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Project No. 2021_154

MIDLOTHIAN ISD STADIUM ADDITIONS AND RENOVATIONS

FOR

MIDLOTHIAN ISD

ADDENDUM NO. 3

DATE: October 28, 2021

GENERAL: The following changes, additions or deletions for the above project shall be made to the Contract Documents; all other Conditions shall remain the same. Note: the additions, deletions or changes listed in this Addendum may affect more than the specific instance(s) mentioned. Coordination may be necessary to fully revise cases of duplicate information. The Addendum supersedes current conditions shown. Acknowledge receipt of this Addendum. This addendum forms a part of the Contract Documents and modifies them as follows:

A3.1 SIGN IN SHEET:
ADD the attached Sign In Sheet for record.

SPECIFICATIONS

A3.2 SECTION 00 0003, ARCHITECTURAL TABLE OF CONTENTS:
REPLACE this section in its entirety.

A3.3 SECTION 10 1150 – PREMIUM DRY ERASE WALL COVERINGS:
REPLACE this section in its entirety.

A3.4 SECTION 23 0900 – INSTRUMENTATION AND CONTROLS FOR HVAC:
REPLACE this section in its entirety.

A3.5 SECTION 23 8128 - SPLIT DIRECT EXPANISON AIR CONDITIONING UNITS WITH ELECTRIC HEAT:

1. Refer to Article 2.2, Paragraph B:
   Revised the word 'horizontal' to 'upflow'.
2. Revised Paragraphs G & H to read as follows:
   " G. Electric Heaters: Electric heat modules shall be installed in unit. Electric heater elements shall be constructed of heavy-duty nickel chromium elements internally connected for the scheduled electrical requirements. Staging shall be achieved through the unit control processor. Each heater package shall have automatically reset high limit control operating through heating element

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contactors. All heaters shall be individually fused from factory, and meet all NEC requirements when properly installed. Power assemblies shall provide single point connection, where noted on schedule. 2 Ton units shall have singlepoint power. 3, 4, and 5 ton units (where single phase heat) shall have multipoint power as noted on the mechanical and electrical drawings. Manufacturer
shall provide wiring option for fan and each stage of electric heat to be wiring individually for a total of up to three points of power per unit. Electrical heat modules shall be UL listed or CSA certified. H. Unit electrical connections shall consist of suitable openings in the cabinet for routing of all utility connections for side power supply connection. The base unit shall contain a terminal strip in the control compartment to allow for terminal-toterminal connection of thermostat (temperature sensor) and field installed accessories. Electrical controls shall be complete with self-contained low voltage control circuit protected by an automatic reset device. All unit power wiring
shall enter the cabinet at a single factory pre-drilled location designed for single point electrical service. 2 Ton units shall have single-point power. 3, 4, and 5 ton units (where single phase heat) shall have multi-point power as noted on the mechanical and electrical drawings. Manufacturer shall provide wiring option for fan and each stage of electric heat to be wiring individually for a total of up to three points of power per unit."

A3.6 SECTION 23 8113 – PACKAGED TERMINAL AIR CONDITIONERS:
ADD this section in its entirety.

A3.7 SECTION 27 0500 - GENERAL COMMUNICATION SYSTEMS REQUIREMENTS:
ADD this section in its entirety.

A3.8 SECTION 27 1030 - DATA AND TELEPHONE CABLE PLANT:
ADD this section in its entirety.

A3.9 SECTION 27 5125 - SOUND REINFORCEMENT SYSTEMS:
ADD this section in its entirety

A3.10 SECTION 28 0500- GENERAL ELECTRONIC SAFETY AND SECURITY SYSTEM REQUIREMENTS:
ADD this section in its entirety.

A3.11 SECTION 28 1327 - BUILDING ACCESS CONTROL SYSTEM:
ADD this section in its entirety.

A3.12 SECTION 28 2123 - VIDEO SURVEILLANCE SYSTEM:
ADD this section in its entirety.

A3.13 SECTION 28 3100 - FIRE ALARM MULTIPLEX SYSTEMS (PERFORMANCE:
ADD this section in its entirety.

A3.14 SECTION 28 3110 – FIRE DETECTION AND ALARM – EXPANION OF EXISTING SYSTEMS:
DELETE this section in its entirety.

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DRAWINGS

A3.15 SHEETS G-001 – TITLE SHEET:
REPLACE this sheet in its entirety,

A3.16 SHEET C1.10 – SITE AND PAVING DETAILS:
REPLACE this sheet in its entirety.
a. REVISED detail of pavers, fencing and gate.

A3.17 SHEET AD-101 - DEMOLITION CEILING PLAN:
REPLACE this sheet in its entirety.

A3.18 SHEET AD-103 DEMOLITION SITE PLAN:
REPLACE this sheet in its entirety.
a. UPDATED sheet to remove more existing fence.

A3.19 SHEET AS-101- ARCHITECTURAL SITE PLAN:
REPLACE this sheet in its entirety.
a. UPDATED sheet to ADD new fence.

A3.20 SHEET AS-102- ENLARGED SITE PLAN:
REPLACE this sheet in its entirety.
a. UPDATED sheet to ADD new fence.
b. REVISED note to ADD painted steel panel 6” tall by gate length and 10” above finish floor at main entrance.

A3.21 SHEET A-101 – ATHLETIC OFFICE FLOOR PLAN:
REPLACE this sheet in its entirety.
a. ADDED elevation 5/A-101 and section detail 6/A-101 for cabinet to plan south wall of Assembly community room regarding AMP location.

A3.22 SHEET A-102 – CONCESSION FLOOR PLAN – ALT BID #2:
REPLACE this sheet in its entirety.
a. RELOCATED new urinal in men’s restroom SW03/NW03/NE03/SE03.
b. ADDED chase wall to water closet in Women’s Restroom SW01.

A3.23 SHEET A-113 – PRESS BOX RCP:
REPLACE this sheet in its entirety.
a. ADDED acoustical ceiling tiles 2X2 with two 4X2 light fixtures.

A3.24 SHEET A-303 – WALL SECTIONS:
REPLACE this sheet in its entirety.
a. REMOVED cement finish at soffit and facia at roof and REPLACE it with metal panel to match specifications.
b. ADDED cover board, elastomeric barrier, and drainage mat.

