shall be wood, with a stain matched to the finish of the adjacent telescopic seating.

B. Carts shall be provided for stacking seats.
C. Provide quantity (145) of:

1. Series Seating Model K
2. Wenger Audience Seat

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate scheduling and access with the Contractor and the Owner.
B. Insert operations and maintenance information into the project record documents as specified above in Submittals.

3.2 PERFORMANCE OF THE WORK

A. The Contractor shall be responsible for storage of stage equipment, tools, and equipment during the period of the installation.

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B. Extent: All specified equipment shall be installed by fully trained superintendents and workmen. Equipment shall be installed in a workman like manner, per plans and specifications. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.
C. Standards:

1. Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes. All welding must be performed in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1).
2. Fabricate metal work in accordance with standards of first-class workmanship with ornamental work free of blemishes like tool marks, burrs, scars, and abrasions. All edges shall be smooth. All points, welds, and intersections shall be properly made and fitted to provide a uniform finish.

D. All connection points shall be welded and ground smooth.
E. Fit abutting surfaces closely.

1. Provide slotted holes, as needed, in steel members which require accurate alignment.

F. Accurately align and adjust various frame members before final anchoring.
G. Erect metal work level, plumb, square and in proper alignment with adjacent work. Deformed components shall be remedied.
H. Attachments: All equipment shall be securely attached to the building structure.
I. Finishes:

1. All welds must be touched up to match disturbed finishes.
2. All finishes which are disturbed during shipping and installation shall be touched up to match the original.

3.3 CLEAN UP

A. The Contractor shall be responsible for cleanup, including removal of packing materials etc. and the protection of surfaces or equipment provided by other trades.

3.4 INSPECTION AND TESTING

A. Upon completion of the installation the Contractor shall notify the Owner's Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Owner’s Representative’s schedule.
B. The Contractor shall arrange for access as necessary for inspection of equipment by the Owner's Representative.
C. In preparation for inspection by the Owner’s Representative system components shall be cleared of dust and debris.
D. All systems shall be complete and will be operated by the Owner’s Representative for approval. Make available for review by the Owner’s Representative:

1. All components for physical inspection.

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a. Contractor shall make provisions for access as necessary.

2. Spare parts inventory.

E. The Contractor shall be liable for any return visits by the specialty sub-contractor, factory engineer or Owner's Representative as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the related Contractor or Owner's Representative to carry out their work.

3.5 TRAINING

A. Upon final approval of the system by the Owner's Representative, representatives from the Platforming System Specialty Sub-Contractor shall instruct designated Owner staff or representatives in the safe use and maintenance of all systems specified herein.
B. Schedule training sessions in advance to fit the Owner staff or representatives' schedules.
C. Provide 4 hours of training.
D. Training shall include, but not be limited to:

1. An overview of the platforming system and all components.
2. Full process for setting up and taking down the system, in all of its configurations.
3. Care and maintenance of the platforming system.

END OF SECTION

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SECTION 116133 - PRODUCTION RIGGING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. The Rigging Contractor shall provide all items necessary for a complete, safe, fully functional system as described herein and as shown on drawings, including all tools, scaffolding, labor, and supervision, even though they may not be specifically enumerated.

1.2 RELATED SECTIONS

A. Coordinate with the following sections in carrying out this work:

1. Division 01 – General Conditions
2. Division 05 – Metals
3. Division 6 & 9 - Floor and adjacent architectural finishes
4. Section 11 61 83 – Production Lighting Control
5. Division 21 – Wet Sprinkler Pipe System
6. Division 23 – HVAC and Plumbing
7. Division 26 – Electrical
8. Section 26 05 35 – Production Systems Electrical Installation
9. It shall be under the work in this section to coordinate established clearances to the general contractor and all others trades on the project and maintain necessary clearance requirements for all rigging components and clear zones.

    a. No conduit, raceway, sprinkler pipe, plumbing pipe, duct, any other part of the mechanical systems, or any structural component shall be in a rigging clear zone nor shall they obstruct the operations of the rigging systems nor shall they be within 6” of a moving rigging component, including lift lines.

1.3 REFERENCES

A. Comply with all national, state and local regulations. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.

B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, CEC, IEEE, and all manufacturer’s recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers’ warranties.

C. Labor shall be provided per applicable labor regulations and practices.

1.4 DEFINITIONS

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A. Refer to Div. 01 for definitions.
B. Owner's representative: For the scope in this Section, authorized personnel representing the Owner and The Shalleck Collaborative, Inc., Theatre Consultants.
C. Recommended Working Load: This specification calls for minimum recommended working loads for hardware. The manufacturer's recommended working load is the maximum load which the manufacturer recommends be applied to properly installed, maintained, and operated new equipment. Manufacturer's recommended working loads shall be determined by calculations by a Licensed Professional Engineer and destructive testing by an independent testing laboratory. These calculations and reports shall be available for review.

1.5 SYSTEM DESCRIPTION

A. Blackbox Theatre will have a Tension Wire grid, dead hung battens in the upstage area, and (1) drapery track and bi-part drapery.
B. Drama Classroom will have a pipe grid and perimeter drapery track and draperies.

1.6 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the Owner's Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.
B. Documentation for the substitution shall be submitted with supporting material and shall include the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner's Representative shall be the sole evaluator of the fitness of the substitution.
C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.7 SUBMITTALS

A. Submittals shall be made in a timely fashion so as to not affect the project schedule and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.
B. All submittals shall be made in electronic format.

1. Provide Hard copies if requested by Architect.
2. Files shall be in .pdf format, and submitted electronically.

C. All submittals shall be prepared for review by the CA Division of the State Architect as "deferred approval" items. As such complete shop drawings and relevant calculations shall be fully engineered and bear the stamp of a Structural Engineer licensed in the State of CA.
D. Submittals shall be reviewed, and field dimensions verified prior to commencing acquisition for, and fabrication of the work in this section. All services and parts of the work in this section shall be verified through the submittal process. Approval does not relieve the Contractor of the responsibility of providing equipment in accordance with the specifications.

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E. Shop Drawings:

1. Submit component and installation drawings and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation.
2. Upon approval by the Owner's Representative, submit a dedicated set of drawings, product data and test and compliance certifications regarding all aspects of the proscenium fire safety curtain for review by building officials.
3. Shop drawing plans and sections shall be at 1/4" scale minimum. Details shall be larger scales to fully explain the component.
4. Provide clear space on all shop drawings for comments and approval stamps.

F. Product Data:

1. Submit data sheets for all standard component parts, which shall include all information necessary to verify compliance with this Section.
2. Product data shall properly identify each component's intended use. Any options or variations must be clearly noted.

G. Samples:

1. Upon 14 days of request by the Owner's Representative, submit samples for review. Samples may include, but are not limited to:

    a. Tracks and hardware
    b. 12" x 12" mock-up of a tension grid panel, including any permanent internal framing members
    c. Selected drapery materials, 2 bolt yards minimum
    d. Sewing detail sampler demonstrating drapery top, side and bottom.

H. Record Documents:

1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Within 30 days, submit three (3) paper copies and six (6) electronic copies, in PDF format, of "as built" submittals including shop drawings, product data, flame certifications and listings, operations and instructions manuals for all products provided, care and maintenance instructions, service line and online contacts and warranty documents. Files shall be in .pdf format, and submitted via email, direct FTP download, USB memory stick, CD or DVD.

1.8 WARRANTY

A. Warranty shall provide coverage of material and product defects and assembly workmanship for a period of three years following the date of acceptance by the Owner.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor, except for safety related items, which shall be corrected within 48 hours of notification.

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1.9 MAINTENANCE SERVICE:

A. Provide maintenance service for a period of one (1) year after final acceptance of the installation. This service consists of at least one visit to the site for checking and adjusting of equipment. Perform the visit 11 months after the system has been accepted. Time of visit shall be coordinated with Owner and Owner Representative's schedule.

1.10 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty suppliers and manufacturers meeting the qualifications listed herein.
B. Specialty suppliers and the individuals responsible for installation in the field shall have been continuously engaged in the sales and integration of rigging equipment similar to that specified herein for a minimum of fifteen years and shall have completed at least ten installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.
C. Specialty suppliers shall have at time of bid, and continuously maintain throughout the project and warranty period, a Specialty Contractor's license appropriate for the work in this section as applicable.
D. Specialty suppliers shall maintain bonds in the amount required for the project.
E. Specialty manufacturers responsible for engineering and manufacturing shall have been continuously engaged in the engineering and manufacturing of rigging equipment similar to that specified herein for a minimum of fifteen years and shall have provided equipment for at least fifty installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.
F. All equipment shall be UL listed and bear the appropriate labels.

1.11 DELIVERY, STORAGE AND HANDLING

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect materials from damage during delivery, handling, storage and installation.
C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.
D. Draperies shall be packed and shipped in methods and containers that shall prevent crushing of finished goods.

1.12 PROJECT CONDITIONS

A. Defects in the field which may impact the work in this Section shall be reported to the Owner's Representative and corrected in accordance with the requirements of the applicable Section of work prior to commencement of the work in this Section.
B. Field Conditions: 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.

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1.13 MAINTENANCE

A. Provide maintenance stock of User-serviceable components within the system. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner at time of system checkout.

B. Maintenance stock shall include:

1. For each type in the system provide:

a. One master traveler track carrier for each track type
b. Four intermediate traveler track carriers for each track type
c. Four shackles of each type in the system.
d. Eight wire rope thimbles for each cable size
e. Eight wire rope compression sleeves for each cable size
f. Twenty complete replacement tension grid cable assemblies of each size used throughout the project. All fittings shall be shop applied.
g. Any tools necessary for removal of old tension grid cables and installation of new tension grid cables.

PART 2 - PRODUCTS

2.1 PRE-APPROVED SPECIALTY SUBCONTRACTORS

A. The following production systems specialty subcontractors have been pre-approved for bidding for the work in this section:

LVH Entertainment Systems
300 Irving Drive
Oxnard, CA 93030
Tel. (805) 278-4584

Protech USA
3431 N. Bruce St
N. Las Vegas, NV 89030
Tel. (702) 639.0290
Contact: Will Brants

Stagecraft Industries, Inc.
5051 North Lagoon Ave
Portland, OR 97217
Tel. (503) 286-1600
Contact: Kevin Shetterly

B. All other manufacturers and installers must be approved prior to bid. Other contractors seeking acceptance must submit the following information at least 2 weeks prior to the bid opening date. Approval of contractors will be by addenda. Failure to submit any of the required information will automatically disqualify the contractor from consideration of approval.

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1. A listing of five equivalent installations including:

   a. Name, address and telephone number of Owner
   b. Name, address and telephone number of Theatre Consultant
   c. Scope of work
   d. A brief written description of the contractor's operation including facilities, financial capabilities, and experience of key personnel.
   e. A statement from a bonding company agreeing to provide the required bonds in the amount required for the project.
   f. Documentation necessary to show compliance with Quality Assurance, above.

2. Permission to bid does not imply acceptance of the specialty subcontractors. It is the sole responsibility of the contractor for this Section to ensure that any price quotations received, and submittals made are for systems that meet or exceed the specifications.

2.2 SPECIALTY MANUFACTURERS AND SUPPLIERS

A. The following production systems specialty manufacturers may furnish equipment for the work in this section:

Wenger/J.R.Clancy/Texas Scenic/H&H
7041 Interstate Island Road
Syracuse, NY 13209

Thern Stage Equipment
5712 Industrial Park Road
Winona, MN 55987

Automatic Devices Company
2121 South 12th Street
Allentown, PA 18103

2.3 MATERIALS

A. All components supplied under this Section shall be new. Used or factory reconditioned components shall not be acceptable.
B. Materials shall conform to the following ASTM, ANSI and ESTA standard specifications:

   1. ASTM A36 – Specification for structural steel
   2. ASTM A47 – Specification for malleable iron casting
   3. ASTM A48 – Specification for gray iron casting
   4. ASTM A120 – Specification for black and hot-dipped zinc-coated (galvanized) steel pipe for ordinary use
   5. ASME B18.2.1&2 – Specification for square and hex bolts and nuts
   6. ASTM B221-02 – Specification for aluminum alloy

C. Materials, devices, assemblies and installation shall meet or exceed applicable ESTA standards.
D. In order to establish minimum standards of safety, the following factors shall be used:

1. Cables and fittings – 8:1 Safety Factor
2. Cable bending ratio – Sheave tread diameter is 30 times cable diameter
3. Tread Pressures – 500 lbs. for cast iron; 900 lbs. for Nylatron; 1000 lbs. for steel
4. Maximum fleet angle – 1-1/2 degrees
5. Steel – Per AISC specifications
6. Bearings – Two times required load at full speed for 2000 hours
7. Bolts – Minimum SAE J429 Grade 5 (ISO R898 Class 8.8), zinc plated

E. All turnbuckles, clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted black.

F. All nuts shall be new lock nuts or shall be provided with “split lock” lock washers or nylock nuts. No exceptions.

G. Lift Lines:

1. Diameters as noted on drawings or as required, 7 x 19 construction, galvanized wire rope aircraft cable, with the following breaking strengths:

   a. 3/16” diameter: 4,200 lbs.
   b. 1/4” diameter: 7,000 lbs.
   c. 3/8” diameter: 14,400 lbs.

2. Damaged or deformed cable shall not be used. All wire rope rigging shall be installed so as to prevent abrasion of the wire rope against any part of the building construction or other equipment.

H. Fabrication:

1. The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall be no burrs or sharp edges to cause a hazard nor shall there be any sharp corners accessible to personnel.
2. All moving parts shall have specified tolerances.
3. All equipment shall be built and installed to facilitate future maintenance and replacement.

I. Finishes:

1. Paint shall be the manufacturer’s standard finish and color except as noted.
2. All turnbuckles, clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted black.

2.4 TENSION GRID

A. General:

1. Performance criteria:

   a. The tensioned wire grid shall be designed for a live load capacity of 20 pounds per square foot.
   b. The maximum tension in any one line shall not exceed 650 pounds.

c. The support frame shall be designed so that compression loads caused by tension in the cables do not exceed 5,000 pounds in any member.
d. For each module, the aircraft cable mesh shall not deflect more than two inches under a maximum concentrated load of 250 pounds.
e. A maximum concentrated load of 250 pounds applied within 12" of the edge of the panel frame shall not cause the threaded studs to bend over the edge of the frame.
f. There shall be no horizontal loads imposed upon the building by the design of the grid
   1) Except for sway braces to add lateral stability, as approved by Owner's Representative.
   2) Except for horizontal loads applied to the purpose designed tension grid perimeter frame which is intended to support the grid panels under tension.

g. The total live load and the weight of the grid shall be transmitted through the hangers or attachment structure to the adjacent building steel.

2. Coordinate work with other trades doing adjoining work to assure proper fit, and installation.
3. The scope of work shall include provision of the tension grid panels. Railings to be provided by Architectural.

B. Materials and Components:

1. All materials shall be new and of best quality. Fittings and fasteners shall be painted or galvanized unless otherwise noted and shall conform to applicable industry requirements and codes.
2. Fittings:

   a. Bolts, nuts, washers, lock washers as required for complete fabrication and installation.

C. Workmanship:

1. Fabricate metal work in accordance with standards of first class workmanship, with ornamental work free of blemishes like tool marks, burrs, scars and abrasions. All edges shall be smooth. All points, welds, and intersections shall be properly made and fitted to provide a uniform finish.
2. All connection points shall be welded and ground smooth.
3. Provide slotted holes, as needed, in steel members which require accurate alignment.
4. Fit abutting surfaces closely.
5. Accurately align and adjust various frame members before final anchoring.
6. Erect metal work level, plumb, square and in proper alignment with adjacent work. Deformed components shall be remedied.

   a. Frames shall be installed with adequate clearances to permit replacement and tensioning of cables after the frames are welded in place.

D. Tension Grid Frame Construction:

1. The tension grid shall be constructed of welded steel frames prefabricated at the subcontractor's shop to form the final configurations as shown on the drawings.

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2. Frames shall have mitered welded corners and shall be shipped as individual units. The tension grid assembly shall not be fabricated in place.
3. The frame members shall have cable holes drilled on 2” centers along the length of each side.

    a. The holes shall be located as shown on drawings.
    b. Holes shall be chamfered on the interior face of the channels to allow unimpeded cable movement under vertical deflection.
    c. The live end of the tensioned wires shall only have nuts on the outside of the frame, so the stud is free to move under vertical deflection.

4. Install plate steel web stiffeners that are substantially welded in place and located at quarter points on each side of the frames and centered between two cable holes.
5. The frames shall be painted, black, prior to weaving.
6. Temporary fabrication and shipping struts as described below shall be installed in the frames prior to the tension grid frames being woven at the factory.
7. Weld frames to support structure provided under this scope.
8. Provide plywood or metal covers for any gaps between adjacent panel frames that are larger than 3” in width.

    a. Covers shall be readily removable to allow access from above to maintain or change cable assemblies.

E. Temporary Fabrication and Shipping Struts

1. Provide temporary fabrication and shipping struts (struts) that are installed before the wire rope cables are woven to prevent deformation of the frames.
2. The struts shall be either 2x4 wooden studs or steel angle. Any required mounting assemblies or residue shall be completely removed from the frames once the temporary struts are removed.
3. The temporary fabrication and shipping struts shall be installed in a cross-pattern to stabilize the frames and mitigate deformation during assembly, shipment and installation. The struts shall remain in the frames until all of the frames, perimeter gussets and tension tabs are welded in place. Upon completion of all welding, remove the struts from the jobsite.

F. Cable Assembly

1. Woven wire tension grid shall be fabricated of wire rope that is attached to the frames.
2. Wire rope shall be 1/8" diameter 7 x 19 galvanized aircraft cable, blackened with electrostatically-applied paint.

    a. Acceptable products shall be by Fehr Brothers, or equal

3. Each cable assembly shall include:

    a. The “dead” end shall be secured with two 1/8" Nicopress wire rope stop sleeves bearing on a washer of appropriate size and thickness. A 1/16” indicator gap shall be provided between the two sleeves.
        1) Double Nicopress Stops
        2) Swaged Headed stud

3) Double threaded swaged ends

b. The “live” end shall be a stainless-steel alloy swaged threaded stud fitting bearing on a washer of appropriate size and thickness and locked in place with a nut and a lock nut on the outside of the panel frame. Stud shall be of appropriate length to provide 1” of future tensioning and adjustment after the cables are woven and initially tensioned in the frames.

4. Fittings and their application methods shall not reduce the recommended working load of the cables.

G. Tension tabs and perimeter gussets

1. Tension Tabs shall be provided on both the top and bottom surfaces.
2. Provide 1” wide strap steel tension tabs that are welded between adjacent frames at quarter points along the perimeter frame. Tabs shall be sized and welded to transmit opposing lateral forces between frames.

a. Center the tension tabs between cables for ease of adjustment.

3. Provide plate steel gussets that are installed along the overall perimeter of the tension grid area that connect the tension grid perimeter channel members to the perimeter support steel provided by structural.

a. Substantially weld the perimeter gussets on quarter points and centered between cables.

H. Tension Grid Loading Signage

1. Provide advisory sign listing maximum allowable loads.
2. Sign shall meet ANSI Z535 standard for warning signs.
3. Mount to wall as directed by Owner’s Representative.

2.5 PIPE GRID

A. Pipe Grid shall be installed as indicated on the drawings. Mount Pipe Grid using hardware configuration as shown on drawings.
B. Adjust pipes so that they are aligned straight and level.
C. Pipe Grid shall be fabricated from 1-1/2" nominal I.D. (1.9" o.d.) schedule 40 steel pipe.

1. All edges shall be de-burred.
2. Battens shall be finished with a suitable black rust resistant finish.

D. All pipes less than 21’ in length shall be continuous and not spliced.

1. Where splices are necessary on pipes longer than 21’, all joints shall be sleeve spliced with 18" long tight fitting sleeves (mechanical tube - not pipe) extending 9" into each pipe and held by two 3/8" hex bolts and lock nuts on each side of the joint. Threaded couplers shall not be permitted. Spliced battens shall have at least the same overall capacity, deflection, and strength as the component pipe.

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E. Intersecting pipes shall be joined with a Clancy #015-100 Cross Grid Connector or by an approved equal. The cross grid connector shall have a recommended working load of at least 2,500 lbs.

F. Each pipe which terminates at the wall shall be mounted to the wall using a flange, anchored into structural backing, as shown on drawings.

G. At each hanging point the hanger shall attach to the overhead structure with an appropriate fitting.

H. Pipe Clamps:

1. Pipe clamps shall be made of two strips of 12 Ga. by 2" hot rolled steel formed to encompass and clamp the pipe batten to prevent its rotation. Corners shall be rounded.
2. There shall be a 3/8" x 1" hex bolt with lock nut above and below the batten. A 5/8" hole in the top of each clamp half allows the attachment of cable, chain, or other fittings.

I. Threaded Rod Hanging Assembly:

1. The grid shall be rigidly hung from the overhead steel structures on centers not exceeding 8’-0” feet in either direction.
2. Each hanging point shall be threaded rod, sized appropriately to support the loading conditions shown in the drawings.

J. Compression Strut Hanging Assembly:

1. Use compression struts in place of threaded rod as needed for seismic bracing.
2. Internally routed diagonal braces shall extend from the pipe grid up to the roof structure. Supply sufficient braces to prevent lateral movement of the pipe grid. Provide diagonal bracing as required.

K. Pipe Grid Loading Signage

1. Provide (1) advisory sign listing maximum allowable distributed and point loads.
2. Sign shall meet ANSI Z535 standard for warning signs.
3. Mount to wall as directed by Owner’s Representative.

2.6 MISCELLANEOUS RIGGING EQUIPMENT

A. Loose Pipe Battens

1. Pipe battens shall be fabricated using materials that support the design loads in accordance with the requirements of these specifications.

   a. Pipe battens shall be fabricated from 1-1/2” nominal diameter (1.9” o.d.) schedule 40 black pipe.
   b. All edges shall be de-burred.
   c. Battens shall be finished with a suitable black rust resistant finish.

2. Provide in the following lengths and quantities:

   a. 25 @ 10’-6”, delivered to the tension grid level and installed as shown on the drawings.

b. 11 @ 10’-6”, delivered to the stage right catwalk (Catwalk 211) and strapped together in a neat stack for storage.

3. Provide pipe mounting clamps in the following quantities and types:

a. Provide (60) fixed, right angle “cheeseborough” type clamps
   1) (50) of these are to be used for the installed loose pipe battens described above.
   2) (10) are to be delivered to the stage right catwalk (Catwalk 211).

b. Provide (20) Swivel “cheeseborough” type clamps, delivered to the stage right catwalk (Catwalk 211).
c. All clamps shall be finished black.

4. Mount each pipe as directed by the Owner’s representative.

B. It is under the work in this section to provide miscellaneous guardrails, brackets and other equipment that is called out in the PR drawings and not noted specifically as under the work of other trades. Such equipment shall meet all prevailing codes.

2.7 DRAPERIES

A. Provide in sizes and quantities as noted on the drapery schedules. Verify in field; scheduled areas for drapes are minimum, and drape area is to be maximized as field conditions allow.

1. Install as shown in drawings.

B. Fabric:

1. Fabric shall be as specified below. Weight and color per drapery schedule.

a. “Black” shall be black.
b. Face fabric shall be IFR velour manufactured by KM Fabrics or J.B. Martin.

2. Flame Retardancy: Fabrics must comply with flame retardancy according to the requirements of the National Fire Protection Association’s NFPA #701.

C. Fullness

1. Pleats: Pleats for draperies specified with fullness shall be box sewn on 12" centers.
2. Fullness shall be sewn into the drape as specified per drapery schedule.

D. Seams:

1. Seams between strips shall be single stitched without puckers using thread of matching color. Drapes shall be sewn so pile runs in the same direction. Seams shall be arranged to be concealed by Pleats.

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E. Manufacturer's contact information, flame certifications, material and drape dimensions shall appear on a label sewn to the rear of a bottom offstage corner of each panel. Label shall be black with white lettering.

F. Sewing

1. Nap shall be sewn up, unless otherwise noted on schedule.
2. Provide a 12" square of face and lining fabric to the rear of a top offstage corner of each panel. This panel shall be available as a cutaway sample for testing of flame retardant characteristics over time.
3. Top Finish: 3-1/2" black nylon webbing shall be double stitched to the top of the curtain with 1" of face fabric turned under the webbing.

    a. Brass rustproof grommets shall be inserted in pleat centers or on12" centers on flat curtains. Grommets shall be used as follows: #4 grommets - lined velour, heavy weight fabrics. Grommets shall be black.
    b. All drapes shall have two grommets in top corners and spacing shall coordinate with master carrier chains.
    c. Track Mounted curtains shall be supplied with black powder coated carabineers at all grommets to attachment to carrier chain.

4. Bottom Hems:

    a. All full height curtains shall have 6" bottom hems complete with separate interior chain pockets filled with #8 plated jack chain. Chain pockets shall be stitched so that the chain will ride 2" above the finished bottom edge of the curtain.

5. Side Hems:

    a. Side hems shall be 2". Raw edge of fabric shall be turned under the 2" side hem. Stage drapery bi-part curtains shall have the onstage face fabric turned to the back of the drape running 3 feet on the back side on the onstage edges of the panels.

2.8 DRAPERY TRACK

A. Provide drapery track in locations as shown on the drawings.

1. Provide complete with all necessary accessories.
2. Maximize height of tracks so top of tracks clear under obstructions by maximum of 1/2".
3. Each section of track less than 20 feet shall be in one continuous piece. Splice clamps shall be permitted for section lengths over 20 feet.
4. Track shall have sufficient capacity to carry maximum loaded carrier at minimum spacing.
5. All non-moving/movement bearing parts shall be finished flat black.
6. Carriers:

    a. Carriers shall be constructed of nylon, supported from two heavy-duty neoprene or urethane-tired wheels riveted to steel body with shielded ball bearings. Each carrier shall be equipped with a free-moving swivel and sufficient trim chain to accommodate a curtain.

b. Each carrier shall have rear fold back-pack tabs and rubber washers shall be provided between each back-pack tab and carrier.
c. Provide one carrier for each 12” of track, plus spares.
d. Provide master carriers at the leading and training edge of each stage drapes.
e. The master carrier block shall be constructed of plated steel having two cable clips to clamp the cord to the carrier. Four wheels in pairs identical to the single carrier above shall support the block.
f. Carriers shall have 25# capacity.

7. Live and dead-end pulleys shall 6” diameter, equipped with sealed precision ball bearings on adequately guarded plated steel housings. Provide end stops at each track end, and as necessary to maintain required clearances around door openings.
8. Provide with 6” diameter adjustable, demountable floor pulley.

a. Fasten to stage floor with threaded inserts and wing bolts for quick removal.

9. Stretch-resistant, cable center operating cord shall be 3/8" in diameter.
10. Stage tracks shall be rigged for bi-parting operation with a 48" center overlap. Hanging clamps will be provided for suspension at five-foot maximum intervals.
11. Traveler Tracks shall be provided as follows:

a. For curved tracks with drapery over 10’ tall:
1) H&H 500 Series
2) ADC Patriarc 500 Series

b. For straight tracks with drapery over 10’ tall:
1) H&H 400 Series
2) ADC Silent Steel 280 Series

c. Or equal

PART 3 - EXECUTION

3.1 PERFORMANCE OF THE WORK

A. The Rigging Contractor shall be responsible for storage of stage equipment, tools, and equipment during the period of the installation.
B. Extent: All specified equipment shall be installed by fully trained superintendents and workmen. Equipment shall be installed in a workman like manner, per plans and specifications. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.
C. Standards: Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes. All welding must be performed in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1).
D. Alignment: Mule blocks, cable rollers and guides shall be installed using a precision laser, as required, to provide proper alignment, to maintain minimum fleet angles, and to prevent contact with other surfaces. There shall be no fleet angle where possible, but if required fleet angle shall be no greater than 1½°.

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E. Fabricate metal work in accordance with standards of first class workmanship with ornamental work free of blemishes like tool marks, burrs, scars and abrasions. All edges shall be smooth. All points, welds and intersections shall be properly made and fitted to provide a uniform finish.
F. All connection points shall be welded and ground smooth.
G. Provide slotted holes, as needed, in steel members which require accurate alignment.
H. Fit abutting surfaces closely.
I. Accurately align and adjust various frame members before final anchoring.
J. Erect metal work level, plumb, square and in proper alignment with adjacent work. Deformed components shall be remedied.
K. Attachments: All equipment shall be securely attached to the building structure.
L. Finishes:

1. All welds must be touched up to match disturbed finishes.
2. All finishes which are disturbed during shipping and installation shall be touched up to match the original.

3.2 CLEAN UP

A. The Contractor shall be responsible for clean up, including removal of packing materials etc. and the protection of surfaces or equipment provided by other contractors.

3.3 PRODUCTION RIGGING INSPECTION

A. Third party ESTA ETCP certified production rigger shall be engaged to provide an ANSI rigging inspection and report noting deficiencies and deviations from ANSI E1.47 – 2020 level two for newly installed equipment. The ESTA ETCP certified production rigging inspector shall not be employed by the installing production rigging contractor. General Contractor shall contract this inspector.
B. Report shall be provided with a list all production rigging equipment and individual components in the project.
C. Inspection shall include all items shown on the PR drawings and in this Section.
D. Report shall include the certification and signature of the inspector, a checkoff of individual details of each item and that it has been inspected and the methods of doing so, and the current condition of each item.
E. Report shall be provided to the District’s Representative as a part of Contractor’s indication of system readiness for final review by District’s Representative.

3.4 INSPECTION AND TESTING

A. Upon completion of the installation, and after allowing the draperies to hang out for 2 weeks minimum, the Contractor shall notify the Owner’s Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Owner’s Representative’s schedule.

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1. The Contractor shall be liable for any return visits by the specialty sub-contractor, factory engineer or Owner's Representative as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the related Contractor or Owner's Representative to carry out their work.

B. During the periods where movable systems are operated, the Theatre shall be quiet.
C. In preparation for inspection by the Owner's Representative:

1. Rigging system components cleared of dust and debris.

D. Make available for review by the Owner's Representative:

1. Access to all components for physical inspection.
2. All systems shall be complete and will be operated by the Owner's Representative for approval.
3. Spare parts inventory.

3.5 TRAINING

A. Upon final approval of the system by the Owner's Representative, representatives from the Rigging Specialty Sub-Contractor shall instruct designated Owner staff or representatives in the safe use and maintenance of all systems specified herein.
B. Schedule training sessions in advance to fit the Owner staff or representatives' schedules.
C. Provide 4 hours of training.
D. Training shall include, but not be limited to:

1. An overview of the systems and all components.
2. Care and maintenance of rigging systems.
3. Care and maintenance of drapes including proper folding and storage
4. Basic system visual inspections

END OF SECTION

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SECTION 116183 – PRODUCTION LIGHTING CONTROL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Services as listed herein and related to the furnishing and commissioning of production lighting dimming and control system equipment.
2. Termination of low voltage lighting control network connections, including but not limited to DMX, and all control wire in the system at control outlets, button stations, LC stations, DMX and 0-10v lighting fixtures, relay panels, and architectural control processor, emergency lighting control and as required for a complete and working system.
3. Programing and addressing of DMX controlled architectural lighting fixtures controlled by the production lighting system.

1.2 RELATED SECTIONS

A. Coordinate with the following sections in carrying out this work:

1. Division 1 – General Conditions
2. Division 26 – Electrical
3. Section 11 61 33 – Production Rigging
4. Section 26 05 35 – Production Systems Electrical Installation
5. Section 27 41 16 - AV Systems

1.3 REFERENCES

A. Comply with all national, state and local regulations. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, CEC, IEEE, and all manufacturer’s recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers’ warranties.
C. Labor shall be provided per applicable labor regulations and practices.

1.4 DEFINITIONS

A. Refer to Div. 1 for definitions.
B. Owner: For the scope in this Section, authorized personnel representing the Owner and The Shalleck Collaborative, Inc., Theatre Consultants.

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1.5 SYSTEM DESCRIPTION

A. The project includes a black box theatre, drama classroom and sports arena, as well as support spaces. The following should be provided:

1. DMX controlled relay or breaker panels, as shown in the drawings.
2. Power and data distribution receptacles, as shown in the drawings.
3. Control equipment
4. Racks and enclosures
5. Control devices for architectural lighting, as required.

    a. Note: it is under the work of this section to review the electrical and architectural lighting drawings and to provide all equipment necessary for a fully functional system, as described in this section, even if this equipment is not shown on the production lighting drawings. It is not necessary to provide any equipment which is specifically shown on the lighting drawings to be provided by Div. 26. It is the responsibility of the lighting integrator to obtain the electrical and architectural lighting drawings.

B. The production lighting control system in all spaces shall be new and complete, and shall control the theatrical lighting, and selected work lighting through interface with networked controlled relays.

C. The system shall be comprised of control panels, control electronics, a data network, controlled relays, and circuit wiring devices.

1.6 CURRENT TECHNOLOGY

A. Only the most current hardware and software shall be provided. In no case will discontinued or superseded products be acceptable. If the manufacturer has developed and successfully released products that meet or exceed the criteria within this specification, the Contractor shall notify the Owner's Representative and submit the new product for review. If accepted, the products will be provided at no additional cost to the Owner. Software upgrades and authorized support services for its proper integration into the system shall be provided at no cost to the Owner throughout the warranty period.

B. In the event of known product defaults or recall, the Contractor shall immediately notify the Owner and Owner's Representative and make immediate arrangements for remedy.

C. None of the stipulations herein shall be grounds for revision to the project schedule.

D. See related procedures under Warranties in this Section.

1.7 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the Owner's Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.

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B. Documentation for the substitution shall be submitted with supporting material and shall include the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner's Representative shall be the sole evaluator of the fitness of the substitution.

C. All expenses related to the substitution including, but not limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.8 SUBMITTALS

A. Submittals shall be made in accordance with Division 1.

B. If permitted under Division 1, all submittals shall be made in electronic format.

1. Files shall be in .pdf format, and submitted via email, download, CD or DVD.

C. Submittals shall be made in a timely fashion so as to not affect the project schedule and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.

D. Submittals shall be reviewed, and field dimensions verified prior to commencing acquisition for, and fabrication of the work in this section. All services and parts of the work in this section shall be verified through the submittal process.

E. Conduit, Backboxes and Electrical Systems Verification Letter:

1. Within 30 days of contract award, the lighting integrator shall review all relevant information pertaining to the production lighting control conduit, backboxes, and line voltage electrical work to be performed by Division 26. A formal memo, indicating acceptance (or desired changes) of the Contract Drawings shall be provided. Failure to provide this memo indicates acceptance of, and liability for, the conduit, backboxes and electrical systems as indicated in the Contract Drawings.

F. Shop Drawings:

1. Submit scaled shop drawings that show the following:

a. Installation requirements.
b. Full system riser diagram(s) illustrating interconnection of system components, wiring requirements, back box sizes and any special installation considerations.
c. Detailed relay panel schedules.
d. Detailed circuit and control schedules.
e. Detailed product drawings, as applicable to this Project.
f. Product Data
g. Screenshots of programmed pages for any touchscreen controllers.

2. Submit data sheets for all standard component parts, which shall include all information necessary to verify compliance with this Section.

G. Color Data:

1. Submit color schedule for all equipment and devices, including custom plates & panels, button panels, lighting fixtures, loose cabling, connectors, equipment racks, etc. Room name and number shall be listed.
2. Show standard color options to allow design team to select.
3. Where no option for color is available, indicate as much.

H. Samples:

1. Upon 14 days of request by the Owner's Representative, submit samples for review. Samples may include, but are not limited to: (not electronic)

   a. Connector, panel and cable assemblies
   b. Relay modules
   c. Panel finish samples

I. Record Documents:

1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Within 30 days, submit "as built" submittals including shop drawings, product data, operations and instructions manuals for all products provided, CD(s) of control systems programming, care and maintenance instructions, service line and online contacts and warranty documents.

1.9 WARRANTY

A. Warranty shall provide coverage of material and product defects and assembly workmanship or installation for a period of two years following the date of acceptance by the Owner.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor. If warranty claims are not serviced to the satisfaction of the Owner within the 14-day period, the Contractor shall bear all costs that arise as a result of the delay, including, but not limited to, the use of temporary replacement components, additional Owner's staffing or overtime, shipping, and cancelled uses or performances.

1.10 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty subcontractors and manufacturers meeting the qualifications listed herein.
B. Specialty subcontractors shall have been continuously engaged in the sales and integration of lighting control equipment similar to that specified herein for a minimum of ten years.

1. Manufacturer shall have been continuously engaged in the manufacturing of lighting control equipment similar to that specified herein for a minimum of ten years.

C. Specialty suppliers shall have at time of bid, and continuously maintain throughout the project and warranty period, a specialty Contractor's license appropriate for the work in this Section.
D. Specialty subcontractors shall have within their employ manufacturer's factory authorized field services technicians, within a four-hour travel distance from the Project site.

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E. All equipment shall be UL listed and bear the appropriate labels.

1.11 DELIVERY, STORAGE AND HANDLING

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.

B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible for properly sequencing the work and protecting equipment from damage during delivery, handling, storage and installation.

C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

1. Devices shall not be delivered to the project site until the site is suitably clean and all adjacent finish work that may be painted or produce dust has been completed. The contractor shall provide and maintain complete protection of all devices until the project has been made available for occupancy by the Owner. The Contractor shall thoroughly clean and remove any dirt or dust that infiltrates system components and shall be responsible for timely replacement of any damaged components.
2. Device labels and connectors shall be delivered with temporary dust and paint protection installed.

1.12 PROJECT CONDITIONS

A. Defects in the field which may impact the work in this Section shall be reported to the Owner's Representative and corrected in accordance with the requirements of the applicable Section of work prior to commencement of the work in this Section.

1.13 MAINTENANCE

A. Provide maintenance stock of User-serviceable components within the system. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner at time of system commissioning.

B. Maintenance stock shall include:

1. One spare relay module of each type in the system.
2. Four fuses of each type in the system.
3. Two control device receptacles and connectors of each type in the system.
4. Four circuit distribution connectors of each type in the system.
5. Four cable mount lighting fixture power connectors of each type in the inventory.
6. Six spare keys of each type in the system.
7. Components recommended by the Manufacturer.
8. Any non-standard tools required for User service.

PART 2 - PRODUCTS

2.1 PRE-APPROVED SPECIALTY SUBCONTRACTORS

A. The following production systems specialty subcontractors have been pre-approved for bidding for the work in this section:

Holzmueller Productions
1000 25th St
San Francisco, CA 94107
Tel. (415) 826-8383
Contact: Jim Schelstrate

Musson Theatrical
890 Walsh Ave
Santa Clara, CA 95050
Tel. (408) 986-0210
Contact: Dave Rimerman

LVH Entertainment Systems
1801 Highland Avenue, Unit E
Duarte, CA 91010
Tel. (800) 716-9408
Contact: Jason Davis

4Wall Entertainment
5435 W. San Fernando Rd.
Los Angeles, CA 90039
Tel. (818) 252-7481
Contact: Brent Prichett

Polaris Lighting
624 Irving Ave
Glendale, CA 91201
Tel. (818) 265-0330
Contact: Floyd Payne

Stagecraft Industries, Inc.
5051 North Lagoon Ave
Portland, OR 97217
Tel. (503) 286-1600
Contact: Wendy Hammatt

B. All other specialty subcontractors must be approved prior to bid. Other contractors seeking acceptance must submit the following information at least 2 weeks prior to the bid opening date. Approval of contractors will be by addenda. Failure to submit any of the required information will automatically disqualify the contractor from consideration of approval.

1. A listing of five equivalent installations including:

    a. Name, address and telephone number of Owner;
    b. Name, address and telephone number of Owner Consultant;
    c. Scope of work.
    d. A brief written description of the contractor's operation including facilities, financial capabilities, and experience of key personnel.
    e. A statement from a bonding company agreeing to provide the required bonds in the amount required for the project.
    f. Documentation necessary to show compliance with Quality Assurance, above

C. Permission to bid does not imply acceptance of the specialty subcontractors. It is the sole responsibility of the contractor for this Section to ensure that any price quotations received, and submittals made, are for control systems that meet or exceed the specifications.

2.2 MANUFACTURERS

A. The dimming and control equipment in this Section shall be a cohesive system supplied and warranted as a system by a single manufacturer and shall be the products of the following pre-approved manufacturers, and shall meet the specifications listed herein:

1. Electronic Theatre Controls
2. Doug Fleenor Design (DMX merger/splitter only)
3. Pathway Connectivity (DMX merger/splitter and fader panel only)
4. Or equal. (No known equal. No substitutions.)

2.3 MATERIALS

A. All components supplied under this Section shall be new. Used or factory reconditioned components shall not be acceptable.

2.4 BLACKBOX THEARE CONTROL CONSOLE

A. Provide the following control console:

1. ETC Element 2 – 6K

B. Provide the following accessories:

1. One (1) ETC Pad RFU units, each with the following accessories:

    a. Shoulder Strap
    b. EETi Stylus Pen
    c. Battery Pack with meter
    d. Office Dock

2. One (1) ETC WAP POE wireless access points, configured as noted below:

a. Mount/install access point on steel plate and attach to tension grid in Studio theatre. Plug into network port mounted to tension grid hanger, provide required network cable.
b. Standards 802.11 a/b/g/n/ac
c. Dual band 2.4 and 5 GHz
d. Wireless data rates up to 300Mbps
e. POE – power over ethernet
f. Setup to work with ETC Pad
g. Black in color.
h. Any lights shall be shut off if in view of audience.

3. Control Room Monitors & Keyboards

a. Provide two monitors for the console.
b. Monitors shall be 22" minimum diagonal color (if supported by console) flat panel display monitors. Provide Dell S2240T Touch Screen Monitor or equal.
c. Monitors shall include vertical and tilt adjustment stand.
d. Provide one keyboard & mouse for each console

4. Power supply and surge protector/UPS capable of maintaining the console and monitor for 15 minutes after power is suspended.
5. Console power and all control cables shall be 25' long.
6. Dust covers for console and all monitors.

2.5 PRODUCTION LIGHTING RELAY PANELS

A. Provide wall mounted relay panels for production lighting relay circuits.
B. General

1. Panels shall be UL 508, UL924 and UL67 listed and so labeled.
2. The panels shall receive ESTA DMX512-A control protocol. Addressing shall be set via the user interface button keypad with any circuit patched to any DMX control address.

a. 2,500V of optical isolation shall be provided between the DMX512 inputs and the control electronics as well as between control and power components.

3. Panels shall be provided in 12, 24 or 48 circuits as shown on drawings.

a. Panel shall support dual and three pole circuits at decreased density where each pole constitutes one of the available single pole circuits
b. Single, Dual or three pole circuits shall be mixed as required for the circuiting shown on the drawings.

C. Electrical

1. Breakers and relays shall be rated to 100% electrical load.
2. Branch circuits shall be 20a unless noted otherwise.
3. Breaker output lugs shall accept 10-14 AWG dual conductor wire
4. Panel shall be fed by 120/208v Three phase, 4-wire plus ground input feeder.

5. Panels shall include a main breaker. See electrical drawings for breaker sizing.

D. Mechanical

1. The panels shall be set up for wall or flush mounting and supplied with cover.

E. Function

1. Panel shall be user programmable.
2. Circuits shall be individually addressable.

F. Provide with the following Breaker Panel Accessories

1. Ethernet Option shall provide advanced control of breakers over streaming ACN (sACN) and transmit status, control override, and measured energy usage per branch circuit to web browser-based interface or central monitoring interface
2. A Contact Input Option shall allow 24 dry contact inputs to be linked for direct or group breaker control, to activate a preset, or to activate a sequence. Controller software shall allow for normally open maintained, normally closed maintained or momentary toggle.
3. A RideThru Option shall provide short-term power backup of control electronics by automatically engaging when power is lost, and recharging when normal power is present
4. A Tamperproof Hardware Kit shall include center reject Torx head screws to prevent access to panel interior by unqualified individuals
5. Main Breaker options

G. Panel shall be of the same manufacturer as the architectural control system.

H. The wall mount relay panel shall be the Sensor IQ Relay Panel as manufactured by Electronic Theatre Controls, Inc.

1. Black Box Theatre: provide 120V panel
2. Gymnasium: Provide both 120V and 208V as indicated

I. Provide the following options:

1. Ethernet Option
2. 0-10V Dimming Option
3. Contact Input Option
4. RideThru Option

2.6 ARCHITECTURAL LIGHTING RELAY PANELS

A. Mechanical

1. The panel shall be 16-gauge steel, surface or recess mounted and complete with locking door/cover. Inner cover shall prevent access to live components, breakers and/or relays.
2. Relay subpanel shall accommodate single, dual or triple pole breakers and relays in any combination.
3. Relay output lugs shall accept 6-14AWG copper wire

B. There shall be a graphical display user interface with number, directional selection buttons; testing shortcut button for relays and presets, status readout and LED indicators and USB receptacle for uploads/downloads and software updates.

C. Functional

1. Pack setup shall be user programmable.
2. Each relay circuit shall be programable with the following attributes.

    a. Type, Name, Circuit, DMX address, sACN address, Space, Circuit Modes, Normal Latch-lock, Fluorescent, DALI, “On” threshold level, “Off” threshold level, Include in UL924 emergency activation, Allow Manual

3. The panel shall be capable of switching all relays on or off at once, or in a user-selectable delay period of 0.1 to 60 seconds, in 0.1 second increments, per relay.
4. Control electronics shall report the following information per branch circuit:

    a. Breaker state
    b. Relay state
    c. Current draw
    d. Voltage
    e. Energy usage over time

D. Built in Control shall include:

1. From the control panel, stations, or timed events it shall be possible to record up to 16 presets and 16 zones per space for up to 8 spaces per panel.
2. Indication of an active preset shall be visible on the LCD display.
3. The panel shall receive ESTA DMX512-A control protocol.

E. The panel shall have a UL924-listed contact input for use in Emergency Lighting systems. The panel shall respond to the contact input by setting relays to “on”, while setting non-emergency relays “off”. Each relay can be selected for activation upon contact input.

F. Electrical

1. The panels shall consist of up to (30) single pole standard breakers with (24) relay controllable (Echo)
2. Provide with main circuit breaker, sized as shown on drawings.

G. Provide the following accessories

1. Network Interface
2. Low voltage 0-10V Dimming Control
3. Ride-Thru Option
4. Main Breaker
5. ELV dimmer, as required per architectural lighting design.

H. Provide panels in size capacity for and relays in quantities to support loads as shown on drawings. Provide with appropriate module types for the loads as sch eduled on drawings, it is in the scope of this section to review the electrical drawings and provide the appropriate modes for all installed lighting fixtures circuited to these panels.

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I. The wall mount relay panels shall be ETC Echo Relay Panel

1. Black Box Theatre: provide 277V panel

2.7 DRAMA CLASSROOM – PRODUCTION LIGHTING RELAY PANEL

A. The Relay Panel shall be used to control circuits for all production lighting fixture outlets.
B. No interconnection to architectural lighting and/or emergency systems is required.
C. The Relay Panel shall accept DMX from the wall button/slider controls.

1. Mini Panels shall support Class 2, ANSI E1.11-2008, USITT DMX512A control communications
2. Mini Panels shall provide a DMX512A wiring connection using terminal blocks for #24 AWG wire
3. Terminal blocks for Cat5e or better wire shall also be available

D. The Relay Panel shall be configurable via ANSI E1.20 Remote Device Management (RDM). RDM parameters shall include:

1. Device Label – configure a name for the device
2. DMX Start Address –set the starting DMX address of the Zone Controller to a value from 1-512
3. DMX Fail Mode (Data Loss) – configure the Zone Controller behavior when DMX is lost: Hold last look, Wait and fade, Go to full (default)
4. Packet Delay – configure the number of packets required before the zone controller activates a change of level (relay on/off or 0-10V output)

E. Provide ETC UFMP8 - Foundry Mini Panel, 8-circuit, 120VAC.

2.8 BLACKBOX THEATRE - ARCHITECTURAL CONTROL ELECTRONICS

A. Provide control electronics with memory capacity and performance as required to meet the functions within these specifications.

1. The system shall permit control of any dimmer or relay on the system by the Control Console or any other DMX512 controller, or the Preset Panels as specified below on a last action basis.
2. Racks shall be configured to normally exchange data via the Ethernet network, with all programming capabilities granted therein.
3. Two optically isolated DMX512 inputs shall be provided, allowing overlapping or separation of any control level. 2,500V of optical isolation shall be provided between the DMX512 inputs and the control module.
4. The system shall send control signal to low voltage relay panels as specified. Architectural control electronics may be housed within or external from dimmer racks.
5. Provide options/modules as necessary to accept an RS-232 control connection from the AV control system.
6. Mount unit in rack mount control enclosure ERn in the control equipment racks indicated on the drawing

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7. Products shall be

    a. ETC Paradigm

2.9 EMERGENCY SYSTEMS

A. Provide equipment necessary for emergency lighting systems
B. Emergency Power Transfer Switch

1. All Devices shall be UL1008 listed and labeled.
2. Provide ELTS by Electronic Theatre Controls (ETC), with modules in quantities as required by electrical engineer to support the emergency lighting system.

    a. For local emergency systems serving fewer than 4 circuits, the Branch Circuit ELTS shall be an acceptable alternate.

C. Emergency signal devices

1. All devices shall be UL 924 listed and so labeled.
2. Provide Power loss detection kit

    a. Provide ETC Emergency Bypass Detection Kit (EBDK)
    b. Provide in quantities as required by electrical engineer to support the emergency lighting system

3. Provide DMX emergency signal dedication

    a. Provide DMX Emergency Bypass Controller (DEBC)
    b. Provide in quantities as required to serve discrete emergency DMX lines as required by electrical engineer to support the emergency lighting system.

2.10 BRANCH CIRCUIT EMERGENCY LIGHTING TRANSFER SWITCH (BCELTS)

A. General

1. The BCELTS shall provide automatic transfer of a single branch circuit from normal to emergency power source, when normal power fails
2. The BCELTS shall transfer a lighting load branch circuit from a dimmer/ relay or secondary control output to a second power source in the event of a loss of power to the primary power source, a normal system failure, or activation of a fire alarm
3. The system shall be listed under ANSI / UL1008 Transfer Switch Equipment and comply with ANSI / NFPA 110 Standard for Emergency and Standby Power Systems, and ANSI / NFPA 70 (NEC), including Article 700, 701 and 702 safety standards. Emergency transfer systems that do not comply with the below stated NEC articles and sections shall not be permitted

    a. Satisfies requirements of the National Electrical Code (NFPA 70):
        1) Article 700 – Emergency Systems

2) Article 701 – Legally Required Standby Systems
3) Article 702 – Optional Standby Systems
4) Section 518.3(C) – Assembly Occupancies
5) Section 520.7 – Theatres and Similar Locations
6) Section 540.11(C) – Motion Picture Projection Rooms

4. The BCELTS shall transfer a single circuit at 120V or 277V up to 20 Amperes in capacity

B. Transfer Switch

1. The BCELTS shall be a UL1008 transfer switch listed for Emergency Systems (NEC Articles 700 and 701; UL CCN WPWR)

   a. Transfer switches not listed under UL1008 shall not be acceptable
   b. Transfer switches listed under UL1008 for Optional Standby (NEC Article 702; UL CCN WPXT) applications only shall not be acceptable
   c. Automatic Load Control Relays (ALCR) listed under UL924 shall not be acceptable

2. The switch shall be positively latched and unaffected by voltage variations or momentary outages so that constant contact pressure is maintained and temperature rise at the contacts is minimized
3. The switch shall be electrically interlocked to ensure only one position, either Normal or Emergency, is engaged at any time
4. The switch shall be break-before-make to ensure that normal and emergency sources are never interconnected within the unit
5. Built-in fuses shall provide 10,000 Ampere Short Circuit Current Rating (SCCR) on the connected emergency circuit
6. Switch contacts shall withstand transfer without welding, with 180º phase displacement between normal and emergency power sources if both sources are energized
7. Transfer switch contacts shall be rated for mixed loads, including electric discharge lamps and tungsten filament lamps
8. Transfer switch shall be rated for a minimum of 6,000 cycles at full tungsten load

C. Control Circuitry

1. The control circuitry shall direct the operation of the transfer switch
2. A field-configurable normally closed (NC) or normally open (NO) dry contact closure input shall be provided

   a. Up to (10) BCELTS devices may be connected to a single remote loop

3. The BCELTS shall support transfer of a 0-10V or DALI controlled circuit

   a. Upon activation of emergency transfer the BCELTS shall break the 0-10V or DALI control circuit, driving connected 0-10V circuits to full output and DALI circuits to their default level.

D. Operation

1. Transfer to alternate emergency supply will occur when normal supply sense voltage drops below 80V when used at 120V or 277V

E. Enclosure

1. The BCELTS shall be mounted in a NEMA 1 interior type enclosure finished in fine-textured epoxy paint
2. The enclosure shall be 8.5”H x 10.5”W x 2.75”D
3. The system shall be provided with an approved overlay mounted on the front of the enclosure, stating, “BRANCH CIRCUIT EMERGENCY LIGHTING TRANSFER SWITCH”
4. The enclosure shall be provided with an approved label indicating that the system is UL1008 LISTED for Emergency Systems

F. Accessories

1. Provide sensor tap kits so the system senses power loss directly from room lighting power source.

G. Provide the Branch Circuit Emergency Lighting Transfer Switch (BCELTS) SC1008 as manufactured by ETC, Inc in quantities as required by electrical engineer to support the emergency lighting system.

2.11 LIGHTING CONTROL ETHERNET NETWORK COMPONENTS

A. Network general specifications:

1. The lighting control system shall operate on an Ethernet TCP/IP based network, with all components and procedures meeting IEEE standard specification 802.3af-2003, for Power over Ethernet, 10/100BaseT and/or 10/100Base FL.
2. The network shall support multiple consoles, computers, file servers, printers, and architectural processors with discrete command lines and control. The network shall support multiple venues/systems on the same network.
3. Device configuration selection, manufacturing, installation shall be accomplished to assure a flexible and robust system for the prevention of data interruption and ease of User maintenance and diagnostics.
4. ESTA ACN protocol shall be supported.

B. Network Nodes

1. DMX and other lighting control data shall be inserted and retrieved on the Ethernet network via protocol translation nodes.
2. Each DMX Node shall have LEDs for indication of power, network activity, and DMX port configuration. Those LEDs used for DMX port configuration indication shall also indicate the presence of valid DMX/EDMX signal.

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3. Network configuration shall be via production lighting control manufacturer's configuration software. The software shall permit complete user flexibility allowing the system operator to patch DMX data over Ethernet DMX (EDMX), assign node labels for easy identification, assign RFUs to specific systems in multi-system networks, assign DMX offsets and provide DMX port prioritization. Each node shall have a specific IP address provided automatically by the software. The user may edit this IP address. Systems that do not support simple Windows configuration, or systems that do not allow complete reconfiguration of the above-mentioned features over Ethernet shall not be acceptable.
4. All configuration data for each network device shall be held at the device and system operation shall not require continuous on-line operation of the network configuration software.
5. Systems connected to the same network shall be capable of arbitrating control over EDMX data. The system shall be capable of alternating control of individual dimmer data between architectural and production lighting systems without intervention by the user. The user shall dictate the conditions under which system shall automatically take control and the network shall allow user override of the user selected defaults. Systems which require direct user intervention to allocate control of dimmers between architectural and production lighting systems shall not be allowed.
6. The network shall allow multiple DMX inputs assigned to the same EDMX range to be set at different priorities. This shall allow the user to assign high or low priority to each DMX input port in the network on a port by port basis. The network shall require a valid DMX signal present at the input to initiate prioritization. Systems that do not allow for prioritization shall not be allowed.
7. Each DMX Node shall control up to 2048 DMX addresses, within the confines of up to 64 DMX (32,767 EDMX address) "universes". The specific DMX data input or output by the Node shall be freely configurable by the user. Duplicate outputs of DMX lines (DMX splitter) and discrete outputs shall be fully supported. Multiple sources may be combined, and a priority may be assigned to each source. Each DMX line may have its own start address and offset for ease of use. DMX ports shall be configurable for either input or output.
8. Maximum delay time from input to output shall not be greater than one packet time (approximately 30 mSec.). A minimum DMX update rate of 40Hz shall be sustained under all conditions.
9. Power for the nodes shall be provided over the Cat5 cable, as PoE as specified herein. The node electronics shall be electrically isolated from the power supplied over the Cat5 cable.
10. DMX inputs shall be fully opto-isolated from the node electronics and from each other. DMX outputs shall be earth-ground referenced. DMX Ports shall be capable of withstanding fault voltages of up to 250VAC without damage.

C. Control Equipment Rack

1. Provide racks in quantities and locations as shown on drawings.
2. Rack general assembly:

    a. Provide industry standard 19" equipment rack for all necessary control equipment specified herein.
    b. Wall mounting with fixed back plane swing out front section for access. Hinges shall be placed on the side appropriate to the mounting condition. Verify in field.

c. Mounting brackets shall be 14-gauge steel
d. Engraved label riveted to the case front with the name of the rack as shown on drawings. Rack label characters shall be ½" high.
e. Bottom air vents and rear knockouts for conduit entry.
f. All unused sections shall be covered with vent panels no taller than 2 rack units (R.U.). Racks with more than 2RU of unused sections shall have drawers installed in unused portions.
g. Rack to be configured as shown on Drawings mounted with all controls within wheelchair chair reach as required by the ADA and local codes.
h. Powder coat finish: Black
i. Body and Back pan shall be 18-gauge Steel
j. Rack rail shall be 11-gauge steel
k. Rack shall be height required to fit all required components.
l. Rack shall be Middle Atlantic Products model DWR, or equal

D. Switches

1. Provide Power Over Ethernet (PoE) 24-port and 12-port 1-Gig Ethernet switches in quantities as required, configured appropriately and suitable for lighting system operation.

a. Any switches outside of the Control Equipment Rack shall be provided in a NEMA enclosure
1) Enclosure shall be labeled on the front with an engraved, lamacoid label reading "LIGHTING CONTROL NETWORK SWITCH"

E. Network Patch Bays:

1. Copper: provide RJ45 patch panels for the termination of copper network taps. Leviton Gigamax series patch bays, or similar, to match specified cable type.
2. Labels

a. Patch bay label shall include each patch space number and corresponding field locations. Label as shown on schedule.
b. Provide typed labels in each patch space label insert as shown on schedule.

3. Label each point as shown on drawings.
4. Provide patch space for each Rack, panel or lighting controller that is not shown on the schedule and provide corresponding label.

F. Provide copper and fiber patch cables as required for the inter connection of the system.
G. Fixed Ethernet Node Gateways

1. Fixed nodes shall be provided in quantities and types required for a complete and operational system.
2. CER network patch port number shall be engraved in the faceplate to identify the network port the unit is connected.
3. Provide ETC RSN-DMX1, 2, or 4 for all DMX gateway devices, in quantities and configurations as shown on drawings.

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4. Provide (quantity as needed) ETC RSN-DMX4 Four port gateway with N3GA-RM rackmount kit for LED house light gateway at all control rack locations.

H. Portable Ethernet Nodes

1. Each node shall incorporate two 5-pin XLR type DMX connectors. Output connectors shall utilize female connectors and input connectors shall utilize male connectors, but directionality is re-configurable using the configuration software and connector adapters.
2. Nodes shall incorporate a backlit graphic LCD display for identification (soft-labeling) and status reporting. Labeling shall be user configurable using configuration software.
3. The node faceplate shall be constructed of durable cast aluminum. Faceplates manufactured of plastic shall not be acceptable. Nodes shall be provided in matte black finish.
4. Portable nodes shall be provided mounted in a rugged enclosure with yoke and cast C-clamp for mounting. RJ-45 connector shall be XLR type, Neutrik Ethercon Series Connectors.
5. Each node shall be supplied with one 10’ Cat5 patch cable with XLR type, Neutrik Ethercon Series Connectors.

    a. Provide six (6) portable node assemblies.
    b. Each node shall be supplied with one 10’ Cat5 patch cable with XLR type, Neutrik Ethercon Series Connectors.
    c. Provide industry standard roadcase with casters and handles. Provide with individual compartments for nodes, and storage compartment for cables.
    d. Provide with black safety cable.

2.12 CONTROL RECEPTACLE PANELS

A. General

1. The control receptacle panels shall consist of the appropriate connectors required for the system this Project.

B. Connectors

1. The control receptacle panels shall include for following connector types, per industry standard:

    a. RJ-45 XLR type, Neutrik Ethercon Series Connectors to match specified cable type, configured to accept standard RJ-45 connectors.
    b. 5-Pin male and female XLR connectors for DMX input/output per industry standard
    c. 120VAC Edison convenience power outlets with integral surge-protector.
    d. Other receptacle types as appropriate per manufacturer’s standard features.

C. Physical

1. Faceplates shall be .080” aluminum, edges eased, finished in fine texture, scratch-resistant powder coat, with fasteners countersunk.

a. Panels specified as flush mounted shall overlap back box by 1/2". Surface mounted panels shall match back box size with no gaps or overlap.
b. Provide all back boxes and coordinate mounting with Div. 26.

2. Color shall be black unless otherwise noted.
3. Panels noted as custom color shall be factory powder coated a color selected by the Owner's Representative. Engraving shall be filled a contrasting color.
4. Engraved and filled labels 1/8" high characters minimum, filled shall be white unless otherwise noted.

a. Network taps and node gateways shall be labeled per the patch bay location and point number as shown on schedule.

5. Wall mounted panels shall mount into an industry standard back box, depending on size and quantity of connectors. A terminal block shall be supplied for terminations.
6. Rack mounted panels shall mount within industry standard equipment racks. Provide local breaker for integral AC power receptacle per Code.
7. Panels mounted in floor boxes shall include a clear flexible vinyl dirt guard as shown on drawings. Guard shall cover receptacles but not labels.
8. Provide complete hardware for mounting on gridiron or catwalk hangers where shown per the Drawings.

2.13 ARCHITECTURAL CONTROL PANELS – BLACKBOX THEATRE

A. Architectural control panels shall be able to control any of the following:

1. Theatrical lighting dimmers / relays
2. Architectural lighting dimmers, relays and non-dims

B. Architectural control panel wiring shall be digital, low voltage wiring that shall be topology free. Panels shall be interactive with each other as described herein.

C. Physical

1. Faceplates shall be .080" aluminum, edges eased, finished in fine texture, scratch-resistant powder coat, with fasteners countersunk.

a. Panels specified as flush mounted shall overlap back box by 1/2". Surface mounted panels shall match back box size with no gaps or overlap.
b. Provide back box and coordinate mounting with Div. 26.

2. Color shall be black unless otherwise noted.
3. Panels noted as custom color shall be factory powder coated a color selected by the Owner's Representative. Engraving shall be filled a contrasting color.
4. Engraved and filled labels 1/8" high characters minimum, filled shall be white unless otherwise noted.
5. Wall mounted panels shall mount into an industry standard back box, depending on size and quantity of connectors. Back boxes shall not exceed 4" in recess depth. A terminal block shall be supplied for terminations.
6. Rack mounted panels shall mount within industry standard equipment racks.

D. LCD Touchscreen

1. Rear illuminated LCD touch screen with all standard advertised features.

    a. Acceptable devices:
        1) ETC Unison Paradigm LCD touch screen

2. Provide, immediately adjacent to LCD Panel:

    a. One illuminated, momentary contact "ENTRY PANEL LOCKOUT" pushbutton. The pushbutton shall cause Theatre one-button panels to be inoperative when pressed once and all “LOCKOUT” pilot lights shall illuminate. The pushbutton shall remain lit so long as the "LOCKOUT" status is maintained. “LOCKOUT” status shall be activated or deactivated at any “LOCKOUT” pushbutton, regardless of the last action. Action on an illuminated pushbutton in “LOCKOUT” mode will release the preset panels for operation and the pilot light shall go out. Action on the lockout button shall not cause any change in level status. This button shall have no effect on the controls outside of the Theatre.
    b. One on/off button to turn on general worklights and rehearsal lights to be programmed at time of commissioning

E. LCD Panel Operations

1. The following should be used as a basis for the initial soft programming of the architectural control stations. The configuration shall be verified with the Owner’s Representatives at time of commissioning.
2. Request an updated button programing sheet from the theatre consultant before commissioning.
3. LCD panels shall be programmed with soft pages for access to various areas and levels of control.

    a. Virtual pushbuttons shall indicate state by a change in appearance. Controls shall be though various pages of controls.
    b. Access shall be divided into two security levels minimum. The panels shall “home” to a first level of access which allows the User to play presets changing the levels of the areas shown on the display, without login. The first level of access shall not allow the programming of presets.
    c. The program function shall become available as a “record” button on the same preset playback screens upon login to the second level with a four-digit pass code on a virtual keypad. The pass code shall initially be set as “4100”. The login screen shall be a back page visible as a first level page choice and shall include a “logout” pushbutton which shall return the panel to the first level. “Logout” from the second level shall automatically occur after 30 minutes of inactivity.
    d. The LCD shall be used to program the multi-button and one-button pushbutton preset panels.
    e. The system shall allow the programming of presets and macros through a “snapshot” procedure. Levels shall be set by the control console, by soft sliders at the LCD panel or at the dimmer rack and then captured as a preset to be replayed at any one of the preset buttons.

f. The first page shall be called “House Presets” and shall contain the same number and function of preset buttons as the multi-button preset stations specified herein.
g. The second page shall be called “Work/Reh” and shall have buttons for the various areas of the theatre’s technical areas and the rehearsal groups. The work light buttons shall include control the low voltage relay circuits as well as production circuits selected as rehearsal lights.
h. The third page shall be called “Show Presets” and shall include ten buttons, named as directed by the Owner’s Representative at time of programming.
i. The next page shall only be visible at the second security level and shall be used to program the one-button entry stations.
j. The next pages shall include sliders for each architect control group as listed in the architectural lighting dimming schedule.
k. The general lock screen shall display a “splash” image as provided by the Owner’s Representative.

F. Portable LCD Touchscreen Panel

1. Portable touchscreen shall be a tabletop unit with integral folding cover/stand or protective case.
2. Operations shall be as specified above for LCD or Touchscreen Panels.

    a. Exception: Entry station lockout and on/off button shall not be included in this panel.

3. Power and control data shall be carried in a single CAT cable with RJ45 network connection. Cable shall be detachable.
4. Quantity: Provide (1) panel assembly
5. Cables: Provide one 10’-0” cable, one 25’-0” cable, and one 100’-0” cable.

G. Multi-Button and One-Button Panels

1. Pushbutton stations shall include programmable buttons with integral LED indicators.
2. Multi button panels shall include a card holder with slide-in tags and clear cover for User labeling.

H. Preset Panel Operations

1. The system shall allow the programming of presets and macros through the LCD as described above.
2. Action on any one button shall cause all identical pushbutton indicators on other panels to mimic the preset state.

2.14 DRAMA CLASSROOM – DMX CONTROL

A. Provide a wall-mounted button panel for simple preset recall.
B. Each button shall be able to recall a pre-programmed look. All buttons shall be capable of turning on or off individually, so that several looks may be stacked to create a scene.
C. Locate PSU for unit in same enclosure as DMX merger/splitter.
D. Provide Pathway Connectivity:

1. Vignette Wall Station modules per drawings
2. Vignette Architectural Gateway with DMX output
3. Enclosures/interfaces/accessories as needed for a complete system

2.15 WIRING DEVICES

A. Provide power distribution wiring devices in the quantities, types and configurations as shown on drawings. All back boxes shall be supplied by production lighting contractor and manufacture.

B. Devices shall be fabricated from 18 gauge cold rolled steel with 16 gauge covers, finished with flat black powder coat unless otherwise noted. Devices shall be UL listed and labeled for the use specified herein.

1. Back box shall not exceed 6-1/2” high x 4” deep x the widths as shown on drawings.
2. Panels specified as flush mounted shall overlap back box by 1/2”. Surface mounted panels shall match back box size with no gaps or overlap.

C. Receptacles and connectors shall all be of the same manufacturer and be fully black.

1. Connectors of the same type shall be of the same manufacturer throughout the project to minimize maintenance stock.
2. 120VAC Connector type: Provide 20A theatre industry standard 3-pin connectors throughout for standard devices.
3. 208VAC Connector type: Provide 20A theatre industry standard Twist-Lock connectors throughout for standard devices.

    a. Connectors shall be Bates, Union, Pro-Pin or equal

D. Receptacles and connectors shall be factory pre-wired to internal feed through terminal blocks and grounded. All wiring and terminals shall be factory numbered. Size all lugs as required based on wire size indicated on the Electrical Drawings. Provide for dedicated neutrals within each device and homerun. Terminals shall be clamp-type compression terminals appropriately listed.

1. All parallel circuits, if applicable shall homerun to the dimmer rack or relay panel, unless otherwise noted.

E. Circuits shall be labeled with engraved lamicoid tags with 1/2” high characters securely riveted to the box and plainly visible. Label color shall be:

1. Production lighting circuits, 120VAC: black tags with white core.
2. Production lighting circuits, 208VAC: blue tags with white core.

F. Provide with all necessary mounting hardware as shown on Drawings and as required.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Advise Div. 26 for the proper installation of the dimming and control equipment specified herein.
B. For the commissioning services as listed herein only, coordinate scheduling and access with the Contractor and Owner and provide personnel lifts or ladders as required for access to the lighting equipment.
C. For the commissioning services as listed herein only, remove all packing materials from the jobsite. Insert operations and maintenance information into the project record documents as specified above in Submittals.

3.2 COMMISSIONING AND DEMONSTRATION

A. Coordinate with Division 26.
B. Factory trained and authorized personnel shall review, test, program and otherwise complete the system, providing that the system and all components are fully functional per the Documents and fully covered under the Manufacturer's warranty.

1. It shall be under the work in this section to provide turnkey proper and logical programming of the lighting control systems.
2. It shall be under the work in this section to coordinate the proper and logical programming of the low voltage relay panel supplied under Division 26.

    a. The low voltage panel shall be programmed so the control groups of branch circuits match the control and indication on the architectural control panels provided and programmed under this section.

C. Upon completion of the installation, the Contractor shall notify the Owner's Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Owner's Representative's schedule.
D. Provide to the Owner's Representative the following upon arrival:

1. All Ethernet wiring shall be tested at Category 5 and certified for full bandwidth operation.

E. Make available for review by the Owner's Representative:

1. All components for physical inspection and inventory.
2. All installed controls shall be operational.
3. All portable controls shall be operational at all plug in locations.
4. Demonstration of input and output of lighting control data throughout the data distribution system.
5. All distribution shall be checked for continuity, grounding and polarity.
6. Simulation of dimmer rack failure and power outage conditions.

F. The Contractor shall be liable for any return visits by the Owner's Representative as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the Owner's Representative to carry out their work.

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G. The Contractor shall arrange for access as necessary for inspection of equipment by the Owner's representatives.

H. Upon completion of the commissioning, the factory trained and authorized personnel shall demonstrate operation and maintenance of the system to the Owner's representatives. Coordinate with the Owner's Representative's schedules two weeks in advance minimum.

I. Provide training as follows:

1. Two days during commissioning period for Owner's forces.
2. One day with Owner's forces one month after initial training.
3. One day with Owner's forces one year after initial training, but prior to warranty expiration.

J. Training shall include, but not be limited to:

1. Safety precautions.
2. Identification of all elements provided under this section.
3. Maintenance, diagnostics and trouble shooting.
4. Control operation training of the console, dimming and control electronics.
5. Operations and maintenance manual orientation.

END OF SECTION

SECTION 116193 –PRODUCTION LIGHTING FIXTURES – FF&E

PART 1 - GENERAL

1.1 SUMMARY

A. Services listed herein relate to the following scopes of work:
B. Furnishing, preparing, and delivery of production lighting fixtures, accessories and equipment.
C. Installation of the Lighting fixtures and equipment per the lighting plot in Appendix-B. Light plot shall be programmed for turnkey operation under the direction of the District's Representative.

1.2 RELATED SECTIONS

A. Coordinate with the following sections in carrying out this work:
B. Division 01 – General Conditions.
C. Base Building documentation is available upon request to the district. Bidders may request copies of as built drawings as well as drawings and specification for the current renovation project. This includes the drawings and specification of the production lighting and rigging systems; PL and PR series drawings and specification sections 116133 and 116183.

1.3 REFERENCES.

A. Comply with all national, state and local regulations and the procedures and requirements of the CA Division of the State Architect, if applicable. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, NEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
C. Labor shall be provided per applicable labor regulations and practices.

1.4 DEFINITIONS

A. Refer to Div. 1 for definitions.
B. District Representative: For the scope in this Section, authorized personnel representing the district and The Shalleck Collaborative, Inc., Theatre Consultants.

1.5 SYSTEM DESCRIPTION

A. Provide production lighting fixtures, cable, accessories and other equipment as indicated in the equipment list.
B. It is under the work of this section to provide lighting extension power, data cable, and any adapters, connectors, couplers or accessories required for installation.
C. Fixtures shall be prepared, tested, and delivered to the project site.
D. Lighting cable and accessories will be provided and delivered to the job site in a "ready to hang" state
E. Lighting fixtures shall be installed, circuited, hung, focused, programed, as drawn in the lighting plot and all paperwork shall be provided as described herein.

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1.6 CURRENT TECHNOLOGY

A. Only the most current hardware and software shall be provided. In no case will discontinued or superseded products be acceptable. If the manufacturer has developed and successfully released products that meet or exceed the criteria within this specification, the Contractor shall notify the District's Representative and submit the new product for review. If accepted, the products will be provided at no additional cost to the Theatre. Software upgrades and authorized support services for its proper integration into the system shall be provided at no cost to the Theatre throughout the warranty period.
B. In the event of known product defaults or recall, the Contractor shall immediately notify The school and the representative and make immediate arrangements for remedy.
C. None of the stipulations herein shall be grounds for revision to the project schedule.
D. See related procedures under warranties in this Section.

1.7 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the District's Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.
B. Documentation for the substitution shall be submitted with supporting material and shall include the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The District's Representative shall be the sole evaluator of the fitness of the substitution.
C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.8 SUBMITTALS

A. Submittals shall be made in a timely fashion so as to not affect the project schedule, and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.
B. All submittals shall be made in electronic format.
C. Provide hard copies if requested.
D. Files shall be in .pdf format, and submitted via email or download
E. All submittals shall be complete and submitted as a comprehensive package, including finish selection materials (if required) and samples (if requested), all materials listed in this section, including, but not limited to, bill of all materials, all shop drawings, product data, relevant calculations (as required) and any other information required to review the systems. Incomplete submittals will be rejected without review.
F. Submittals shall be reviewed and field dimensions verified prior to commencing acquisition for, and fabrication of the work in this section. All services and parts of the work in this section shall be verified through the submittal process.
G. Product Data:
H. Submit data sheets for all standard component parts, which shall include all information necessary to verify compliance with this Section.
I. Record Documents:

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J. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
K. Within 10 days of acceptance by District's Representative, submit one (1) electronic copy of record documents and any hard copies required herein.
L. One (1) electronic copy of "as built" submittals including shop drawings, product data, operations and instructions manuals for all products provided, care and maintenance instructions, service line and online contacts and warranty documents.
M. Submit electronic record documents on USB flash drive storage media.
N. Record Documents for Lighting Plot:
O. Record documents shall include circuit assignments and any changes to the lighting plot or paperwork as a result of changes during installation, focus, and programming.

1.9 WARRANTY

A. Warranty shall provide coverage of material and product defects and assembly workmanship or installation for a period of three years following the date of acceptance by the Theatre.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor. If warranty claims are not serviced to the satisfaction of the owner within the 14 day period, the Contractor shall bear all costs that arise as a result of the delay, including, but not limited to, the use of temporary replacement components, additional District's staffing or overtime, shipping, cancelled uses or performances.

1.10 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty suppliers and manufacturers meeting the qualifications listed herein.
B. Specialty supplier shall have been continuously engaged in the sales and integration of lighting equipment similar to that specified herein for a minimum of ten years.
C. Manufacturer shall have been continuously engaged in the manufacturing of lighting fixtures and equipment similar to that specified herein for a minimum of fifteen years.
D. Specialty suppliers shall have at time of bid and continuously maintain throughout the project and warranty period a Contractor's license appropriate for the work in this Section.
E. Specialty suppliers shall maintain bonds in the amount required for the project.
F. Specialty suppliers shall have within their employ, manufacturers factory authorized field services technicians within a four hour driving distance from the project site.
G. All equipment shall be UL listed and bear the appropriate labels.
H. All Specialty Suppliers must be Authorized dealers for the Manufacturer specified.

1.11 DELIVERY, STORAGE AND HANDLING

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.
C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

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D. Devices shall not be delivered to the project site until the project is suitably clean and all adjacent finish work that may be painted or produce dust has been completed. The contract shall provide and maintain complete protection of all devices until the project has been made available for occupancy by the Theatre. The Contractor shall thoroughly clean and remove any dirt or dust that infiltrates system components and be responsible for timely replacement of any damaged components.
E. Device labels and connectors shall be delivered with temporary dust and paint protection installed.

1.12 PROJECT CONDITIONS

A. Defects in the field which may impact the work in this Section shall be reported to the District's Representative and corrected in accordance with the requirements of the applicable section of work prior to commencement of the work in this Section.

PART 2 - PRODUCTS

2.1 SPECIALTY SUPPLIERS

A. Requirements listed in above Quality Assurance Section.
B. The following production systems specialty subcontractors have been pre-approved for bidding for the work in this section:

Holzmueller Productions
1000 25th St
San Francisco, CA 94107
Tel. (415) 826-8383
Contact: Jim Schelstrate
Email: jim@holzmueller.com

Musson Theatrical
890 Walsh Ave
Santa Clara, CA 95050
Tel. (408) 986-0210
Contact: Michael Howden
Email: mhowden@musson.com

C. All other specialty subcontractors must be approved prior to bid. Other contractors seeking acceptance must submit the following information at least 2 weeks prior to the bid opening date. Approval of contractors will be by addenda. Failure to submit any of the required information will automatically disqualify the contractor from consideration of approval.
D. A listing of five equivalent installations including:

1. Name, address and telephone number of Theatre;
2. Name, address and telephone number of Theatre Consultant;
3. Scope of work.
4. A brief written description of the contractor's operation including facilities, financial capabilities, and experience of key personnel.

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5. A statement from a bonding company agreeing to provide the required bonds in the amount required for the project.
6. Documentation necessary to prove compliance with the above Quality Assurance section.

2.2 MANUFACTURERS

A. Lighting fixtures and equipment in this Section shall be the products of the following specialty manufacturers:

1. Electronic Theatre Controls
2. TMB
3. LEX
4. Neutrik
5. City Theatrical
6. BMI
7. The Light Source
8. Other manufacturers as listed in the fixture and equipment schedule.

B. Permission to bid does not imply acceptance of substitutions or alternative manufacturers. It is the sole responsibility of the contractor for this section to ensure that any price quotations received, and submittals made are for lighting fixtures and accessories that meet or exceed the specifications and all product substitutions must be individually authorized prior to bidding, as specified above.

2.3 MATERIALS

A. Provide production lighting fixtures, accessories, equipment and spare parts as shown in Appendix A.
B. All components supplied under this section shall be new. Used or factory reconditioned components shall not be acceptable.
C. All fixtures and accessories shall be the manufacturer and model listed in Appendix A unless a substitution request is approved in writing, or a product has been superseded by a newer model. Equal products may only be substituted by the process outlined above, no exceptions.
D. For items without manufacture and/or model information, contractor shall provide equipment meeting the specification herein.
E. Items necessary for the complete installation of a working system, such as incidental hardware, clamps, extra pipes, etc., shall be provided within bid cost.

2.4 LABELING:

A. General:

1. Labels shall be resistant to wear with heavy use and fading.
2. Labels shall be permanent so that it is resistant to removal in case of theft.
3. Labels shall be resistant to prolonged exposure to high temperatures created by equipment.
4. Labels shall be black with white lettering on an adhesive label.

B. All fixtures, accessories, and equipment shall be labelled with the venue name:

1. “Sanger High School - Theatre”

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C. All fixtures shall be labeled on the fixture body.
D. All cables shall be labeled in the following manner on the male side of the cable:

1. All cables shall be labeled with the name of the venue.
2. In addition to the labels on the cabling, provide ½" colored band (or electrical tape) indicating size. Colored bands compound and combine like roman numerals, such that a 25' cable would have two yellow bands and one red band per the system below.

a. Red= 5'
b. Yellow = 10'
c. Orange = 50'
d. Blue = 100'

3. All cables shall have one shrink wrap piece shall be shrunk over machine printed length label and colored bands.

2.5 PRODUCTION LIGHTING FIXTURES

A. Fixture preparation:

1. As part of base work all fixtures shall all be prepared in the following manner:
2. The connector shall be prewired where applicable.
3. Each fixture yoke shall be provided with requisite hanging hardware as required by relevant manufacturer's specifications.

B. Safety cables installed to fixture yoke.

1. Provide 1/8 x 18", or longer as required, 7x7 black galvanized lighting restraint cable with 5/16" spring hook by Fehr Code 39312-18B or equal.
2. Fixtures with more than one yoke or c-clamp shall be provided with one safety cable per yoke or C-Clamp.

2.6 ACCESSORIES

A. Provide storage for accessories as required: impact resistant plastic bins with integral hand holds- these shall be easily stackable and resist flexing or warping when fully loaded with cable.
B. Provide and affix permanent label with inventory of storage contents on side of container.
C. Provide quantities for all accessories as specified in Appendix-A.
D. All parts shall be black.

2.7 CABLE

A. General

1. It is under the work of this section to calculate and provide all cable necessary for the functional installation of the lighting plot in addition to cable listed in the Appendix-A.
2. Provide cable listed in the Appendix-A.
3. All cable shall have #4, 1/8" uncoated black tie line "installed" on each cable for tying each individual coil of cable or 1/2" x 9" min. black Velcro cable strap that loops cable and stays attached when fully extended.

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B. 20A rated stage extension cable:

1. All connectors of the same manufacturer as those on the fixtures. Connectors shall provide clamping strain relief that tightly engages the cable jacket. Visible leads shall not be acceptable. Stage-Pin connectors shall have a Clear Cover.
2. Strain relief mechanism shall be fully engaged.
3. Cable shall be of neoprene covered, black, heavy duty SO, SOW or better three-wire 12/3 cable. Internal wiring shall be sized to circuit ampacity and shall be rated at 125°C.
4. SJTO is acceptable for PowerCON items.

C. Control cabling

1. Cable assemblies shall be heavy touring grade TMB ProPlex cable or similar.
2. Cable shall have a gold plated, 5 pin XLR type connector.
3. DMX cable shall consist of two pairs of 22 AWG tinned copper stranded 19x34 with Fluorinated ethylene propylene insulation.
4. Cable shall be reinforced with 600# breaking strength Kevlar.
5. The inner shield shall be aluminum/mylar with 100% coverage.
6. The outer shield shall be copper braid with 85% coverage.
7. Outer jacket shall be black polyurethane with 5000psi tensile strength.
8. Outside diameter shall not exceed 0.300".
9. Cable weight, excluding connectors, shall not exceed 50 pounds per 1000’.
10. Cable shall meet or exceed ETL specifications for DMX data transmission.
11. Cable shall be TMB Proplex PC224P or equal.

PART 3 - EXECUTION

3.1 INSTALLATION- DELIVERY

A. Deliver fixtures to the stage in ready to hang/install state.
B. Remove and recycle all packaging from the delivery site.
C. Upon completion of the installation, the contractor shall notify the District Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the District Representative’s schedule.
D. The factory trained and authorized personnel shall demonstrate operation and maintenance of the system to the District Representative. Coordinate with the District Representative’s schedules two weeks in advance minimum.
E. Spare inventory shall be identified for review by District Representative.
F. Arrange all delivered equipment in an easily accessible and secure location within the venue.
G. Contractor shall notify District’s Representative of equipment delivery so that District’s Representative may verify equipment manifest.
H. Arrange all equipment in rows and stacks of similar items so quantities can be easily verified.
I. After quantities are verified and equipment is checked move all equipment to a storage location as identified by the District’s Representative.

3.2 INSTALLATION- LIGHTING PLOT

A. It shall be under the work in this section to:

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1. Deliver all equipment and mount it at lighting positions as shown in the Light Plot.
2. Connect, address, and patch all fixtures.
3. Install all accessories shown in Appendix A: Lighting Fixtures and Equipment List light plot and Appendix B: Light plots-.
4. Provide turnkey setup and logical programming of the lighting patch. Preset effects cues will be programed into the console with the consultant present.

B. Prior to installation, the contractor shall test all circuits and data lines for proper function. Report any identified issues to the District Representative.
C. All lighting fixtures shall be installed following standard industry practices for safety and shall follow all manufacturers requirements and guidelines.
D. All fixtures shall have a minimum of (1) safety cable from the safety cable anchor point of the fixture or yoke, around the lighting batten.
E. Fixtures shall be cabled using a “daisy-chain” method of installation, utilizing PowerCon, PowerCon TRUE TOP 1 and DMX extensions between fixtures.
F. Un-Moulded Two-fers, splitters or receptacles strings are not acceptable.

1. “Two-Fers” or “Three-Fers” are only permitted at the distribution receptacle point, and not within the “daisy-chain.”

G. For the first fixture connection on each chain, a 18” Stagepin or Twistlok to PowerCon TRUE TOP 1 adapter shall be used and may connect directly to the first fixture or extension cable.

1. There shall be no more fixtures per circuit than recommended by manufacturers or where total number of fixtures would exceed wattage/ amperage capacity of circuit or cables used, at 80% derated, whichever is lesser.
2. All cables and connectors in any given chain of fixtures shall be PowerCON TRUE1 TOP. Connector types shall not be mixed within a chain.

H. Cable installation:

1. Cable installation shall be neat and dressed and shall be subject to the approval of the District Representative.
2. "Cables shall be provided in appropriate standard lengths required to install plot. Custom length cables are not required and should not be made. Provide appropriate standard-length cable to avoid unnecessary extra cable, cable swags/drops or excessive coils or bundles.
3. Provide enough spare cable lengths to adjust fixture through it’s full range of motion for focus, also, provide sufficient additional lengths so that any fixture can move up to 24” without needing to add cable.
4. 5’ PowerCon or PowerCon TRUE TOP 1 cables provided with the fixtures may be used for the lighting plot, any unused standard cables shall be provided to the owner in addition to the spares noted on the equipment list.
5. All excess cable shall be mounted to the pipe in a way that minimizes their appearance from the audiences perspective.
6. There shall be no swags of cables or loose cables seen below any of the lighting pipes, except cable slack needed for fixture adjustment.
7. Tie bundles with #4 uncoated black cotton tie line or Velcro, do not use zip ties.

I. Lighting plot and fixture installation:

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1. Provide a completed and revised lighting plot based upon the plot provided in Appendix-B.
2. Fixture power relay and DMX address information shall be recorded at time of installation, documented, and turned over to user for records.
3. Install all fixtures and accessories as shown in the light plot.
4. All DMX fixtures shall be set to address specified in the lighting plot paperwork prior to installation
5. Connect all fixtures and cables to power and data receptacles.
6. Fixtures shall be affixed to hanging position in a consistent orientation

J. All fixtures shall be addressed and programed into the Mosaic Show Control system, provided in the base scope.

K. Provide an additional page of presets labeled “stage light presets” on the touch screen controller with the following:

1. Full stage wash
2. Pre-Curtain presentation
3. Presenter left
4. Presenter right
5. Presenter center
6. Other user defined presets (up to 10)

L. Focus and Programming Schedule:

1. Below is a schedule of days (not date specific) for the focus and programing process. Consecutive days noted.
2. Production Electrician and Console Programmer shall be present at all sessions, except where noted.

M. Schedule:

1. Pre-programing – contractor shall perform all pre-programing and patch work as required to pre-configure all fixtures. All fixtures shall be verified to be working. This shall be completed before focus.
2. Focusing – 1 partial day, with District’s representative, Programmer and Production Electrician + Crew.
3. Cue Programing – presets to be programmed as described above.
4. Final focus and Cue Programming/touch up – Once programming is complete notify District’s Representative that the final installation is ready to be checked. 1 partial day with District’s representative, Programmer and Production Electrician.

3.3 COMMISSIONING AND DEMONSTRATION

A. Factory trained and authorized personnel shall review, test, program and otherwise complete the system, providing that the system and all components are fully functional per the Documents and fully covered under the Manufacturer’s warranty.

B. Upon completion of the installation, the Contractor shall notify the District’s Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the District’s Representative’s schedule.

C. Make available for review by the District’s Representative:

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D. All components for physical inspection and inventory.
E. All installed controls shall be operational.
F. All portable controls shall be operational at all plug in locations.
G. The Contractor shall be liable for any return visits by the District's Representative as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the District's Representative to carry out their work.
H. The Contractor shall arrange for access as necessary for inspection of equipment by the District's representatives.

3.4 TRAINING

A. Upon completion of the commissioning, the factory trained and authorized personnel shall demonstrate operation and maintenance of the system to the District's representatives. Coordinate with the District's Representative's schedules two weeks in advance minimum.
B. Training shall include, but not be limited to:

1. Safety precautions.
2. Identification of all elements provided under this section.
3. Maintenance, diagnostics and trouble shooting.
4. Control operation training of the fixtures.
5. Operations and maintenance manual orientation.
6. Care of equipment.
7. Use of RDM features on LED fixtures.
8. Proper hanging, adjustment, and rigging of lighting fixtures.
9. Lighting fixture focus.
10. Console and Architectural system programming.

C. Provide 4 hours of training.

3.5 APPENDIX

A. Appendix A: Lighting Fixtures and Equipment List.
B. Appendix B: Light Plot.

END OF SECTION

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Sanger HS - Theatre
Production Lighting - FF&E Equipment List
Section 116183A ADDENDUM 8

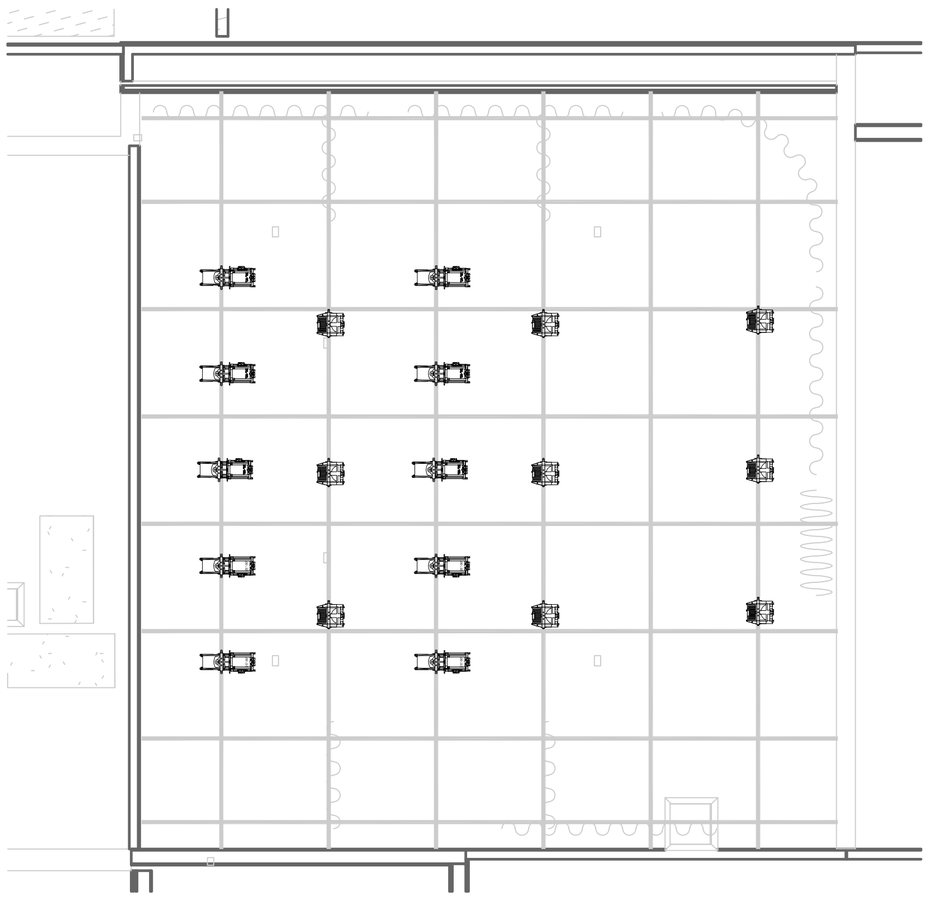
Notes:
1. Conduit, backboxes and electrical power required for A/V systems are provided under division 26 work
2. This list contains key components, but does not list every piece needed for a complete system
   Contractor is responsible to provide a complete and working sytem, regardless of the completeness of this list
3. A/R= As Required
4. OFCI= Owner Furnished, Contractor Installed

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	BLACK BOX THEATRE				
	Production Lighting Fixtures				
1L	Color Source Spot V w/ Shutter Assembly	ETC	CSSPOTMV	48	C-Clamp, PowerCON True 1 to PowerCON True 1 (5'), Pattern Holder, safety cable, Soft Focus Diffuser
2L	ColorSource V Fresnel	ETC	CSFRESVMAXMV	20	C-Clamp, PowerCON True 1 to PowerCON True 1 (5'), safety cable,
3L	ETC Lonestar	ETC	LS-UB-MI2550A1200-B	4	two (2) 107 mm Three-hole Omega brackets, one (1) PowerCON True 1 to PowerCON True 1 (5'), and a safety cable.
	Accessories				
1A	ETC S4 CYC Light Attachment	ETC	S4LEDCYC	10	
2A	15-30° XDLT Zoom Lens Tube with 7.5" Media Frame, Black	ETC	7462A2018-K	12	
3A	25 to 50 Degree Source Four Zoom Lens Tube	ETC	7060A2032-K	36	
4A	Hat Half - 7.5"- City Theatrical Stackers	City Theatrical	CIT-STH-2841	48	
5A	8 Inch Barn Door	ETC	ETC-FRESBD7.5	20	
6A	Smooth Wash Diffuser for Source Four LED- 7.5"	ETC	S4LED-SWD6	48	
	Cables - Power				
1C	PowerCON True 1 to PowerCON True 1 @10'	LEX/TMB	Contractor	50	
2C	PowerCON True 1 to PowerCON True 1 @15'	LEX/TMB	Contractor	25	
3C	PowerCON True 1 to Stagepin' (5')	LEX/TMB	Contractor	25	
	Cables- Data				
1D	5-pin DMX Cable @ 10'	LEX/TMB	Contractor	70	
2D	5-pin DMX Cable @ 15'	LEX/TMB	Contractor	10	
3D	5-pin DMX Cable @ 25'	LEX/TMB	Contractor	4	
4D	CAT5e Cable	LEX/TMB	Contractor	A/R	As required for Spot Track Camera System and Networking for 2 Moving Lights
	Miscellaneous				
1M	Tie Line	Contractor	Contractor	A/R	As required to dress cable
2M	SCHEDULE 40 PIPE	Contractor	Contractor	A/R	As required to complete black box light plot
3M	Rigid Cheeseborough Clamp for 2" OD Sch 40 Pipe	Contractor	Contractor	A/R	As required to complete black box light plot
4M	Super Mega Side Arm 24	The Light Source	SMSA-24	4	With safety cable

Sanger HS - Theatre
Production Lighting - FF&E Equipment List
Section 116183A ADDENDUM 8

Notes:
1. Conduit, backboxes and electrical power required for A/V systems are provided under division 26 work
2. This list contains key components, but does not list every piece needed for a complete system
   Contractor is responsible to provide a complete and working sytem, regardless of the completeness of this list
3. A/R= As Required
4. OFCI= Owner Furnished, Contractor Installed

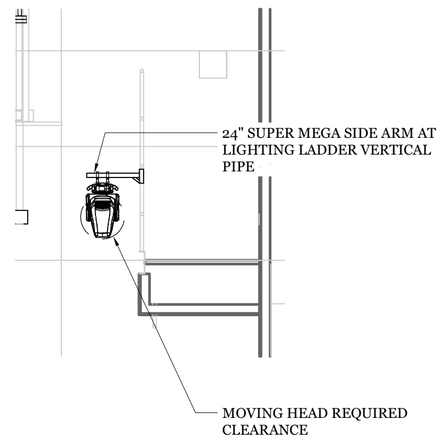
REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	DRAMA CLASSROOM				
	Production Lighting Fixtures				
1L	Color Source Spot V w/ Shutter Assembly	ETC	CSSPOTMV	10	C-Clamp, PowerCON True 1 to PowerCON True 1 (5'), Pattern Holder, safety cable, Soft Focus Diffuser
2L	ColorSource V Fresnel	ETC	CSFRESVMAXMV	10	C-Clamp, PowerCON True 1 to PowerCON True 1 (5'), safety cable,
	Accessories				
1A	25 to 50 Degree Source Four Zoom Lens Tube	ETC	7060A2032-K	10	
2A	Hat Half - 7.5"- City Theatrical Stackers	City Theatrical	CIT-STH-2841	10	
3A	8 Inch Barn Door	ETC	ETC-FRESBD7.5	10	
4A	Smooth Wash Diffuser for Source Four LED- 7.5"	ETC	S4LED-SWD6	10	
	Cables - Power				
1C	PowerCON True 1 to PowerCON True 1 @10'	LEX/TMB	Contractor	20	
2C	PowerCON True 1 to PowerCON True 1 @15'	LEX/TMB	Contractor	10	
3C	PowerCON True 1 to Stagepin' (5')	LEX/TMB	Contractor	10	
	Cables- Data				
1D	5-pin DMX Cable @ 10'	LEX/TMB	Contractor	20	
2D	5-pin DMX Cable @ 15'	LEX/TMB	Contractor	4	
3D	5-pin DMX Cable @ 25'	LEX/TMB	Contractor	2	
	Miscellaneous				
1M	Tie Line	Contractor	Contractor	A/R	As required to dress cable



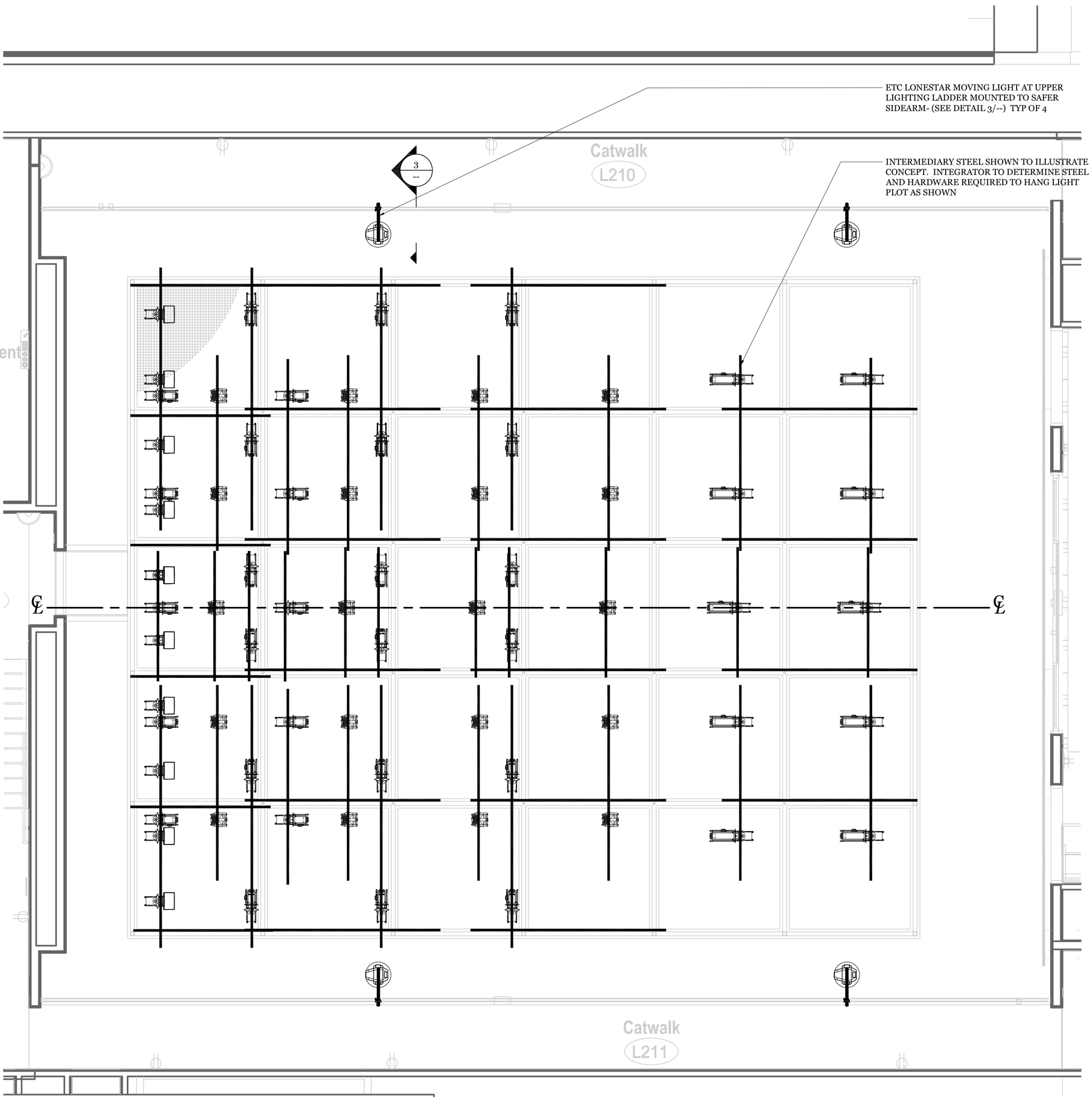
2 DRAMA CLASSROOM LIGHTING PLAN
1/4"=1'-0"

LIGHTING SYMBOL KEY

SYMBOL	FIXTURE TYPE	QTY. SHOWN
	ETC - COLORSOURCE SPOT V 25°-50° ZOOM	10
	ETC - COLORSOURCE V FRESNEL	10



3 ETC LONESTAR MOUNTING, TYP
1/2"=1'-0"



LIGHTING SYMBOL KEY

SYMBOL	FIXTURE TYPE	QTY. SHOWN
	ETC - COLORSOURCE SPOT V 15°-30° ZOOM	10
	ETC - COLORSOURCE SPOT V 25°-50° ZOOM	28
	ETC - COLORSOURCE V FRESNEL	20
	ETC - COLORSOURCE SPOT V CYC	10
	ETC LONESTAR	4
	The Light Source - Super-Mega Side-Arm- 24"	4

1 BLACK BOX LIGHTING PLAN
1/4"=1'-0"

PRODUCTION LIGHTING FF&E

Title: PRODUCTION LIGHTING FF&E LIGHT PLOT ADD 8
Date: 2026-09-22
Scale: AS NOTED
Drawn By: PMM
Drawing Number:
Appendix B

The Shalleck Collaborative Inc.
Planning and Design of Theatres | Production Systems | AV
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SECTION 12 66 23 – TELESCOPIC SEATING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Provision of services as listed herein and related to the manufacturing, delivery and complete installation of a telescoping seating system with integral chairs and matching loose and ganged seats.
2. Coordination with all related sections doing adjacent or integrated work.

1.2 RELATED SECTIONS

A. Coordinate with the following sections, as well as any other related sections, in carrying out this work:
B. Division 01 – General Conditions
C. Floor and adjacent architectural finishes
D. Division 26 – Electrical

1.3 REFERENCES

A. Comply with all national, state and local regulations. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, NEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
C. Labor shall be provided per applicable labor regulations and practices.

1.4 DEFINITIONS

A. Refer to Div. 01 for definitions.
B. Owner's Representative: For the scope in this Section, authorized personnel representing the Owner and The Shalleck Collaborative, Inc., Theatre Consultants.

1.5 SYSTEM DESCRIPTION

A. Telescoping Platform Seating includes electrically operated systems of multiple-tiered seating rows comprising of seats, deck components, understructure that permits closing without requiring dismantling, into a nested configuration for storing.

1. The platform shall have programmed stop positions:

a. Fully Opened

b. Fully Closed
c. Intermediate stop #1 with 4 seatable rows deployed.
d. Intermediate stop #2 as determined in the submittal process.

2. It is in the scope of this section to coordinate any required connections to the building structure.

B. Seating layout:

1. Seating shall be in the configuration as shown in drawings.
2. Seat width combinations shown on drawings may be revised by the Contract only if warranted by actual field dimensions and if approved by the Architect. The Contractor shall submit proposed revisions for review, and any changes should attempt to preserve the following (in descending order of priority):

a. Seats shall stagger in the center seating sections.
b. All row ends shall be aligned at aisles.
c. Seat counts shall be maximized. No row shall have more than 2 chair sizes, and these sizes shall not be more than 1” different.

C. The seating shall be provided with seat uplift devices in order to provide the required passing width in the seating rows.

1.6 CHAIR DESIGN CRITERIA

A. The overall depth of the telescopic rows and the front-to-back envelope dimension of every chair with the seat having risen without assistance shall comply with building code for clear passing widths.
B. Structural Performance:

1. Engineer, fabricate and install telescopic Platform seating systems to the following structural loads without exceeding allowable design working stresses of materials involved, including anchors and connections. Apply each load to produce maximum stress in each respective component of each Platform seat unit.

a. Design Loads: Comply with NFPA 102, 2016 Edition, Chapter 5 for design loads, ICC 300 – 2017, as well as DSA IR 16-5.

C. All submittals shall be prepared for structural review by the CA Division of the State Architect as “deferred approval” items. As such complete shop drawings and relevant calculations shall be filly engineered and bear the stamp of a Structural Engineer licensed in the Sate of CA.
D. Seismic Criteria:

1. Systems shall be designed such that any additional support or bracing required upon deployment shall be integral to the deployment mechanism and shall not require the manual installation of additional bracing or additional attachment to the floor structure.

a. Manufacturer to provide automatic, mechanically deployed seismic anchorage pins from top row of unit to structure above in both the deployed and retracted positions.

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E. Manufacturer's System Design Criteria, and as required by applicable codes:

1. Platform seat assembly & design to support and resist, in addition to its own weight, the following forces:

a. Live load of 120 lbs per linear foot on seats and decking
b. Uniformly distributed live load of not less than 100 lbs per sq. ft. of gross horizontal projection.
c. Parallel sway load of 24 lbs. per linear foot of row.
d. Perpendicular sway load of 10 lbs. per linear foot of row.

2. Hand Railings, Posts and Supports: Engineered to withstand the following forces applied separately:

a. Concentrated load of 200 lbs. applied at any point and in any direction.
b. Uniform load of 50 lbs. per foot applied in any direction.

3. Guard Railings, Post and Supports: Engineered to withstand the following forces applied separately:

a. Concentrated load of 200 lbs. applied at any point and in any direction along top rail.
b. Uniform load of 50 lbs. per foot applied horizontally at top rail and a simultaneous uniform load of 100 lbs. per foot applied vertically downward.

F. Member Sizes and Connections: Design criteria (current edition) of the following shall be the basis for calculation of member sizes and connections:

1. AISC: Manual of Steel Construction
2. AISI: Specification for Design of Cold Formed Steel Structural Members
3. AA: Specification for Aluminum Structures
4. NFOPA: National Design Guide For Wood Construction.

G. Chairs

1. Seats:

a. Seat shall be tested and professionally certified through an independent testing laboratory to support and withstand an evenly distributed 600 lb static load without failure or irregularities that would impair usefulness.
b. Self-lifting seat shall be tested and professionally certified through an independent testing laboratory to withstand 350,000 operating cycles without failure of seat mechanism or measurable component wear.
c. Seat shall be tested and professionally certified to withstand 10,000 impacts of a 40 lb sandbag dropped on the center of the seat from each of the following heights: 6", 8", 10", and 12". The rate of impacts shall be approximately 18 per minute with the total quantity of impacts equaling 40,000.

2. Backs:

a. Back shall withstand an evenly distributed front or rear static load of 450 lbs.

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b. Back shall be tested and professionally certified to withstand, without failure, 40,000 swinging impacts each to the front and rear of the back by means of two opposing 40 lb. sandbags. The sandbags shall be moved horizontally and equally for 10,000 cycles each at the following distances of 6", 8", 10", and 12" at a rate of 35 cycles per minute.
c. Back shall withstand, without failure, an evenly distributed Horizontal Traverse Static Load of 200 lbs. The load shall be applied to the top of the back at a 45-degree angle to the row of seats.

3. Armrests shall be tested and professionally certified to withstand, without failure, a 200 lb. static load applied both perpendicular to and vertically down on the arm.
4. Materials shall satisfy applicable test, codes, standards, or requirements for flammability as follows:

a. Copolymer polypropylene shall have a burn rate of 1 inch per minute or less per ASTM 635.
b. Upholstery materials shall meet requirements as set forth in the state of California Bureau of Home Furnishings Technical Bulletin 117-2013.

1.7 SUBSTITUTIONS

A. There shall be no substitutions unless approved prior to acceptance of bid by owner's representative.

1. Product and component substitutions from basis of design manufacturer shall be submitted for review.
2. Contractor shall provide the following information for review for any alternate manufacturer.

a. Product information including brochures, cut sheets and standard technical details.
b. Submittal drawings from previous projects showing materials and construction of platforms and understructures, similar products and conditions to those specified, technical details of seats, attachment and construction of seats and mounting base, railings, closures and any other information required to fully explain the system.
c. A letter detailing any deviations from the specification. If information regarding deviations is not disclosed, it will indicate that the product is in compliance with the specification. No undisclosed deviations will be accepted during the submittal process.
a. Any information required to prove compliance with section 1.10 below.

B. The owner's representative shall have 10 working days to review product information.

1.8 SUBMITTALS

A. Submittals shall be made in accordance with Division 1.
B. Submittals shall be made in a timely fashion so as to not affect the project schedule and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.

C. All submittals shall be prepared for review by the California Division of the State Architect as "deferred approval" items. As such complete shop drawings and relevant calculations shall be fully engineered and bear the stamp of a Structural Engineer licensed in the state of California.
D. Submittals shall be reviewed, and field dimensions verified prior to commencing acquisition for, and fabrication of the work in this section. All services and parts of the work in this section shall be verified through the submittal process. Approval does not relieve the Contractor of the responsibility of providing equipment in accordance with the specifications.
E. Shop Drawings:

1. Submit scaled shop drawings that show the following:

a. Telescoping mechanism in its entirety, including seat heights, row spacing and rise, aisle widths and locations, assembly dimensions, anchorage to supporting structure, seismic pins, material types and finishes.
b. Detailed seating layout with every seat width indicated
c. Verified field dimensions
d. Required clearances for seat light J-boxes and motor connections.
e. Clear aisle dimensions and exact placement of aisles, in the coordination of other trades. Provide other required clearances
f. Inventory of seat widths required and provided
g. Finish and accessory schedule
h. Contractor shall assume complete responsibility for the accuracy of all chair measurements and field dimensions shown on the shop drawings.
i. Details, product information and Location of all electrical boxes to be mounted to the building.

F. Product Data:

1. Submit data sheets for standard component parts, which shall include all information necessary to verify compliance with this Section.

G. Deviations:

1. List of deviations from these project specifications as described above in section 1.7.

H. Samples:

1. Submit Selection cards for the following:

a. Metal finish selection card.
b. Plastic finish selection card.
c. Wood finishes selection card.
d. Fabric selection cards.
e. Carpet samples for selection

2. Submit real samples of any of the above upon request.

a. Metal, plastic and wood sample chips shall be 2"x2" minimum
b. Fabric and carpet samples shall be 12" x 12" minimum.

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I. Mock-up:

1. Chair

a. Upon review and approval of the shop drawings, data and selection of finishes, provide one complete and operating dual chair mock-up on a solid base.
b. Mock-up shall demonstrate all finishes as selected.
c. Mock-ups shall include one seat of the smallest type in the project and one of the largest.

2. Railing

a. Provide one complete guardrail and one complete handrail of each type in the project.
b. Include hinge and base attachment.

3. Platform step

a. Provide mock-up showing platform intermediate step complete with nosing and working aisle light.
b. Mockup shall have carpet.

4. All components of mockup above shall be attached to a small section of the platform with carpet and shipped folded as a complete singular mockup unit.
5. Mock-up shall be reviewed and approved prior to commencing acquisition for, and fabrication of the work in this section, and shall be retained as a model for comparison to the final installation.
6. All costs for shipping of the mock-up to the to the job site shall be borne by the Contractor. Following approval of the finished installation, the mock-up shall be turned over to the Owner.

J. Certification of Flame Proofing or Flame Resistance: Submit certification, recommendations and instructions for laundering of specific fabrics and maintenance of entire installation.
K. Record Documents:

1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Within 30 days, submit six copies of “as built” submittals including shop drawings, product data, and care and maintenance instructions and warranty documents.

1.9 WARRANTY AND SERVICE

A. Warranty shall provide coverage of material defects, assembly workmanship and installation for a period of five years following the date of acceptance by the Owner.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor.
C. Provide service visits to inspect and adjust the system as required 2 months and 12 months after acceptance by the owner. Service visits shall include a 1-2 hour training/discussion session with the owner.

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1.10 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty suppliers and manufacturers meeting the qualifications listed herein.
B. Specialty suppliers and the individuals responsible for installation in the field shall have been continuously engaged in the sales and integration of telescopic platforming and seating equipment similar to that specified herein for a minimum of ten years and shall have completed at least ten installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.
C. Specialty suppliers shall maintain bonds in the amount required for the project.
D. Specialty manufacturers responsible for engineering and manufacturing shall have been continuously engaged in the engineering and manufacturing of telescopic platforming and seating equipment similar to that specified herein for a minimum of ten years and shall have provided equipment for at least fifty installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.
E. All equipment shall be UL listed and bear the appropriate labels.

1.11 DELIVERY, STORAGE AND HANDLING

A. Materials shall be packed for shipment by personnel qualified in seating installations and shipping. Packing shall prevent damage to the chairs during transit. Costs to repair or replace all chairs damaged during the course of the contract services shall be borne by the Contractor.
B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.
C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

1.12 PROJECT CONDITIONS

A. Contractor shall examine the work in place to ensure their manufacturing and services properly reflect the field conditions.
B. Defects in the field which may impact the work in this Section shall be reported to the Architect and corrected in accordance with the requirements of the applicable Section of work prior to commencement of the work in this Section.

1.13 MAINTENANCE

A. Provide the following spare parts from the same production run as the installed chairs:

1. Spare seat and back covers in a quantity equal to 5% of chairs provided, prorated to sizes of chairs used.
2. Spare LED strips for aisle lights in a quantity equal to 10% of the aisle lights installed.
3. 1 spare railing
4. 2 spare handrails
5. 1 spare seat back or each size, fully upholstered
6. 1 spare seat bottom of each size fully upholstered
7. 2 spare seat mounting arms

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8. Any other manufacturer recommended spare parts

B. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner.

PART 2 - PRODUCTS

2.1 SPECIALTY MANUFACTURERS AND SUPPLIERS

A. The Contractor must have been engaged in the fabrication and installation of equipment of the type indicated herein for no less than 5 full years, with a minimum of two completed relevant installations in the United States at time of bid.

B. The following production systems specialty manufacturers may furnish equipment for the work in this section:

Hussey Seatway
Wiltshire, UK
Represented by Norcon Industries
7717 North Riverwood Way
Eagle Mountain, UT 84005
Contact: Tim Norris, Trevor Nebeker
Tel: (480) 839-2324
Email: tim@norconindustries.net; trevoen@norconindustries.net

Audience Systems
Westbury, Wilshire, BA13 4 JP
United Kingdom
Contact: Jemma Gunning
Tel: (269) 349-1521
Email: jgunning@audiencesystems.com
Represented by Titan Carter Platform Systems
Contact: Walter Dalla Riva
Tel: (905) 301-6712
E-mail: wdallariva@titancarter.com

Jezet Seating
Siberiëstraat 10
3900 Overpelt
Belgium
North American Office:
7140 Albert Einstein
Montreal, QC
H4S 2C, Canada
Contact: Carlos Seara
Tel: (305) 450-1763
Email: carlos@jezet.com

Master Industrie
1 Rue Laennec
85130 La Verrie
France
North American Office :
205 SE Spokane Street, Suite 300
Portland, OR 97202
Contact: Jean Baptiste Cordon
Tel: (503) 984-5904
Email: jbcordon@master-industrie.com

2.2 GENERAL

A. Provide and install all seating and seating components complete with all necessary accessories as described herein.

2.3 MATERIALS

A. In all cases where a device or a part of equipment is referred to in a singular manner within the Contract Documents, it is intended that such a reference shall include all devices required to complete the installation in accordance with the Contract Documents.
B. All Variations from the specified materials and product must be approved by the owner.
C. Fire Performance Characteristics:

1. Flame retardant performance: Upholstery components and the assembly thereof shall be in conformance with flammability standards as set forth in California Technical Bulletin #117-2013.
2. Padding: Provide new (prime manufacture) polyurethane foam with an average burn length not exceeding 8” and average flame time after removal of flame source not exceeding 15 seconds after falling, when tested vertically in compliance with Federal Test Method Standard 191, Method 5903.2.
3. Fabric: provide fabric complying with 16 CFR Part 1610 Class I, State of CA Tech. Bulletin #117-2013 Section E (CS-191-53)
4. Certificates: Certificates shall be provided by manufacturer attesting that the materials provided for theatre seating meet the above fire performance requirements.

D. Gray Iron Castings: ASTM A48, Class 25.
E. Steel Plates, Shapes, and Bars: ASTM A36
F. Steel Sheets for Baked Enamel Finish: ASTM A591, commercial and drawing quality; Class C, galvanized – bonderized; 20-gauge minimum unless otherwise indicated.
G. Expansion Bolts: FS FF-B-588; Type, Class, and Style as recommended by the chair manufacturer.
H. Concealed Plywood: PS 1/ANSI A199.
I. Finish for all exposed metal parts shall be per schedule 12 61 23 A, below.
J. Finish for all exposed plastic parts shall be per schedule 12 61 23 A, below.
K. Seat and inner back upholstery fabric shall be per schedule 12 61 23 A, below.
L. Carpet shall be per schedule 12 61 23 A, below.
M. Fascia/Toe Boards shall be per schedule 12 61 23 A, below.
N. Cushions

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1. Both seat and back cushions must be made of open cell polyurethane foam.

O. Fabrication

1. Fabricate all work in the section in accordance with the owner's direction, specifications, approved shop drawings, pertinent project drawings, established trade practices and applicable code requirements.
2. Machine finish all operating pars to standard trade tolerance, fits and finishes.
3. Carry out shop welding in full accordance with the appropriate sections of "Specifications for the Design, Fabrication and Erection of Structural Steel Buildings" of the American Institute of Steel Construction (AISC).

2.4 TELESCOPIC PLATFORMS

A. Wheels: Minimum 6" diameter with 1-3/8" non-marring soft rubber face, designed to protect wood, synthetic, or carpet tile floor surfaces. Hard faced wheel treads or smaller wheels will not be acceptable.
B. Telescopic Bases: Fitted with not less than 6 wheels under each moving row.
C. Columns: Tube steel of high tensile steel fitted with wide-based diagonal braces to meet design conditions. The columns shall be supported by a full welded gusset from columns to caster horns.
D. Row interlocks: Interlocks shall be provided to adjoin row structures by means of interacting steel connections, and there shall be automatic locks on all rows in all sections.
E. Row Levelers: Leveling devices shall be provided at the front of each row at platform ends.
F. Decking:

1. Shall be fabricated from fully welded tube steel frames with Plywood sheeting and carpet finish.
2. Plywood

a. Plywood sheeting shall be screwed to steel frames at all edges and cross supports with screws on a minimum 6" spacing.
b. /Plywood shall be 7/8" nominal minimum, with exterior glue, all plies Group 1 plugged crossband under face, produced in conformance with PS-1-74 of the National Bureau of Standards.

3. Plywood shall be screwed or through bolted to deck stiffeners, doublers, and frame cantilevers for structural integrity, including transmittance of sway forces to the understructure.
4. Frames

a. Frames shall be fully welded. Bolted connections are not acceptable.
b. Front, rear and exposed side frames shall be tube steel.
c. Decking shall have steel frames spanning in the front to rear direction, welded to steel perimeter frame.
d. Spacing shall not exceed 32"
e. All plywood seams shall be supported by steel framing, no exceptions.
f. Deck supports shall underlie the decking, providing added stiffness and attachment.
g. If mid-aisle handrails are provided. A steel frame shall be provided to support all mid-aisle handrail attachment sleeves.

5. Decking and deck supports shall form a rigid closed deck structure providing positive containment. Deck structure shall be fabricated leaving no opening such that any major human extremity of other items could pass, accidently of deliberately.
6. Decking shall be delivered to the site fully assembled in undivided sections.

    a. Decking may be subdivided only when required for shipping or for installation into the site due to reasonable install path of travel restrictions.
    b. If segmented decks are required, sections shall be welded once assembled.
    c. Segmented decks shall have seams concealed fasteners.

7. Cover decking in carpet.

    a. Carpet may be installed on site to conceal seams from decks delivered in segments.

G. All welds shall be made at the factory by welders that are certified on the equipment and process used.
H. Moving rows shall be equipped with a single molded resin component guide to ensure ease of operation and provide alignment augmentation. Frames shall be interlocked at top and bottom.
I. Fasteners: All structural connection that are not welded shall be made with S.A. E. stress rated bolts and self-locking nuts.
J. Telescopic platforms shall not be required to attached to the floor at any location forward of the leading edge of the storage position. Pins, tie-down bolts, or other forms of forward floor attachment shall not be acceptable. Pins to structure at the rear / top row of fully tracking units are acceptable, provided they automatically interlock to the structure upon platform deployment and storage, and do not require manual actuation.
K. It is in the scope of this section to coordinate any required connections to the building structure.
L. Finish of structure:

    1. Steel: Understructure abraded, cleaned, electrostatically sprayed and finished with low gloss baked enamel.
    2. Steel nosing/risers finished with corrosion resistant bronze anodized finish zinc alloy plating.

2.5 SIDE CLOSURE PANELS

A. Provide Closure panels at the sides of each row.

    1. Panels fabric shall be per schedule 12 61 23 A, below.
    2. Panels shall be attached to the sides of the seating bank and shall not be removed for telescopic seating operation.
    3. Panels shall not abrade each other or surrounding wall finish and shall not bind during unit operation.
    4. Panels shall have a sewn bottom pocket to hold a jack chain counterweight. Chains shall be one continuous length per pocket.
    5. Panels shall have grommits at 6” on center across the top hem, which shall ride on a rod attached to the underside of the telescoping platform. The leading edge shall be solidly attached to the front of its riser platform. A black elastic shall attach the trailing end of each drape to the riser platform above it.

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2.6 ELECTRICAL, MOTOR AND CONTROL

A. Motor

1. Integral automatic “frictionless” propulsion system to open and close telescopic seating to be supplied. Motors to be supplied with a minimum of 1 motor per each section width.

B. Provide all electrical components and connection boxes from the point of building power connection to div 26 electrical for installation.

1. Provide receptacles, back boxes and disconnects as required.

C. Control

1. Unit shall be self-guiding and shall not require operation of multiple motors for course adjustment.
2. Provide pendant for control of seating unit.

a. Unit must operate on a single pendant with a single button control. Operation of multiple pendants or buttons shall not be acceptable.

3. Electrical system to include open/close, and intermediate stop limit switches with operation by pendant control.

a. If seismic pins are required, the electrical control system shall automatically deploy and retract these pins when the top row is moved.

4. Pendant control receptacle to be mounted in the riser of the first row behind a hinged panel with a locking cover to prevent unauthorized access and shall be single outlet for both forward and reverse folding.
5. Operation
6. Safety

a. Provide a visible alarm, such as a strobe light, which shall be placed on the rear wall under the unit and shall operate when the unit is moving.
b. Provide a mushroom style emergency stop button on the rear wall under the unit.

2.7 AISLE LIGHTING

A. Fixture

1. Provide UL approved aisle lighting fixtures for installation under the nosing of each riser. Fixture color temperature shall be between 2500K and 3000K.
2. Fixture shall be protected from damage or breakage by a heavy-duty lens designed to take the load of an adult up to 400#

a. Lens shall be angled to meet requirements of stair nosing code.

B. Provide transformers for aisle lighting in quantities as required.

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1. Transformers shall be provided in a labeled wall mount box and located in the Control Booth to prevent transformer noise from disturbing the audience.
2. Coordinate mounting location with electrical contractor and electrical drawings.
3. Provide junction box with terminal strips for termination connection of aisle lighting behind seating unit.
4. Provide wall mount box with dimmers in quantity necessary for aisle lights. Dimmer shall control setting of aisle lights and shall be manual. Wall mount box may be located either before or after transformers as necessary. Provide in box with labeled locking cover.

C. Aisle lighting shall be configured in zones or on relays such that the aisle lighting in a row will not activate unless that row is deployed.

2.8 GUARDS, HANDRAILS, AND RAILINGS

A. General

1. Guard, handrail, and railing materials and finishes shall be per Schedule 12 61 23 A, below.

    a. All welds on metal guards, handrails, and railings shall be clean and deburred.

2. Guards and handrails shall meet all code and safety regulation as required by local, state and national code as well as by OSHA and CalOSHA and federal law including the Americans with Disabilities Act (ADA).

    a. Guards and rails shall be engineered to strength and resistance in all directions required.
    b. Openings shall meet code and regulatory minimum dimensions.
    c. All members shall meet graspability requirements per code and federal law.

B. Side Folding Guards

1. Provide folding rails at row ends. Rails shall fold over seats and /or aisle steps and shall store beneath the platforms. Guardrails which need to be removed prior to seat storage shall not be acceptable.
2. Side Guards Integral Handrails

    a. Handrails shall be integrated into side guards.
    b. Handrails shall be 34” and 38” tall measured above the riser nose as required by code.
    c. Handrail shall lock into attachment base and be installed or removed for storage position without the use of tools.

C. Front folding railings

1. Provide front railings to protect the edge condition when loose seats are not used on the flat floor.
2. Front railings shall mount to the platform deck and shall fold over the seats for storage.

    a. Railings shall be 30” tall measured from the deck of the first telescopic row.
    b. Railings may be shorter than 30” to allow for folding but shall not be less than 24”.

c. Railing shall extend across the full width of the first row, except the clear aisles.

D. Design of guardrails/handrails shall comply with all local codes with respect to dimensional attributes, handrail grasp ability and diameter/section.

2.9 UPHOLSTERED CHAIRS

A. General:

1. The chair seating system shall be comprised of a system of individual chairs on stanchions with lock/release foot pedal devices.

   a. Beam mounted seats are acceptable up to maximum gangs of (4) four chairs.

2. The dimensional and physical characteristics of the seating and the seating plan shall be in accordance with applicable codes, applicable contract documents and the following specifications.
3. Seats and back shall have internally supported peripheral heavy gauge steel frames. The frames shall support, resist and transmit design loads to the rectangular steel chair stringer without excessive deflection of noise.
4. Chairs shall fully fold for storage between platform decks and shall be supported on gas struts.

B. Seats:

1. Seats shall be finished per schedule 12 61 23 A, below.
2. Seats shall be cantilevered, self-centering, automatic full lift with over-center retract feature for ease of row passage and janitorial access.
3. Provide heavy-duty steel hinges of compensating type, each equipped with noiseless adjustable seat lifting device; provide for each rotation on bushings which do not require lubrication and have a positive internal return stop of rubber or neoprene. Gravity pivots are an acceptable alternative.
4. Seats to be upholstered with a molded, open-cell foam cushion, minimum 2”.

   a. Seat Back shall be 2” of additional foam at lower portion for lumbar support.

5. Fabric covering sewed into box construction with welts and securely attached without use of track, screws, or clips.

C. Backs:

1. Fabricate back as padded, upholstered component.
2. Any exposed fasteners shall be black, tamper –proof hardware.
3. Chairs will lock rigidly into use position without excessive movement once they are in the use position. Chair stringer shall serve as the focal attachment and shall in turn transmit all forces to the standards.

D. Chair Stanchions:

1. The chair stanchions shall be fabricated of continuously welded, closed seam steel tube.

2. Each stanchion will engage in a pivot receiver support bracket mounted directly to the floor structure of the platform. Each chair module will be supported on a single stanchion. The pivot bracket shall automatically lock the chair in the upright use position and shall not unlock unless the stanchion foot pedal is depressed.
3. Stanchion finish shall be as described for Exposed Metal parts in Schedule 12 61 23 A, below.

E. Arm Rests:

1. Provide arm rests at each aisle and between chairs, designed for concealed mounting to the chair stanchion assembly.
2. Finish of armrest shall be per Schedule 12 61 23, below.

F. Row and Seat Identification:

1. Provide plates with etched characters for row and seat identification system as shown in the drawings.

a. It is the responsibility of the contractor to request a number and letter scheme if one is not provided in the drawings.

2. Seat ID number plates shall be affixed to the seat pan and shall be secured with 2 fasteners.
3. Row identification tags shall be located as listed in Schedule 12 61 23 A, below.
4. Finish of plates shall be per Schedule 12 61 23 A, below.

PART 3 - EXECUTION

3.1 PERFORMANCE OF THE WORK

A. The installation is to be performed under the direction of a qualified installation superintendent representing and employed by the Contractor.

3.2 INSTALLATION

A. There shall be no gaps between edges of steps or rows and chair components that would cause a trip hazard greater than 3”.

3.3 ADJUSTING AND CLEANING

A. All work is to be inspected, adjusted as necessary, and cleaned. Touch-up finishes to restore damage or soiled surfaces.
B. Remove from the jobsite all debris and packing materials and dispose of legally.

3.4 DEMONSTRATION

A. Installed seating shall be operated for observation and approval by the Owner’s Representative. Contractor shall make necessary adjustments as required.

B. Final observation shall be scheduled according to the project schedules and based on the availability of the Architect. Contractor shall provide a written declaration that the project is completed and ready for final review.

1. Costs for re-observation due to the Owner's Representative having deemed the installation incomplete and/or the work having been found not in compliance with the specifications shall be borne by the Contractor. These costs include, but are not limited to hourly consulting fees including travel time, travel and other expenses related to the re-inspection.

C. Training

1. Provide training to the owner on the basic use and care of the system.
2. Training shall cover:

a. Use, procedures and safety precautions.
b. Operation of all components.
c. Basic repair and maintenance including motors, controls, aisle lighting and alignment.
d. Trouble shooting and realignment.

3.5 APPENDIX

A. 126623A : Seating System Attributes

PART 4 - BASIS OF DESIGN PRODUCT

A. Basis of design platforming system shall be: Hussey Seatway TP

1. Or equal

B. Basis of design chair shall be: Hussey Seatway Gallery 3

1. Or equal

4.2 CHAIR FINISHES

1. Upholstry Fabric: As described below
2. Back Panel Material: Upholstered inner; stained plywood outer back
3. Under-Pan Material: Fully upholstered
4. Armrest Material: stained hardwood
5. Stain: selected from standard line
6. Finish: selected from standard line

4.3 UPHOLSTERY FABRIC

A. Upholstery fabric shall meet the following requirements:

1. Quality – The finish goods are to be graded “First Quality”. This precludes the use of seconds or of 1st run seconds. No flaws, piercing, or discoloration will be accepted.
2. Width of fabric: 57”
3. Weight: 14.4oz per linear yard
4. Fabric: 77% wool; 12% nylon, 6% acrylic, 5% linen
5. Cleanability: mild, water-free dry cleaning solvent
6. Color Fastness to Light: 40 hours
7. Surface Abrasion: 100,000 double rubs, minimum
8. Flame Resistance (meet or exceed):

a. State of California Technical Bulletin #117-2013

B. Color and style:

1. Manufacture: Maharam
2. Style: Rowan
3. Color: selected from standard line

4.4 EXPOSED METAL EXCEPT HANDRAILS AND GUARDRAILS

A. Metal parts visible from the front, top, sides, or underside of the telescopic seating unit, and any parts visible on the chair shall be:

1. Color: Black

4.5 GUARDS, HANDRAILS, AND RAILINGS

A. Handrails and Guardrails shall be:

1. Material:
2. Design: Guards, Handrails, and Railings shall be from manufacturer's standard line as selected by architect.

    a. Provide edge framing of 3/16"x2" flat steel bar.
    b. Lower portion of the railing shall be:
        1) Perforated metal sheet
        2) Top edge shall be 30" measured above the riser nose of each platform deck and intermediate step.
        3) Upper portion shall be a series of 1.25" round steel tube or bar spaced evenly and set at 34", 38" and 42" above the riser nose of each platform deck and intermediate step.
        4) Front railings shall not have upper round tubes or bars.

3. Finish:Matte or Semi-gloss
4. Color:black

4.6 EXPOSED PLASTIC

A. Exposed plastic parts on the telescopic seating unit and chair shall be:

1. Color: Black

4.7 CARPET

A. Color and style:

1. Manufacture: As selected by architect from platform manufacturer's standard line.
2. Style: As selected by architect from platform manufacturer's standard line.
3. Color: "Charcoal"

4.8 FACIA / TOE BOARDS

1. Fascia panels and toe boards shall be stained plywood.
2. Species: manufacturer's standard
3. Stain: Match Architect's sample
4. Finish: Match Architect's sample

4.9 SIDE CLOSURE PANELS, FABRIC

A. Fabric side closure panels shall be:

1. 22oz IFR velour, installed nap down.
2. Color: Black

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4.10 ROW AND SEAT IDENTIFICATION

1. Provide all aisles with row ID plates, with minimum ½" letters.

    a. Plates shall be inset in carpet
    b. ID plate shall be finished in brushed aluminum with black Raleway characters.

2. Provide all seats with ID numbers, with minimum 5/16" numbers.

    a. Seat ID number plate to be installed on the underside of the seat pan, centered left to right and 1" down from the lip of the pan.
    b. Seat ID number plate to be finished in brushed aluminum with black Raleway characters.

END OF SECTION

SECTION 23 00 01 - HEATING, VENTILATING AND AIR CONDITIONING

PART 1: - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

A. The General Mechanical Provisions, Section 23 00 00, shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
1. Air distribution system.
2. All equipment as shown or noted on the drawings or as specified. Furnish motor starters except where motor control centers are used. Coordinate with Division 26.
3. Circulating water system.
4. Refrigeration system.
5. System energy balance.
6. Coordinate with Section 23 09 23 (Direct Digital Control and Energy Management System) regarding location and installation of system sensors and to provide simultaneous start-up.
7. Coordinate and cooperate with commission agent as required by Section 01 91 13.
8. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, ductwork, braces, supports, housekeeping pads, temperature controls and related items no longer required.

B. Work Specified Elsewhere:
1. Line voltage power wiring, motor starters in motor control centers, disconnect switches and installation of all starters are included in the Electrical Section, unless otherwise noted.
2. Connection of gas, condensate drains and domestic water to equipment.
3. Concrete and reinforcing steel unless specifically called for in the drawings or specifications.
4. Painting unless specifically called for in the drawings or specifications.
5. Carpentry.
6. Direct Digital Control and Energy Management System (DDC/EMS).

PART 2: - PRODUCTS

2.1 PIPING MATERIALS:

A. Hot or Chilled Water Piping:
1. Above Grade:
a. 2" and Smaller: Schedule 40 black steel pipe, ASTM A53. 150 psi black malleable iron screwed fittings, ANSI B16.3.

b. 2-1/2" Through 4": Screwed pipe as above -OR- welded or grooved pipe as below.

c. 6" and Larger: Schedule 40 black steel pipe, ASTM A53. Standard weight carbon steel welding fittings, long radius ells, ANSI B16.9. Joints may be grooved pipe unions, EPDM gaskets. Grinnell, Gruvlok, Victaulic.

2. Underground Chilled and Hot Water Piping:

a. General: Underground chilled and hot water lines shall be Ferro-Therm, as manufactured by Thermacor Process. All straight sections, fittings and other accessories shall be factory-fabricated to job dimensions. Each system layout shall be computer-analyzed by the piping system manufacturer to determine stress on the carrier pipe and anticipated thermal movement of the service pipe. The system design shall be in conformance with ANSI B31.1. Provide manufacturer's shop drawings with dimensioned piping layout and details of all expansion fittings, elbows, building entry points and all other pertinent information needed to verify that the type of materials being offered is in accordance with the specifications.

b. Jacket: Seamless high density polyethylene (HDPE) in accordance with ASTM D1248, Type 3, Class C. Minimum jacket thickness shall be 125 mils.

c. Carrier Pipe: ASTM A-53, Grade B, electric-resistance welded black steel with beveled ends for field welded joints. Schedule 40. Butt welding fittings shall conform to ANSI Standard B16.9.

d. Insulation: Polyurethane foam completely filling the annular space between the carrier pipe and the outer jacket to a minimum thickness of 1.38 inch. The in-place density shall be 2 pounds per cubic foot; the thermal conductivity factor shall be 0.15 BTU/(Hr.)(Sq. Ft.)(°F/In.); and shall have a closed cell content of 90%. Exposed insulation at unit ends shall be sealed with factory applied high temperature elastomer vapor barrier sealant.

e. Fittings: Fittings shall be factory fabricated and preinsulated with polyurethane foam insulation. The insulation shall be protected with a 1-piece, seamless, molded HDPE jacket of the same type, thickness and quality as that of the straight units of preinsulated pipe. Field fabrication, alteration or insulation of fittings is not permitted.

f. Expansion Fittings and Elbows: Prefabricated expansion fittings, elbows and tees shall be furnished and installed where shown. Preinsulated fittings that must provide compensation for pipe expansion and/or contraction shall be externally insulated with flexible polyurethane foam insulation. The straight units adjoining expansion fittings shall also be insulated with flexible polyurethane foam insulation to the extent shown on the drawings. Expansion fittings and elbows shall be properly

designed in accordance with stress limits indicated by ANSI B31.1 Code for Pressure Piping. The pipe manufacturer shall furnish pipe stress calculations and expansion details stamped by a registered professional engineer showing that the piping design meets this code.

3. Valves and Specialties:
   a. Valves:
      (1) General: Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Milwaukee, Nibco, Stockham, Walworth, as well as Grinnell, Gruvlok and Victaulic for grooved joint systems, are acceptable. All valves of a particular type or for a particular service shall be by the same manufacturer. Butterfly valves may be substituted for 2-1/2" and larger gate valves above grade; see specification below.
      (2) Gate Valve: Provide 2" extension necks at insulated pipes, where required. 2" and Smaller: All bronze. Rising stem. Union bonnet. Wedge disk. Screwed connection. Malleable iron handwheel. Class 125. Nibco T-124. 2-1/2" and Larger: Iron body, bronze mounted. Non-rising stem. Resilient wedge. Class 125. Flanged or AWWA hub end as applicable. Nibco F-619-RWS. Underground valves shall have square operating nut. Provide one operating "T" handle for underground valves.
      (3) Butterfly Valve: Iron threaded lug body. Aluminum bronze disk. O-ring seals. Resilient, removable seat. 416 stainless steel shaft. 6" and smaller valves shall have multi-position lever handle. 8" and larger valves shall have gear operator. Provide 2" extension neck at insulated pipes. Demco Series NE, Grinnell, Stockham.
      (4) Plug Valve: Eccentric bronze or nickel plated semi-steel plug, semi-steel body, bronze bushings, Buna-N-rings. 175 psi WOG. KeyPort Valve Series 400.
      (5) Check Valve: Non-slam, lift type. Replaceable bronze seat, disk and bushings. Stainless steel helical spring. Disk guided at top and bottom. Flow area through valve shall exceed cross sectional area of pipe. 150 psi WOG. CPV, Mueller Steam Specialty. 2" and Smaller: Shall be screwed brass with hand lapped bronze disk. 2-1/2" and Larger: Shall be iron body, wafer or flanged with resilient Buna-N or TFE facing on seat.
      (6) Ball Valve: Full port. Bronze body, cap, stem, disk and ball. Screwed connection. Lever handle. TFE seat. O-ring seals. 300 psi WOG. Apollo, Nibco, Jomar.
      (7) Globe Valve: All bronze. Renewable TFE disk. Screwed connection. Malleable iron handwheel. Union bonnet. Class 150. Stockham B-22.
      (8) Valve Box: Pre-cast reinforced concrete. Cast iron lid marked for services. Christy F22 in foot traffic areas; G5 in roadways.
   b. Instruments:
      (1) Pressure Gage: Phosphor bronze tube. Bronze bushed. 1% accuracy. Cast aluminum case. 3-1/2" white dial. Adjustable pointer. Operating pressure at midscale. 1/4" NPT brass socket.

Provide brass porous core pressure snubber and gage cock. Trerice, Weksler, Winters.

(2) Thermometer: 3" dial. Stainless steel case. Back or bottom connected as required. 1/2" NPT. 20-240ºF, 2ºF divisions for hot water, 25-125ºF, 2ºF divisions for chilled water. 2" insertion length. Allowance to be made for insulation thickness. Marshalltown, Moeller, Taylor, Tel Tru, Winters.

(3) Thermometer Well: Brass well. Suitable for 3" dial thermometer above. Provide 2" extension at insulated pipes.

(4) Gage Cock: Lever handle brass cock. 1/4" NPT connections. Provide 2" extension at insulated pipes.

(5) Instrument Well: Suitable for temperature sensing element. Coordinate with supplier of temperature controls.

(6) Flow Switch: Paddle type. McDonnell No. FS4-3.

c. Miscellaneous Specialties:

(1) Pressure Relief Valve: ASME rated fully automatic, reseating pressure relief valve sized in accordance with energy input. Watts.

(2) Union: 2" and Smaller: AAR malleable iron, bronze to iron ground seat. 300 psi. Grinnell. Size 2-1/2" and Larger: Grooved pipe, synthetic gasket, malleable iron housing. Victaulic Style 77, type "E" gasket, Grinnell.

(3) Combination Reducing/Relief Valve: Iron body. Diaphragm operated. Brass internal parts. Reducing valve shall have a built-in strainer and check valve and have a field adjustable range of 10-25 psi and a 125 psi maximum working pressure. Relief valve shall be set at 30 psi. Bell and Gossett No. F-3.

(4) Balancing Cock: Calibrated all bronze balancing/shutoff valve or cock. Screwed connections. Memory stop. Position indicator. Drain connection. Taps for differential pressure gage, with check valves or shutoffs. 125 psi working pressure. Internal seals. Preformed insulation block. Armstrong, FlowSet by Flow Design, Inc., Grinnell, Tour and Andersson, Victaulic.

(5) Strainer: "Y" type, 125 psi. Machined seats. Stainless steel screens. Provide gate valve blowoff with hose threads. Bailey, Mueller Steam Specialty.
2" and Smaller: Screwed bronze body. Perforation size 0.057".
2-1/2" and Larger: Flanged iron body, perforation size as follows:

Pipe Size	Perforation Dia.
2-1/2" - 3"	1/16"
4" - 6"	3/32"
8" and Larger	1/8"

(6) Dielectric Coupling: Insulating union, flange or waterway fitting rated for 250 psig. EPCO, Clearflow.

(7) Suction Diffuser: Cast iron angle type body with inlet vanes and combination diffuser/strainer/orifice cylinder with 3/16" openings. Provide fine mesh start-up strainer (to be removed after 30 days of operation). Strainer free area to be not less than five times the sectional area of pump connection. Adjustable support foot, drain tapping and gage tapping. Bell and Gossett, Taco, Thrush.

(8) Expansion Tank: Pressurized diaphragm type or bladder type, as shown on drawings. Welded steel, ASME code construction with ASME stamp and certification, 125 psi, 240ºF. Sealed elastomer diaphragm or heavy duty butyl bladder. Pre-charged with air to initial fill pressure of system. Base or saddle as required for mounting. Removable access cover for bladder type. Sight glass for diaphragm type (hot water service only). Amtrol, Taco.

(9) Flexible Connection: 2" and Smaller: Screwed connection. Corrugated bronze core covered with high tensile bronze tubular braid. 150 psi working pressure. Flexonics, Keflex. 2-1/2" and Larger: Contoured, molded Teflon bellows. Minimum of three convolutions. Monel reinforcing rings. Limit bolts. Flanged connection. 100 psi working pressure. Belmont, Resistoflex. -Or- Multiple laminations of 321 stainless steel. 150 psi working pressure. Limit bolts. Flanged connection. Hyspan Series 5500.

(10) Air/Dirt Separator: Full flow coalescing type combination air eliminator and dirt separator. Separator shall be fabricated steel, rated for 150 psig working pressure, stamped and registered in accordance with ASME Section VIII, Division 1 for unfired pressure vessels, and include two equal chambers above and below the inlet / outlet nozzles. Unit shall include internal elements filling the entire vessel to suppress turbulence and provide air elimination efficiency of 100% free air, 100% entrained air, and 99.6% dissolved air at the installed location. The elements must consist of a copper core tube with continuous wound copper medium permanently affixed to the core. Internal coalescing elements consisting of plastic, perforated steel plate/tubes or loosely filled steel rings will not be accepted. Dirt separation efficiency shall be a minimum of 80% of all particles 30 micron and larger within 100 passes. Basis of design for the air eliminator / dirt separator shall be the Spirovent® Series VDT or VHT as manufactured by Spirotherm, Inc., Glendale Heights, Illinois or approved equal as noted*. Optional Series VDN or VHN by Spirotherm, Inc. shall include removable lower head for internal inspection if so noted on the drawings and schedule.

B. Condenser Water Piping:
1. 4" and Smaller: Schedule 40 galvanized steel pipe, ASTM A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3.
2. 6" and Larger: Schedule 40 black steel pipe, ASTM A53. Standard weight carbon steel welding fittings, long radius ells, ANSI B16.9. Joints above grade may be grooved pipe unions, EPDM gaskets. Grinnell, Victaulic.
3. Valves and Specialties: Same as for chilled water piping.

C. Refrigerant Piping: Hard drawn Type ACR copper, dried and capped, ASTM B280. Wrought copper fittings, silver alloy brazed, 1100ºF, Silfos.

D. Flue Piping:

1. Gas Flue Piping: AL29-4C alloyed stainless steel, double wall metal flue pipe. Factory fittings. UL listed to UL 1738. Heat Fab model Saf-T CI.
2. Flue Cap: Designed to properly ventilate flue regardless of wind direction. Storm proof, bird proof. Heat Fab.

E. Miscellaneous Piping Items:
1. Pipe Support:
a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendations. Felt liner for copper piping. Hanger and rod shall have galvanized finish. B-Line, Anvil, Unistrut.
b. Insulation Support: Calcium silicate insulation, 100 psi, or heavy density fiberglass, 100 psi. Insulation thickness equal to adjoining pipe insulation. Steel support shield or saddle. Provide vapor barrier for chilled water piping. Insulation and/or vapor barrier shall extend 1" beyond steel support. Pipe hanger in accordance with paragraph 1 above. Increase hanger size per manufacturer's recommendation. B-Line, Pipe Shields, Inc., Uni-Grip.
c. Isolating Shield: Galvanized steel shell and reinforcing ribs. 1/4" non-conducting hair felt pad. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Semco.
d. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Anvil, Unistrut.
2. Flashing: Flashing for piping through roof shall be prefabricated galvanized steel roof jacks with 16" square flange around pipe. Provide clamp-on storm collar and seal water tight with mastic. Maintain dielectric separation between copper and galvanized materials. For cold process built-up roof, material shall be 4 lb/ft2 lead instead of galvanized steel. For single-ply roofing, use the roofing manufacturer’s recommended flashing material.

2.2 PIPING INSULATION MATERIALS:

A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.

B. Pre-Molded Fiberglass: Heavy density sectional pre-molded fiberglass with vapor barrier laminated all service jacket and pressure sealing vapor barrier lap. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-ºF at a mean temperature of 50ºF. Perm rating 0.02, ASTM E96. Puncture rating 50 Beach units, ASTM D781. Provide 3" (min.) wide tape of same material as lap for butt joints. 1" thickness for chilled water piping. For hot water piping 140ºF and less, thickness shall be 1" for pipe sizes less than 1”, 1-1/2" thickness for pipe sizes 1" and larger. For hot water piping over 140ºF, thickness shall be 1-1/2" for pipe sizes less than 1-1/2”, 2” thickness for pipe sizes 1-1/2" and larger. CSG Insulation Corp., Knauf, Johns-Manville, Owens-Corning. See Title 24, Part 6 “California Energy Code” for temperatures above 250ºF.

C. Fiberglass Blanket: Unfaced, 1-1/2" thick. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-ºF at a mean temperature of 50ºF. Knauf, Johns-Manville, Owens-Corning.

D. PVC Jacket (for pipe, fittings and valves): Pre-molded polyvinyl chloride (PVC) jackets, 0.020" thickness. Size to match application. Provide solvent weld adhesive and PVC vapor barrier pressure sealing tape by same manufacturer. Zeston.

E. Reinforcing Mesh: 10 x 10 strands per square inch. Polyester or fiberglass. Mast-a-Fab, Vimasco Elastafab or Childers Chil Glas #10.

F. Vapor Barrier Coating: Childers CP-34, Foster 30-65. Permeance shall be 0.08 perms or less at 45 mils dry as tested by ASTM F1249.

G. Lagging Adhesive: Childers CP-50A MV1, Foster 30-36.

H. Aluminum Jacketing: Aluminum pipe and fitting jacketing, 0.016" thickness for straight pipe. 0.024" thickness for fittings. Integral moisture barrier. Stucco-Embossed finish. Provide pre-fabricated aluminum strapping and seals by same manufacturer. ITW or RPR.

I. Outdoor Weather Barrier Mastic: Childers CP-10/11, Foster 46-50.

J. Metal Jacketing/Flashing Sealant: Childers CP-76, Foster 95-44.

K. Insulating Tape: Ground virgin cork and synthetic elastomeric. Black, odorless, and non-toxic. K factor 0.43 Btu-in/hr-ft2-ºF or less. Non-shrinking. For outdoor use, provide protective finish by same manufacturer. Halstead.

L. Foamed Plastic: Rubber based elastomeric preformed pipe insulation. Thermal conductivity shall not exceed 0.27 Btu-in/hr-ft2-ºF at a mean temperature of 70ºF. 1/2" thick. Provide adhesive by same manufacturer. Armacell Armaflex.

2.3 DUCTWORK MATERIALS:

A. General: All ductwork materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50. Shall comply with 2019 CMC.

B. Metal Ductwork: Metal ductwork shall be galvanized sheet steel, lock forming quality, ASTM A-653, with gage and construction to match SMACNA Standard for pressure required (26 gage minimum).
   1. Moisture Bearing Exhaust Ductwork: Exhaust ductwork bearing moisture such as exhaust ducts from showers, dishwashers, clothes driers, etc. shall be constructed of aluminum sheets (unless shown otherwise on drawings), with gage and construction to match SMACNA Standard for pressure required.
   2. Grease Bearing Exhaust Ductwork: Exhaust ducts from Type I grease hoods shall be constructed in accordance with Chapter 5 of the California Mechanical Code with 16 gage galvanized steel or 18 gage stainless steel. All joints shall be made with a continuous weld. Exposed ducts shall be stainless steel.

C. Flexible Ductwork: Insulated flexible ductwork. One pound per cubic foot glass fiber insulation, 1-1/2" thick (R-6), 2” thick (R-8) where ductwork is outside the building thermal insulation envelope. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft^2-ºF at a mean temperature of 75ºF. Seamless metalized reinforced polyester vapor barrier jacket. Continuous internal liner bonded to galvanized steel wire helix. Duct shall be capable of continuous operation at 1-1/2" of positive water static pressure and 4,000 ft/min air velocity. Duct shall be capable of continuous operation at 1-1/2" of positive water static pressure and 4,000 ft/min air velocity. Steel connection collars. Duct shall comply with NFPA 90A. JP Lamborn.

D. Duct Sealants: All Joints Exposed to Weather: Sealant shall be G.E. "Silglaze II" or Silimax Multipurpose Silicone Sealant, without substitution. Joints Not Exposed to Weather: Fiber reinforced. White in color. Design Polymerics DP1030, Hardcast Versa-Grip 181, Hardcast CCWI-181. Joints Not Exposed to Weather and Exposed to View in Finished Areas: Non fibrated. Gray in color. Foster 32-19, Childers CP-146, Design Polymerics DP 1010, or United Duct Sealer WB.

E. Spiral Wound Metal Ductwork: Spiral wound factory fabricated galvanized steel, gages in accordance with the CMC. All fittings shall be factory fabricated. Fittings exposed to view shall have all seams fully welded. Tees and laterals shall be conical type. Connections to plenums shall be with bell-mouth fittings. 12" and smaller ells shall be two piece die-stamped. Ells larger than 12" shall be five piece. McGill Airflow. Shop fabricated fittings are not acceptable.

F. Underground Duct: Ductwork shall be closed cell plastic material that is recyclable, does not emit volatile organic compounds, and conforms to ASTM-D2412. Ductwork shall be resistant to mildew, mold (UL 181B), and radon gas (BSS 7239-88). Ductwork shall not rust or crack under external stress or strain. Ductwork shall have integral R-10 equivalent thermal insulation value, without the use of external insulation, per NSF's P374 Protocol and verified by a NSF Thermal Testing Report. Provide elbows, duct, diffusers, plenum, clamp & gasket, boots, saddle registers and caulk as required by drawings for underground installation. All joints shall be sealed via gasket or bolts and sealant. Clamps and gaskets shall be used on ductwork without flanges. Clamps shall be polyethylene with stainless steel plates and stainless steel screws. Gaskets shall comprise of ¼” thick butyl rubber sealant tape that is water and UV resistant and shall not stain. Gaskets shall comply with ASTM-E84 for flame and smoke spread. Flanged joints and duct branches shall use a co-polymer adhesive caulking sealant that is water and UV resistant. Flanges shall be connected with stainless steel bolts. Duct system performance shall exceed SMACNA’s Leakage Class 3 requirements at the system design static pressure. Complete duct system (including: plenums, round duct, run-outs, diffuser boots, etc.) must be from one manufacturer and be of the same material, construction and connection method throughout. Field made duct components are NOT acceptable. Include the complete underground duct system including plenums and diffuser boots. Unless otherwise noted, all duct and fittings shall be constructed per SMACNA’s Duct Construction Standards (+10 w.g.). Duct system shall carry a 10 year Limited Warranty. Duct system shall be installed by an AQC Industries’ trained installer. BlueDuct® by AQC Industries.

2.4 AIR TERMINALS AND DUCT FITTINGS:

A. Grilles: (Grilles, Registers, Diffusers and Louvers)

1. Information on Drawings: Refer to Grille Schedule on the drawings for the list of grilles. Manufacturer's model numbers are listed to complete the description Titus. Equivalent models of Anemostat or Krueger are acceptable. Refer to the floor plans for neck size, CFM, air diffusion pattern and fire damper, if required.
2. Performance: Submit complete performance data (throw, pressure drop, noise level, etc.) for all grilles proposed, other than those scheduled. Testing shall be in accordance with ANSI/ASHRAE 70-1991. If, according to the certified data of the manufacturer of the proposed units, the sizes indicated on the drawings will not perform satisfactorily, the units shall be reselected by the Contractor for the proper diffusion, spread, pressure drop, throw and noise level.
3. Frame and Accessories: All supply, return, and exhaust grilles shall not have an opposed blade volume control damper unless otherwise noted. All surface mounted grilles shall have a perimeter gasket and flanged edge. All grilles shall have frames suitable for mounting in the surfaces designated by the architectural drawings. Key or screwdriver operated, no slide bars.
4. Finish: All ceiling and wall grilles and all louvers shall have a paintable white finish unless otherwise noted. Interior components (everything behind the face plate) shall be flat black. Floor grilles shall have an anodized aluminum finish unless otherwise noted.

B. Branch Duct Volume Damper: Volume control damper (VCD) in rectangular ducts shall be as follows: Opposed blade, 6" maximum blade width, 16-gage blade, 48" maximum length, nylon or oil impregnated bronze bearings, 1/2" diameter pin shaft, 16-gage channel frame, actuating rod and linkage out of air stream. VCD in round duct shall be as follows: Damper blade full height of branch and 1" less than branch width. All branch dampers shall have regulator with stamped steel handle, spring loaded shaft nut, cast body and serrated self-locking die cast core. Regulator for horizontal ducts overhead shall be mounted on sides or bottom of ducts. Secure a 12" length of brightly colored plastic ribbon to handle for ease of location. Where rectangular or round ductwork is insulated, slit insulation to allow handle to protrude. Ventlok 641 (with 607 end bearing for round ducts).

C. Extractor: Curved blade turns in adjustable position rigid frame. Tuttle and Bailey Deflectrol.

D. Turning Vanes: Double wall, hollow metal, air foil shape. Spacing in accordance with manufacturer's recommendations. Aero Dyne HEP.

E. Flexible Connection: UL listed neoprene coated 30 ounce fiberglass cloth. 3" metal, 3" fabric, 3" metal. Ventglas.

F. Fire/Smoke Damper: California State Fire Marshal approved. UL listed and labeled indicating fire rating. Hour rating as required by the rating of the wall, ceiling, floor, etc. in which it is installed. Combination fire/smoke dampers shall have normally-closed, non-stall factory electric actuator rated for 250ºF (min.) and shall be Leakage Class II.

G. Duct Access Door:
1. Rectangular: Insulated double wall door. Full piano hinge. Cam latch. Pressure rating to match application. Air Balance, Ductmate.

2. Round: Three layers of stamped steel. Inside panel shall consist of two layers of metal which are spotwelded together along the rim, encapsulating high density fiberglass insulation (25/50 rated). Closed cell neoprene gasket bonded to the inside of the door. Zinc plated conical springs installed between the inner and outer door. Polypropylene molded knobs with threaded metal inserts. Knobs shall be easily turned by hand and shall be UL94HB listed. Zinc plated carriage bolts, clinched and sealed to the inner door. Provide self adhesive template for the exact size of duct opening. Pressure rating to match application. Ductmate.

H. Variable Air Volume Terminal (VAV/VVH):
1. General: Pressure independent, single-duct electric powered variable volume terminal. Scheduled pressure drop is maximum allowable at inlet static at design conditions. Provide integral flow taps and calibration chart on each unit. Performance testing shall be in accordance with ARI Standards. Enviro-Tec, Titus.
2. Casing: Welded 24-gage galvanized steel. Provide hanger holes on four corners. Interior insulation shall be 1/2" thick, 1-1/2 lb. density glass fiber with high density facing. Insulation shall be UL listed and in compliance with NFPA 90A. Maximum allowable leak rate 2% at 3" WC.
3. Controls: Provide integral cross flow velocity sensor furnished and installed at the factory.
4. Coils: Units specified with hot water coils shall have factory installed access panel upstream of the coil and shall have coil with 1/2" O.D. seamless copper tube with 0.017" tube wall. Fin tube expanded into fin collar for permanent bond. Leak tested at 300 psig.
5. Sound Performance Data: Discharge sound and radiated sound levels shall not exceed the published sound levels of the terminals which were used as the basis of design. The manufacturer shall submit discharge sound and radiated sound data in both sound power level (ref: 10-12 watts) in octave bands and noise criteria (NC) ratings. Testing shall be in accordance with ARI Standards.

I. Sound Trap:
1. General: Dimensions as shown on plans. 22-gage galvanized steel construction suitable for a differential air pressure of 8" of water. Filler material shall be in accordance with NFPA 90A. Maximum pressure drop as scheduled. Air flow measurements shall be made in accordance with applicable portions of ADC, AMCA and ASME airflow test codes. Buensod-Agitair, Environmental Elements Corp., Industrial Acoustics Company, Vibro-Acoustics.
2. Sound Performance Data: The dynamic insertion loss and self-generated noise levels shall meet or better the published sound data of the sound traps which were used as the basis of design. Acoustic ratings shall be determined in a test facility which provides for airflow in both directions. The test set-up and procedure shall be such that all effects due to end reflection, directivity, flanking transmission, standing waves and test chamber sound absorption are eliminated. Acoustic ratings shall include dynamic insertion loss and self-generated noise levels for each octave band both for forward flow (air and noise in same direction) and reverse flow (air and noise in opposite directions) with air flow of at least 2000 fpm entering face velocity. Ratings shall be certified by an independent testing laboratory.

2.5 DUCTWORK INSULATION MATERIALS:

A. General: All ductwork insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.

B. Fiberglass Blanket: **Installed** thermal resistance at a mean temperature of 75ºF shall not exceed indicated value. 3/4 lb/ft^3 or 1 lb/ft^3, **R-6** where ductwork is within the building thermal insulation envelope. 3/4 lb/ft^3 **R-8** where ductwork is outside the building thermal insulation envelope and/or above the roof. Faced with glass reinforced foil laminated to Kraft paper. Certainteed, Knauf, Johns-Manville, Owens-Corning.

C. Acoustic Lining: Glass fiber. **Installed** thermal resistance at a mean temperature of 75ºF shall meet or exceed indicated value. One side coated to prevent fiber erosion up to 6000 ft/min. Average noise reduction coefficient of 0.80. 1.5 lb/ft3 density. 1" thick (**R-4.2**) where ductwork is within the building thermal insulation envelope. 2" thick (**R-8**) where ductwork is outside the building thermal insulation envelope and/or above the roof. Certainteed, Knauf, Johns-Manville, Owens-Corning.

D. Bonding Adhesive: Design Polymerics DP2501, Foster 85-60.

E. Fire Resistive Duct Wrap: Nominal 1-1/2” thick, 6 lb/ft3 high-temperature fiber blanket thermal insulation encapsulated in a fiberglass-reinforced aluminized polyester foil. Grease Duct Listing Standards (Double Wrap) ASTM E 2336 / ICC-ES AC101. Ventilation Duct Listing Standard (Single Wrap) – ISO 6944. 3M Fire Barrier Duct Wrap 615+.

2.6 EQUIPMENT:

A. General Requirements:
1. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
2. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Where Architectural screening is indicated, equipment shall not extend above or beyond screening. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
3. Ratings:
   a. Gas: Gas burning equipment shall be furnished with 100% safety gas shut-off, intermittent pilot ignition, and be CSA (US) certified, except that boilers shall be CSA (US) certified or UL listed.
   b. Electrical: Electrical equipment shall be in accordance with NEMA Standards and UL or ETL listed where applicable standards have been established.
4. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.

5. Electrical:
   a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be manual reset, shall have H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.
   b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.
   c. Motors: Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be open drip proof, NEMA B design on pumps and fans, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction unless otherwise noted. Design shall limit starting inrush current and running current to values shown on drawings. Motors 1 horsepower and larger shall be the premium efficiency type, tested according to IEEE Standard 112, Method B. Motors exposed to weather shall be TEFC. Motors in a fan air stream shall be TEFC or TEAO. Vertical motors outdoors shall be ODP or TEFC and shall have rain caps.
   d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.
   e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.
   f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.
6. Fan Selection - Static Pressure: Unless otherwise noted, pressure scheduled as external static pressure (ESP) includes all ductwork and accessory losses external to the unit housing. Unless otherwise noted, pressure scheduled as total static pressure includes all ductwork, filter, coil, cabinet, damper and other accessory losses. Unless otherwise noted, pressure scheduled as duct static pressure includes all supply and return ductwork and accessory losses external to the unit housing and plenum (as applicable). The allowance for filter losses is 0.3" WC, unless otherwise noted. Submit itemized static pressure losses for all components.
7. Filters:
   a. General: Tested and rated in accordance with ASHRAE Standard 52.2 and Title 24, C.C.R. Furnish and install one complete change of all filters after air balance is completed and prior to acceptance.

b. Filter Media: 2" media. MERV-13. Clean filter resistance 0.41" water at 500 fpm. Throw away frame. Class 2. Camfil AP-Thirteen.

8. Screens: All duct or louver openings to the outside shall be covered with 1/2", 16-gage, galvanized wire mesh screen.
9. Mixing Dampers: Opposed blade, 16-gage. Six-inch maximum blade width, 48" maximum length. Nylon or oil impregnated bronze bearings. One-half inch diameter pin shaft. 16-gage channel frame. One percent maximum leakage at 4" WC in accordance with AMCA 500 for outside air dampers. Actuating rod out of air stream. Arrow.
10. Sound Ratings: Shall be in accordance with ASHRAE 36 - 72. Sound ratings shall not exceed scheduled values.
11. Drives: Unless noted as direct connected, drives shall be V-belt, rated at 150% of motor horsepower. Multiple drive belts shall be matched set. Drive sheaves shall be dynamically balanced, adjustable, range +/- 10%, selected at mid range. Adjustable relative movement shall be lockable to shaft. Belts shall be aligned within 1-1/2 degrees at all times. Open drives shall be provided with OSHA approved open mesh belt guards. Belt guards exposed to weather shall be weatherproof enclosure with louvered face for adequate ventilation. Driving motor shall be mounted on adjustable rails. T.B. Woods, Browning. Submit RPM range of driven machine with drive selection.
12. Coils:
    a. Construction: Copper tube. Copper or aluminum 0.0075" min. thickness fins hydraulically or mechanically bonded to tube. 16-gage galvanized steel rigid channel coil casing. Rated working pressure 200 psig min. All coils shall have connections at the same end. Wherever two or more coils are being controlled by a single control valve, each coil shall be installed with a separate balancing cock and a Pete's Plug at each outlet.
    b. Capacity: Ratings certified by ARI in accordance with ARI Standard 410. Cooling coil face velocity shall not exceed manufacturer's published ratings or 600 fpm. Heating coil face velocity shall not exceed 1000 fpm. Include coil selection calculations in shop drawings.
    c. Hot or Chilled Water Coils: Copper or cast iron headers, brazed or spun to tube. Tube wall minimum thickness 0.024". 10 fins/inch maximum.
    d. Direct Expansion Coils: Copper suction header silver brazed to tubes, distributing tubes and expansion valve. Working pressure 250 psig minimum. 10 fins/inch maximum.

B. Air Cooled Chiller (WC-1A, 1B, 1C):
1. General: Refer to paragraph 2.6A for general requirements. The contractor shall furnish and install water chiller(s) as shown and scheduled in the plans and specifications. Units are leak tested, pressure tested, then evacuated and charged. All chillers are factory tested prior to shipment. Units ship with a full operating charge of oil and refrigerant as standard. Units can also be shipped with a nitrogen charge if required. Unit panels, structural elements and control boxes are constructed of galvanized steel and mounted on a bolted galvanized steel base. Unit panels, control boxes and the structural base are finished with a baked-on powder paint. Trane ACX.
2. Certified AHRI Performance Trane air-cooled chillers are rated within the scope of the Air-Conditioning, Heating & Refrigeration Institute (AHRI) Certification Program and display the AHRI Certified® mark as a visual confirmation of

conformance to the certification sections of AHRI Standard 550/590 (I-P) and ANSI/AHRI Standard 551/591 (SI).

3. Refrigeration Circuits All chiller sizes are designed with two refrigerant circuits. Each refrigeration circuit includes two or three scroll compressors, a compressor suction and discharge service valve, liquid line shutoff valve, removable core filter, liquid line sight glass with moisture indicator, charging port and an electronic expansion valve.
4. Evaporator Braze plate heat exchanger is made of stainless steel with copper as the braze material. It is designed to withstand a refrigerant side working pressure of 460 psig and a waterside working pressure of 150 psig. Evaporator is tested at 1.1 times maximum allowable refrigerant side working pressure and 1.5 times maximum allowable water side working pressure. Immersion heaters protect the evaporator to an ambient of -20°F (-29°C). The evaporator is covered with factory-installed 0.75 inch (19.05 mm)Armaflex II or equal (k=0.28) insulation. Foam insulation is used on the suction line.
5. Condenser and Fans For ACSA units, the air-cooled microchannel condenser coils are used with all aluminum brazed fin construction. For ACXA units, the round tube plate fin (RTPF) coils are used with aluminum fin constructions. The condenser coil has an integral subcooling circuit. The maximum allowable working pressure of the condenser is 650 psig. Condensers are factory proof and leak tested at 1.1 times maximum allowable refrigerant side working pressure. Coils can be cleaned with high pressure water. Direct-drive vertical-discharge airfoil condenser fans are dynamically balanced. The condenser fan motors are permanent magnet motors with integrated drive to provide variable speed fan control for all fans. Chillers are equipped with EC condenser fan motors with permanently lubricated ball bearings and internal thermal and overload protection.
6. Compressor The unit is equipped with two or more hermetic, direct-drive, 3600 rpm 60 Hz (3000 rpm 50 Hz) suction gas-cooled scroll compressors with intermediate discharge valve to increase seasonal efficiency. Overload protection is included. The compressor includes: centrifugal oil pump, oil level sight glass and oil charging valve. Each compressor will have compressor heaters installed and properly sized to minimize the amount of liquid refrigerant present in the oil sump during off cycles.
7. Unit Controls All unit controls are housed in an outdoor rated weather tight enclosure with removable plates to allow for customer connection of power wiring and remote interlocks. All controls, including sensors, are factory mounted and tested prior to shipment. Microcomputer controls provide all control functions including startup and shut down, leaving chilled water temperature control, evaporator flow proving, compressor staging, electronic expansion valve modulation, condenser fan sequencing and speed control, anti-recycle logic, automatic lead/lag compressor starting, and load limiting.
8. Symbio™ 800 The Symbio™ 800 unit control module, utilizing Adaptive Control™ microprocessor, automatically takes action to avoid unit shut-down due to abnormal operating conditions associated with low refrigerant pressure, high condensing pressure, low oil return or low suction superheat, and high compressor discharge temperature. Should the abnormal operating condition continue until a protective limit is violated, the unit will be shut down. Unit protective functions of the Symbio™ 800 include: loss of chilled water flow,

evaporator freezing, loss of refrigerant, low refrigerant pressure, high refrigerant pressure, high compressor motor temperature, and loss of oil to the compressor.

9. AdaptiView TD7 Display A full color AdaptiView™ TD7 touch screen display indicates all important unit and circuit parameters, in logical groupings on various screens. The parameters including chilled water set point, leaving chilled water temperature, demand limit set point, evaporator and condenser refrigerant temperatures and pressures, compressor and fan speeds, and all pertinent electrical information. The display also provides “on screen” trending graphs of predefined parameters as well as customizable trend graphs based on user defined parameters from a list of all available parameters. The display also provides indication of the chiller and circuits’ top level operating modes with detailed sub-mode reports available with a single key press, as well as diagnostics annunciation and date and time stamped diagnostic history. The color display is fully outdoor rated, and, can be viewed in full daylight without opening any control panel doors.
10. Standard power connections include main three phase power to the compressors, condenser fans and control power transformer and optional connections are available for the 115 volt/60 Hz single phase power for the thermostatically controlled evaporator heaters for freeze protection.
    - Outdoor capable: – Removable Cover – UV Resistant Touchscreen – -40°C to 70°C Operating Temperature – IP56 rated (Power Jets of Water from all directions)
    - RoHS Compliant
    - UL 916 Listed
    - CE Certification
    - Emissions: EN55011 (Class B)
    - Immunity: EN61000 (Industrial)
    - Display: Mechanical Specifications AC-PRC002E-EN 37 – 7 inch diagonal – 800x480 pixels – TFT LCD @ 600 nits brightness – 16 bit color graphic display
    - Display Features: – Alarms – Reports – Unit Settings – Display Settings
    - Graphing
    - Global Application with Support for 27 Languages
11. Chilled Water Reset Control logic and factory installed sensors are provided to reset leaving chilled water temperature. The set point can be reset based on ambient temperature or return evaporator water temperature.
12. Factory Mounted Flow Proving and Flow Control The factory installed evaporator water flow switch is provided with the control logic and relays to turn the chilled water flow on and off as the chiller requires for operation and protection. This function is a requirement on the chiller.
13. Pump Package The pump package contains a single pump or dual pumps (one redundant), drain valves, service isolation valves, pressure ports, pressure relief, and fluid strainer. Pump package applications include short water loops, decoupled systems and service for an entire loop volume. Because the fluid distribution system beyond the chiller is unknown, Trane Select Assist reports Available Head as the head leaving the brazed plate evaporator. Head leaving the evaporator includes the evaporator head loss, pump package piping frictional effects head losses, valve head losses, and strainer head loss summation. The pump package should not be operated at NPSHR. Operartion at this suction head will cause cavitation. NPSHA should be at least 1.5 to 2.5 times NPSHR.