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A3.25 SHEET A-402 - ENLARGED PLANS INTERIOR ELEVATION CASEWORK DETAILS:
REPLACE this sheet in its entirety.
a. ADDED elevation 25/A-402 for tack board size and location in breakroom.
b. ADDED description to elevation detail 23/A-402 for countertop, back splash, and upper/lower base cabinet.
c. ADDED TAS clearance for water fountain reference detail 1&16/A-402
d. ADDED TAS clearance for sink and cabinet reference detail 7/A-402
e. ADDED TAS clearance for urinal reference detail 17/A-402

A3.26 SHEET A-403 -INTERIOR DETAILS:
REPLACE this sheet in its entirety.
a. REVISED detail 12/A-403 to include bump out to hide steel column with metal stud and gypsum.
b. REVISED detail 10/A-403 to cover steel column with break metal on both sides of column.
c. REVISED detail 7/A-403 to remove one layer of gypsum board both sides of wall for 1hr fire rated wall.
d. UPDATED section 6/A-403 to include 12" wide tempered glass shelf X 3 with shelf bracket
e. ADDED detail 15/A-403 for TAS sink and cabinet clearance.

A3.27 SHEET A-404 – ENLARGED PLANS INT. ELEVATION – ALT BID #2:
REPLACE this sheet in its entirety.
a. REVISED detail 1&2/A-404 for relocated urinal enlarged plans.
b. REVISED note Sanitary Napkins Dispenser owner furnished contractor installed.

A3.28: SHEET A-501 – EXTERIOR DETAILS:
REPLACE this sheet in its entirety.
a. REVISED detail 3 & 7/A-501 to REMOVE cement finish at soffit and facia at roof and ADD roof cover board, elastomeric barrier, and drainage mat.

A3.29 SHEET A-701 - FLOOR FINISH PLAN:
REPLACE this sheet in its entirety.
a. Updated finish PT3/WT3/VG1 notes.

A3.30 SHEET S-101 – STRUCTURAL NOTES:
REPLACE this sheet in its entirety.
a. UPDATED structural notes UF-2, 4, and 7 to clarify the base bid and alternate #5 modified subgrade requirements.

A3.31 SHEET M-104 – FLOOR PLAN – FIELD HOUSE – HVAC:
ADD sheet in its entirety.

A3.32 SHEET M-123 – FLOOR PLAN – PRESS BOX – HVAC:
REPLACE sheet in its entirety.
a. REVISED key notes under 'NOTES BY SYMBOL'.

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A3.33 SHEET M-301 – ENLARGED PLAN- MECH. ROOM – HVAC:
REPLACE sheet in its entirety.
a. ADDED/REVISED keynotes under 'NOTES BY SYMBOL'.

A3.34 SHEET M-302 – MECHANICAL ROOM SECTIONS – HVAC:
REPLACE sheet in its entirety.
a. REVISED graphical items and 'GENERAL MECHANICAL NOTES' as shown on attached drawing.

A3.35 SHEET M-401 – MECHANICAL DETAILS – HVAC:
REPLACE sheet in its entirety.
a. REVISED exhaust fan detail.

A3.36 SHEET M-402 – MECHANICAL DETAILS – HVAC:
REPLACE sheet in its entirety.
a. REVISED some details and added some additional details.

A3.37 SHEET M-5.01 – MECHANICAL SCHEDULES:
REPLACE sheet in its entirety.
a. Revised schedules as shown on attached drawing.

A3.38 SHEET MD-123 – DEMOLITION FLOOR PLANS – PRESS BOX – HVAC:
REPLACE sheet in its entirety.
a. Revised key notes under 'NOTES BY SYMBOL'.

A3.39 SHEET MPE-1.02 – SITE PLAN – MPE:
REPLACE sheet in its entirety.
a. REVISED underground low voltage conduits between new Athletic Office building addition and existing Field House.
b. REVISED point of interception of existing feeder to ensure there wasn't a conflict with concrete ramp.

A3.40 SHEET MPE-104 – ROOF PLANS – PRESS BOX – MPE:
REPLACE sheet in its entirety.
a. ADDED additional key notes under 'NOTES BY SYMBOL'.

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A3.41 SHEET M-113 – FLOOR PLAN – PRESS BOX – HVAC:
REPLACE this sheet in its entirety.
a. REVISED/ADDED Keynotes under 'NOTES BY SYMBOL'.
b. ADDED 'GENERAL PIPING NOTES'.
c. ADDED notes for fire protection rework as required in the space.

A3.42 SHEET E1.01 – FLOOR PLAN - LEVEL 1 – ATHLETIC OFFICE – POWER:
REPLACE this sheet in its entirety.
a. Drawing 1, REVISED power plan for UPDATED power requirements for FACP, EMS, etc.

A3.43 SHEET E1.03 – FLOOR PLAN – PRESS BOX – POWER:
REPLACE this sheet in its entirety.
a. Drawing 3, refer to drawing for UPDATED power requirements at Press Box.

A3.44 SHEET E213 - FLOOR PLAN – LEVEL 2 – PRESS BOX – LIGHTING:
REPLACE this sheet in its entirety.
a. Drawing 1, refer to UPDATED lighting and lighting control design.

A3.45 SHEET E223 – FLOOR PLAN – LEVEL 3 – PRESS BOX – LIGHTING:
REPLACE this sheet in its entirety.
a. Drawing 1, refer to UPDATED lighting and lighting control design.

A3.46 SHEET E7.01 – ELECTRICAL RISER & SCHEDULES:
REPLACE this sheet in its entirety.
a. Refer to drawing for UPDATED FEL panel schedule and UPDATED Transformer Secondary Feeder schedule.

A3.47 SHEET ET1.0 – ELECTRICAL COMMUNICATIONS SITE PLAN:
REPLACE this sheet in its entirety.
a. CHANGES to the underground conduits under slab.

A3.48 SHEET ET1.2 – COMMUNICATIONS FLOOR PLAN – CONTROL ROOM:
REPLACE this sheet in its entirety.
a. ADDED data in Control Room on Stadium Concourse room 120.