Ambient freeze protection down to -4°F (-20° C) for water is included. Dependent on the freeze inhibitor solution, the freeze protection ambient temperature decreases accordingly. The pump skid contains an independent pump motor starter panel. The pump starter panel's power supply is prewired into the chiller's control panel assembly, an independent pump motor power supply is not required. Variable pump speed command is integrated with the chiller controller allowing variable flow functionality.

14. BACnet Communications Interface Allows the user to easily interface with BACnet® via a single twisted pair or Ethernet wiring to a factory-installed Symbio™ 800 controller.
15. Isolators — Elastomeric Elastomeric Isolators provide isolation between chiller and structure to help eliminate vibration transmission.
16. Manufacturer's Field Services:
    a. All Startup, maintenance and monitoring functions shall be performed by a manufacturer's commercial agent to confirm, (in writing), that equipment has been correctly installed and passes specification checklist prior to equipment becoming operational and covered under OEM warranty.
    b. Applied chiller manufacturers shall maintain service capabilities no more than 100 miles from the job site.
    c. The manufacturer shall furnish complete submittal wiring diagrams of the chiller(s) starter(s) and associated components like cooling towers, pumps, interlocks, etc. as applicable for field maintenance and service.
17. Warranty: Chiller manufacturer shall provide a whole unit parts, labor and refrigerant warranty for a period of 10 years from start-up. The warranty must be provided by the manufacturer; third party insurance/warranty coverage is not acceptable. The chiller manufacturer shall provide an original factory warranty certificate for each chiller listing as a minimum chiller model, serial number, and warranty information as specified.
18. Maintenance Services:
    a. All inspections and service of units shall be accomplished by factory trained and authorized servicing technicians.
    b. All labor for leak checking the chiller according to the manufacturer's IOM and documentation must be included.
    c. In conjunction with and supporting Factory warranty OEM shall furnish complete factory authorized service and maintenance for applied chillers for 5 year from the Date of Substantial Completion. All work shall be done by factory service department.
    d. OEM shall provide and report quarterly, semiannual, and annual maintenance in compliance with or better than ASHRAE Standard 180-2008.
    e. Submit copy of service call work orders and summary report to the owner, including description of work performed, operating performance status and noted exceptions.

C. Air Cooled Chiller (WC-2A, 2B):
1. General: Refer to paragraph 2.6A for general requirements. The contractor shall furnish and install water chiller(s) as shown and scheduled in the plans and specifications. Units are leak tested, pressure tested, then evacuated and charged. The air-cooled modular chiller system shall consist of individual chiller modules

that are assembled on site. Each chiller module shall be completely factory wired and tested prior to shipment. Each module shall include a compressor, evaporator, air cooled condenser, and controls. Controls shall be designed on a distributed primary control system that allows the primary microprocessor to operate remaining secondary modules in the event of a malfunction of any secondary controller. The controls shall also be designed to allow each individual secondary microprocessor to operate on its own temperature sensor if there is a failure of the primary microprocessor.

2. Certified AHRI Performance: Trane air-cooled chillers are rated within the scope of the Air-Conditioning, Heating and Refrigeration Institute (AHRI) Certification Program and display the AHRI Certified® mark as a visual confirmation of conformance to the certification sections of AHRI Standard 550/590 (I-P) and ANSI/AHRI Standard 551/591 (SI).
3. Refrigeration Circuits: The Manhattan Gen II Chiller uses dual independent refrigeration circuits in each module using hermetically sealed scroll compressors each with Rotalock connections, oil level sight glass, suction gas-cooled motor with solid-state sensors in the windings for overload protection, and circuit breaker protection. There shall be two independent compressors and refrigerant circuits per module. Compressors shall be mounted to the formed sheet metal frame with rubber-in-shear vibration isolators. The SuperMod Chiller uses a hermetically sealed tandem scroll compressor set with a true variable speed lead compressor motor and a fixed speed lag compressor. The tandem set shall include an oil level sight glass, suction gas-cooled motor with solid-state sensors in the windings for overload protection, and in-line circuit breaker protection. There shall be two compressors per tandem set and one refrigerant circuit per module. Compressors shall be mounted to the formed sheet metal frame with rubber-in-shear vibration isolators.
4. Evaporator: The Manhattan Gen II chiller uses a dual circuit, brazed plate evaporator on each module constructed of 316 stainless steel plates and copper brazing. The supply and return fluid piping connections to each evaporator shall include an electronic and a manual isolation valve to allow servicing of each module individually while the remaining modules continue to operate, and to allow for variable flow. The fluid connections to each evaporator shall use roll grooved couplings for service convenience and ease of installation. Each evaporator shall be insulated with ¾ inch closed cell insulation. The maximum working pressure shall be 650 psi. Evaporator piping fluid velocity shall not exceed 10 fps at any point in the system. The SuperMod chiller uses a brazed plate, single circuit evaporator in each module constructed of 316 stainless steel plates and copper brazing. The supply and return fluid piping connections to each of the evaporator shall include an electronic and a manual isolation valve to allow servicing of each module individually while the remaining modules continue to operate, and to allow for variable flow. The fluid connections to each evaporator shall use roll grooved couplings for service convenience and ease of installation. Evaporators shall be insulated with ¾ inch closed cell insulation.
5. Condenser and Fans: The air-cooled condenser coils have aluminum fins mechanically bonded to copper tubes with integral subcooling circuits. The coils shall be sized to provide full heat of rejection at a maximum 25°F temperature difference between the condensing temperature and ambient air ARTC-PRC001A-EN 33 temperature at jobsite elevation above sea level. The coils shall

be factory tested to a minimum of 600 psig. The condenser fan motors shall be maintenance free, high efficient Electronically Commutated Motors (ECM) with energy reduction capabilities of up to 35%. The fan motors shall vary speed to maintain the refrigeration head pressure.

6. Compressor: The Manhattan Gen II chiller uses a hermetically sealed, scroll compressor on each refrigeration circuit. The Copeland scroll compressor is a state-of-the-art compressor with relay and overload monitoring capabilities designed to accommodate liquids (both oil and refrigerant) without causing compressor damage. The SuperMod chiller uses a tandem set of fixed speed and variable speed compressors by Copeland. The variable speed compressor is the latest development by Copeland using brushless permanent magnet motors. The Copeland compressor uses CoreSense technology as a sensor to unlock advanced capabilities such as protection, diagnostics, communication, and verification. Technicians can make faster, more accurate decisions resulting in improved compressor performance and reliability.
7. Variable Speed Drive (SuperMod): SuperMod's tandem variable speed compressors also include the Emerson Copeland Scroll EVC1150B/1185B Variable Frequency Drive (VFD) which delivers maximum machine performance with sensorless permanent magnet motor control, for dynamic and efficient machine operation. The drive is designed to control a compressor in one of two modes. The analog / digital control mode and the Modbus control mode.
8. Unit Controls: The primary chiller module shall incorporate the primary microprocessor controller. The primary microprocessor shall communicate with the remaining secondary microprocessors in each module via a local network communications protocol. The primary microprocessor shall include a phase monitor to protect against low voltage, phase unbalance, phase loss, and phase reversal conditions. The primary controller shall read all analog and fault port values from all secondary module controllers and shall pass these values to the Building Automation System via BACnet®, Modbus™ or LONWORKS® protocols. Each chiller control system shall include operational switches for each compressor; high- and low-pressure transmitters to provide indication of refrigeration pressures in each circuit; high and low refrigeration pressure alarms including shutting shut down the faulty compressor(s); anti-short cycling compressor timers; minimum compressor run timers; connection to Building Automation System (if required).
9. Carel c.pCO Controller: The chillers employ a Carel c.pCO all-digital data control system which is assigned to all primary and secondary modules to control and report key system settings and indicators. Key features include: Processes all communications, IOs, and executes programs in tens of milliseconds; Online debugging for prompt programming code troubleshooting; Includes 3 serial ports, 2 ethernet ports and 1 USB port.
10. EXOR eSmart07 HMI: An operator 7–inch touch screen interface panel with graphical display shall be installed on the primary module to allow chiller operation monitoring, adjustment of user set points, and alarm monitoring. Key features include:
    - Resistive touchscreen
    - Remote monitoring and control with primary-secondary functionality Mechanical Specifications

- Wide selection of communication drivers available with multiple-driver communication capability
- Data display in numerical, text, bar graph, analog gauges, and graphic image formats.

11. Heat Recovery Operation: The modular heat recovery chiller system is equipped with a brazed plate condenser in each module each with, a thermal dispersion flow switch plus valves and controls for heat recovery operation.
12. Manufacturer's Field Services:
    a. All Startup, maintenance and monitoring functions shall be performed by a manufacturer's commercial agent to confirm, (in writing), that equipment has been correctly installed and passes specification checklist prior to equipment becoming operational and covered under OEM warranty.
    b. Applied chiller manufacturers shall maintain service capabilities no more than 100 miles from the job site.
    c. The manufacturer shall furnish complete submittal wiring diagrams of the chiller(s) starter(s) and associated components like cooling towers, pumps, interlocks, etc. as applicable for field maintenance and service.
13. Warranty: Chiller manufacturer shall provide a whole unit parts, labor and refrigerant warranty for a period of 10 years from start-up. The warranty must be provided by the manufacturer; third party insurance/warranty coverage is not acceptable. The chiller manufacturer shall provide an original factory warranty certificate for each chiller listing as a minimum chiller model, serial number, and warranty information as specified.
14. Maintenance Services:
    a. All inspections and service of units shall be accomplished by factory trained and authorized servicing technicians.
    b. All labor for leak checking the chiller according to the manufacturer's IOM and documentation must be included.
    c. In conjunction with and supporting Factory warranty OEM shall furnish complete factory authorized service and maintenance for applied chillers for 5 year from the Date of Substantial Completion. All work shall be done by factory service department.
    d. OEM shall provide and report quarterly, semiannual, and annual maintenance in compliance with or better than ASHRAE Standard 180-2008.
    e. Submit copy of service call work orders and summary report to the owner, including description of work performed, operating performance status and noted exceptions.

D. Boiler:
1. General: Refer to paragraph 2.6A for general requirements. Each boiler size is designed for a Maximum Allowable Working Pressure (MAWP) of 125 psig (8.6 Bar), constructed in accordance with the ASME Code Section IV and bear the "H" stamp. The insulated boiler is mounted on a base and powder coated steel casing provided. A drain valve connection is provided at the front bottom for

field piping of a boiler drain valve, which can be furnished as an option. Cleaver-Brooks.

2. Boiler Trim and Controls: The following items are furnished:
   a. Probe Type Low Water Cutoff control, manual reset.
   b. Excess Water Temperature Cutoff, manual reset.
   c. NTC (negative temp. coefficient) sensor for hot water supply temperature.
   d. NTC sensor for hot water return temperature.
   e. ASME Safety Relief Valve set @ 125 psig. (8.6 Bar)
   f. Combination Temperature/Pressure Gauge.
3. Burner Control: The CB Falcon is an integrated burner management and modulation control with a touch-screen display/operator interface. Its functions include the following:
   a. Two (2) heating loops with PID load control.
   b. Burner sequencing with safe start check, pre-purge, direct spark ignition, and post purge.
   c. Electronic ignition.
   d. Flame Supervision.
   e. Safety shutdown with time-stamped display of lockout condition.
   f. Variable speed control of the combustion fan.
   g. Supervision of low and high gas pressure, air proving, stack back pressure, high limit, and low water.
   h. First-out annunciator.
   i. Real-time data trending.
   j. (3) pump/auxiliary relay outputs.
   k. Modbus communication capability.
   l. Outdoor temperature reset.
   m. Remote firing rate or setpoint control
   n. Setback/time-of-day setpoint
   o. Lead/Lag for up to 8 boilers
4. Forced Draft Burner
   a. The burner is a "Pre-mix" design consisting of a unitized venturi, single body dual safety gas valve, blower, and burner head.
   b. Full modulation is accomplished with a variable speed fan for 5:1 turndown ratio.
   c. For near flameless combustion, the burner utilizes a Fecralloy-metal fiber head.
   d. Noise level at maximum firing is less than 70 dBA regardless of boiler size.
   e. Operating on Natural Gas, NOx emissions will be less than 20 PPM regardless of boiler size and the boiler is certified for California and Texas for Low NOx emissions.
   f. As an option, the burner is capable of direct vent combustion.
   g. Ignition of the main flame is via direct spark, utilizing high voltage electrodes and a separate electrode for flame supervision.
   h. To ensure adequate combustion air is present prior to ignition, and to ensure the fan is operating, a combustion air proving switch is furnished.
   i. A High Air Pressure Switch is provided to ensure burner lockout if excessive back pressure due to a blocked stack occurs.

j. For ease of maintenance and inspection, the burner is furnished with hydraulic rods and easy opening lockdown nuts, which permit the burner to swing up (except 500 and 750, which are hinged only). This provides full access to the burner and electrodes, as well, to the tube sheet and tubes.

5. Burner Gas Train: The standard gas train is equipped in accordance with UL certification and complies with ASME CSD-1. Each burner gas train includes:
   a. Low Gas Pressure Interlock, manual reset.
   b. High Gas Pressure Interlock, manual reset.
   c. ASME CSD-1 Test Cocks.
   d. Downstream manual ball type shutoff cock.
   e. Single body dual safety shutoff gas valve.
6. Optional Equipment:
   a. Dual gas train for quick and easy fuel switchover.
   b. Reusable air filter.
   c. Condensate neutralization tank assembly - consists of neutralizing media, filter, and PVC condensate holding tank with integral drain trap.
   d. Outside air intake for direct vent combustion.
   e. Outdoor temperature sensor for indoor/outdoor control.
   f. Header temperature sensor for multiple boiler Lead/Lag operation.
   g. Auxiliary Low Water Control (shipped loose) for field piping by others into the system piping.
   h. Alarm Horn for safety shutdown.
   i. Relays for output signal for burner on, fuel valve open.
   j. Stack Thermometer.
   k. Stack temperature limit-sensor.
   l. Auto air vent.
   m. Boiler drain valve.
7. Manufacturer’s Field Services:
   a. General: The boiler supplier’s factory authorized service organization shall be responsible for performance of inspections, start up and testing of the package boiler, and accessory equipment and materials furnished under this Section. A detailed written record of the startup performance, including burner setting data over the entire load range shall be furnished to the engineer before final acceptance. All labor, equipment, and test apparatus shall be furnished by the authorized service organization. All equipment defects discovered by the tests shall be rectified either by the service organization or boiler manufacturer.
   b. Equipment Inspection: Boiler representative to provide jobsite assistance to inspect boilers and other equipment upon arrival, verifying completeness of equipment supplied and potential damages. All shipped loose components, such as casing, to be mounted on boiler by boiler provider after contractor has set boiler in building.
   c. Pre Start-up Walk Through: Boiler representative shall visit jobsite reviewing installation with mechanical contractor to be conducted approximately 1 week prior to startup.
   d. Start-up shall be conducted by experienced and factory authorized technician in the regular employment of the authorized service organization, and shall include:

e. Demonstrate that boiler, burner, controls, and accessories comply with requirements of this Section as proposed by the boiler and accessories supplier. Pre-test all items prior to scheduling the final testing that will be witnessed by the test engineer.

f. Readings at different firing rates (20, 50, 75 and 100%) of load for the modulating burner shall be taken with a written report of the tests submitted to the engineer. The reports shall include readings for each firing rate tested and include stack temperatures, O2, CO, NOx, and overall boiler efficiency.

g. Auxiliary Equipment and Accessories: Observe and check all valves, draft fans, electric motors and other accessories and appurtenant equipment during the operational and capacity tests for leakage, malfunctioning, defects, and non compliance with referenced standards or overloading as applicable.

h. Commissioning Requirements:
   1) Fireside inspection
   2) Set up fuel train and combustion air system
   3) Set up operating set points
   4) Check all safeties, including Flame safeguard, LWCO, Airflow, Fuel pressures, High limits.
   5) Set up and verify efficiencies at 20%, 50%, 75%, and 100%
   6) Set up and verify burner turndown.

i. Training to include all safety procedures, maintenance procedures, control operations, and diagnostic procedures. Training to be provided in a single 8 hour (max) continuous session to accommodate operator's availability on site.

j. Source Test: Source test services shall be provided by manufacturer representative. Contractor shall be required to place full load on boilers for source testing throughout the firing range. Source testing shall be in accordance with SJVUAPCD protocol: three 30 minute test runs on each boiler, certified source test equipment, SJVUAPCD inspector on site during testing. All permits shall be by contractor.

8. Warranty Data:
   a. The pressure vessel shall be guaranteed against thermal shock for 20 years when utilized in a closed loop hydronic heating system with a temperature differential of 120 °F or less. The boiler pressure vessel shall be guaranteed accordingly without a minimum flow rate or return water temperature requirement. The boiler shall not require the use of flow switches or other devices to ensure minimum flow.
   b. The pressure vessel, tubes and tube sheets (heat exchanger) shall be guaranteed against flue gas corrosion and materials/workmanship for a period of 10 years. The condensate collection box shall be guaranteed for 20 years. The burner cylinder shall be warranted for a period of 5 years.
   c. All parts not covered by the above warranties shall carry a 1 year warranty from startup, or 18 months from shipment, whichever occurs first. This shall include all electrical components and burner components.

9. Field Testing:
   a. The manufacturer's representative shall test all boiler and burner interlocks, actuators, valves, controllers, gauges, thermometers, pilot

lights, switches, etc. Any malfunctioning component shall be replaced at the time of initial start-up if found to be inoperative.

b. All adjustments to boiler, burner, and boiler control system shall be performed by the manufacturer's authorized service representative.

10. Start-Up, Instruction and Warranty Service:

a. The manufacturer's representative shall provide start-up and instruction of each new boiler, including burner and boiler control system as specified herein. Start-up and instruction shall cover all components assembled and furnished by the manufacturer whether or not of his own manufacture.

b. Warranty service shall be in accordance with the manufacturer's warranty statement unless other provisions have been agreed to during project bidding.

E. Pumps:

1. General: Refer to Paragraph 2.6A for general requirements. Pumps shall be selected to be non-overloading at any point on the pump curve. Contractor shall include all costs required to field trim or change pump impeller, if necessary, to match design conditions. All motors 1 horsepower and larger shall be the high efficiency type. Bell and Gossett, Grundfos, PACO, Peerless, Taco.

2. Materials and Components: Enclosed bronze impeller hydraulically and dynamically balanced on shaft. Renewable bronze wear rings. Mechanical seals unless otherwise noted. Stainless steel shaft or steel shaft with bronze sleeve. Gray iron casing. Suction and discharge connections shall be 125 psi flanges tapped for pressure readings.

3. In Line Centrifugal: In line single stage, end suction centrifugal pump close coupled to motor. Pipe supported or cast iron support stand as indicated on drawings.

F. Air Handling Unit:

1. General: Pressure classification, type, and accessories/options as indicated on schedules. Refer to Paragraph 2.6A for general requirements. All units will be shipped with an integral base frame designed with the necessary number of lift points for safe installation. The lift points will be designed to accept standard rigging devices and be removable after installation. Units shipped in sections will have a minimum of four points of lift. Sizes 3-30 will also be shipped with a shipping skid designed for forklift transport. Units will be shipped with a shipping skid designed for forklift transport and the integral base will be designed with the necessary number of lift points for safe installation. The lift points will be designed to accept standard rigging devices and removable after installation. Units shipped in sections will have a minimum of four points of lift. Per ASHRAE 62.1 recommendation, units will be shipped stretch-wrapped to protect unit from intransit rain and debris. Unit shall be UL and C-UL Listed. Air-handling performance data shall be certified in accordance with AHRI Standard 430. Unit sound performance data shall be provided using AHRI Standard 260 test methods and reported as sound power. Coil performance shall be certified in accordance with AHRI Standard 410. Trane.

2. Unit Construction: All unit panels shall be 2-inch solid, double-wall construction to facilitate cleaning of unit interior. Unit panels shall be provided with a mid-span, no through metal, internal thermal break. Casing thermal performance shall

be such that under 55°F supply air temperature and design conditions on the exterior of the unit of 81°F dry bulb and 73°F wet bulb, condensation shall not form on the casing exterior. All exterior and interior AHU panels will be made of G40 galvanized steel. Optionally, all interior AHU casing panels will be made of 201 stainless steel. The casing shall be able to withstand up to 8 inches w.g. positive or negative static pressure. The casing shall not exceed 0.0042 inch deflection per inch of panel span at 1.5 times design static pressure up to a maximum of +8 inches w.g. in all positive pressure sections and -8 inches w.g. in all negative pressure sections. The unit floor shall be of sufficient strength to support a 300-lb. load during maintenance activities and shall deflect no more than 0.0042 inch per inch of panel span. The casing air leakage shall not exceed leak class 9 (CL = 9) per ASHRAE 111 at 1.25 times maximum casing static pressure (P in inches w.g.), up to a maximum of +8 inches w.g. in all positive pressure sections and -8 inches w.g. in all negative pressure sections, where maximum casing leakage (cfm/100 ft2 of casing surface area) = CL x P0.65. Optionally, the casing air leakage shall not exceed leak class 6 (CL = 6) per ASHRAE 111 at 1.25 times maximum casing static pressure (P in inches w.g.), up to a maximum of +8 inches w.g. in all positive pressure sections and -8 inches w.g. in all negative pressure sections, where maximum casing leakage (cfm/100 ft2 of casing surface area) = CL x P0.65.

3. Insulation: Panel insulation shall provide a minimum thermal resistance (R) value of 13 ft²•h•ºF/Btu throughout the entire unit. Insulation shall completely fill the panel cavities in all directions so that no voids exist and settling of insulation is prevented. Panel insulation shall comply with NFPA 90A.
4. Drain Pans: All cooling coil sections shall be provided with an insulated, double-wall, galvanized or stainless steel drain pan. To address indoor air quality (IAQ), the drain pan shall be designed in accordance with ASHRAE 62.1 being of sufficient size to collect all condensation produced from the coil and sloped in two planes promoting positive drainage to eliminate stagnant water conditions. The outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition. All drain pan threaded connections shall be visible external to the unit. Drain connections shall be of the same material as the primary drain pan and shall extend a minimum of 2 1/2 inches beyond the base to ensure adequate room for field piping of condensate drain traps. Coil support members inside the drain pan shall be of the same material as the drain pan and coil casing. Heating coil, access, and mixing sections may be provided with an optional IAQ drain pan.
5. Access Doors: Access doors shall be 2-inch double-wall construction. Interior and exterior door panels shall be of the same construction as the interior and exterior wall panels, respectively. All doors downstream of cooling coils shall be provided with a thermal break construction of door panel and door frame. Gasketing shall be provided around the full perimeter of the doors to prevent air leakage. Surface-mounted handles shall be provided to allow quick access to the interior of the functional section and to prevent through-cabinet penetrations that could likely weaken the casing leakage and thermal performance. Handle hardware shall be designed to prevent unintended closure. Access doors shall be hinged and removable for quick, easy access. Hinges shall be interchangeable with the door handle hardware to allow for alternating door swing in the field to minimize access interference due to unforeseen job site obstructions. Door handle hardware shall be adjustable and visually indicate locking position of door

latch external to the section. All doors shall be a minimum of 60 inches high when sufficient height is available, or the maximum height allowed by the unit height. Door handles will be provided for each latching point of the door necessary to maintain the specified air leakage integrity of the unit. Optionally, a single-handle door shall be provided for all outward swinging doors linked to multiple latching points necessary to maintain the specified air leakage integrity of the unit. An optional shatterproof window for viewing, capable of withstanding unit operating pressures, shall be provided in the door.

6. Marine Lights: A factory-mounted, weather-resistant (enclosed and gasketed to prevent water and dust intrusion), light emitting diode (LED) fixture shall be provided in sections of the unit as specified for maintenance and service visibility. Fixture shall be complete with aluminum die cast housing, polycarbonate lens designed for maximum light output, and LEDs wired to a single switch within a factory-provided service module. LED lighting shall provide instant-on white light and have a minimum 50,000 hour life. Fixtures shall be designed for flexible positioning during maintenance and service activities for optimal location. All lights within the unit shall be wired to a single switch within the factory provided service module. The service module shall have an optional GFCI receptacle separate from the load side of the equipment. Electrical contractor shall be required to provide a 120V supply to the factory mounted service module for the marine light circuit (unless single-point power is provided) and always for the GFCI receptacle circuit per NEC. The service module shall be provided in the fan section, unless a controls section is provided. In which case, the service module will be provided in the controls section. The light switch is always on the supply fan.

7. Fans: The fan type shall be provided as required for stable operation and optimum energy efficiency. The fan shall be statically and dynamically balanced at the factory as a complete fan assembly (fan wheel, motor, drive, and belts). The fan shaft shall not exceed 75 percent of its first critical speed at any cataloged speed. Fan wheels shall be keyed to the fan shaft to prevent slipping. The fan shafts shall be solid steel. The fan section shall be provided with an access door on the drive side of the fan. The fan shall be a single-width, single-inlet plenum fan. The fan blades shall be aluminum backward-inclined airfoil. Plenum fan shall be direct-driven. Fan sections containing multiple fans shall be controlled using a common control signal, such as the duct static control signal, to modulate the fan speed. The fan and motor assembly (on sizes 10 to 120) shall be internally isolated from the unit casing with 2-inch (50.8-mm) deflection spring isolators, furnished and installed by the unit manufacturer. The isolation system shall be designed to resist loads produced by external forces, such as earthquakes, and conform to the current IBC seismic requirements. The motor shall be integrally mounted to an isolated fan assembly furnished by the unit manufacturer. The motor shall be mounted inside the unit casing on an adjustable base to permit adjustment of drive-belt tension. The motor shall meet or exceed all NEMA Standards Publication MG1 requirements and comply with NEMA Premium efficiency levels when applicable. The motor shall have T-frame, squirrel cage with size, type, and electrical characteristics as shown on the equipment schedule. The motor shall be open and drip-proof, 460 volt, 3-phase, 60 Hz. The fan section shall have motor leads extended to a factory-installed external junction box to facilitate motor wiring and to maintain air leakage integrity of the casing. The fan motor wiring shall be factory-wired to the

external motor junction box within flexible metal conduit of adequate length so that the fan vibration isolation will not be restricted. On units supplied with plenum fans, expanded metal door guard(s) shall be supplied on the access door(s) to the fan, and those downstream access door(s) where unintended access to the plenum fan could occur. Door guard in intended to deter unauthorized entry and incidental contact with rotating components. Refer to the Product Data section for fans with access door guard(s).

8. Coils: Refer to paragraph 2.6, A, 12.
9. Filters: Filter sections shall have filter racks, at least one access door for filter removal, and filter blockoffs to prevent air bypass around filters. The filter sections shall be supplied with 2-inch filters. The filters shall be 2-inch, made with 100 percent synthetic fibers that are continuously laminated to a supported steel-wire grid with water repellent adhesive. Filters shall be capable of operating up to 625-fpm face velocity without loss of filter efficiency and holding capacity. The filters shall have a MERV 13 rating when tested in accordance with the ANSI/ASHRAE Standard 52.2.
10. Mixing Section: A functional section shall be provided to support the damper assembly for outdoor, return, and/ or exhaust air. Dampers shall modulate the volume of outdoor, return, or exhaust air. The dampers shall be of double-skin airfoil design with metal, compressible jamb seals and extruded-vinyl blade-edge seals on all blades. The blades shall rotate on stainless-steel sleeve bearings. Airfoil dampers shall be rated for a maximum leakage rate of 3 cfm/ft² at 1 in. w.g. complying with ASHRAE 90.1 maximum damper leakage. All leakage testing and pressure ratings shall be based on AMCA Standard 500-D. Dampers may be arranged in a parallel or opposed-blade configuration.
11. Outdoor Unit Paint: External surface of unit casing shall be prepared and coated with a minimum 1.5 mil enamel finish or equal. Units supplied with casing exterior factory-painted shall be able to withstand a salt spray test in accordance with ASTM B117 for a minimum of 500 consecutive hours. Unit casing exterior will be provided with manufacturer’s standard color, or alternative color when required.
12. Outdoor Unit Roof: Trane engineered inner roofs incorporate mid-span, internal thermal breaks to eliminate thermal conduction paths from the interior of the air handler to the exterior (2-inch R13 foam-insulated). Inner/ Indoor/ roof will be installed in such a manner as to prevent air bypass between internal components. A single layer Outer/Outdoor roof is utilized above the inner roof and will be sloped at a minimum 0.125 inches per foot either from one side of unit to other, or from center to sides of the unit. Roof assembly will overhang all walls of units by a 1.5-inch minimum.
13. Access/Inspection Sections: A section shall be provided to allow additional access/inspection of unit components and space for field-installed components as needed. The section length shall be variable to accommodate specific access, spacing, or dimensional requirements. An access door shall be provided for easy access. All access sections shall be complete with a double-wall, removable door downstream for inspection, cleaning, and maintenance. Interior and exterior door panels shall be of the same construction as the interior and exterior wall panels, respectively. All doors downstream of cooling coils shall be provided with a thermal break construction of door panel and door frame.
14. Controls: Field supplied VFD shall be mounted externally on the fan section in a NEMA Type 1 enclosure (unit sizes 3-120) or internally in a NEMA Type 4

equivalent unit casing (unit sizes 3-120) within a dedicated controls section or housed fan section. The internal enclosure shall be an integral part of the unit casing to allow for thermal venting to casing interior, but shall be accessible from unit exterior through access door. Internally mounted starters/VFDs shall have doors with the same construction as other doors on unit. An external disconnect shall be mounted through the access door to the starter or VFD to disconnect full power from starter/VFD, lights, or control power.

15. Start-up: Provide equipment startup by factory or factory trained technicians.

G. Exhaust Fan:

1. General: All exhaust fans shall be tested and rated in accordance with AMCA Standard 210. Fans exposed to weather shall have ventilated weatherproof housing over motor and drive assembly. Refer to Paragraph 2.6A for general requirements. All direct drive fans shall be provided with unit mounted speed controllers. All exhaust fans shall have a disconnect switch. All motors 1 horsepower and larger shall be the premium efficiency type.
2. Roof Fan (Direct, Downblast): Spun aluminum, roof mounted, direct driven, downblast centrifugal exhaust ventilator. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners and stainless steel fasteners on cap. Spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base shall have continuously welded curb cap corners for maximum leak protection. Discharge baffle shall have a rolled bead for added strength. An integral conduit chase shall be provided through the curb cap and into the motor compartment to facilitate wiring connections. Motor shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Unit shall bear an engraved aluminum nameplate. Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. An aerodynamic aluminum inlet cone shall be provided for maximum performance and efficiency. Motor shall be heavy duty type with permanently lubricated sealed bearings and furnished at the specified voltage, phase and enclosure. Backdraft damper. Greenheck.
3. Roof Fan (Belt, Downblast): Spun aluminum, roof mounted, belt driven, downblast centrifugal exhaust ventilator. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners and stainless steel fasteners on cap. Spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base shall have continuously welded curb cap corners for maximum leak protection. Discharge baffle shall have a rolled bead for added strength. A two piece top cap shall have stainless steel quick release latches to provide access into the motor compartment without the use of tools. An integral conduit chase shall be provided through the curb cap and into the motor compartment to facilitate wiring connections. The motor, bearings and drives shall be mounted on a minimum 14 gauge steel power assembly, isolated from the unit structure with rubber vibration isolators, and enclosed in a weather-tight compartment, separated from the exhaust airstream. Lifting lugs shall be provided to help prevent damage from improper lifting. Unit shall bear an engraved aluminum nameplate. Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Motor shall be heavy duty type with

permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure. Bearings shall be heavy duty regreasable ball type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed. Belts shall be oil and heat resistant, non-static Type 4L. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150 percent of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM. Backdraft damper. Greenheck.

4. Rook Fan (Direct, Upblast): Spun aluminum, roof mounted, direct driven, upblast centrifugal exhaust ventilator. Fan shall be UL 705 listed. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners and stainless steel fasteners on cap. Spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base shall have a one piece inlet spinning and continuously welded curb cap corners for maximum leak protection. Windband shall have a rolled bead for added strength. A two piece top cap shall have stainless steel quick release latches to provide access into the motor compartment without the use of tools. An integral conduit chase shall be provided into the motor compartment to facilitate wiring connections. The motor shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Unit shall bear an engraved aluminum nameplate. Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. An aerodynamic aluminum inlet cone shall be provided for maximum performance and efficiency. Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure. Exhaust fan shall have roof curb and hinged base with lock hasp and galvanized aircraft cable supports. Weep hole. Greenheck.
   Kitchen Hood Fans shall be UL 762 listed and shall have grease trough.

5. Roof Fan (Belt, Upblast): Spun aluminum, roof mounted, belt driven, upblast centrifugal exhaust ventilator. Fan shall be UL 705 listed. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners and stainless steel fasteners on cap. Spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base shall have a one piece inlet spinning and continuously welded curb cap corners for maximum leak protection. Windband shall have a rolled bead for added strength. A two piece top cap shall have stainless steel quick release latches to provide access into the motor compartment without the use of tools. An integral conduit chase shall be provided into the motor compartment to facilitate wiring connections. The motor, bearings and drives shall be mounted on a minimum 14 gauge steel power assembly, isolated from the unit structure with rubber vibration isolators, and shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Lifting lugs shall be provided to help prevent damage from improper lifting. Unit shall bear an engraved aluminum nameplate. Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure. Bearings shall be heavy duty regreasable ball type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed. Belts

shall be oil and heat resistant, non-static Type 4L. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150 percent of the installed motor horsepower. Exhaust fan shall have roof curb and hinged base with lock hasp and galvanized aircraft cable supports. Weep hole. The variable pitch motor drive must be factory set to the specified fan RPM. Greenheck.
Kitchen Hood Fans shall be UL 762 listed and shall have grease trough.

H. Split System Heat Pump (IDU/ODU):
1. General: Refer to Paragraph 2.6A for General Requirements. Completely assembled and factory tested. Provide all starters and relays required for operation. All components by same manufacturer. Trane-Mitsubishi.
2. Outdoor Unit:
a. Compressor: Sealed hermetic rotary compressor with vibration isolator mountings. Crankcase heater, suction line accumulator, recycling timer. High and low head pressure/temperature protection. Motor overload protection, low ambient feature to 20F cooling mode. High and low side service valves. Recycling timer. Single phase start assist kit. 5-year extended warranty.
b. Fan and Coil: Finned tube non-ferrous coil. Propeller type fan, 1200 RPM maximum, direct drive. Totally enclosed motor, overload protected, permanently lubricated, resiliently mounted.
c. Cabinet: Weatherproof, factory paint.
3. Indoor Unit:
a. Supply Fan: Direct drive, multi-speed forward curve, centrifugal fan, resiliently mounted. Thermally protected motor.
b. Indoor Coil: Copper tube, aluminum fin, DX coil.
c. Electric Heaters: Integral part of unit, complete with all operational and safety controls, single point wiring terminal, 5-year factory warranty, UL listed as a complete unit.
d. Condensate Pan: Install under complete coil area with drain connections.
e. Filter: Washable media. Class 2 or better.
4. Controls: Microprocessor control containing temperature selection, room temperature indication, automatic cooling/heating changeover, malfunction alarm, power failure automatic restart safety, and emergency operation function.

PART 3: - EXECUTION

3.1 PIPING INSTALLATION:

A. General:
1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Architect. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or

equipment. Vertical lines shall be installed to allow for building settlement without damage to piping. Lines shall be adequately braced against vertical and lateral movement. Pipe sizes indicated on the drawings are nominal sizes unless otherwise noted. Pipe sizes shall not decrease in direction of flow, unless otherwise noted.

2. Joints:
   a. Threaded: Pipe shall be cut square, and reamed to full size. Threads shall be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
   b. Welded or Brazed: Filler rod shall be of suitable or the same alloy as pipe. Brazing filler metal shall have a minimum melting point of 1100ºF. Welding or brazing shall be performed by a Certified Welder or Brazer as certified by an organization/institution that uses standards recognized by the American Welding Society (AWS) and meets the requirements of the ASME Boiler and Pressure Vessels Code, Section 9.
   c. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.
   d. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards.
3. Fittings and Valves:
   a. Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.
   b. Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
   c. Unions: A union shall be installed on the leaving side of each valve, at all sides of automatic valves, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.
   d. Valves: All valves shall be full line size. At equipment connections, valves shall be full size of upstream piping. Provide a shut-off valve at each point of connection to existing piping.
   e. Valve Accessibility: All valves shall be located so that they are easily accessible. Valves located above ceilings shall be installed within 24" of the ceiling. For situations where this is not practical or where valves are greater than 10' above floor, chain wheel operators shall be provided. Chain shall extend down to 7' above the floor. All such installations must have prior review by the Engineer.
4. Pipe Support:
   a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural system. Refer to drawings for additional requirements and attachment to structure. Side beam clamps shall be provided with retaining straps to secure the clamp to the opposite side of the beam. Vertical piping shall be supported with riser clamp at 20' on center (maximum). Support pipe within 12" of all changes in direction.

Pipe Size (In.)	Maximum Spacing Between Supports (Ft.)*		
	Copper	Sch. 40 Steel	Plastic

1/2	6	6	4
3/4	6	8	4
1	6	8	4
1-1/4	6	8	4
1-1/2	6	10	4
2	10	10	4
2-1/2	10	10	4
3	10	10	4
4	10	10	4
6	10	10	4
8	10	10	4

*Based on straight lengths of pipe with couplings only. Provide additional supports for equipment, valves or other fittings. Plastic piping shall be supported per the manufacturer's recommendations. Seismic requirements may reduce maximum spacing.

b. Hot Water Piping: Support individual pipes with insulation support and pipe hanger. Install per manufacturer's recommendations.

c. Chilled Water Piping: Support individual pipes with insulation support and pipe hanger. Install per manufacturer's recommendations. Piping shall have complete vapor seal.

d. Refrigerant Piping: Support insulated refrigerant line with construction channel and sheet metal support saddle or Cooper B-Line Armafix clamps. 5' spacing. Use isolation shield for uninsulated pipe. When using pre-charged tubing, all changes of direction shall be made with bending tools producing neat uniform bends. Free hand bends will not be accepted.

e. Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for review.

5. Miscellaneous:

a. Escutcheons: Provide chrome plated escutcheons where piping penetrates walls, ceilings, or floors in finished areas.

b. Pipe Sleeves: All piping passing through concrete or concrete block shall be provided with pipe sleeves. Allow 1" (nominal) clearance between sleeve and pipe or pipe insulation. Piping through walls or footings below grade shall be sealed with Link Seal. Pipes passing between floors shall have Holdrite HydroFlame water/firestop sleeves, UL listed.

c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe or pipe insulation sealed with fire rated materials in accordance with the requirements of 2019 CBC Section 714. Pipes passing between fire rated floors shall have Holdrite HydroFlame water/firestop sleeves, UL listed.

d. Thermometer or Pressure Gage Tap: Provide tee for instrument well. Minimum size of pipe surrounding well shall be 1-1/2". Mount on side of pipe.

e. Dielectric Couplings: Dielectric couplings shall be installed wherever piping of dissimilar metals are joined, except that bronze valves may be installed in ferrous piping without dielectric couplings.

B. Hot or Chilled Water Piping: Provide shut-off valve for each building and at each connection to equipment. Before threading, welding or grooving any pipe, it shall have a cloth material of the proper size pulled through pipe to clean out any foreign material, and then a visual inspection through pipe to verify it is clean. Any process done to pipe end will require that pipe end be inspected inside before a fitting is fitted to pipe (to insure that cutting oil or pipe burrs are removed). Always have pipe threading machine sloped to prevent cutting oil from running into the pipe. Branch lines leaving horizontal lines shall leave on the horizontal or at an upslope of 45°, unless they are rising up to another horizontal line which will insure the pipe to remain air free. All high points in any part of the system shall have the means to purge air. Unless otherwise noted all vents shall be 1/4" petcocks with 1/4" copper tube discharge. Route tube to condensate pan, floor sink, etc. If a drain point is not available, terminate tube with a return bend to allow water to be collected. Before connection to equipment, all piping shall be thoroughly flushed with water. Only equipment mounted on vibration isolators shall be connected with flexible connection. The manufacturer of the underground piping system shall instruct the installer regarding the manufacturer's required installation procedures. The manufacturer shall also provide sufficient job-site inspection to insure that the work is being accomplished in accordance with the plans, specifications and manufacturer's requirements. Upon completion of the installation, a certificate shall be furnished to the Architect by the manufacturer of the system, certifying the installation was made in accordance with his requirements and in compliance with the plans and specifications.

C. Condenser Water Piping: Provide shut off valve at each connection to equipment. Before installing, all pipe shall be rapped along entire length to loosen sand, mill scale, etc. Pipe 2" and larger shall be cleaned internally with wire brush. Before connection to equipment, all piping shall be thoroughly flushed with water. Do not install strainers between tower sump and pump suction. Connections to equipment mounted on vibration isolators shall be made with flexible connection.

D. Refrigerant Piping: Pipe shall be cut square. Joint surfaces shall be thoroughly cleaned, fitted and erected before brazing. Continuously purge with Nitrogen during brazing. After installation, evacuate to 29 inches of mercury, ambient temperature during evacuation shall not be less than 70ºF. After evacuation, fill with dry nitrogen to 250 psi and maintain for two-hour period without additional charge. After nitrogen test, purge with refrigerant charged through dryer and maintain holding charge in system and equipment. Refrigerant piping below grade shall be run in 4" (min.) PVC conduit with long radius ells. Seal ends of conduit watertight.

E. Flue Piping: Flue piping shall be installed in accordance with its UL listing and the manufacturer's instructions.

3.2 PIPING INSULATION INSTALLATION:

A. Chilled and Hot Water Supply and Return:
1. General: All chilled and hot water supply and return piping (including all fittings and accessories) and all chilled water equipment shall be insulated. Insulate a sufficient length of make-up water piping to prevent condensation.
2. Pipe: Apply pre-molded fiberglass sections to pipe using integral pressure sealing lap adhesive in accordance with manufacturer's recommendations. Stagger longitudinal joints. Seal butt joints with factory supplied pressure sealing tape.

3. Fittings and Valves:
   a. Wrap all fittings and valves with pre-cut fiberglass blanket to thickness matching adjoining insulation. Cover blanket with PVC jacket, solvent welded. Seal all joints with factory supplied pressure sealing vapor barrier tape with a 1-1/2" (min.) overlap on both sides of joint. Insulate all flanges, unions and valves except stems and operators. All joints on chilled water piping shall be sealed with vapor barrier coating in addition to the vapor barrier tape.
   b. For miscellaneous fittings and accessories for which PVC jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the fiberglass blanket with reinforcing mesh, one coat of lagging adhesive, and a final coat of vapor barrier coating.
4. Vapor Barrier Continuity: All exposed ends of insulation and all gaps or voids in vapor barrier shall be sealed with reinforcing mesh, one coat of lagging adhesive and a final coat of vapor barrier coating. Build up all horizontal areas to prevent water accumulation.
5. Pipe Hangers: Seal all joints at pipe hangers with vapor barrier tape. Joints on chilled water piping shall be sealed with vapor barrier coating in addition to the vapor barrier tape.
6. Piping Exposed to Weather:
   a. All piping and fittings exposed to weather shall have, in addition to the above described insulation, an aluminum jacketing. Insulation at grooved pipe couplings shall be covered with aluminum flange fitting covers. Secure in place with factory supplied straps. Install all joints and seams to prevent water entry, seal with 1/8” bead of gray metal jacketing sealant.
   b. For miscellaneous fittings for which aluminum jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the insulation with reinforcing mesh and at least two coats of outdoor mastic. Plastic fitting covers shall not be used where exposed to weather.
7. Additional Finish for Exposed Piping and Equipment: All piping and equipment exposed to view but protected from the weather shall be given an additional finish of PVC jackets. Do not install this jacket where it will be subjected to a temperature of 150ºF or more such as immediately adjacent to boilers. In these locations install reinforcing mesh, one coat of lagging adhesive and a final coat of vapor barrier coating.
8. Equipment: Chilled water equipment with continuous circulation (pumps, heat exchanger, etc.), shall be insulated with materials similar to those described in Paragraph 2-02. It shall be the Contractor's responsibility to provide adequate insulation to prevent condensation, a complete vapor barrier, weatherproofing for equipment exposed to the weather, and a neat-appearing installation. Insulate hot water equipment same as above except no vapor barrier. Submit materials and method of installation to Engineer for review.

B. Refrigerant Piping: Cover piping with foamed plastic insulation. Longitudinal and end seams shall be thoroughly cemented with adhesive in accordance with manufacturer's recommendations. Cover all fittings, unions, valves and connections. Piping exposed to view shall be covered with PVC jacketing. Piping exposed to weather shall be covered

with aluminum jacketing, install all joints and seams to prevent water entry, seal with 1/8” bead of gray metal jacketing sealant.

3.3 DUCTWORK INSTALLATION:

A. General:
1. Standards: Unless otherwise noted, all ductwork shall be constructed and installed in accordance with current SMACNA Standards. Ductwork shall be built to a pressure classification equal to or greater than the maximum operating pressure at that point in the ductwork. A copy of these standards shall be maintained at the job site at all times. Duct work and accessories shall be installed in a manner to prevent vibration and rattling.
2. Access: Provide duct access doors as required to adjust equipment and dampers. Provide wall or ceiling access panels, or remote actuators as required where equipment and dampers are not otherwise accessible. Remote regulator shall be as detailed on drawings.
3. Flanges and Escutcheon: Where ductwork penetrates walls, ceilings, or floors, furnish and install flange or escutcheon of same material as duct.
4. Flexible Connections: Connection of ductwork to any vibrating equipment shall be with 3" (min.) flexible connection. Install with ample slack and uniform gap. There shall be no metal to metal contact across flexible connection. Flexible connections exposed to weather shall have a protective sheet metal cover.
5. VAV/VVH System: For all variable air volume (VAV) systems, the supply ductwork between the fan discharge and the VAV boxes shall be constructed per SMACNA standards to a pressure level equal to the maximum shut-off pressure the fan can generate. All joints in this ductwork shall be sealed with duct sealant in accordance with manufacturer's recommendations. Install VAV boxes with four diameters of straight duct on up-stream side.

B. Low Velocity-Low Pressure (up to 2,000 ft/min and up to 2.0 in water):
1. Sheet Metal Ductwork:
a. Ells: Ells with less than standard radius and square ells shall be fitted with turning vanes.
b. Tees: Tees in supply ductwork shall be straight tap-in with extractor or 45 degree take-off as shown on drawings. Grilles or branches in supply ductwork shall be a minimum of 8 duct diameters downstream of tees.
c. Duct Joints and Seams: All joints and seams which are not exposed to weather shall be sealed airtight with duct sealant. All joints and seams exposed to weather shall be sealed air and water tight with outdoor sealant. (See Part 2 of this Specification). All joints on metal ductwork exposed to view inside building shall be sealed air tight with grey duct sealant.
d. Dampers: Install volume control damper and damper regulator in all branch ducts.
2. Flexible Glass Fiber Ductwork: The use of flexible duct is limited to the last 5 feet of each branch duct (i.e. one 5 foot section of flexible duct may be used to connect the grille to the sheet metal branch duct). No joints are permitted in this 5' length. Hangers shall be 4" wide metal straps spaced to prevent sagging, 42" spacing maximum. Insert 6" wide fiberglass pad between duct and hanging strap. Joints shall be installed with stainless steel or nylon draw bands, Duro Dyne

Dyn-O-Tie. Minimum turn radius shall be in accordance with SMACNA Standards (turn radius of duct centerline not less than 1.5 times the duct diameter).

3. Spiral Wound Metal Ductwork: At side duct grilles, the grille shall be cut directly into the spiral duct. Duct to duct joints shall be made with the spiral seam rotated so that the seam forms a continuous helical pattern across the joint.
4. Moisture Bearing Exhaust Ductwork: Joints shall be made with male end in direction of airflow and shall be sealed watertight with mastic. Unless otherwise indicated, the ducts shall slope down towards the source of moisture (grille, hood, drier, etc.). Sheet metal screws or any other device that protrudes into the duct shall not be used for clothes drier exhaust ducts.
5. Grease Bearing Exhaust Ductwork: Horizontal portions of the duct shall slope down towards the hood at 1/4" per foot (min.) unless the total horizontal length exceeds 75 feet, then the slope shall be 1" per foot (min.). Provide access panels at changes of direction as required by CMC. Drains shall be provided at low points in horizontal ducts per 2016 CMC 510.1.3. Horizontal ducts shall be provided with access in accordance with 2016 CMC Section 510.3.3.
6. Underground Ductwork: Install ducts with constant slope up to grilles. All ducts and fittings shall be anchored to prevent floating as slab is poured. Any rectangular metal duct or fitting which is not protected with a polyvinyl chloride coating shall be encased in 3" (min.) concrete. Polyethylene ductwork installation shall comply with the manufacturer’s installation instructions.

3.4 AIR TERMINALS AND DUCT FITTINGS INSTALLATION:

A. General: Unless otherwise noted, all air terminals and duct fittings shall be installed in accordance with current SMACNA Standards. Terminals and fittings shall be installed in a manner to prevent vibration and rattling. Metal surfaces exposed to view behind grilles and registers shall be painted flat black.

B. Fire/Smoke Damper: Shall be installed in accordance with the manufacturer's recommendations. Provide access doors as required, label per CBC. Manufacturer's instructions shall be available to the inspecting authorities. Shall be tested according to State Fire Marshal requirements.

3.5 DUCTWORK INSULATION INSTALLATION:

A. General: Insulate all sheet metal supply, return and outside air intake ductwork except as noted below. Insulation shall be continuous through walls and floors except at fire dampers.

B. Where Insulation Is Not Required: Do not insulate factory-insulated ducts or casings, acoustic lined ducts, fibrous glass ducts, underground ductwork, supply or return ductwork exposed to view in the space that it serves, or exhaust ductwork.

C. Concealed Ductwork: Wrap concealed ductwork including outside air intakes with fiberglass blanket lapped 2" minimum. Secure with staples 4" on centers maximum on straight runs and 3" maximum at elbows and fittings. Insulation on bottom of ducts wider than 36" shall also be secured with mechanical fasteners at 24" on center.

D. Acoustic Lining: Unless otherwise indicated, all supply and return ductwork in equipment rooms, all ductwork exposed to weather and other ducts as indicated on drawings, shall have acoustic lining. Do not acoustic line outside air intakes. Where acoustic lining is installed, increase each sheet metal dimension to accommodate lining and maintain clear inside duct dimensions shown on drawings. Apply lining with bonding adhesive in accordance with manufacturer's recommendations and also secure with mechanical fasteners in accordance with SMACNA Standards. Seal exposed edges of lining with bonding adhesive.

E. Fire Resistive Wrapped Ducts: Where indicated on drawings, ductwork shall be covered with fire resistive duct wrap. Install in accordance with it’s UL or Omega Point Laboratories Design number (as applicable) and the Manufacturer’s Installation Instructions.

3.6 EQUIPMENT INSTALLATION:

A. General: It shall be the responsibility of the equipment installer to ensure that no work done under other specification sections shall in any way block or otherwise hinder the equipment. All equipment shall be securely anchored in place. All equipment shall be installed level.

B. Air Handling Units: Spring isolators shall be adjusted to allow movement to maximum free spring length. Piping support shall be designed so that piping weight does not bear on equipment. Hot water coil shall be mounted upstream of chilled water coil.

C. Gage Taps: Gage taps, such as Pete's Plugs, shall be installed immediately adjacent to all heat exchanger and pump connections (i.e. inlet and outlet of all pumps, boilers, chillers, condensers, coils, etc.). Taps shall be installed to allow for a pressure gage or thermometer to be easily inserted and read. Provide 1 set of gages (pressure gage with Pete's Plug adapter, chilled water thermometer and hot water thermometer). Deliver to Owner.

D. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

E. Pumps: Install pumps with a minimum of 8 diameters of straight pipe at the pump suction unless a suction diffuser is installed. Sufficient clearance to wall or other obstructions shall be provided so that motor and rotating parts can be removed without disassembly of volute or piping. Anchor bolt configuration shall be compatible with this method of removal. Pedestal mounted pumps shall have their bases grouted. Realign pump and motor according to Hydraulic Institute Standards after grouting and connection of piping.

F. Boiler: Installation shall be in accordance with California Code of Regulations, Title 8, Industrial Relations. Where required, permit for system operation shall be obtained and permanently posted at installation.

G. Equipment Platforms: Shall be as shown on drawings and as follows: Flashing and platform cover shall be 22 gage (min.) sheet metal. All joints and seams shall be soldered with 2" (min.) overlaps. Provide 3/4" gap around perimeter between roofing and platform

cover to facilitate re-roofing. Extend drip lip down 3" (min.). Provide 30# felt under platform cover.

3.7 TESTS AND ADJUSTMENTS:

A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Architect. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested.

B. Piping Tests:
1. General: Tests may be made in sections, however, all connections between sections previously tested and new section must be included in the new test. There shall be no drop in pressure during test except that due to ambient temperature changes. All components of system not rated for test pressure shall be isolated from system before test is made.
2. Water Piping: Maintain 100 psig water pressure for 4 hours.

3.8 SYSTEM ENERGY BALANCE:

A. Scope: Provide the services of an independent test and balance agency to test, adjust and balance, retest and record performance of the system to obtain design quantities as specified. The agency must prove that they have no affiliation with any equipment manufacturer, design engineer, installing contractor, or any other party which might lead to a conflict of interest, in order to provide an unbiased, third party system balance and report.

B. Qualifications: Prior to commencing work, the agency shall be reviewed by the Engineer and shall be certified by the Associated Air Balance Council, National Environmental Balancing Bureau or Testing, Adjusting and Balancing Bureau. The agency shall provide documentation of having successfully completed at least five projects of similar size and scope.

C. Instruments: All instruments shall be accurately calibrated; calibration histories shall be available for examination. Application of instrumentation shall be in accordance with AABC, NEBB or TABB standards.

D. Submittals: Include in shop drawings copies of forms to be used for testing and balancing showing all data which is to be recorded. Three copies of completed balance report shall be submitted to and reviewed by the Mechanical Engineer prior to the final mechanical construction review.

E. Procedure - General: Procedure shall be in accordance with Associated Air Balance Council's "National Standards for Field Measurements and Instrumentation - Total System Balance", Volume Two, No. 12173, or equivalent NEBB or TABB standards. System shall be in full, continuous operation during test. Balanced quantities shall be plus 10%, minus 0% of design quantities. All nameplate data, manufacturer, model and serial numbers shall be recorded for each item tested.

F. Extended Warranty: The test and balance agency shall include an extended warranty of 90 days after completion of test and balance work, during which time the Engineer, at his discretion, may request a recheck or resetting of any item or items in test report. The agency shall provide technicians to assist the Engineer in making any tests he may require during this period of time.

G. Air Balance Procedure (For Each Air Handling System):
1. All air filters shall be clean when air balance is performed.
2. Provide a sketch of the equipment showing exactly where all pressure readings were taken.
3. Adjust blower RPM to design requirements.
4. Record motor full load amperes.
5. Make pitot tube traverse of main supply and return ducts and obtain design CFM at fans.
6. Record system static pressures, inlet and discharge.
7. Record filter quantity, size(s) and pressure drop across filter(s) at each filter bank.
8. Adjust system for design CFM recirculated air.
9. Adjust system for design CFM outside air.
10. Record entering air temperatures. (DB heating, DB and WB cooling.)
11. Record leaving air temperatures. (DB heating, DB and WB cooling.)
12. Adjust all main supply and return air ducts to design CFM.
13. Adjust all zones to design CFM, supply and return.
14. Adjust all diffusers, grilles and registers to plus 10%, minus 0% of design requirements.
15. Adjust CFM at all exhaust fans, make-up units, etc. (high and low speed, where applicable). Record applicable data from items 1 through 11 above.
16. Each grille, diffuser and register shall be identified as to location.
17. Verify proper diffusion pattern for all ceiling grilles and that all sidewall grilles are set for 5 degrees upward deflection unless otherwise noted. Make a notation of any that are not set properly.
18. Size, type and manufacturer of diffusers, grilles, registers and all tested items shall be identified and listed. Manufacturer's ratings shall be used to make required calculations on all items.
19. Readings and tests of diffusers, grilles, and registers shall include required FPM velocity and test resultant velocity, required CFM and test resultant CFM after adjustments.
20. In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified. Testing agency shall check all controls for proper calibrations and list all controls requiring adjustment by control installers.
21. All diffusers, grilles and registers shall be adjusted for required air patterns and to minimize drafts.
22. As a part of the work of this contract, THE AIR CONDITIONING CONTRACTOR shall make any changes in pulleys, belts and dampers or the addition of dampers required for correct balance as recommended by air balance agency, at no additional cost to Owner.
23. Set, test and adjust packaged heating/cooling unit economizer operation in cooperation with controls contractor. Record minimum and maximum outside and exhaust airflows.

H. Water Balance Procedure (For Each Pumping System):
1. Set valves for maximum coil flow.
2. Remove and clean all strainers.
3. Examine water in system and determine if water has been treated and cleaned.
4. Check expansion tanks to determine that they are properly charged and that the system is completely full of water. Bleed air from system.
5. Set operating temperatures of all equipment to design requirements.
6. Air balance must be complete before water balance begins.
7. Adjust pumps to design flow by use of differential pressure gage calibrated in feet of water.
8. Adjust water flow through all equipment to design flow.
9. Record leaving and return water temperatures at all equipment. Reset to correct design temperature.
10. Record water temperatures at inlet side of coils. Record rise or drop of temperatures from source.
11. Balance all coils for design flow and mark settings on flow controllers.
12. After coils are balanced, recheck settings at all equipment and readjust if required.
13. Record pressure drop through coils, and reset to design flow. Set pressure drop across bypass valve to match coil full flow pressure drop.
14. Record the following at each coil:
    a. Inlet water temperatures.
    b. Leaving water temperatures.
    c. Pressure drop across coil.
    d. Pressure drop across bypass valve.
15. Record pump suction and discharge pressures at operating condition and also with pump discharge valve completely closed.
16. Record running amperage of pump motor at operating condition and also with pump discharge valve completely closed.
17. Record water metering device readings.

3.9 WATER TREATMENT:

A. General: All new HVAC equipment and auxiliary water piping systems shall be cleaned, passivated and treated as herein specified. Chemical compound identifications are from San Joaquin Chemicals, Inc., a State of California Contractor, License #461677. A written generic formula including active ingredients percentages must be submitted for review to be accepted as equivalent. Provide treatment as required to control scale, corrosion, biological growth, foaming and general fouling. Chemical treatments indicated below are generic in nature, actual formulations, dosages and application shall be determined by analysis of the make-up water to be treated with consideration for the system metallurgy, type of treatment equipment employed and operating units characteristics. Initial cleaning, preparation and start-up shall be supervised by the water treatment company's field service application specialist having a minimum of ten (10) years' experience with these type applications. The water treatment contracting company shall have not less than fifteen (15) years' experience with these type applications.

B. Cleaning and Initial Preparations:
1. Initial Fill: As the first water is introduced into the system, add not less than 10 gallons for each 1,000 gallons of contained water volume of a liquid blend of

alkaline detergent; SANASOLV ® 6103 for closed systems, SANACOR ® 2605 - WR metal passivator as a white rust inhibitor for open galvanized systems, and SANACOR ® CUI for metal passivator as an enhanced copper tube corrosion inhibitor, comprised of the following ingredients:

Closed (Hot, Chilled, Non-Galvanized Open Systems):
- Sodium Silicate Penta-hydrate
- Sodium Tri-Polyphosphate
- Tri-Sodium Phosphate
- Dispersing Polymers
- Wetting Agent, non-ionic

Open (Galvanized Passivator):
- Ortho-phosphate
- Poly-phosphate
- Dispersing Polymers
- Azole
- Buffered at pH 7.2-7.8

Open (Enhanced Copper Tube Passivator):
- Azole in solution (pH 7.5 to 8.5)

2. Circulation: The above closed loop detergent shall be re-circulated for not less than twelve (12) hours/not more than forty-eight (48) hours after which the system shall be rapidly dumped with re-circulating pumps operating to provide maximum practical motion, and whenever possible, with simultaneously adding or chasing with rinse water. It is important that make-up water rate exceed water discharge rate. In either case, the system shall be flushed until neutral to phenolphthalein, reaches the same pH and TDS levels as the clean flushing water and is free from suspended material and color. Provide circulating pumps as required. If existing main circulating pumps are utilized for flushing the system, the entire system shall be flushed and re-treated.
   a. After flushing, all strainers shall be removed and cleaned. If the system contained a significant level of suspended solids, recirculating pump seal replacement may be required as requested by the project engineer as recommended by the water treatment field service application specialist. These functions will be the responsibility of the mechanical contractor with supervision by the water treatment applications specialist.
   b. Be sure that all heating and/or cooling coils are kept open during the cleaning and flushing process and that cleaning solution is re-circulating through them and totally flushed from the entire system. These functions will be the responsibility of the mechanical contractor with supervision by the water treatment applications specialist.
   c. After flushing cleaner/metal passivator from the open galvanized system, immediately re- passivate galvanized systems with SANACOR® 2605-WR at 10 gallons/1,000 gallons contained water and leave the passivator in the system to naturally deplete during normal operating blowdown cycles.
   d. After flushing cleaner/metal passivator from the open condenser water system, immediately re-passivate these enhanced copper alloy tube systems with SANACOR® 2605-CUI at 10 gallons/1,000 gallons contained water and leave the passivator in the system to naturally deplete during normal operating blowdown cycles.
3. Initial Treatment Closed Loop: As soon as possible after flushing (within two hours), and with clean water in the systems, introduce 800 to 1,200 parts per

million of sodium nitrite, pH buffer, yellow metal inhibitor and anti-scalants, (SANACOR® 2301-A) and adjust system water pH to 8.5 - 10.5. Maintain treatment concentration in all closed systems using by-pass feeders; (two-gallon feeders for less than 1,000 gallons contained water and five or twelve-gallon feeder for larger systems.

4. Initial Treatment Open System: Introduce 500-1000 parts per million recommended SANACOR® 2600 series antiscalant/antifoulant/metal passivator/inhibitor to open recirculating water systems. Allow this inhibitor to fall naturally within control limits as recommended by the water treatment applications specialist. This inhibitor does not replace the galvanized or enhanced copper tube passivators that should already be in the systems and allowed to dissipate through normal system bleed-off.

C. Certification Before Start-Up: Equipment shall not be started until the water sides of all units have been cleaned and treated per these specifications under the supervision of the water treatment company's applications specialist. The field service applications specialist or their designate shall prepare a letter and submit it to the mechanical contractor and/or consulting engineer indicating that all piping systems have been properly cleaned and treated and are ready to be put into operation.

D. Continuation of Supervision: The water treatment service company shall provide supervision of the water treatment program for a period of not less than one year from commencement of the water treatment program which shall consist of analysis of all treated systems and the submittal of a written analytical report stating the current conditions and recommendations for maintaining optimal controls. This service shall be performed monthly or more frequently as specified or required.

E. Chemical Supply: Provide a one year (12 months) supply of chemicals from commencement of the water treatment program to maintain the following criteria based on 17 hours operation per day, 7 days a week, at 75% loading capacity. Water treatment contractor must allow for one year supply of chemicals, (including biocides) regardless of the system operating conditions. The only exception: if a closed water system is dumped or takes on more than 10% make-up of its total water volume during the first year, additional required chemicals cost over the 10 % will be reimbursed with proper documentation. Part of this documentation requires water treatment contractors proposed closed system use rate requirements to be supplied with Submittals.

1. Chilled Closed System: Provide and maintain an excess sodium nitrite concentration of 800-1200 ppm by addition of SANACOR® 2301-A. Consider ≅ 10% per year water loss by volume.
2. Hot Water Closed System: Provide and maintain an excess sodium nitrite concentration of 800-1200 ppm by addition of SANACOR® 2301-A. Consider ≅ 10% per year water loss by volume.
3. Condenser Cooling Water: Provide and maintain between 200 and 500 ppm total treatment concentration of recommended SANACOR® 2600 series inhibitor. Inhibitor selection and feed rate will be based on make-up water quality, system metallurgy, projected cycles of concentrations, type of system and environmental compliance requirements.
4. Condenser Cooling Water: Provide biocide (SANATOX® 2080) pelletized bromine/chlorine hydantoin (must be over sixty (60%) percent active as Bromine) to be fed via bypass pot feeder specifically designed for this type oxidizing product. A second and sometimes third liquid non-oxidizing biocide and/or bio-dispersant may be considered based on location, environment, system size and type, etc.

5. Responsibility: It is the responsibility of the water treatment service company to guarantee biological control of each treated system for the first year warranty period. In addition to maintaining corrosion rates less than 1.0 mpy for steel, 0.1 mpy for yellow metals, with no pitting, and total elimination of scaling and/or fouling of all treated systems.

F. Equipment and Accessories:

1. Water Meter: A properly sized pressure regulated back-flow preventer shall be installed in any make-up water line where chemicals may be injected. A properly sized contacting head water meter or a paddle wheel flow sensor (in-line or wall mount with pulse counter) which will signal a chemical pump with both internal and external operating characteristics for feeding inhibitor chemical proportional to real-time system make-up. Seametric MJNR-200 1 pulse/10gal
2. Controller: Controller shall continuously monitor the conductivity of an open cooling water stream via a remote or attached sensor. As the conductivity rises above a pre-set conductivity level as established by the water treatment company, the controller shall signal a N/C motorized bleed valve to open, evacuating high TDS recirculating water. The valve shall remain open until the conductivity drops two to five percent below the pre-set level. The conductivity level shall be adjustable from 100-5,000 micro siemens. Controller shall have operating mode indicator lights, connections for chemical pump, N/C bleed-off valve and shall have a conductivity sensor flow switch and flange for wall mounting, Advantage, Aqua Track, Wal-Chem, Lakewood, Pulsatron, models or approved equal. Walchem WCTT600PSNNM-BN
3. Chemical Pump: Positive displacement pump with variable stroke and frequency, 2.0 gph - 250 PSI, both external and internal input function, acrylic or PVC head as appropriate for the chemical proposed with reinforced, thermoplastic housing. Provide foot valve with strainer, 4-function discharge valve, polyethylene tubing. Advantage, Liquid Metronics, Inc., Walchem or approved equal. Walchem1XB-007TCN-U
4. Biocide/Bio-dispersant Pump: Positive displacement Pump with variable stroke frequency, 2.0 gph – 250 PSI with input function from the controller timer, acrylic or PVC head as appropriate for the biocide, thermoplastic housing, provide foot valve with strainer, 4 function discharge valve, polyethylene tubing. Advantage, Liquid Metronics, Inc., Walchem or approved equal. One pump is required, a second pump will be supplied at the discretion of the water treatment company with E.4. Walchem 1XB-007TCN-U
5. Solenoid/Motorized Bleed Valve: Normally closed, pilot operated diaphragm valve or normally closed motorized, ¾” to 2” pipe size based on projected line pressure and bleed-off rate.Griswold Controls, Model 4160, 115 volt coil, Erie N/C motorized valve or approved equal. GTP-MGV10B/WP
6. Chemical Tank: 65-110-250 gallon polyethylene double walled containment or chemicals resistant powder-coated steel or stainless steel overlay containment of polypropylene chemical bulk container. Proper selection of tank capacity must assure a minimum of three (3) months chemical supply.
   1-DW65-BLUE (INHIBITOR)
   1-DW65-BLUE (BIOCIDE)
7. Brominator: Properly sized for tower capacity to maintain not less than 60 days supply of briquettes during the optimum use period. Include all necessary valves, air vent, calibrated outlet valve, inlet ball valve, calibrated slotted ball valve, drain

line, flow meter (2-10 g.p.m. or as required). GTP/BR-40-HP W/MGV10B/WP CPV Moto Valve

G. Analytical Equipment and Reagents:
Test Master Jr. Test Cabinet, complete or equal
Myron L 6PIIFC pH/Conductivity/ORP meter
Sodium Nitrite Drop Test Set
Open Recirculating Inhibitor Drop Test Set (T. S. 260 or approved equal)
Bromine/Chlorine Test Set, Color Comparator Type
Total Alkalinity Drop Test Set
SANACHECK Bio-Stick Testing
*All reagents supplied for first year of operation

H. Installation: Install all equipment and accessories per the piping diagrams on drawings and the manufacturer's recommendations as approved by the consulting engineer and under the direction of the water treatment contractor.

I. Electrical: Work in this section must be performed by the electrical contractor under the supervision of the water treatment contractor.

J. Submittal Acceptance: Submittals will not be accepted without annual chemical and biocide use calculations and these calculations must illustrate proper chemical double-walled bulk containment tanks selection and brominator selection based on the water treatment company’s submitted use rate calculation, referring to operating load as specified under E. “Chemical Supply”. The water treatment supplier is obligated to supply items specified for one year regardless of their calculations as submitted, with exception under E for closed loop systems.

END OF SECTION

SECTION 260535 - PRODUCTION SYSTEMS ELECTRICAL INSTALLATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Provision of services as listed within Div. 26 related to the installation of production systems and electrical infrastructure including:

    a. Production lighting control systems
    b. Production AV systems
    c. Telescopic seating units
    d. Production power “company switches”
    e. Coordination with all related sections doing adjacent or integrated work.

B. It shall be under the work in this section to provide electrical infrastructure, accommodations and connections to systems in other Sections.

1. It shall be under the work of a specialty sub-contractor for Section 11 61 83 – Production Lighting Control to furnish equipment only to the jobsite. It is under the work in this Div. 26 Section to coordinate with, receive, install all equipment (line voltage and low voltage) and provide all power infrastructure, conduit, raceway, wire, connectors, hardware and other incidental items, terminations for both line voltage and testing to provide a complete and working system. Reference PL Documents for other electrical requirements.
2. It shall be under the work of a specialty sub-contractor for Section 12 66 23 – Telescopic Seating to furnish equipment to the jobsite. It is under the work in this Div. 26 Section to coordinate with, receive, install all equipment and connection panels (line voltage and low voltage) mounted to the building, and provide all power infrastructure, conduit, raceway, wire, connectors, hardware and other incidental items, terminations for both line voltage and low voltage and testing to provide a complete and working system, including low voltage aisle lighting accommodations. Reference PS Documents for other electrical requirements.
3. It shall be under the work of a specialty sub-contractor for Section 27 41 16 – AV Systems to provide and install equipment, including low-voltage wire pull. It is under the work in this Div. 26 section to provide and install a complete and working line-voltage isolated-ground power infrastructure. It is also under the scope of Div. 26 to provide and install all low-voltage conduit, raceway, and standard backboxes. Specialty backboxes will be provided by the 27 41 16 contractors to Div. 26 for installation. Reference AV Documents for other electrical requirements.

C. It is under the work of this section to provide all conduit and backboxes to all Production Lighting and AV systems.

1. Exception: Surface and rail mounted Production Lighting backboxes will be furnished by Div 11 Production Lighting Control Systems.

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2. Exception: Floor boxes and specialty (non-standard or NEMA) backboxes will be furnished by Div 27 AV Systems.

1.2 RELATED SECTIONS

A. Coordinate with the following sections in carrying out this work:

1. Division 1 General Conditions
2. Section 11 61 33 – Production Rigging
3. Section 11 61 83 – Production Lighting Control
4. Section 12 66 23 – Telescopic Seating
5. Other Division 26 Sections
6. Section 27 41 16 - AV Systems

1.3 REFERENCES

A. Comply with all national, state and local regulations. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.

B. All production system design drawings and specifications assume 100% above-grade, above-slab EMT conduit.

1. At the contractor's option, Rigid PVC and/or Rigid Metal Conduit (RMC) may be used at in-slab/on-grade, under-slab/in-grade, or in-slab/not on-grade conditions, so long as the requirements referenced below are met.

1.4 SYSTEM DESCRIPTION

A. Production Lighting Control System

1. The system shall be designed for the control of production lighting and shall consist of factory pre-wired dimming and processing rack enclosures containing dimmers, relay panels, power supplies, breakers, terminals and/or control electronics.
2. Dimmed and Relay circuits shall be connected to factory pre-wired wiring devices.
3. System shall work in conjunction with specified low-voltage control and receptacle stations.
4. All equipment is furnished as equipment only and must be installed and connected by the electrical contractor.

B. AV Systems- Electrical Power

1. The IG power system will be designed to provide clean power with reduced susceptibility to EMI/RFI, using an isolated ground and a dedicated isolation transformer.

C. AV Systems- Low Voltage Conduit

1. The conduit system is designed to reduce susceptibility to EMI/RFI, using EMT metallic conduit and physical separation.

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D. "Company Switches" are cabinets and receptacles specially designed for temporary production power connections.

E. Fixed Seating

1. The fixed audience seating is furnished with aisle lighting fixtures pre-wired into the chairs. The seats come with pigtails that must be terminated into cast in slab junction boxes and conduit provided by division 26. Some of the seats are demountable, and the connection must be made removable via plug-and-socket.
2. The fixed audience seating contractor shall furnish a low voltage transformer and manual dimmer(s) for aisle light intensity adjustment to be installed and connected by division 26.

F. Telescopic Seating System

1. A motorized telescopic seating system is being furnished and installed by the specialty sub contractor for Section 126623 – Telescopic Seating System. The Seating contractor will also provide any specialty or proprietary connector panels and face plates for device connection.
2. The seating contractor will provide all connectors, cable or flexible conduit and wire required for connections to the seating systems at wall box locations.
3. Motor connections:

    a. The seating manufacture will provide Motor power terminations and/or receptacles and any disconnects required for installation.
    b. Mounting and terminations to the building are under the work of the div 26 contractor.

4. Aisle lighting

    a. The seating contractor will provide transformers for aisle lights mounted in a wall box with a labeled cover plate as well as manual dimmer(s) for aisle lighting intensity adjustment, mounted in a labeled wall box with a locking cover.
    b. It is under the work of the Div 26 electrical contractor to mount equipment and provide terminations for all aisle lights.

5. It is under the work of this section to provide:

    a. All conduit, boxes to furnish devices related to seating systems.
    b. Any common receptacles panels or connections and any black face plates for pull boxes.
    c. Terminations for all line and low voltage connections including motor power and aisle light power.

1.5 DESIGN CRITERIA

A. Production Lighting System

1. Branch production lighting wiring and infrastructure shall provide 115VAC +/-3% at all wiring devices under a 575w lighting load.

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2. Production dimming shall be rated for 100% continuous operation. Branch wire size and conduit/raceway shall be sized for the full rated loads of the dimmers and 100% continuous operation of every circuit without deration on any part of the circuit or system, subject to the maximum overall feeder and protection devices as listed in Drawings. For 20A loads, assume 10AWG wire unless otherwise noted. Splices in the wire are not acceptable, the wire shall be continuous from dimmer rack connection to distribution device wire connector strip without any connections or splices in the wire between.
3. Control wiring shall be installed per the related trade and regulatory guidelines including but not limited to UL, NEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
4. In-slab/on-grade and under-slab/in-grade conditions: At the contractor's option, Rigid PVC and/or Rigid Metal Conduit (RMC) may be used, so long as the following conditions are met:

    a. Contractor must use the "wet location" cable as identified in the Production Lighting wiring key.
    b. "Wet Location" cable is larger in diameter, so the contractor must calculate the conduit sizes to maintain compliance with NEC fill ratios. Submit calculations for review.
    c. "Wet Location" cable is more expensive. The project will not accept a cost increase due to lack of communication between electrical contractor and Production Lighting contractor.

B. AV Systems: Isolated Ground and Isolation Transformer

1. All power to AV systems must be on a dedicated K-13 rated transformer, combined with an isolated ground system. AV power will be identified with orange outlets throughout the facility.
2. All orange IG outlets shall be identified with a label indicating load center and circuit. "P-Touch" style labels are acceptable.
3. The isolated ground system shall be a "star" configuration, meaning that all AV power system grounds ultimately reference the building ground at only one point, typically located in the main electrical service room. This location shall be in a separate junction box and shall be clearly labeled as to its function with a screw-on lamicoid label.
4. The main branches for the IG system (from main electrical room to branch AV power panels) will be fed with #3/0 AWG insulated ground cable. From these main points, branch load circuits connect to an IG busbar using standard-size (12 or 14 AWG) conductors. In addition, a #3/0 AWG IG conductor must be brought to the AV equipment racks, for termination to an equipment rack busbar, provided by the AV contractor.

C. AV Systems: Motorized Breaker Panel with Sequencing Card

1. Provide Lyntec Manufacturing Model RPC with the following options:

    a. Sequencing from contact closure and network control connection
    b. Integrated IG buss bar in attached separate cabinet.
    c. Bolt-On Breakers.

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d. Panelboard style
e. Circuit and main breakers as shown in electrical panel schedules
f. Provide control boards for all breakers in the panel.

2. In cases where one panelboard services circuits in two different spaces, configure panel with multiple sequencer control cards, so the panel may act as separate systems.
3. The AV systems contractor will provide the low-voltage control panel that will activate and de-activate the sequencing unit. Coordinate with AV systems contractor for connection and proper configuration of sequencing and timing.
4. The Fire Alarm system contractor will provide a contact closure for instantly shutting down power to all circuits. Connect to emergency terminals on Lyntec sequencing board. Coordinate with Fire Alarm systems contractor for connection and configuration.

D. AV Systems: Low-voltage conduit system

1. All low-voltage AV conduit shall be as indicated in the AV drawings, using a 100% EMT conduit pathway.
2. In-slab/on-grade and under-slab/in-grade conditions: At the contractor's option, Rigid PVC and/or Rigid Metal Conduit (RMC) may be used, so long as the following conditions are met:

   a. Contractor must use the "wet location" cable as identified in the AV cable schedule.
   b. "Wet Location" cable is larger in diameter, so the contractor must re-calculate the conduit sizes to maintain compliance with NEC fill ratios. Submit calculations for review.
   c. "Wet Location" cable is more expensive. The project will not accept a cost increase due to lack of communication between electrical contractor and AV contractor.
   d. Contractor must maintain stated separation and grouping requirements.

3. In-slab/not on-grade conditions, such as metal deck or floors not on grade: Rigid PVC and/or Rigid Metal Conduit (RMC) may be used, so long as the following conditions are met:

   a. Contractor must maintain stated separation and grouping requirements.

4. All AV wiring shall be installed per the related trade and regulatory guidelines including but not limited to UL, NEC, IEEE, and all manufacturer's recommendations and requirements.

   a. Contractor shall be responsible if work under their control voids or jeopardizes manufacturers' warranties.
   b. The following shall be met:
      1) NEC Article 725 and 800

5. The AV conduit system is comprised of five different signal types, A thru F:

   a. Mic
   b. Line

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c. Video/Communication/Data
d. Loudspeaker
e. Empty
f. Fiber

6. Each signal type (A thru F) is a separate system of conduits. A typical system will have five conduits exiting each on-stage multi-box.
7. The following conduit separation tables shall be observed:

SEPARATION OF AV CONDUIT TO AC

	AV CONDUIT
AC- BRANCH LOAD	36”
AC- FEEDER	48”
AC- BRANCH DIMMED LOAD	36”
TEL/DATA	12”
CONTROL (OTHER)	12”

AV CONDUIT TYPE SEPARATION

		A	B	C	D	E/F
A		--	12”	12”	12”	12”
B		12”	--	6”	6”	6”
C		12”	6”	--	6”	6”
D		12”	6”	6”	--	6”
E		12”	6”	6”	6”	--

1.6 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the Owner’s Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.
B. Documentation for the substitution shall be submitted with supporting material and shall including the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner’s Representative shall be the sole evaluator of the fitness of the substitution.
C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.7 SUBMITTALS

A. Reference applicable sections for submittal requirements. Final wire types and electrical installation requirements shall be indicated on final approved shop drawings for each discipline. The final approved shop drawings shall supersede the contract documents.
B. Shop Drawings:

1. Submit full-size (minimum 30” x 42”) scaled shop drawings that show the following:

a. All production systems conduits or devices to be included in-slab, under-slab, or in concrete/CMU walls.
b. Dimensioned locations of in-floor trenchduct, floor boxes, or any other production systems device that will be cast in concrete, including conduit sizes and entry points.
c. Dimmer rack and relay panel mounting
d. Floor pocket mounting

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2. Submit manufacturer cut sheets or product data for the following devices:

    a. Motorized Breaker Panel Board
    b. Company Switches
    c. Overhead Cable Tray
    d. Floor Pockets
    e. NEMA-1 Raceway

3. Contractor is responsible for any repair or remediation necessary due to failure to receive approval for production systems conduit or devices placed in-slab, under-slab, or in CMU walls.
4. Conduit, Backboxes and Electrical Systems Verification Letter:

    a. Within 30 days of contract award, the contractor shall review all relevant information pertaining to the production lighting control systems low-voltage conduit, backboxes, and line-voltage electrical work to be performed by division 26. A formal memo, outlining acceptance (or desired changes) of the contract drawing shall be provided. Failure to provide this memo indicates acceptance of, and liability for, the conduit, backboxes and electrical systems as indicated in the contract drawings.
    b. If the contractor chooses to exercise the option to place conduit in-slab and on-grade or under-slab and in-grade, the contractor shall submit a revised AV conduit riser with new conduit size calculations using cables from the “wet-rated” AV cable schedule.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Components and types per referenced specification sections except where manufacturer’s recommendations and requirements vary.

    1. Refer to final, approved production systems manufacturers or specialty sub contractor’s shop drawings for final control wiring types, counts and routes, which shall govern over drawings. Coordinate with manufacturer or specialty sub-contractor for alternate routes and wire counts in case of field limitations.

2.2 PRODUCTION LIGHTING

A. All power and control wiring shall be labeled at each end and connected per circuit assignments as shown on the PL drawings and approved shop drawings, as applicable.
B. Provide excess tails at ends as recommended by the manufacturer.
C. Control wiring shall be continuous with no splices per the applicable industry standards.
D. Wiring device wiring:

    1. Branch load wiring shall include a dedicated neutral for each circuit, sized as a current carrying conductor. No common neutrals will be accepted.

2. Provide one ground wire for every 6 circuits within each wiring device with a minimum of one ground wire per wiring device, homerun to and terminated at the dimmer rack or relay panel, sized per applicable regulatory requirements.
3. Any and all parallel circuits shall be home run to the dimmer racks unless otherwise noted.
4. Coordinate circuit management for proper landing on device lugs. Coordination shall include, but not be limited to verifying with the manufacturer during the submittal process and prior to manufacturing, provision of the appropriate lug sizes within the devices.
5. Branch circuit load wiring shall be continuous no splices will be acceptable between dimmer lugs and wiring device terminal strip.
6. Coordinate with manufacturer for the provision of properly sized terminals and lugs, as appropriate for compliant wiring. Wire size reductions or spliced leaders used for stepping down wire size to fit manufactures' terminals is not acceptable.
7. All power and control wiring for production systems shall be pulled in metal raceway. This shall include empty raceway provided for future production systems wiring.
8. Production lighting conduit shall be no smaller than 1" diameter, or the greater of what is required by either the applicable code, Drawings or the final, approved equipment shop drawings.

2.3 AV SYSTEMS

A. All low-voltage AV conduits shall have the following:

1. Clear and permanent labels at each end.
2. Pull strings installed. Pull strings shall be the type with distance markings to indicate length of conduit.

B. Overhead cable tray

1. Provide Cooper B-Line Series One, three dividers with four compartments, non-ventilated (solid) bottom, solid removable lids and associated clips, 18" width, 6-8" depth.
2. Provide in locations as shown in the drawings.

C. Floor Pockets

1. Install floor pockets at locations as shown on the drawings. Floor pockets will be provided by the AV and PL contractors.

    a. At locations where pocket is to be located on grade, provide "pour pan" below floor pocket backbox. Pour pan will provide at least 1" of concrete between grade and backbox to prevent corrosion.
    b. Floor pocket backbox shall be placed in flooring material to yield a finished product that is flush with the finish floor, including floor box cover.

2.4 MOTORIZED & SEQUENCED BREAKER PANELS

A. See related panelboard section. Provide motorized and sequenced breaker panels with the following features:

1. All A.C. power for the AV system shall be supplied from a time sequenced source capable of being remote controlled from multiple locations.
2. A means of visual operator feedback shall provide an indication of the progress of the power turn-on or turn-off sequence at each control point.
3. Time between sequence steps shall be adjustable from 1/8 second to 1 second.
4. Sequencing shall have a time delay adjustable between the low-level equipment circuits and the power amplifier circuits. The delay time shall have a field adjustable range from 1 second to 8 minutes.
5. The sequencing system shall be capable of shedding the load within 3 seconds after a power failure and automatically re-sequencing when power resumes and remains above 105 volts for more than 5 seconds without operator intervention.
6. The sequencing system shall have brownout protection; monitoring the line voltage and triggering an automatic shutdown if the line voltage drops below 95 volts for more than 2 seconds.
7. The sequencing system shall have emergency shutdown capability triggered by external contacts.
8. Un-sequenced circuits, as required, shall be supplied from the same A.C. source so that a single lever main circuit breaker is dedicated to the sound system.
9. Three phase sequenced panelboards shall have 200% neutrals.
10. All sequenced panelboards shall have a separate and attached isolated technical ground section.
11. All branch circuit breakers shall be bolt-on.