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Attachments:

Architectural:
Sign In Sheet
Specification Section 00_0003, 10_1150, 23 0900, 23_8113, 27_0500, 27 1030, 27_5125, 28_0500, 28_1327, 28_2123 & 28_3100
Drawing Sheets: G-001, AD-101, AD-103, AS-101, AS-102, A-101, A102, A-113, A-303, A-402, A-403, A-404, A-501 & A-701

Civil – TNP, Inc.
Drawing Sheet C1.10

Structural – Alpha Consulting Engineers:
Drawings Sheet S-101

MPE – RWB Consulting Engineers:
M-104, M-123, M-301, M-302, M-401, M-402, M-5.01, MD-123, MPE-1.02, MPE-104, M-113, E1.01, E1.03, E213, E223 & E7.01

EMA Engineering & Consulting:
ET1.0, ET1.2

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00 4325	SUBSTITUTION REQUEST FORM (PRIOR TO BID)
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31 3116	TERMITE CONTROL
	DIVISION 32 – EXTERIOR IMPROVEMENTS
	SEE ATTACHED CIVIL TABLE OF CONTENTS

SECTION 10 1150

PREMIUM DRY ERASE WALL COVERING

PART 1 - GENERAL

1.1 SUMMARY

A. Division includes
   1. Dry Erase Wall Covering
   2. Magnetic Self Stick Dry Erase Wall Coverings
   3. Self Stick Dry Erase Wall Covering
   4. Tackable Cork Dry Erase Wall Covering
   5. Tray, Trim, and Presentation Rails
   6. Accessories

B. Related Divisions
   1. Section 09 2900: Gypsum Board: Wall substrate.
   2. Section 09 9100: Painting and Coating: Preparation and Priming of Substrate Surfaces.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. ASTM 84-91a Surface burning characteristics of building materials.

B. Gypsum Association
   1. GA-14-M-97 recommended finish levels of gypsum board

C. NFPA

1.3 SUBMITTALS

A. Manufacturers' descriptive product data and installation instructions for all dry erase wall covering, adhesive, and accessory required.

B. Manufactures recommended care and maintenance for all Jot-a-wall products.

C. Samples:
   1. 7"x9" sample of each dry erase material specified.
   2. 6" sample of all trim, tray, and end caps specified.

1.4 QUALITY ASSURANCE

A. Installer: Installation by skilled commercial wall covering contractor with no less than three (3) years of documented experience installing dry erase wall covering.

B. SURFACE BURNING CHARACTERISTICS CLASSIFICATION: Provide materials that meet Class I/A rating when tested in accordance with ASTM E84 for flame spread and smoke developed.

C. Field Samples: Prepare field samples for Architect's review and establish requirements for seaming and finish trim.

1. Install sample panel of each type presentation wall covering specified in area designated by Architect.
2. Maintain corrected and approved samples to serve as standard of performance for the project.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver presentation wall coverings to the project site in unbroken and undamaged original factory packaging and clearly labeled with the manufacturer's identification label, quality or grade, and lot number.

B. Store materials in a clean, dry storage are with temperature maintained above 50°F (10°C) with normal humidity. Store material within original packaging to prevent damage.

1.6 PRODUCT CONDITIONS

A. Do not apply presentation wall coverings when surface and ambient temperatures are outside the temperature ranges required by the wall coveringmanufacturer.

B. Provide continuous ventilation and heating facilities to maintain substrate surfaceand ambient temperatures above 55°F (13°C) unless required otherwise by manufacturer's instructions.

C. Apply adhesive when substrate surface temperature and ambient temperature isabove 55°F (13°C) and relative humidity is below forty percent.

D. Maintain constant recommended temperature and humidity for at least 72 hours prior to and throughout the installation period, and for 72 hours after wall covering installation completion.

1.7 WARRANTY

A. Five (5) year limited warranty. Jot-a-wall warrants that the surface will maintain its writing performance and not stain under normal conditions, when used in strict accordance with or care and maintenance instructions.

1.8 MAINTENANCE

A. Before initial use of the writing surface, the material must be cleaned with Expo cleaner and a soft cloth. Then rinse with clean water and towel dry. We recommend the use of original Expo markers (sometimes called Expo Bold markers) for optimum performance. Other markers can also be used, but shouldbe tested for acceptability before use across the entire writing surface.

B. Long-term exposure of the Jot-a-wall dry erase surface to permanent markers may result in the marker penetrating the surface, leaving a permanent stain. Permanent marker may be removed by writing over the mark with a dry erase pen (using circular motions over the permanent marker) letting it dry and then erasing. Alternatively, the mark may be removed with isopropyl alcohol, but timeis a critical factor in preventing migration of the marker into the material. <u>The longer the permanent marker is left on the material, the more difficult it is to remove.</u>

C. <u>Use only felt erasers.</u> Remove dry-erase markings with a felt eraser for longer lasting surface effectiveness. Press firmly when erasing, using a circular motion. Change erasers as they become dirty. Dirty erasers leave excess ink on the surface of the board.

D. Caution: Any sharp edged eraser can scratch the dry erase surface. Change erasers as they become soiled to avoid leaving excess marker residue on the surface of the board. For cleaning marker residue build-up, use Jot-a-wall's cleaner or Expo's dry erase cleaning solution and a soft towel. Then rinse with clean water and towel dry. For long term care we strongly suggest the entire writing surface be cleaned on a regular basis to insure the ultimate performance and appearance of the product. Warning: Never use abrasive cleaners or cleaning tools, hard edged erasers, sharp pointed writing instruments or sharp edged magnets on any Jot-a-wall products.

PART 2 – PRODUCTS

2.1 MATERIALS

A. JOM-WC-50 and JOM-WC-60: Non-magnetic Vinyl dry erase wall covering with a non-woven backing. Applied with commercial wall covering adhesive directly to a properly prepared drywall surface.
   1. Total Weight: 35 oz. per lineal yard
   2. Backing: Non-woven
   3. Roll Width: 49"/50"/ 124.66 cm/127 cm
   4. Roll Length: 50'/ 15.24 cm
   5. Total Thickness: 21 mil/ .533 cm
   6. Fire Rating: Class A

2.2 TRIM AND TRAY

A. Aluminum Trim: 1-3/4" face and 5/16" depth

2.3 ACCESSORIES

A. Adhesive: Heavy duty clear or clay based vinyl adhesive.

B. Primer: White pigmented acrylic primer formulated for use with vinyl wallcovering.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Observe before hanging, wall conditions to ensure wall conditions meet orexceed Level 4 finish.

B. Test walls to receive dry erase material with moisture meter. Moisture shall notexceed 4 percent.

C. Wall Surfaces shall be smooth, clean, structurally sound and free from imperfections that could show through the surface of the material.

D. Contact the General Contractor and Architect in writing of any conditions that could cause

delay to installation.

3.2 INSTALLATION

1. A. WALLCOVERING BACKED MATERIAL: JOM-WC-50, JOM-WC-60Acclimate wall covering 24 hours before installation in the area to receive wall covering.
2. Follow manufacture's installation instruction.
3. Examine material for color, quality, and quantity, as specified prior to cutting.
4. Adhesive: Use heavy duty premixed clear or clay based vinyl adhesive.
5. Primer: Use a white acrylic wall covering primer.
6. Install all material in the exact order as it is cut from the bolt. Reverse hang alternate sheets.
7. Do not crease or bend material during installation.
8. Install horizontally using a level, or straight line.
9. When installing floor to ceiling, seam the material out of the optimum writing area.
10. Smooth the surface of the material with a wall covering smoother, wrapped with a soft cloth. Take out all air bubbles, wrinkles, gaps, and overlaps. Do not use sharp edged smoothing tools. Smooth wall covering from the middle of the sheet to outside edges.
11. Removed any adhesive from the surface of the material using warm soap solution and rinse with clean water.
12. Make sure there isn't any residue of adhesive or soap left on the writing surface.
13. Stop installation of material that is questionable in appearance and call distributor of product.

3.3 CLEAN UP

A. After installation remove all excess adhesive immediately using a soft cloth andwarm soapy solution.

B. Whether the product is installed with adhesive or is a self-stick product rinse thematerial with clean water after installation and dry with clean soft towel.

C. After installation, remove rubbish and debris caused from the dry eraseinstallation. Leave the area neat and clean.

END OF SECTION

SECTION 23 0900

INSTRUMENTATION AND CONTROLS FOR HVAC

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

A. Comply with Division 1 - General Requirements and referenced documents.

B. Comply with Section 23 0500, General Provisions, and all other Division 23 Sections, as applicable.

C. Refer to other divisions for coordination of work with other trades.

1.2 SYSTEM DESCRIPTION

A. The scope shall include the furnishing and installing of Energy Management System devices with new direct digital controllers, all local and remote control panels, temperature control field devices, appurtenances, etc., to accomplish specific control sequences specified herein, to provide fire and freeze protection; cocks and wells for various temperature and pressure control, sensing and indicating devices; pressure and temperature indicating instruments; supporting structures, and other required components for a complete and operating system.

B. The scope shall include all new electric connections to new thermostats, sensors, valves, dampers and actuators, switches and relays, and all other new components of the system requiring electric connections.

C. The scope shall further include all temperature control and interlocking wiring and wiring devices, including raceways, as indicated herein.

D. Provide all software programs as required to effect the sequences of control, monitoring, reporting, etc., as indicated herein.

E. The new system installed shall be fully automatic, subject to various types of remote surveillance, routine remote adjustments, remote status, remote alarms, remote data collection for trending/historical files, and other operations as indicated herein, from a new local remote microprocessor-based Local Area Network (LAN), with the local system capable of stand-alone operation. The system shall be capable of being monitored and controlled remotely off site by a Central Processing Unit (CPU) at the Facilities Central Maintenance Office via modem and telephone line, or on the District LAN. The entire system of control and automation at this building shall thus become an integral part of the existing facilities Energy Management System (EMS).

F. Bidders are specifically advised that full and effective two-way communication between the new system installed under this contract and the Owner's existing CPU must be achieved in an approved manner, including whatever may be required in the form of interface hardware and software without effecting or interrupting other system software. Simultaneous on-line communication of this system and others with the Central EMS is mandatory.

G. This system of equipment and software shall be provided and installed by the single local factory trained and authorized sales, installation and service agent of Enviromatic Systems (Reliable Controls).

1.3 QUALITY ASSURANCE

A. The equipment provided under this Section of the Specifications shall be installed, calibrated, adjusted, and put in completely satisfactory operation by a Control Systems installer experienced in this type of work.

B. The successful Control Systems installer shall meet the following requirements:

1. All spare parts must be locally stocked and readily available within a 24 hour period.
2. Service personnel shall be available, on call, on a 24 hour a day, year round basis, or service personnel will respond by visitation to the site within four (4) hours of a service call considered serious in nature or classified by the Owner as an emergency.
3. Be able to provide evidence of having successfully installed similar sized and types of systems for a minimum of ten (10) years.

C. All control devices shall be as specified in the technical portion of this section of the specifications. The system shall be installed by workmen skilled, experienced, and specifically trained in the application, installation, calibration, adjusting, and testing of instrumentation of the type specified.

D. All control system components shall operate satisfactory without damage at 110% above and 85% below rated voltage and at ± 3 hertz variation in line frequency. Provide static, transient, and short circuit protection on all inputs and outputs. Communication lines shall be protected against incorrect wiring, static transients and induced magnetic interference. All bus connected devices shall be A.C. coupled, or equivalent, so that any single device failure will not disrupt or halt bus communications. Provide line voltage input protection to all network level controllers to protect these devices from over-voltage and lightning strike conditions.

E. A service representative of the installer shall check the instrumentation for proper installation, calibrate all instruments and make all adjustments necessary to ensure proper operation of the system in full cooperation with the Testing, Adjusting, and Balancing (TAB) Firm. Refer to Section 23 0593. All instruments and software required for checking, calibrating, and proving the system shall be provided under this Section of the Specifications. The service representative shall spend sufficient time with all of the Owner's Representatives after the system is installed and properly functioning to instruct the Owner's Representative (Operations and Maintenance Personnel) in the operation of the system for a minimum of sixteen (16) hours for the basic Controls System and twenty-four (24) hours for the EMS. At final completion of the installation provide personnel and instruments of satisfactory quality available to check the calibration of all instruments, and to demonstrate system operation as described in "Sequences of Operation".

F. All basic control devices, parts, and other materials, shall be standard catalog products of a single reputable manufacturer and shall essentially duplicate equipment which has been in satisfactory service for at least one (1) year. All materials and parts shall be items in current production by the manufacturers. First of a kind new technology devices will not be considered. Accessory equipment that is required to make a complete and functioning system that is not of the same manufacturer furnishing the basic control equipment shall carry the guarantee of the basic control equipment manufacturer and repair and replacement parts shall be available through normal local trade channels.

G. All software updates and enhancements which evolve during the first year warranty period following system acceptance, "Substantial Completion", shall be furnished to the Owner without additional cost. This shall include the local stand-alone direct digital controllers and the building network manager computer(s).

H. Furnish an extended one (1) year warranty beyond the standard one (1) year warranty for the EMS to include all electronic components and control devices associated therewith. Provide additional three (3) year parts warranty beyond this for a total of five (5) years for all dampers and actuators.

I. All network level controllers shall be ASHRAE BacNET and shall communicate with all other BacNET Protocol communication systems at the building network level.

1.4 SYSTEM START-UP AND COMMISSIONING

A. After completion of the installation, Contractor shall place the system in operation and shall perform all necessary testing and debugging operations of the basic systems and EMS.

B. An acceptance test shall be performed in the presence of the Testing, Adjusting, and Balancing (TAB) Company, to verify correct sequences of operation, calibration, and operation of the Controls and Energy Management System, when installed, with every part of the system functioning satisfactorily and having been fully commissioned, and with no outstanding items requiring completion or correction, the system will be accepted by the Architect and Owner for "Substantial Completion", and will then be placed under Warranty.