B. Provide panel size & circuits as indicated on the plans.

C. Provide LynTec Manufacturing model RPC series Sequencing Panelboard. Contact information: 800-724-4047. www.lyntec.com

2.5 COMPANY SWITCHES

A. 200A & 400A, 120/208VAC, 3-phase company switches shall have the following features:

1. Unit shall be UL Listed and labeled, and NEC Article 520 compliant.
2. The unit shall have a wiring chamber that contains both direct wire lugs and single pole industry standard “Camlok E1016” output connectors. Provide six cam-lock connectors. Individual connectors of appropriate sex per regulations and industry standard.
3. Cam and lug cables shall enter and exit the wiring chamber from access holes in the bottom of the enclosure.
4. A lockable hinged access door shall provide access to the wiring chamber, denying access to the connections when mated.
5. Outside of door shall have safety precautions dominantly displayed.
6. The access door shall engage the shunt trip mechanism of the main circuit breaker whenever it is not fully closed, so that connections cannot be made or broken under load.
7. Output lug connections shall accommodate a maximum of 250mcm cable.
8. The unit shall contain (1) 100% rated 3 pole main circuit breaker with a 65K AIC rating.
9. Breaker shall be recessed beneath the plane of the front panel of the unit to prevent accidental operation.

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10. Breaker shall be equipped with an OSHA compliant lockout and tagout padlock attachment to lock the handle in the off position when not in use.
11. The unit shall be equipped with light emitting diode indicator lights for each supply phase, labeled with NEC specified color-codes and alphabetic names of phases.
12. Contractor connections to the main circuit breaker shall accept up to 500mcm wire.
13. Enclosure shall be fabricated from 14 gauge steel and shall have (4) welded mounting tabs.
14. Special Accommodations:

    a. For the production lighting company switch, provide dual neutral connections.
    b. For the AV systems company switch, provide both isolated ground and building ground connections.

15. Acceptable units, subject to the specifications herein:

    a. Lex Products Powergate Company Switch
    b. ESL Power Systems Show Switch
    c. Or equal

B. Provide company switches in locations as shown on drawings. 120/208VAC, 3-phase, 100A company switches shall have the following features:

1. 3-phase, 120/208VAC safety mechanical interlocked pin and sleeve 4-pole 5-wire connector

    a. Mechanical interlock shall prevent the switch from being turned on –when nothing is plugged in and shall prevent something from being unplugged – when something is turned on.

2. Unit shall be UL Listed and labeled with safety interlocked outlet containing an integral 100A circuit breaker.
3. Ul Listed circuit breaker rated 65kAIC @ 208VAC provide short circuit and overcurrent protection.
4. Indicator lights for power on
5. 5100R9W pin and sleeve receptacle with protective cover.
6. Actuator rod allows user to turn on/off and reset tripped breaker.
7. Powder coated wrinkle black galvanneal enclosure, type 1
8. Certified for current interrupting at full rated current and voltage.
9. Rated for 10,000 mechanical cycles and 6,000 electrical cycles.
10. 21” x 11” x 10.5”
11. Acceptable units, subject to the specifications herein:

    a. ESL Power Systems – CSPS-100C-208Y/120-65-311-55-CW1

PART 3 - EXECUTION

3.1 INSTALLATION

A. Production Lighting Control System

1. It is under the work in this Div. 26 Section to receive and store the necessary materials and equipment for installation of the dimmer system. It is the intent of these specifications and plans to include everything required for proper and complete installation and operation of the dimming system, even though every item may not be specifically mentioned. The contractor shall deliver on a timely basis to other trades any equipment that must be installed during construction.
2. It is under the work in this Div. 26 Section to be responsible for field measurements and coordinating physical size of all equipment with the architectural requirements of the spaces into which they are to be installed.
3. It is under the work in this Div. 26 Section to install all lighting control and dimming equipment in accordance with final, approved manufacturer's approved shop drawings.

3.2 CONDUIT/RACEWAY INSTALLATION

A. Conduit/raceway shall not be placed where it obstructs production functions or the proper installation of other production systems.

1. No conduit/raceway is permitted on lighting pipes or rigging grids used for performance. Crossing pipes or grids used for performance shall only be allowed where authorized by the District's Representative. This restriction includes all horizontal catwalk railings. Vertical conduit/raceway shall be placed on vertical structural hangers or where otherwise permitted by the District's Representative.
2. No conduit/raceway is permitted within stage rigging wells.
3. No devices are permitted below 6" above bottom of fly tower rigging/roof beams.
4. No conduit/raceway is permitted on the fly tower gridiron walking surface.
5. No conduit/raceway is permitted on tension grid hangers below 6'-8" above walking surface of tension grid.
6. Clear zones shall be maintained where noted on Drawings and on specialty sub-contractors approved shop drawings. Violations shall be corrected as required by the District's Representative at no additional cost to the District.

B. Any conduit required to be placed in concrete slab or in grade shall be approved by the consultant. See requirements above.

C. Coordinate with related contractors and District's Representative.

3.3 COMMISSIONING

A. Production Lighting Control System

1. All branch load circuits shall be live tested before connecting the loads to the dimmer system load terminals.
2. All branch load circuits shall be live tested after termination for proper wiring, continuity and polarity. Irregularities shall be corrected before arrival of manufacturer's factory-trained personnel and Owner's Representative checkout.
3. Upon completion of the installation, including testing of load circuits, the contractor shall notify the dimming system manufacturer that the system is available for formal checkout.

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4. Notification shall be provided in writing, two weeks prior to the time factory-trained personnel are needed on the job site.
5. No power is to be applied to the dimming system unless specifically authorized by written instructions from the manufacturer.

B. Isolated Ground System

1. Upon final checkout, the contractor shall demonstrate the integrity of the isolation grounding system by removing the IG connection to the main building ground at the central connection point, and metering ground at various IG outlets throughout the space.

C. The Div. 26 Contractor shall be liable for any return visits by the specialty sub-contractor, factory engineer or Owner's Representative as a result of incomplete or incorrect wiring, or erroneous representation that the Systems are complete and ready for the related Contractor or Owner's representative to carry out their work.

END OF SECTION

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SECTION 274116 – PRODUCTION AV SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes: Services as listed herein and related to the furnishing, installation, and commissioning of audio, video and communications equipment.
B. Related Documents: The Conditions of the Contract and Division 01 – General Requirements apply to this section as fully as if repeated herein.
C. Related Sections: Coordinate with the following sections in carrying out this work:
   1. Section 11 61 33 – Stage Rigging Systems
   2. Section 11 61 83 – Production Lighting Control Systems
   3. Section 26 05 35 – Production Systems Electrical Installation
   4. Division 26 – Electrical

1.2 REFERENCES:

A. Comply with all national, state and local regulations and the procedures and requirements of the local authorities. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
B. Equipment shall be provided in accordance with the related trade and regulatory guidelines including but not limited to UL/ETL, NEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
C. Labor shall be provided in accordance with applicable labor regulations and practices.

1.3 DEFINITIONS:

A. Refer to the General Conditions for definitions.
B. Architect: For the scope in this Section, authorized personnel representing Owner and the Theater Consultant.

1.4 SYSTEM DESCRIPTION:

A. Black Box Theatre
   1. Audio- Reinforcement
      a. The reinforcement audio system is comprised of a digital mixer for events requiring a live operator, and an automatic mixing system for events that do not require a live operator. The digital mixer shall also be provided with expansion cards and accessories, as well as a rolling road case with doghouse as indicated in the equipment list and Drawings.
      b. Remote input devices with accessories as indicated shall be provided.

c. The internal programming of the DSP is under the scope of this work and shall be submitted for approval during the shop drawing process. The contractor is responsible to provide standard & customary DSP blocks, including necessary EQ, protection limiting, etc.
d. The system will use a digital audio snake, utilizing Dante protocol.
e. The DSP/matrix shall be capable of providing multiple inputs & outputs. All DSP programming is the responsibility of the AV contractor. DSP programming shall be carried out by a factory-certified programmer.
f. Dedicated network switches and associated patchbays shall be provided to support audio network systems.
g. One media player with theatre-specific functionality shall be provided for events requiring audio playback.
h. A rack-mounted Apple Macintosh computer with Apple keyboard and mouse shall be provided for multi-channel audio recording and playback. The computer shall be configured per audio playback software manufacturer recommendation. The computer shall have the following minimum options (or better at time of purchase):

ADD8

1) Apple M6 chip with 12-core, 12-GPU, and 16-core Neural Engine
2) 32.0 GB unified memory
3) 1.0 TB SSD hard drive
4) 10GB Ethernet
5) Wired Mouse & Keyboard
6) Mac and Windows OS installed (via Parallels)
7) Software & accessories per equipment list

i. Four channels of wireless microphone shall be provided with handheld transmitters, complete with antenna combiner, remote-mount active antennas, and accessories as noted.
j. The reinforcement and playback loudspeaker system is comprised of a left/right system with subwoofers. Connection points for patchable amplifiers are provided.
k. Provide all required mounting hardware and engineering for all AV devices, and coordinate exact mounting conditions with architect, structural engineer & general contractor.
l. Audio, data, and loudspeaker patchbays and patchcords shall be provided. See patchbay section below.
m. Equipment racks and accessories shall be provided as shown on the drawings. See equipment rack section below for additional information.
n. UPS units shall be provided as indicated.
o. A motorized, sequencing breaker panel shall be provided under electrical. It is in the scope of this section to program the sequencing panel and configure both hard button (at booth) and touchscreen controls to properly sequence the circuits up and down.
    1) All equipment shall shut down when the system is powered down, except for the control processor and associated network switch.

2. Video - Presentation
    a. A presentation video switching and routing system with scaling shall be provided to handle signals from all video devices, including on-stage laptop computer inputs, DVD/blu-ray, and other inputs as indicated on the Drawings. All input and output devices shall use CATx cable as the means of transport to the control booth. The switcher shall be fully HDCP compliant and support EDID.

b. Video scalers shall be properly configured to accept any common aspect ratio or resolution and modify the image for proper viewing on the projection screen. This function shall be automatic and require no additional configuration from user.
c. Provide projector, lens, mount and complete installation for video projector.
d. The projection screen shall be provided with the following:
    1) Motorized
    2) External Low Voltage Control Unit (LVC-IV)
    3) 1.6:1 aspect ratio
    4) Front projection surface with black backing per equipment list
    5) Black Case
    6) Additional black drop shall be provided as necessary to allow the bottom of the screen to hang at 4'-0" above floor in regular use.
    7) An extra 12" of black drop beyond that required shall be provided to accommodate unforeseen field conditions.
    8) Sized as indicated in the 274116-A equipment list.
e. Control booth video monitoring shall be via HDCP-compliant HDMI and SDI rack-mount monitor/receiver.
f. A production SDI video router shall be provided for routing SDI signals throughout the facility. Control shall be possible via the front of the router and remote-control panels. Additional control system macros may be required. Refer to Control System Programming and Client preferences.
g. Video patchbays and patchcords for 12G-SDI video shall be provided. See patchbay specification section below.
h. A fixed-mount color SDI camera shall be provided for a fixed stage shot. The stage shot shall feed a QAM modulator via SDI router for back-of-house feed. Both shall be normalled to the stage manager panel locations on the video patchbay.
i. A modulated television (MATV/CATV) system shall be provided, in conjunction with the building-wide system. Two HD modulators and integrated streaming engine shall be provided. Coordinate channel selection with any incoming campus CATV services.
j. The ability to mute the program video via CATV modulator shall be provided from the touchpanel. The modulator shall be switched (via IP control) to the CV input, which has a video black signal present.
k. Dual 7" LCD panels shall be provided in the portable stage manager's rack and control booth racks, for viewing fixed camera SDI video signals.
l. Rackmount 16"-19" video monitors shall be provided at the main racks and control booth racks for both SDI Multiview monitoring as well as for KVM or presentation monitoring. This monitor shall be located for standing operation. Provide a wired keyboard and mouse at operable distance below the monitor.
m. Provide backboxes for flat panel displays as noted in the drawings.

3. Video - Broadcast
    a. A compact broadcast video switcher shall be provided with local and modular I/O. The switcher shall be capable of format conversion and frame synchronization, graphics/text layering, effects, Multiview, stereo audio input and output, as well as AV-over-IP source and endpoint distribution. The switcher shall have a 10GBE live stream output.

b. The switcher shall be mounted in the equipment racks, with local monitoring, as well as having remote monitoring and control capabilities. The video and USB monitoring shall be over IP and patchable at any AV panel location.
c. A compact video switcher control surface shall be provided for remotely controlling video switcher functions.
d. Three PTZ cameras with SDI and AV-over-IP outputs shall be provided. Provide mounts as shown in the drawings.
e. Modular AV-over-IP to SDI converters shall be provided for sending and receiving SDI video through the video router, as indicated.
f. A sync generator shall be included as well as required accessories. Sync should be sent to all Black Box devices that can accept sync and reference signals.
g. A 46" LCD monitor (Multiview) and wired keyboard/mouse shall be provided for use with KVM extensions to the video operator position.
h. A streaming encoder with YouTube/Facebook/etc capabilities shall be provided.
i. An SD-card recording device with media shall be provided.
j. Provide a complete Winsted E-SOC work surface & rack system as indicated in the drawings. The system should generally include the following items:
    1) One Base unit w/ continuous laminate work surface w/ "comfort edge"
    2) Two 6RU turret-style rack cabinets
    3) One pull-out keyboard shelf
    4) Versa-trak system
    5) One 46" multiview LCD monitor mount
    6) Two Loudspeaker shelves
    7) Caster wheel option
    8) Removable access panels to allow access to wall and in-wall panels & power connections located behind furniture system from front side. This is required so the furniture system doesn't need to be moved to access wall connections otherwise obscured.
    9) Covers, doors, rack rails, stringers, data/power cable management, and other accessories as needed for a complete system.
    10) Laminate finishes shall be selected from the manufacturer's standard line. Submit options for review.

4. Assistive Listening
    a. An ADA-compliant FM-based assistive listening system shall be provided.
    b. Receivers and accessories will be provided under separate package.
5. Production Intercom
    a. A two-channel production intercom system shall be provided to allow communications between the control booth and stage platform/backstage areas.
    b. The production intercom main station shall be capable of firing an outboard relay, in conjunction with the program override/duck system.
    c. The production intercom station shall be capable of outputting a line-level signal from a microphone mounted on the front panel.
    d. All intercom connections shall be homerun and terminated at a WAGO-style DIN-rail terminal strip with internal bussing. Wire jumper bussing between blocks is not acceptable.
6. Program/Paging

a. A program listen and back-of-house (BOH) / front-of-house (FOH) paging system shall be provided. The program listen system shall be fed either from a shotgun microphone mounted in the hall, or directly from the mixing console. The selection of source shall happen automatically in the DSP unit, based on a gate. If no signal is available from the console, the input source will change to the shotgun microphone. The selection shall also be available from the control system, using an "auto", "console" or "shotgun" selector.
b. All GPIO connections shall be made as shown on the drawings.
c. A panel with momentary, non-latching, illuminated control buttons shall be provided, allowing for MUTE functions at FOH and BOH, as well as activation of the HOUSE PAGE function.
    1) The mute buttons shall illuminate RED to provide system-wide status of the mute function.
    2) The house page button shall illuminate GREEN to provide status of the house page function. This button shall also have a safety cover to prevent accidental activation.
    3) When the "house page" is pressed at the same time as the "announce" button on the intercom base station, the audio from the intercom base station microphone shall be routed to the paging loudspeakers in the theatre.
d. An announcement recorder / player shall be provided as part of the main DSP unit, with remote triggering from the house manager's station.
    1) Triggering shall be from the house manager's panel touchscreen. When busy, the touchscreen button shall reflect status.
    2) The contractor shall provide a recording of chimes for initial use as the audience recall.
    3) The contractor shall show the user how to manage recordings via the system software.
e. A program override system shall be provided. Each support space is fed via individual 70V amplifier channel and includes a **local volume control with priority override**. When a page is active, the system shall allow any BOH page to be heard, regardless of local volume level. Additional paging controls such performed from the main control touchpanels for the theatre, as required by the Consultant or Client.

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f. A paging loudspeaker shall be provided, at locations indicated on the Drawings. The loudspeaker shall activate when both "announce" (intercom unit) and "house page" (custom panel) are pressed at the same time.
g. A custom portable stage manager's panel shall be provided, with remote intercom station and paging, custom button panel and rack-mounted light.
h. A house manager panel shall be provided at locations shown in the drawings. From the panel, the house manager may activate the audience recall playback device, make a voice page to the lobby, control volume at all FOH zones, play music in the lobby zones from a portable device, and communicate with the stage personnel via production intercom.

7. Control System
    a. A touch screen-based control system shall be provided for control over all applicable AV devices.
    b. Color touchscreens shall be provided at locations shown on the drawings.

c. The control system shall connect via IP to the architectural lighting system for preset recall. Coordinate with theatrical lighting contractor for necessary information.

d. All control system programming is the responsibility of the AV contractor, and shall be submitted during the shop drawing phase for approval.

8. **Broadcast System**

a. **A complete system for live streaming/broadcasting shall be provided in the theatre.**

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b. **Provide a switcher with control surface, remote-controlled PTZ cameras with controllers, and streaming encoder.**

c. **Provide SD card recorder and accessories as noted.**

d. **Provide control furniture with the following accessories:**

1) Finish from manufacturer's standard line
2) Accessories as needed for a complete system
3) 46" video monitor mount
4) (2) 4RU turrets
5) Keyboard Tray
6) Entire system on casters

9. Control System Programming – Main Theatre

a. Touchpanels shall be configured with the most often-used device functions. Do not attempt to put every possible device function on the touchpanel.

b. The touchpanel shall be configured to work in two modes: manual and automatic.

1) When in manual mode, all functions shall be "single function" buttons.
2) A password must be entered to access manual mode.
3) In manual mode, access to advanced controls shall be possible, such as:
   a) Automixer, Wireless Mic, Video Source & Main System Volume
   b) System On/Off
   c) Projector On/Off/Mute
   d) Projection Screen Up/Down/Stop
   e) Subwoofer mix/separate select (for aux-fed subs)
   f) CATV Modulator Audio/Video Mute
   g) Architectural Lighting Preset Recall (coordinate with 116183)
   h) Program audio feed (auto, console, shotgun mic)
   i) Audience Recall Chime
   j) Lobby Flat Panel Display Power, Input & Tuner

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   k) **Paging override enable/disable (by space)**
   l) Other functions as required
4) In Automatic mode, the user shall choose either "presentation with audio and video" or "presentation with audio only". After choosing, the system shall activate the appropriate macros to enable the system to display the chosen source. In either event, the automix jacks and wireless microphones shall be active.
5) Volume controls for "video playback" and "mic level" shall be always accessible.
6) A projector mute function shall be provided, utilizing the projector's mechanical dowser (if available). If no mechanical dowser is available, mute image.

c. Touchpanel programming is the responsibility of the contractor. An outline has been made above but does not include all functions required. The contractor is responsible to design a graphic user interface using the following guidelines:
   1) In automatic mode, use must be able to complete any function within two button presses.
   2) More important functions shall be more prominent on the interface.
   3) Like functions shall appear at the same place on every screen.
   4) Nesting menus are not allowed.

d. The base template for the touchpanel shall be from the stock manufacturer's line, with customization as necessary. The template colors shall be modified to match School colors, and the splash screen shall show the School's logo.

10. Control System Programming – House Manager
    a. Touchpanels shall be configured with the most often-used device functions. Do not attempt to put every possible device function on the touchpanel.
    b. Provide the following controls:
       1) Lobby & Restroom Volume & audio feed select
       2) Paging volume
       3) Chime volume
       4) Audience Recall Chime, programs 1-4
       5) Lobby Flat Panel Display Power, Input & Tuner
       6) Other functions as required
    c. Touchpanel programming is the responsibility of the contractor. An outline has been made above but does not include all functions required. The contractor is responsible to design a graphic user interface using the following guidelines:
       1) User must be able to complete any function within two button presses.
       2) More important functions shall be more prominent on the interface.
       3) Like functions shall appear at the same place on every screen.
       4) Nesting menus are not allowed.
    d. The base template for the touchpanel shall be from the stock manufacturer's line, with customization as necessary. The template colors shall be modified to match School colors, and the splash screen shall show the School's logo.

B. Drama Classroom
   1. Audio
      a. The reinforcement audio system is comprised of a rack mounted DSP with local i/o, playback devices, and wall-mounted powered speakers.
      b. One media player with theatre-specific functionality shall be provided for events requiring audio playback. The media player shall accept SD/USB drives, Bluetooth, as well as have a 3.5mm stereo aux input.
      c. The playback loudspeaker system is comprised of two portable powered speakers, each with yokes, two theatre-style c-clamps and one safety cable, and power/signal cables.
      d. Provide all required mounting hardware and engineering for all AV devices mounted overhead.

C. Recording Studio
   1. Audio
      a. The Contractor shall deliver a fully functional "turn-key" recording studio.

b. The recording studio shall support the digital recording of audio from the adjacent studio live room, or from any of the production spaces via Dante connection.
c. A multi-track capable digital recording system shall be provided, complete with digital controller and computer-based recording software with necessary input/output devices.
    1) The Contractor shall be responsible for ensuring that necessary parameters of the recording software are accessible and controllable via the digital portion of the recording console.
d. A Dante-based system shall be provided, including both mic and line level interfaces, as well as a thunderbolt to Dante interface for CPU connectivity.
e. An recording computer shall be Apple Mac Studio and shall be configured based on the recording software manufacturer's typical hardware requirements. Additional requirements include:

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    1) Apple M5 Max chip with 18-core CPU, 40-core GPU, and 16-core Neural Engine
    2) 64.0 GB unified memory
    3) 2.0 TB SSD hard drive
    4) 10GB Ethernet
    5) Wired Mouse & Keyboard
    6) Software & accessories per equipment list
f. A BT/SD/USB/CD media player and 6-ch rackmount DI shall be provided.
g. A 5.1 mid-field audio monitoring system with subwoofer shall be provided in the control room.
    1) Configure the monitor controller as needed for monitoring switching and controlling.
    2) Configure the Genelec SAM system for bass management and delay.
h. A 2.0 audio monitoring system shall be provided in the live room.
i. A digital musician-monitoring system shall be provided and allow for each musician to have control over their own multi-track mix using local mixing devices and headphones. The system shall receive signal via Dante connection.

2. Video
    a. A pair of 27", 4k resolution digital video monitors on articulating arms shall be used for local video monitoring of computer & console functions.
    b. A pair of 55", 4k resolution monitors shall be positioned above the desk so that all class members may see.
    c. A single 55", 4k resolution monitor shall be provided in the studio for instructional use and shall also include a local HDMI input with soundbar and button controller.
    d. The monitors shall each be fed with a discreet digital video signal from the CPU.
3. Control System
    a. A local button panel shall be provided for control over the live room flat panel display.
    b. All control system programming is the responsibility of the AV Contractor and shall be submitted during the shop drawing phase for approval.
4. Network
    a. Network switches shall be provided to support all IP protocols in use. Configure VLANs as needed. Provide support for Primary and Secondary Dante networks, using separate switches.
    b. A master clock / sync generator shall be provided with PTP option. Connect to all units, and set all units to receive grand master clock information from this unit.

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1) This unit shall also serve as the master clock for the Dante system.

c. Copper patchbays and patchcords shall be provided. See patchbay section below.

5. Utility
   a. A talkback/listenback system shall be provided, using a panel mic in the studio and an integral console mic in the control room.
   b. Bantam/TT audio patchbays and patchcords shall be provided. See patchbay section below.
   c. Several DC-powered recording lights shall be provided, with control from a button on a rack-mounted panel.
   d. A motorized, sequencing breaker panel shall be provided under electrical. It is in the scope of this section to program the sequencing panel and configure both hard button and touchscreen controls to properly sequence the circuits up and down.
   e. Power distribution shall be provided as indicated in the specs.
   f. Several UPS (Uninterruptable Power Supply) units shall be provided for all processor-based equipment. The units shall be fanless, and rackmounted.
6. Custom panels shall be provided as shown in the drawings. Provide panels in colors to match architectural direction, including custom colors where noted.
   a. Reference architectural finish schedule, and provide color submittal as indicated in submittal section below.
7. Equipment Rack
   a. Equipment racks and accessories shall be provided as shown on the drawings. See equipment rack section below for additional information.
   b. UPS units shall be provided as indicated.
8. Furniture
   a. Provide a complete work surface & rack system as indicated in the drawings. The system should generally include the following items:
      1) Base units w/ continuous laminate work surface with standard edge
      2) (2) 27” LCD video display stands & mounts as shown
      3) (3) Speaker Shelves
      4) (5) 4RU Turret-style rack cabinets
      5) (1) Pull-out keyboard shelf
      6) Rear track system
      7) Casters for entire system
      8) Covers, doors, rack rails, stringers, data/power cable management, and other accessories as needed for a complete system.
      9) Laminate finishes shall be selected from the manufacturer’s standard line. Submit options for review.
      10) Provide manufacturer delivery and installation services.

D. Band & Choral Rooms
1. The music classroom system is comprised of a main AV switcher and signal transport unit located at the equipment rack, along with a control panel located near the front of the room.
2. Provide video projector with lens and ceiling mount.
3. Provide motorized projection screen and install complete.
4. A rack-mounted media player shall be provided with Bluetooth, USB/SD, and 3.5mm stereo auxiliary inputs.
5. Install an owner-provided BYOD device and connect complete.

6. The system will provide local inputs for connecting HDMI laptop computers. Laptop computers & portable video players will be provided by owner.
7. Provide a rack-mount DSP/matrix for playback functions, along with local I/O on a rack panel.
8. Loudspeakers are active wall-mount type. Mount as required to clear lighting and other obstructions, while providing even audio coverage in the student seating area.
9. Provide a simple audio recording system, with hanging mics, a mixer, and USB/Flash recorder.
10. Provide a pull-out rack for all equipment. Coordinate with casework to confirm proper fit.
11. Provide and install all necessary equipment and accessories for a complete and working system.
12. See architectural & electrical sheets for proper placement of AV devices.

E. Network Configuration
1. AV systems that operate on IP-based networks shall be properly configured, using manufacturer-recommended settings.
2. AV systems shall be separated into one VLAN per sub-system.

F. **Portable Equipment - Theatre**

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1. **Provide loose equipment as shown in the equipment list.**
   a. **Assemble wireless mic system into rack and configure for use.**
   b. **Load all equipment into the work box and trunk.**
   c. **Discard all packing and configure all equipment in a ready-to-use state.**
2. **On all loose cables, provide a color heatshrink label or engraved shell reading "Sanger HS Theatre", and an affixed Velcro cable tie. Color of heatshrink or connector boot shall determine length. Patchcords need not be labeled. Use the following color scheme:**
   a. **10' or less: White**
   b. **25': Orange**
   c. **50': Green**
   d. **100': Red**

G. **Portable Equipment – Recording Studio**

ADD8

1. **Provide loose equipment as shown in the equipment list.**
   a. **Discard all packing and configure all equipment in a ready-to-use state.**
2. **On all loose cables, provide a color heatshrink label or engraved shell reading "Sanger HS Recording", and an affixed Velcro cable tie. Color of heatshrink or connector boot shall determine length. Patchcords need not be labeled. Use the following color scheme:**
   a. **10' or less: White**
   b. **25': Orange**
   c. **50': Green**
   d. **100': Red**

1.5 CURRENT TECHNOLOGY:

A. Only the most current hardware and software shall be provided. In no case will discontinued or superseded products be acceptable. If the manufacturer has developed and successfully released products that meet or exceed the criteria within this specification, the Contractor shall notify the Architect and submit the new product for review. If accepted, the products shall be provided at no additional cost to the Owner. Software upgrades and authorized support services for its proper integration into the system shall be provided at no cost to the Owner throughout the warranty period.
B. In the event of known product defaults or recall, the Contractor shall immediately notify the Architect and make immediate arrangements for remedy.
C. None of the stipulations herein shall be grounds for revision to the Project schedule.
D. See related procedures under Warranties in this Section.

1.6 SUBSTITUTIONS:

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by Architect in accordance with Section 01 – Substitution Procedures. Requests shall be made in a timely fashion so as to not affect the Project schedule in either case of the substitution being accepted or rejected.
B. Documentation for the substitution shall be submitted with supporting material and shall including the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Architect shall be the sole evaluator of the fitness of the substitution.
C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.7 SUBMITTALS:

A. If permitted under Section 01– Submittal Procedures, all submittals shall be made in electronic format.
   1. Files shall be in .pdf format and submitted via CD or DVD.
   2. Clearly indicate submittal number and description in the file name of the document.
   3. Each document shall be a separate file.
   4. Markups will be made electronically, and the submittal returned via electronic means.

B. Submittals shall be made in a timely fashion so as to not affect the Project schedule and shall allow for adequate time for review and resubmittal. Partial submittals will not be acceptable and will be returned without review.
C. Submittals shall be reviewed, and field dimensions verified prior to commencing acquisition for, and fabrication of the Work in this section. All services and parts of the work in this section shall be verified through the submittal process.
D. Prior to commencing work on shop drawings, the contractor shall facilitate a meeting between the contractor and Architect and his consultant to “walk through” the AV systems.
E. Conduit, Backboxes and Electrical Systems Verification Letter:

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1. Within 30 days of contract award, the AV contractor shall review all relevant information pertaining to the AV systems low-voltage conduit, backboxes, and line voltage electrical work to be performed by Division 26. A formal memo, outlining acceptance (or desired changes) of the contract drawing shall be provided. Failure to provide this memo indicates acceptance of, and liability for, the conduit, backboxes and electrical systems as indicated in the Drawings.

F. Shop Drawings:
   1. Submit full-size (minimum 30" x 42") scaled shop drawings that show the following:
      a. Installation requirements and mounting conditions.
      b. Provide stamped structural drawings by a structural engineer licensed in the state in which the project takes place showing complete mounting details for all devices over 20 pounds.
      c. Full system riser diagram(s) illustrating interconnection of system components, wiring requirements, back box sizes and any special installation considerations.
      d. Block diagrams, showing equipment interconnection.
      e. Internal DSP programming
      f. IP table, showing all connected devices with IP address, subnet, VLAN info, MAC address, and any other related network information.
         1) Coordinate with Owner for proper IP configuration.
      g. Equipment rack and patchpanel drawings.
      h. Full-scale drawings of custom plates
      i. Color schedule for each device, including plates, speakers, and all equipment with room name and number.
      j. Run sheets or field wiring drawings.
      k. Equipment modification drawings, including statement of purpose for modification and agreement to provide full manufacturer warranty, if modifications cause a voided warranty.
      l. Final schematic drawings of any custom circuitry.
      m. Detailed equipment list, including quantity, manufacturer and model.
      n. Detailed product drawings, as applicable to the project.
      o. Copies of contract drawings will not be accepted as shop drawings and will be returned without review.
   2. AV Control System Touchpanels:
      a. Provide an electronic file for approval of working touchpanel files. File shall be in a format that both consultant and Owner can use on any windows-based computer (with required software installation.)
      b. Provide any required viewing software.
      c. Touchpanel design subcontractor is responsible for design of touchpanel layouts but shall be subject to consultant and Architect approval.
      d. A separate file for each touchscreen shall be provided.
   3. Acceptance of any submitted data or shop drawings for material, equipment, apparatus, devices, arrangement and layout shall not relieve contractor from responsibility of furnishing same of proper dimensions and weight, capacities, sizes, quantity, and installation details to perform efficiently the requirements and intents of the systems design. Such acceptance shall not relieve the contractor from responsibility for error, omissions or inadequacies of any sort on submitted data or shop drawings.

G. Product Data:

1. Submit a detailed equipment list, including manufacturer, model number, description and quantity for each item.
2. Do not submit equipment cut sheets, except for custom or non-standard devices.

H. Samples:
1. Submit samples for review if requested. Samples may include, but are not limited to:
   a. Connector, panel and cable assemblies
   b. Panel finish samples
   c. Custom switch, button or similar assemblies

I. **Training Documentation:**
1. **Submit a training syllabus for review prior to conducting training. Syllabus shall include, at minimum:**

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   a. **Training topics and learning objectives.**
   b. **Proposed sequence and duration of training topics.**
   c. **Equipment, systems, and software to be covered.**
   d. **Hands-on exercises and demonstrations.**
   e. **Training materials and reference resources to be provided.**
   f. **Method for verifying participant competency.**
2. **Submit electronic "quick-start guide" including basic functions, such as:**
   a. **System startup / shutdown.**
   b. **Signal routing.**
   c. **Volume control.**
   d. **Special uses.**
   e. **Basic troubleshooting guide.**
   f. **Contact information for service.**
3. **Training documentation shall comply with the requirements of the Training section**.

J. Record Documents: Submit record documents in accordance with Section 01.
1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Submit copies of "as-builts" including:
   a. Shop drawings, product data, operations and instructions manuals for all products provided.
   b. Equipment list, with manufacturer, model number, serial number, IP address and MAC address for all installed devices.
   c. Electronic backup on Compact Disc of control systems and DSP systems programming.
   d. Care and maintenance instructions, service line and online contacts.
   e. Warranty documents.
   f. Key list, showing the following for all keys in the system: device name and model number, system controlled, key model number or other replacement identifier, tech support number for equipment manufacture, and thumbnail picture of device.

K. Submittal procedures and quantities are specified in Section 01– Submittal Procedures.

1.8 WARRANTY:

A. Warranty shall provide coverage of material and product defects and assembly workmanship or installation for a period of two years following the date of acceptance by the Architect.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor.
C. The Contractor shall bear all costs that arise as a result of the warranty claim, including, but not limited to, the use of temporary replacement components, additional Owner staffing or overtime, shipping, cancelled uses or performances.
D. Activate all manufacturers' warranties in the name of the Owner, within one week of the date of acceptance.
E. Provide two return visits following system acceptance to fine tune or repair any items requested by the Owner:
   1. 30-40 days following acceptance
   2. 1 year following acceptance
   3. 2 years following acceptance

1.9 QUALITY ASSURANCE:

A. Equipment in this Section shall be provided by specialty subcontractors and manufacturers meeting the qualifications listed herein.
B. Specialty subcontractor shall have been continuously engaged in the sales and integration of audio, video and communications equipment similar to that specified herein for a minimum of 10 years.
C. Specialty subcontractors shall have at time of bid and continuously maintain throughout the project and warranty period a low voltage Specialty Contractor's license appropriate for the work in this Section, and in the state in which the project takes place.
D. Specialty subcontractors shall employ field service technicians within a four-hour driving distance from the Project site.
E. Specialty subcontractors shall employ personnel with the following minimum certifications:
   1. Avixa/Infocomm CTS-I Certification
   2. QSC – QSYS Level 2 Certification
   3. **QSC – QSYS Control 201 Certification**
   4. L'Acoustics Level 2 Certification
   5. Dante Level 3 Certification
   6. **Netgear Networks – AV Certification Level 1**

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F. All equipment shall be UL or ETL listed and bear the appropriate labels.

1.10 DELIVERY, STORAGE AND HANDLING:

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.
C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

1. Devices shall not be delivered to the project site until the project is suitably clean and all adjacent finish work that may be painted or produce dust has been completed. The contract shall provide and maintain complete protection of all devices until the Project has been made available for occupancy by the Owner. The contractor shall thoroughly clean and remove any dirt or dust that infiltrates system components and be responsible for timely replacement of any damaged components.
2. Device labels and connectors shall be delivered with temporary dust and paint protection installed.

1.11 PROJECT CONDITIONS:

A. Defects in the field which may impact the work in this Section shall be reported to the Architect and corrected in accordance with the requirements of the applicable Section of Work prior to commencement of the Work in this Section.

1.12 MAINTENANCE:

A. Provide maintenance stock of User-serviceable components within the system. Maintenance stock shall be packaged in weather resistant box labeled “spare parts for AV system” and turned over to the owner at time of system commissioning.
B. Maintenance stock shall include:
1. Four fuses of each type in the system.
2. Five connectors of each type in the system.
3. Six spare keys of each type in the system.
4. Components recommended by the manufacturer.
5. Any non-standard tools required for Owner service.
6. Four spare lamps for each type in the system.

PART 2 - PRODUCTS

2.1 PRE-APPROVED SPECIALTY SUBCONTRACTORS

A. The following AV systems contractors are pre-approved to complete the work in this section:

AMT Systems
Attn: Tim Carlson
26810-A Oak Ave.
Santa Clarita, CA 91351
Tel: (661) 251-4206

Diversified
Attn: Adam Lopez
3275 Edward Avenue
Santa Clara, CA 95054
Phone: (408) 969-1972

ICS Integration, Inc.
Attn: Mark Berlo
550 Parrott Street, Unit #40
San Jose, California 95112
Phone: (408) 491-6000

PCD, Inc.
Attn: John Rudolph
1032 Maxwell Drive
Santa Rosa, CA 95401
Phone: (707) 546-3633

Solotech
Attn: Derek Lewis
11060 Randall Street
Sun Valley, CA 91352
Tel: 818-765-3800

Sound Image
Attn: Michael Martin
2425 Auto Park Way
Escondido, CA 92029
Tel: (760) 737-3900

B. Those not listed above shall submit qualifications for review. In order to qualify, the contractor shall submit the following information to the Architect for review:
   1. Meet all qualifications and requirements of Section 1.9 – Quality Assurance.
   2. List of personnel who will be working on this Project, including skills, experience, and accreditations.
   3. List of union affiliations, contractor licenses, and other applicable trade certifications.
   4. List of projects completed within the past 5 years, with references. Provide phone and/or e-mail addresses for reference contacts.
   5. Proof that at least 5 jobs in the past 5 years have a minimum contract value equal to or greater than the project listed herein, and are of similar type.
   6. Proof of bonding and insurance.

C. Permission to bid does not imply acceptance of the specialty subcontractors. It is the sole responsibility of the contractor for this Section to ensure that any price quotations received, and submittals made are for systems that meet or exceed the specifications.

2.2 MANUFACTURERS:

A. AV equipment in this Section shall be provided by specialty manufacturers providing products meeting the specifications herein.
B. Provide all equipment as listed in 274116-A, equipment list.

2.3 SYSTEMS:

A. Audio Systems General Requirements:
   1. Grounding: All grounding in racks is the responsibility of the AV contractor. All devices shall be appropriately grounded to the isolated grounding system busbar.
   2. Un-Balanced Devices: Provide a balancing transformer for any unbalanced device, at both input and output.
   3. Loudspeaker Rigging: All loudspeaker rigging shall be reviewed and stamped by a licensed structural engineer, licensed in the state in which the project takes place. The contractor is responsible to secure the structural stamp, including all expenses associated therein.

B. Video Systems General Requirements:
   1. Reference SMPTE standard for specified SDI video type.

C. Modulated (CATV) Video Systems General Requirements:
   1. Cable Distribution System: The cable distribution system shall consist of coaxial cables, user interfaces, signal taps, splitters, RF amplifiers, signal equalizers, power supplies, and ancillary hardware as required to meet the system requirements specified below.
   2. The signal level of each channel at each TV outlet shall be +5 dBmV, plus or minus 3 dBmV.
   3. The system shall meet the following minimum parameters at each TV outlet:
      a. Signal-To-Noise Ratio: 43 dB
      b. Cross Modulation: -46 dB
      c. Hum Modulation: -55 dB
      d. Return Loss: 14 dB
      e. Isolation (outlet-outlet): 24 dB
      f. Aural Carrier Level: 13 dB to 17 dB below visual
      g. Impedance: 75 ohm

2.4 MATERIALS:

A. All components supplied under this Section shall be new. Used or factory reconditioned components will not be acceptable.

B. Cabling
   1. Provide cabling as indicated in the drawings.

C. **Portable Equipment – Recording Studio**

ADD8

   1. **Provide Middle Atlantic BGR series. See drawings for exact size.**
   2. **Provide with solid rear locking door.**
   3. **Provide with rear rails.**
   4. **3,000 pound weight capacity.**
   5. **All structural elements shall be finished in black powder coat.**
   6. **Rack shall be UL listed.**
   7. **Rack shall be OSHPD listed.**
   8. **Provide the following options:**
      a. **Removable keylocked side panels, model # BSPN-xxx. As required.**
      b. **9 RU soild top panel, model #BGR-STPxx. One per rack.**
      c. **Vertical Lacer strip, heavily perforated, 77" long, model # LACE-xx-OP. Two per rack.**

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d. **Horizontal Lacer Bars, model #LBP series. Ten per rack, or as needed.**
e. **Brush Grommet panel, model #BRxx series. As needed.**
f. **Copper Bus Bar, model #BB-xx. One per rack.**
g. **Utility Drawer, model D4. One per rack group.**
h. **Blank & Vent panels, as needed to fill rack.**
i. **Ganging hardware, model #GANG-10, as needed.**
j. **Full height utility light, white w/ dimmer, model FWD-LT-UTL-xxx-D. One set per rack. Provide maximum length allowed by rack size.**
k. **Custom rack mounts for equipment without rack ears, model #RSH-series.**

9. **Mount racks as necessary to meet Zone 4, Seismic Design Category (SDC) "D" and Seismic Use Group III Upper Floor Essential Equipment rating and have an Ip rating of 1.5, based on manufacturer recommendations.**
   a. **Provide model #BGR-ISO-Z4 seismic brackets, one set per rack.**
10. **Provide the following for thermal management:**
   a. **552 CFM Fan Top with controller, model #BGR-552FT-FC. One per rack.**
   b. **Vent panels at bottom of rack, model VT-series. As required.**
11. **Provide the following for power management:**
   a. **Modular power raceway, model #MPR-8A. One per rack.**
   b. **Dual 20A Isolated Ground outlets, model #M-2x20IGA. Fill MPR raceway.**
   c. **Single-Circuit 15A power strip for UPS power distribution, model # PD-2415SC-NS.**
   d. **DC power distribution, model PD-DC series or equal. Provide best model to match specified equipment. Provide in quantities as needed. No "wall wart" power supplies are allowed.**
   e. **Non-switching front-mounted convenience outlets. Provide one unit per rack group. Model #PD-2015R-NS or equal.**

D. Floor Standing Swing-Out 19" Equipment Rack:
1. Provide Middle Atlantic SR-series. See drawings for exact sizes.
2. 500 lb. weight capacity.
3. All structural elements shall be finished in black powder coat.
4. Rack shall be UL Listed.
5. Provide the following options:
   a. Solid Front Door, model #FD-xx.
   b. Vertical Lacer strip, heavily perforated, 77" long, model # LACE-xx-OP. Two per rack.
   c. Horizontal Lacer Bars, model #LBP series. Ten per rack, or as needed.
   d. Brush Grommet panel, model #BRxx series. As needed.
   e. Rear rail kit, 10-32 threaded, model # DWR-RRxx. One per rack.
   f. Copper Bus Bar, model #BB-xx. One per rack.
   g. Utility Drawer, model D4. One per rack group.
   h. Blank & Vent panels, as needed to fill rack.
   i. Full height utility light, white w/ dimmer, model FWD-LT-UTL-xxx-D. One set per rack. Provide maximum length allowed by rack size.
   j. Custom rack mounts for equipment without rack ears, model #RSH-series.
   k. If two SR racks are specified next to each other, provide zero-clearance latch, model #DWRSR-ZL. One per pair.
6. Provide the following for power management:

a. Modular power raceway, model #MPR-x. One per rack. Provide maximum length allowed by rack size. Provide jumpers, junction box, terminals and accessories as required for a complete system.
b. Dual 20A Isolated Ground outlets, model #M-2x20IGA. Fill MPR raceway.
c. If UPS is specified: provide single-circuit 15A power strip for UPS power distribution, model #PD-2415SC-NS.
d. DC power distribution, model PD-DC series or equal. Provide best model to match specified equipment. Provide in quantities as needed. No "wall wart" power supplies are allowed.
e. Non-switching front-mounted convenience outlets. Provide one unit per rack group. Model #PD-2015R-NS or equal.

7. Provide the following for thermal management:
   a. 4.5" fan, model #QFAN. Two per rack.
   b. 4.5" fan guard, model #GUARD. Two per rack.
   c. Vent Blockers, model VBK-xxx. As required.
   d. Thermostatic Fan Control for MPR raceway, model #FC-4A. One per rack group.
   e. Vent panels at bottom of rack, model VT-series. As required.

E. Wall-Mounted Swing-Out 19" Equipment Rack
1. Provide Middle Atlantic DWR Series.
2. Useable height shall be as required to fit equipment, useable depth shall be 26".
3. 250 lb. weight capacity.
4. All structural elements shall be finished in black powder coat.
5. Rack shall be UL Listed.
6. Follow attachment methods as described in the drawings, which meet structural criteria provided by the project structural engineer.
7. Provide the following options:
   a. Solid Front Door with keylock, model #FD-xx.
   b. Custom rack mounts for equipment without rack ears, model #RSH-series.
   c. Other items as shown in the equipment list.
8. Provide the following for power management:
   a. Provide rack-mounted power distribution & sequencing device as indicated in the equipment list.
9. Provide the following for thermal management:
   a. Dual 6" fan kit with accessories, model #DWR-FK6-26. One per rack.
   b. Thermostatic Fan Control, model #FC-4-1CA. One per rack.
   c. Vent panels at bottom of rack, model VT-series. One per rack.

F. Casework-Mounted Pull-out 19" Equipment Rack
1. Provide Middle Atlantic SRSRX-XX series.
2. Useable height shall be determined by casework allowances, useable depth shall be 23".
3. 200 lb. weight capacity.
4. All structural elements shall be finished in black powder coat.
5. Rack shall be UL Listed.
6. Provide the following options:
   a. Custom rack mounts for equipment without rack ears, model #RSH-series.
7. Provide the following for power management:
   a. Provide a rack-mounted, sequenced power distribution panel per specification.

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8. Provide the following for thermal management:
    a. Coordinate with casework provider to ensure proper ventilation.
    b. Provide Middle Atlantic UQFP series fan panels.

G. Connectors:
1. Microphone and Line Level Audio
    a. XLR-M, 3-pin:
        1) For panel-mount, Provide Neutrik NC3MD-L-1, 3-pole male XLR connector in black.
        2) For cable-end, provide Neutrik NC3MXX, 3-pole male connector.
    b. XLR-F, 3-pin, Standard
        1) For panel-mount, Provide Neutrik NC3FD-L-1, 3-pole female XLR connector in black.
        2) For cable-end, provide Neutrik NC3FXX, 3-pole female connector.
    c. XLR-F, 3-pin, Automixing (BLUE)
        1) Provide BLUE trim ring, Neutrik SCDP-FX-6.
    d. 1/4” Tip/Ring/Sleeve
        1) For panel-mount, Provide Neutrik NJ3FP6C, locking tip/ring/sleeve connector.
        2) For cable-end, provide Neutrik NP3X, tip/ring/sleeve connector.
    e. Phono
        1) For panel-mount, Provide Neutrik NF-2D series, with appropriate color isolation washer.
        2) For cable-end, provide Neutrik NF2C-B-2 “Profi” connector.
2. Production Intercom:
    a. XLR-M, 3-pin, Intercom (RED)
        1) Provide RED trim ring, Neutrik SCDP-FX-2.
3. Integrated Control Systems:
    a. For panel-mount in configurations using legacy data and power bus (AxLink or Cresnet), provide Neutrik NC4FD-L-1, 4-pole female XLR connector.
    b. For panel-mount in configurations using networked control bus, refer to RJ-45 data information below.
    c. Cable-end configurations are project dependent. See drawings.
4. Loudspeaker:
    a. For panel-mount in 2 or 4-conductor applications, use Neutrik Speakon NL4MP 4-pole connector.
    b. For panel-mount in 8-conductor applications, use Neutrik Speakon NL8MPR 8-pole connector.
    c. For cable-end in 2 or 4-conductor applications, use Neutrik Speakon NL4FC 4-pole connector.
    d. For cable-end in 8-conductor applications, use Neutrik Speakon NL8FC 8-pole connector.
5. Video:
    a. Production Video/12G:
        1) For panel-mount, Provide Neutrik NBB75DFIX, recessed bulkhead jack, feed through, isolated connector.
        2) For cable-end, provide Neutrik NBNC75B-series, push-pull style connector. Use appropriate connector for cable specified.
    b. “F” Connector:

1) For panel-mount, provide Holland G-F81F* inline barrel connector with 3.0 GHz minimum performance.
2) For cable-end, provide Holland Superlok G-series compression connector with 3.0 GHz minimum performance.

6. RF Antenna – 50-ohm
   a. For panel-mount, Provide Canare BJ-JRUD, recessed bulkhead jack, feed through, isolated connector.
   b. For cable-end, provide Canare BP-C series. Use appropriate connector for cable specified.
7. Data:
   a. RJ-45
      1) For panel-mount, provide Neutrik Ethercon NE8 series punch-down connector in black to match cable type.
      2) For cable end, provide Neutrik Ethercon NE8-series connectors in black to match cable type.
   b. Fiber
      1) For panel-mount, provide Neutrik Opticalcon NO2-4FD feed-thru panel mount connectors.
      2) For cable end, provide Neutrik Opticalcon cables in quantities shown in 274116-A equipment list.

H. Patchbays:
1. Microphone and Line Level Audio:
   a. Provide Bittree 489 programmable series with 3-pin molex style termination with the following options:
      1) Longframe ¼”-style connectors
      2) 2x26 jacks with 12” deep chassis
      3) 2 designation strips in over/under configuration
      4) Mono spacing, 2 RU
      5) Isolated Grounding
      6) Normals per Drawings
      7) Black in color
      8) Paper designation strips. Provide .doc file to Owner for future use.
      9) Provide Middle Atlantic “CLAW” patchcord holder, one per rack.
   b. Patchbay layout shall be in standard “output at top, inputs at bottom” scheme with clear method for showing normals. Contractor shall be responsible for exact patchbay layout.
   c. Labeling shall be as follows:
      1) All labeling shall exactly match circuit in field.
      2) Labeling shall be sequential per circuit type, beginning at 1.
   d. Patchbays by AVP, Inc are also acceptable.
2. Microphone and Line Level Audio (Bantam/TT):
   a. Provide Bittree 969 programmable series with 3-pin molex style termination with the following options:
      1) Bantam (TT) style connectors
      2) 2x48 jacks with 12” deep chassis
      3) 2 designation strips in over/under configuration
      4) Mono spacing, 2 RU
      5) Isolated Grounding

6) Normals per Drawings
7) Black in color
8) 6” deep rear lacing bar
9) Digital AES internal wire
10) Paper designation strips. Provide .doc file to Owner for future use.
11) Provide Middle Atlantic “CLAW” patchcord holder, one per rack.

b. Patchbay layout shall be in standard “output at top, inputs at bottom” scheme with clear method for showing normals. Contractor shall be responsible for exact patchbay layout.

c. Labeling shall be as follows:
1) All labeling shall exactly match circuit in field.
2) Labeling shall be sequential per circuit type, beginning at 1.

d. Patchbays by AVP, Inc are also acceptable.

3. Bulkhead Type XLR/BNC
a. Provide AVP, Inc. WKM-US216E3-Z-B81 series with solder termination and the following options:
1) 2x16 jacks with 6” cable bar
2) 2 designation strips in over/under configuration
3) 3 RU
4) Black in color
5) Paper designation strips. Provide .doc file to Owner for future use.

4. Loudspeaker:
a. Provide AVP, Inc. WK-U212E3-NL4MP series with solder termination and the following options:
1) 2x12 jacks with 12” deep chassis
2) 2 designation strips in over/under configuration
3) 2 RU
4) Black in color
5) Paper designation strips. Provide .doc file to Owner for future use.

b. Provide 2 output jacks from each amplifier channel. Configure as follows:
1) Amplifier “A”, Channel One Jacks:
2) Pins 1+/1- : Amp Channel One
3) Pins 2+/2-: Amp Channel Two
4) Amplifier “A”, Channel Two Jacks:
5) Pins 1+/1- : Amp Channel Two
6) Pins 2+/2-: No Connection
7) See Drawings for additional information.
8) Provide Middle Atlantic “CLAW” patchcord holder, one per rack.

5. 12G-SDI Production Video:
a. Provide Bittree Video MINI-WECO 12G+ series patchbay.
b. Provide the following configuration:
1) WECO-style connectors
2) 2x32 jacks with 12” deep chassis
3) 2 designation strips in over/under configuration
4) 2 RU
5) Normals per Drawings. Provide looping plugs in quantities needed.
6) Black in color
7) Paper designation strips. Provide .doc file to Owner for future use.
8) Provide Middle Atlantic “CLAW” patchcord holder, one per rack.

c. Patchbays by AVP, Inc. in are also acceptable.

6. Data - Copper:
   a. Provide Belden REVConnect Series Flush-Mount Modular Keystone Panel.
   b. Provide with the following configuration:
      1) CAT 6A Shielded
      2) RJ45 jack with shielding to match 10GX cable type
      3) 1x24 jacks with 6” deep removeable rear lacing bar
      4) 1 designation strip in over configuration
      5) 1 RU
      6) Black in color
      7) Paper designation strips. Provide .doc file to Owner for future use.
      8) Provide Middle Atlantic “CLAW” patchcord holder, one per rack.
7. Data - Fiber
   a. Provide Corning CCH Series fiber optic patching systems.
   b. Provide housing, LC patchpanels, and required accessories for a complete installation.

2.5 PANELS:

A. General: The control receptacle panels shall consist of the appropriate connectors required for the system.

B. Physical:
1. Faceplates shall be 0.080” aluminum, edges eased, finished in fine texture, scratchresistant powder coat, with fasteners countersunk.
   a. Panels specified as flush mounted shall overlap back box by 1/2”. Surface mounted panels shall match back box size with no gaps or overlap.
   b. Coordinate back box type, size and mounting with Division 26 - Electrical.
2. Color shall match the finished wall color of the wall onto which it will be mounted, unless otherwise noted. Submit color table for review.
3. Panels noted as custom color shall be factory powder coated a color selected by the Architect. Legends shall be laser etched.
4. Laser etched labels 1/4” high characters minimum, unless otherwise noted.
   a. Labeling shall be as indicated on the Drawings.
   b. Use Arial font.
5. Wall mounted panels shall mount into an industry standard back box, depending on size and quantity of connectors.
6. Rack mounted panels shall mount within industry standard equipment racks.
7. Panels mounted in floor boxes shall include a translucent flexible vinyl dirt guard as indicated on Drawings.
8. Provide complete hardware for mounting on gridiron hangers where indicated on the Drawings.
9. Provide aluminum cable tie-off bars in matching color on all panels 8” wide and larger, as indicated on the Drawings.
   a. Keystone Electronics Corporation “Aluminum Oval Instrumentation Handles”, part number 546, 5” wide x 2” deep handle. www.keyelco.com; 800-221- 5510.
   b. Color: To match panel
10. At keyswitch locations for “SAK” devices:
   a. Provide same key for all locations.

b. Key must be removeable in both “on” and “off” positions.
c. See drawings for make & model number.
d. Provide (6) additional keys for future use, above the keys supplied with the locks.
e.

C. Floor Pockets:
1. Provide flush, floor mounted pockets with cover and cable slot. Lid finish and lid type to be determined during submittal period from manufacturer’s standard line.
2. Provide interior, flexible translucent PVC dirt guard to cover receptacles. Labels shall remain visible.
3. Provide floor pocket backboxes and pour pans (if conditions warrant) to Division 26 - Electrical for installation.

PART 3 - EXECUTION

3.1 INSTALLATION- GENERAL:

A. Coordinate with Division 26 - Electrical for the proper installation of the conduit, backboxes, and electrical service as specified herein.
B. Coordinate scheduling and access with the Contractor and provide personnel lifts or ladders as required for access to the AV equipment.
C. Remove all packing materials from the Project Site. Insert operations and maintenance information into the Project record documents as specified above in Submittals.
D. Provide a label on the back of each piece of network-connected equipment indicating it’s IP address.
E. Record Block Diagram: Post a laminated 11x17 as-built block diagram of the entire system (split into multiple sheets as necessary), and physically attached to the equipment rack in a logical location for Owner reference.

3.2 CABLE INSTALLATION:

A. Mark cables, regardless of length, with permanent, non-handwritten number or letter cable markers within 6-inches of both ends. There shall be no unmarked cables in the system. Marking codes used on cables shall correspond to codes used on Drawings and schedules.
B. As indicated on the Drawings, group cables according to signal type. Up to 6 separate conduit systems may be in place, divided as follows:
1. A: Microphone Level Audio
2. B: Line Level Audio
3. C: Video and Communication Level
4. D: Loudspeaker Level
5. E: Empty/Future expansion
6. F: Fiber Optic Level

C. As much as possible, maintain separation of signal types when outside of conduit.
D. No cable shall be installed with a bend radius less than recommended by the manufacturer.
E. Cables types shall be as indicated on the Drawings. In plenum spaces, provide the plenum version of the specified cable type.

F. No cable splicing is allowed, except for systems that are daisy-chained.

3.3 PROTECTION OF PROPERTY:

A. Contractor is responsible to provide protection for all equipment, tools and materials delivered to the Project Site prior to final acceptance by Owner. Any loss or damage is the responsibility of the contractor, until final acceptance by Owner.

3.4 SEQUENCING:

A. The contractor shall not install any electronic equipment until the room where the equipment shall be located has been finally painted or otherwise finished, and cleaned by the Contractor or Owner's Representative. Any damage to equipment resulting from failure to follow this requirement will result in the contractor replacing the damaged equipment at their cost.

3.5 COMMISSIONING AND DEMONSTRATION:

A. Coordinate with Division 26 - Electrical.
B. Appropriately trained personnel shall review, test, program and otherwise complete the system, following completion of installation.
C. Upon completion of the installation, the Contractor shall notify the Architect that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Architect's schedule.
D. Audio System Tuning:
   1. Following complete system installation, each device shall be set for correct gain-staging.
      a. This is best accomplished with an oscilloscope and a 400Hz tone generator, but other methods may be used.
      b. If the system has been set correctly, the console's VU meters will be at zero when the system is accomplishing the specified dB-SPL level. Every device in the audio signal path should clip at the same level, maximizing headroom and keeping the noise floor to a minimum.
   2. System shall be tuned prior to final checkout by contractor, using a computer-based audio analysis program, such as SMAART, TEF, or SIMM. A factory-certified individual shall carry out the tuning.

E. Cable Television System Tuning:
   1. Following complete installation, each device in the CATV system shall be tuned to exact an output of +5 dBmV, +/- 3 dBmV at the television output.
   2. Audio input at the modulator shall be set in accordance with the gain staging requirements covered in the audio sections.
   3. Video input at the modulator shall be set per manufacturer's guidelines.

F. Provide to the Architect and or his Consultant the following upon arrival:
   1. Measurements of impedance of each loudspeaker prior to connecting it to an amplifier.
   2. Measurements confirming the polarity of each loudspeaker, from output of console through entire system.

3. Measurements showing all Ethernet wiring complies with Category 6A requirements for full bandwidth operation.
4. Verification that every line has been sweep tested and conforms to standard requirements per signal level.
5. Measurements showing CATV output voltage at each TV outlet.
6. Demonstration of input and output of signal throughout the entire system.

G. Make available for review by the Architect and or his Consultant:
1. All components for physical inspection and inventory.
2. A computer to access any DSP units.
3. All installed devices in full operation, with no temporary equipment in place.
4. All portable devices, fully complete, and available to test at all plug-in locations.
5. Test equipment, including:
   a. High quality media for every presentation source
   b. Portable TV with CATV receiver input
   c. Sound level meter
   d. Portable amplified loudspeaker
   e. Waveform monitor (oscilloscope)
   f. Audio analysis equipment (provides real time display, pink noise source, test oscillator, level and THD+N measurements)
   g. Cablesets, adapters, and connectors for inserting the test equipment into and out of the system's user interfaces and connector plates.

H. The Contractor shall be liable for any return visits by the Architect and/or his consultant as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the Architect to carry out its work.

I. The Contractor shall arrange for access as necessary for inspection of equipment by the Architect and or his consultant

J. Upon completion of the commissioning, Contractor shall demonstrate operation and maintenance of the system to the Owner. Coordinate with the Owner's schedules two weeks in advance minimum.

3.6 TRAINING:

A. Do not provide training until final checkout is complete, and all punch items have been resolved. Contractor will be responsible to conduct training again if provided prior to completion of checkout and punch items.

B. **Provide training as follows:**

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1. **16 Hours during commissioning period for maintenance staff.**
2. **16 Hours with user group one week prior to initial handover to users.**
3. **8 Hours with user group and maintenance staff one month after initial training.**
4. **8 Hours with user group and maintenance staff one year after initial training, but prior to warranty expiration.**
   a. **Training hours may be divided into multiple training sessions conducted over multiple days. The total training hours specified for each training period shall be provided regardless of the number or duration of individual training sessions.**

C. **Training shall include, but not be limited to, the following topics as applicable to the systems provided.**

1. **System Overview and Signal Flow: System organization and tracing of audio, video, control, and network signal paths.**
2. **Connections, Cabling and Patching: Identification and use of cables, connectors, signal types, inputs, outputs, and patching systems.**
3. **System Startup, Shutdown and Control: Proper startup and shutdown procedures and operation of touchscreens and other system control interfaces.**
4. **Audio Mixing Fundamentals: Channel setup, gain structure, equalization, dynamics, effects, mixes, groups, phantom power, and preset or scene operation.**
5. **Audio Routing and Distribution: Routing audio to loudspeakers, monitors, subwoofers, surround systems, recording systems, paging systems, and other destinations.**
6. **Microphones and Wireless Audio: Setup and operation of wired and wireless microphones, RF frequencies, antennas, wireless systems, and automatic microphone mixing.**
7. **Loudspeakers and System Gain: Loudspeaker types and zones, appropriate operating levels, gain structure, and prevention and correction of audio feedback.**
8. **Video Sources, Routing and Displays: Connection and routing of video sources and operation of projectors, displays, screens, and associated video systems.**
9. **AV Networking: Basic AV network concepts, networked audio and video, virtual soundcards, signal routing, and basic network troubleshooting.**
10. **Playback, Recording and Computer Audio: Operation of playback and recording systems and routing of audio and video between computers and AV systems.**
11. **Intercom, Paging and Communications: Operation of intercom stations, wired and wireless belt packs, paging systems, and communications between designated locations.**
12. **Assistive Listening and Accessibility: Purpose, setup, routing, operation, and verification of assistive listening systems and associated accessibility features.**
13. **System Documentation: Use of record drawings, signal-flow diagrams, rack elevations, connection drawings, and operation and maintenance documentation.**
14. **Troubleshooting and Problem Isolation: Identification and diagnosis of common audio, video, control, power, connection, routing, and configuration problems.**
15. **AV Safety and Equipment Protection: Hearing and sound-level safety, projector and laser safety, phantom power precautions, and practices for safe operation and protection of equipment.**
16. **Independent System Setup: Hands-on application of patching, routing, mixing, control, documentation, and troubleshooting skills to accomplish typical system operating tasks.**

D. **TRAINING DOCUMENTATION**

1. **Document each training session, including the date, duration, training topics provided, name of trainer, and names and signatures of trainees in attendance.**
2. **At completion of each training session, each trainee shall sign documentation acknowledging the training topics received.**
3. **Trainees may elect to omit or discontinue training on individual topics. Any topic not received at the trainee's election shall be identified on the training documentation and acknowledged by the trainee's signature.**
4. **Submit completed training documentation to the following each training session**.

3.7 PROJECT CLOSEOUT:

A. See submittal section above for required closeout documents.

3.8 APPENDIX:

A. 27 41 16-A Equipment List

Sanger HS
AV Systems Equipment List
Section 274116

Notes:
1. **Conduit, backboxes and electrical power required for A/V systems are provided under division 26 work.**
2. **This list contains key components, but does not list every piece needed for a complete system. Contractor is responsible to provide a complete and working sytem, regardless of the completeness of this list.**
3. **A/R= As Required**
4. **OFCI= Owner Furnished, Contractor Installed**
5. **OFOI= Owner Furnished, Owner Installed**

REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
		BLACKBOX THEATRE				
		Audio System				
		Mixer/MultiChannel				
ADD 8	1MA	Digital Mixer	Allen & Heath	**SQ5 Plus**	1	
	2MA	Dante I/O Card	Allen & Heath	SQ Dante 64	1	
	3MA	Dust Cover	Allen & Heath	SQ-5 Dust Cover	1	
	4MA	Tablet Bracket	Allen & Heath	SQ Bracket	1	
	5MA	Mixer case w/ doghouse & wheels	Anvil Style ATA	A/R	1	
	6MA	Effects Add-Ons	Allen & Heath	Compressor Pack 1	1	
	7MA	Effects Add-Ons	Allen & Heath	Dynamic Trio Pack	1	
	8MA	Effects Add-Ons	Allen & Heath	GEQ Pack	1	
	9MA	*Remote I/O - Amp Room*				
	10MA	Digital Audio Mixer, Remote Input, 16x8	Allen & Heath	DT168	1	
	11MA	Digital Audio Mixer, Remote Input, 16x8 Rack Kit	Allen & Heath	AB168-RK10	1	
	12MA	*Remote I/O- Portable*				
	13MA	Digital Audio Mixer, Remote Input, 16x8	Allen & Heath	DT168	2	
	14MA	Ruggedized CAT6A STP cable w/ Ethercon, 25'-0"	Whirlwind	ENC6ASE-25	2	ethercon both ends
	15MA	Ruggedized CAT6A STP cable w/ Ethercon, 50'-0"	Whirlwind	ENC6ASE-50	2	ethercon both ends
	16MA	*Automixer/DSP*				
ADD 8	17MA	Audio DSP matrix / automixer	QSC	**Core 24F**	1	
	18MA	Audio expansion	QSC	QIO-ML2X2	1	
	19MA	Audio expansion	QSC	QIO-ML4i	1	
	20MA	Ctrl expansion - GPIO	QSC	QIO-GP8x8	1	
	21MA	QIO rackmount & PSU for (4) modules	QSC	QIO-RMK / QIO-PSU	1	
	22MA	32x32 Dante License	QSC	SLDAN-32-P	1	
	23MA	UCI Deployment License	QSC	SL-QUD-110-P	1	
	24MA	Scripting Engine License	QSC	SL-QSE-110-P	1	

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	25MA	*Outboard Equipment Rack*				
	26MA	Rackmount Light/Power Unit	Furman	PL-8C	1	
	27MA	UPS, 500VA, Fanless	Middle Atlantic	UPS-S500R	1	
ADD 8	28MA	CD/Media Playback	**Tascam**	**CD-400U**	1	
	29MA	Computer-Based Effects Playback Computer	Apple	Mac Mini	1	see specs for further info, provide key/mouse
	30MA	Wireless keyboard & mouse	Apple	A/R	1	
	31MA	Mac Mini Rackmount	Sonnettech	RackMac mini	1	
	32MA	Thunderbolt to SDI I/O converter	Blackmagic Design	Ultrastudio 4K Mini	1	
	33MA	Computer-Based Audio/Video Playback Software	Figure 53	Q-Lab Pro Bundle	1	
	34MA	Computer-Based Recording Software	Avid	ProTools	0	OFE
	35MA	Dante Virtual Soundcard Software	Audinate	Virtual Soundcard	1	
	36MA	Rack Mounted Keyboard shelf	Middle Atlantic	KB-SS	1	
	37MA	27" LCD Monitor, 4k	Samsung	Syncmaster Series	1	
	38MA	Monitor Mount, desktop style	Ergotron	A/R	1	bolt to top of rolling rack
	39MA	Custom Snake, 25'-0"	Whirlwind	A/R	1	
	40MA	Rack Mounted Drawer	Middle Atlantic	A/R	1	fill empty spaces
	41MA	Rolling Rack Case, 20RU	Anvil Style ATA	A/R	1	no SKB
	42MA	*Wireless Mic System*				
	43MA	Wireless Mic RX, Quad Channel, Dante	Shure	ULXD4Q	1	
	44MA	Wireless Mic Handheld TX	Shure	ULXD2/B58	2	
	45AV	Wireless Mic Bodypack TX	Shure	ULXD1	2	
	46AV	Wireless Mic Bodypack - Lavaliere Mic	Countryman	B3	4	
	47AV	Rechargeable Battery	Shure	SB900B	8	
	48AV	2-port Battery Charger, Drop-In w/ PSU	Shure	SBC-200	2	
	49AV	Antennas, Powered	Shure	UA 874	2	
	50AV	Antenna Rack Panel	Contractor	Custom	1	
	51AV	*Loudspeaker System*				
	52AV	Main Loudspeaker	L-Acoustics	X12	2	
	53AV	Main Loudspeaker Bracket	L-Acoustics	X-UL12	2	
	54AV	Subwoofer Loudspeaker	L-Acoustics	SB15M	2	
	55AV	Audio Amplifier, 4-ch, AVB	L-Acoustics	LA4X	1	
	56AV	Loudspeaker Mounting/Rigging	Custom	Contractor	A/R	Per drawings
	57AV	Audio Amplifier, 4-ch, 500W @ 8 ohm, Patchable	QSC	CX-Q 2K4	1	
	58AV	*Utility*				
	59AV	Audio Patchbay	Bittree	489 Series	A/R	see specs for further info
	60AV	Audio Patch Cable, Red, 3'	Bittree	LPC3602-110	20	
	61AV	Audio Combining Networks	Radio Design Labs	STD-600	2	
	62AV	Audio Isolation Transformers	Radio Design Labs	TX-AT1	2	
	63AV	Data Patchbay / RJ-45 / CAT6A STP	Belden	REV Connect Series	A/R	see specs for further info
	64AV	RJ-45 to RJ-45 CAT6A STP Patch Cable, 3'	Comprehensive	CAT6A-3BLU	20	
	65AV	Loudspeaker Patchbay	AVP	WK-U212E3-NL4MP	A/R	see specs for further info
	66AV	Loudspeaker Patch Cable, 4-cond, Black, 3'	Whirlwind	NL4-003	10	
	67AV	Loudspeaker Y Cable, 4-cond.	Whirlwind/Custom	Custom	2	
	68AV	XLR Bulkhead Patchbay	AVP	Maxxum Series	A/R	see specs for further info
	69AV	*Equipment Racks*				

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
ADD 8	70AV	Equipment Racks & Accessories, Amp	Middle Atlantic	**BGR Series**	**2**	see specs for further info
	71AV	Equipment Racks & Accessories, Booth	Middle Atlantic	SR Series	1	see specs for further info
	72AV	Power Controller	Lyntec	SS2-LRP	1	connect to Lyntec panel (by elec)
ADD 8	73AV	Power raceway & accessories	Middle Atlantic	**MPR-8A + accessories**	1	1/rack
	74AV	Power modules	Middle Atlantic	M-2X20IGA	8	8/rack
	75AV	UPS, 1000VA, Fanless	Middle Atlantic	UPS-S1000R	2	Amp, Booth
ADD 8	76AV	**UPS Power Distribution**	**Middle Atlantic**	**PD-2415SC-NS**	**2**	**1/rack**
ADD 8	77AV	Ethernet Switch, 10/100/1000, 10G up, Power Over Ethernet	**Netgear**	**M4250 Series**	**A/R**	see specs for further info
	78AV					
	79AV					
	80AV	Miscellaneous Hardware				
	81AV	Wire & Cable				
	82AV	Labor				
		Video Systems				
		Switching/Transport				
	1AV	Presentation Switcher	Extron	IN1808	1	
ADD 8	2AV	HDMI Transmitter, Decora	Extron	**DTP T HWP 4K 331 D**	1	
	3AV	HDMI Output	Extron	DTP HDMI 4K 330 Rx	1	Projector
	4AV	Local Input Panel (HDMI, 1/8")	Contractor	Custom	1	
	5AV	*Projection*				
ADD 8	6AV	Video Projector, 15k lumen, 1920x1200, DLP, Laser	**Sharp**	**XP-A155U-B**	1	
ADD 8	7AV	Video Projector Lens	**Sharp**	**A/R**	1	
	8AV	Video Projector Ceiling Mount	Chief Mfg	A/R	1	
	9AV	Motorized Projection Screen, 16:10 ratio, non-tensioned	Draper	Paragon E	1	see drawings for size + black drop
	10AV	Projection Screen, Low Voltage Control	Draper	LVC	1	
	11AV	*Monitoring / Playback*				
	12AV	19" Color Monitor & Receiver, HDCP, Tuner	Totevision	LED-1906HDMTR	1	Amp room
	13AV	15.6" rackmount SDI/HDMI monitor	Lilliput	BM-150-4KS	1	Booth
	14AV	*Utility*				
ADD 8	15AV	HD Color Camera, Fixed	Marshall	**CV348**	1	
	16AV	HD Color Camera Lens	A/R	A/R	1	provide full stage shot
	17AV	Camera Mount	Contractor	A/R	1	
	18AV	Video router	Black Magic Design	Smart Videohub 20x20	1	
	19AV	Router control panel	Black Magic Design	Master Control Pro	1	
	20AV	Video Patchbay	Bittree	12G+ Mini-WECO	A/R	
	21AV	Video Patch Cable, Blue, 3'	Bittree	VPCMK3606-75	10	
	22AV	Video Looping Plug	Bittree	LPMK7505	10	
	23AV	*Portable SM Station*				
	24AV	Dual 7" LCD Monitor, Rackmount, SDI	Black Magic Design	Smart View DUO	1	SM Station
	25AV	Portable Case for 7" Color monitor	SKB	A/R	1	

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	26AV	*Cable TV*				
	27AV	CATV Modulator, Clear QAM & IP, 2-ch	Contemporary Research	QMOD-SDI2	1	provide rack mount
	28AV	CATV Amplifier & Combiner	Contemporary Research	QDA4-45	1	
	29AV	CATV Accessories	Blonder Tongue	As Required	A/R	taps, splitters, etc.
	30AV	Composite Blackburst Generator	Black Magic Design	MC Generator	1	
	31AV	*Flat Panels - BOH*				
	32AV	32" LCD TV, QAM Tuner	Samsung/LG	A/R	6	
	33AV	Flat Panel Mount - 32" Flat Panel	Chief	TS218TU	6	
	34AV	*Flat Panels - FOH*				
	35AV	65" LCD Monitor, 4K, LAN control, QAM Tuner	Samsung/LG	A/R	1	Lobby
	36AV	Wall Mount for Monitor w/ Swing- Recessed	Chief Mfg	PNRIW Series + PSB	1	
	37AV	In-Wall Junction Box	Chief Mfg	PAC-501	1	
	38AV	55" LCD Monitor, 4K, LAN control, Vertical	Samsung/LG	A/R	3	Lobby
	39AV	Wall Mount for Monitor - Pull Out	RP Visuals	RPWM-16B-XM-TNV-NB	3	
	40AV	In-Wall Junction Box	RP Visuals	RPWM-16B-BOX	3	
	41AV	Digital Signage Player	OFCI	OFCI	0	<QTY: 4 - OFCI>
	42AV					
	43AV					
	44AV	Miscellaneous Hardware				
	45AV	Wire & Cable				
	46AV	Labor				
		Assistive Listening				
	1AL	FM Transmitter	Listen Technologies	LT-800	1	
	2AL	FM Transmitter Rackmount	Listen Technologies	LA-326	1	
	3AL	FM Transmitter Antenna	Listen Technologies	LA-125	1	
	4AL	FM Receiver w/ Rechargeable Battery	Listen Technologies	LR-4200-072	12	
	5AL	12-unit Charger Case	Listen Technologies	LA-380	1	
	6AL	Inductive Loop	Listen Technologies	LA-430	4	
	7AL	Earphone	Listen Technologies	LA-402	12	
	8AL					
	9AL					
	10AL	Miscellaneous Hardware				
	11AL	Wire & Cable				
	12AL	Labor				
		Production Intercom				
	1PI	Remote Station, 2 ch	Clear-Com	RM-702	1	Portable SM
	2PI	Master Station, 2 ch	Clear-Com	MS-702	1	Booth
	3PI	Custom Button Panel	Custom	Custom	2	
	4PI	Gooseneck Mic	Clear-Com	GM-9	2	
	5PI	Wall Station	Clear-Com	HB-702	2	Green & HM
	6PI	Handset w/ Cradle & earset kill switch	Clear-Com	HS-6	2	For HB-702; use right-angle XLR.