C. The Automatic Temperature Control and Energy Management System Installer shall thoroughly check all controls, sensors, operators, sequences, etc., before notifying the TAB Agency that the Automatic Temperature Controls and Energy Management System are operational. The Automatic Temperature Control and Energy Management System Installer shall provide technical support (technicians and necessary hardware and software) to the TAB Agency to allow for a complete check-out of these systems.

1.5 SUBMITTALS

A. Submittals shall be complete and be in full accordance with Section 23 0500, General Provisions.

B. Submittals shall include complete, continuous line, point to point wiring diagrams including tie-in points to equipment with written sequences of control adjacent to pertinent control diagrams. Specification sheets shall be submitted on each piece or type of equipment in a separate brochure and show sufficient detail to indicate compliance with these specifications. Drawings and Specification sheets shall show setpoints, throttling ranges, actions, proportional bands, and integration constants, where applicable. Complete brochures shall include the wiring diagrams as well as operating and maintenance instructions on the equipment.

C. Complete and approved shop drawings shall be obtained prior to commencing installation work, unless otherwise approved by the Owner or Owner's Representative.

D. Tag numbers, as shown or specified, shall appear for each item on the wiring diagrams and data sheets. Data sheets shall properly reflect in every detail the specific item submitted.

E. After completion of the work, Contractor shall prepare and furnish maintenance brochures for the Owner. The maintenance brochures shall include operating instructions, specifications, and instruction sheets for all instruments and a complete set of "As-Built" control drawings. After approval of submittal, completion of all installation work, software checkout, and system commissioning in conjunction with the Testing, Adjustment and Balance (TAB) Firm, furnish to the Owner the following:

1. One (1) set of Blue or Black line prints of "As-Built" drawings, half size (11" X 17"), inserted in a three-ring binder.

2. One (1) copy of the final approved Shop Drawings in suitably sized three ring binders.
3. A USB Drive with all documents indicated above, to include Operations and Maintenance Manuals and spare parts list included thereon included in PDF format.

F. Provide a complete replacement spare parts list to the Owner.

1.6 EMS SOFTWARE TOOLS AND LICENSES

A. Submit a copy of all software installed on the servers and workstations related to this project.

B. Submit all licensing information for all software installed on the servers and workstations.

C. Submit a copy of all software used to execute the project even if the software was not installed on the servers and workstations.

D. Submit all licensing information for all of the software used to execute the project.

E. All software revision shall be as installed at the time of system acceptance.

1.7 PRODUCT HANDLING

A. Cover and protect material in transit and at site. Material not properly protected and stored, and which is damaged or defaced during construction shall be rejected.

B. Cover control panels, open ends of control piping and open ends of control valves stored on site until just prior to installation of wiring and valves respectively.

C. Storage and protection of materials shall be in accordance with Division 1.

PART 2 PRODUCTS

2.1 TEMPERATURE SENSORS

A. Temperature sensors shall be nickel wire thermistor, 10,000 or 30,000 ohm resistance, or RTD Type, with 1000 ohms resistance at 70 Deg.F., and a 3 ohms/per degree F temperature coefficient.

B. Ambient temperature limits shall be minimum of 0-125 Deg.F. with a +/- 0.25% accuracy of nominal resistance at 70 Deg.F.

C. Condenser water temperature sensors and cabling shall be hermetically sealed to prevent condensation damage to conductors or elements. Sensors for immersion locations shall not be affected by vibrations encountered in normal piping systems.

D. Mixed air temperature sensors shall be the averaging capillary type to sense duct temperature across the full duct width. Minimum sensor length shall be 15 feet and include adequate supports for element within the duct or at the face of the coil, maintain minimum one inch (1") separation from coil.

E. Furnish sensors with maximum 6 to 9 inch insulated pigtail leads or trim sensor pigtail leads to meet this criteria once installed.

F. All sensor actions shall be the same for the entire building.

G. Mount all room wall sensors at 48" inches above finished floor to comply with A.D.A., unless indicated or approved otherwise by the Architect or Owner's Representative.

H. Wall space temperature sensors shall include the following accessories, features and functions:

1. Normal Increase/Decrease Temperature Setpoint adjustments; limits set through software (initially use ±2 Deg.F.).
2. Impact Resistant Lexan type cover material.
3. Local override pushbutton to energize controlled equipment.
4. Local operator interface communication service jack compatible with mobile trouble shooting terminal unit. Alternately, provide spare service jack on terminal equipment controller on controlled terminal equipment.

I. Sensors shall be as manufactured by Reliable Controls; Automation Components, Inc. (ACI); or Veris Industries.

2.2 RELATIVE HUMIDITY SENSORS

A. Provide a 100% solid state copolymer wafer, of bonded layer hygrometric materials, humidity sensor and transducer. Sensor shall require no periodic maintenance or recurring calibration. Sensor shall be linear and temperature compensated.

B. Sensor shall have +/-2% Relative Humidity (RH) accuracy over a 100% RH range and +/-1% over the 30-80% RH range.

C. Sensor shall produce outputs of 4-20 mA or 1-11 VDC.

D. Sensor shall be in an impact resistant cover with ventilating openings in occupied spaces. Provide duct or remote mount probes as required for the application.

E. Wall mounted sensors shall be mounted 48 inches above finished floor to comply with A.D.A., unless indicated or otherwise approved by the Architect or Owner's Representative.

F. Acceptable Manufacturers:

1. Vaisala (±2% to 3% acceptable).
2. General Eastern (±2% to 3% acceptable).
3. Automation Components, Inc. (ACI).
4. Veris Industries.
5. Reliable.

2.3 AUTOMATIC DAMPERS

A. Provide all control dampers, under this Section of the Specifications, of the types and sizes indicated on the Drawings, including but not limited to outside air intakes, return, relief, and other motorized air control dampers where shown, or where not an integral part of the equipment furnished and specified in other sections of these specifications. All dampers shall be special low leakage extended performance type.

B. Damper frames shall be not less than 16 gauge galvanized steel formed for extra strength with mounting holes for flange and enclosed duct mounting.

C. Dampers shall be available in two-inch size increments from 8" horizontal and vertical to 48". Requirements for dampers over 48" in size shall be met by using standard modules with interconnecting hardware to limit damper blade length to a maximum of 48". Provide separate actuator for damper modules exceeding 32.0 square feet and as required for smaller sizes due to torque requirements.

D. All damper blades shall be not less than 16 gauge galvanized steel roll formed for high velocity performance. Blades on all dampers must be not over 6" wide.