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	7PI	Din Rail Terminal Strip w/ 3-conductor bussing	Wago	A/R	A/R	home run all PL, combine @ TS
	8PI					
	9PI					
	10PI	Miscellaneous Hardware				
	11PI	Wire & Cable				
	12PI	Labor				
		Program & Paging				
	1PM	Microphone for PGM system	Audio-Technica	AT8035	1	
	2PM	Shock Mount for PGM Mic	Audio-Technica	AT8415	1	Provide c-clamp; mount to catwalk rail
ADD 8	3PM	Audio Amplifier, 4-ch, 250 watt @ 70v	**QSC**	**MPA-Q 4x250**	1	
ADD 8	4PM	Audio Amplifier, 8-ch, 250 watt @ 70v	**QSC**	**MPA-Q 8x250**	1	
	5PM	Program/Paging Speakers- Ceiling (SC)	JBL	Control 45 C/T	20	
	6PM	Program/Paging Speakers- High Ceiling (SHC)	JBL	Control 47 HC	2	
	7PM	Program/Paging Speakers- Pendant (SHP)	JBL	Control 65 P/T	8	
	8PM	Paging Speakers, Coax, 70V, Black	Community	R.15 COAX-B	1	provide yoke mount & c-clamp
ADD 8	**9PM**	**70V Volume Control with Priority Override (SAD)**	**Atlas**	**AT100-PARM**	**5**	
ADD 8	**10PM**	**70V Volume Control (SA)**	**Atlas**	**AT100-RM**	**1**	
ADD 8	**11PM**	**GPIO Expander**	**QSC**	**QIO-GP8x8**	**1**	
ADD 8	**12PM**	**QIO Rack Mount Kit**	**QSC**	**QIO-RMK**	**1**	
ADD 8	**13PM**	**24VDC Power Supply**	**RDL**	**PS-24V3A**	**1**	
ADD 8	**14PM**	***Control Booth Rack***				
ADD 8	**15PM**	**Audio Expander, 4-ch line input**	**QSC**	**QIO-ML4i**	**1**	
ADD 8	**16PM**	**GPIO Expander**	**QSC**	**QIO-GP8x8**	**1**	
ADD 8	**17PM**	**QIO Power Supply**	**QSC**	**QIO-PSU**	**1**	
ADD 8	**18PM**	**QIO Rack Mount Kit**	**QSC**	**QIO-RMK**	**1**	
ADD 8	**19PM**	***Portable SM Station***				
ADD 8	**20PM**	**Rackmount Light/Power Unit**	**Furman**	**PL-8C**	**1**	
ADD 8	**21PM**	**Portable Case, Shallow, 4RU**	**SKB**	**1SKB-R4S**	**1**	
ADD 8	**22PM**	**Audio Expander**	**QSC**	**QIO-ML4i**	**1**	
ADD 8	**23PM**	**GPIO Expander**	**QSC**	**QIO-GP8x8**	**1**	
ADD 8	**24PM**	**QIO Power Supply**	**QSC**	**QIO-PSU**	**1**	
ADD 8	**25PM**	**QIO Rack Mount Kit**	**QSC**	**QIO-RMK**	**1**	
ADD 8	**26PM**	***House Manager Panel***				
ADD 8	**27PM**	**Custom Button Panel**	**Custom**	**Custom**	**1**	**see drawings**
ADD 8	**28PM**	**Switched Handheld Mic w/ coil cord & right-angle XLR**	**Shure**	**SM-58S**	**1**	**provide panel mounted clip**
ADD 8	**29PM**	**Bluetooth to Dante**	**RDL**	**DB-BTN21**	**1**	
ADD 8	**30PM**	**Dual Mic Input to Dante**	**RDL**	**DB-RN22**	**1**	
	31PM					

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	32PM					
	33PM	Miscellaneous Hardware				
	34PM	Wire & Cable				
	35PM	Labor				
		Control System				
	1CS	Touchpanel, Wired, 7" (CSP-1)	QSC	TSC-70-G3	2	Control Booth, Stage
	2CS	Rackmount accessory	A/R	A/R	1	
	3CS	Touchpanel, Wired, 5"	QSC	TSC-50-G3	1	HM Panel
	4CS	Ethernet Switch, 10/100/1000, 10G up, Power Over Ethernet	Refer to Audio System	Add'l swithes, A/R	1	see specs for further info
	5CS	Control link to lighting system via IP to ETC Paradigm	Contractor	Custom	1	coordinate with production lighting
	6CS	Control System Accessories	A/R	A/R	A/R	psu, blocks, etc…
	7CS	Control System Programming	Custom	Custom	1	Use certified programmer
	8CS					
	9CS					
	10CS	Miscellaneous Hardware				
	11CS	Wire & Cable				
	12CS	Labor				
		Plates & Panels				
	1PP	Gang Panel	Contractor	Contractor	A/R	
	2PP	Multi-I/O Panel	Contractor	Contractor	A/R	
	3PP					
	4PP					
	5PP	Wire & Cable				
	6PP	Labor				

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
		BLACKBOX THEATRE - BROADCAST				
		Video System - Production/Streaming				
		Video Switcher				
	1VP	Production Video Switcher	Newtek	Tricaster Mini X	1	Include rack kit, keyboard, and mouse
	2VP	NDI /SDI converters	Newtek	Spark Plus I/O 3GSDI Converter	5	Include rack shelf and power
	3VP	Switcher - 1 year warranty professional	Newtek	PTUTCMXHDMI	3	year
	4VP	Control Surface - 1 year warranty professional	Newtek	PTUTCTCMCS	3	year
	5VP	*Cameras*				
	6VP	PTZ Camera, NDI, Low Light, Black	Panasonic	AW-UE80	3	
	7VP	PTZ Camera, Wall Mount, Black	Panasonic	FEC-40WM	1	
	8VP	PTZ Camera, Pole Clamp, 1.5" pipe, Black	Global Truss	Mini 360 1.5 BLK	2	attach to camera & lighting pipe
	9VP	*Video Operator Position*				
	10VP	Video Switcher Control Panel	Newtek	Tricaster MiniCS	1	
	11VP	KVM extender with USB 2.0	Adder	XD641	1	Includes Rx and Tx; include rackmount
	12VP	Multiview monitor, 46" LCD	Samsung/LD	A/R	1	mount in furniture
	13VP	Dual 7" LCD Monitor, Rackmount, SDI	Black Magic Design	Smart View DUO	1	
	14VP	PTZ Controller	Panasonic	AW-RP60	1	
	15VP	*Streaming & Recording*				
	16VP	Streaming Encoder	Aja	HELO Plus	1	
	17VP	SD Card Recorder	Black Magic Design	HyperDeck Studio HD Plus	1	
	18VP	SD Card Media, 256GB	ProGrade Digital	256GB UHS-II SDXC Memory Card	4	
	19VP	*Utility*				
	20VP	Sync Generator	AJA	Gen10	1	Sync at 59.94; format 1080p
	21VP	*Furniture*				
ADD 8	22VP	Modular Broadcast Furniture	**Laguna Design**	**Zephyr**	1	see specs for requirements
	23VP					
	24VP					
	25VP	Miscellaneous Hardware				
	26VP	Wire & Cable				
	27VP	Labor				

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
		DRAMA CLASSROOM				
		Audio System - Production				
	1AV	Audio DSP matrix / automixer, 8x8 Dante	QSC	Core 8 Flex	1	provide UCI & Scripting Licenses
	2AV	Touchpanel, Wired, 5"	QSC	TSC-50-G3	1	
	3AV	Rackmount for TP	QSC	A/R	1	
ADD 8	4AV	Bluetooth Receiver - Media Player	**Tascam**	**CD-400U**	1	
	5AV	Main Loudspeaker, Powered	Yamaha	DZR10	2	
	6AV	Main Loudspeaker Yoke Bracket	Yamaha	UB-DZR10H	2	
	7AV	Theatre-Style C-Clamps	ETC	400CC	4	install two per yoke
	8AV	Theatre-Style Safety Cable	ETC	400SC	2	install one per yoke
	9AV	Mic / Intercom Cable, 25'	Whirlwind	MK425	2	
	10AV	Power Cable, 12AWG, 25'-0" black, Rugged Jacket	Contractor	A/R	2	
ADD 8	11AV	Audio over IP/Control Switch, Gigabit, Q-SYS/Dante, 1G up	**Netgear**	**M4250 Series**	1	
	12AV	*Utility*				
	13AV	Power Distribution & Sequencing	Middle Atlantic	PDS-615R	1	
	14AV	AV Rack, Pull-Out Mount	Middle Atlantic	SRSR Series	1	
	15AV	Rack Fan	Middle Atlantic	A/R	1	
	16AV	*Classroom System - NIC*				
	17AV	Flat panel & mount, HDMI input	OFOI	OFOI	0	(Qty: 1 - OFOI)
	18AV					
	19AV					
	20AV	Miscellaneous Hardware				
	21AV	Wire & Cable				
	22AV	Labor				

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
		RECORDING STUDIO				
		Audio Recording- Control Room				
		Mix/Interface				
ADD 8	1AV	Desktop Control Surface- 8 fader Section	SSL	UF8	2	
ADD 8	2AV	Desktop Control Surface - Master Section	SSL	UC1	1	
ADD 8	3AV	Desktop Control Surface - DAW Section	SSL	UF1	1	
ADD 8	4AV	*Audio Interface - Local*				
ADD 8	5AV	Line In/Out, 16-ch, Dante	Focusrite	A16R	1	
ADD 8	6AV	Microphone Preamp, 8-ch, Dante	Focusrite	RedNet MPR8	2	
ADD 8	7AV	Thunderbolt / Dante Interface (128x128)	Focusrite	RedNet TNX	1	
ADD 8	8AV	*Recording - CPU*				
ADD 8	9AV	Recording Computer w/ kybd & mouse	Apple	Mac Studio	1	
ADD 8	10AV	Mac Studio Rack Mount	Sonnet Tech	Rack Mac Studio	1	
ADD 8	11AV	TB5 to HDMI adapter	A/R	A/R	4	
ADD 8	12AV	USB 2.0 Extender	Icron	Ranger 2304	1	
ADD 8	13AV	Recording Software	OFE	OFE	0	(Qty: 1- OFCI)
ADD 8	14AV	Dante Controller Software	Audinante	Dante Controller	1	
ADD 8	15AV	Focusrite Software	Focusrite	Rednet Control	1	
ADD 8	16AV	Genelec Software	Genelec	SAM	1	
ADD 8	17AV	Computer-Based Recording Software, Setup & Training	Certified Technician	4 Hrs Setup & 4 Hrs Training	1	
ADD 8	18AV	*Playback - I/O*				
ADD 8	19AV	CD/BT/SD/USB Player	Tascam	CD-400U	1	
ADD 8	20AV	6-CH DI, rackmount	Radial	JD6	1	
ADD 8	21AV	*Monitoring-Audio Control (5.1)*				
ADD 8	22AV	Control Room Monitoring Loudspeaker, Mains, Powered	Genelec	8340A SAM Studio Monitor	5	Control Room
ADD 8	23AV	Monitoring Loudspeaker, Wall Mount	Genelec	8000-402B Adjustable Mount	2	
ADD 8	24AV	Control Room Monitoring Loudspeaker, Sub, Powered	Genelec	7370A SAM Studio Sub	1	Control Room
ADD 8	25AV	Control Room Monitor Calibration Kit & USB Interface	Genelec	GLM SAM	1	
ADD 8	26AV	GLM Hub Manager	Genelec	MAI0137	1	
ADD 8	27AV	Control Room Monitor Controller, Dante	Focusrite	R1	1	
ADD 8	28AV	*Monitoring-Audio Live Room*				
ADD 8	29AV	Studio Room Monitoring Loudspeaker L/R, Powered	Genelec	8340A SAM Studio Monitor	2	Studio
ADD 8	30AV	Monitoring Loudspeaker, Wall Mount	Genelec	8000-402B Adjustable Mount	2	Studio
ADD 8	31AV	*Monitoring-Audio Musician*				
ADD 8	32AV	Musician Monitoring System- Base Unit, Dante	Digital Audio Labs	LMPro16	1	
ADD 8	33AV	Musician Monitoring System, User Unit	Digital Audio Labs	LMPro Duo	4	
ADD 8	34AV	Musician Monitoring System, User Unit Mic Stand Mount	Digital Audio Labs	MT-1	4	
ADD 8	35AV	Musician Monitoring System, 25' CAT6A cable, Ethercon > RJ45	ProCo Sound	DURASHIELD-25NB45	8	4 spare
ADD 8	36AV	Headphones	AKG	K 240	8	
ADD 8	37AV					

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
ADD 8	38AV	***VIDEO***				
ADD 8	39AV	*Monitoring - Control Room*				
ADD 8	40AV	27" LED Monitor, HDMI Input, 4k resolution, VESA	LG/Samsung	A/R	2	mounts in furniture
ADD 8	41AV	55" LCD Monitor, HDMI Input, 232 control, 4k resolution	LG/Samsung	A/R	2	
ADD 8	42AV	In-Wall Junction Box	Chief Mfg	PAC-501	2	
ADD 8	43AV	Wall Mount for Monitor w/ Swing- Recessed	Chief Mfg	PNRIW Series + PSB	2	
ADD 8	44AV	Long-Length Fiber HDMI Cable	Extron	Pro Plenum	4	size TBD in field
ADD 8	45AV	*Monitoring - Live Room*				
ADD 8	46AV	55" LCD Monitor, HDMI Input, 232 control, 4k resolution	LG/Samsung	A/R	1	
ADD 8	47AV	In-Wall Junction Box	Chief Mfg	PAC-501	1	
ADD 8	48AV	Wall Mount for Monitor w/ Swing- Recessed	Chief Mfg	PNRIW Series + PSB	1	
ADD 8	49AV	Long-Length Fiber HDMI Cable	Extron	Pro Plenum	1	size TBD in field
ADD 8	50AV	Bulkhead HDMI - Decora, White	Crestron	MP-WP152-W	1	
ADD 8	51AV	Powered Soundbar	JBL	PSB-1	1	
ADD 8	52AV	Button Panel	Extron	MLC Plus 100	1	
ADD 8	53AV					
ADD 8	54AV	***UTILITY***				
ADD 8	55AV	*Talkback*				
ADD 8	56AV	Talkback Microphone for LIVE room	Audix	GS1	1	
ADD 8	57AV	Patching				
ADD 8	58AV	Audio Patchbay, TT Type	Bittree	969A Series	A/R	
ADD 8	59AV	Audio Patch Cable, Red, 3', TT Type	Bittree	BPC3602-110	40	
ADD 8	60AV	Audio Combining Networks	Radio Design Labs	STD-600	2	
ADD 8	61AV	Audio Isolation Transformers	Radio Design Labs	TX-AT1	2	
ADD 8	62AV	Data Patchbay / RJ-45 / CAT6A STP	Belden	REVConnect Series	A/R	see specs for further info
ADD 8	63AV	RJ-45 to RJ-45 CAT6A STP Patch Cable, 3'	Comprehensive	CAT6A-3BLU	10	
ADD 8	64AV	*Network / Clock*				
ADD 8	65AV	Gigabit LAN switch, POE	Netgear	M4250 Series	1	
ADD 8	66AV	Sync/PTP/NTP/LTC Generator	Brainstorm	DXD-8	1	With PTP option
ADD 8	67AV	*Recording Lights*				
ADD 8	68AV	RECORDING light, 12VDC, LED	Punchlight	Recording Display (Black)	3	
ADD 8	69AV	Recod Light GPIO Interface & PSU	Punchlight	GPI-UNI	1	
ADD 8	70AV	Recording Light Switch in Rack Panel	Contractor	Custom	1	
ADD 8	71AV	*Utility*				
ADD 8	72AV	UPS Unit, Fanless	Middle Atlantic	UPS-S1000R	2	Desk & Rack
ADD 8	73AV	Power Distribution	Middle Atlantic	PD-915R	4	Desk & Rack
ADD 8	74AV	Rack Drawer	Middle Atlantic	D2/D3/D4	A/R	Fill empty spaces in side racks
ADD 8	75AV	Gang Panel	Contractor	Contractor	A/R	
ADD 8	76AV	Multi-I/O Panel	Contractor	Contractor	A/R	

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
ADD 8	77AV	*Equipment Rack*				
ADD 8	78AV	Equipment Racks & Accessories	Middle Atlantic	BGR Series	1	see specs for further info
ADD 8	79AV	Power Controller	Lyntec	SS2-LRP	1	connect to Lyntec panel (by elec)
ADD 8	80AV	Power raceway & accessories	Middle Atlantic	MPR-8A + accessories	1	1/rack
ADD 8	81AV	Power modules	Middle Atlantic	M-2x20IGA	6	6/rack
ADD 8	82AV	UPS Unit, 2200VA	Middle Atlantic	UPS-S2200R	1	Rack
ADD 8	83AV	UPS Power Distribution	Middle Atlantic	PD-2415SC-NS	1	1/rack
ADD 8	84AV	*Furniture*				
ADD 8	85AV	Custom Studio Furniture	Laguna Design	Echo Custom	1	finish determined by architect
ADD 8	86AV	Power Distribution	Middle Atlantic	PD-815R-PL	2	Desk
ADD 8	87AV	UPS Unit, 1000VA, Brick Type	Eaton/APC	A/R	1	Desk
ADD 8	88AV					
ADD 8	89AV					
ADD 8	90AV	Miscellaneous Hardware				
ADD 8	91AV	Wire & Cable				
ADD 8	92AV	Labor				
		BAND/ORCH & CHORAL ROOMS	**(QTY: 2)**			
		AV System				
		Video		***Qty Per Room***		
	1AV	AV Switcher	Extron	IN1808 IPCP	1	
	2AV	HDMI Receiver	Extron	DTP HDMI 4K 330 Rx	1	Projector
	3AV	BYOD Device	OFCI	OFCI	0	(Qty: 1 - OFCI)
ADD 8	4AV	Video Projector, 8.5k lumen, 1920x1200, DLP, Laser	**Sharp**	**XP-A824U-W**	1	
ADD 8	5AV	Video Projector Lens	**Sharp**	**A/R**	1	
	6AV	Video Projector Ceiling Mount	Chief Mfg	A/R	1	
	7AV	Motorized Projection Screen, 16:10, Matte White	Draper	Acumen V	1	size per drawings + black drop
	8AV	Projection Screen, Low Voltage Control	Draper	LVC	1	
	9AV	*Audio Playback*				
	10AV	4x4 line mixer	Extron	DMP44LC	1	
	11AV	Bluetooth Receiver	**Tascam**	**CD-400U**	1	mount antenna outside rack
	12AV	Main Loudspeaker, Powered, White	Martin Audio	CDD-LIVE12	2	
	13AV	Loudspeaker Wall Mounting, Mains, white	Martin Audio	WB12	2	
	14AV	*Audio Recording*				
	15AV	USB/Flash Recorder, 2-ch Mic Preamp, Dante	**Tascam**	**SS-CDR250N**	1	recording
ADD 8	**16AV**	**USB/Flash/CD Recorder, Dante Card**	**Tascam**	**IF-DA2**	**1**	
	17AV	Hanging Choir Mics, White	Audix	M1255BW	2	recording
	18AV	*Control Systems*				
	19AV	Touchpanel Controller	Extron	TLP PRO 725M	1	
	20AV	Control System Accessories	Extron	A/R	1	
	21AV	Audio over IP/Control Switch, Gigabit, Q-SYS/Dante, 1G up	**Netgear**	**M4250 Series**	1	

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	22AV	*Utility*				
	23AV	Power Distribution	Middle Atlantic	PD-915R	1	
	24AV	Custom I/O rack panel	Contractor	Custom	1	
	25AV	AV Rack, Pull-Out Mount	Middle Atlantic	SRSR Series	1	
	26AV	Rack Fan	Middle Atlantic	A/R	1	
	27AV	In-Wall Junction Box with cover, white	Chief Mfg	PAC-526-FCW	2	future flat panels
	28AV					
	29AV					
	30AV	Miscellaneous Hardware				
	31AV	Wire & Cable				
	32AV	Labor				
	LOOSE EQUIPMENT - THEATRE					
		Production Intercom - Wired				
ADD 8	1AV	Heavy-Duty Headset	Clear-Com	CC-300	8	
ADD 8	2AV	Light-Duty Headset	Clear-Com	CC-110	4	
ADD 8	3AV	Handset	Clear-Com	HS-6	1	
ADD 8	4AV	Wired Beltpack, Analog PL, 1-ch	Clear-Com	RS-701	12	
ADD 8	5AV	Call Signal Flasher	Clear-Com	FL-7	1	
ADD 8	6AV	*Portable Wireless Mics - One 16-channel System*				
ADD 8	7AV	Rackmount Light/Power Unit	Furman	PL-8C	1	
ADD 8	8AV	Wireless Mic RX, Receiver, Base Unit	Shure	ANX4	1	
ADD 8	9AV	Wireless Mic RX, 4-ch License	Shure	ANX4-4CL	4	
ADD 8	10AV	Wireless Mic Handheld TX	Shure	ULXD2/B58	16	
ADD 8	11AV	Wireless Mic Bodypack TX	Shure	ULXD1	16	
ADD 8	12AV	Body Pack Microphone, Headworn	Point Source Audio	CO-8WH	16	color tbd
ADD 8	13AV	Beltpac for body mic	wirelessmicbelts.com	BP-SH-ULXD-x	30	(10) Black, (10) Tan, (10) White
ADD 8	14AV	Belt Package, 20-pack	wirelessmicbelts.com	BELT-20PACK-x	3	(1) Black, (1) Tan, (1) White
ADD 8	15AV	Rechargeable Battery	Shure	SB900B	32	
ADD 8	16AV	8-port Battery Charger	Shure	SBC-800	2	
ADD 8	17AV	Antenna, Dual	RF Venue	DFIN	1	
ADD 8	18AV	Antenna Rack Panel	Contractor	Custom	1	
ADD 8	19AV	Slide-Out drawer for Battery Chargers, 1RU	Middle Atlantic	SSL	1	mount chargers to shelf
ADD 8	20AV	Wireless Mic Antenna Coax Cable, 25'-0"	Shure	UA825	2	
ADD 8	21AV	Portable Case, Anvil/ATA style, wheels, 24RU	ProX	A/R	1	
ADD 8	22AV	Rack Drawer with foam bottom	Middle Atlantic	D2/D3/D4	A/R	fill empty with rack drawers
ADD 8	23AV	25' XLR-F to XLR-M Snake, 16-ch	Whirlwind	A/R	1	

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
ADD 8	24AV	*Microphones & DI*				
ADD 8	25AV	Handheld Microphone	Shure	SM58	4	
ADD 8	26AV	Handheld Microphone, switched	Shure	SM58 Switched	1	
ADD 8	27AV	Handheld Microphone	Shure	SM57	4	
ADD 8	28AV	Handheld Microphone, condenser	Shure	Beta 87a	2	
ADD 8	29AV	Hanging Choir Mic w/ hanger & 50' cable	Audix	1255B + MC Hanger + 50' cable	2	
ADD 8	30AV	Podium Mic w/ weighted base	Audio Technica	U857QL / AT8615	2	
ADD 8	31AV	DI Box, passive	Radial	ProDI	2	
ADD 8	32AV	Dual DI Box, passive, PC	Radial	ProAV2	2	
ADD 8	33AV	Mic Case, 12-hole with cable storage	SKB	1SKB-1200	1	
ADD 8	34AV	Extra Mic Clip for SM58, 10-pack	Shure	A25DM	1	10 pack
ADD 8	35AV	*Test Gear*				
ADD 8	36AV	Cable Multi-Tester	Whirlwind	MCT-7	1	
ADD 8	37AV	*Portable Speakers*				
ADD 8	38AV	Powered Loudspeaker, Booth Monitor	JBL	LSR 305	2	
ADD 8	39AV	Desk Stand for Booth Monitor	IsoAcoustics	ISO-L8R130	2	
ADD 8	40AV	Main Loudspeaker, Powered	Yamaha	DZR10	2	
ADD 8	41AV	Portable Effects Speakers, small	JBL	AC16	4	
ADD 8	42AV	Portable Effects Speakers, large	JBL	AC18/95	4	
ADD 8	43AV	U-Bracket for small speaker	JBL	MTU16	4	(1) C-Clamp per unit
ADD 8	44AV	U-Bracket for large speaker	JBL	MTU18	4	(1) C-Clamp per unit
ADD 8	45AV	Safety Cable for Yoke Bracket	ETC	400SC	8	
ADD 8	46AV	C-Clamp for Yoke Bracket	ETC	400CC	8	Mount to yoke bracket
ADD 8	47AV	Table-top mic stand, round base	Atlas Sound	DMS-7E	4	
ADD 8	48AV	*Mic Stands*				
ADD 8	49AV	Standard round-base mic stand, Black	Atlas Sound	MS10CE	4	
ADD 8	50AV	Tripod mic stand w/ boom, Black	K & M	210/8	4	
ADD 8	51AV	Audio Adapter Kit	Remote Audio	APPKI PRO	1	
ADD 8	52AV	*Accessories*				
ADD 8	53AV	BNC Barrel Adapter	Canare	BCJ-JK	4	
ADD 8	54AV	XLR-M/M Barrel Adapter	Neutrik	NA3MM-B	4	
ADD 8	55AV	XLR-F/F Barrel Adapter	Neutrik	NA3FF-B	4	
ADD 8	56AV	CAT6A STP Barrel Adapter	Neutrik	NE8FFX6-W	4	
ADD 8	57AV	Cotton Tie Line, Black, 600' roll, 1/8" black, unglazed	Musson Theatrical	A/R	1	
ADD 8	58AV	Headphones	Sony	MDR-7506	1	
ADD 8	59AV	5-Drawer Work Box w/ table	ProCases	AC-WB5MT	1	or equal
ADD 8	60AV	ATA-style rolling cable/stand trunk	ProCases	AC-MTP2	1	or equal

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
ADD 8	61AV	*Cables*				
ADD 8	62AV	*NOTE: Provide color heatshink label on all cables reading "Sanger West HS Theatre". Color denotes length.*				
ADD 8	63AV	*NOTE: Provide hook & loop type black velcro ties on each cable, permanently affixed for use when storing cable. No zip-tie type.*				
ADD 8	64AV	Mic / Intercom Cable, 10'	Whirlwind	MK4-10	10	
ADD 8	65AV	Mic / Intercom Cable, 25'	Whirlwind	MK4-25	20	
ADD 8	66AV	Mic / Intercom Cable, 50'	Whirlwind	MK4-50	4	
ADD 8	67AV	Mic / Intercom Cable, 100'	Whirlwind	MK4-100	2	
ADD 8	68AV	1/4" to 1/4" instrument cable, 6'-0"	Whirlwind	L-6	4	
ADD 8	69AV	Loudspeaker Cable, 5'	Whirlwind	NL4-005	10	
ADD 8	70AV	Loudspeaker Cable, 10'	Whirlwind	NL4-010	10	
ADD 8	71AV	Loudspeaker Cable, 25'	Whirlwind	NL4-025	4	
ADD 8	72AV	Loudspeaker Cable, 50'	Whirlwind	NL4-050	4	
ADD 8	73AV	Edison Power Cable, 12AWG, 25'-0" black, SJOOW	Lex Products	PE700J-25-515	6	
ADD 8	74AV	Edison Power Cable, 12AWG, 50'-0" black, SJOOW	Lex Products	PE700J-50-515	6	
ADD 8	75AV	BNC Video Cable, 10'	Canare	CAL55CUHD010	4	
ADD 8	76AV	BNC Video Cable, 25'	Canare	CAL55CUHD025	4	
ADD 8	77AV	BNC Video Cable, 50'	Canare	CAL55CUHD050	2	
ADD 8	78AV	Audio Patch (longframe) to XLR-M, 3', Red	Bittree	LPCXM3602-110	2	
ADD 8	79AV	Audio Patch (longframe) to XLR-F, 3', Red	Bittree	LPCXF3602-110	2	
ADD 8	80AV	Video Patch (Mini-WECO) to BNC Cable, 3', Blue	Bittree	VPBM3600-75	2	
ADD 8	81AV	F CATV Video Cable, 25'	A/R	A/R	4	
ADD 8	82AV	HDMI Extension Cables, 25'	Extron	HDMI Pro/25	4	
ADD 8	83AV	Ruggedized CAT6A STP cable w/ Ethercon, 25'-0"	Whirlwind	ENC6ASE-25	8	ethercon both ends
ADD 8	84AV	Ruggedized CAT6A STP cable w/ Ethercon, 50'-0"	Whirlwind	ENC6ASE-50	8	ethercon both ends
ADD 8						
ADD 8		**LOOSE EQUIPMENT - RECORDING STUDIO**				
ADD 8						
ADD 8		*Microphones & DI- Audio Recording*				
ADD 8	1AV	Microphone, Large Condenser, Matched Pair	AKG	C414 XLS/ST	1	pair
ADD 8	2AV	Microphone, Dynamic	Shure	SM57	4	
ADD 8	3AV	Microphone, Dynamic	Shure	SM58	4	
ADD 8	4AV	Microphone, Large Diaphragm Condenser	Shure	KSM32	1	
ADD 8	5AV	Microphone, Matched Pair Small Condenser, pair	Studio Projects	C4	1	matched pair
ADD 8	6AV	Microphone, Drum Kit, 5 pc	Shure	PGDMK6-XLR	1	
ADD 8	7AV	Microphone, Large Dynamic	AKG	D112	1	
ADD 8	8AV	DI Box, 1-ch	Radial	Pro D1	2	
ADD 8	9AV	DI Box, Stereo	Radial	Pro D2	2	
ADD 8	10AV	DI Box, SansAmp	Tech 21	SansAmp Bass Driver V2	2	
ADD 8	11AV	Portable Padded Case for Microphones	Gator	GTSA-MIC15	1	

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REV	REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
ADD 8	12AV	*Miscellaneous*				
ADD 8	13AV	Table-top mic stand, round base	Atlas Sound	DMS-7E	8	
ADD 8	14AV	Standard round-base mic stand, Black	Atlas Sound	MS10CE	8	
ADD 8	15AV	Boom Stand, Studio, Wheels	Atlas	SB36WE	2	
ADD 8	16AV	Boom Stand, Studio, Wheels	Triad-Orbit	Starbird SB-1	2	
ADD 8	17AV	Audio Adapter Kit	Remote Audio	APPKI PRO	1	
ADD 8	18AV	XLR-M/M Barrel Adapter	Neutrik	NA3MM-B	10	
ADD 8	19AV	XLR-F/F Barrel Adapter	Neutrik	NA3FF-B	10	
ADD 8	20AV	CAT6A STP Barrel Adapter	Neutrik	NE8FFX6-W	10	
ADD 8	21AV	*Cables*				
ADD 8	22AV	*NOTE: Provide color heatshink label on all cables reading "Sanger West HS - Recording". Color denotes length.*				
ADD 8	23AV	*NOTE: Provide hook & loop type black velcro ties on each cable, permanently affixed for use when storing cable. No zip-tie type.*				
ADD 8	24AV	Mic / Intercom Cable, 10'	Whirlwind	MK410	10	
ADD 8	25AV	Mic / Intercom Cable, 25'	Whirlwind	MK425	10	
ADD 8	26AV	Mic / Intercom Cable, 50'	Whirlwind	MK450	4	
ADD 8	27AV	Mic / Intercom Cable, 100'	Whirlwind	MK4100	4	
ADD 8	28AV	1/4" to 1/4" instrument cable, 6'-0", TS	Whirlwind	L-6	10	
ADD 8	29AV	Audio Patch (TT) to XLR-M, 3', Red	Bittree	BPCXM3602-110	2	
ADD 8	30AV	Audio Patch (TT) to XLR-F, 3', Red	Bittree	BPCXF3602-110	2	
ADD 8	31AV	HDMI Extension Cables, 15', Ultra Flexible	Extron	HDMI Ultra/15	2	
ADD 8	32AV	Ruggedized CAT6A STP cable, 25'	Whirlwind	ENC6ASE-25	4	
ADD 8	33AV	Ruggedized CAT6A STP cable, 50'	Whirlwind	ENC6ASE-50	4	
ADD 8	34AV	Edison Power Strip	Furman	SS-6B	4	
ADD 8	35AV	Edison Power Cable, 12AWG, 25'-0" black, SJOOW	Lex Products	PE700J-25-515	4	
			END OF SECTION			

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DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- Concrete Masonry Unit Wall. 8" wide
- Concrete Wall, or Column. Size as indicated.
- Stud Wall, Studs and Interior Wall materials continuous from floor to underside of floor or roof deck. Studs at 16" o.c. unless otherwise noted. Interior Wall materials shall include Batt Insulation, Sound Deadening Board, Plywood Sheathing, Gypsum Board, and Cement Plaster/ Ceramic Tile setting bed where occurs.
- Stud Wall, Studs and finish material continuous from floor to minimum 6" above ceiling. Studs to be braced to underside of roof framing or deck if not required to be continuous to roof framing or deck. Studs at 16"o.c. Unless Otherwise Noted. See Structural for bracing and extent of Structural Sheathing.
- 1 Hr. Corridor Wall - Fire Partition (1 Hr. Fire Resistive Construction, 20 Min. Door Assemblies, 45 Min. Window Assemblies)
- 1 Hr. Fire Barrier - (1 Hr. Fire Resistive Construction, 60 Min. Door / Window Assemblies)
- 2 Hr. Fire Barrier - (1 Hr. Fire Resistive Construction, 90 Min. Door / Window Assemblies)
- LANDSCAPING, Planter with CAST-IN-PLACE CONCRETE Walls with LANDSCAPING, Topsoil and amendments. See A11 X/A511 H11 X/A511
- A / ### — Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 0 — Reference Grid
- 101 / a — Opening Group No. Refer to Door or Window Opening Schedules
- Room name / 101 — Room Designation
- ## / # — Wall Assembly Symbols. Refer to Sheet X/A101
- Reference Point
- Indicates 48" x 30" Clear floor or ground space
- Indicates 60" clear turning space

MINIMUM DOOR CLEARANCES

ABBREVIATIONS

FEBC FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Type FEBC-#, Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls, See A7 X/A605

FEC-# FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, Type FEC-#, Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls, See A7 X/A605

EQ	Equal	FOM	Face of Masonry	UNO	Unless Noted Otherwise
DS	Downspout	FOS	Face of Stud	RO	Rough Opening
FF	Face of Finish	FS	Floor Sink	Typ	Typical
FOC	Face of Concrete	HB	Hose Bib	Sim	Similar
FD	Floor Drain	MO	Masonry Opening	OH	Opposite Hand

NOTES

1. All Exterior Walls shall be Wall Assembly Type 6.B E.M Unless Noted Otherwise.
2. All Interior Walls shall be Wall Assembly Type 6.D I.M Unless Noted Otherwise.
3. All Dimensions are to Face of Stud (FOS) or Center Line, Unless Noted Otherwise.
4. All Elevation Dimensions are above Finish Floor at each floor level, Unless Noted Otherwise.
5. Dimensions noted as "+/-" are nominal.
6. Floor Drains (FD) and Floor Sinks (FS) shall be set -3/4" and a min. of 3'-0" from nearest wall, Unless Noted Otherwise. Floor slopes to drain shall not exceed 1.9% in any direction.
7. For room signage refer to the SIGNAGE SCHEDULE AND PLANS
8. FIRE RESISTIVE ASSEMBLIES:
   a. All Through Penetrations and Wall Membrane Penetrations through Walls of Fire Resistive Construction shall be protected in accordance with their Fire Resistive Ratings.
   b. All walls of fire and/or smoke resistive construction shall be permanently identified with signs or stenciling in lettering not less than 3 inches (76 mm) in. height with a minimum 3/8 inch (9.5 mm) stroke in a contrasting color incorporating the following wording: FIRE AND/OR SMOKE BARRIER "#" HOUR RATED, PROTECT ALL OPENINGS, signs or stenciling shall be located above ceilings on both sides of the wall, located 15'-0" from ends of wall and at intervals not to exceed 30'-0" horizontally along the wall or partition. Note: "#" indicates the hourly rating of the wall or partition.
9. FIRE RESISTIVE CONSTUCTION: Refer to X/A101 through X/A105 for Typical Details. Refer to to the Regulatory Floor Plans for the Rated Horizontal Assembly location(s).
10. FIRE ASSEMBLIES FOR STRUCTURAL STEEL: Refer to detail A7 - X/A102 for fire assembly requirements for all concealed and exposed horizontal, vertical and diagonal structural steel members.

F18 — Floor Plan Legend

No Scale



Area A Key Plan - Building L

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
FIRST FLOOR PLAN - AREA A
Drawing

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LICENSED ARCHITECT MEGHAN K. FERNO No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

Designed By: -
Drawn By: -
Checked By: MF
Reviewed By: MF

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Scale: As indicated
Project Number: 2171
Date: 12/22/22

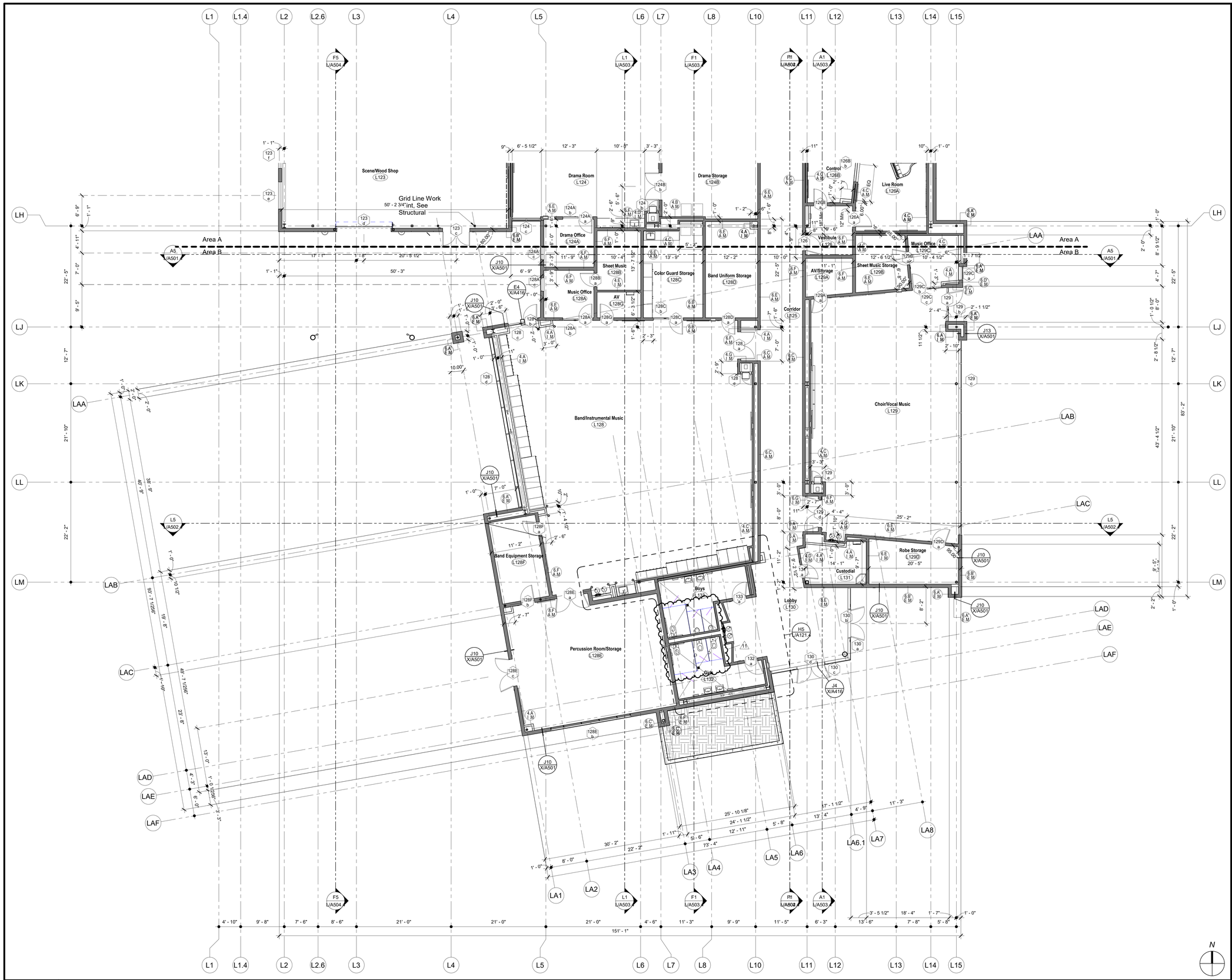
L/A102.4
AD8

A1
1/8" = 1'-0"

Floor Plan- First Floor Area A

Refer to F18 for Symbols, Abbreviations and Notes

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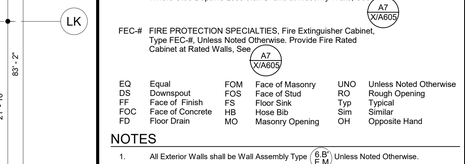
DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- Concrete Masonry Unit Wall. 8" wide
- Concrete Wall, or Column. Size as indicated.
- Stud Wall, Studs and Interior Wall materials continuous from floor to underside of floor or roof deck. Studs at 16" o.c. unless otherwise noted. Interior Wall materials shall include Batt Insulation, Sound Deadening Board, Plywood Sheathing, Gypsum Board, and Cement Plaster/ Ceramic Tile setting bed where occurs.
- Stud Wall. Studs and finish material continuous from floor to minimum 6" above ceiling. Studs to be braced to underside of roof framing or deck if not required to be continuous to roof framing or deck. Studs at 16"o.c. Unless Otherwise Noted. See Structural for bracing and extent of Structural Sheathing.
- 1 Hr. Corridor Wall - Fire Partition (1 Hr. Fire Resistive Construction, 20 Min. Door Assemblies, 45 Min. Window Assemblies)
- 1 Hr. Fire Barrier - (1 Hr. Fire Resistive Construction, 60 Min. Door / Window Assemblies)
- 2 Hr. Fire Barrier - (1 Hr. Fire Resistive Construction, 90 Min. Door / Window Assemblies)
- LANDSCAPING, Planter with CAST-IN-PLACE CONCRETE Walls with LANDSCAPING, Topsoil and amendments. See A11 X/A511, H11 X/A511
- A / ### — Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 0 — Reference Grid
- 101 / a — Opening Group No. Refer to Door or Window Opening Schedules
- Room name / 101 — Room Designation
- ## / # — Wall Assembly Symbols. Refer to Sheet X/A101
- Reference Point



ABBREVIATIONS

FEBC FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Type FEBC-#, Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls, See A7 X/A605

FEC-# FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, Type FEC-#, Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls, See A7 X/A605

EQ	Equal	FOM	Face of Masonry	UNO	Unless Noted Otherwise
DS	Downspout	FOS	Face of Stud	RO	Rough Opening
FF	Face of Finish	FS	Floor Sink	Typ	Typical
FOC	Face of Concrete	HB	Hose Bib	Sim	Similar
FD	Floor Drain	MO	Masonry Opening	OH	Opposite Hand

NOTES

1. All Exterior Walls shall be Wall Assembly Type (6.8" E.M) Unless Noted Otherwise.
2. All Interior Walls shall be Wall Assembly Type (6.D I.M) Unless Noted Otherwise.
3. All Dimensions are to Face of Stud (FOS) or Center Line, Unless Noted Otherwise.
4. All Elevation Dimensions are above Finish Floor at each floor level, Unless Noted Otherwise.
5. Dimensions noted as "+/-" are nominal.
6. Floor Drains (FD) and Floor Sinks (FS) shall be set -3/4" and a min. of 3'-0" from nearest wall, Unless Noted Otherwise. Floor slopes to drain shall not exceed 1.9% in any direction.
7. For room signage refer to the SIGNAGE SCHEDULE AND PLANS
8. FIRE RESISTIVE ASSEMBLIES:
   a. All Through Penetrations and Wall Membrane Penetrations through Walls of Fire Resistive Construction shall be protected in accordance with their Fire Resistive Ratings.
   b. All walls of fire and/or smoke resistive construction shall be permanently identified with signs or stenciling in lettering not less than 3 inches (76 mm) in. height with a minimum 3/8 inch (9.5 mm) stroke in a contrasting color incorporating the following wording: FIRE AND/OR SMOKE BARRIER "#" HOUR RATED, PROTECT ALL OPENINGS, signs or stenciling shall be located above ceilings on both sides of the wall, located 15'-0" from ends of wall and at intervals not to exceed 30'-0" horizontally along the wall or partition. Note: "#" indicates the hourly rating of the wall or partition.
9. FIRE RESISTIVE CONSTUCTION: Refer to X/A101 through X/A105 for Typical Details. Refer to to the Regulatory Floor Plans for the Rated Horizontal Assembly location(s).
10. FIRE ASSEMBLIES FOR STRUCTURAL STEEL: Refer to detail A7 - X/A102 for fire assembly requirements for all concealed and exposed horizontal, vertical and diagonal structural steel members.

F18 — Floor Plan Legend
No Scale



Area B Key Plan - Building L

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
FIRST FLOOR PLAN - AREA B
Drawing

darden architects
ARCHITECTURE PLANNING INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051
LICENSED ARCHITECT MICHAEL K. FENLON No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

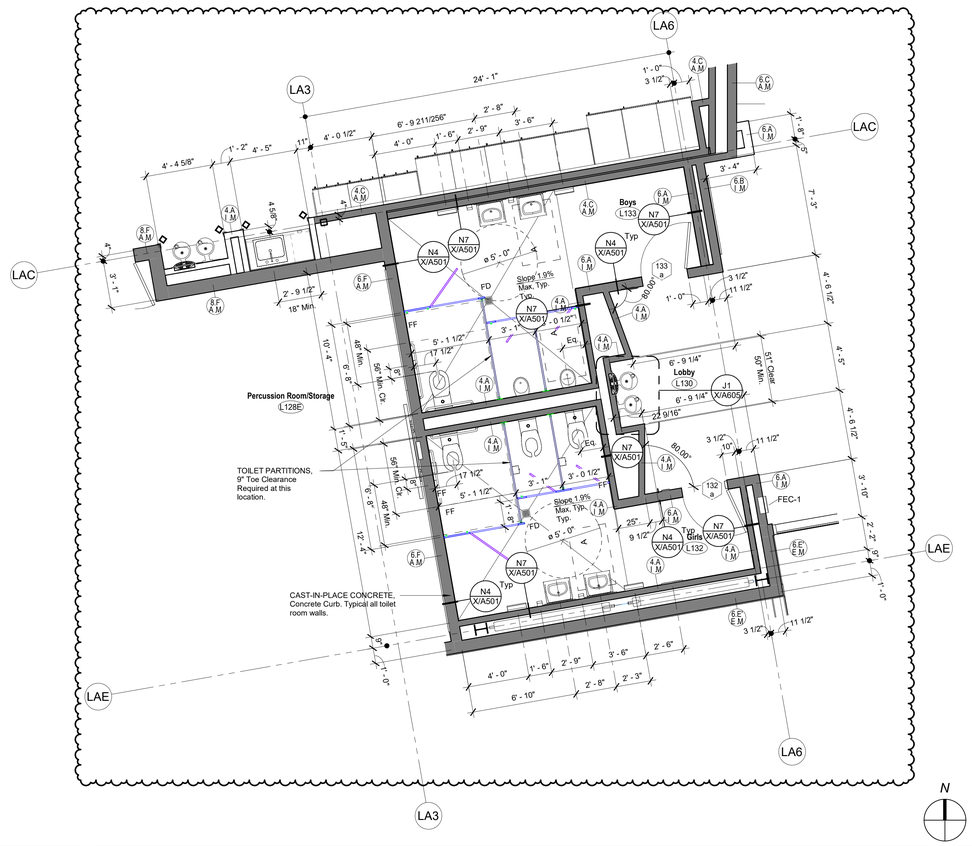
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Scale: As indicated	Drawn By: -	
Project Number: 2171	Checked By: MF	
Date: 12/22/22	Reviewed By: MF	

L/A103.4
AD8

A1
1/8" = 1'-0"

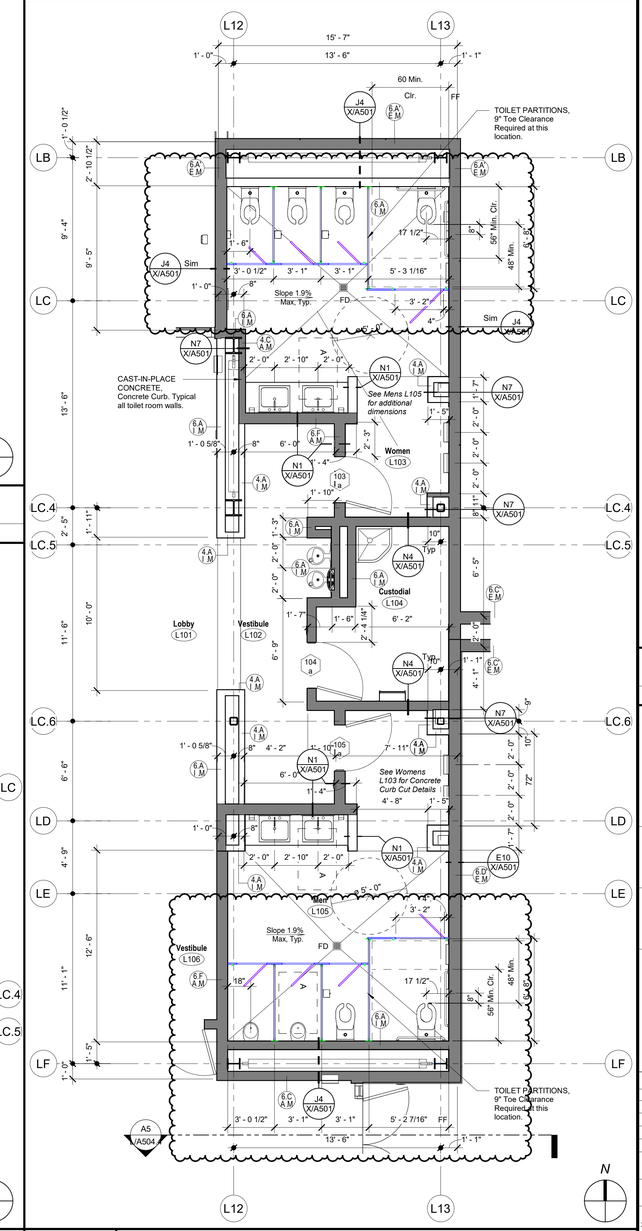
Floor Plan- First Floor Area B
Refer to F18 for Symbols, Abbreviations and Notes

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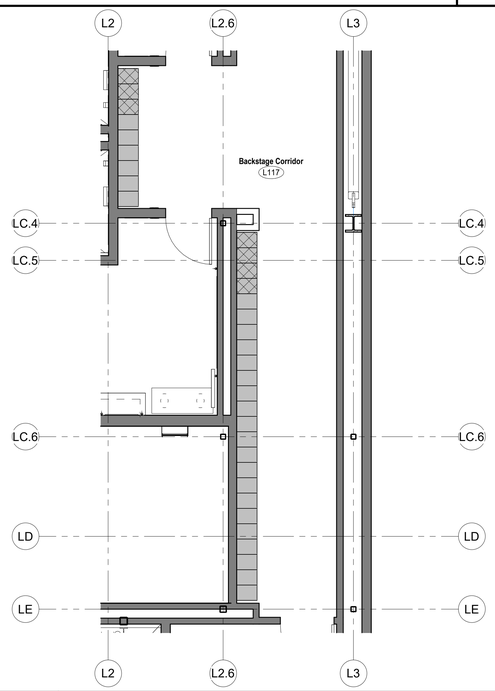
H5 — Enlarged Toilet Plan - 132 and 133

1/4" = 1'-0"



A13 — Enlarged Toilet Plan - 103, 104 & 105

1/4" = 1'-0"



Enlarged Locker Room Legend

- Accessible Locker
- 3 - Tier Locker - Locker Room

Accessible Locker Room Requirements

Backstage Corridor - L117 - Locker

North Locker
- 9 Lockers in a Row
- 9 x 3 Tier Lockers = 27 Lockers
- 27 x 5% = 2 Accessible Gym Lockers Required
- **2 Accessible Lockers Provided**

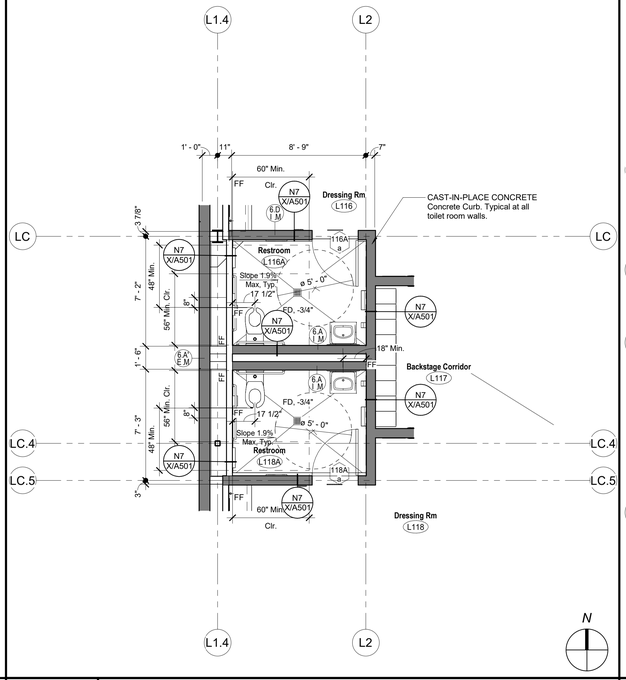
South Locker
- 24 Lockers in a Row
- 24 x 3 Tier Lockers = 72 Lockers
- 72 x 5% = 4 Accessible Gym Lockers Required
- **4 Accessible Lockers Provided**

Notes

1. Accessible lockers with the back wall deeper than 10" and max 24" shall have a clothes hook located max 46" a.f.f. (11B-308.3.2)
2. Locker Bench Base, See Detail A1 M/A140

A1 — Enlarged Locker Plan - L117

1/4" = 1'-0"



A8 — Enlarged Toilet Plan - 116A and 118A

1/4" = 1'-0"

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- Concrete Masonry Unit Wall. 8" wide
- Concrete Wall, or Column. Size as indicated.
- Stud Wall, Studs and Interior Wall materials continuous from floor to underside of floor or roof deck. Studs at 16" o.c. unless otherwise noted. Interior Wall materials shall include Batt Insulation, Sound Deadening Board, Plywood Sheathing, Gypsum Board, and Cement Plaster/ Ceramic Tile setting bed where occurs.
- Stud Wall. Studs and finish material continuous from floor to minimum 6" above ceiling. Studs to be braced to underside of roof framing or deck if not required to be continuous to roof framing or deck. Studs at 16"o.c. Unless Otherwise Noted. See Structural for bracing and extent of Structural Sheathing.
- 1 Hr. Corridor Wall - Fire Partition (1 Hr. Fire Resistive Construction, 20 Min. Door Assemblies, 45 Min. Window Assemblies)
- 1 Hr. Fire Barrier - (1 Hr. Fire Resistive Construction, 60 Min. Door / Window Assemblies)
- 2 Hr. Fire Barrier - (1 Hr. Fire Resistive Construction, 90 Min. Door / Window Assemblies)
- LANDSCAPING, Planter with CAST-IN-PLACE CONCRETE Walls with LANDSCAPING, Topsoil and amendments. See A11 X/A511 H11 X/A511
- A ### — Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 0 — Reference Grid
- 101 a — Opening Group No. Refer to Door or Window Opening Schedules
- Room name 101 — Room Designation
- # # # — Wall Assembly Symbols. Refer to Sheet X/A101
- Reference Point
- Indicates 48" x 30" Clear floor or ground space
- Indicates 60" clear turning space

MINIMUM DOOR CLEARANCES

ABBREVIATIONS

FEBC FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Type FEBC-#, Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls, See A7 X/A605

FEC-# FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, Type FEC-#, Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls, See A7 X/A605

EQ	Equal	FOM	Face of Masonry	UNO	Unless Noted Otherwise
DS	Downspout	FOS	Face of Stud	RO	Rough Opening
FF	Face of Finish	FS	Floor Sink	Typ	Typical
FOC	Face of Concrete	HB	Hose Bib	Sim	Similar
FD	Floor Drain	MO	Masonry Opening	OH	Opposite Hand

NOTES

1. All Exterior Walls shall be Wall Assembly Type 6.B* E.M Unless Noted Otherwise.
2. All Interior Walls shall be Wall Assembly Type 6.D I.M Unless Noted Otherwise.
3. All Dimensions are to Face of Stud (FOS) or Center Line, Unless Noted Otherwise.
4. All Elevation Dimensions are above Finish Floor at each floor level, Unless Noted Otherwise.
5. Dimensions noted as "+/-" are nominal.
6. Floor Drains (FD) and Floor Sinks (FS) shall be set -3/4" and a min. of 3'-0" from nearest wall, Unless Noted Otherwise. Floor slopes to drain shall not exceed 1.9% in any direction.
7. For room signage refer to the SIGNAGE SCHEDULE AND PLANS
8. FIRE RESISTIVE ASSEMBLIES:
   a. All Through Penetrations and Wall Membrane Penetrations through Walls of Fire Resistive Construction shall be protected in accordance with their Fire Resistive Ratings.
   b. All walls of fire and/or smoke resistive construction shall be permanently identified with signs or stenciling in lettering not less than 3 inches (76 mm) in. height with a minimum 3/8 inch (9.5 mm) stroke in a contrasting color incorporating the following wording: FIRE AND/OR SMOKE BARRIER "#" HOUR RATED, PROTECT ALL OPENINGS, signs or stenciling shall be located above ceilings on both sides of the wall, located 15'-0" from ends of wall and at intervals not to exceed 30'-0" horizontally along the wall or partition. Note: "#" indicates the hourly rating of the wall or partition.
9. FIRE RESISTIVE CONSTUCTION: Refer to X/A101 through X/A105 for Typical Details. Refer to to the Regulatory Floor Plans for the Rated Horizontal Assembly location(s).
10. FIRE ASSEMBLIES FOR STRUCTURAL STEEL: Refer to detail A7 - X/A102 for fire assembly requirements for all concealed and exposed horizontal, vertical and diagonal structural steel members.

F18 — Floor Plan Legend

No Scale

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
ENLARGED FLOOR PLANS
Drawing

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LICENSED ARCHITECT REGISTERED U.S. PATENT OFFICE No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

Designed By: -
Drawn By: -
Checked By: MF
Reviewed By: MF

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Scale: As indicated
Project Number: 2171
Date: 12/22/22

L/A121.4
AD8

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DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- MECHANICAL, Air Supply Grill
- MECHANICAL, Air Return Grill
- MECHANICAL, Strip Grill
- MECHANICAL, Exhaust Fan
- FIRE PROTECTION, Fire Sprinkler Head. Refer to Fire Protection Drawings.
- OD PLUMBING, Overflow Drain
- PLUMBING, Roof Drain, Refer to Plumbing.
- SD ELECTRICAL, Fire Alarm Device
- SV ELECTRICAL, Fire Alarm Device, Audio/Visual
- (RA) ROOF ACCESSORIES, Roof Hatch
- ACOUSTICAL CEILINGS, Suspended Ceiling Compression Strut/ Splay Wire location
- ELECTRICAL, Light Fixture, Recessed, Unless Noted Otherwise. (p) = Pendant Mounted (s) = Surface Mounted
- ELECTRICAL, Light Fixture. Wall Mounted
- ELECTRICAL, Light Fixture, Linear
- STEEL AND FABRICATIONS, Access Ladder
- VS ELECTRICAL, Vape Sensor. Refer to ELECTRICAL for Data outlet. Device to be OFOI .
- CEMENT PLASTER, Cement Plaster System
- GYPSUM BOARD, Refer to Interior Finish Schedule. Support Gyp. Bd. from METAL FRAMING. See Structural detail **16-X/S603** for typical soffit framing and metal framing attachment to Metal deck.
- FIBER-CEMENT PANELS
- ACOUSTICAL CEILINGS, ACT-II, ACT-IV, ACT-IX, ACT XV, ACT-XVII
- ACOUSTICAL CEILINGS, ACT-III
- ACOUSTICAL CEILINGS, ACT-X
- ACOUSTICAL CEILINGS, ACT-XII
- ACOUSTICAL CEILINGS, ACT-XIII
- INSULATION, Acoustical Blanket, 1" Thick, Stick Pinned to Metal Deck
- METAL DECK/ ACOUSTICAL METAL DECK, Open to above. Refer to Interior Finish Schedule for Deck type. See Interior Finish Schedule for INSULATION, Black Faced Acoustic Insulation locations.
- MCM, Metal Panels @ Canopy
- PERFORATED METAL PANELS See Roof Plan for more information. See Detail A4 X/A513, A11 X/A513, A1 X/A513
- TRANSLUCENT PANELS, Skylight Panel System, See Detail A9 X/A514, F4 X/A514, F11 X/A514, F14 X/A514, L14 X/A514
- ACOUSTICAL CEILINGS, ACT-XI
- ACOUSTICAL CEILINGS, ACT-XVI
- ACCESS DOORS AND FRAMES, Ceiling Access. 20" x 30" minimum. Contractor to field verify clear headroom of not less than 30 inches.
- 1 Hr. Corridor Wall - (1 Hr. Fire Resistive Construction, 20 Min. Door Assemblies, 45 Min. Window Assemblies)
- 1 Hr. Fire Barrier - (1 Hr. Fire Resistive Construction, 60 Min. Door Assemblies)
- 1 Hr. Occupancy Separation / Fire Partition - (1 Hr. Fire Resistive Construction, 45 Min. Door Assemblies, 45 Min. Window Assemblies)
- MISCELLANEOUS SPECIALTIES, Unistrut Support System Refer to Drawing X/A606 for details
- Reference Point

ABBREVIATIONS

Clg.	Ceiling	OF	Over Flow
Ht.	Height	UNO	Unless Noted Otherwise
LO	Louver Opening	ACT	ACOUSTICAL CEILINGS, Tile, Suspended,
Typ.	Typical	CP	CEMENT PLASTER, System
Sim.	Similar	GB	GYPSUM BOARD, Type "X", UNO
OH	Opposite hand	GLB	GLUE-LAMINATED CONSTRUCTION, Beam
DS	Downspout	MD	METAL DECK

NOTES

1. ACOUSTICAL CEILINGS, For typical suspended ceiling support and bracing. Refer to N11 X/A603, A1 X/A603, N1 X/A603, J14 X/A603, A11 X/A603, A14 X/A603, E18 X/A602
2. Gypsum Board Ceilings Noted As "CLG HT Varies", Gypsum Board is attached to bottom side of framing/ joists, UNO
3. Ceiling Heights indicated are above Finish Floor at each floor level, UNO.
4. Where Fire Sprinklers occur at Acoustic Tile, Sprinkler Heads shall be centered in the Tile.
5. Not all fire Sprinkler Head locations are shown to provide code required coverage. But locations shown are intended to convey design intent. Coordinate with FIRE PROTECTION.
6. See Structural drawings and details for the framing of soffits and ceilings.
7. Single Lights or Single Rows of Lights at Soffits/ Ceilings shall be centered, UNO.
8. For ACOUSTICAL CEILINGS at Unistrut Grid Support Refer to Sheet X/A606
9. MCM PANELS, For Typical attachment, See, J11 X/A504, E14 X/A504, J14 X/A504, N11 X/A504, A11 X/A504

E18 — Reflected Ceiling Legend
No Scale

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
FIRST REFLECTED CEILING PLAN - AREA A
Drawing

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LICENSED ARCHITECT REGISTERED K. K. FONG No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

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Designed By: -
Drawn By: -
Checked By: MF
Reviewed By: MF

Scale: 1/8" = 1'-0"
Project Number: 2171
Date: 12/22/22

L/A202.4
AD8

A1 — Reflected Ceiling Plan- First Floor Area A
1/8" = 1'-0"
Refer to E18 for Symbols, Abbreviations, and Notes.

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DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

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ABBREVIATIONS

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Ht.	Height	UNO	Unless Noted Otherwise
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Typ.	Typical	CP	CEMENT PLASTER, System
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DS	Downspout	MD	METAL DECK

NOTES

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E18 — Reflected Ceiling Legend

No Scale

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1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
FIRST REFLECTED CEILING PLAN - AREA B
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LICENSED ARCHITECT MICHAEL K. FENNELL No. C23724 REN. 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

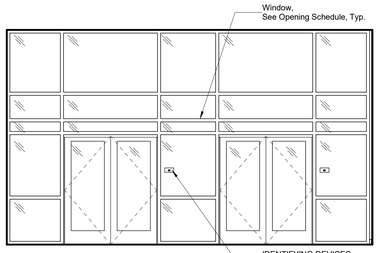
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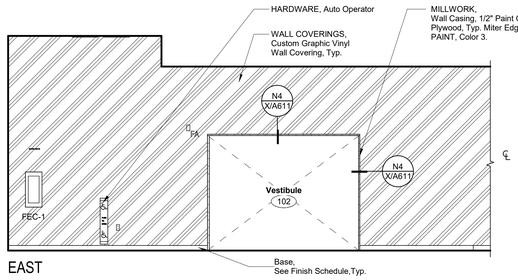
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AD8

A1
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Refer to E18 for Symbols, Abbreviations, and Notes.

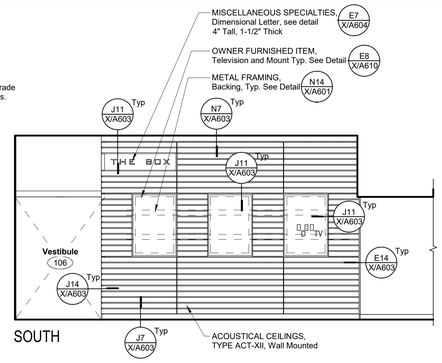
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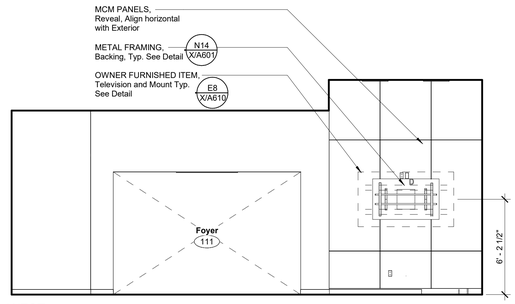
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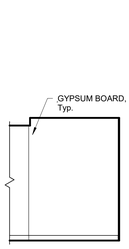


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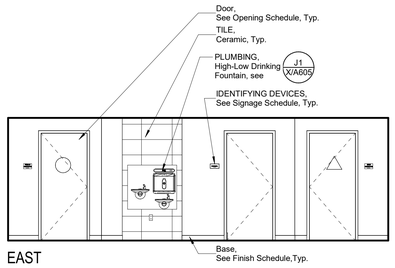


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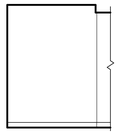
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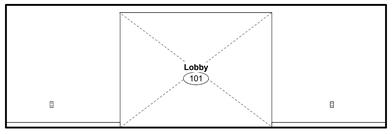
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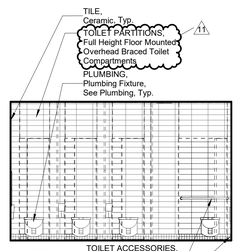


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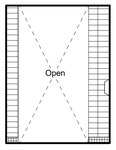


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L102 Vestibule

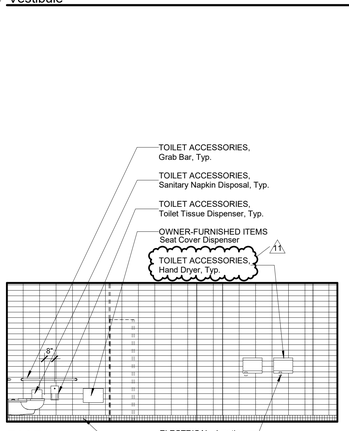


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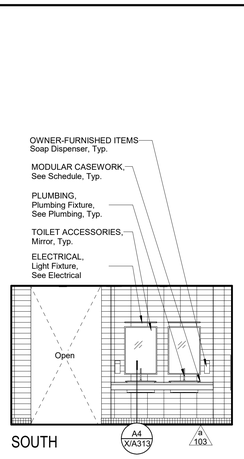


NORTH Partial

L103 Women



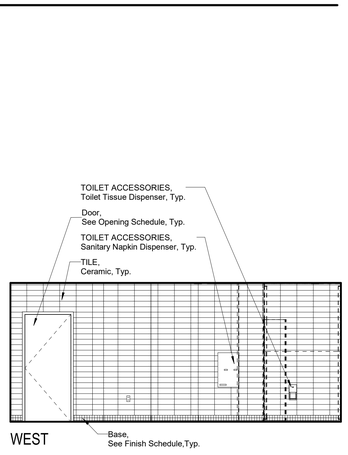
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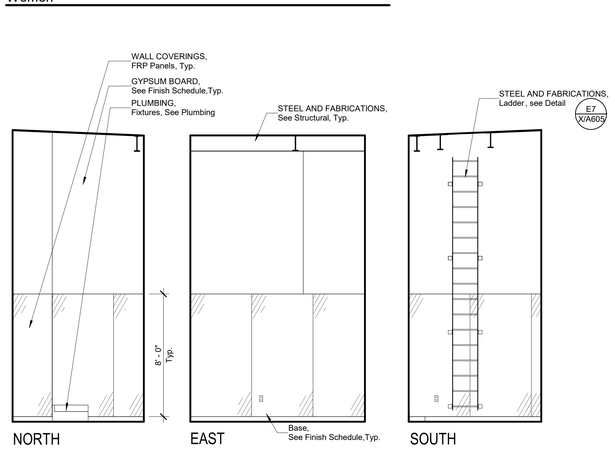


PARTIAL SOUTH



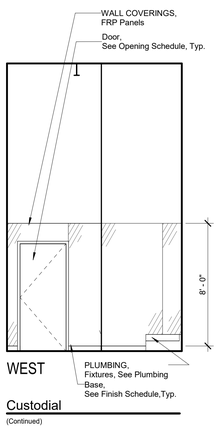
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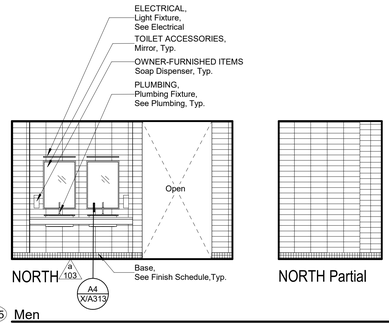


NORTH EAST SOUTH

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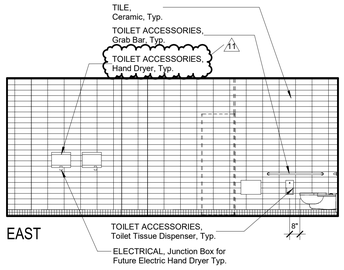


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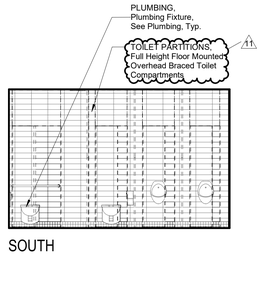


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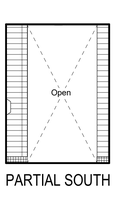
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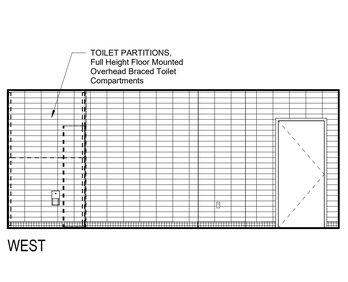
EAST



SOUTH



PARTIAL SOUTH



WEST

L105 Men

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- a / ### — Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 10 — Equipment Item No. Refer to Equipment Schedule.
- FEC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, See A7 X/A605. Provide Fire Rated Cabinet at Rated Walls
- FEBC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Top of Cabinet @ +5'-0", Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls. See FEC for detail.
- ELECTRICAL, Speaker @ +7'-6" to center of device, Unless Noted Otherwise.
- ELECTRICAL, Clock/Speaker @ +7'-6" to center of device, Unless Noted Otherwise. Refer to Specification Section OWNER FURNISHED ITEMS.
- ELECTRICAL, Outlet
- ELECTRICAL, Light Switch
- SV — ELECTRICAL, Audible/Visual Alarm
- V — ELECTRICAL, Volume Control
- TV — ELECTRICAL, Television Outlet
- T — MECHANICAL, Thermostat
- HB — PLUMBING, Hose Bib
- D — ELECTRICAL, Data Outlet
- IS — ELECTRICAL, Intrusion Sensor
- MS — ELECTRICAL, Motion Sensor
- ELECTRICAL, Telephone Outlet Wall Phones +46" top of outlet box.
- GLASS -or- WALL COVERINGS, Glass Marker Wall System
- WALL COVERINGS, FRP Panels -or- WALL COVERING, Acoustical Panel
- WALL COVERINGS, Vinyl Covered Tackboard Panels -or- VISUAL DISPLAY BOARDS, Tack Board Panel
- TILE, Ceramic

ABBREVIATIONS

Gl.	Glass	Sim.	Similar
KS	Knee Space	Dia.	Diameter
OH	Opposite Hand	UNO	Unless Noted Otherwise
Typ.	Typical	Min	Minimum

NOTES

1. All Details, Materials and Finishes shall be considered typical for all similar conditions Unless Noted Otherwise.
2. Refer to Plumbing, Mechanical, Telecommunications, Food Service, and Electrical for all wall mounted devices and coordinate location and heights with Architectural (ie. casework, equipment, etc.)
3. Locate and mount TOILET ACCESSORIES and PLUMBING per detail A1 X/A605 Unless Noted Otherwise.
4. Provide backing at all TOILET ACCESSORIES, TOILET PARTITIONS, and IDENTIFYING DEVICES per detail N14 X/A601 Unless Noted Otherwise.
5. Provide Backing for TOILET ACCESSORIES, Grab Bars per detail E1 X/A605 Sim.
6. Locate and mount IDENTIFYING DEVICES per detail A1 X/A604 Unless Noted Otherwise.
7. Provide backing at all MODULAR CASEWORK per detail N14 X/A601
8. Attach all MODULAR CASEWORK per details L7 X/A310 E7 X/A310
9. WALL COVERINGS, Vinyl Covered Tackboard, See detail E4 X/A601 Where single Board is adjacent to TV, coordinate custom cutout with TV Mount location. Verify TV height with Owner.
10. WALL COVERINGS, FRP Panels, See detail A7 X/A601
11. GYPSUM BOARD, Control Joints, see details J7 X/A601 and J11 X/A601 E7 X/A601 Typ
12. GYPSUM BOARD, Metal Accessories, see details
13. VISUAL DISPLAY BOARDS, Liquid Markerboard/Tack Board, See detail N1 X/A604
14. METAL FRAMING, Backing, See detail N14 X/A601
15. WALL AND CORNER GUARDS, Corner Guard, see detail A1 X/A601
16. WALL AND CORNER GUARDS, Wall Protection, see detail J1 X/A604
17. METAL PANELS, Interior Acoustical Wall Liner Panel, see detail G4 M/A140 Typ
18. Mounting height of all television monitors to be coordinated with owner prior to commencement of work.
19. Refer to Interior Finish Schedule for TILE type and Interior Design Sheets for Pattern, where occurs.
20. For GYPSUM BOARD Horizontal and Vertical Expansion Joint, see A1 X/A102
21. For CEMENT PLASTER Horizontal and Vertical Joints, see A11 X/A505 E8 X/A610
22. OWNER FURNISHED ITEMS, Television Monitor and Mount, see

E18 — Interior Elevation Legend

No Scale

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
INTERIOR ELEVATIONS L101-L105
Drawing

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ARCHITECTURE
PLANNING
INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051
LICENSED ARCHITECT MICHAEL K. FENLON No. C23724 Rev. 4-30-27 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date
5	ADDENDUM 5	12-13-23
11	ADDENDUM 8	9-25-2026

Revision

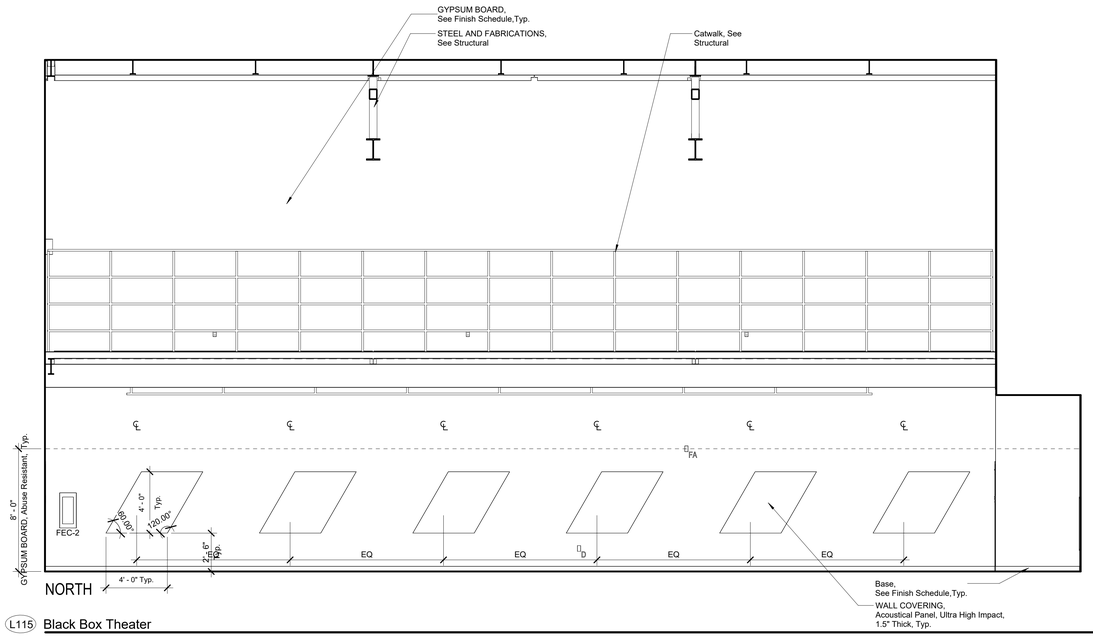
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A1 — Interior Elevations
1/4" = 1'-0"
See E18 for Interior Elevation Legend

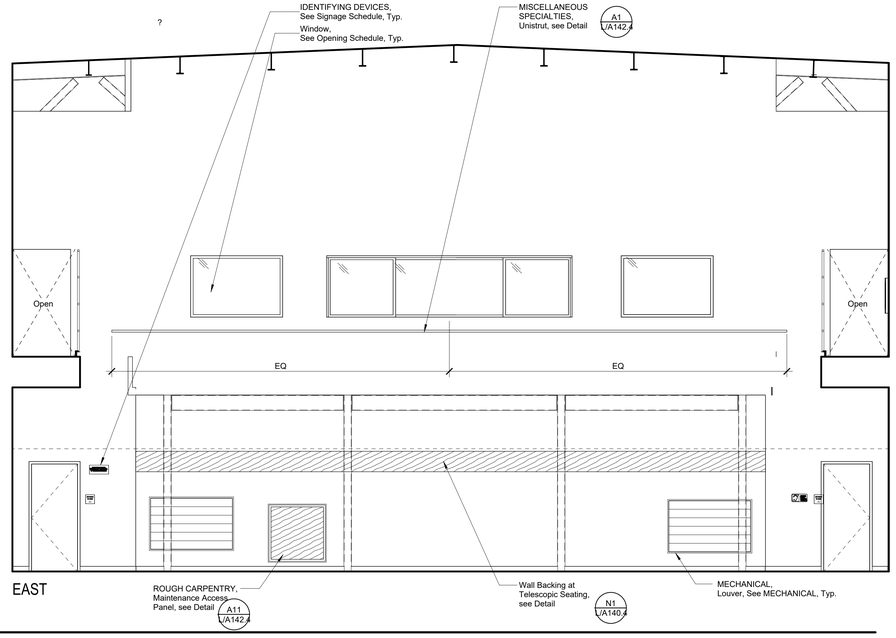
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Project Number: 2171
Date: 12/22/22

L/A601.4
AD8

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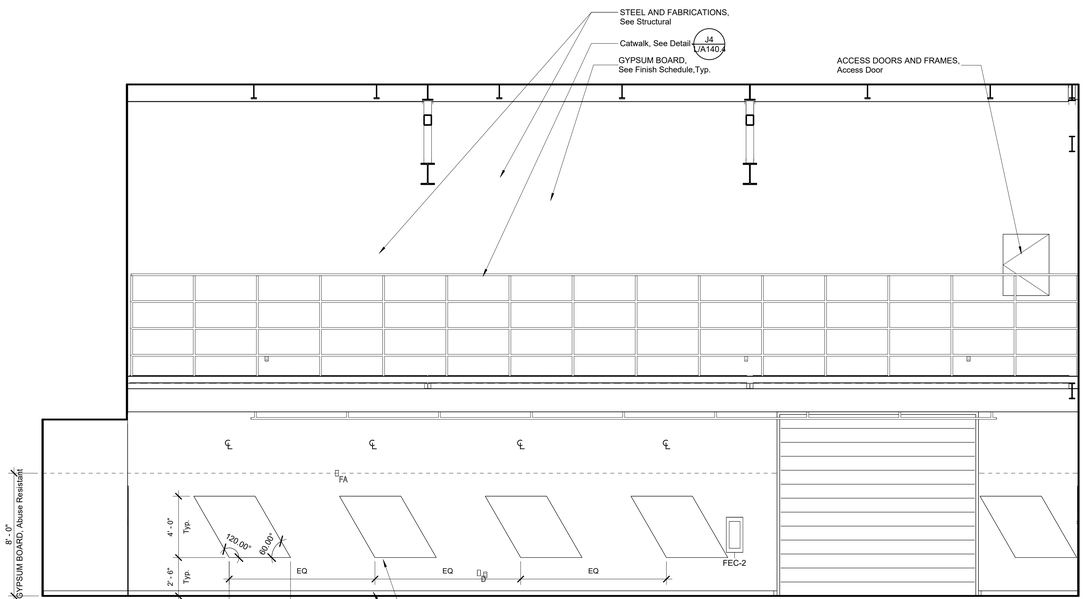


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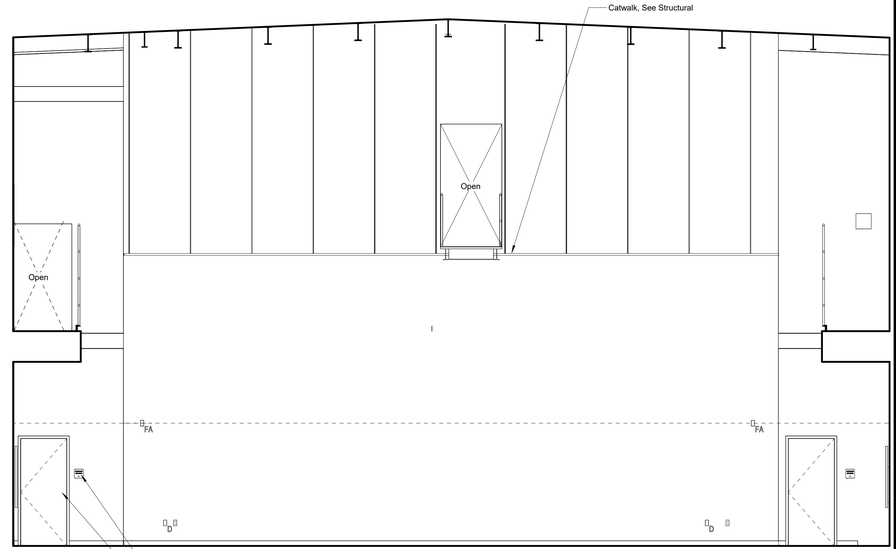


EAST

L115 Black Box Theater

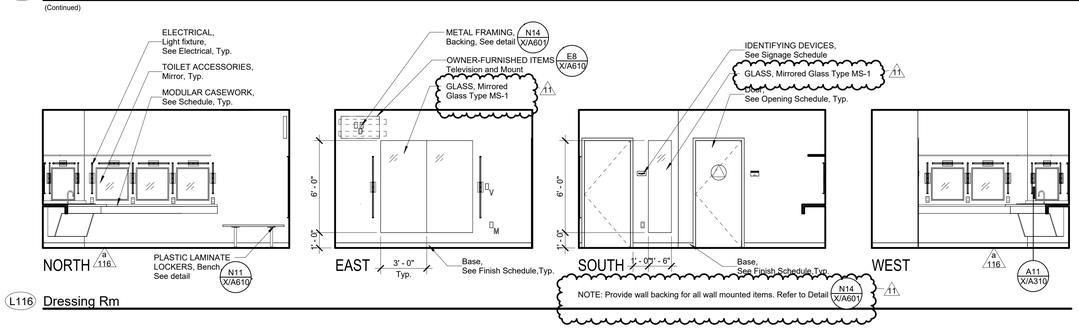


SOUTH



WEST

L115 Black Box Theater
(Continued)



L116 Dressing Rm

A1
1/4" = 1'-0"

Interior Elevations

See E18 for Interior Elevation Legend

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- Equipment Item No. Refer to Equipment Schedule.
- FEC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, See A7 /A605. Provide Fire Rated Cabinet at Rated Walls
- FEBC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Top of Cabinet @ +5'-0", Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls. See FEC for detail.
- ELECTRICAL, Speaker @ +7'-6" to center of device, Unless Noted Otherwise.
- ELECTRICAL, Clock/Speaker @ +7'-6" to center of device, Unless Noted Otherwise. Refer to Specification Section OWNER FURNISHED ITEMS.
- ELECTRICAL, Outlet
- ELECTRICAL, Light Switch
- SV — ELECTRICAL, Audible/Visual Alarm
- V — ELECTRICAL, Volume Control
- TV — ELECTRICAL, Television Outlet
- T — MECHANICAL, Thermostat
- HB — PLUMBING, Hose Bib
- D — ELECTRICAL, Data Outlet
- IS — ELECTRICAL, Intrusion Sensor
- MS — ELECTRICAL, Motion Sensor
- ELECTRICAL, Telephone Outlet Wall Phones +46" top of outlet box.
- GLASS -or- WALL COVERINGS, Glass Marker Wall System
- WALL COVERINGS, FRP Panels -or- WALL COVERING, Acoustical Panel
- WALL COVERINGS, Vinyl Covered Tackboard Panels -or- VISUAL DISPLAY BOARDS, Tack Board Panel
- TILE, Ceramic

ABBREVIATIONS

Gl.	Glass	Sim.	Similar
KS	Knee Space	Dia.	Diameter
OH	Opposite Hand	UNO	Unless Noted Otherwise
Typ.	Typical	Min	Minimum

NOTES

1. All Details, Materials and Finishes shall be considered typical for all similar conditions Unless Noted Otherwise.
2. Refer to Plumbing, Mechanical, Telecommunications, Food Service, and Electrical for all wall mounted devices and coordinate location and heights with Architectural (ie. casework, equipment, etc.)
3. Locate and mount TOILET ACCESSORIES and PLUMBING per detail A1 /A605. Unless Noted Otherwise.
4. Provide backing at all TOILET ACCESSORIES, TOILET PARTITIONS, and IDENTIFYING DEVICES per detail N14 /A601. Unless Noted Otherwise.
5. Provide Backing for TOILET ACCESSORIES, Grab Bars per detail E1 /A605 Sim.
6. Locate and mount IDENTIFYING DEVICES per detail A1 /A604. Unless Noted Otherwise.
7. Provide backing at all MODULAR CASEWORK per detail N14 /A601
8. Attach all MODULAR CASEWORK per details L7 /A310 E7 /A310
9. WALL COVERINGS, Vinyl Covered Tackboard, See detail E4 /A601. Where single Board is adjacent to TV, coordinate custom cutout with TV Mount location. Verify TV height with Owner.
10. WALL COVERINGS, FRP Panels, See detail A7 /A601
11. GYPSUM BOARD, Control Joints, see details J7 /A601 and J11 /A601 Typ
12. GYPSUM BOARD, Metal Accessories, see details E7 /A601
13. VISUAL DISPLAY BOARDS, Liquid Markerboard/Tack Board, See detail N1 /A604
14. METAL FRAMING, Backing, See detail N14 /A601
15. WALL AND CORNER GUARDS, Corner Guard, see detail A1 /A601
16. WALL AND CORNER GUARDS, Wall Protection, see detail J1 /A604
17. METAL PANELS, Interior Acoustical Wall Liner Panel, see detail G4 /M/A140 Typ
18. Mounting height of all television monitors to be coordinated with owner prior to commencement of work.
19. Refer to Interior Finish Schedule for TILE type and Interior Design Sheets for Pattern, where occurs.
20. For GYPSUM BOARD Horizontal and Vertical Expansion Joint, see A1 /A102
21. For CEMENT PLASTER Horizontal and Vertical Joints, see A11 /A505
22. OWNER FURNISHED ITEMS, Television Monitor and Mount, see E8 /A610

E18 — Interior Elevation Legend
No Scale

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
INTERIOR ELEVATIONS L115-L116
Drawing

darden architects
ARCHITECTURE
PLANNING
INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051
LICENSED ARCHITECT — MICHAEL K. FONG — No. C23724 — Exp. 4-30-27 — STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

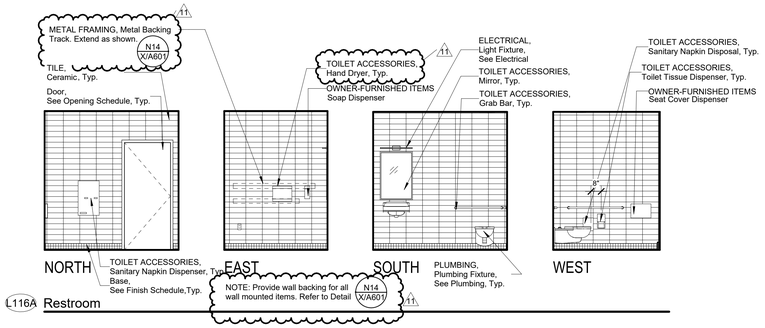
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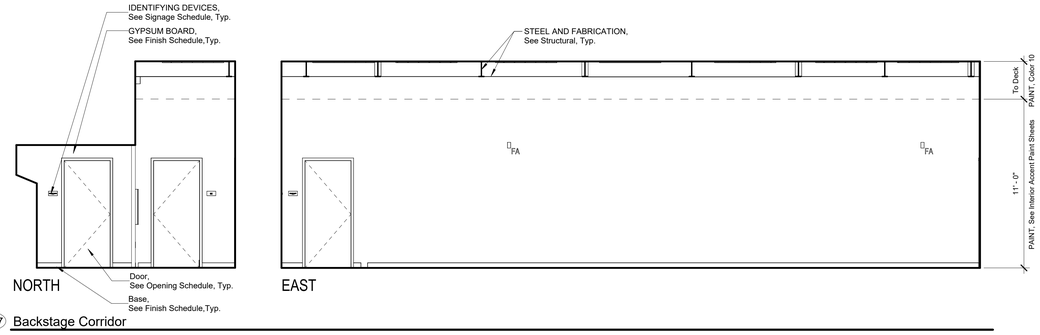
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L/A603.4
AD8

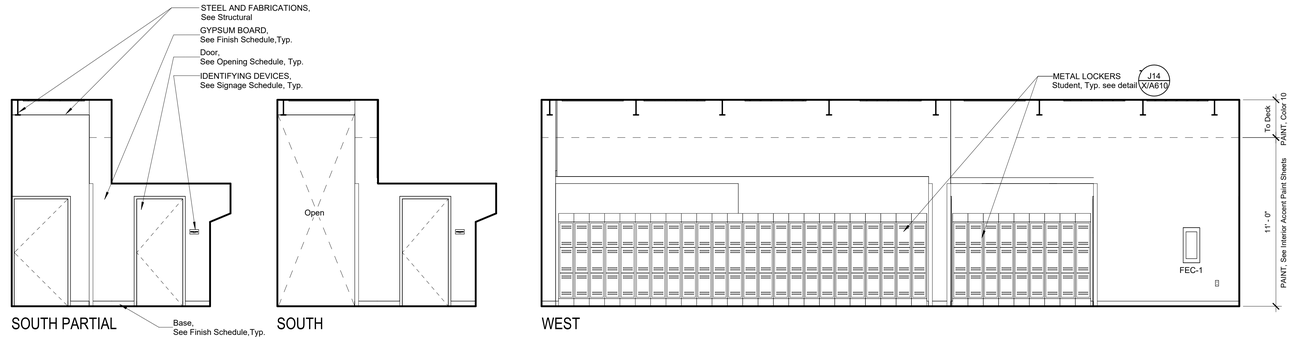
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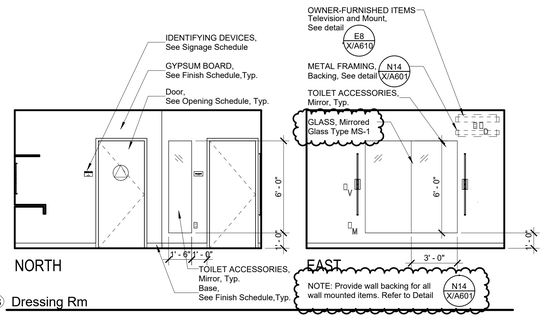
L116A Restroom



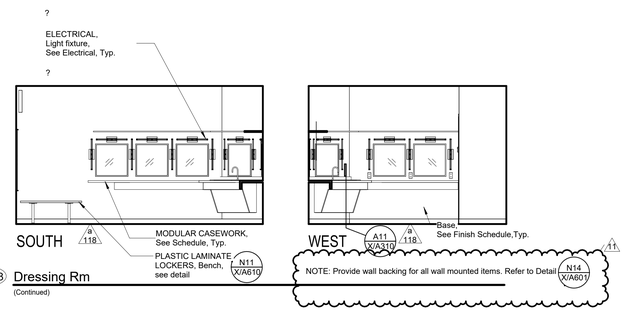
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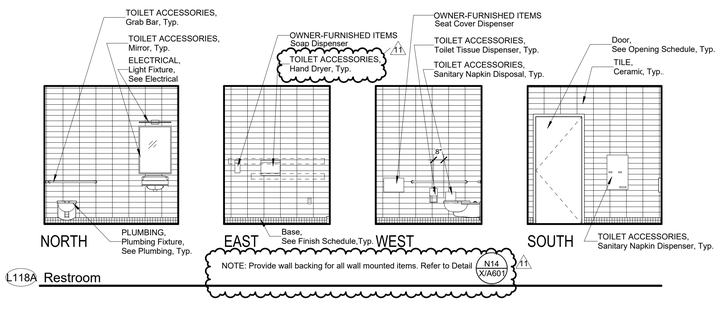
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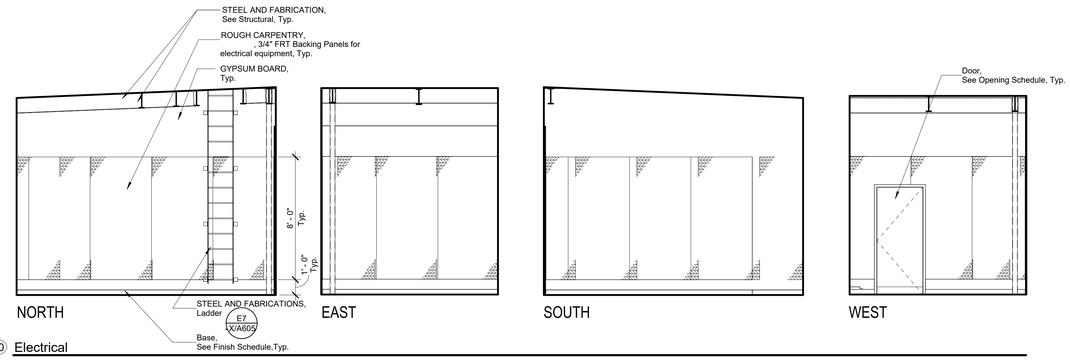
L118 Dressing Rm



L118 Dressing Rm
(Continued)