E. Blade bearings shall be nylon or oilite with 1/2" zinc plated steel shafts.

F. All blade linkage hardware shall be of corrosion-resistant finish and readily accessible for maintenance after installation.

G. Provide continuous replaceable neoprene or butyl rubber edging seals for all outdoor and relief air dampers where blade edges meet when dampers are closed. Spring loaded stainless steel side jamb seals shall be provided for all dampers.

H. Dampers and seals shall be suitable for temperature ranges of -20 degrees F to 200 degrees F at specified leakage ratings.

I. Dampers used for proportional control shall have opposed blades.

J. Leakage rates for all controlled dampers shall not exceed 5 CFM of air flow per square foot of face area based on a 16 square foot damper, at 1.0" W.C. differential, rated in accordance with AMCA 500. Furnish test data with submittals.

K. Acceptable manufacturers (No other manufacturers will be allowed):

1. Johnson Controls, Inc.
2. Honeywell, Inc.
3. American Warming and Ventilating, Inc.
4. Ruskin.

2.4 ELECTRIC DAMPER ACTUATORS

A. All control dampers shall receive electric actuators.

B. Electronic direct-coupled actuation devices shall be provided.

C. Electric Actuators shall be direct-coupled over the shaft, enabling it to be mounted directly to the damper shaft without the need for connecting linkage. The fastening clamp assembly shall be of a "V" bolt design with associated "V" shaped toothed cradle attaching to the shaft for maximum strength and to eliminate slippage.

D. Spring return actuators shall have a "V" clamp assembly of sufficient size to be directly mounted to an integral jack shaft of up to 1.05 inches when the damper is constructed in this manner. Single bolt or set screw type fasteners are not acceptable.

E. Actuators shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the entire rotation of the actuator. Mechanical end switches or magnetic clutch to deactivate the actuator at the end of rotation are not acceptable.

F. For power-failure/safety applications, an internal mechanical spring return mechanism shall be built into the actuator housing. Non-mechanical forms of fail-safe operation are not acceptable. <u>This applies to all dampers directly connected to outside and relief air systems.</u> All spring return actuators shall be capable of both clockwise and counterclockwise spring return operation by simply changing the mounting orientation.

G. Proportional actuators shall accept a 0 to 10 VDC or 0 to 20 mA control input and provide a 2 to 10 VDC or 4 to 20 mA operating range. An actuator capable of accepting a pulse width modulating control signal and providing full proportional operation of the damper is acceptable. Floating point type control is acceptable on fan coil units, unit heaters and variable air volume terminals. All actuators shall provide a 2 to 10 VDC position feedback signal.

H. All 24 VAC/VDC actuators shall operate on Class 2 wiring and shall not require more than 10 VA for AC or more than 8 watts for DC applications. Actuators operating on 120 VAC power shall not require more than 10 VA.

I. All non-spring return actuators shall have an external manual gear release to allow manual positioning of the damper or valve when the actuator is not powered. Spring return actuators with more than 60 in-lb torque capacity shall have a manual crank for this purpose.

J. All modulating actuators shall have an external, built-in switch to allow the reversing of direction of rotation.

K. Actuators shall be provided with a conduit fitting and a minimum three-foot electrical cable and shall be pre-wired to eliminate the necessity of opening the actuator housing to make electrical connections.

L. Actuators shall be Underwriters Laboratories Standard 873 listed.

M. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuator's rated torque and shall have a minimum 2-year manufacturer's warranty, starting from the date of substantial completion.

N. All actuators connected to all sequenced valves and dampers shall have independent control and adjustment from one another to emulate a pilot positioner.

O. Acceptable Manufacturer's:

1. TAC.
2. Belimo.
3. Johnson Controls, Inc.
4. Siemens.
5. Honeywell, Inc.

2.5 CURRENT SENSING STATUS RELAYS

A. Provide current sensing status relays for motor operation status monitoring as specified elsewhere herein.

B. Sensors shall be 100% solid state, no mechanical parts, and have no calibration drift.

C. Sensors shall have an adjustable trip level, be isolated, have single set point adjustment, require no external power (power induced from conductor), and have integrated adjustable wall or floor mounting bracket.

D. Sensors shall be suitable for motor loads from 0 to 100 HP, with a supply current of 1 ampere up to 135 amperes, 600 VAC RMS, setpoint adjustable to +/-1% range from 0-95% non-condensing relative humidity

E. Sensors shall be as manufactured by Veris Industries, Inc.

2.6 FREEZESTATS

A. Freezestats, for freeze protection, shall be capillary tube type with minimum 20 foot long sensing element, sensitive to the coldest temperature along any 12 inch long portion, to de-energize equipment on a drop in temperature below setpoint.

B. Freezestats shall be field adjustable from a minimum of no lower than 35 Deg.F. up to 65 Deg.F. Standard setpoint shall be 40 Deg.F., unless noted otherwise. Provide dual temperature setpoint scale.

C. Freezestats shall be manual reset, unless indicated otherwise, and be rated for 120 VAC, maximum 10.0 amperes. Provide one (1) normally - open and one (1) normally - closed contacts. Provide an additional set of dry contacts on each device for connection to a central control and monitoring system.

D. Sensor and controller shall be able to operate in ambient conditions from 20 Deg.F. to 104 Deg.F. in a dust-proof and moisture-proof enclosure.

E. Provide mounting bracket suitable for mounting on ductwork and the side of air handling equipment.

F. Provide grommets for protection of capillary where inserted through drilled openings in equipment or ductwork.

G. Provide capillary tube stand-off brackets suitable to hold sensing element off of water coil fins to secure element firmly in place, as well as to avoid close contact with coil tubes.

H. Freezestats shall be as manufactured by Johnson Controls, Inc.; Honeywell, Inc.; Invensys: Siemens; or Robertshaw.

2.7 ROOM SENSOR AND THERMOSTAT PROTECTIVE COVERS

A. Provide opaque Lexan thermostat guards with mounting brackets and tamper proof screws for each new wall mounted thermostat and sensor installed, unless indicated otherwise. Administrative office areas and classrooms shall not require guards. Generally, guards shall be provided in Institutional Public Use Areas such as Public Use Corridors. Provide wire type guards in Gymnasiums.

B. Guards shall be sized to accommodate the thermostat or sensor to be enclosed, and include ventilation openings, ring base, and key lock.

C. Guards shall be as manufactured by:

1. Mason.
2. Honeywell.
3. Best Engineered Control Products.

2.8 AIR FLOW DIFFERENTIAL PRESSURE SWITCHES (HIGH/LOW PRESSURE)

A. Air flow differential pressure switches shall be provided to monitor high or low static pressure in ductwork, where required elsewhere herein, and to detect clogged air filters, unless specified in other sections of these specifications.