L118A Restroom



L120 Electrical

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 10 — Equipment Item No. Refer to Equipment Schedule.
- FEC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, See Provide Fire Rated Cabinet at Rated Walls (A7 X/A605)
- FEBC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Top of Cabinet @ +5'-0", Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls. See FEC for detail.
- ELECTRICAL, Speaker @ +7'-6" to center of device, Unless Noted Otherwise.
- ELECTRICAL, Clock/Speaker @ +7'-6" to center of device, Unless Noted Otherwise Refer to Specification Section OWNER FURNISHED ITEMS.
- ELECTRICAL, Outlet
- ELECTRICAL, Light Switch
- SV — ELECTRICAL, Audible/Visual Alarm
- V — ELECTRICAL, Volume Control
- TV — ELECTRICAL, Television Outlet
- T — MECHANICAL, Thermostat
- HB — PLUMBING, Hose Bib
- D — ELECTRICAL, Data Outlet
- IS — ELECTRICAL, Intrusion Sensor
- MS — ELECTRICAL, Motion Sensor
- ELECTRICAL, Telephone Outlet Wall Phones +46" top of outlet box.
- GLASS -or- WALL COVERINGS, Glass Marker Wall System
- WALL COVERINGS, FRP Panels -or- WALL COVERING, Acoustical Panel
- WALL COVERINGS, Vinyl Covered Tackboard Panels -or- VISUAL DISPLAY BOARDS, Tack Board Panel
- TILE, Ceramic

ABBREVIATIONS

Gl.	Glass	Sim.	Similar
KS	Knee Space	Dia.	Diameter
OH	Opposite Hand	UNO	Unless Noted Otherwise
Typ.	Typical	Min	Minimum

NOTES

1. All Details, Materials and Finishes shall be considered typical for all similar conditions Unless Noted Otherwise.
2. Refer to Plumbing, Mechanical, Telecommunications, Food Service, and Electrical for all wall mounted devices and coordinate location and heights with Architectural (ie. casework, equipment, etc.)
3. Locate and mount TOILET ACCESSORIES and PLUMBING per detail (A1 X/A605) Unless Noted Otherwise.
4. Provide backing at all TOILET ACCESSORIES, TOILET PARTITIONS, and IDENTIFYING DEVICES per detail (N14 X/A601) Unless Noted Otherwise.
5. Provide Backing for TOILET ACCESSORIES, Grab Bars per detail (E1 X/A605) Sim.
6. Locate and mount IDENTIFYING DEVICES per detail (A1 X/A604) Unless Noted Otherwise.
7. Provide backing at all MODULAR CASEWORK per detail (N14 X/A601)
8. Attach all MODULAR CASEWORK per details (L7 X/A310) (E7 X/A310)
9. WALL COVERINGS, Vinyl Covered Tackboard, See detail (E4 X/A607) Where single Board is adjacent to TV, coordinate custom cutout with TV Mount location. Verify TV height with Owner.
10. WALL COVERINGS, FRP Panels, See detail (A7 X/A601)
11. GYPSUM BOARD, Control Joints, see details (J7 X/A601) and (J11 X/A601) Typ
12. GYPSUM BOARD, Metal Accessories, see details (E7 X/A601) Typ
13. VISUAL DISPLAY BOARDS, Liquid Markerboard/Tack Board, See detail (N1 X/A604)
14. METAL FRAMING, Backing, See detail (N14 X/A601)
15. WALL AND CORNER GUARDS, Corner Guard, see detail (A1 X/A601)
16. WALL AND CORNER GUARDS, Wall Protection, see detail (J1 X/A604)
17. METAL PANELS, Interior Acoustical Wall Liner Panel, see detail (G4 M/A140) Typ
18. Mounting height of all television monitors to be coordinated with owner prior to commencement of work.
19. Refer to Interior Finish Schedule for TILE type and Interior Design Sheets for Pattern, where occurs.
20. For GYPSUM BOARD Horizontal and Vertical Expansion Joint, see (A1 X/A102)
21. For CEMENT PLASTER Horizontal and Vertical Joints, see (A11 X/A505) (E8 X/A610)
22. OWNER FURNISHED ITEMS, Television Monitor and Mount, see

E18 — Interior Elevation Legend
No Scale

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
INTERIOR ELEVATION L116A-L120
Drawing

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ARCHITECTURE
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INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

LICENSED ARCHITECT MICHAEL K. FERNOW No. C23724 Ren. 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

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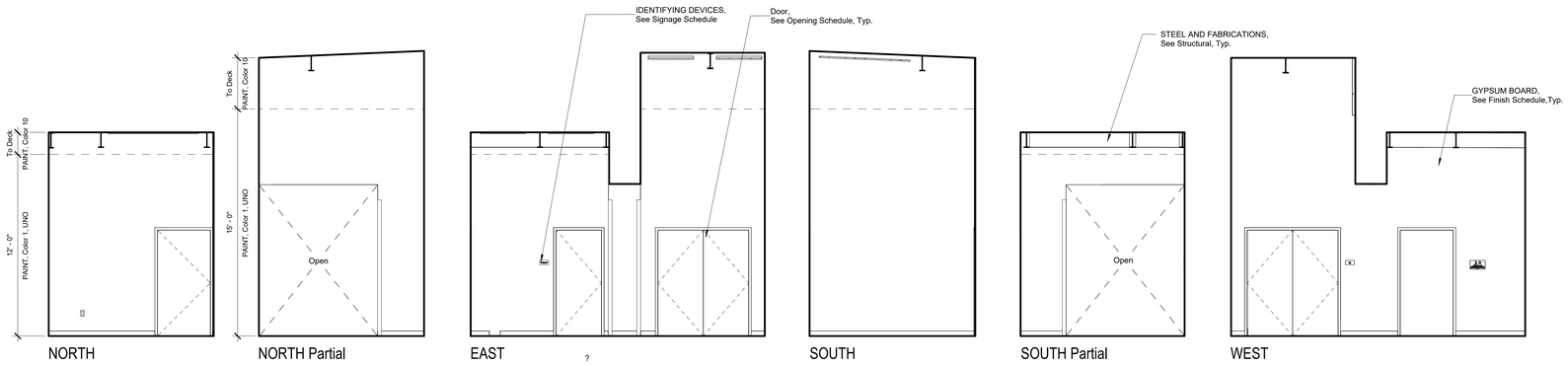
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Project Number: 2171
Date: 12/22/22

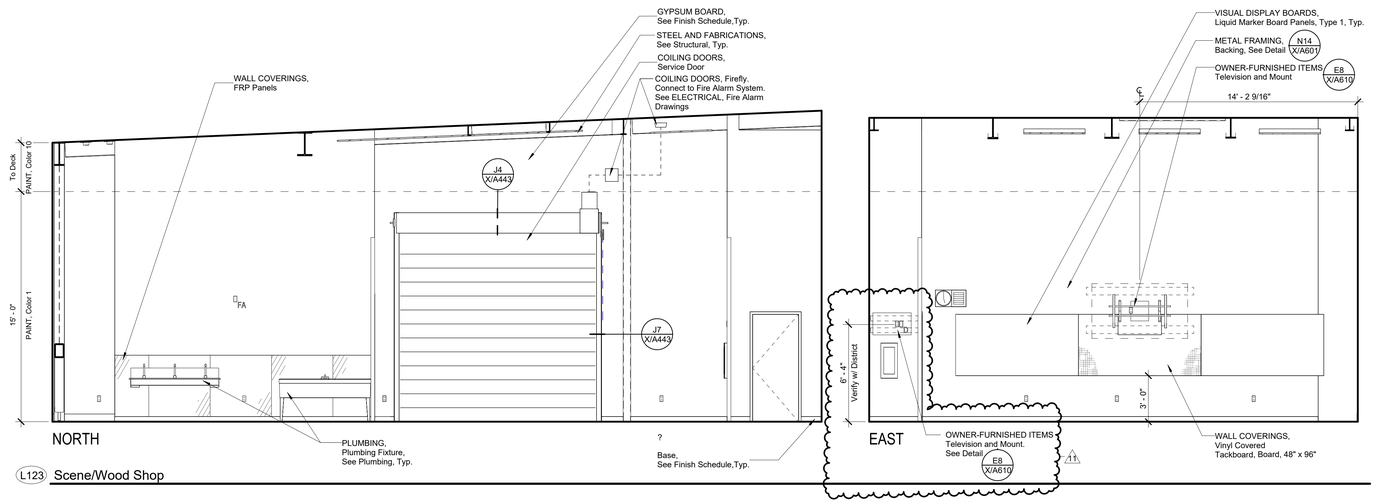
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A1 — Interior Elevations
1/4" = 1'-0"
See E18 for Interior Elevation Legend

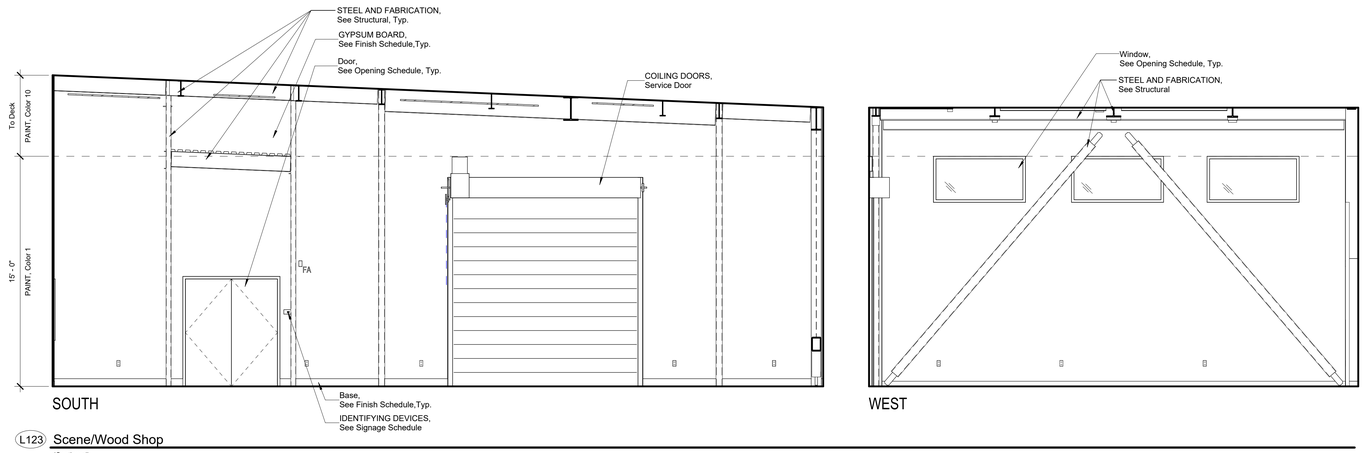
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L122B Corridor



L123 Scene/Wood Shop



L123 Scene/Wood Shop
(Continued)

SYMBOLS

- Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 10 — Equipment Item No. Refer to Equipment Schedule.
- FEC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, See A7 X/A605. Provide Fire Rated Cabinet at Rated Walls
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ABBREVIATIONS

Gl.	Glass	Sim.	Similar
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Typ.	Typical	Min	Minimum

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4. Provide backing at all TOILET ACCESSORIES, TOILET PARTITIONS, and IDENTIFYING DEVICES per detail N14 X/A601 Unless Noted Otherwise.
5. Provide Backing for TOILET ACCESSORIES, Grab Bars per detail E1 X/A605 Sim.
6. Locate and mount IDENTIFYING DEVICES per detail A1 X/A604 Unless Noted Otherwise.
7. Provide backing at all MODULAR CASEWORK per detail N14 X/A601
8. Attach all MODULAR CASEWORK per details L7 X/A310 E7 X/A310
9. WALL COVERINGS, Vinyl Covered Tackboard, See detail E4 X/A601 Where single Board is adjacent to TV, coordinate custom cutout with TV Mount location. Verify TV height with Owner.
10. WALL COVERINGS, FRP Panels, See detail A7 X/A601
11. GYPSUM BOARD, Control Joints, see details J7 X/A601 and J11 X/A601
12. GYPSUM BOARD, Metal Accessories, see details E7 X/A601 Typ
13. VISUAL DISPLAY BOARDS, Liquid Markerboard/Tack Board, See detail N1 X/A604
14. METAL FRAMING, Backing, See detail N14 X/A601
15. WALL AND CORNER GUARDS, Corner Guard, see detail A1 X/A601
16. WALL AND CORNER GUARDS, Wall Protection, see detail J1 X/A604 Typ
17. METAL PANELS, Interior Acoustical Wall Liner Panel, see detail G4 M/A140
18. Mounting height of all television monitors to be coordinated with owner prior to commencement of work.
19. Refer to Interior Finish Schedule for TILE type and Interior Design Sheets for Pattern, where occurs.
20. For GYPSUM BOARD Horizontal and Vertical Expansion Joint, see A1 X/A102
21. For CEMENT PLASTER Horizontal and Vertical Joints, see A11 X/A505 E8 X/A610
22. OWNER FURNISHED ITEMS, Television Monitor and Mount, see

E18 — Interior Elevation Legend
No Scale

DSA File No.: *10-H15*

DSA Application No.: *02-120779*

Agency Approval

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
INTERIOR ELEVATIONS L122B, L123
Drawing

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LICENSED ARCHITECT RODNEY K. K. FENG No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

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Designed By: -
Drawn By: -
Checked By: MF
Reviewed By: MF

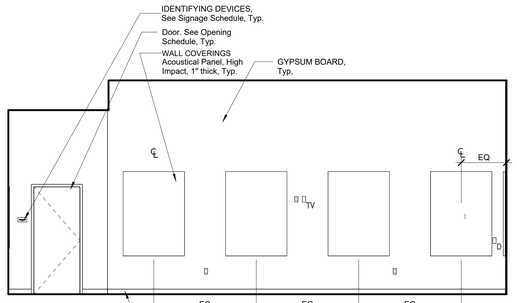
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Project Number: 2171
Date: 12/22/22

L/A606.4
AD8

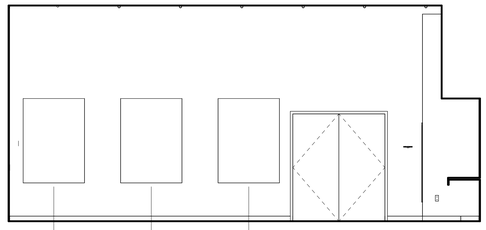
A1 — Interior Elevations
1/4" = 1'-0"
See E18 for Interior Elevation Legend

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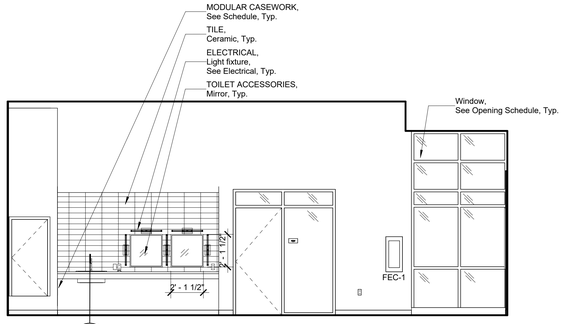
L124 Drama Room



NORTH

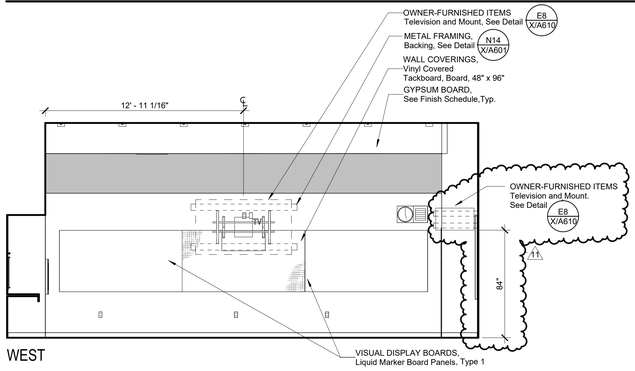


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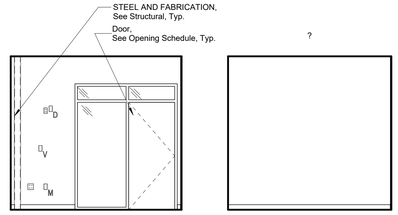
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L124 Drama Room



WEST

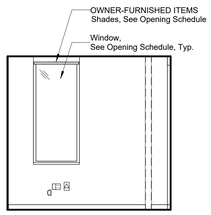
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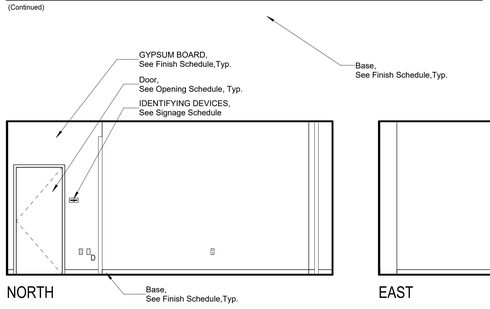
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SOUTH ?

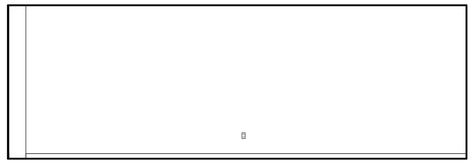


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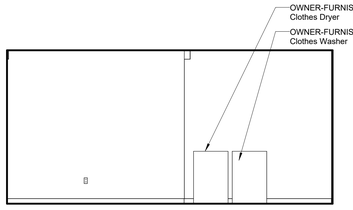
L124 Drama Room
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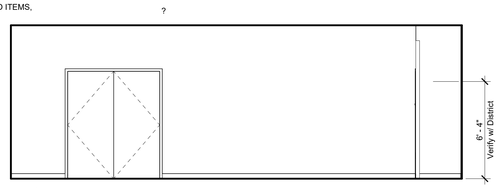
NORTH



EAST



SOUTH



WEST

L124B Drama Storage

E8 X/A610

SYMBOLS

- a ### — Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 10 — Equipment Item No. Refer to Equipment Schedule.
- FEC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, See A7 X/A605. Provide Fire Rated Cabinet at Rated Walls
- FEBC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Top of Cabinet @ +5'-0", Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls. See FEC for detail.
- ELECTRICAL, Speaker @ +7'-6" to center of device, Unless Noted Otherwise.
- ELECTRICAL, Clock/Speaker @ +7'-6" to center of device, Unless Noted Otherwise Refer to Specification Section OWNER FURNISHED ITEMS.
- ELECTRICAL, Outlet
- ELECTRICAL, Light Switch
- SV — ELECTRICAL, Audible/Visual Alarm
- V — ELECTRICAL, Volume Control
- TV — ELECTRICAL, Television Outlet
- T — MECHANICAL, Thermostat
- HB — PLUMBING, Hose Bib
- D — ELECTRICAL, Data Outlet
- IS — ELECTRICAL, Intrusion Sensor
- MS — ELECTRICAL, Motion Sensor
- ELECTRICAL, Telephone Outlet Wall Phones +46" top of outlet box.
- GLASS -or- WALL COVERINGS, Glass Marker Wall System
- WALL COVERINGS, FRP Panels -or- WALL COVERING, Acoustical Panel
- WALL COVERINGS, Vinyl Covered Tackboard Panels -or- VISUAL DISPLAY BOARDS, Tack Board Panel
- TILE, Ceramic

ABBREVIATIONS

Gl.	Glass	Sim.	Similar
KS	Knee Space	Dia.	Diameter
OH	Opposite Hand	UNO	Unless Noted Otherwise
Typ.	Typical	Min	Minimum

NOTES

1. All Details, Materials and Finishes shall be considered typical for all similar conditions Unless Noted Otherwise.
2. Refer to Plumbing, Mechanical, Telecommunications, Food Service, and Electrical for all wall mounted devices and coordinate location and heights with Architectural (ie. casework, equipment, etc.)
3. Locate and mount TOILET ACCESSORIES and PLUMBING per detail A1 X/A605 Unless Noted Otherwise.
4. Provide backing at all TOILET ACCESSORIES, TOILET PARTITIONS, and IDENTIFYING DEVICES per detail N14 X/A601 Unless Noted Otherwise.
5. Provide Backing for TOILET ACCESSORIES, Grab Bars per detail E1 X/A605 Sim.
6. Locate and mount IDENTIFYING DEVICES per detail A1 X/A604 Unless Noted Otherwise.
7. Provide backing at all MODULAR CASEWORK per detail N14 X/A601
8. Attach all MODULAR CASEWORK per details L7 X/A310 E7 X/A310
9. WALL COVERINGS, Vinyl Covered Tackboard, See detail E4 X/A601 Where single Board is adjacent to TV, coordinate custom cutout with TV Mount location. Verify TV height with Owner.
10. WALL COVERINGS, FRP Panels, See detail A7 X/A601
11. GYPSUM BOARD, Control Joints, see details J7 X/A601 and J11 X/A601
12. GYPSUM BOARD, Metal Accessories, see details E7 X/A601 Typ
13. VISUAL DISPLAY BOARDS, Liquid Markerboard/Tack Board, See detail N1 X/A604
14. METAL FRAMING, Backing, See detail N14 X/A601
15. WALL AND CORNER GUARDS, Corner Guard, see detail A1 X/A601
16. WALL AND CORNER GUARDS, Wall Protection, see detail J1 X/A604
17. METAL PANELS, Interior Acoustical Wall Liner Panel, see detail G4 M/A140 Typ
18. Mounting height of all television monitors to be coordinated with owner prior to commencement of work.
19. Refer to Interior Finish Schedule for TILE type and Interior Design Sheets for Pattern, where occurs.
20. For GYPSUM BOARD Horizontal and Vertical Expansion Joint, see A1 X/A102
21. For CEMENT PLASTER Horizontal and Vertical Joints, see A11 X/A505 E8 X/A610
22. OWNER FURNISHED ITEMS, Television Monitor and Mount, see

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

E18 — Interior Elevation Legend
No Scale

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
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Project

BUILDING L
INTERIOR ELEVATIONS L124-L124B
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Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

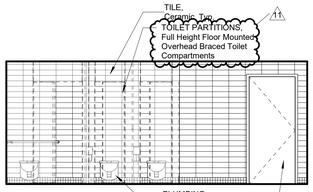
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A1 — Interior Elevations
1/4" = 1'-0"
See E18 for Interior Elevation Legend

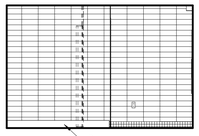
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Drawn By: -
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Reviewed By: MF
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Project Number: 2171
Date: 12/22/22

L/A607.4
AD8

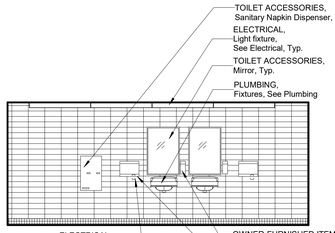
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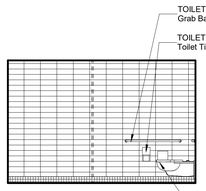
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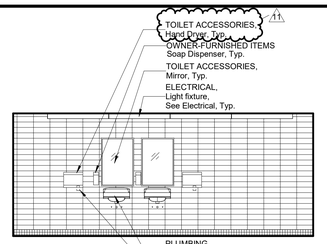


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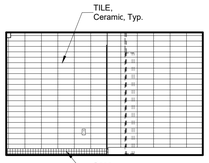


WEST

L132 Girls

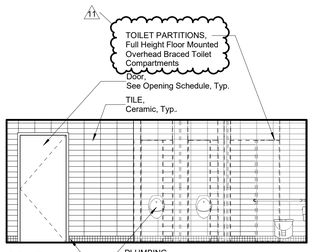


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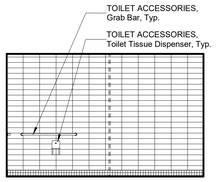


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L133 Boys

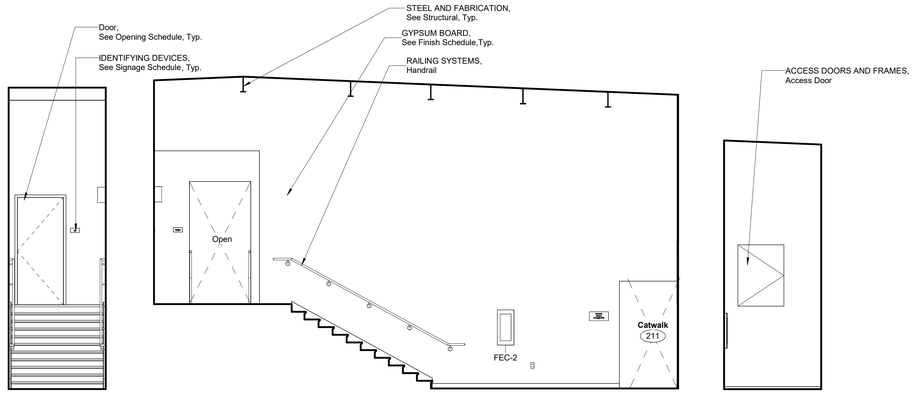


SOUTH



WEST

L133 Boys
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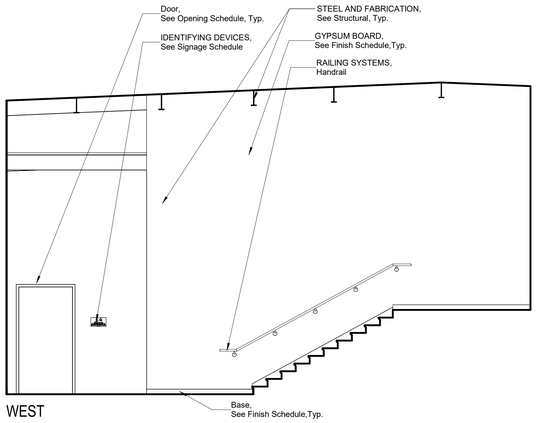


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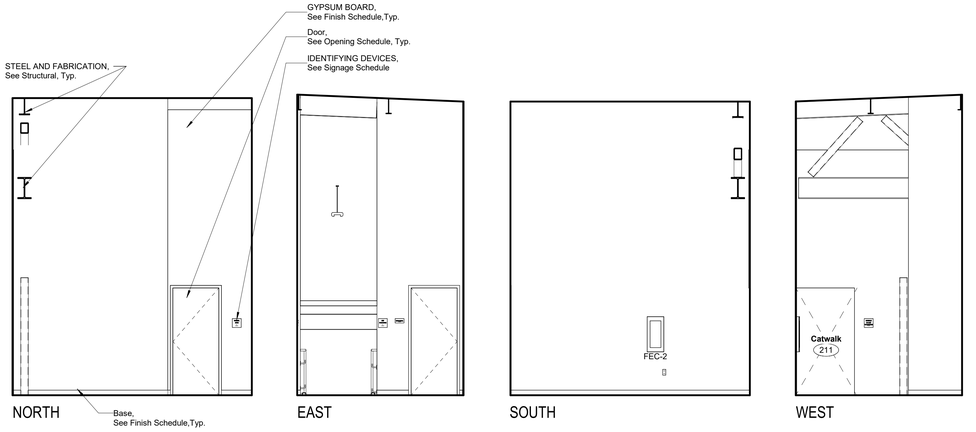
SOUTH

L201 Vest



WEST

L201 Vest
(Continued)



NORTH

EAST

SOUTH

WEST

L202 Vest

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

SYMBOLS

- a / ### — Cabinet Group No. Refer to Modular Casework Schedule and Lab Casework Schedule.
- 10 — Equipment Item No. Refer to Equipment Schedule.
- FEC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher Cabinet, See Provide Fire Rated Cabinet at Rated Walls (A7 / X/A605)
- FEBC — FIRE PROTECTION SPECIALTIES, Fire Extinguisher/Blanket Cabinet, Top of Cabinet @ +5'-0", Unless Noted Otherwise. Provide Fire Rated Cabinet at Rated Walls. Provide Surface Mounted Cabinet at Rated Walls Where Stud Depth is Less than 6" and at Masonry Walls. See FEC for detail.
- ELECTRICAL, Speaker @ +7'-6" to center of device, Unless Noted Otherwise.
- ELECTRICAL, Clock/Speaker @ +7'-6" to center of device, Unless Noted Otherwise Refer to Specification Section OWNER FURNISHED ITEMS.
- ELECTRICAL, Outlet
- ELECTRICAL, Light Switch
- SV — ELECTRICAL, Audible/Visual Alarm
- V — ELECTRICAL, Volume Control
- TV — ELECTRICAL, Television Outlet
- T — MECHANICAL, Thermostat
- HB — PLUMBING, Hose Bib
- D — ELECTRICAL, Data Outlet
- IS — ELECTRICAL, Intrusion Sensor
- MS — ELECTRICAL, Motion Sensor
- ELECTRICAL, Telephone Outlet Wall Phones +46" top of outlet box.
- GLASS -or- WALL COVERINGS, Glass Marker Wall System
- WALL COVERINGS, FRP Panels -or- WALL COVERING, Acoustical Panel
- WALL COVERINGS, Vinyl Covered Tackboard Panels -or- VISUAL DISPLAY BOARDS, Tack Board Panel
- TILE, Ceramic

ABBREVIATIONS

Gl.	Glass	Sim.	Similar
KS	Knee Space	Dia.	Diameter
OH	Opposite Hand	UNO	Unless Noted Otherwise
Typ.	Typical	Min	Minimum

NOTES

1. All Details, Materials and Finishes shall be considered typical for all similar conditions Unless Noted Otherwise.
2. Refer to Plumbing, Mechanical, Telecommunications, Food Service, and Electrical for all wall mounted devices and coordinate location and heights with Architectural (ie. casework, equipment, etc.)
3. Locate and mount TOILET ACCESSORIES and PLUMBING per detail (A1 / X/A605) Unless Noted Otherwise.
4. Provide backing at all TOILET ACCESSORIES, TOILET PARTITIONS, and IDENTIFYING DEVICES per detail (N14 / X/A601) Unless Noted Otherwise.
5. Provide Backing for TOILET ACCESSORIES, Grab Bars per detail (E1 / X/A605) Sim.
6. Locate and mount IDENTIFYING DEVICES per detail (A1 / X/A604) Unless Noted Otherwise.
7. Provide backing at all MODULAR CASEWORK per detail (N14 / X/A601)
8. Attach all MODULAR CASEWORK per details (L7 / X/A310) (E7 / X/A310)
9. WALL COVERINGS, Vinyl Covered Tackboard, See detail (E4 / X/A601) Where single Board is adjacent to TV, coordinate custom cutout with TV Mount location. Verify TV height with Owner.
10. WALL COVERINGS, FRP Panels, See detail (A7 / X/A601)
11. GYPSUM BOARD, Control Joints, see details (J7 / X/A601) and (J11 / X/A601)
12. GYPSUM BOARD, Metal Accessories, see details (E7 / X/A601) Typ
13. VISUAL DISPLAY BOARDS, Liquid Markerboard/Tack Board, See detail (N1 / X/A604)
14. METAL FRAMING, Backing, See detail (N14 / X/A601)
15. WALL AND CORNER GUARDS, Corner Guard, see detail (A1 / X/A601)
16. WALL AND CORNER GUARDS, Wall Protection, see detail (J1 / X/A604)
17. METAL PANELS, Interior Acoustical Wall Liner Panel, see detail (G4 / W/A140) Typ
18. Mounting height of all television monitors to be coordinated with owner prior to commencement of work.
19. Refer to Interior Finish Schedule for TILE type and Interior Design Sheets for Pattern, where occurs.
20. For GYPSUM BOARD Horizontal and Vertical Expansion Joint, see (A1 / X/A102)
21. For CEMENT PLASTER Horizontal and Vertical Joints, see (A11 / X/A505)
22. OWNER FURNISHED ITEMS, Television Monitor and Mount, see (E8 / X/A610)

E18 — Interior Elevation Legend
No Scale

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

BUILDING L
INTERIOR ELEVATIONS L132-L202
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LICENSED ARCHITECT — MICHAEL K. FENTON — No. C23724 — Exp. 4-30-27 — STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
11	ADDENDUM 8	9-25-2026

Revision

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Designed By: -
Drawn By: -
Checked By: MF
Reviewed By: MF

Scale: 1/4" = 1'-0"
Project Number: 2171
Date: 12/22/22

L/A614.4
AD8

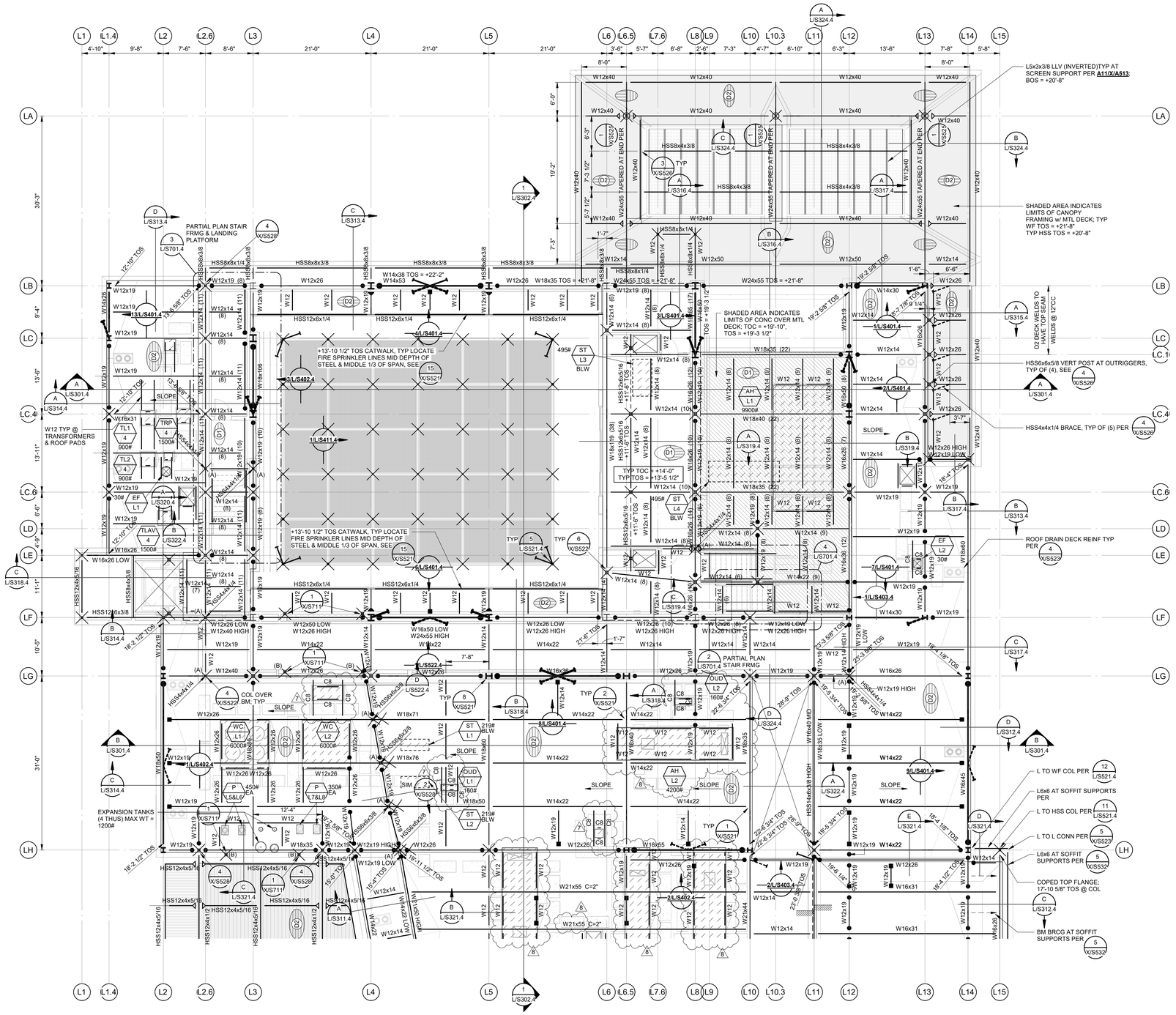
A1 — Interior Elevations
1/4" = 1'-0"
See E18 for Interior Elevation Legend

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DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval



FLOOR AND LOW ROOF FRAMING PLAN BLDG L - AREA A

1/8" = 1'-0"

BUEHLER
600 Q STREET, SUITE 200
SACRAMENTO, CA 95811
916 443 0303

Consultant

SANGER EDUCATION COMPLEX - PHASE 3

Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727

Project

BUILDING L

FLOOR AND LOW ROOF FRAMING PLAN - AREA A

Drawing

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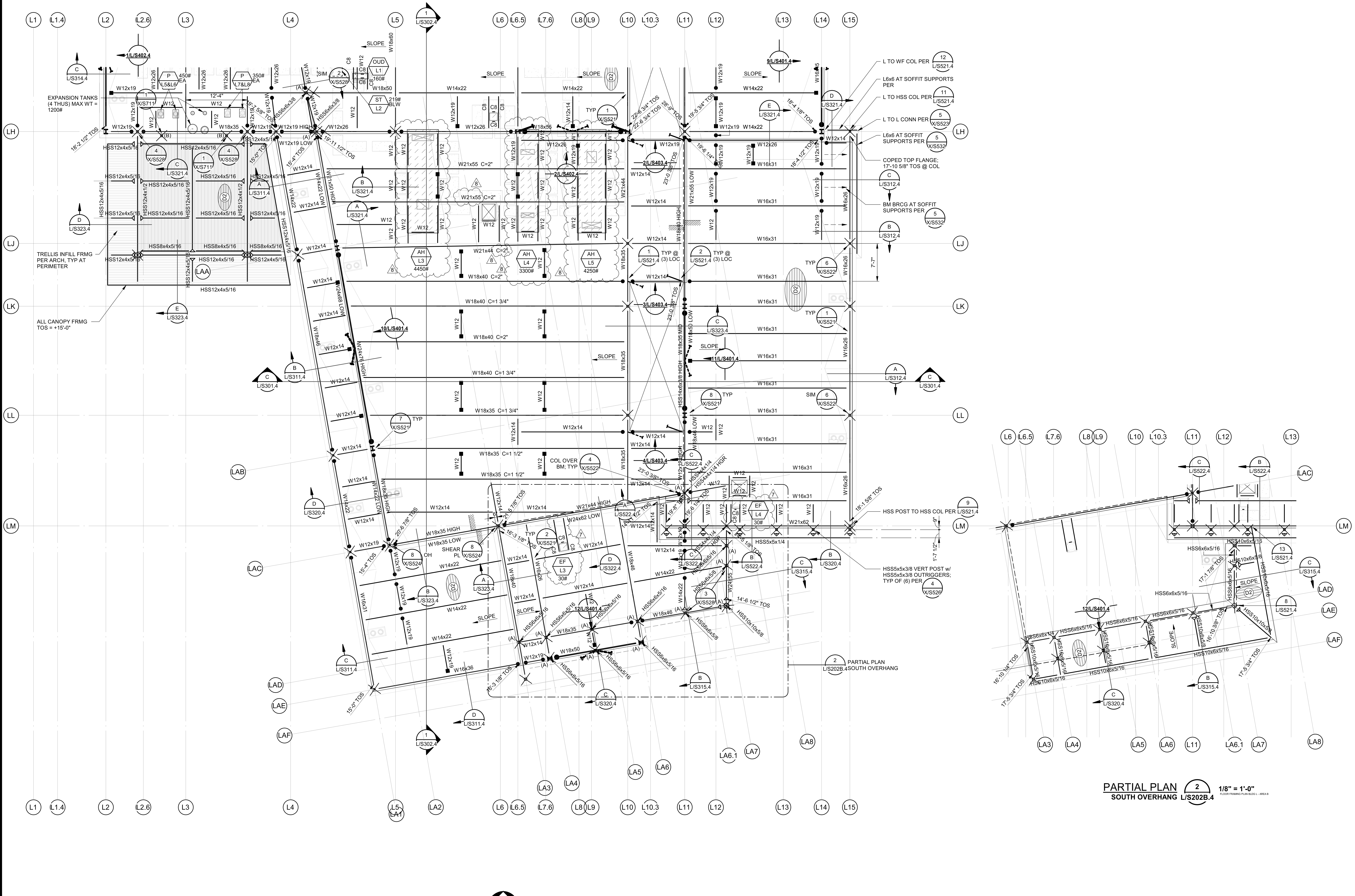
Architect

No.	Revision/Submission	Date
7	ADDENDUM 7	9/10/2026
8	ADDENDUM 8	9/25/2026

Revision

	Designed By: NY	Copyright 2021 Darden Architects
Scale: 1/8" = 1'-0"	Drawn By: RAZ	L/S202A.4
Project Number: 2171	Checked By: AAS	AD8
Date: 12/20/2022	Reviewed By: AAS	

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FLOOR FRAMING PLAN BLDG L - AREA B 1/8" = 1'-0"

PARTIAL PLAN SOUTH OVERHANG 2 L/S202B.4 1/8" = 1'-0"

DSA File No.: 10-H15

DSA Application No.: 02-120779

Agency Approval

BUEHLER
600 Q STREET, SUITE 200
SACRAMENTO, CA 95811
916 443 0303

Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727

Project

BUILDING L
LOW ROOF FRAMING PLAN - AREA B

Drawing

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LICENSED ARCHITECT MICHAEL K. FENESCEY No. C23724 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
7	ADDENDUM 7	9/10/2026
8	ADDENDUM 8	9/25/2026

Revision

		Designed By: NY	Copyright 2021 Darden Architects
Scale:	1/8" = 1'-0"	Drawn By: RAZ	L/S202B.4
Project Number:	2171	Checked By: AAS	
Date:	12/20/2022	Reviewed By: AAS	AD8

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N

ENLARGED PLUMBING SITE PLAN

SCALE: 1"=20'-0"

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

General Notes

LAWRENCE ENGINEERING GROUP
4910 E. Clinton Way, Suite 101 Fresno, CA 93727
(559) 431-6181 FAX (559) 431-1342
22040

REGISTERED PROFESSIONAL ENGINEER MICHAEL D. CAMPBELL No. M 25886 Exp. 6/30/26 MECHANICAL STATE OF CALIFORNIA

Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

SITE DEVELOPMENT
ENLARGED PLUMBING SITE PLAN
Drawing

darden architects
ARCHITECTURE PLANNING INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

LICENSED ARCHITECT MICHAEL K. FONG No. C23724 Renewal 4-30-27 STATE OF CALIFORNIA

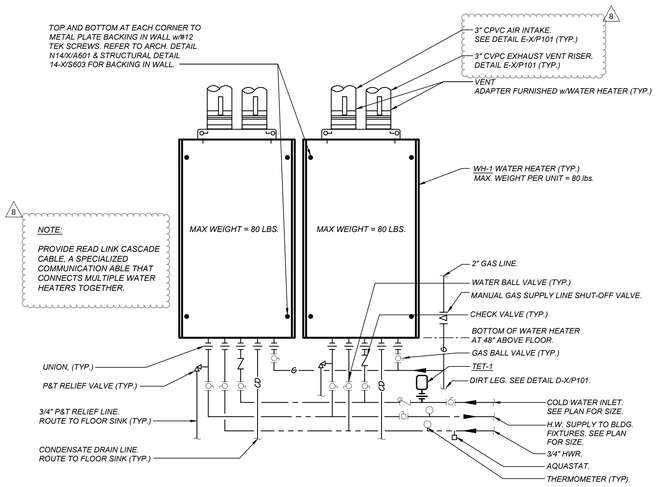
Architect

No.	Revision/Submission	Date
8	Addendum #8	9/25/2026

Revision

	Designed By:	Copyright 2021 Darden Architects
Scale:	Drawn By: LEG	
Project Number: 2171	Checked By:	SD/P101.4
Date: 08/11/23	Reviewed By:	AD8

15 September 2026 5:24 PM P:\2022\22040 Sanger USD Ed Center Phase 3\4-Drawings\5 CP\SDP101.4 - ENLARGED PLUMBING SITE PLAN.dwg ryanf

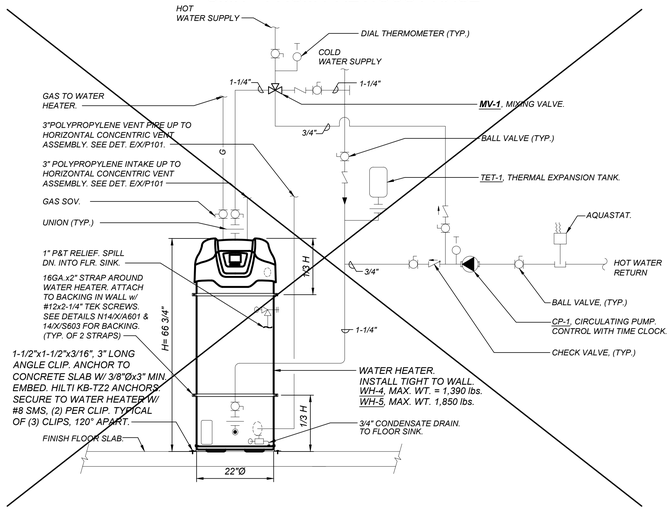


(2) TANKLESS WATER HEATERS (WH-2)

A X/P102

SCALE: NONE

OMIT - FROM PREVIOUS PHASE

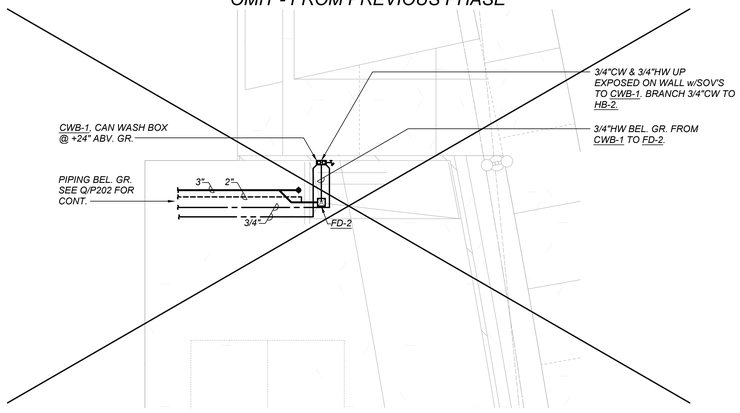


GAS WATER HEATER (WH-4 & WH-5)

C X/P102

SCALE: DIAGRAMATIC

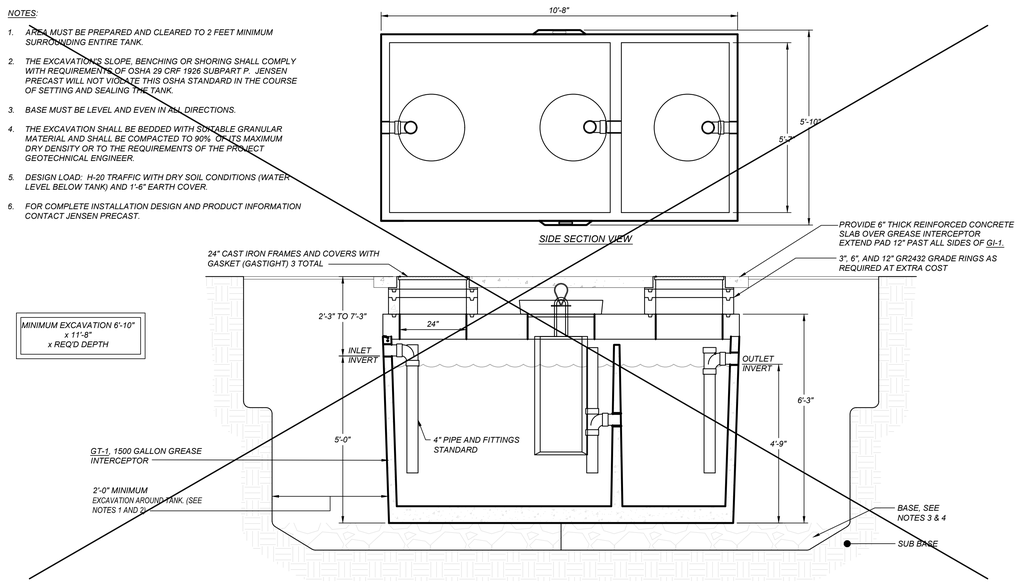
OMIT - FROM PREVIOUS PHASE



ENLARGED PLUMBING PLAN - BLDG. Q CAN WASH

F X/P102

SCALE: 1/8"=1'-0"



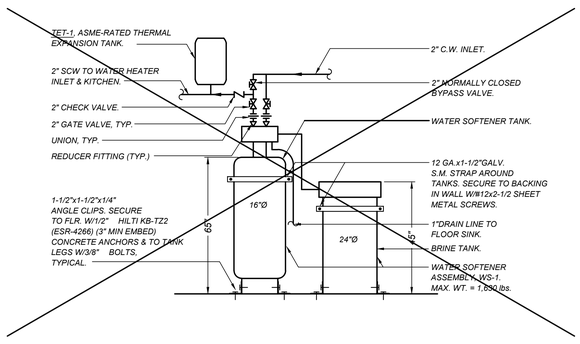
OMIT - FROM PREVIOUS PHASE

GREASE INTERCEPTOR DETAIL

B X/P102

SCALE: NONE

OMIT - FROM PREVIOUS PHASE

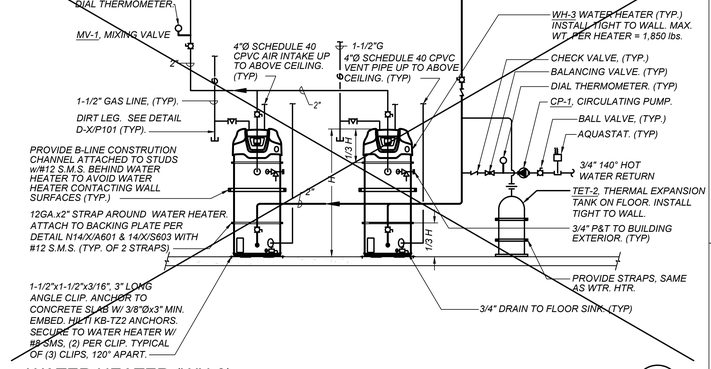


WATER SOFTENER DETAIL

D X/P102

SCALE: NONE

OMIT - FROM PREVIOUS PHASE



WATER HEATER (WH-3)

E X/P102

SCALE: NONE

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

General Notes

LAWRENCE ENGINEERING GROUP
4910 E. Clinton Way, Suite 101 Fresno, CA 93727
(559) 431-6181 22040 FAX (559) 431-1342

REGISTERED PROFESSIONAL ENGINEER MICHAEL D. CAMPBELL Exp. 6-30-25 MECHANICAL STATE OF CALIFORNIA

Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
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Project

TYPICAL INFORMATION
PLUMBING DETAILS

Drawing

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LICENSED ARCHITECT MICHAEL K. FONG No. C23724 Renewal 4-30-27 STATE OF CALIFORNIA

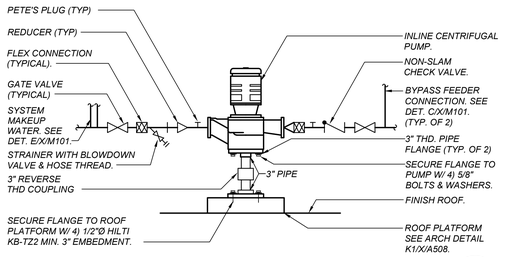
Architect

No.	Revision/Submission	Date
8	Addendum #8	9/25/2026

Revision

	Designed By:	Copyright 2021 Darden Architects
Scale:	Drawn By: LEG	X/P102
Project Number: 2171	Checked By:	
Date: 08/11/23	Reviewed By:	AD8

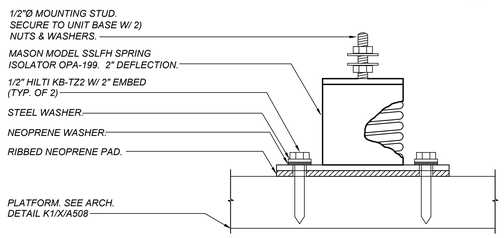
15 September 2026 5:25 PM P:\2022\22040 Sanger USD Ed Center Phase 3\4-Drawings\5 P\X/P102 – DETAILS.dwg ryanf



INLINE PUMP ON BASE PIPING DETAIL

K X/M102

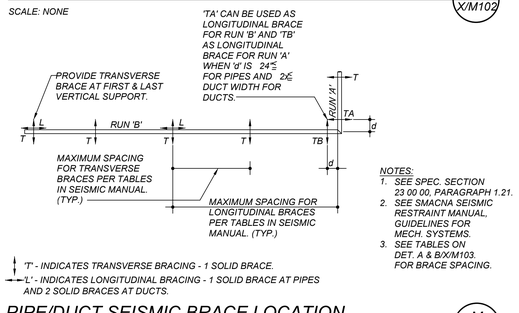
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SPRING ISOLATOR ON PLATFORM DETAIL

L X/M102

SCALE: NONE



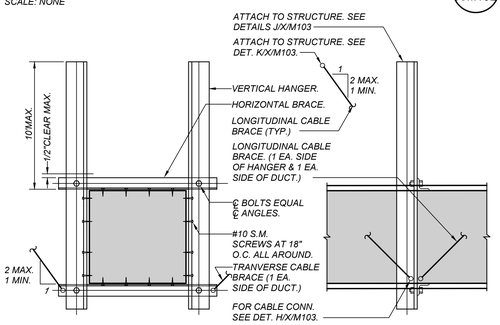
'T' - INDICATES TRANSVERSE BRACING - 1 SOLID BRACE.
'L' - INDICATES LONGITUDINAL BRACING - 1 SOLID BRACE AT PIPES AND 2 SOLID BRACES AT DUCTS.

NOTES:
1. SEE SPEC. SECTION 23 00 00, PARAGRAPH 1.21.
2. SEE SMACNA SEISMIC RESTRAINT MANUAL, GUIDELINES FOR MECH. SYSTEMS.
3. SEE TABLES ON DET. A & B/X/M103. FOR BRACE SPACING.

PIPE/DUCT SEISMIC BRACE LOCATION

M X/M102

SCALE: NONE

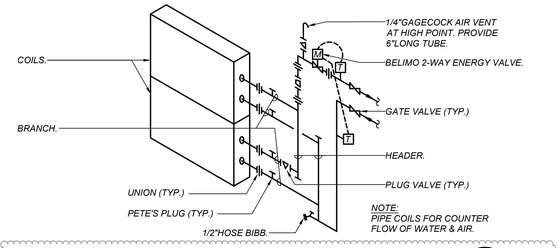


NOTES:
1. SEE SPEC SECTION 23 00 00.
2. FOR DUCT 6 FT. & LARGER.
3. SEE TABLES ON DETAILS A,B,C/X/M103.

SEISMIC RESTRAINT RECT. DUCT SUPPORT

N X/M102

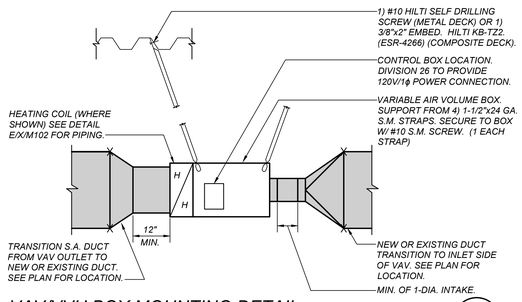
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AHU-L1: 2-WAY MULTIPLE COIL PIPING DETAIL

P X/M102

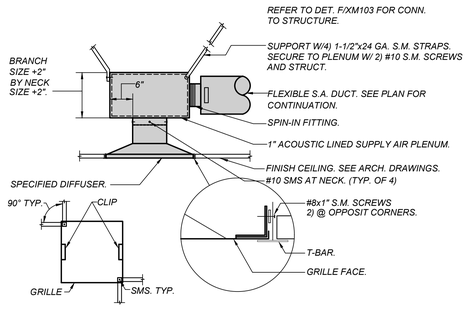
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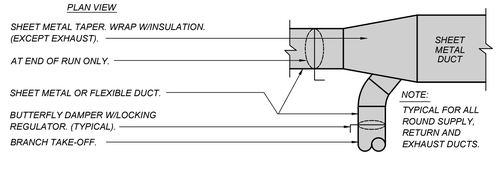


VAV/VVH BOX MOUNTING DETAIL

F X/M102

SCALE: NONE MM090

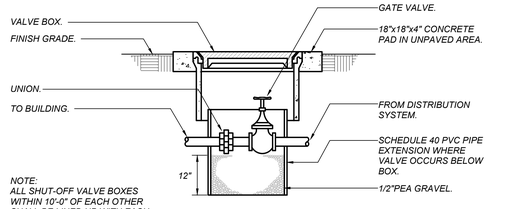




TYPICAL S.A. DEVICE-BRANCH DUCT DETAIL

G X/M102

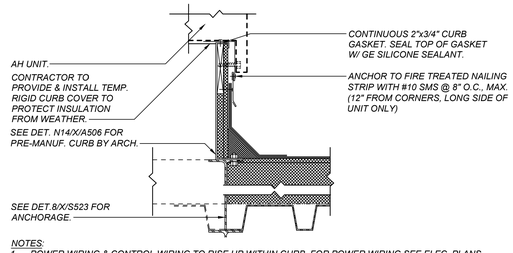
SCALE: NONE



SHUT-OFF VALVE IN BOX DETAIL

H X/M102

SCALE: NONE

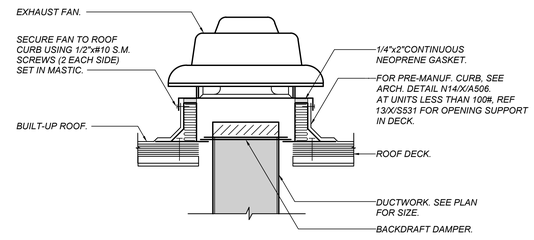


NOTES:
1. POWER WIRING & CONTROL WIRING TO RISE UP WITHIN CURB. FOR POWER WIRING SEE ELEC. PLANS.
2. MAX. WT. = 23,000 LBS.
3. HUSHCORE MODEL DS-41 FOR BUILDING M&Q. HUSHCORE MODEL DS-45 FOR BUILDING L. REFER TO SPEC SECTION 018123 PART 2.1D.

AIR HANDLER MOUNTING ON ROOF CURB

J X/M102

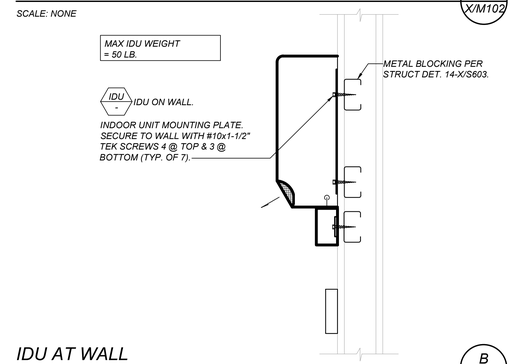
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ROOF EXHAUST FAN MOUNTING DETAIL

A X/M102

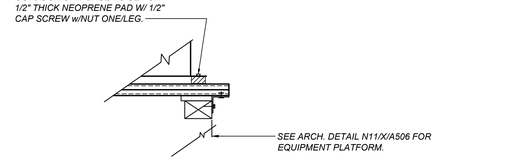
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IDU AT WALL

B X/M102

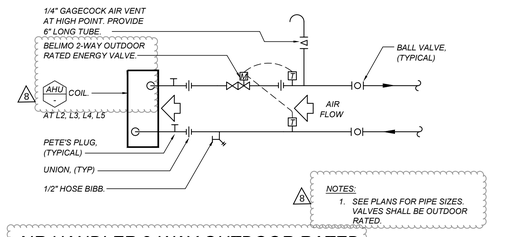
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WC / ODU MTG. DETAIL

C X/M102

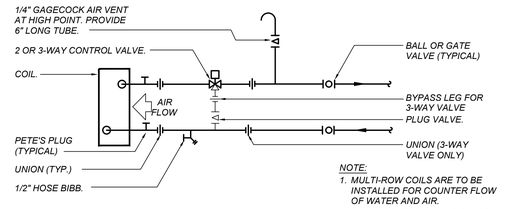
SCALE: NONE



AIR HANDLER 2-WAY OUTDOOR RATED "ENERGY VALVE" COIL PIPING DETAIL

D X/M102

SCALE: NONE



2 OR 3 WAY COIL PIPING DETAIL AT VVH BOXES

E X/M102

SCALE: NONE

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

General Notes

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4910 E. Clinton Way, Suite 101 Fresno, CA 93727
(559) 431-0101 22040 FAX (559) 431-1342

LICENSED PROFESSIONAL ENGINEER MICHAEL D. CANTRELL No. ME 20588 Exp. 6-30-25 MECHANICAL STATE OF CALIFORNIA

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LICENSED ARCHITECT MEGHEET K. PATWARDHAN No. C23724 Ren. 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
5	*Addendum #5*	*12/13/23*
8	Addendum #8	9/25/2026

Revision

	Designed By:	Copyright 2021 Darden Architects
Scale:	Drawn By: LEG	X/M102
Project Number: 2171	Checked By:	
Date: 08/11/23	Reviewed By:	AD8

15 September 2026 10:45 AM P:\2022\22040 Sanger USD Ed Center Phase 3\4-Drawings\4 M\XM102 – DETAILS.dwg david s

GRILLE SCHEDULE

MARK	DUTY	DESCRIPTION
A	CEILING SUPPLY	TITUS TDC (TYPE 3) LOUVER FACE SQUARE OR RECTANGULAR NECK DIFFUSER FOR STD. LAY-IN CEILING, AND NO. 26 OFF-WHITE FINISH. (18"X18" NECK ADAPTER SIZE SHOWN).
B	CEILING SUPPLY	TITUS TDC (TYPE 1) LOUVER FACE SQUARE OR RECTANGULAR NECK DIFFUSER FOR SURFACE MOUNTING, AND NO. 26 OFF-WHITE FINISH.
C	CEILING SUPPLY	TITUS PAS (TYPE 3) PERFORATED FACE ROUND NECK DIFFUSER FOR STD. LAY-IN CEILING, FLAT BLACK INTERIOR, AND NO. 26 OFF-WHITE FINISH.
D	WALL SUPPLY	TITUS MODEL 1707 REGISTER WITH REMOVABLE CORE, O.B.D., 5 DEGREE UPWARD DEFLECTION, AND NO. 26 OFF-WHITE FINISH.
F	CEILING SUPPLY	PRICE MODEL SHP-CF, PARALLELOGRAM SHAPED CUSTOM FLOW SLOT DIFFUSER, WITH 24" BEAM SPACING X 24" BASE FOR LAY-IN CEILING, TOP INLET 5A PLENUM, EXTRUDED ALUMINUM FRAME, ADJUSTABLE STEEL BLACK PATTERN CONTROLLER, ALUMINUM CENTER PANEL, PLASTIC LOCKING PINS, COATED STEEL FASTENERS, AND ARMSTRONG WHITELUME FINISH. PRIOR TO ORDERING, CONTRACTOR SHALL FIELD VERIFY INSTALLED CEILING PATTERN FOR DIFFUSER PLACEMENT AND ORIENTATION: INDICATE LEFT HANDED OR RIGHT HANDED ORIENTATION WHEN ODERING.
G	CEILING SUPPLY	TITUS FL-25 HIGH THROW (TYPE 66) EXTRUDED ALUMINUM SLOT DIFFUSER. TWO SLOTS, 2 CRA BORDER, PATTERN CONTROLLER, FLAT BLACK INTERIOR, AND NO. 26 WHITE FINISH. IN LIEU OF #26 WHITE FINISH, PROVIDE #84 BLACK FINISH BEING USED ON WOOD VENEER STYLE CEILINGS.
H	CEILING RETURN OR EXHAUST	TITUS CORE 50F (TYPE 1) ALUMINUM EGG CRATE REGISTER WITH 1/2" x 1/2" GRID, FOR SURFACE MOUNTING WITH NO. 26 OFF-WHITE FINISH.
I	CEILING RETURN OR EXHAUST	TITUS PAR (TYPE 3) PERFORATED FACE SQUARE OR RECTANGULAR NECK REGISTER FOR STD. LAY-IN CEILING , FLAT BLACK INTERIOR, AND NO. 26 OFF-WHITE FINISH.
J	WALL RETURN	TITUS CORE 25RL (TYPE 1) STEEL RETURN REGISTER, , AND NO. 26 OFF-WHITE FINISH.
K	WALL, CEILING OR DUCT RETURN	TITUS CORE 4FL (TYPE 1) ALUMINUM RETURN REGISTER WITH NO. 26 WHITE FINISH.
L	CEILING SUPPLY	TITUS FL-15 HIGH THROW (TYPE 66) EXTRUDED ALUMINUM SLOT DIFFUSER. TWO SLOTS, 2 CRA BORDER, PATTERN CONTROLLER, FLAT BLACK INTERIOR, AND NO. 26 WHITE FINISH. IN LIEU OF #26 WHITE FINISH, PROVIDE #84 BLACK FINISH BEING USED ON WOOD VENEER STYLE CEILINGS.
M	CEILING SUPPLY	TITUS MODEL OMNI SQUARE PLAQUE ROUND NECK DIFFUSER FOR STD. LAY-IN CEILING , FLAT BLACK INTERIOR, AND NO. 26 OFF-WHITE FINISH, DUCT RADIUS WITH AIR SCOOP.
N	WALL SUPPLY	TITUS MODEL CT-481 (FRAME TYPE 5) LINEAR BAR DIFFUSER w/1/8" BARS AT 1/4" SPACING AND 15 DEGREE DEFLECTION AND NO. 26 WHITE FINISH.
P	CEILING SUPPLY	TITUS MODEL MLTZ-38 w/Z AND CAP 2 SLOT, TO FIT ARMSTRONG DESIGN FLEX CEILING SYSTEMS. 3/4" TYPE 4 INSTALL BETWEEN CEILING SLATS. FINISH TO MATCH ARCH. CEILING.
R	WALL SUPPLY	TITUS MODEL TBF-AA ALUMINUM TURBOFUSER NOZZEL DIFFUSER w/ADJUSTABLE RINGS, PAINTED FLAT BLACK.
S	WALL RETURN (HEAVY DUTY)	TITUS CORE 33RF HEAVY DUTY GRILLE, AND NO. 26 OFF-WHITE FINISH.
T	CEILING RETURN OR EXHAUST	TITUS CORE 50F (TYPE 3) ALUMINUM EGG CRATE REGISTER WITH 1/2" x 1/2" GRID, FOR LAY-IN CEILING, AND NO. 26 OFF-WHITE FINISH.
U	CEILING SUPPLY	TITUS PAS (TYPE 3) PERFORATED FACE ROUND NECK DIFFUSER FOR STD. LAY-IN CEILING, FLAT BLACK INTERIOR, AND NO. 26 OFF-WHITE FINISH.
V	WALL RETURN	TITUS MODEL CT-481 (FRAME TYPE 5) LINEAR BAR DIFFUSER w/1/8" BARS AT 1/4" SPACING AND NO. 26 WHITE FINISH.
W	DUCT SUPPLY	TITUS MODEL TMR ROUND NECK, ROUND DIFFUSER WITH THREE INNER CONES, REMOVABLE INNER CONES, EQUALIZING GRID, NO. 26 OFF-WHITE FINISH.
X	CEILING SUPPLY	TITUS ML-40 1-1/2" SLOT DIFFUSER WITH CONTINUOUS PLENUM, BOARDER TYPE 2A. FINISH TO MATCH CEILING.

AIR HANDLER SCHEDULE

	DESIGNATION	AH M1	AH M2 / AH M3	AH M4	AH M5	AH M6	AH M7	AH Q1	AH Q2	AH Q3	AH Q4	AH Q5	AH L1	AH L2	AH L3	AH L4	AH L5
SUPPLY FAN	AIR FLOW (CFM)	14,500	30,000	12,425	12,700	9,000	8,300	12,150	8,000	14,000	9,000	8,500	19,320	5,060	6,475	2,890	5,000
	TOTAL SP (IN WC)	5.6	5.3	4.5	4.4	4.6	4.3	4.5	4.3	4.9	4.6	5.2	4.2	4.3	4.7	4.15	4.3
	ESP (IN WC)	2.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.3	2.0	2.0	2.0	2.0
	MIN. OSA (CFM)	4,535	12,320	4,575	7,600	3,485	1,760	8480	2,250	4,940	2,650	2,975	7,100	1,200	200	700	750
	HP/BRAKE HP TOTAL	2@15 / 24.3	4@15 / 41.0	2@7.5 / 12.8	2@7.5 / 13.7	2@7.5 / 10.4	2@5 / 9.5	2@ 7.5 / 13.9	2@5 / 8.6	2@10 / 18.3	2@7.5 / 11.3	2@7.5 / 10.5	2@ 10 / 9.7	7.5 / 5.5	10 / 7.4	5 / 2.95	7.5 / 5.39
	VOLTS/PHASE	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3
	FAN TYPE/CLASS	SWSI / H	SWSI / M	SWSI / H	SWSI / H	SWSI / M	SWSI / H	SWSI / M	SWSI / M	SWSI / M	SWSI / M	SWSI / M	SWSI / I	SWSI / I	SWSI / I	SWSI / I	SWSI / I
	ISOLATOR DEFL. (IN)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	UNIT MCA / MOCP / FLA	71 / 110 / 61	140.6 / 200 / 120.65	41 / 60 / 35.7	41 / 60 / -	36 / 50	28 / 40 / -	41 / 60	28 / 40 / -	57 / 80 / -	36.1 / 50	40 / 60 / 35	63 / 90 / 56	18.6 / 25 / 15.8	25.7 / 35 / 22.2	13.6 / 20 / 11.6	18.6 / 25 / 15.8
	LIGHTS/RECEPTACLE	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1	115 / 1
	LIGHT/REC. MCA/MOCP/FLA	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6	13.3 / 15 / 10.6
RETURN FAN	AIR FLOW (CFM)	14,500	30,000	9,125	12,700	9,000	8,300	12,150	8,000	14,000	9,000	8,500	19,320	5,060	6,475	2,890	5,000
	ESP (IN WC)	1.5	1.0	1.5	1.5	1.5	1.0	1.5	1.5	1.5	1.5	1.5	1.0	1.0	1.0	1.0	1.0
	HP/BRAKE HP TOTAL	2@7.5 / 13.05	4@7.5 / 20.75	2@5 / 7.6	2@5 / 7.8	2@5 / 5.9	2@3 / 4.2	2@5 / 7.3	2@ 3 / 4.7	2@7.5 / 11.6	2@ 3 / 5.9	2@5 / 6.15	2@ 7.5 / 5.4	3 / 2.11	5 / 3.03	1.5 / 1.0	3 / 2.1
	VOLTS/PHASE	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3
	FAN TYPE/CLASS	SWSI / M	SWSI / M	SWSI / H	SWSI / H	SWSI / M	SWSI / M	SWSI / H	SWSI / M	SWSI / M	SWSI / M	SWSI / M	SWSI / I	SWSI / M	SWSI / M	SWSI / M	SWSI / M
	ISOLATOR DEFL. (IN)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
COOLING COIL	SENSIBLE (MBH)	430.62	1093	409	475	341	234	510	239	447	272	289.2	670	166.1	212.6	96.6	155.4
	TOTAL (MBH)	438.24	1109	427	500	312	254	535	254	475	292	303.8	822.5	214.4	277.1	126.7	211.0
	COIL SIZE/ROWS	25 / 6	65.6SF / 4	29.6 / 6	29.6 / 6	20.5 / 6	20.8 / 4	28.6 / 6	20.0 / 6	28.6 / 6	20.5 / 6	16.8 / 6	48.3 / 6	12.3 / 6	13.44 / 6	7.99 / 6	12.3 / 6
	AIR PD (IN WC)	0.652	0.4	0.24	.4	.4	0.3	.4	.33	.47	.44	.576	0.42	0.49	0.65	0.38	0.49
	EADB/EAWB (°F)	85.7 / 65.5	92 / 67	85 / 65.5	89.1 / 66.5	86 / 65.3	80.7 / 64	93.3 / 67.8	82.3 / 64.4	84 / 65	82.6 / 64.5	86 / 65.5	86.5 / 68	84.8 / 68	84.8 / 68	85 / 68	83.2 / 68
	LADB/LAWB (°F)	57 / 55.57	57 / 55	55 / 53.4	55 / 53	54.3 / 52.5	54.5 / 53.6	55 / 54	55 / 54	55 / 53	55 / 53	55 / 53.55	55 / 54.3	55 / 54.4	55.0 / 54.25	54.7 / 53.9	55 / 54.5
	GPM/PD (FT)	87.34 / 3.0	221 / 6.3	85 / 5.3	100 / 7.0	63 / 5.7	52 / 7.9	106 / 8	50 / 2.3	94 / 6.4	59 / 5.1	60.55 / 5.7	164.0 / 3.4	42.7 / 4.9	55.2 / 6.9	25.2 / 10.9	30.68 / 2.85
	EWT/LWT (°F)	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55	45 / 55
	BRANCH SIZE	2.5	4	3	3	2.5	2.5	3	2.5	3	2.5	2.5	3	2	2.0	1.5	2.0
	VALVE TYPE	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	3-WAY	2-WAY	2-WAY	2-WAY	3-WAY
HEATING COIL	CAPACITY (MBH)	345.96	715	316	375	257	244	263	198	340	225	193.4	737.5	166.1	202.8	141.0	156.3
	COIL SIZE/ROWS	24SF / 2	65.6SF / 2	28.7 / 2	29 / 2	21 / 2	19.3SF / 2	29.9 / 2	19.8 / 2	28.7 / 2	20.8 / 2	16.8 / 2	49.1 / 2	12.3 / 2	13.65 / 2	7.99 / 2	12.3 / 2
	AIR PD (IN WC)	0.186	.16	.059	.2	.15	.07	.15	.1	.13	.12	.14	0.09	0.11	0.14	0.09	0.11
	GPM/PD (FT)	34.66 / 0.48	72 / 5.8	32 / 1.0	38 / 1.8	26 / 1.1	25 / 1.0	26 / 3.1	20 / .2	34 / .5	23 / 1.0	19.38 / 0.41	73 / 13.9	16.6 / 2.1	20.3 / 3.2	14.1 / 1.5	15.7 / 0.36
	EAT/LAT (F)	70 / 92	70 / 92	70 / 93.4	70 / 97.2	70 / .96	70 / 97	70 / 90	70 / 92	70 / 92	70 / 93	70 / 90.98	57 / 76	62.4 / 92.7	62 / 91.3	70 / 92.7	62 / 91.2
	EWT/LWT (F)	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120	140 / 120
	BRANCH SIZE	2.5	2.5	2	2	2	2	2	1.5	2	1.5	2.5	1.5	1.5	1.5	1.5	1.5
	VALVE TYPE	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY
FILTER	QUANTITY/SIZE	3@12"x24"	4@16"x20"	3@12"x24"	3@12"x24"	4@16"x25"	4@16"x25"	3@12"x24"	4@16"x25"	3@12"x24"	4@16"x25"	2@20"x20"	(36) 20"x 20"x2"	(6) 16"x 20"x2"	(4) 16"x 20"x2"	(1) 20"x 24"x2"	(6) 16"x 20"x2"
		2@16"x20"	2@20"x24"	2@16"x20"	2@16"x20"	3@20"x25"	3@20"x25"	2@16"x20"	3@20"x25"	2@16"x20"	3@20"x25"	4@20"x24"	-	-	(2) 16"x 25"x2"	(1) 24"x 24"x2"	-
		6@20"x20"	-	6@20"x24"	6@20"x24"	-	-	6@20"x24"	-	6@20"x24"	-	-					
	FINAL PD (IN WC)	1.00	.50	.50	.50	.50	.50	.50	.50	.50	.50	1.0	1.00	1.00	1.00	1.00	1.00
	EFFICIENCY (MERV)	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13	MERV 13
HUMIDIFIER	STEAM CBS/HR	-	244.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AIR TEMP (°F) GAIN	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ENTERING DB (°F)	-	59.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AIR FLOW CFM	-	30,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	MANUFACTURER	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE
	TYPE	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	ROOF TOP	INDOOR	OUTDOOR	OUTDOOR	OUTDOOR	OUTDOOR
	MODEL NUMBER	CSAA025	CSAA066	CSAA030	CSAA030	CSAA021	CSAA021	CSAA030	CSAA021	CSAA030	CSAA021	CSAA017	CSAA050	CSAA012	CSAA014	CSAA008	CSAA012
	SERVICE	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. Q	BLDG. Q	BLDG. Q	BLDG. Q	BLDG. Q	BLDG L - MECH RM	BLDG L - ROOF	BLDG L - ROOF	BLDG L - ROOF	BLDG L - ROOF
	OPER. WT. (LBS)	9,000	23,000	10,000	10,000	9,000	8,000	10,000	9,000	10,000	9,000	9,000	9,900	4,201	4,420	3,291	4,206
	ACCESSORIES	2,3,4,5	1,2,3,4,5	1,2,3,4,5	2,3,4,5	2,3,4,5	2,3,4,5	2,3,4,5,6	2,3,4,5	2,3,4,5	2,3,4,5	2,3,4,5	2,3,4	3,4,5	3,4,5	3,4,5	3,4,5

1. AHU-M2 & AHU-M3 SHALL HAVE FACTORY INSTALLED REVERSE OSMOSIS HUMIDIFIERS.
2. AHU-M1 THRU AHU-L1 TO BE PROVIDED WITH BACKDRAFT DAMPERS ON THE SUPPLY AND RETURN FANS.
3. SUPPLY DUCT SMOKE DETECTOR FOR AUTOMATIC FAN SHUT-DOWN UPON SMOKE DETECTION.
4. LOW LEAK, DOUBLE WALL CONSTRUCTION WITH CURB READY BASE RAIL, HINGED ACCESS PANELS, TREADPLATE UNIT FLOOR AND SINGLE POINT POWER CONNECTION.
5. ROOF CURB BY ARCH. SEE ARCH. SPECS AND DETAILS. WEIGHT INCLUDES CURB, CONT. SHALL COORDINATE.
6. PROVIDE SUPPLY FAN VFD CONTROLLED BY FOOD SERVICE DEMAND CONTROL SYSTEM.

OMIT - FROM PREVIOUS PHASE

CEILING FAN SCHEDULE

DESIGNATION	CF Q1 THRU CF Q3
NO. OF BLADES	3
VOLTS (AC) / PHASE	115 / 1
MAX RPM	158
MOCP	10
DRIVE	DIRECT
MOUNTING	BEAM
MANUFACTURER	BIG ASS FANS
DIAMETER (FT.)	12
MODEL NUMBER	ESSENCE
CONTROL	WALL SWITCH
SERVICE	MPR 100
OPER. WT. (LBS)	100
ACCESSORIES	1, 2

1. 3' MIN EXTENSION TUBE FOR COMPLIANCE WITH NFPA 13 11.1.7(3).
2. INTERLOCK W/ FIRE ALARM SYSTEM FOR AUTO-MATIC SHUT-DOWN UPON ALARM.

OMIT - FROM PREVIOUS PHASE

OMIT - FROM PREVIOUS PHASE

EXHAUST FAN SCHEDULE

DESIGNATION	EF M1	EF M2	EF M3	EF M4	EF M5 THRU EF M6	EF M7	EF M8	EF M9	EF M10	EF M11	EF M12
CFM	1700	1065	325 - 350	1065	325 - 350	4280	700	325 - 350	3100	700	3100
ESP (IN WC)	1.0	1.2	0.35	1.2	0.35	1.75	0.4	0.35	1.5	0.4	1.5
HP / WATTS / BHP	.75 / - / .51	.75 / - / .38	.25 / - / .04	.75 / - / .38	.25 / - / .04	3 / - / 1.95	.25 / - / .04	.25 / - / .04	2 / - / 1.3	.25 / - / .04	2 / - / 1.3
VOLTS/PHASE	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	460 / 3	120 / 1	120 / 1	208 / 1	120 / 1	208 / 1
RPM	1334	1374	953	1374	953	1055	1093	953	1302	1093	1302
TIP SPEED/SONES	5804 / 12.2	5262 / 10.3	2791 / 5.2	5262 / 10.3	2791 / 5.2	6766 / 18.1	3184 / 4.6	2791 / 5.2	6305 / 16.8	3184 / 4.6	6305 / 16.8
DRIVE	DIRECT	DIRECT	DIRECT	DIRECT	DIRECT	DIRECT	DIRECT	DIRECT	DIRECT	DIRECT	DIRECT
MOUNTING	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF
MANUFACTURER	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK
TYPE	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL
MODEL NUMBER	CUE-160HP-VG	CUE-140-VG	G-099-VG	CUE-140-VG	G-099-VG	CUE-240HP-VGD	G-100-VG	G-099-VG	CUE-180-VG	G-100-VG	CUE-180-VG
CONTROL	EMS	EMS	EMS	EMS	EMS	EMS	EMS	EMS	EMS	EMS	EMS
SERVICE	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M	BLDG. M
OPER. WT. (LBS)	125	100	50	100	50	300	50	50	150	50	150
ACCESSORIES	1	1	1	1	1	1	1	1	1	1	1

1. PROVIDE WITH BACKDRAFT DAMPER, VARI GREEN CONTROL SYSTEM W/ EMS INTERFACE AND SPEED CONTROL DIAL ON MOTOR.

OMIT - FROM PREVIOUS PHASE

EXHAUST FAN SCHEDULE (CONT.)

DESIGNATION	EF Q1	EF Q2	EF Q3 THRU EF Q5	EF Q6	EF Q7	EF Q8	EF Q9	EF L1	EF L2 AND EF L3	EF L4
CFM	150	1200	1874	1796	2075	1118	425	220	600	150
ESP (IN WC)	0.4	2.0	2.0	2.0	1.2	3.25	0.35	0.4	0.4	0.4
HP / WATTS / BHP	1/15 / - / .02	1.0 / - / .04	3.0 / - / 1.23	2.0 / - / 1.19	1.0 / - / .73	3.0 / - / 1.54	.25 / - / .04	1/15 / - / .02	1/10 / - / .08	1/15 / - / .02
VOLTS/PHASE	120 / 1	460 / 3	460 / 3	460 / 3	460 / 3	460 / 3	120 / 1	120 / 1	120 / 1	120 / 1
RPM	1549	1,715	1,770	1,770	1,176	2,101	953	1549	1642	1549
TIP SPEED/SONES	3295 / 4.4	6,565 / 9.9	8,535 / 19.7	8,439 / 19.5	5,746 / 12.7	10,038 / 33	2791 / 5.2	3295 / 4.4	4674 / 8.1	3295 / 4.4
DRIVE	DIRECT	DIRECT	BELT	BELT	BELT	BELT	DIRECT	DIRECT	DIRECT	DIRECT
MOUNTING	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF
MANUFACTURER	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK
TYPE	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL
MODEL NUMBER	G-070-VG	CUE-160XP-VG	CUBE-240XP-VGD-30	CUBE-240XP-VGD-30	GB-200HP-VGD-10	CUBE-240XP-VGD-30	G-099-VG	G-070-VG	G-090-VG	G-070-VG
CONTROL	EMS	KIT. HOOD CONTROL	KIT. HOOD CONTROL	KIT. HOOD CONTROL	EMS	KIT. HOOD CONTROL	EMS	EMS	EMS	EMS
SERVICE	BLDG. Q	BLDG. Q	BLDG. Q	BLDG. Q	BLDG. Q	BLDG. Q	BLDG. Q	BLDG. L	BLDG. L	BLDG. L
OPER. WT. (LBS)	30	100	175	175	125	300	50	30	30	30
ACCESSORIES	1	1,2	1,2,3	1,2,3	1	1,2	1	1	1	1

1. PROVIDE WITH BACKDRAFT DAMPER, VARI GREEN CONTROL SYSTEM W/ EMS INTERFACE AND SPEED CONTROL DIAL ON MOTOR.
2. PROVIDE WITH CLEAN-OUT PORT, SS BIRD SCREEN, UL 705 LISTED, VENTILATED CURB EXTENSION WITH HINGED CURB CAP & GREASE TRAP; FACTORY DISCONNECT SWITCH WITH PIGTAIL.
3. PROVIDE WITH AUTO BELT TENSIONER, GRIP NOTCH BELTS.

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

General Notes

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4919 E. Clinton Way, Suite 101 Fresno, CA 93727
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REGISTERED PROFESSIONAL ENGINEER MICHAEL D. CONTI No. M024888 Exp. 9-30-25 MECHANICAL STATE OF CALIFORNIA

Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727

Project

TYPICAL INFORMATION
MECHANICAL SCHEDULES

Drawing

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Architect

No.	Revision/Submission	Date
5	*Addendum #5*	*12/13/23*
7	*RFI 004*	*04/11/24*
8	Addendum #8	9/25/2026

Revision

	Designed By:	Copyright 2021 Darden Architects
Scale:	Drawn By: LEG	
Project Number: 2171	Checked By:	X/M201
Date: 08/11/23	Reviewed By:	AD8

15 September 2026 10:45 AM P:\2022\22045 Sanger USD Ed Center Phase 3\14-Drawings\X M\M201 - SCHEDULES.dwg dovid s

OMIT - FROM PREVIOUS PHASE

VARIABLE AIR VOLUME BOX WITH HEAT SCHEDULE (BUILDING Q)

DESIGNATION	VVH Q1	VVH Q2	VVH Q3	VVH Q4	VVH Q5	VVH Q6	VVH Q7	VVH Q8	VVH Q9	VVH Q10	VVH Q11	VVH Q12	VVH Q13	VVH Q14	VVH Q15	VVH Q16	VVH Q17	VVH Q18	VVH Q19	VVH Q20
CFM (MAX)	2,160	550	600	2,360	700	4,350	900	2,800	1,200	1,100	650	1,050	2,195	2,015	790	350	1,150	2,300	700	300
CFM (MIN)	713	182	198	779	231	1,436	297	924	396	363	215	347	724	665	261	116	380	759	231	99
CFM (HEATING)	1,080	275	300	1,180	350	2,175	450	1,400	600	550	325	525	1,098	1,008	395	175	575	1,150	350	150
VOLTAGE/PHASE	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1
POWER (WATTS)	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
INLET PRESSURE (IN. WC)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
INTERNAL PD (IN. WC)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
MAX NC (DISCHARGE)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEATING CAPACITY (MBH)	46.9	11.9	13.0	51.2	15.2	94.4	19.5	60.8	26.0	23.9	14.1	22.8	47.6	43.7	17.1	7.6	25.0	49.9	15.2	6.5
GPM	4.7	1.2	1.3	5.2	1.5	9.5	2.0	6.1	2.6	2.4	1.4	2.3	4.8	4.4	1.7	0.8	2.5	5.0	1.5	0.7
PD (FT.)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
EADB (°F)	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
EWT (°F)	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
LWT (°F)	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
BRANCH SIZE (IN.)	1	3/4	3/4	1	3/4	1	3/4	1	3/4	3/4	3/4	3/4	3/4	1	3/4	3/4	3/4	1	3/4	3/4
VALVE TYPE	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	3 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY
MANUFACTURER	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS
MODEL	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV
SIZE	14	7	7	14	8	24X16	9	14	10	10	7	10	14	14	9	5	10	14	6	10
LOCATION	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q	BLDG Q
OPER. WT. (LBS)	60	45	45	60	50	85	50	60	50	50	45	50	60	60	50	40	50	60	50	45
ACCESSORIES	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2

1. PROVIDE WITH 2 ROW HOT WATER COIL, STERILOC INTERNAL LINER
2. REFER TO EMS/102 FOR CONTROLS.

8 8 8 8

OMIT - FROM PREVIOUS PHASE

VARIABLE AIR VOLUME BOX WITH HEAT SCHEDULE (BUILDING M)

DESIGNATION	VVH M1	VVH M2	VVH M3	VVH M4	VVH M5	VVH M6	VVH M7	VVH M8	VVH M9	VVH M10	VVH M11	VVH M12	VVH M13	VVH M14	VVH M15	VVH M16	VVH M17	VVH M18
CFM (MAX)	1,225	500	1750	1450	690	1300	2050	1200	1630	1920	1725	2880	1200	1200	2250	900	2250	2800
CFM (MIN)	404	165	578	380	228	429	677	396	538	634	569	950	396	396	743	297	743	924
CFM (HEATING)	613	250	875	575	345	650	1,025	600	815	960	863	1,440	600	600	1,125	450	1,125	1,400
VOLTAGE/PHASE	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1
POWER (WATTS)	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
INLET PRESSURE (IN. WC)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
INTERNAL PD (IN. WC)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
MAX NC (DISCHARGE)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEATING CAPACITY (MBH)	26.6	10.9	38.0	25.0	15.0	28.2	44.5	26.0	35.4	41.2	37.4	62.5	26.0	26.0	48.8	19.5	48.8	60.8
GPM	1.8	0.7	2.6	1.7	1.0	1.9	3.0	1.8	2.4	2.8	2.5	4.2	1.8	1.8	3.3	1.3	3.3	4.1
PD (FT.)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
EADB (°F)	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
EWT (°F)	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
LWT (°F)	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110
BRANCH SIZE (IN.)	3/4	3/4	1	1	3/4	1	1	1	1	3/4	3/4	1	3/4	3/4	3/4	3/4	1	1
VALVE TYPE	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	3 WAY	2 WAY	3 WAY	2 WAY	3 WAY	2 WAY	2 WAY	3 WAY	2 WAY	2 WAY	2 WAY	3 WAY
MANUFACTURER	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS
MODEL	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV
SIZE	10	8	12	10	8	10	14	10	12	12	12	16	12	12	14	9	14	16
LOCATION	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M
OPER. WT. (LBS)	50	50	60	50	50	50	60	50	60	60	60	85	60	60	60	50	60	85
ACCESSORIES	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2

1. PROVIDE WITH 2 ROW HOT WATER COIL, STERILOC INTERNAL LINER
2. REFER TO EMS/102 FOR CONTROLS.

8 8 8

SOUND TRAP SCHEDULE

DESIGNATION	ST L1	ST L2	ST L3	ST L4
AIR FLOW (CFM)	3,400	3,400	11,000	11,000
FACE VELOCITY (FPM)	750	750	1,070	1,070
PRESS. DROP (IN. W.C.)	0.07	0.07	0.25	0.25
SIZE (W" x H" x L")	24 x 24 x 84	24 x 24 x 84	42 x 34 x 84	42 x 34 x 84
DYNAMIC INSERTION LOSS				
63 hz	6	6	12	12
125 hz	11	11	16	16
250 hz	21	21	30	30
500 hz	43	43	51	51
1000 hz	47	47	38	38
2000 hz	42	42	22	22
4000 hz	28	28	17	17
8000 hz	21	21	14	14
MANUFACTURER	I.A.C.	I.A.C.	I.A.C.	I.A.C.
	RECTANGULAR	RECTANGULAR	RECTANGULAR	RECTANGULAR
MODEL NUMBER	7LFM	7LFM	7LFM	7LFM
LOCATION	WOOD SHOP L123	WOOD SHOP L123	CONTROL L203	CONTROL L203
	SUPPLY	RETURN	SUPPLY	RETURN
OPER. WT. (LBS)	219	219	495	495
ACCESSORIES	1,2	1,2	1,2	1,2

1. PROVIDE WITH 22 GAUGE GAL. STEEL CASING, 26 GAUGE GAL. PERFORATED STEEL PARTITIONS, INORGANIC GLASS FIBER FILLER MATERIAL PACKED 5% COMPRESSION, ASTM E84 FLAME/SMOKE RATING OF 20/20.
2. ASTM E477 RATED.
3. SUPPORT UNITS OVER 250 LBS FROM BEAMS OR UNISTRUTS PER 3/X/E203 OR 13/X/S532.

8

OMIT - FROM PREVIOUS PHASE

VARIABLE AIR VOLUME BOX WITH HEAT SCHEDULE (BUILDING M)

DESIGNATION	VVH M19	VVH M20	VVH M21	VVH M22	VVH M23	VVH M24	VVH M25	VVH M26	VVH M27	VVH M28	VVH M29	VVH M30
CFM (MAX)	2550	845	845	2600	2850	900	1350	2495	1910	800	1200	400
CFM (MIN)	842	295	279	858	941	297	446	823	630	264	396	132
CFM (HEATING)	1,275	448	423	1,300	1,425	450	675	1,248	955	400	600	200
VOLTAGE/PHASE	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1
POWER (WATTS)	75	75	75	75	75	75	75	75	75	75	75	75
INLET PRESSURE (IN. WC)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
INTERNAL PD (IN. WC)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
MAX NC (DISCHARGE)	-	-	-	-	-	-	-	-	-	-	-	-
HEATING CAPACITY (MBH)	55.3	19.4	18.3	56.4	61.8	19.5	29.3	54.1	41.4	17.4	26.0	8.7
GPM	3.7	1.3	1.2	3.8	4.2	1.3	2.0	3.6	2.8	1.2	1.8	0.6
PD (FT.)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
EADB (°F)	55	55	55	55	55	55	55	55	55	55	55	55
EWT (°F)	140	140	140	140	140	140	140	140	140	140	140	140
LWT (°F)	110	110	110	110	110	110	110	110	110	110	110	110
BRANCH SIZE (IN.)	1	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
VALVE TYPE	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	3 WAY	3 WAY	3 WAY	2 WAY	2 WAY	2 WAY	3 WAY
MANUFACTURER	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS
MODEL	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV
SIZE	14	8	8	14	14	9	12	14	14	9	9	6
LOCATION	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M	BLDG M
OPER. WT. (LBS)	60	50	50	60	60	50	60	60	60	50	50	45
ACCESSORIES	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2

1. PROVIDE WITH 2 ROW HOT WATER COIL, STERILOC INTERNAL LINER
2. REFER TO EMS/102 FOR CONTROLS.

8

VARIABLE AIR VOLUME BOX WITH HEAT SCHEDULE (BUILDING L)

DESIGNATION	VVH L1	VVH L2	VVH L3	VVH L4	VVH L5	VVH L6	VVH L7	VVH L8	VVH L9	VVH L10	VVH L11
CFM (MAX)	1,010	200	2,400	2,400	640	600	470	575	340	1,200	350
CFM (MIN)	333	66	792	792	211	198	155	190	112	396	116
CFM (HEATING)	505	100	1,200	1,200	320	300	235	288	170	600	175
VOLTAGE/PHASE	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1	120 / 1
POWER (WATTS)	75	75	75	75	75	75	75	75	75	75	75
INLET PRESSURE (IN. WC)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
INTERNAL PD (IN. WC)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
MAX NC (DISCHARGE)	-	-	-	-	-	-	-	-	-	-	-
HEATING CAPACITY (MBH)	21.9	4.3	52.1	52.1	13.9	13.0	10.2	12.5	7.4	26.0	7.6
GPM	2.2	0.4	5.3	5.3	1.4	1.3	1.0	1.3	0.7	2.6	0.8
PD (FT.)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
EADB (°F)	55	55	55	55	55	55	55	55	55	55	55
EWT (°F)	140	140	140	140	140	140	140	140	140	140	140
LWT (°F)	120	120	120	120	120	120	120	120	120	120	120
BRANCH SIZE (IN.)	1	3/4	1	3/4	3/4	1	3/4	3/4	3/4	1	3/4
VALVE TYPE	3 WAY	3 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	2 WAY	3 WAY	3 WAY	2 WAY
MANUFACTURER	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS
MODEL	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV	DESV
SIZE	14	7	16	16	8	8	7	8	7	14	7
LOCATION	L117	L114	L101	L101	L103	L124B	L126B	L126A	L129B	L128E	L203
OPER. WT. (LBS)	60	45	60	60	50	50	45	50	45	60	45
ACCESSORIES	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2

1. PROVIDE WITH 2 ROW HOT WATER COIL, STERILOC INTERNAL LINER
2. REFER TO EMS/102 FOR CONTROLS.

DSA File No.:
10-H15

DSA Application No.:
02-120779

Agency Approval

General Notes

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REGISTERED PROFESSIONAL ENGINEER MICHAEL D. CANTRELL No. M029888 Exp. 6-30-25 MECHANICAL STATE OF CALIFORNIA

Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
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Project

MECHANICAL SCHEDULES

Drawing

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LICENSED ARCHITECT MICHAEL K. FENNO No. C23724 Renewal 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
5	*Addendum #5*	*12/13/23*
	RFI 004	*04/11/24*
8	Addendum #8	9/25/2026

Revision

Designed By:
Drawn By: LEG
Checked By:
Reviewed By:

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Scale:
Project Number: 2171
Date: 08/11/23

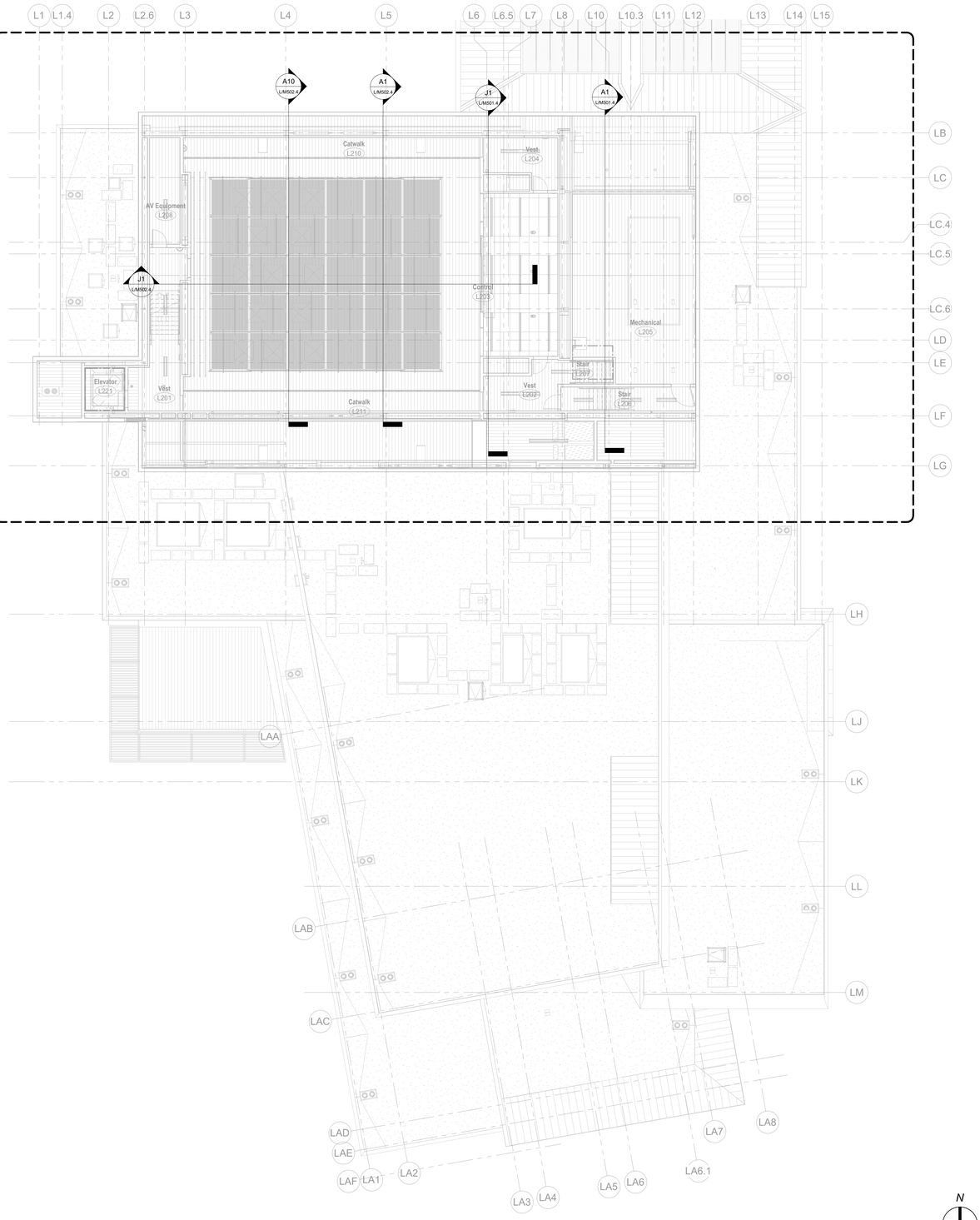
X/M202

AD8

15 September 2026 10:45 AM P:\2022\22040 Sanger USD Ed Center Phase 3\4-Drawings\4 M\XM202 – SCHEDULES.dwg david s

FOR MECHANICAL WORK TO BE ACCOMPLISHED IN THIS AREA REFER TO SHEET L/M203.4.

8

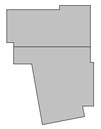


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Overall Key Plan - Building L

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Consultant

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Project

BUILDING L
SECOND FLOOR OVERALL MECHANICAL PLAN
Drawing

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No.	Revision/Submission	Date
8	Addendum #8	9/25/2026

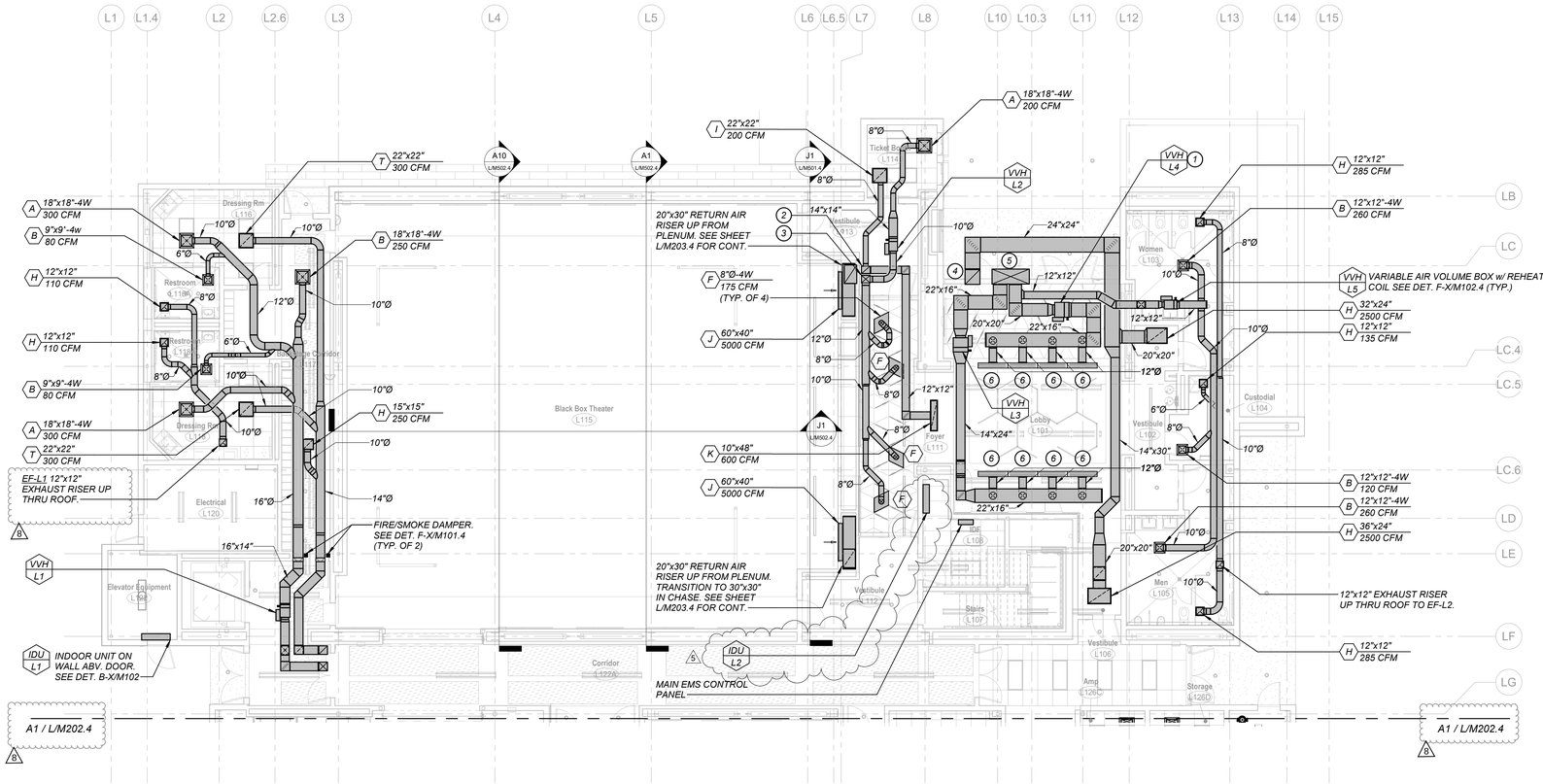
Revision

	Designed By: AB	Copyright 2022 Darden Architects
Scale: As indicated	Drawn By: Author	L/M102.4
Project Number: 22040	Checked By: AB	
Date: 08/11/2023	Reviewed By: AB	AD8

A1
3/32" = 1'-0"

SECOND FLOOR OVERALL MECHANICAL PLAN

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DSA File

DSA Application No.:
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KEYNOTES: (THIS SHEET ONLY)

1. *UNLESS OTHERWISE NOTED, ALL DUCTWORK DOWNSTREAM OF VAV BOXES SHALL HAVE 1" ACOUSTIC LINING. (TYP.)*
2. *14"x12" RETURN AIR RISER UP TO CONTROL ROOM.*
3. *14"x12" SUPPLY AIR DROP FROM CONTROL ROOM.*
4. *24"x24" RETURN AIR RISER UP TO MECHANICAL ROOM.*
5. *24"x60" SUPPLY AIR DROP FROM MECHANICAL ROOM.*
6. *G 12"Ø / 800 CFM*

Overall Key Plan - Building L

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Exp. 6/30/25

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Project

BUILDING L
FIRST FLOOR MECHANICAL PLAN - AREA A
Drawing

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LICENSED ARCHITECT MICHAEL K. FERNANDEZ No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA

Architect

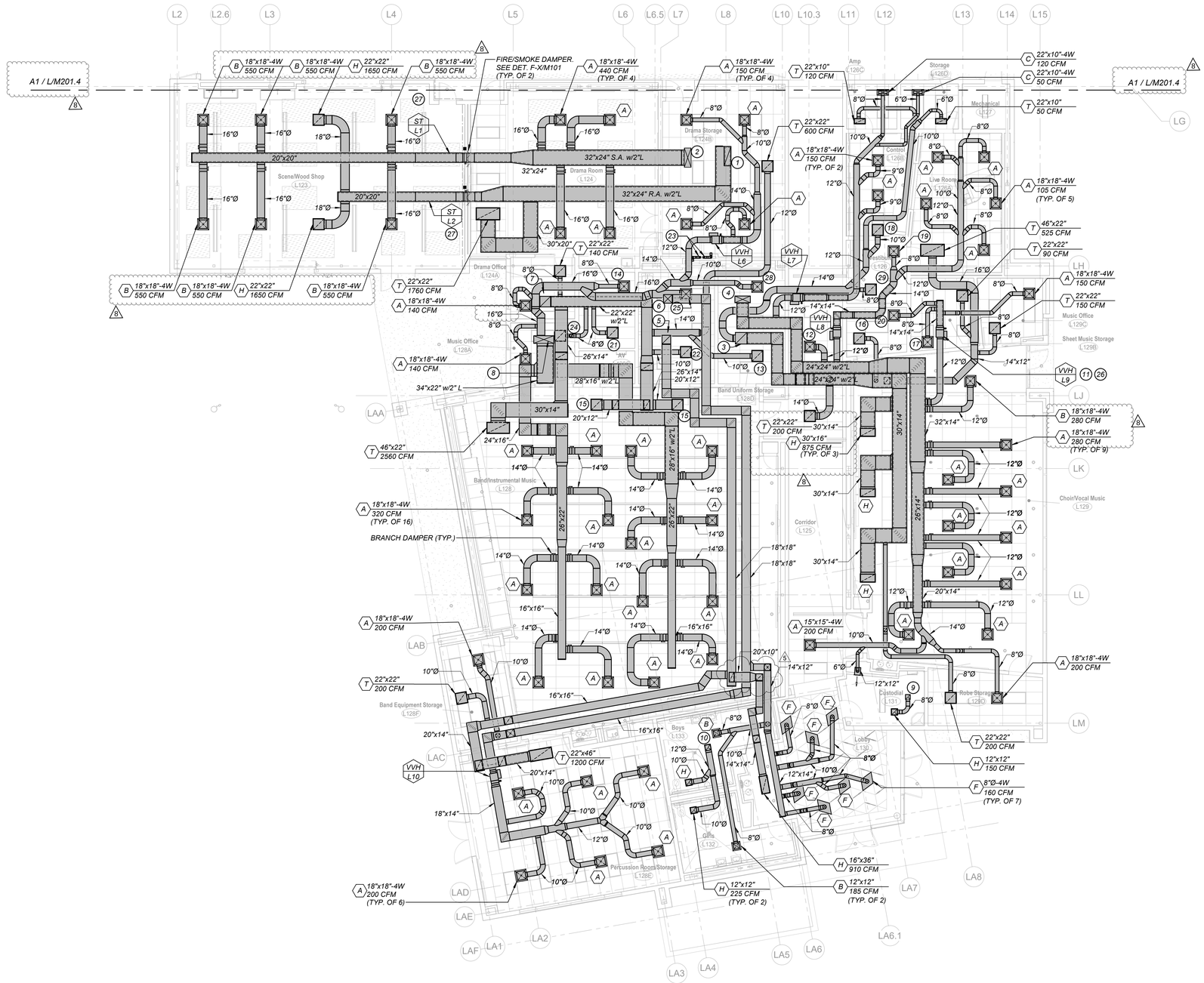
No.	Revision/Submission	Date
5	Addendum #5	12/13/23
8	Addendum #8	9/25/2026

Revision

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Scale: As indicated	Drawn By: Author	*L/M201.4*
Project Number: 22040	Checked IChecker	
Date: 08/11/2023	Reviewed Approver	AD8

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1/8" = 1'-0"
FIRST FLOOR MECHANICAL PLAN - AREA A

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DSA File No.:
DSA File

DSA Application No.:
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Agency Approval

KEYNOTES: (THIS SHEET ONLY)

1. *14"x40" RETURN AIR RISER UP TO AH-L2 ON ROOF.*
2. *14"x40" SUPPLY AIR DROP FROM AH-L2 ON ROOF.*
3. *24"x24" RETURN AIR RISER UP TO AH-L5 ON ROOF.*
4. *14"x32" SUPPLY AIR DROP FROM AH-L5 ON ROOF.*
5. *18"x18" RETURN AIR RISER UP TO AH-L4 ON ROOF.*
6. *18"x18" SUPPLY AIR DROP FROM AH-L4 ON ROOF.*
7. *22"x22" RETURN AIR RISER UP TO AH-L3 ON ROOF.*
8. *16"x42" SUPPLY AIR DROP FROM AH-L3 ON ROOF.*
9. *12"x12" EXHAUST AIR RISER UP TO EF-L4 ON ROOF.*
10. *12"x12" EXHAUST AIR RISER UP TO EF-L3 ON ROOF.*
11. *UNLESS OTHERWISE NOTED, ALL DUCTWORK DOWNSTREAM OF VAV BOXES SHALL HAVE 1" ACOUSTIC LINING. (TYP.)*
12. *A 15"x15"-4W 300 CFM*
13. *A 18"x18"-4W 75 CFM*
14. *T 22"x22" 75 CFM*
15. *T 22"x22" 1280 CFM*
16. *T 22"x22" 100 CFM*
17. *A 18"x18"-4W 90 CFM*
18. *T 22"x22" 300 CFM*
19. *B 18"x18"-4W 50 CFM*
20. *A 18"x18"-4W 100 CFM*
21. *T 22"x22" 75 CFM*
22. *T 22"x22" 250 CFM*
23. *4" DRYER VENT RISER UP TO ROOF. TERMINATE WITH ROOF CAP. SEE DET. J8-X/A506 (TYP. OF 2)*
24. *T 22"x22" 140 CFM*
25. *A 18"x18"-4W 250 CFM*
26. *SEE DETAIL F/X/M102 FOR SUPPORT.*
27. *SOUND TRAP SUPPORT, TYP. OF STD. DUCT SUPPORT.*
28. *A 18"x18"-4W 150 CFM*
29. *T 15"x15"-4W 50 CFM*

Overall Key Plan - Building L

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22040
Exp. 6-30-25
MECHANICAL
Consultant

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BUILDING L
FIRST FLOOR MECHANICAL PLAN - AREA B
Drawing

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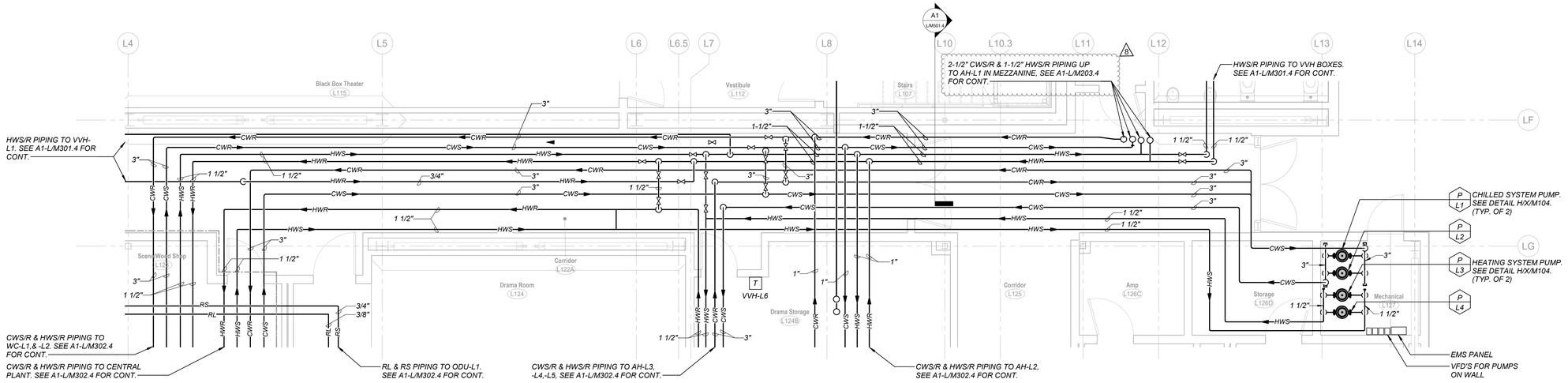
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5	Addendum #5	12/13/23
8	Addendum #8	9/25/2026

Revision

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Project Number: 22040	Checked Checker	AD8
Date: 08/11/2023	Reviewed Approver	

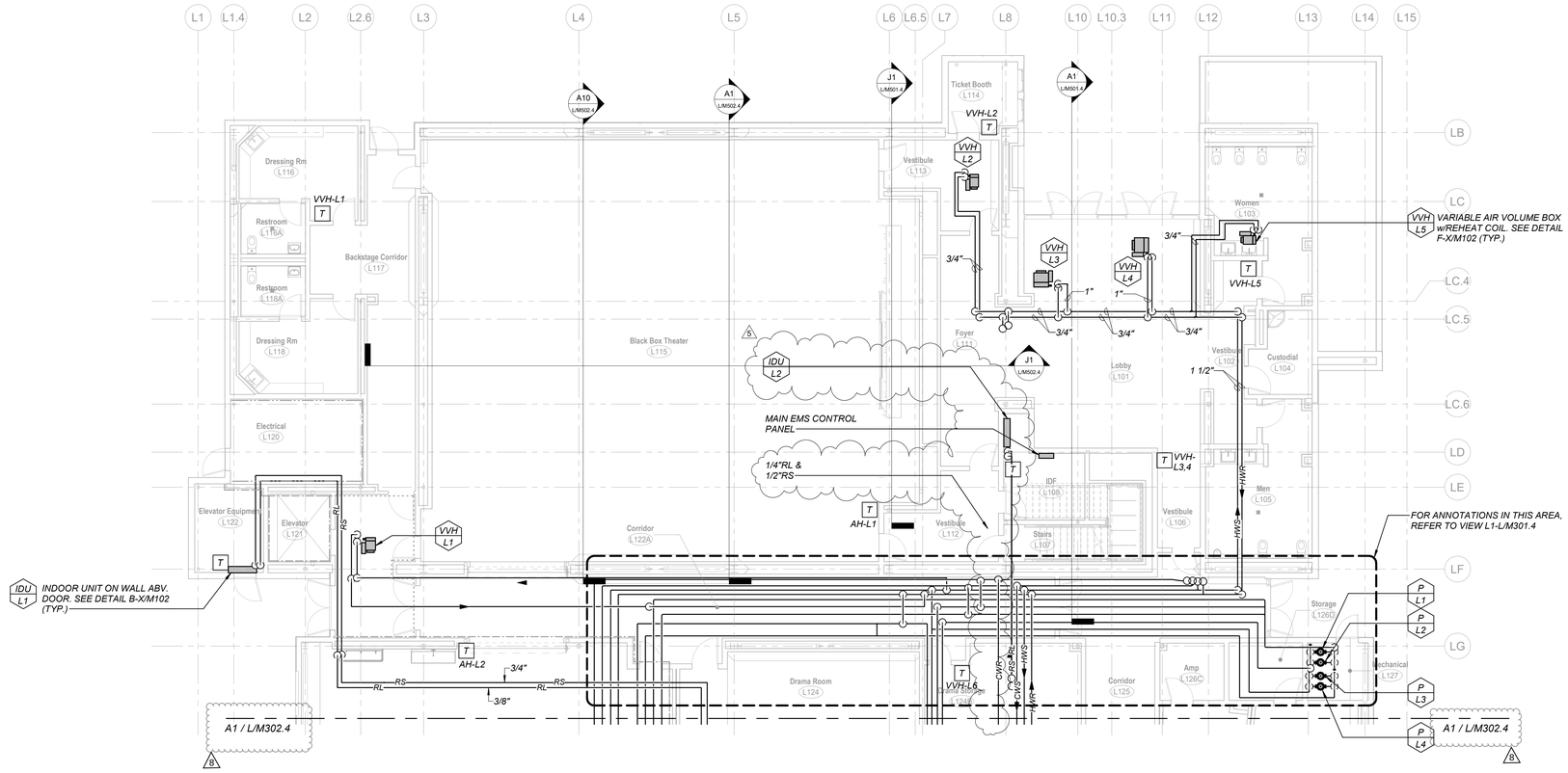
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1/8" = 1'-0"
ENLARGED FIRST FLOOR MECHANICAL PLAN - AREA B

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L1 — ENLARGED MECHANICAL PIPING PLAN - L122A

1/4" = 1'-0"



A1 — 1/8" ENLARGED FIRST FLOOR PIPING - AREA A

1/8" = 1'-0"

N

DSA File No.:
DSA File

DSA Application No.:
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Overall Key Plan - Building L

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BUILDING L
FIRST FLOOR MECHANICAL PIPING PLAN - AREA A

Drawing

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5	Addendum #5	12/13/23
8	Addendum #8	9/25/2026

Revision

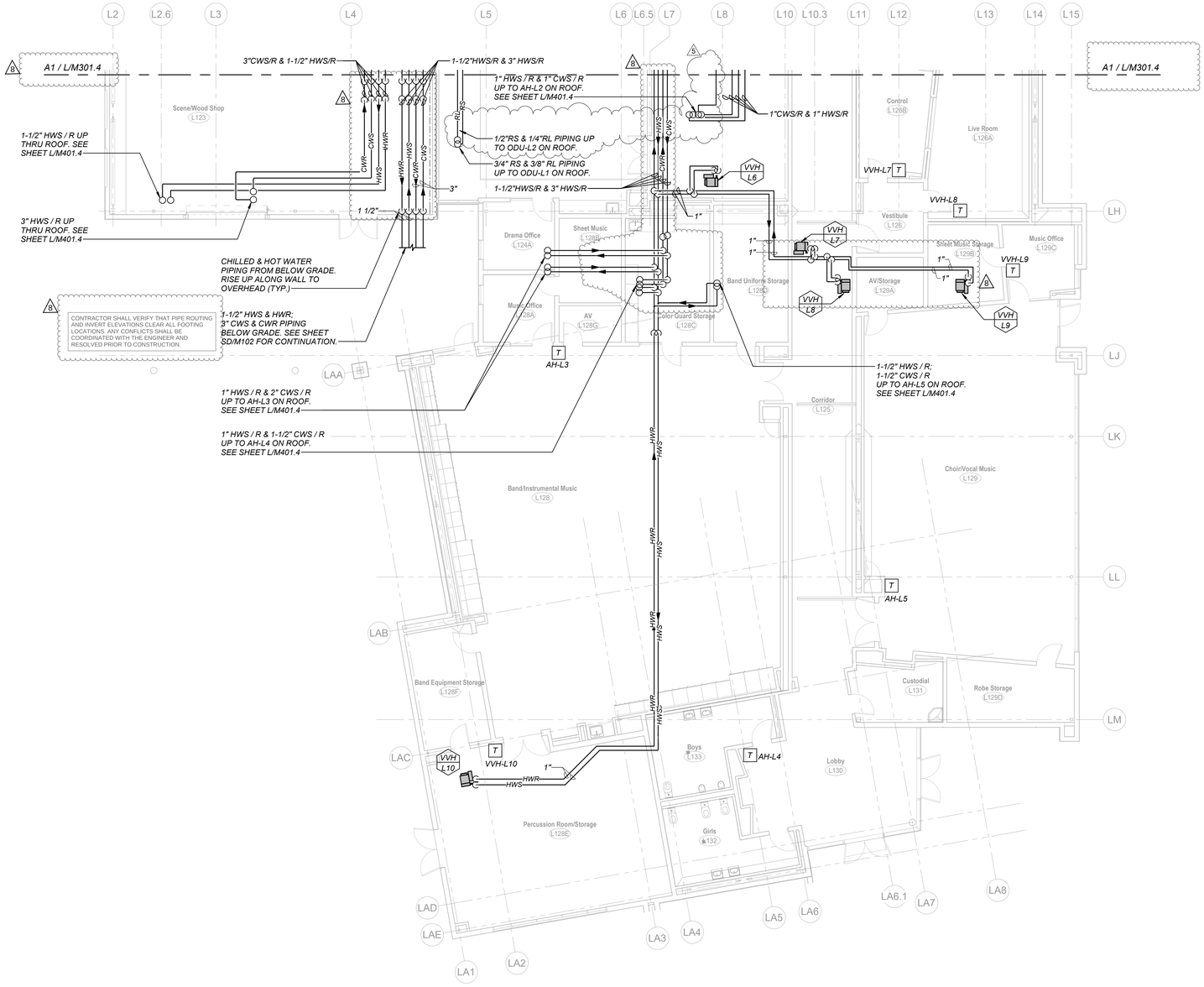
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Drawn By: Author
Checked Checker
Reviewed Approver

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Scale: As indicated
Project Number: 22040
Date: 08/11/2023

L/M301.4
AD8

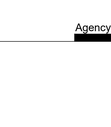
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DSA File

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Overall Key Plan - Building L

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22040

Exp. 9-30-25

Consultant

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Sanger Unified School District
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BUILDING L
FIRST FLOOR MECHANICAL PIPING PLAN - AREA B
Drawing

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No.	Revision/Submission	Date
5	Addendum #5	12/13/23
8	Addendum #8	9/25/2026

Revision

Designed Designer
Drawn By: Author
Checked Checker
Reviewed Approver

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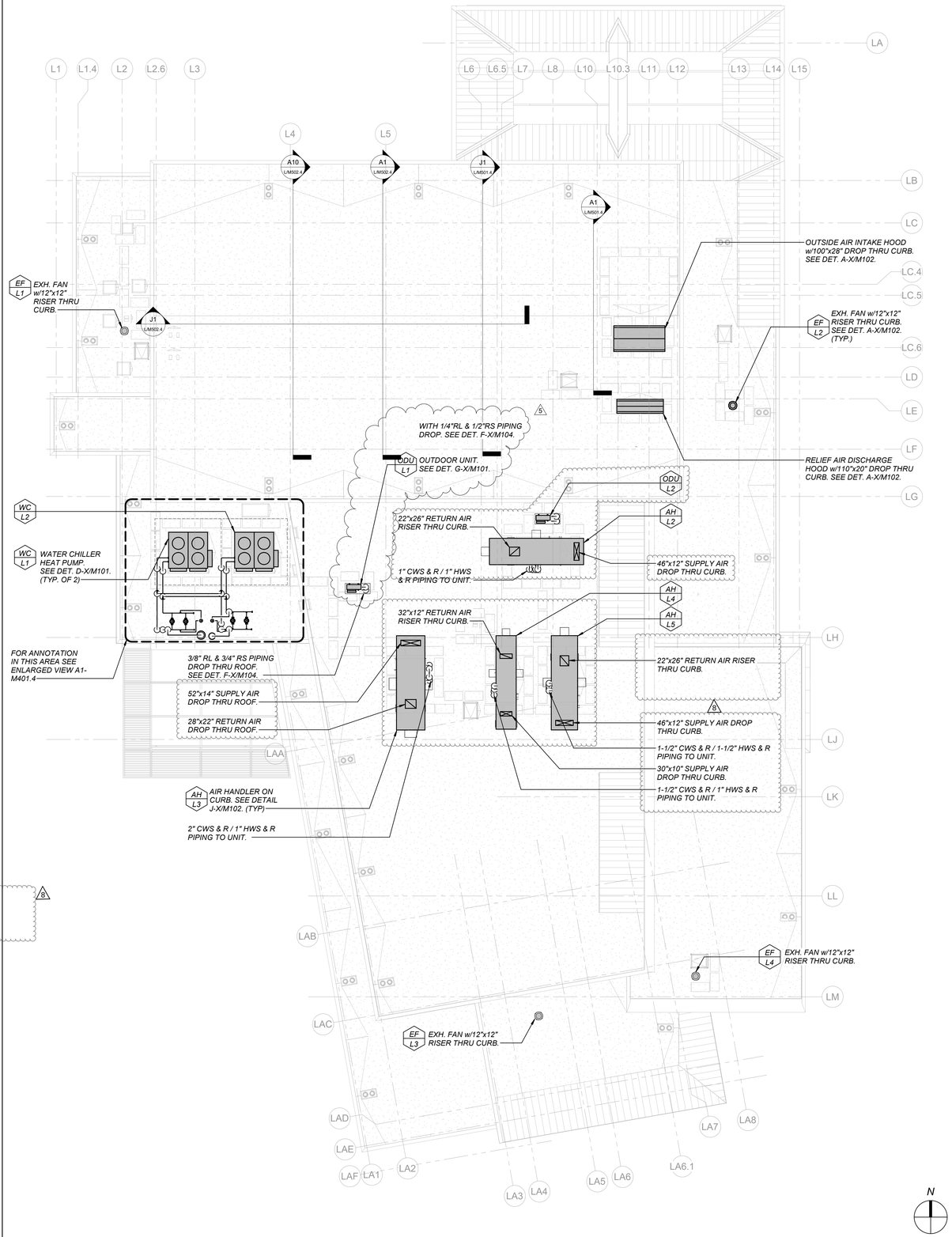
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Date: 08/11/2023

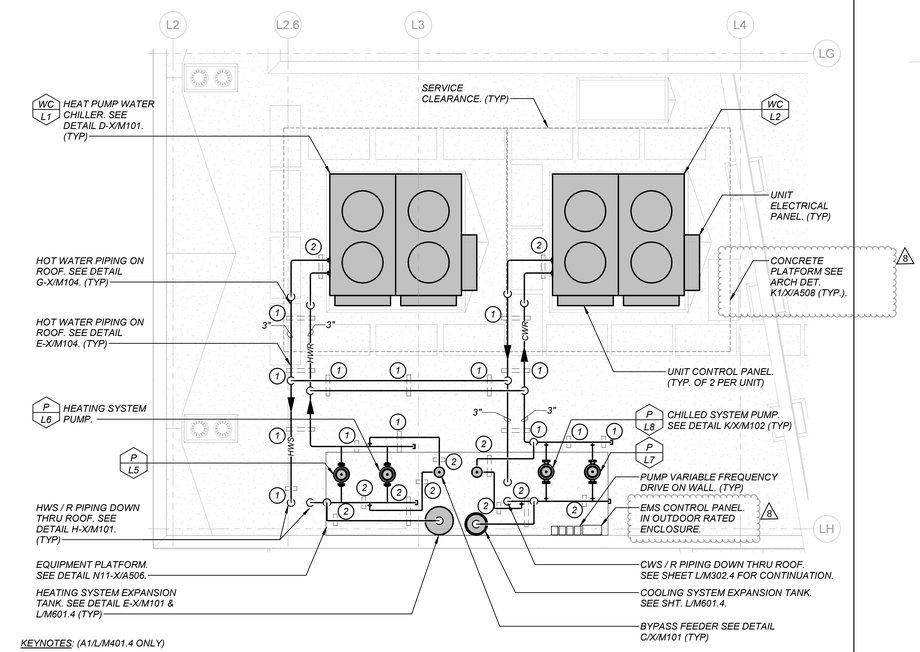
L/M302.4
AD8

A1
1/8" = 1'-0"

ENLARGED FIRST FLOOR PIPING - AREA B

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KEYNOTES: (A1/L/M401.4 ONLY)

1. PIPING SUPPORT AT ROOF, SEE DETAIL E/X/M104.
2. PIPING SUPPORT AT CONCRETE PLATFORM, SEE DETAIL J/X/M105.

A1 ENLARGED MECHANICAL ROOF PLAN
1/4" = 1'-0"

A8 MECHANICAL ROOF PLAN
3/32" = 1'-0"

DSA File No.:
DSA File

DSA Application No.:
DSA App

Agency Approval



Overall Key Plan - Building L

LAWRENCE ENGINEERING GROUP
4910 E. Clinton Way, Suite 101 Fresno, CA 93727
(559) 431-8161 22040 FAX (209) 431-1562

Exp. 6-30-26

Consultant

SANGER EDUCATION COMPLEX - PHASE 3

Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727

Project

BUILDING L

OVERALL MECHANICAL ROOF PLAN

Drawing

darden architects
ARCHITECTURE PLANNING INTERIORS
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6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

Exp. 4-30-27

Architect

No.	Revision/Submission	Date
5	Addendum #5	12/13/23
8	Addendum #8	9/25/2026

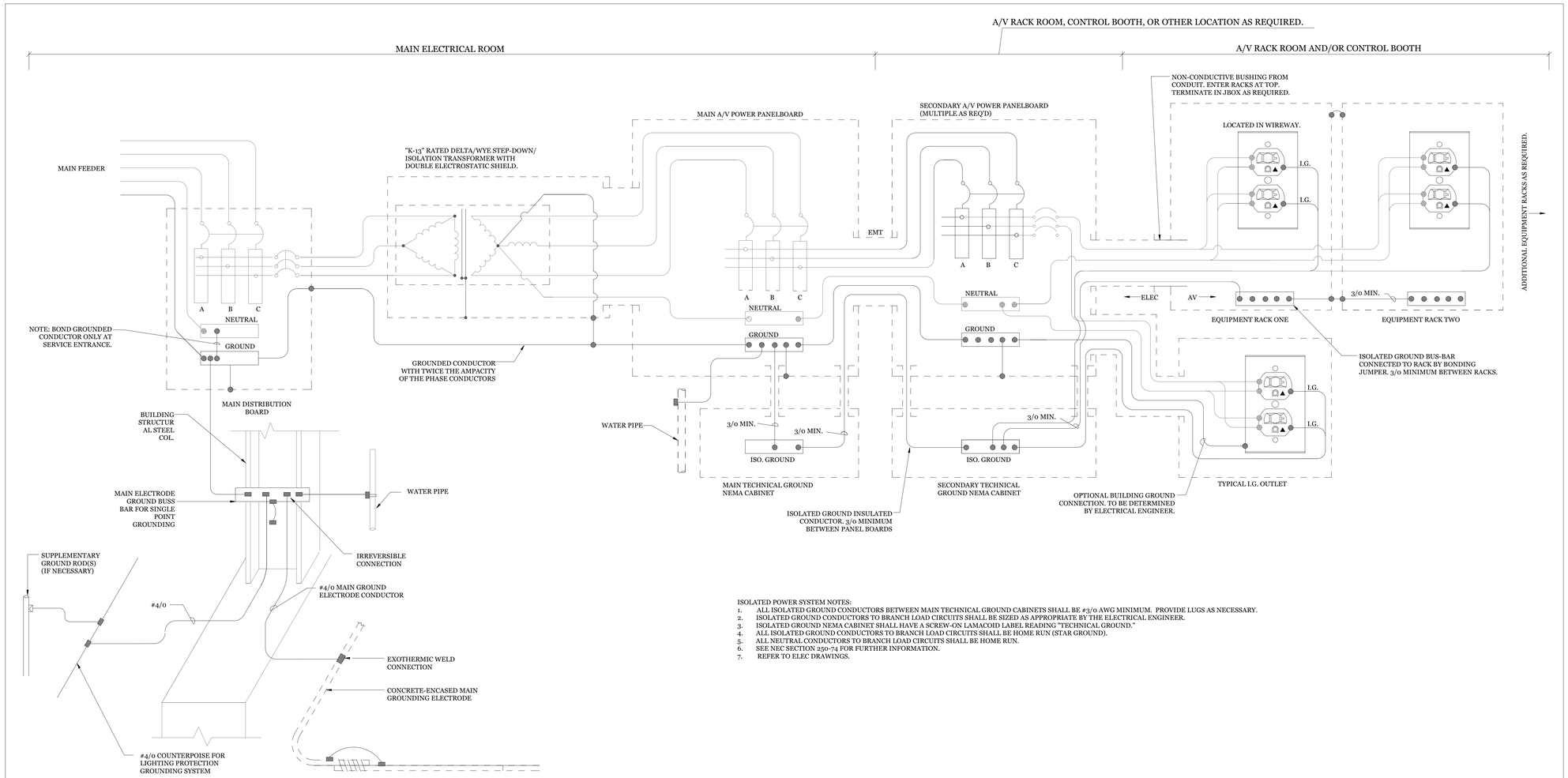
Revision

Designed Designer
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Scale: As indicated
Drawn By: Author
Project Number: 22040
Checked Checker
Date: 08/11/2023
Reviewed Approver

L/M401.4
AD8

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ISOLATED POWER SYSTEM NOTES:
1. ALL ISOLATED GROUND CONDUCTORS BETWEEN MAIN TECHNICAL GROUND CABINETS SHALL BE #3/0 AWG MINIMUM. PROVIDE LUGS AS NECESSARY.
2. ISOLATED GROUND CONDUCTORS TO BRANCH LOAD CIRCUITS SHALL BE SIZED AS APPROPRIATE BY THE ELECTRICAL ENGINEER.
3. ISOLATED GROUND NEMA CABINET SHALL HAVE A SCREW-ON LAMACOID LABEL READING "TECHNICAL GROUND."
4. ALL ISOLATED GROUND CONDUCTORS TO BRANCH LOAD CIRCUITS SHALL BE HOME RUN (STAR GROUND).
5. ALL NEUTRAL CONDUCTORS TO BRANCH LOAD CIRCUITS SHALL BE HOME RUN.
6. SEE NEC SECTION 250-74 FOR FURTHER INFORMATION.
7. REFER TO ELEC DRAWINGS.

3 TYPICAL ISOLATED GROUND SYSTEM DIAGRAM
NTS

PRODUCTION SYSTEMS SCOPE MATRIX

AV: AUDIO-VISUAL CONTRACTOR EC: ELECTRICAL CONTRACTOR	PROVIDED BY		INSTALLED BY	
SCOPE	**EC**	**AV**	**EC**	**AV**
POWER SYSTEMS (COMPLETE)	Yes	No	Yes	No
COMPANY SWITCHES	Yes	No	Yes	No
CONDUIT FOR AV SYSTEM	Yes	No	Yes	No
STANDARD GANG & DIMENSIONAL BACKBOXES	Yes	No	Yes	No
FLOOR & WALL SPECIALTY BACKBOXES	No	Yes	Yes	No
WIRE & PULL FOR AV SYSTEMS (LOW-VOLTAGE ONLY)	No	Yes	No	Yes
WIRE TERMINATION FOR AV SYSTEMS	No	Yes	No	Yes
EQUIPMENT RACKS FOR AV	No	Yes	No	Yes
AV EQUIPMENT & INSTALLATION	No	Yes	No	Yes
AV TESTING, TUNING, CONFIGURATION	No	Yes	No	Yes

2 PRODUCTION SYSTEMS SCOPE MATRIX
NTS

CBC-ASSISTIVE LISTENING CODE REFERENCES

NOTE: ALL ALS SYSTEMS PROVIDED SHALL COMPLY WITH CURRENT CBC AND BE APPROVED BY AHJ

11B-216.10 ASSISTIVE LISTENING SYSTEMS:
EACH ASSEMBLY AREA REQUIRED BY SECTION 11B-219 TO PROVIDE ASSISTIVE LISTENING SYSTEMS SHALL PROVIDE SIGNS INFORMING PATRONS OF THE AVAILABILITY OF THE ASSISTIVE LISTENING SYSTEM. THE SIGN SHALL INCLUDE WORDING THAT STATES "ASSISTIVE-LISTENING SYSTEM AVAILABLE" AND SHALL BE POSTED IN A PROMINENT PLACE AT OR NEAR THE ASSEMBLY AREA ENTRANCE. ASSISTIVE LISTENING SIGNS SHALL COMPLY WITH SECTION 11B-703.5 AND SHALL INCLUDE THE INTERNATIONAL SYMBOL OF ACCESS FOR HEARING LOSS COMPLYING WITH SECTION 11B-703.7.2.4.
EXCEPTION:
WHERE TICKET OFFICES OR WINDOWS ARE PROVIDED, SIGNS SHALL NOT BE REQUIRED AT EACH ASSEMBLY AREA PROVIDED THAT SIGNS ARE DISPLAYED AT EACH TICKET OFFICE OR WINDOW INFORMING PATRONS OF THE AVAILABILITY OF ASSISTIVE LISTENING SYSTEMS.

11B-219 ASSISTIVE LISTENING SYSTEMS:
11B-219.1 GENERAL:
ASSISTIVE LISTENING SYSTEMS SHALL BE PROVIDED IN ACCORDANCE WITH SECTION 11B-219 AND SHALL COMPLY WITH SECTION 11B-706.
11B-219.2 REQUIRED SYSTEMS:
AN ASSISTIVE LISTENING SYSTEM SHALL BE PROVIDED IN ASSEMBLY AREAS, INCLUDING CONFERENCE AND MEETING ROOMS.
EXCEPTION: THIS SECTION DOES NOT APPLY TO SYSTEMS USED EXCLUSIVELY FOR PAGING, BACKGROUND MUSIC, OR A COMBINATION OF THESE TWO USES.
11B-219.3 RECEIVERS:
THE MINIMUM NUMBER OF RECEIVERS TO BE PROVIDED SHALL BE EQUAL TO 4 PERCENT OF THE TOTAL NUMBER OF SEATS, BUT IN NO CASE LESS THAN TWO. TWENTY-FIVE PERCENT MINIMUM OF RECEIVERS PROVIDED, BUT NO FEWER THAN TWO, SHALL BE HEARING-AID COMPATIBLE IN ACCORDANCE WITH SECTION 11B-706.3.
EXCEPTIONS:
1. WHERE A BUILDING CONTAINS MORE THAN ONE ASSEMBLY AREA AND THE ASSEMBLY AREAS REQUIRED TO PROVIDE ASSISTIVE LISTENING SYSTEMS ARE UNDER ONE MANAGEMENT, THE TOTAL NUMBER OF REQUIRED RECEIVERS SHALL BE PERMITTED TO BE CALCULATED ACCORDING TO THE TOTAL NUMBER OF SEATS IN THE ASSEMBLY AREAS IN THE BUILDING PROVIDED THAT ALL RECEIVERS ARE USABLE WITH ALL SYSTEMS.
2. WHERE ALL SEATS IN AN ASSEMBLY AREA ARE SERVED BY AN INDUCTION LOOP ASSISTIVE LISTENING SYSTEM, THE MINIMUM NUMBER OF RECEIVERS REQUIRED BY SECTION 11B-219.3 TO BE HEARING-AID COMPATIBLE SHALL NOT BE REQUIRED TO BE PROVIDED.

11B-219.4 LOCATION:
IF THE ASSISTIVE-LISTENING SYSTEM PROVIDED IS LIMITED TO SPECIFIC AREAS OR SEATS, THEN SUCH AREAS OR SEATS SHALL BE WITHIN A 50-FOOT (15240 MM) VIEWING DISTANCE OF THE STAGE OR PLAYING AREA AND SHALL HAVE A COMPLETE VIEW OF THE STAGE OR PLAYING AREA.
11B-219.5 PERMANENT AND PORTABLE SYSTEMS:
PERMANENTLY INSTALLED ASSISTIVE-LISTENING SYSTEMS ARE REQUIRED IN AREAS IF (1) THEY ACCOMMODATE AT LEAST 50 PERSONS OR IF THEY HAVE AUDIO-AMPLIFICATION SYSTEMS, AND (2) THEY HAVE FIXED SEATING. IF PORTABLE ASSISTIVE-LISTENING SYSTEMS ARE USED FOR CONFERENCE OR MEETING ROOMS, THE SYSTEM MAY SERVE MORE THAN ONE ROOM. AN ADEQUATE NUMBER OF ELECTRICAL OUTLETS OR OTHER SUPPLEMENTARY WIRING NECESSARY TO SUPPORT A PORTABLE ASSISTIVE-LISTENING SYSTEM SHALL BE PROVIDED.

11B-706 ASSISTIVE LISTENING SYSTEMS
11B-706.1 GENERAL:
ASSISTIVE LISTENING SYSTEMS REQUIRED IN ASSEMBLY AREAS, CONFERENCE AND MEETING ROOMS SHALL COMPLY WITH SECTION 11B-706.
11B-706.2 RECEIVER JACKS:
RECEIVERS REQUIRED FOR USE WITH AN ASSISTIVE LISTENING SYSTEM SHALL INCLUDE A 1/8 INCH (3.2 MM) STANDARD MONO JACK.
11B-706.3 RECEIVER HEARING-AID COMPATIBILITY:
RECEIVERS REQUIRED TO BE HEARING-AID COMPATIBLE SHALL INTERFACE WITH TELECOILS IN HEARING AIDS THROUGH THE PROVISION OF NECKLOOPS.
11B-706.4 SOUND PRESSURE LEVEL:
ASSISTIVE LISTENING SYSTEMS SHALL BE CAPABLE OF PROVIDING A SOUND PRESSURE LEVEL OF 110 DB MINIMUM AND 118 DB MAXIMUM WITH A DYNAMIC RANGE ON THE VOLUME CONTROL OF 50 DB.
11B-706.5 SIGNAL-TO-NOISE RATIO:
THE SIGNAL-TO-NOISE RATIO FOR INTERNALLY GENERATED NOISE IN ASSISTIVE LISTENING SYSTEMS SHALL BE 18 DB MINIMUM.
11B-706.6 PEAK CLIPPING LEVEL:
PEAK CLIPPING SHALL NOT EXCEED 18 DB OF CLIPPING RELATIVE TO THE PEAKS OF SPEECH.

11B-219.3 ASSISTIVE LISTENING RECEIVERS

CALIFORNIA BUILDING CODE (2022)

Capacity of Seating in Assembly Area	Minimum Number of Required Receivers	Minimum Number of Required Receivers to be Hearing-Aid Compatible
1-50 Seats	Two	Two
51+ Seats	4% of the Total Amount of Seating	25%

ASSISTIVE LISTENING-CBC

AV SYSTEM	# SEATS	# RECEIVERS REQUIRED	# HEARING-AID COMPATIBLE REQUIRED	TYPE	NOTES
BLACKBOX	248	10	3	FM	
TOTAL:	248	10	3		

NOTE: THE TABLE ABOVE SHOWS THE MINIMUM REQUIRED QUANTITY OF RECEIVERS AND HEARING-AID COMPATIBLE RECEIVERS. QUANTITY PROVIDED IN THIS PROJECT MAY EXCEED THOSE SHOWN IN THIS TABLE

1 ASSISTIVE LISTENING CALCULATIONS & REFERENCES
NTS

DSA File No.:
10-H15

DSA Application No.:
02-119023

Agency Approval

The Shalleck Collaborative Inc.
Planning and Design of Theatres Production Systems | AV
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Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727

Project

Audio-Visual - Typical Information
AV ISO GROUND, ALS, & CONDUIT INFO

Drawing

darden architects
ARCHITECTURE PLANNING INTERIORS
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LICENSED ARCHITECT RICHARD K. FEDNEY No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
	100CD	12/15/22
	DSA BACKCHECK	08/11/23
B	ADD 8	09/22/2026

Revision

Designed By: IDH
Drawn By: GTEH
Checked By: STK
Reviewed By: IDH

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Scale: 12" = 1'-0"
Project Number: 2771
Date: 08/11/23

AV001
AD8

9/24/2026 7:09:55 AM
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AV PANEL SCHEDULE

DEVICE TYPE	LOCATION	DEVICE DESCRIPTION	PANEL SIZE - FLUSH MOUNT	PANEL SIZE - SURFACE MOUNT	BOX TYPE - FLUSH MOUNT	BOX TYPE - SURFACE MOUNT	WIRING CONNECTION
AV-B1	BLACK BOX	MULTI I/O PANEL	13 X 13	12 X 12	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
AV-B2	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B3	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B4	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B5	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B6	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B10	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B11	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B12	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B13	BLACK BOX	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-B14	BLACK BOX	MULTI I/O PANEL	13 X 13	12 X 12	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
AV-B15	BLACK BOX	MULTI I/O PANEL	13 X 13	12 X 12	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
AV-B16	BLACK BOX	MULTI I/O PANEL	13 X 17	12 X 16	NEMA TYPE 1 12X16X6	NEMA TYPE 1 12X16X6	HOME RUN TO AV RACK
AV-R1	RECORDING STUDIO	MULTI I/O PANEL	13 X 13	12 X 12	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
AV-R2	RECORDING STUDIO	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-R3	RECORDING STUDIO	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-R4	RECORDING STUDIO	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
AV-R5	RECORDING STUDIO	MULTI I/O PANEL	9 X 11	8 X 10	NEMA TYPE 1 8X10X6	NEMA TYPE 1 8X10X6	HOME RUN TO AV RACK
CM-2	SEE DRAWINGS	PRODUCTION INTERCOM CONNECTIONS	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
CM-W	SEE DRAWINGS	PRODUCTION INTERCOM WALL STATION	PRE-MADE DEVICE	PRE-MADE DEVICE	2-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 2-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
CSP-1	BLACK BOX	REMOTE CONTROL PANEL	PRE-MADE DEVICE	PRE-MADE DEVICE	2-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 2-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
CSP-B	SEE DRAWINGS	REMOTE CONTROL PANEL	PRE-MADE DEVICE	PRE-MADE DEVICE	2-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 2-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
FM	SEE DRAWINGS	FM ASSISTIVE LISTENING ANTENNA	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
FPD-F	SEE DRAWINGS	FLAT PANEL DISPLAY	N/A	N/A	MFR: CHIEF MFR MODEL: PAC-526	N/A	HOME RUN TO AV RACK
FPD-P	SEE DRAWINGS	FLAT PANEL DISPLAY	N/A	N/A	MFR: CHIEF MFR MODEL: PAC-501	N/A	HOME RUN TO AV RACK
FPD-V	SEE DRAWINGS	FLAT PANEL DISPLAY WITH PULL OUT MOUNT	N/A	N/A	MFR: RPVISUALS MODEL: WALLMATE 16	N/A	HOME RUN TO AV RACK
HDMI	SEE DRAWINGS	HDMI INPUT	2-GANG	2-GANG	2-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 2-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
HM	BLACK BOX	HOUSE MANAGER PANEL	16X16 W/ STANDOFFS	16X16 W/ STANDOFFS	NEMA TYPE 1 18X18X8	NEMA TYPE 1 18X18X8	HOME RUN TO AV RACK
JB-1	BLACK BOX	J-BOX	13 X 13 W/ GROMMET	12 X 12 W/GROMMET	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
JB-2	RECORDING STUDIO	J-BOX	13 X 13 W/ GROMMET	12 X 12 W/GROMMET	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
JB-3	RECORDING STUDIO	J-BOX	13 X 13 W/ GROMMET	12 X 12 W/GROMMET	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
LCC	SEE DRAWINGS	LIGHTING CONTROL CONNECTION	2-GANG W/ GROMMET	2-GANG W/ GROMMET	2-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 2-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
MC-1	SEE DRAWINGS	MICROPHONE CONNECTIONS	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
MC-2	SEE DRAWINGS	MICROPHONE CONNECTIONS	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
PTZ	BLACKBOX	PAN TILT ZOOM CAMERA	N/A DIRECT CONNECT	N/A DIRECT CONNECT	2-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 2-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
PTZ-C	BLACK BOX	CEILING PAN TILT ZOOM CAMERA	1-GANG W/ GROMMET	1-GANG W/ GROMMET	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
RK-1	BLACK BOX	EQUIPMENT RACK J-BOX	N/A	N/A	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
RK-2	BAND ROOM	EQUIPMENT RACK J-BOX	N/A	N/A	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
RK-3	CHOIR ROOM	EQUIPMENT RACK J-BOX	N/A	N/A	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
RK-4	DRAMA ROOM	EQUIPMENT RACK J-BOX	N/A	N/A	NEMA TYPE 1 12X12X6	NEMA TYPE 1 12X12X6	HOME RUN TO AV RACK
RL	RECORDING STUDIO	RECORDING LIGHT	PRE-MADE DEVICE	PRE-MADE DEVICE	2-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 2-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
SA	SEE DRAWINGS	70V VOLUME CONTROL	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
SAD	SEE DRAWINGS	70V VOLUME CONTROL	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK

AV PANEL SCHEDULE

DEVICE TYPE	LOCATION	DEVICE DESCRIPTION	PANEL SIZE - FLUSH MOUNT	PANEL SIZE - SURFACE MOUNT	BOX TYPE - FLUSH MOUNT	BOX TYPE - SURFACE MOUNT	WIRING CONNECTION
SC	SEE DRAWINGS	CEILING MOUNTED 70V LOUDSPEAKER	1-GANG BLANK	1-GANG BLANK	1-GANG W/ FLEX CONDUIT TO LOUDSPEAKER	1-GANG W/ FLEX CONDUIT TO LOUDSPEAKER	FROM AV RACK - CONTINUES TO OTHER SIMILAR DEVICES IN AREA
SCRC	SEE DRAWINGS	MOTORIZED SCREEN CONTROL	2-GANG	2-GANG	2-GANG DOUBLE-DEPTH BOX	2-GANG DOUBLE-DEPTH WEATHERPROOF BOX	HOME RUN TO AV RACK
SHC	SEE DRAWINGS	HIGH-CEILING MOUNTED 70V LOUDSPEAKER	1-GANG BLANK	1-GANG BLANK	1-GANG W/ FLEX CONDUIT TO LOUDSPEAKER	1-GANG W/ FLEX CONDUIT TO LOUDSPEAKER	FROM AV RACK - CONTINUES TO OTHER SIMILAR DEVICES IN AREA
SHP	SEE DRAWINGS	PENDANT MOUNTED 70V LOUDSPEAKER	1-GANG BLANK	1-GANG BLANK	1-GANG W/ FLEX CONDUIT TO LOUDSPEAKER	1-GANG W/ FLEX CONDUIT TO LOUDSPEAKER	FROM AV RACK - CONTINUES TO OTHER SIMILAR DEVICES IN AREA
SP-1	RECORDING STUDIO	SELF-POWERED LOUDSPEAKER CONNECTIONS	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
SP-1	SEE DRAWINGS	SELF-POWERED LOUDSPEAKER CONNECTIONS	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
TB	RECORDING STUDIO	TALKBACK MICROPHONE	PRE-MADE DEVICE	PRE-MADE DEVICE	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
V-4	BLACKBOX	VIDEO I/O CONNECTIONS	3-GANG	3-GANG	3-GANG DOUBLE-DEPTH BOX	DOUBLE-DEPTH 3-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
VPJ	SEE DRAWINGS	VIDEO PROJECTOR	7 X 7 W/ GROMMET	6 X 6 W/ GROMMET	NEMA TYPE 1 6X6X6	NEMA TYPE 1 6X6X6	HOME RUN TO AV RACK
VTV	SEE DRAWINGS	CATV OUTLET	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK
WX	SEE DRAWINGS	WIRELESS MICROPHONE ANTENNA	1-GANG	1-GANG	2-GANG DOUBLE-DEPTH BOX W/ 1-GANG REDUCER	DOUBLE-DEPTH 1-GANG BELL WEATHERPROOF BOX	HOME RUN TO AV RACK

1 AV PANEL SCHEDULE
NTS

B

DSA File No.:
10-H15

DSA Application No.:
02-119023

Agency Approval

The Shalleck Collaborative Inc.
Planning and Design of Theatres
Production Systems | AV
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Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727
Project

Audio-Visual - Typical Information
AV PANEL SCHEDULE
Drawing

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ARCHITECTURE
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6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051
LICENSED ARCHITECT MICHAEL K. FERNEZIAN No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date
	100CD	12/15/22
	DSA BACKCHECK	08/11/23
B	ADD 8	09/22/2026

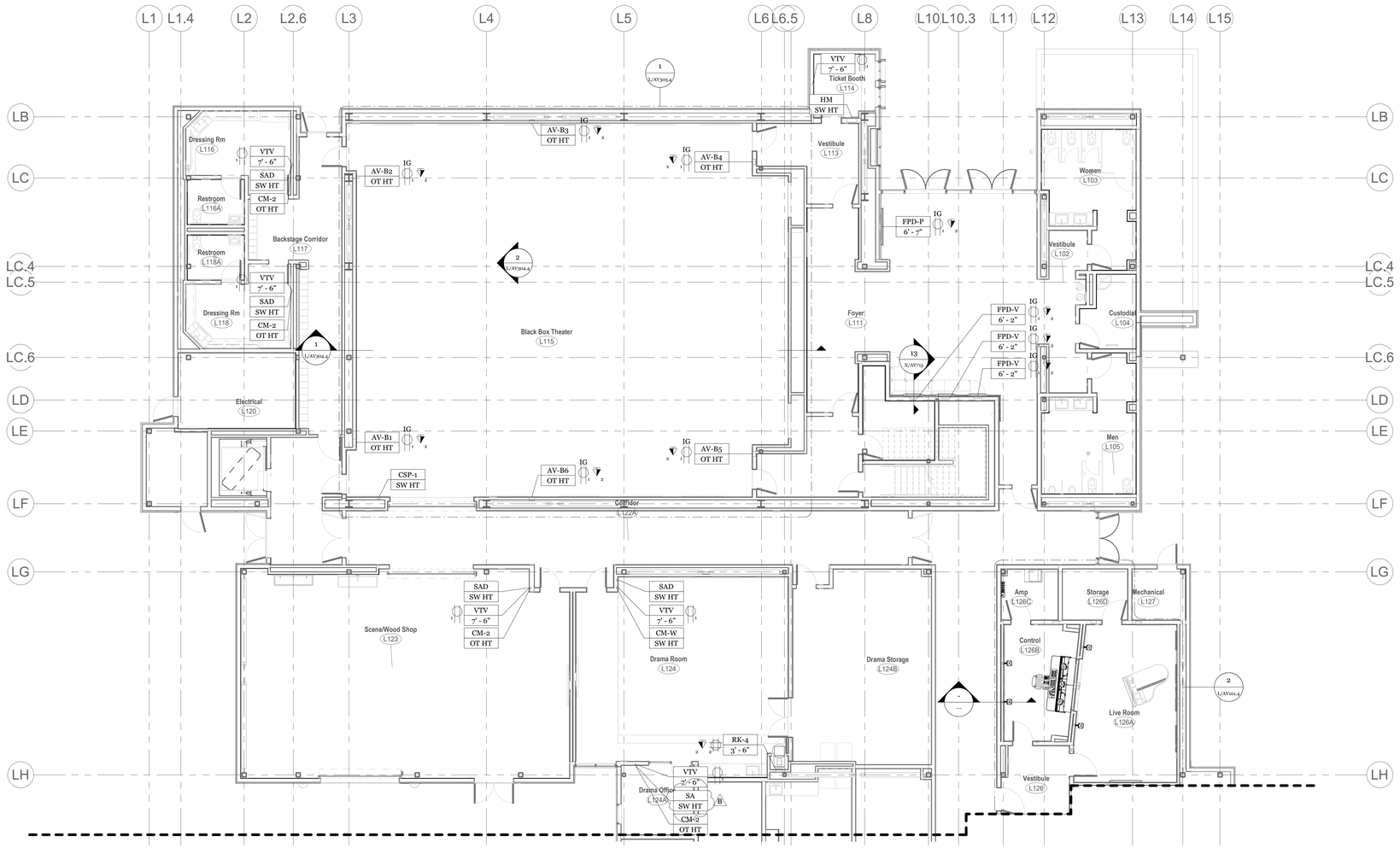
Revision

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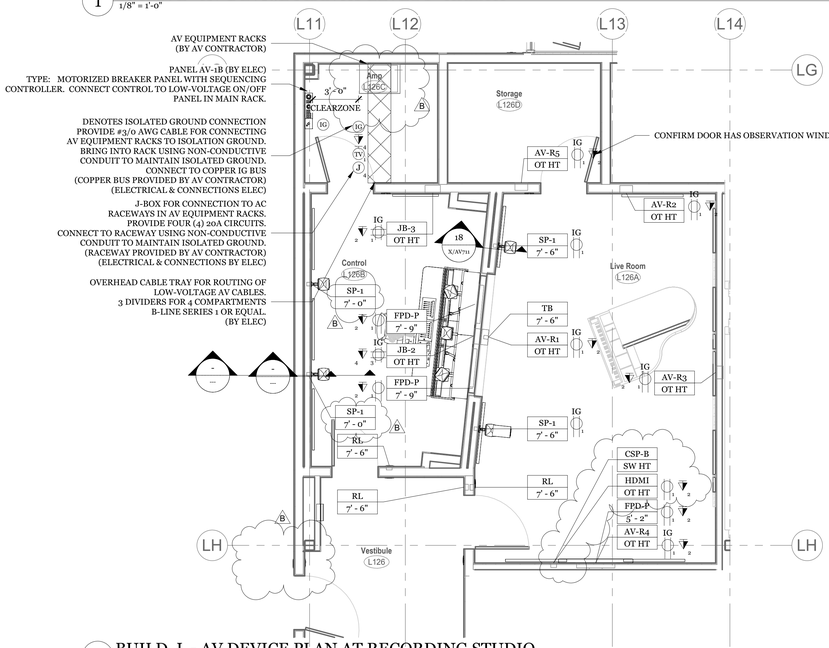
Designed By: IDH
Drawn By: GTEH
Checked By: STK
Reviewed By: IDH
Scale: 12" = 1'-0"
Project Number: 2771
Date: 08/11/23

AV003
AD8

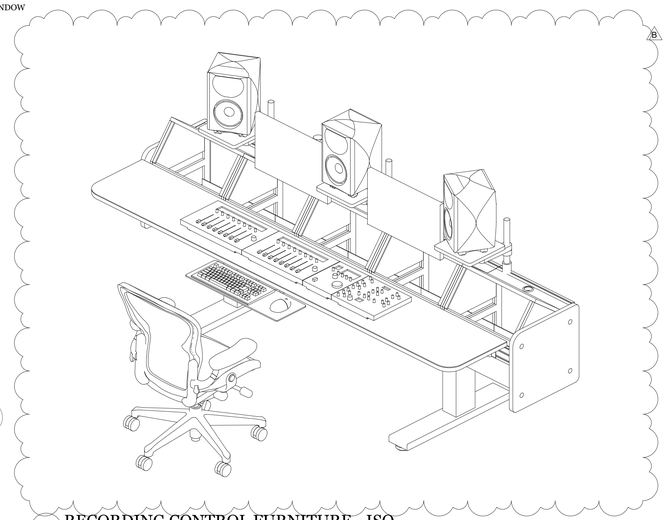
9/24/2026 7:09:56 AM
Autodesk Docs://Sanger High School/SangerHS - AV.rvt



1 BUILD. L - AV DEVICE PLAN AT LEVEL 1 - AREA A
1/8" = 1'-0"



2 BUILD. L - AV DEVICE PLAN AT RECORDING STUDIO
1/4" = 1'-0"



3 RECORDING CONTROL FURNITURE - ISO

AV SYMBOL KEY

DEVICE LOCATION
AV PANEL TYPE
XXX
X'-X"
MOUNTING CONDITION OR HEIGHT ABOVE IMMEDIATE FINISHED FLOOR BELOW TO CENTER OR BACKBOX

OT HT: PROJECT STANDARD OUTLET HEIGHT
SW HT: PROJECT STANDARD SWITCH HEIGHT
CLNG: CEILING MOUNTED

AUDIO
- AV-XX: CUSTOM AV PANEL & LOCATION
- MC-#: MICROPHONE INPUT & JACK QUANTITY
- FM: FM ASSISTIVE LISTENING ANTENNA
- WX: WIRELESS MICROPHONE ANTENNA
- TB: TALKBACK MICROPHONE

VIDEO
- V-#: VIDEO I/O & JACK QUANTITY
- VPJ: VIDEO PROJECTOR
- VTV: CATV OUTLET
- FPD-#: FLAT PANEL DISPLAY & TYPE
- PTZ: PAN TILT ZOOM CAMERA
- BCAST: BROADCAST CAMERA CONNECTION
- CAM: FIXED COURT CAMERA CONNECTION

LOUDSPEAKER
- LS-#: LOUDSPEAKER & JACK QUANTITY
- SAD: DIGITAL VOLUME CONTROL
- SC: CEILING MOUNT 70V LOUDSPEAKER
- SHC: HIGH CEILING MOUNT 70V LOUDSPEAKER
- SHP: PENDANT MOUNT 70V LOUDSPEAKER
- SP-#: SELF-POWERED LOUDSPEAKER & JACK QUANTITY

INTERCOM
- CM-#: INTERCOM OUTLET & JACK QUANTITY
- CM-W: INTERCOM WALL STATION
- HM: HOUSE MANAGER PANEL

CONTROL
- CSP-#: REMOTE CONTROL PANEL & TYPE
- SCRC: MOTORIZED ROLL-DOWN SCREEN CONTROL
- LCC: LIGHTING CONTROL CONNECTION

OTHER
- JB-#: JUNCTION BOX & TYPE
- RK-#: EQUIPMENT RACK & LOCATION
- RL: "RECORDING" LIGHT

LOOSE CONNECTION TO PANEL
AV EQUIPMENT TYPE
XXX
XXX
MOUNTING CONDITION

AUDIO
- MIC: MICROPHONE

VIDEO
- PTZ: PAN TILT ZOOM CAMERA
- VCAM: VIDEO CAMERA
- VDWL: VIDEO WALL

LOUDSPEAKER
- LS: LOUDSPEAKER
- SUB: SUBWOOFER
- SP: SELF-POWERED LOUDSPEAKER
- PH: PAGING HORN

ELECTRICAL

IG — IG DUPLEX OUTLET, 120V / 20A & QTY (BY ELEC)
IG — IG QUAD OUTLET, 120V / DUAL 20A & QTY (BY ELEC)
DUPLEX OUTLET, 120V / 20A & QTY (BY ELEC)
QUAD OUTLET, DUAL 120V / 20A & QTY (BY ELEC)
SPECIALTY OUTLET & QTY (SEE DESCRIPTION) (BY ELEC)
J — JUNCTION BOX & QTY (SEE DESCRIPTION) (BY ELEC)
TV — BUILDING CATV OUTLET (SEE AV DRAWINGS)
TEL/DATA OUTLET & QTY (BY ELEC)
IG — ISOLATED GROUND CONNECTION (BY ELEC)

GENERAL NOTES

1. ALL AC OUTLETS, CONDUIT & BACKBOXES BY ELEC.
2. REQUIRED STRUCTURAL BACKING BY ARCH.
3. AV CONTRACTOR TO COORDINATE WITH ELEC TO DETERMINE EXACT LOCATION OF AV BACKBOXES.