B. Switches shall be capable of operating in ambient temperatures from 0 Deg.F. to 165 Deg.F.

C. Setpoints shall be field adjustable from 0.05 to 5.0 inches water column to suit the application. Provide concealed scale plate with adjusting screw for setpoint adjustment. Scale shall be selected such that the normal operating range is at the midpoint of the scale; i.e. an operating range of 0.30 to 0.70 needs a scale of 1.0.

D. Materials of Construction:

1. Buna-N Diaphragm
2. Molded polycarbonate enclosure.
3. Zinc plated cold rolled steel; 0.040 inches thick for diaphragm housing and 0.032 inches thick for cover material.

E. Provide appropriate mounting brackets and any remote mounting probe kits as necessary for each particular mounting condition.

F. Acceptable Manufacturers:

1. Johnson Controls, Inc.
2. Honeywell, Inc.
3. Invensys.
4. Siemens.
5. Robertshaw.
6. Dwyer.

2.9 LOCAL CONTROL PANELS

A. New local equipment control panels shall be installed in each equipment room, or other locations as indicated or as required, for new electric equipment and control devices. They shall be totally enclosed, pre-piped, and wired to labeled terminals to house all associated controllers, thermometers, relays, switches, etc. serving that equipment. Provide one cabinet for each air handling unit or group of units in the same room.

B. Panels shall be mounted at a convenient height for access. Acceptable locations include mechanical equipment rooms, storage closets, electrical rooms, or other spaces as indicated on the Drawings. Above ceiling locations are not acceptable.

C. Thermometers, pilot light switches, and gauges shall be flush mounted on panel surface.

D. Cabinet frames shall be extruded aluminum sections with riveted corners supported by internal angle brackets. Door shall have continuous hinged door, with latch and key lock.

E. Sub-Panel and face panel shall be removable for ease of installation and replacement. Face panel shall be of a finished color with a finished frame.

F. Knockouts for 1/2" x 3/4" EMT connection and 1-1/2" x 1-1/2" trough shall be provided at top and bottom of panel.

G. Identify each panel, switch, and device by an engraved, bolt-on, black phenolic nameplate with white lettering securely attached. Identify all control devices inside panels similarly. Embossed plastic tape will not be acceptable on panel front faces but will be allowed on panel interiors.

H. Switches and pilot lights shall be mounted on the panel face with all other devices mounted inside the panel. Devices inside panels shall be wired to numbered dual terminal strips.

I. Start-Stop Pushbuttons and Pilot Lights, where called for, shall be of the low voltage and neon type. Pushbuttons shall be heavy duty type. Pilot lights shall be interlocked with starter auxiliary contacts except fans and pumps which shall have current sensing relays to indicate run status.

J. Each new control panel installed shall have a minimum of 25% consolidated spare/extra space available inside the panel for mounting of control devices for future system modifications or changes. This space shall be indicated on the panel shop drawing.

K. All wiring inside panels shall be concealed in a wiring harness.

L. Permanently affix inside each panel a final "as-built" control drawing of the piping and wiring of the panel.

M. All panels shall be factory assembled, piped and wired.

2.10 ENERGY MANAGEMENT SYSTEM

A. The existing central EMS HARDWARE is located in the District Maintenance Facility and is intended to be reused.

B. Network Level Controllers shall have a 16 bit based microprocessor with EPROM operating system. DDC programs and data files shall be in non-volatile EEPROM or flash memory to allow simple and reliable additions and changes. Each network controller shall have an on-board 30 day battery back-up realtime clock. Controllers shall be provided as required with capacity to accommodate input/output (I/O) points required for the application plus any spare points as specified. Each panel shall be provided with a socket for a Portable Operators Terminal (POT), and a port for network communications at no less than 78,000 baud. Controllers shall have outputs which shall

be binary for On-Off control, with true variable voltage (0-10v), for driving analog or pneumatic transducer devices. Analog outputs shall have a minimum incremental resolution of one percent of the operating range of the controlled device. Controllers shall have LEDs for continuous indication of all bus communications, power, and operational status. All panel electronics and associated equipment shall be installed in suitable enclosures.

C. Terminal Equipment Controllers (TEC's) shall be UL916 standalone EEPROM based and configured to perform the sequences specified, and with I/O selected for the application. TEC enclosures shall be compact plastic conforming to UL94-5V or plated steel. Each TEC shall be provided with LED type annunciation to continually display its operational mode; power, normal, or in an alarm state. TEC networks operating on a 9000 baud rate shall be grouped with no more than 20 TEC's per primary bus connected device. For TEC networks operating over 50,000 baud, up to 100 TECs may be so grouped.

D. General:

1. Software development and programming shall be as directed by the Owner and as described herein. Contractor shall install all program operating time schedules as furnished by the Owner.
2. During construction, the Contractor may operate equipment in what is considered a Construction Schedule. The control systems installer, at Substantial Completion, shall remove such schedules and replace these with individual, independent, operating schedules for each system and individual piece of equipment, specifically air handling equipment.
3. Program trend logging of all analog and binary points of control at intervals as directed by the Owner, initially use fifteen (15) minutes.
4. Overall systems control shall be performed by a field programmable direct digital controller, microprocessor based, which incorporates Direct Digital Control, all necessary energy management functions and provides for digital display and convenient local adjustments of desired variations at each individual controller cabinet. This shall include scheduled programming and system interlocks.
5. DDC control units and all hardware shall be capable of continued operation at room temperatures of 40 Deg.F. to 120 Deg.F. and humidity from 10% up to a non-condensing point of 90%. All inputs shall be capable of withstanding continuous shorting to 120 VAC.
6. Provide any external electrical power supply protection devices to protect controllers from external voltage surges to include high voltage and lightning disturbances/protection.
7. Provide function switches in a local control panel, if not integral with the DDC controller, with "on-off" control and a "manual-auto" switch for each new DDC output (contact type) with switch status information being available to the central systems historical data files for all air handling equipment over 2000 CFM in capacity, pumps and controlled exhaust fans over 2000 CFM in capacity. Alternately, provide this capability integral with the Direct Digital Controllers. Terminal units such as small exhaust fans, small fan coil units, heat pumps, and rooftop A/C units are not required to have function switches. Switches shall be concealed within the local control panel or digital controller enclosure to be lockable. The network manager software shall identify points that are locally overridden and report by display to the building CPU to include generating a printout at the local or remote location printer.
8. Provide a hard wire connection between the Building LAN serving all new Controllers to the Central Facilities Energy Management System. Verify dependable utilization of this system and transfer of local system data and

functions to the existing control system CPU. General data reporting and alarms transmission shall be verified.