DSA File No.:
10-H15

DSA Application No.:
02-119023

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Project

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AV DEVICE PLAN AT LEVEL 1
Drawing

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	DSA BACKCHECK	08/11/23
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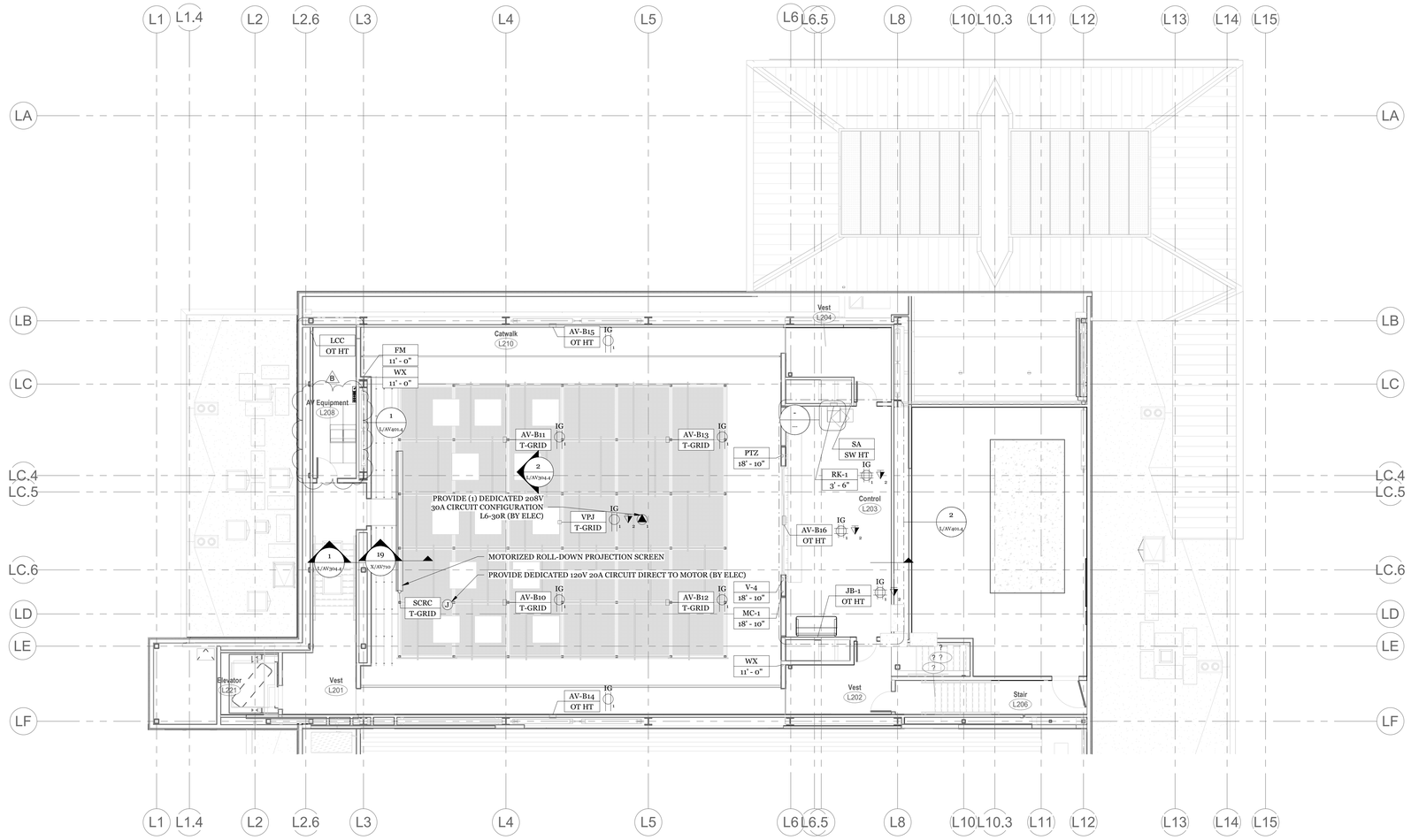
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1 BUILD. L - AV DEVICE PLAN AT LEVEL 2 - AREA A
1/8" = 1'-0"

AV SYMBOL KEY

DEVICE LOCATION
AV PANEL TYPE
XXX
X'-X"
MOUNTING CONDITION OR HEIGHT ABOVE IMMEDIATE FINISHED FLOOR BELOW TO CENTER OR BACKBOX

OT HT: PROJECT STANDARD OUTLET HEIGHT
SW HT: PROJECT STANDARD SWITCH HEIGHT
CLNG: CEILING MOUNTED

AUDIO
- AV-XX: CUSTOM AV PANEL & LOCATION
- MC-#: MICROPHONE INPUT & JACK QUANTITY
- FM: FM ASSISTIVE LISTENING ANTENNA
- WX: WIRELESS MICROPHONE ANTENNA
- TB: TALKBACK MICROPHONE

VIDEO
- V-#: VIDEO I/O & JACK QUANTITY
- VPJ: VIDEO PROJECTOR
- VTV: CATV OUTLET
- FPD-#: FLAT PANEL DISPLAY & TYPE
- PTZ: PAN TILT ZOOM CAMERA
- BCAST: BROADCAST CAMERA CONNECTION
- CAM: FIXED COURT CAMERA CONNECTION

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LOOSE CONNECTION TO PANEL
AV EQUIPMENT TYPE
XXX
XXX
MOUNTING CONDITION

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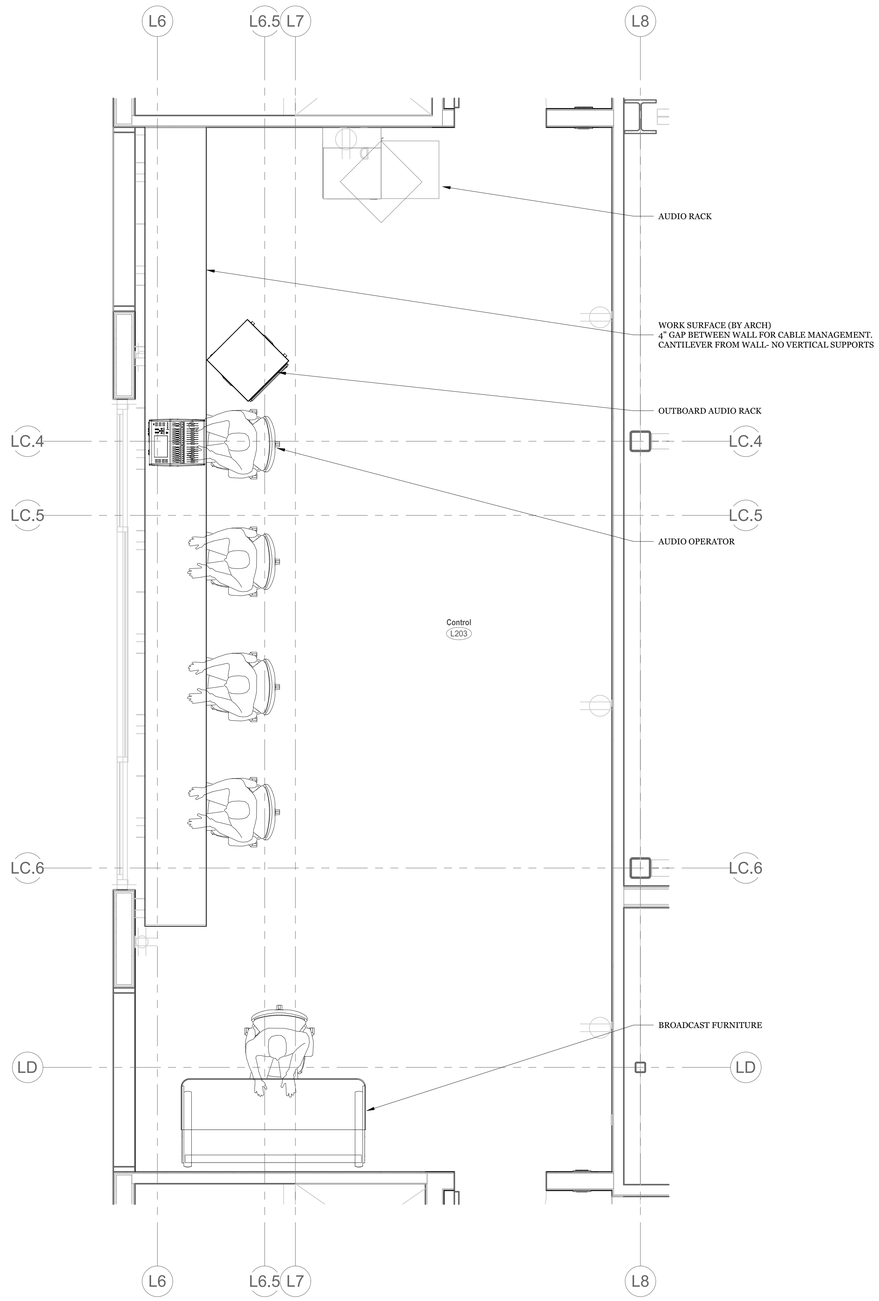
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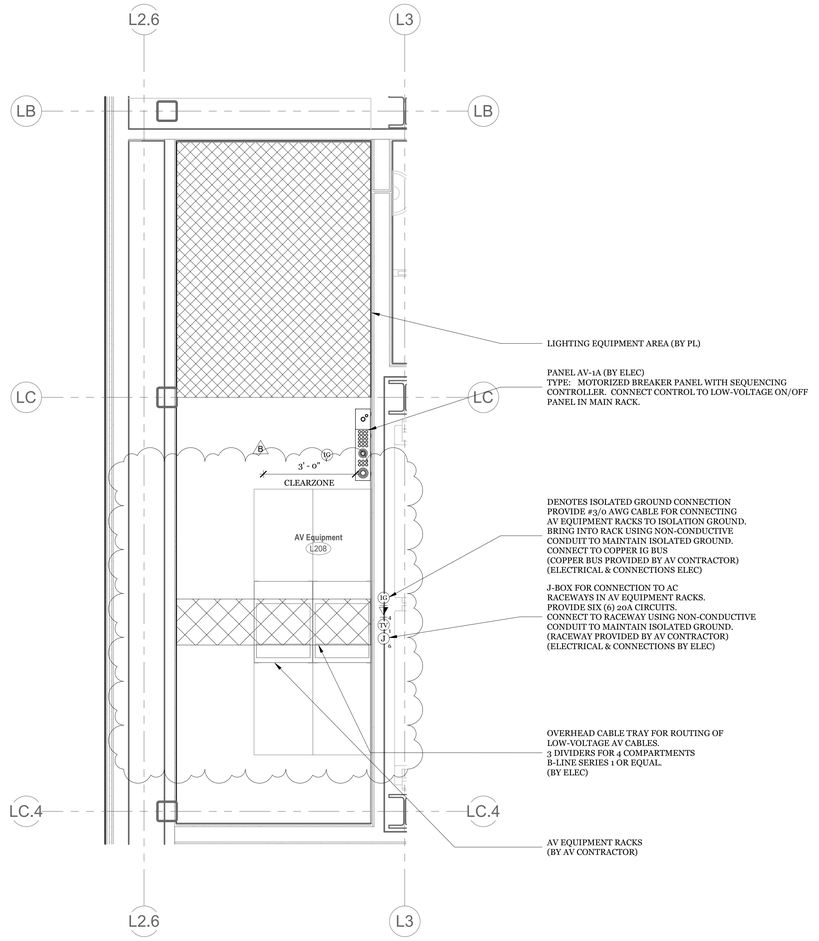
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2 BUILD. L - AV ENLARGED PLAN AT CONTROL 203
1/2" = 1'-0"



1 BUILD. L - AV ENLARGED PLAN AT AV 208
1/2" = 1'-0"

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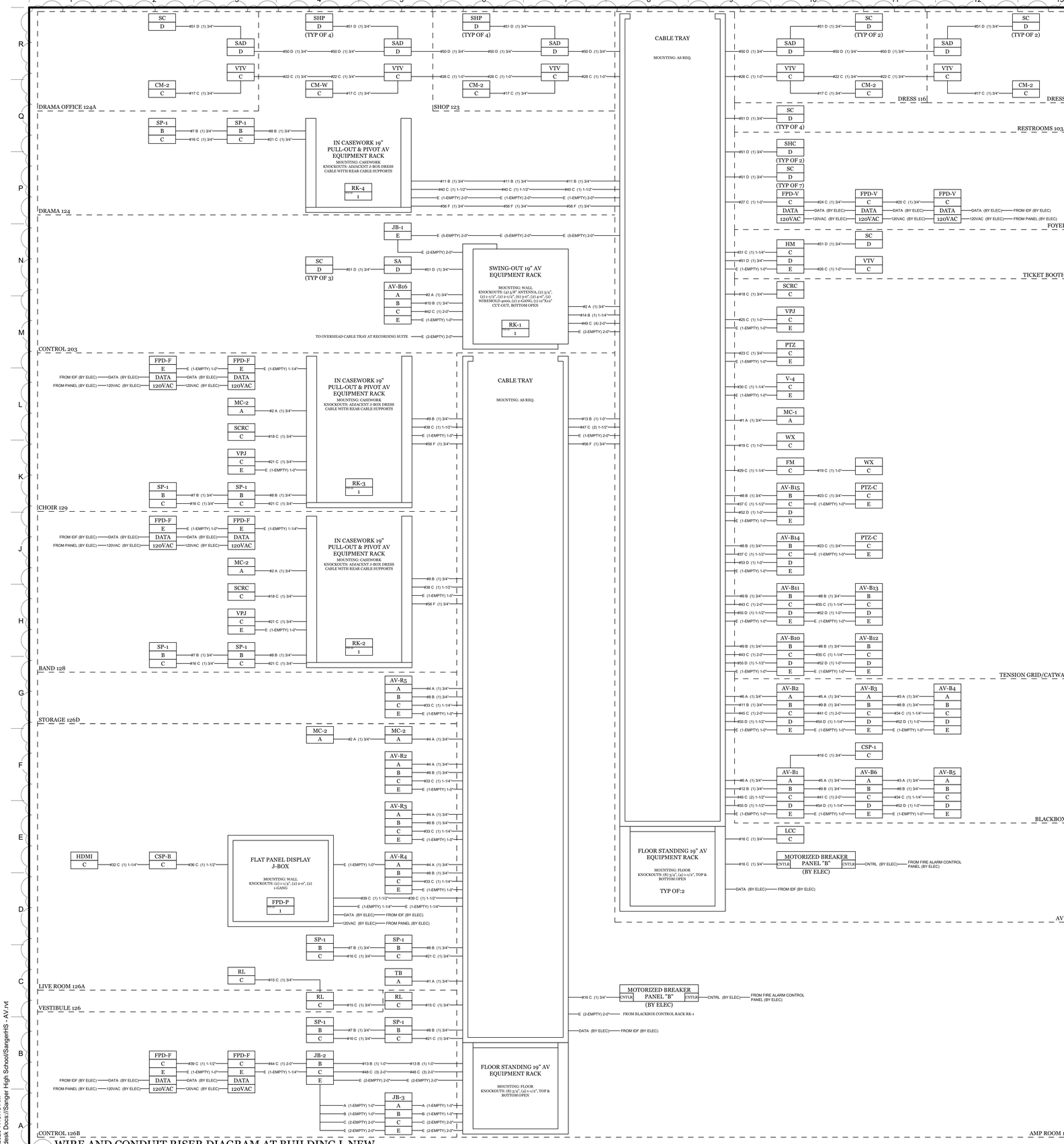
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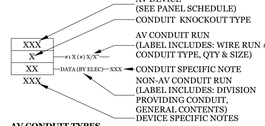
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1 WIRE AND CONDUIT RISER DIAGRAM AT BUILDING L NEW
NTS

AV WIRE & CONDUIT KEY



AV CONDUIT TYPES
A: MIC LEVEL
B: LINE LEVEL
C: VIDEO, NETWORK, & RF LEVEL
D: LOUDSPEAKER LEVEL
E: EMPTY CONDUIT
F: FIBER OPTIC LEVEL

NON-AV CONDUIT TYPES
120VAC: LINE VOLTAGE (BY ELEC)
208VAC: LINE VOLTAGE (BY ELEC)
DATA: BUILDING DATA (BY ELEC/TECH)
CATV: TELEVISION COAX (BY ELEC/TECH)
CNTRL: EXTERNAL CONTROL (BY ELEC/TECH/FA)

AV CONDUIT SIZES
3/4", 1-0", 1-1/4", 1-1/2", 2-0"

NOTES:
1. WIRES OF SIMILAR WIRETYPE CLASSIFICATION (A, B, C, D, E, OR F) MAY BE COMBINED INTO A SINGLE CONDUIT.
2. MINIMUM CONDUIT SIZE IS 3/4".
3. ALL CONDUITS ARE DRAWN ASSUMES DRY CABLE. IF WET CABLE MUST BE USED RECALCULATE CONDUIT SIZE.
4. ALL CONDUIT SIZES TO BE VERIFIED IN WRITING BY AV CONTRACTOR WITHIN 30 DAYS OF CONTRACT AWARD.
5. ALL CONDUIT & BACKBOXES BY ELEC.
6. FOLLOW CONDUIT SEPARATION TABLES AS INDICATED ON KEY SHEET & IN SPECIFICATIONS.
7. INCREASE CONDUIT TO NEXT SIZE UP FOR RUNS GREATER THAN 50'-0" WITHOUT A JUNCTION BOX.
8. SEE WIRE SCHEDULE FOR CONDUIT CONTENTS

WIRE SCHEDULE

CONDUIT RUN #	CONDUIT TYPE	A1 QTY	B1 QTY	C2 QTY	C5 QTY	C7 QTY	C8 QTY	C9 QTY	C10C QTY	C12 QTY	HDMI	D2 QTY	D3 QTY	D4 QTY	F3 QTY
1	A	1													
2	A	2													
3	A	3													
4	A	4													
5	A	6													
6	A	9													
7	B		1												
8	B		2												
9	B		4												
10	B		5												
11	B		6												
12	B		8												
13	B		16												
14	B		28												
15	C			0	0	1	0	0	0	0	0				
16	C			0	1	0	0	0	0	0	0				
17	C			1	0	0	0	0	0	0	0				
18	C			0	0	0	1	0	0	0	0				
19	C			0	0	0	0	0	0	1	0				
20	C			0	1	0	0	1	0	0	0				
21	C			0	2	0	0	0	0	0	0				
22	C			1	0	0	0	1	0	0	0				
23	C			0	1	1	0	0	1	0	0				
24	C			0	2	0	0	1	0	0	0				
25	C			0	2	0	0	0	1	0	0				
26	C			2	0	0	0	1	0	0	0				
27	C			0	3	0	0	1	0	0	0				
28	C			3	0	0	0	1	0	0	0				
29	C			0	0	0	0	0	0	2	0				
30	C			0	1	1	0	0	3	0	0				
31	C			1	3	0	0	1	0	0	0				
32	C			0	0	0	0	0	0	0	1				
33	C			0	6	0	0	0	0	0	0				
34	C			1	2	0	0	1	2	0	0				
35	C			1	3	0	0	0	2	0	0				
36	C			0	1	1	0	0	0	0	1				
37	C			1	4	1	0	0	3	0	0				
38	C			1	4	0	0	0	4	0	0				
39	C			0	1	0	0	0	0	0	1				
40	C			0	6	0	0	0	4	0	0				
41	C			2	4	0	0	2	4	0	0				
42	C			2	5	0	0	1	4	0	0				
43	C			2	6	0	0	0	4	0	0				
44	C			0	2	0	0	0	0	0	2				
45	C			3	6	0	0	3	6	0	0				
46	C			3	10	0	0	3	8	0	0				
47	C			2	16	0	0	0	8	0	0				
48	C			0	5	0	0	0	0	5	0				
49	C			3	33	0	1	1	15	2	0				
50	D											0	0	1	
51	D											0	1	0	
52	D											2	0	0	
53	D											3	0	0	
54	D											4	0	0	
55	D											6	0	0	
56	F														1

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AV WIRE & CONDUIT RISER DIAGRAM
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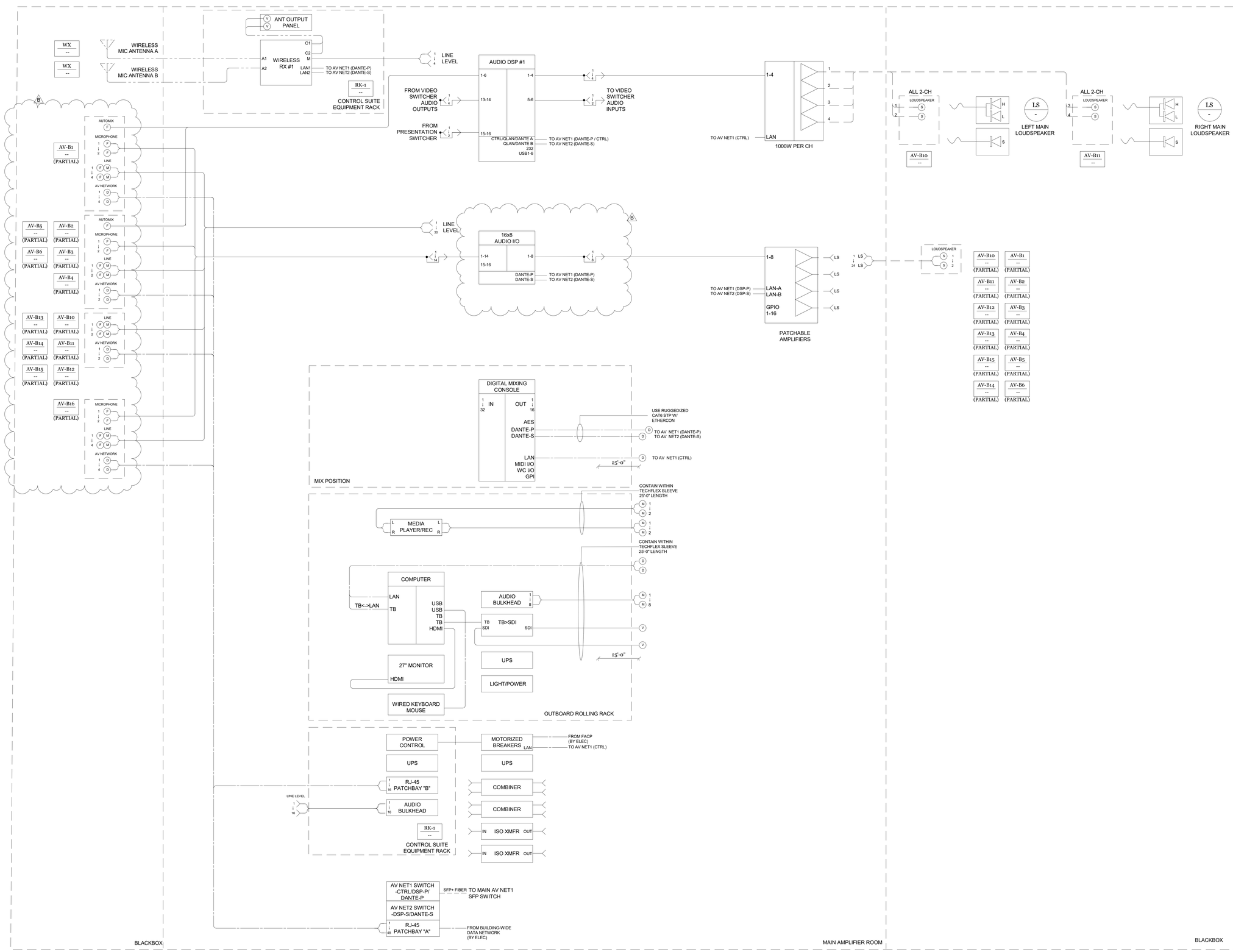
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1 AUDIO BLOCK DIAGRAM AT BLACKBOX
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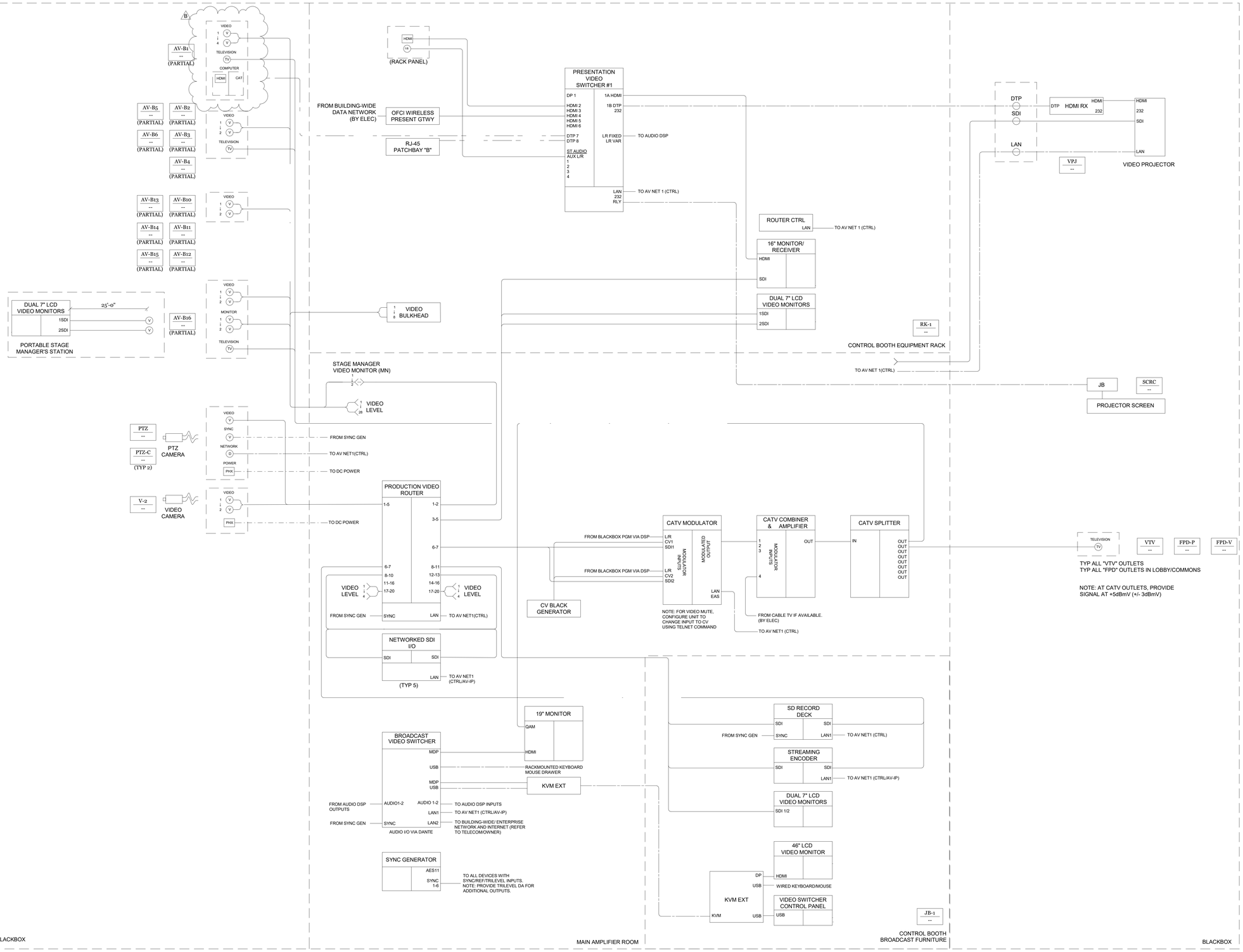
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1 VIDEO BLOCK DIAGRAM AT BLACKBOX
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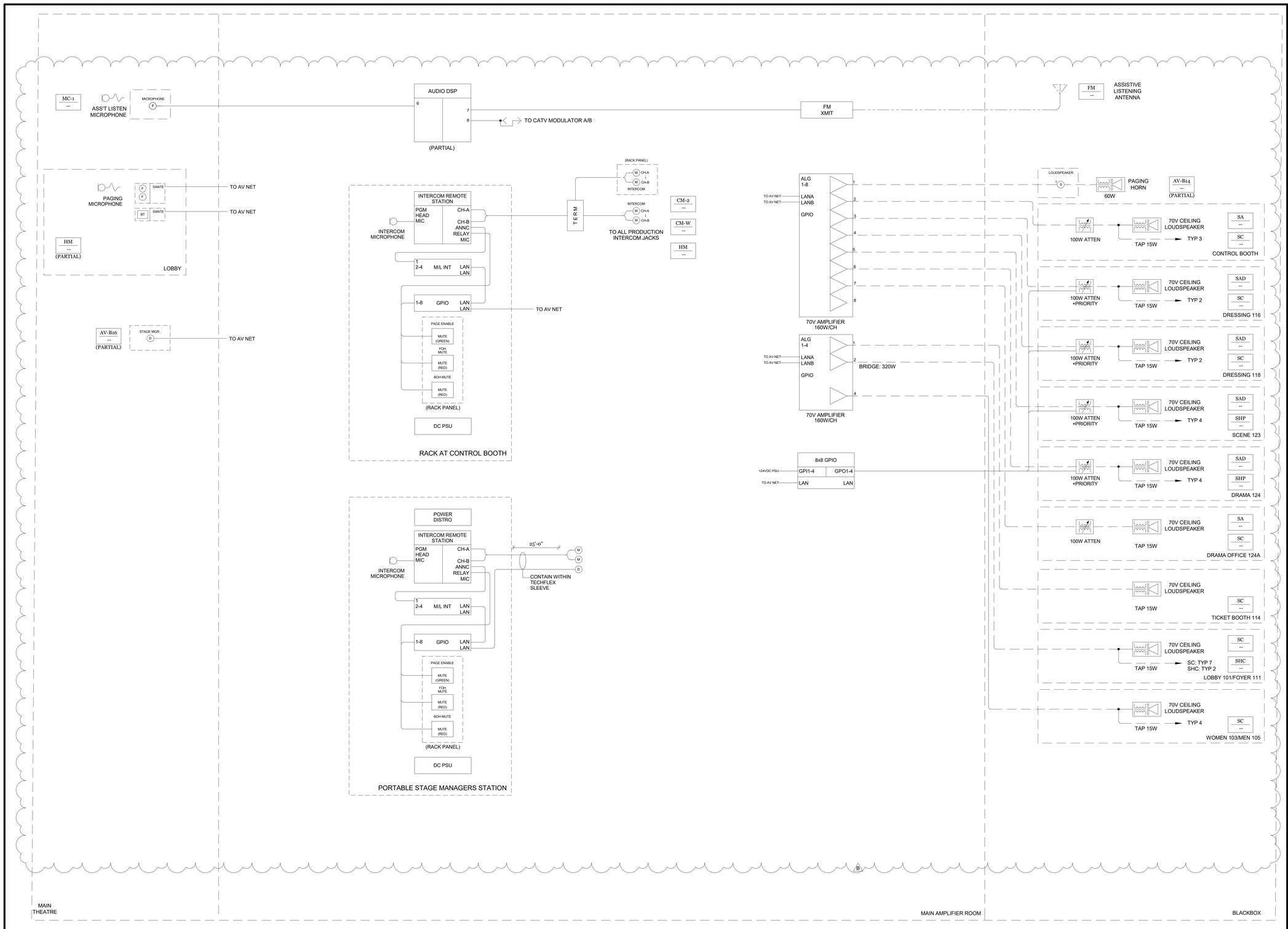
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1 PROGRAM/PAGING BLOCK DIAGRAM AT BLACKBOX
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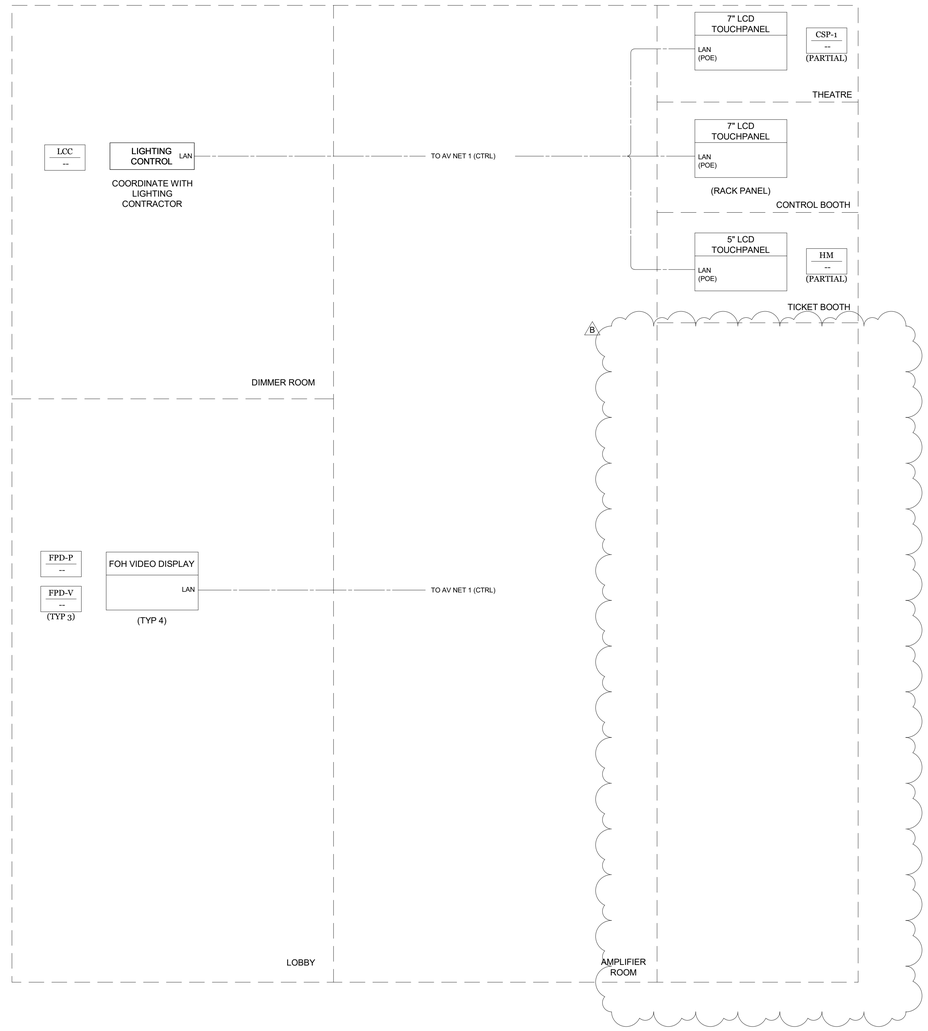
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1 CONTROL BLOCK DIAGRAM AT BLACKBOX
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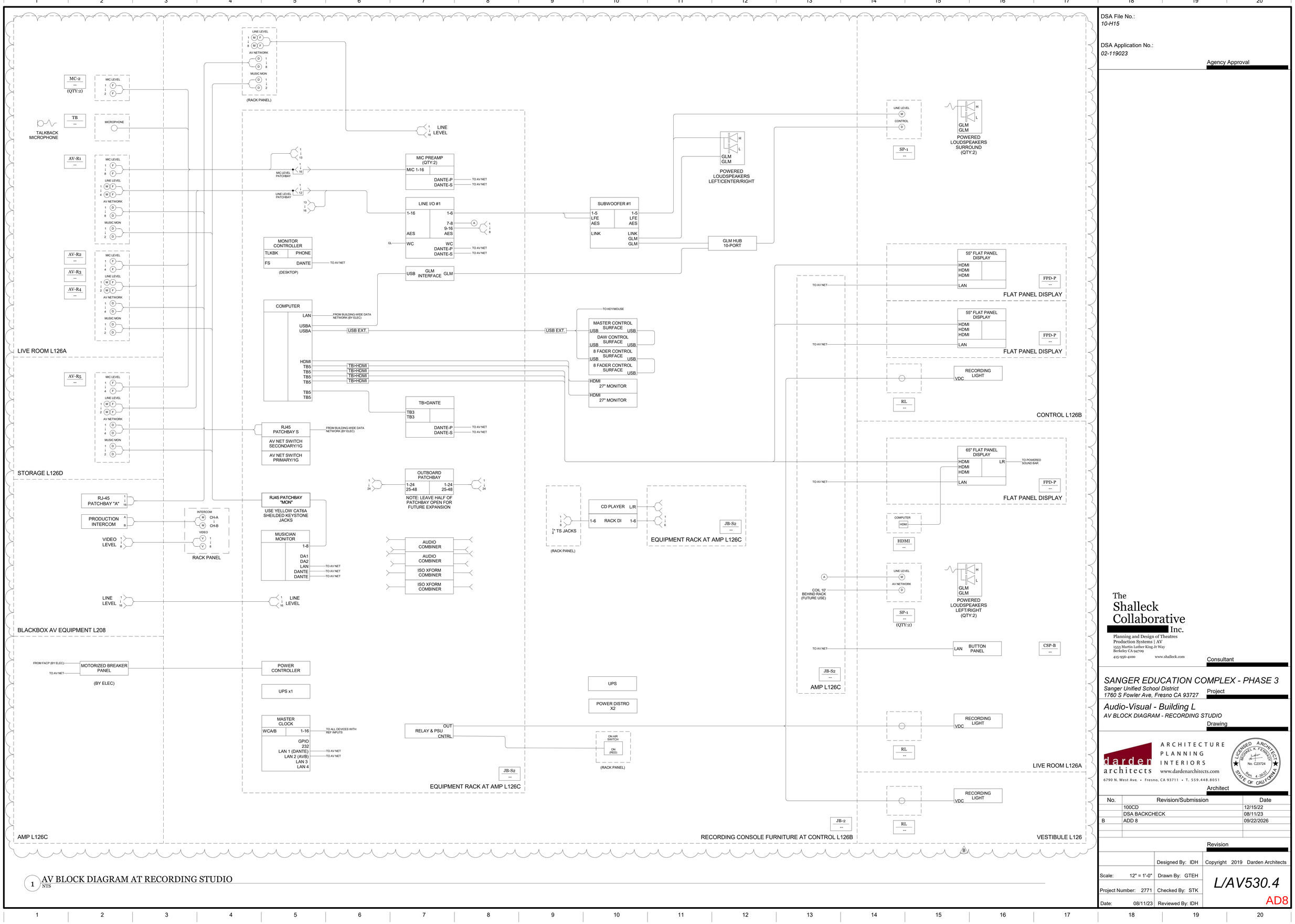
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1 AV BLOCK DIAGRAM AT RECORDING STUDIO
NTS

DSA File No.:
10-H15

DSA Application No.:
02-119023

Agency Approval

The Shalleck Collaborative Inc.
Planning and Design of Theatres
Production Systems | AV
1553 Martin Luther King Jr Way
Berkeley CA 94709
415-956-4100 www.shalleck.com

Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727

Project

Audio-Visual - Building L
AV BLOCK DIAGRAM - RECORDING STUDIO

Drawing

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LICENSED ARCHITECT RICHARD K. FERNO No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
	100CD	12/15/22
	DSA BACKCHECK	08/11/23
B	ADD 8	09/22/2026

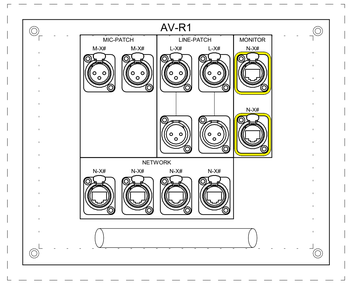
Revision

	Designed By: IDH	Copyright 2019 Darden Architects
Scale: 12" = 1'-0"	Drawn By: GTEH	*L/AV530.4*
Project Number: 2771	Checked By: STK	AD8
Date: 08/11/23	Reviewed By: IDH	

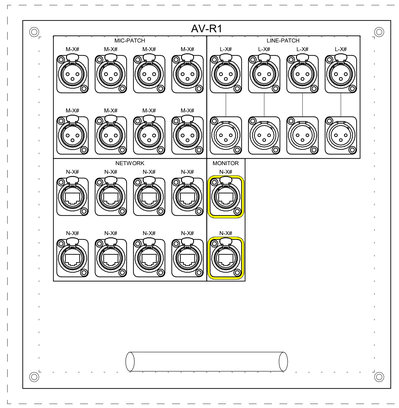
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9 AV PANEL CSP-1
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



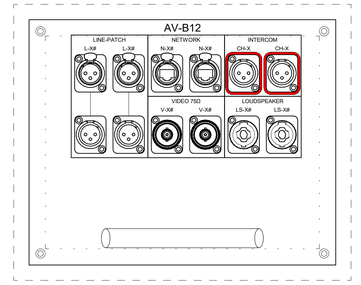
8 AV PANEL AV-R2,3,4
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



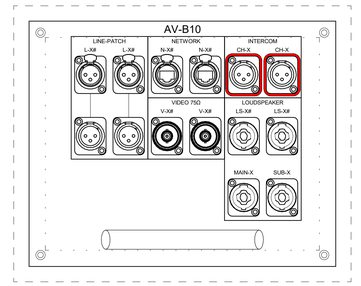
7 AV PANEL AV-R1
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.

6 AV PANEL AV-B14
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.

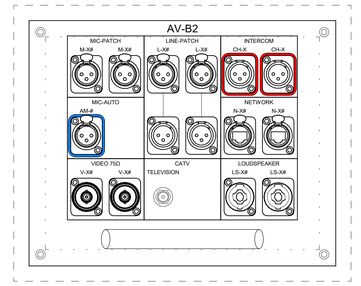
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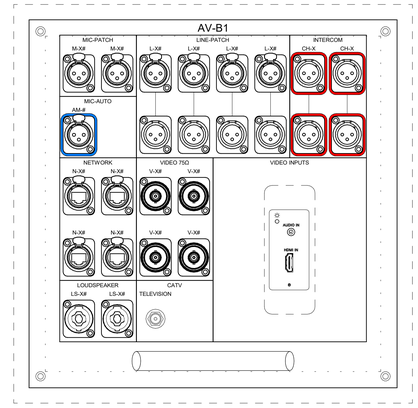
4 AV PANEL AV-B12,13,15
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



3 AV PANEL AV-B10,11
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



2 AV PANEL AV-B2,3,4,5,6
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



1 AV PANEL AV-B1
6" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.

GENERAL NOTES

1. ALL AC OUTLETS, CONDUIT & BACKBOXES BY ELEC.
2. REQUIRED STRUCTURAL BACKING BY ARCH.
3. AV CONTRACTOR TO COORDINATE WITH ELEC TO DETERMINE EXACT LOCATION OF AV BACKBOXES.

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Reviewed By: IDH

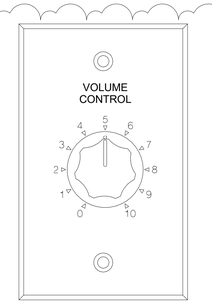
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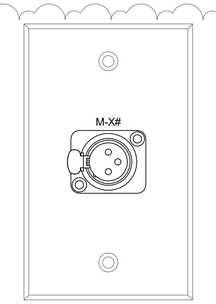
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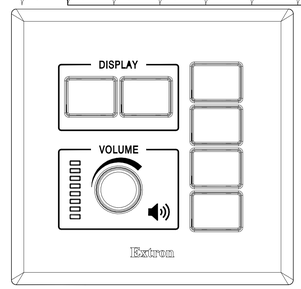
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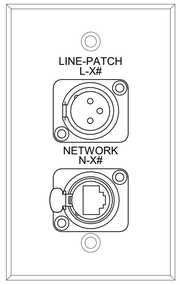
12 AV PANEL SA,SAD
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



8 AV PANEL MC-1
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



5 AV PANEL CSP-B
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



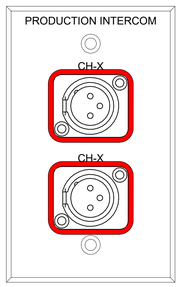
16 AV PANEL SP-1
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



15 AV PANEL WX
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



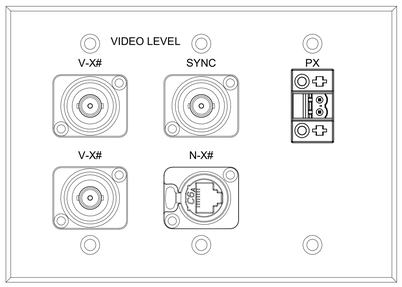
3 AV PANEL FM
12" = 1'-0"
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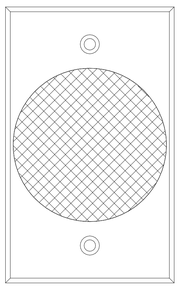
17 AV PANEL CM-2
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



14 AV PANEL VTV
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



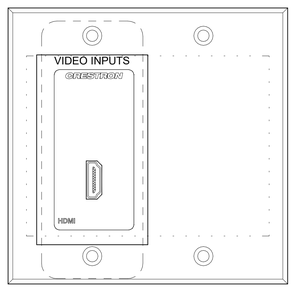
2 AV PANEL V-4
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



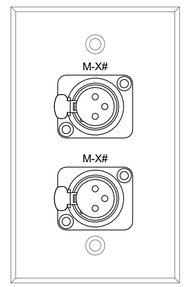
19 AV PANEL TB
12" = 1'-0"



13 AV PANEL V-1
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



4 AV PANEL HDMI
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



1 AV PANEL MC-2
12" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.

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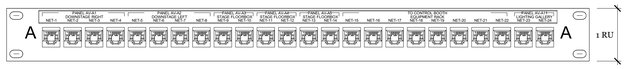
Revision

	Designed By: IDH	Copyright 2019 Darden Architects
Scale: 12" = 1'-0"	Drawn By: GTEH	X/AV702
Project Number: 2771	Checked By: STK	
Date: 08/11/23	Reviewed By: IDH	AD8

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GENERAL NOTES

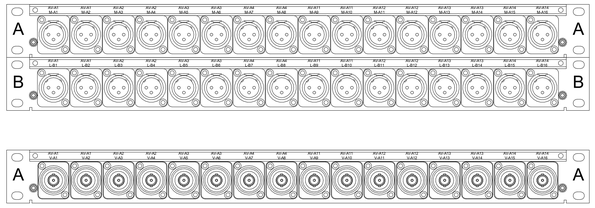
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NOTES:
- SEE SPECIFICATIONS FOR FURTHER INFO ON TERMINATION, GROUNDING, ETC.
- NUMBER SIGNAL TYPES SEQUENTIALLY. FIELD PLATE LEGENDS SHALL EXACTLY MATCH PATCHBAY.

11 TYPICAL NETWORK PATCHBAY
6" = 1'-0"

THIS ITEM WEIGHS LESS THAN 20 LBS.

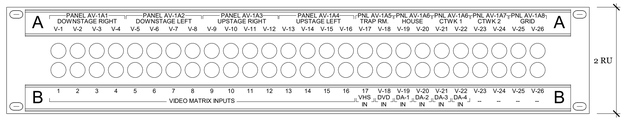


10 RACK PANEL XLR & BNC BULKHEAD PATCHBAY
6" = 1'-0"

THIS ITEM WEIGHS LESS THAN 20 LBS.



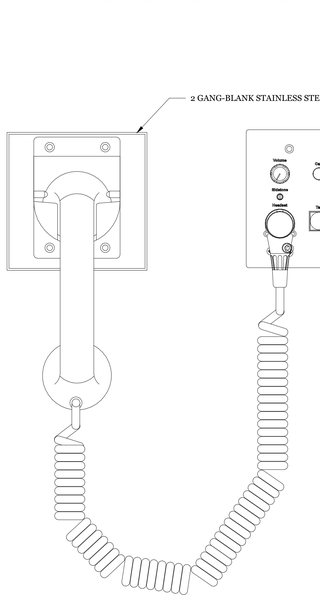
9 WIRELESS MICROPHONE ANTENNA CONNECTION PANEL
6" = 1'-0"



NOTES:
- USE PAPER LEGENDS. PROVIDE COMPUTER FILE TO USER FOR FUTURE MODIFICATIONS.
- DENOTE NORMALS WITH HORIZONTAL LINE ABOVE & BELOW AT LEGEND (AS SHOWN ABOVE).
- SEE SPECIFICATIONS FOR FURTHER INFO ON TERMINATION, GROUNDING, ETC.
- NUMBER SIGNAL TYPES SEQUENTIALLY. FIELD PLATE LEGENDS SHALL EXACTLY MATCH PATCHBAY.

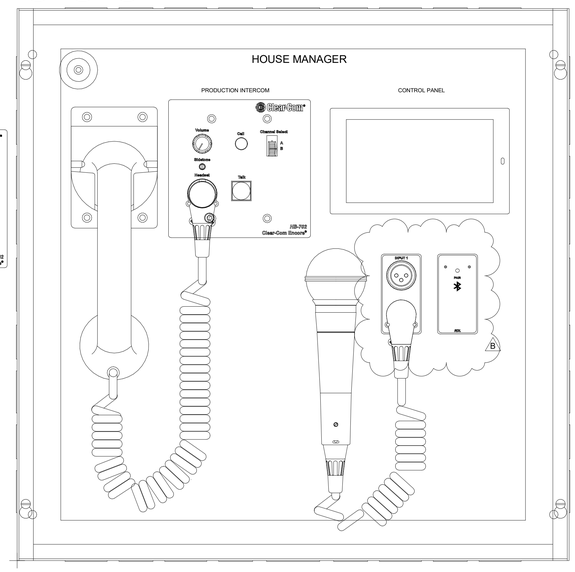
8 TYPICAL VIDEO PATCHBAY
6" = 1'-0"

THIS ITEM WEIGHS LESS THAN 20 LBS.



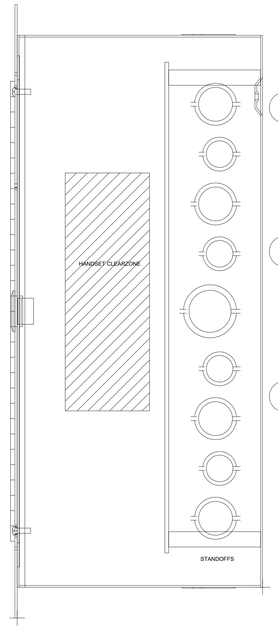
12 AV PANEL CM-W
6" = 1'-0"

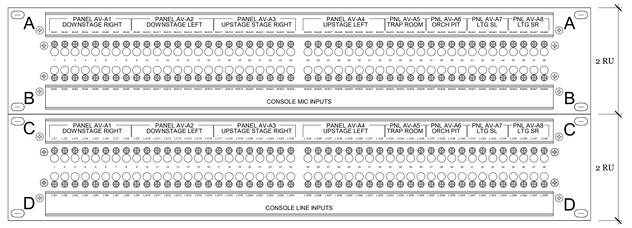
THIS ITEM WEIGHS LESS THAN 20 LBS.



7 AV PANEL HM
6" = 1'-0"

THIS ITEM WEIGHS LESS THAN 20 LBS.

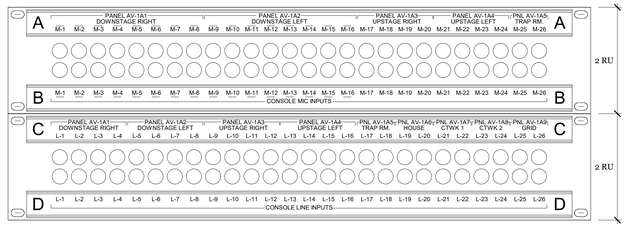




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6 TYPICAL MIC / LINE PATCHBAY
6" = 1'-0"

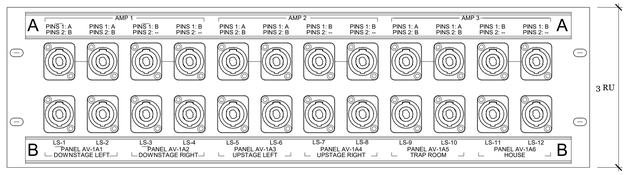
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- NUMBER SIGNAL TYPES SEQUENTIALLY. FIELD PLATE LEGENDS SHALL EXACTLY MATCH PATCHBAY.

5 TYPICAL MIC / LINE PATCHBAY
6" = 1'-0"

THIS ITEM WEIGHS LESS THAN 20 LBS.



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4 TYPICAL LOUDSPEAKER PATCHBAY
6" = 1'-0"

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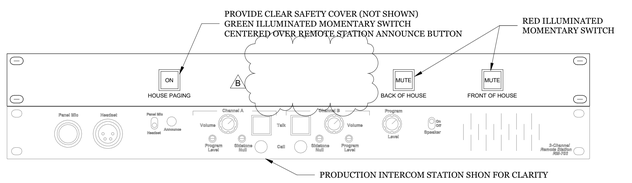


3 PRODUCTION INTERCOM RACK PANEL
6" = 1'-0"

THIS ITEM WEIGHS LESS THAN 20 LBS.



2 LOCAL VIDEO INPUT PANEL
6" = 1'-0"



1 CUSTOM PAGING RACK PANEL
6" = 1'-0"

THIS ITEM WEIGHS LESS THAN 20 LBS.

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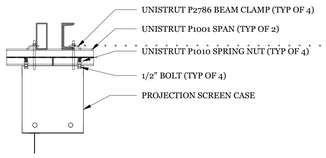
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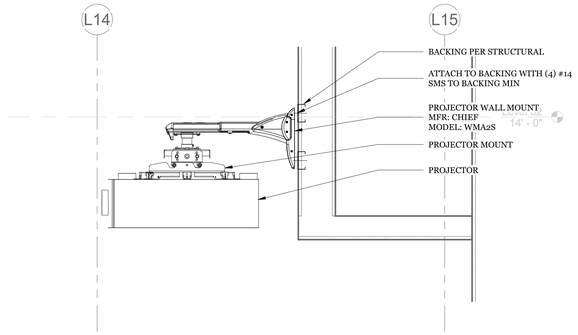
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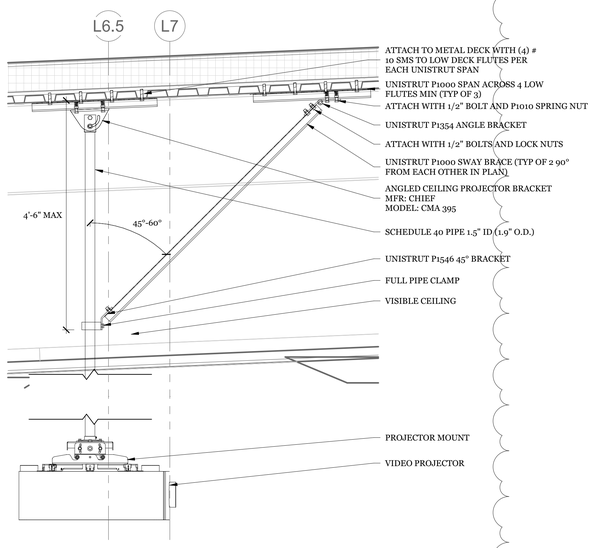
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19 PROJECTION SCREEN AT BLACKBOX MOUNTING
1" = 1'-0"
MAX TOTAL WEIGHT: 650 LBS.



15 PROJECTOR AT CHOIR MOUNTING
1" = 1'-0"
MAX TOTAL WEIGHT: 70 LBS.



13 PROJECTION AT BAND MOUNTING
1" = 1'-0"
MAX TOTAL WEIGHT: 70 LBS.

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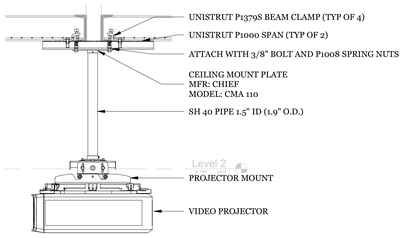
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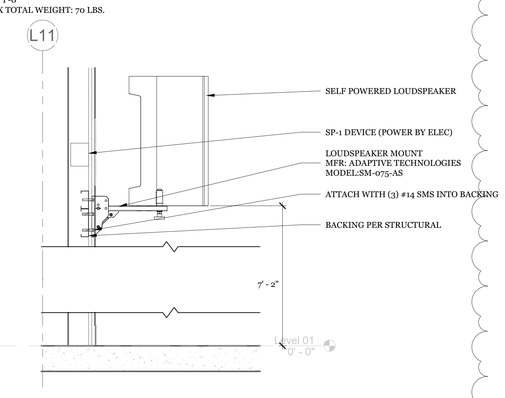
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1 PROJECTOR AT BLACKBOX MOUNTING

1" = 1'-0"

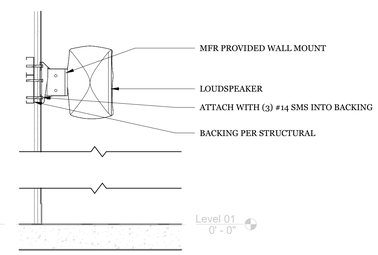
MAX TOTAL WEIGHT: 70 LBS.



19 LOUDSPEAKER AT MUSIC ROOMS MOUNTING

1" = 1'-0"

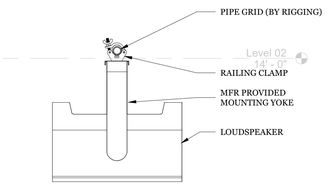
MAX TOTAL WEIGHT: 50 LBS.



18 LOUDSPEAKER AT LIVE ROOM MOUNTING

1" = 1'-0"

MAX TOTAL WEIGHT: 20 LBS.



17 LOUDSPEAKER AT DRAMA ROOM

1" = 1'-0"

MAX TOTAL WEIGHT: 50 LBS.

DSA File No.:
10-H15

DSA Application No.:
02-119023

Agency Approval

The
Shalleck
Collaborative
Inc.
Planning and Design of Theatres
Production Systems | AV
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415-956-4100 www.shalleck.com

Consultant

SANGER EDUCATION COMPLEX - PHASE 3
Sanger Unified School District
1760 S Fowler Ave, Fresno CA 93727

Project

Audio-Visual - Details
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LICENSED ARCHITECT
MICHAEL K. FENN
No. C23724
Exp. 4-30-27
STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
	100CD	12/15/22
	DSA BACKCHECK	08/11/23
B	ADD 8	09/22/2026

Revision

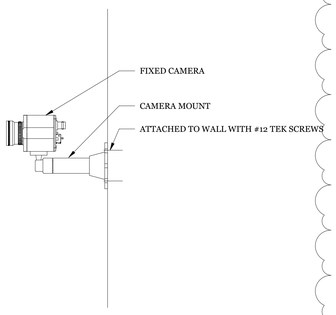
Designed By: IDH
Drawn By: GTEH
Checked By: STK
Reviewed By: IDH

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Scale: 1" = 1'-0"
Project Number: 2771
Date: 08/11/23

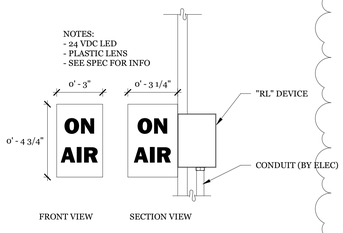
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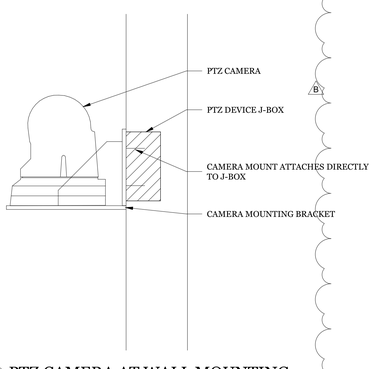
20 V-2 FIXED VIDEO CAMERA MOUNTING

3" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



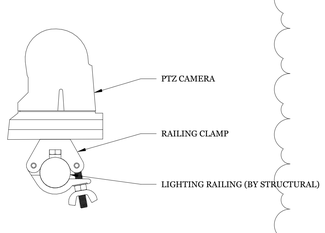
19 ANCHORAGE DETAIL

3" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



18 PTZ CAMERA AT WALL MOUNTING

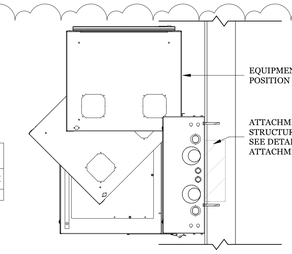
3" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.



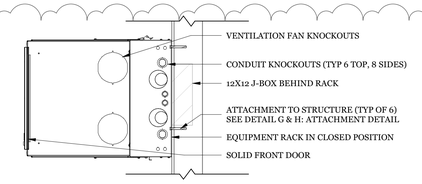
17 PTZ CAMERA AT RAILING MOUNTING

3" = 1'-0"
THIS ITEM WEIGHS LESS THAN 20 LBS.

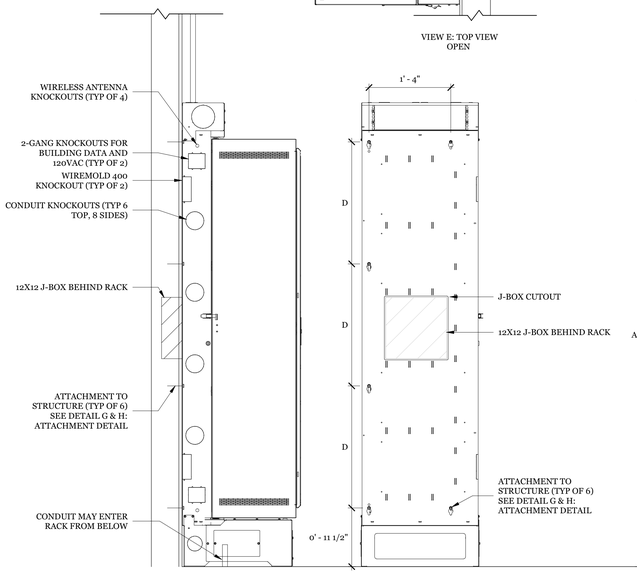
SWING-OUT AV RACKS				
LOCATION	MODEL	"A"OVERALL HEIGHT	"B" OVERALL WIDTH	"C" OVERALL DEPTH
CONTROL 203	SR-46-28	8' - 5 1/4"	1' - 11 9/16"	2' - 4 11/32"



VIEW E: TOP VIEW OPEN



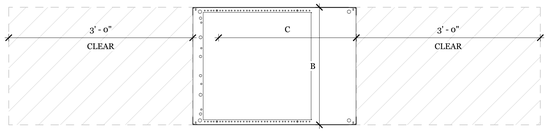
VIEW F: TOP VIEW CLOSED



VIEW D: SIDE VIEW 2 | VIEW A: FRONT VIEW BACKPAN ONLY | VIEW B: FRONT VIEW WITH DOOR | VIEW C: SIDE VIEW2

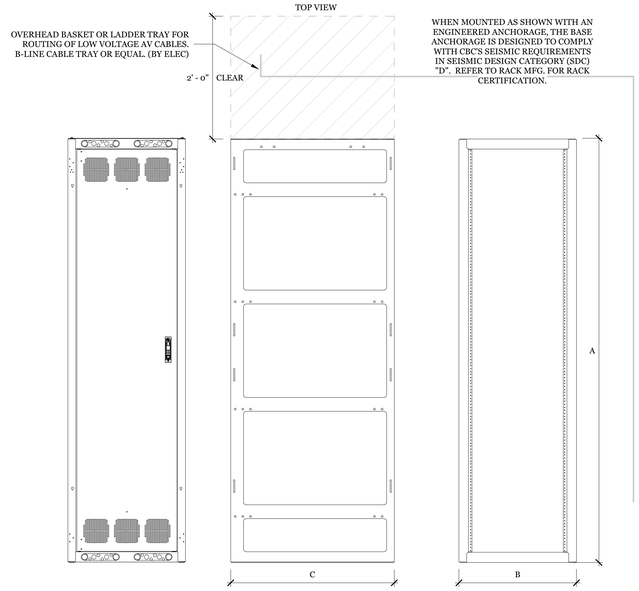
2 WALL MOUNTED SWING-OUT EQUIPMENT RACK DETAIL

1" = 1'-0"
EMPTY WEIGHT: 270 LB?
EQUIPMENT WEIGHT: 335 LBS.
TOTAL MAX WEIGHT: 605 LBS.

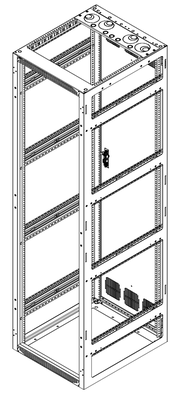


TOP VIEW

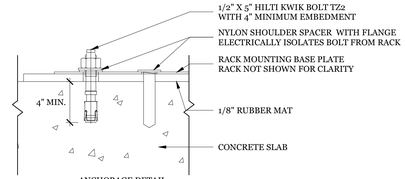
FIXED AV RACKS (BGR)					
LOCATION	QTY	MODEL	"A"OVERALL HEIGHT	"B" OVERALL WIDTH	"C" OVERALL DEPTH
AMP 126C	1	BGR-4532	6' - 10 7/8"	1' - 11"	2' - 8"
AV 208	2	BGR-4532	6' - 10 7/8"	1' - 11"	2' - 8"



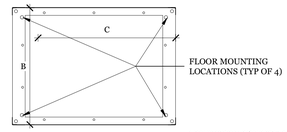
REAR VIEW | SIDE VIEW (PANELS OMITTED FOR CLARITY) | FRONT VIEW (DOOR OMITTED FOR CLARITY)



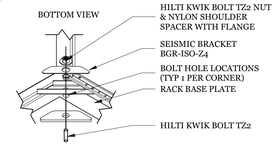
ISOMETRIC VIEW (NOT TO SCALE)



ANCHORAGE DETAIL SCALE: 6" = 1'-0"



BOTTOM VIEW



CORNER ISOMETRIC VIEW (NOT TO SCALE)

1 FLOOR MOUNTED STANDING EQUIPMENT RACK DETAIL

1" = 1'-0"
EMPTY WEIGHT: 320 LBS.
EQUIPMENT WEIGHT: 980 LBS.
TOTAL MAX WEIGHT: 1200 LBS.

GENERAL NOTES

1. ALL AC OUTLETS, CONDUIT & BACKBOXES BY ELEC.
2. REQUIRED STRUCTURAL BACKING BY ARCH.
3. AV CONTRACTOR TO COORDINATE WITH ELEC TO DETERMINE EXACT LOCATION OF AV BACKBOXES.

DSA File No.:
10-H15

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Agency Approval

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LICENSED ARCHITECT MICHAEL K. FERNOW No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA

Architect

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B	ADD 8	09/22/2026

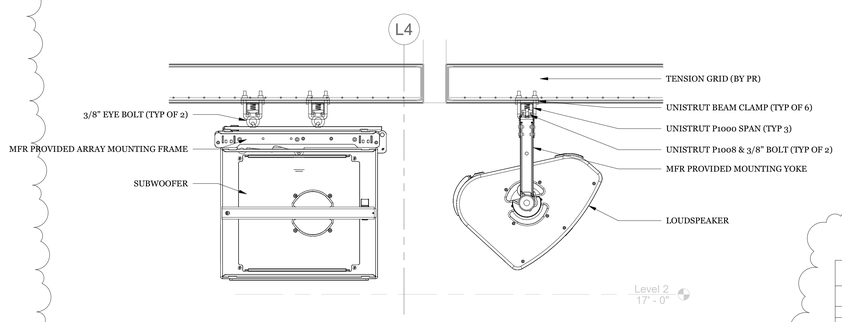
Revision

Designed By: IDH
Drawn By: GTEH
Checked By: STK
Reviewed By: IDH
Scale: As indicated
Project Number: 2771
Date: 08/11/23

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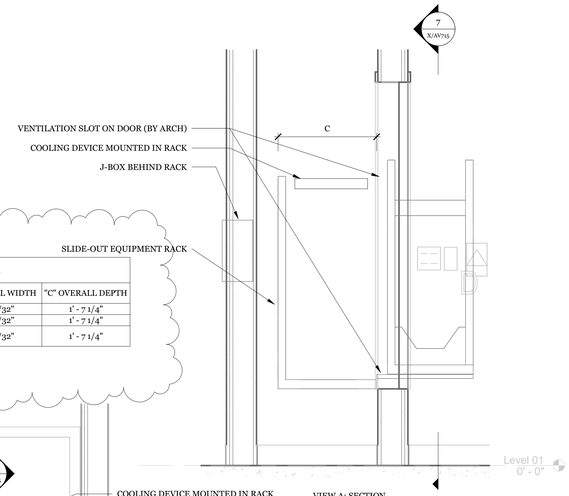
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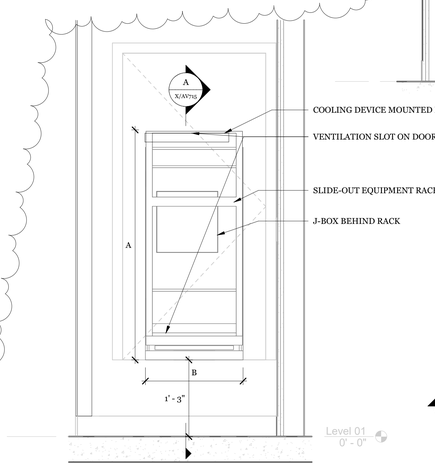
16 LOUDSPEAKER AT BLACKBOX MOUNTING

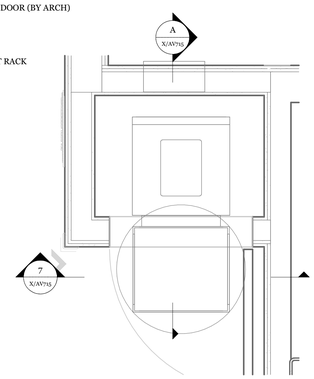
1 1/2" = 1'-0"
SUBWOOFER MAX TOTAL WEIGHT: 80 LBS.
LOUDSPEAKER MAX TOTAL WEIGHT: 80 LBS.

SLIDE-OUT AV EQUIPMENT RACK				
LOCATION	MODEL	"A"OVERALL HEIGHT	"B" OVERALL WIDTH	"C" OVERALL DEPTH
BAND 128	SRSR-4-24	3' - 9"	1' - 7 3/32"	1' - 7 1/4"
CHOIR 129	SRSR-4-24	3' - 9"	1' - 7 3/32"	1' - 7 1/4"
DRAMA ROOM 124	SRSR-4-24	3' - 9"	1' - 7 3/32"	1' - 7 1/4"



VIEW A: SECTION

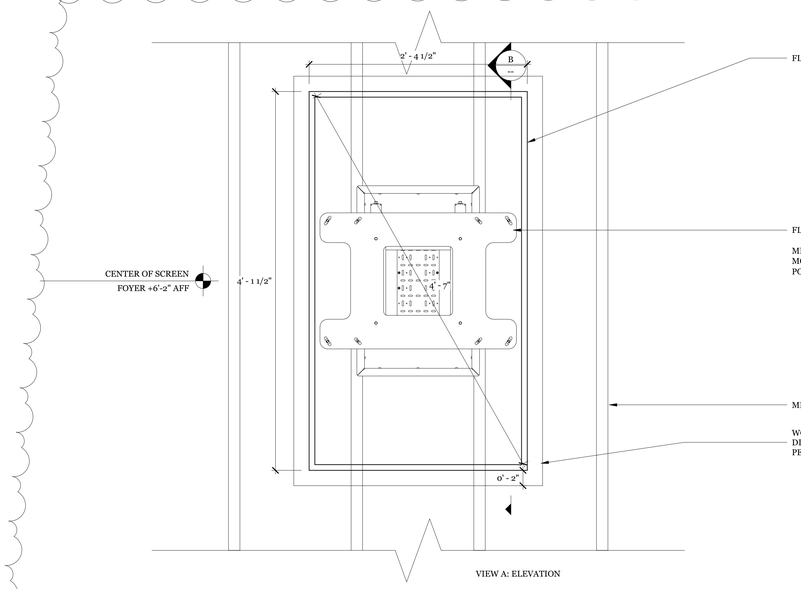




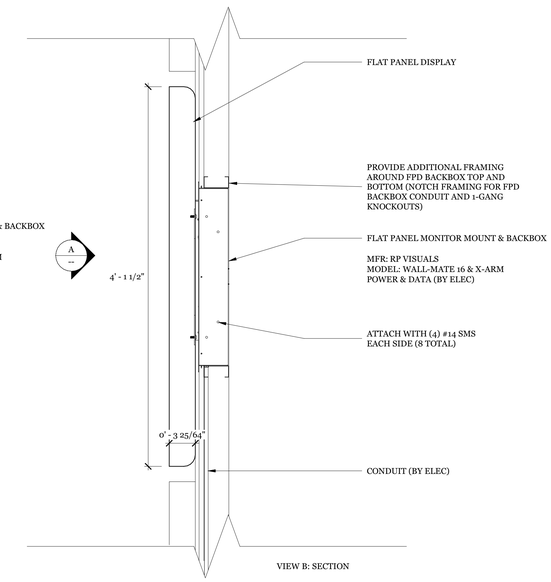
VIEW B: PLAN

7 SRSR EQUIPMENT RACK MOUNTING

1" = 1'-0"
EMPTY WEIGHT: 70 LBS.
EQUIPMENT WEIGHT: 130 LBS.
TOTAL MAX WEIGHT: 250 LBS.



VIEW A: ELEVATION



VIEW B: SECTION

13 FPD-V FLAT PANEL DISPLAY MOUNTING

1 1/2" = 1'-0"
MAX TOTAL WEIGHT: 125 LBS.

DSA File No.:
10-H15

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Agency Approval

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	DSA BACKCHECK	08/11/23
B	ADD 8	09/22/2026

Revision

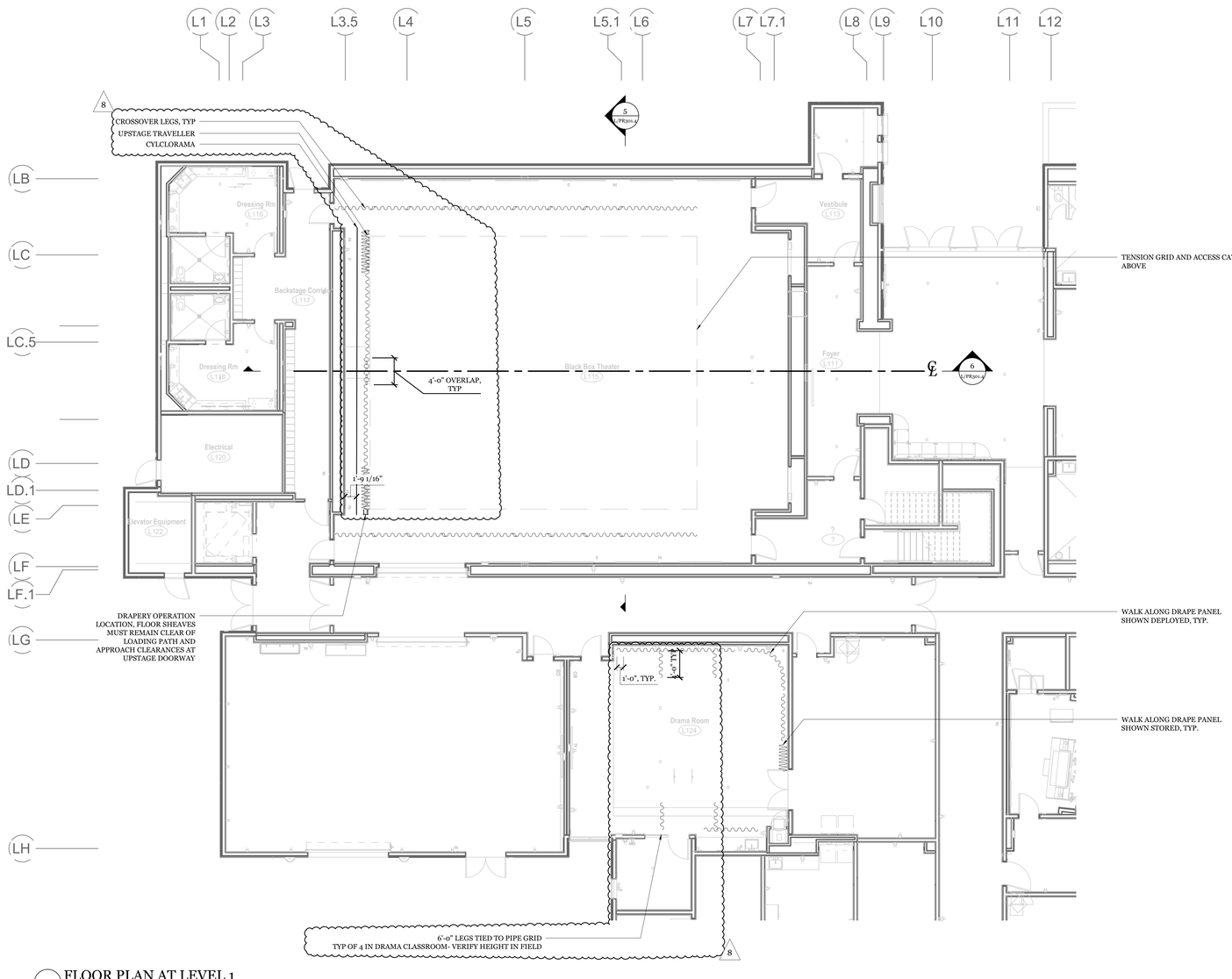
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Reviewed By: IDH

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1 FLOOR PLAN AT LEVEL 1
1/8"=1'-0"

RIGGING GENERAL NOTES

1. THIS SHEET IS INTENDED TO PROVIDE RIGGING AND DRAPERY INFORMATION ONLY. REFERENCE OTHER ARCHITECTURAL AND ENGINEERING DOCUMENTS FOR RELATED AREAS.
2. SHOW ATTACHMENT BACKING REQUIREMENTS ON SHOP DRAWINGS.
3. COORDINATE WITH ALL RELATED TRADES TO MAINTAIN CLEARANCES FOR RIGGING SYSTEMS INSTALLATION AND SAFE AND EFFECTIVE USE. NO PIPE, CONDUIT, RACEWAY, DUCT, NOR ANY OTHER OBSTRUCTION SHALL BE PERMITTED IN RIGGING CLEAR ZONES, OR WITHIN 6" OF ANY MOVING COMPONENT OF RIGGING SYSTEMS, INCLUDING LIFT LINES.
4. SEE SPECIFICATIONS FOR PRODUCT AND INSTALLATION CRITERIA.
5. PRODUCTION SYSTEMS SHOWN ARE DEFERRED APPROVAL. INSTALLATION OF ALL DEFERRED APPROVAL ITEMS SHALL NOT BE STARTED UNTIL CONTRACTORS DRAWINGS, SPECIFICATIONS AND ENGINEERING CALCULATIONS FOR THE ACTUAL SYSTEMS TO BE INSTALLED HAVE BEEN ACCEPTED AND SIGNED BY THE ARCHITECT AND APPROVED BY THE DIVISION OF THE STATE ARCHITECT

ABBREVIATIONS

# = POUNDS	PL = PRODUCTION LIGHTING
AFF = ABOVE FINISHED FLOOR	PR = PRODUCTION RIGGING
CLR = CLEAR	PS = PRODUCTION SEATING
DIV = SPECIFICATIONS DIVISION	RWL = RECOMMENDED WORKING LOAD
EC = ELECTRICAL CONTRACTOR	SAD = SEE ARCHITECTURAL DRAWINGS
EE = ELECTRICAL ENGINEER	SED = SEE ELECTRICAL DRAWINGS
FM = FLUSH MOUNT	SF = SQUARE FEET
HL = HOUSE LEFT	SIM = SIMILAR
HR = HOUSE RIGHT	SL = STAGE LEFT
HT = HEIGHT	SM = SURFACE MOUNT
LF = LINEAR FEET	SMD = SEE MECHANICAL DRAWINGS
MAX = MAXIMUM	SR = STAGE RIGHT
MIN = MINIMUM	SSD = SEE STRUCTURAL DRAWINGS
NIC = NOT IN CONTRACT	TYP = TYPICAL
NTS = NOT TO SCALE	VIF = VERIFY IN FIELD
OPP = OPPOSITE	UON = UNLESS OTHERWISE NOTED

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PRODUCTION RIGGING
BUILDING L - PLAN AT LEVEL 1

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Architect

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A	ADDENDUM 8	09/21/26

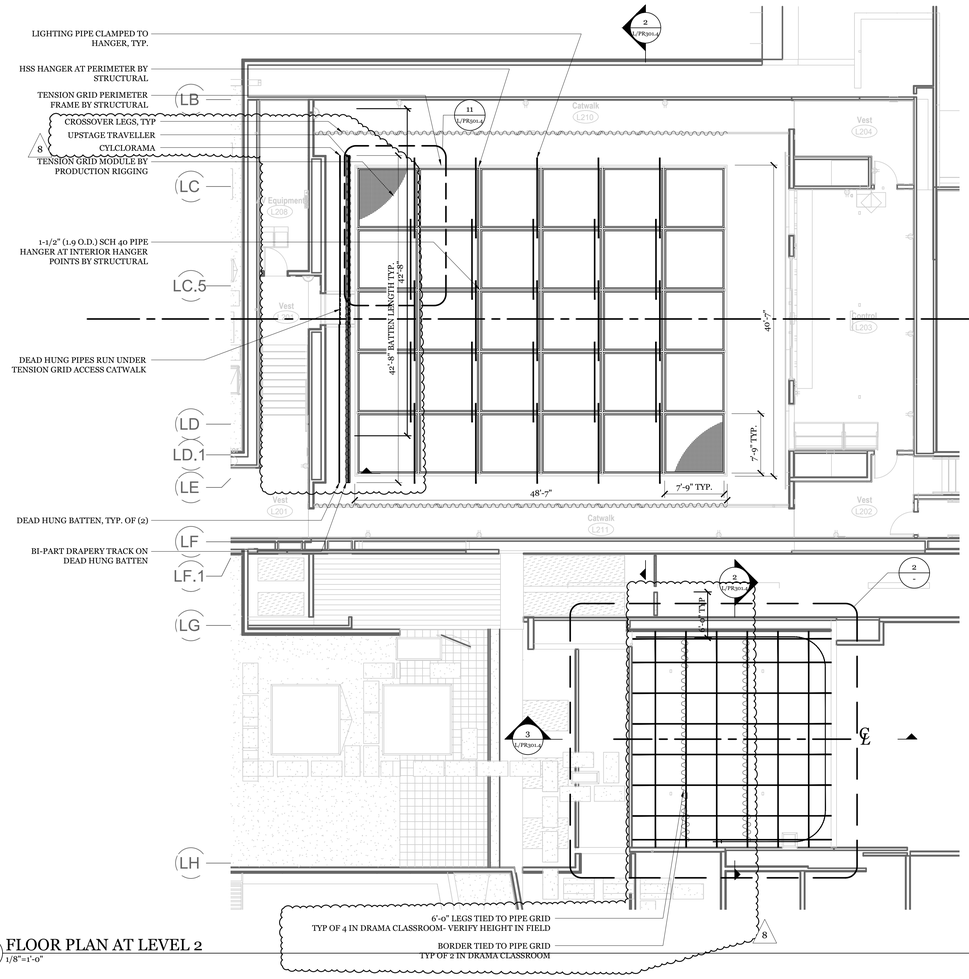
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Drawn By: RC
Checked By:
Reviewed By: IDH

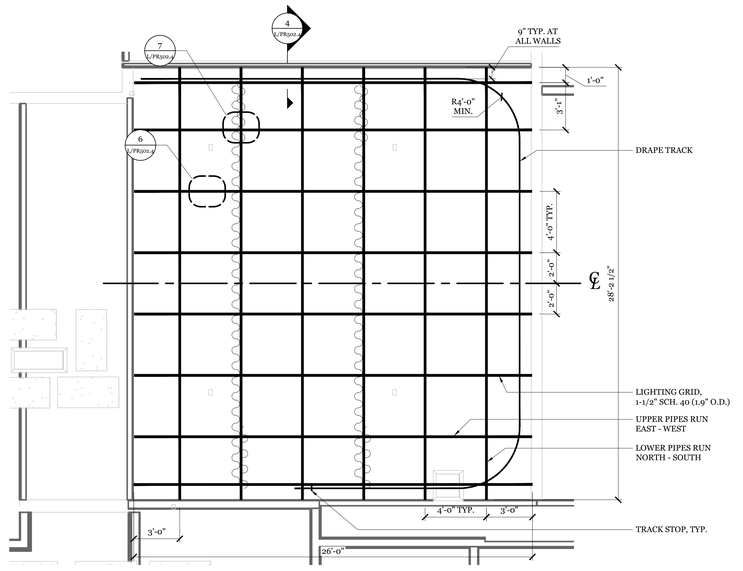
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Date: xx/xx/xx

L/PR101.4
AD8



1 FLOOR PLAN AT LEVEL 2
1/8"=1'-0"



2 DETAIL PLAN AT CLASSROOM PIPE GRID
1/8"=1'-0"

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Architect

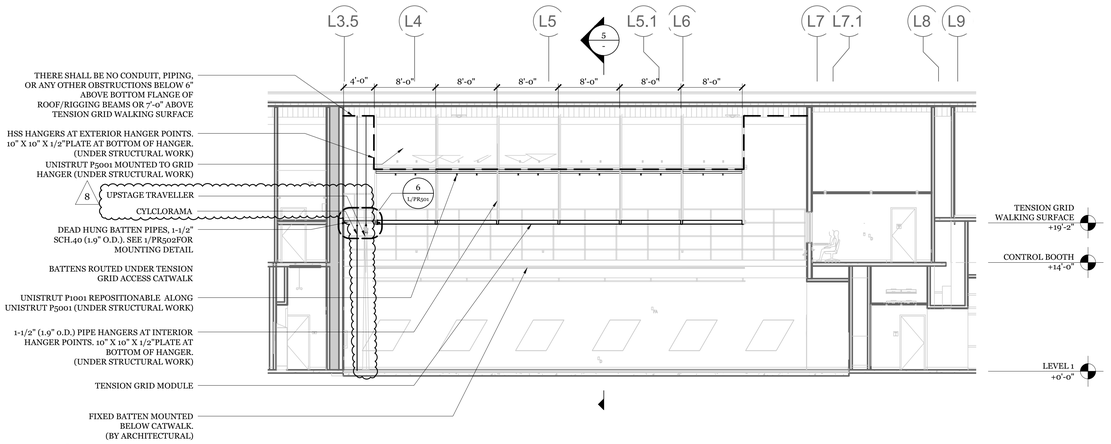
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8	ADDENDUM 8	09/21/26

Revision

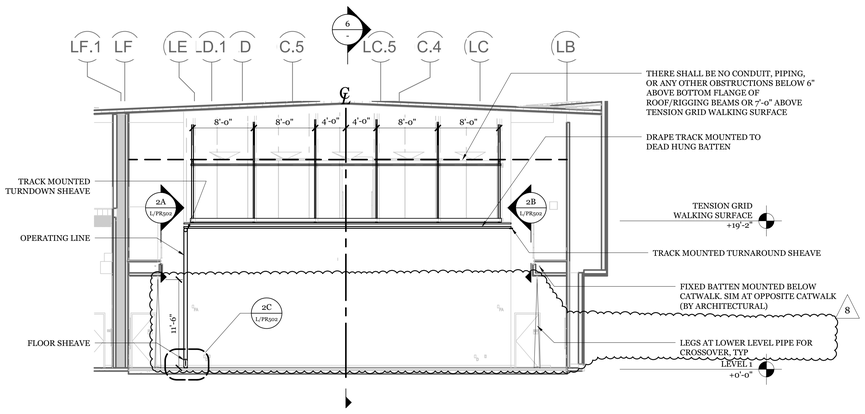
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Checked By:
Reviewed By: IDH
Scale:
Project Number: 2771
Date: xx/xx/xx

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6 CENTERLINE SECTION AT THEATER
1/8"=1'-0"



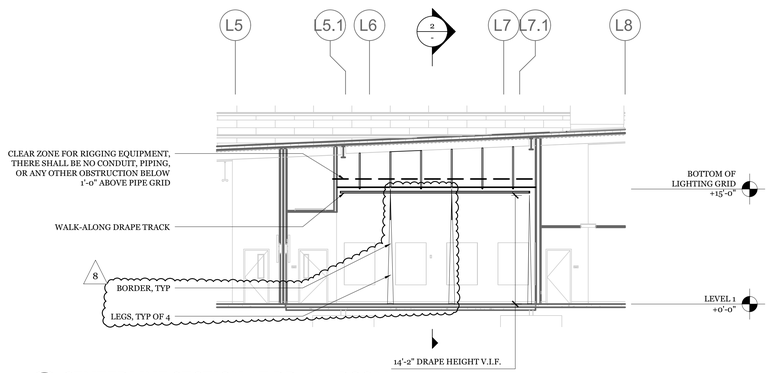
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1/8"=1'-0"

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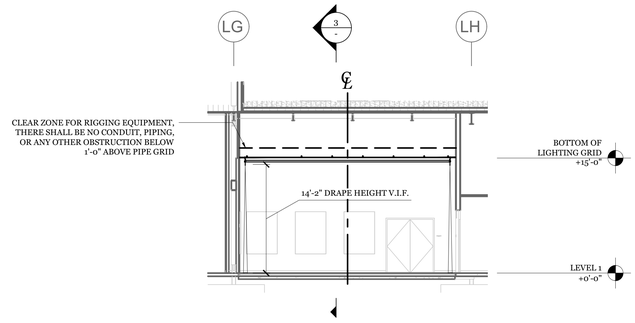
BLACK BOX DRAPERY FF&E SCHEDULE									
DRAPE NAME	WIDTH	HEIGHT	# OF PANELS	FULLNESS	WEIGHT	LINER	COLOR	OPERATION	NOTES
UPSTAGE TRAVELER	42-8"	18'-9"	2	50%	20 OZ	NO	BLACK	BI-PART	DRAPERY TRACK
CYCLORAMA	42'-8"	18'-9"	1	0%	LINO	NO	WHITE	N/A	WITH 3/4" BOTTOM PIPE
LEGS #1	6'-0"	11'-6"	20	50%	20 OZ	NO	BLACK	N/A	NAP DOWN, IFR VELOUR

** ALL DRAPERY HEIGHTS ARE TO BE VERIFIED IN FIELD AND MAXIMIZED**

4 BLACK BOX DRAPERY SCHEDULE
NOT TO SCALE



3 CENTERLINE SECTION AT DRAMA ROOM
1/8"=1'-0"



2 TRANSVERSE SECTION AT DRAMA ROOM
1/8"=1'-0"

8

DRAMA CLASSROOM DRAPERY FF&E SCHEDULE									
DRAPE NAME	WIDTH	HEIGHT	# OF PANELS	FULLNESS	WEIGHT	LINER	COLOR	OPERATION	NOTES
BORDER #1	26'-0"	3'-6"	1	50%	20 OZ	NO	BLACK	N/A	NAP DOWN, IFR VELOUR
LEGS #1	4'-0"	14'-2"	2	50%	20 OZ	NO	BLACK	N/A	NAP DOWN, IFR VELOUR
BORDER #2	26'-0"	3'-6"	1	50%	20 OZ	NO	BLACK	N/A	NAP DOWN, IFR VELOUR
LEGS #2	4'-0"	14'-2"	2	50%	20 OZ	NO	BLACK	N/A	NAP DOWN, IFR VELOUR
CURVED DRAPE	8'-0"	14'-2"	6	50%	18-20 OZ	NO	BLACK	WALK-ALONG	NAP DOWN, IFR VELOUR

** ALL DRAPERY HEIGHTS ARE TO BE VERIFIED IN FIELD AND MAXIMIZED**

1 DRAMA ROOM DRAPERY SCHEDULE
NOT TO SCALE

RIGGING GENERAL NOTES

1. THIS SHEET IS INTENDED TO PROVIDE RIGGING AND DRAPERY INFORMATION ONLY. REFERENCE OTHER ARCHITECTURAL AND ENGINEERING DOCUMENTS FOR RELATED AREAS.
2. SHOW ATTACHMENT BACKING REQUIREMENTS ON SHOP DRAWINGS.
3. COORDINATE WITH ALL RELATED TRADES TO MAINTAIN CLEARANCES FOR RIGGING SYSTEMS INSTALLATION AND SAFE AND EFFECTIVE USE. NO PIPE, CONDUIT, RACEWAY, DUCT, NOR ANY OTHER OBSTRUCTION SHALL BE PERMITTED IN RIGGING CLEAR ZONES, OR WITHIN 6" OF ANY MOVING COMPONENT OF RIGGING SYSTEMS, INCLUDING LIFT LINES.
4. SEE SPECIFICATIONS FOR PRODUCT AND INSTALLATION CRITERIA.
5. PRODUCTION SYSTEMS SHOWN ARE DEFERRED APPROVAL. INSTALLATION OF ALL DEFERRED APPROVAL ITEMS SHALL NOT BE STARTED UNTIL CONTRACTORS DRAWINGS, SPECIFICATIONS AND ENGINEERING CALCULATIONS FOR THE ACTUAL SYSTEMS TO BE INSTALLED HAVE BEEN ACCEPTED AND SIGNED BY THE ARCHITECT AND APPROVED BY THE DIVISION OF THE STATE ARCHITECT

ABBREVIATIONS

# = POUNDS	PL = PRODUCTION LIGHTING
AFF = ABOVE FINISHED FLOOR	PR = PRODUCTION RIGGING
CLR = CLEAR	PS = PRODUCTION SEATING
DIV = SPECIFICATIONS DIVISION	RWL = RECOMMENDED WORKING LOAD
EC = ELECTRICAL CONTRACTOR	SAD = SEE ARCHITECTURAL DRAWINGS
EE = ELECTRICAL ENGINEER	SED = SEE ELECTRICAL DRAWINGS
FM = FLUSH MOUNT	SF = SQUARE FEET
HL = HOUSE LEFT	SIM = SIMILAR
HR = HOUSE RIGHT	SL = STAGE LEFT
HT = HEIGHT	SM = SURFACE MOUNT
LF = LINEAR FEET	SMD = SEE MECHANICAL DRAWINGS
MAX = MAXIMUM	SR = STAGE RIGHT
MIN = MINIMUM	SSD = SEE STRUCTURAL DRAWINGS
NIC = NOT IN CONTRACT	TYP = TYPICAL
NTS = NOT TO SCALE	VIF = VERIFY IN FIELD
OPP = OPPOSITE	UON = UNLESS OTHERWISE NOTED

DSA File No.:
10-H15

DSA Application No.:
02-119023

Agency Approval

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Consultant

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Project

PRODUCTION RIGGING
BUILDING L - SECTIONS

Drawing

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LICENSED ARCHITECT GEORGE K. FEE No. C23724 Exp. 4-30-27 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
	100CD	12/15/22
	DSA BACKCHECK	08/11/23
8	ADDENDUM 8	09/21/26

Revision

Designed By: IDH
Drawn By: RC
Checked By:
Reviewed By: IDH

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Scale:
Project Number: 2771
Date: xx/xx/xx

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AD8