9. No PC shall be provided in the facility. A web-based browser software system, with server, shall be used to allow any authorized District employee the ability to access the Control System and operating parameters for monitoring and adjustment or for schedule changes. Maintenance Department may use this system, but will also use an Owner furnished laptop to plug into a communications jack located at control panels, wall mounted sensors, or DDC Controllers.
10. Web-based interface shall be used for digital parameter display, programmed to display analog variables, binary conditions, off normal scans and other analog or binary information required for analysis and adjustment of the system being controlled. Computer shall further contain display features to indicate automatic operation, manual or override operation, alarm indication, and other auxiliary displays associated with special purpose auxiliary function keys.
11. Energy Management System programs shall include, but not all are necessarily utilized, but shall not be limited to:

    a. Optimal start-stop using an adaptive algorithm to prevent the need for manual adjustments of parameters.
    b. Optimization programs controlling equipment using outdoor dry bulb and dew point temperatures. The outdoor wet bulb temperature shall be calculated by the following equation:

WB = (DB-DP)K+DP where K = 0.560-0.0068 (DP-30)

E. Control:

1. Control algorithms shall be available and resident in the digital system controller to permit Proportional, Integral, and Derivative control modes in any combination to meet the needs of the application. Other control modes such as incremental, floating, or two-position must be available to adapt to job needs.
2. All control shall be performed in a digital manner using the digital signal from the microprocessor based controller converted through electronic circuitry for modulation of electric actuators.
3. Provide sensitivity adjustment for all DDC output control points.
4. The library of routines available in firmware must be capable of generating additional programs as may be required for specific client tailored requirements. The Owner shall be capable of revising programs without the aide of the installer.
5. Adjustments of all new control variables shall be conveniently available at any computer terminal that has the appropriate EMS software loaded onto it, through the use of the keyboard and display. The adjustments shall include, but not be limited to, proportional gain, integral rate, the velocity and acceleration constants associated with incremental control and on/off values of two-position control.

F. Field Programmable:

1. The local DDC controllers shall each contain all necessary mathematic, logic, utility functions; and all standard energy calculations and control functions in ROM to be available in any combination for field programming the unit. These routines shall include, but not be limited to:

a. Math Routines:

1) Basic Arithmetic
2) Binary Logic
3) Relational Logic
4) Fixed Formulas for Psychometric Calculations

b. Utility Routines for:

1) Process entry and exit
2) Keyboard functions
3) Variable adjustments and output
4) Alarm Indication
5) Restart

c. Control Routines for:

1) Signal compensation
2) Loop control
3) Energy conservation
4) Timed programming

2. Final field programs shall be stored in battery backed up RAM or in permanent memory.

G. Expandability: The DDC shall be expandable by adding additional field interface units that operate through the central processor of the DDC. The processor in the DDC shall be able to manage remote field interface units thereby expanding its control loop and energy management point capacity. Remote units shall be able to stand alone and have two-way communication in a LAN configuration. Systems furnished shall be fully manufacturer supported and under current production.

H. Calibration Compensation: To maintain long term analog accuracy to the controller sensing circuits, the DDC shall sense the voltage being supplied to the resistance sensing element and through firmware compensate for power supply changes due to long term drift or drift due to ambient temperature changes at the power supply.

I. Battery Backup: New DDC system controllers shall be supplied with a minimum of 48 hours of nickel-cadmium battery backup, during power outages, for the RAM, with an automatic battery charger to maintain charge while power is on, to prevent internal component damage or failure. DDC modules shall have automatic restart capabilities with sequencing after a power failure without program interruption. This shall include the staggered restart of EMS controlled equipment in pre-selected load groups in 15-30 second intervals, adjustable, to minimize KW demand on restart of equipment after power is restored.

J. Associated Hardware:

1. All actuators for valves and dampers shall be supplied under this section of the specifications.
2. Where modulating electric actuators are used they shall be compatible with the (pulse width modulated) output of the Digital System Controller.

K. Diagnostics: The Digital System Controller shall contain in its program a self-test procedure for checking the digital controllers, and by means of a non-destructive memory, check the computer.

L. Default Operating Procedure and Alarms:

1. All variables shall be identified as being reliable or unreliable. When a calculation is required to use a value (sensed or calculated), which is identified

as being unreliable, the unreliable data value will flash. The calculation will use a default value programmed into the unit.

2. All alarms (a pump that did not start, etc.) and all deviation alarms (temperature, off, normal, etc.) will locally display an alarm as well as report to the CPU the type of alarm, designate equipment or system effected, date and time of alarm. A hard copy printout of alarms shall be generated at the CPU location. A scan can then identify all alarm conditions and their identifier.

M. Cabinet:

1. The DDC modules shall be enclosed in a metal frame cabinet. The cabinet shall be constructed such that it can be mounted and electrical terminations can be made during the construction phase of the project. The DDC electronics are to be removed and added at a later date, only prior to start-up.
2. Cabinet shall be installed on the wall in the Mechanical Rooms or elsewhere as indicated.
3. DDC cabinets shall be provided with a key lock. All cabinets on each installation shall utilize one master key.
4. All control wiring and system communications shall be electrically terminated inside DDC cabinets.

N. U. L. Approval: The DDC system panels shall be an approved U.L. System, with U. L. listing as a Signaling System.

O. General software features of the web controller and field controllers, with sufficient internal memory, shall include the following as a minimum (although not all are necessarily used):

1. Start-Stop Functions
2. Optimized Start-Stop Control (warm-up and cool-down)
3. Time Programmed Commands
    a. Normal occupancy
    b. Holiday
    c. Occupancy overrides
    d. Schedules shall be programmable up to one year in advance with system wide or global scheduling and local, point by point scheduling.
4. Duty Cycle Control
5. Night Setback/Setup
6. Electric Demand Limiting
7. Override Feature
8. Run Time Totalization with data in non-volatile module memory.

Provisions shall be made for on-line programming and override.

P. On/Off Points of System Control shall be provided for the following:

1. Each split DX AC Unit:
    a. Athletic Office Bldg: A/C-1,2,3,4,5 and 6.
    b. Existing Field House: FCUFW-1 and FCUFW-2.
2. Lighting controls (Refer to Electrical Drawings for lighting control interface): **Provide BacNET interface between the new lighting control system for the Athletic Office Bldg. and the EMS system to allow for full scheduling capability of all lighting in this facility.**
3. Exhaust fans:
    a. Restrooms, Custodial and Locker Room: **EF-1 and 4 (Athletic Bldg), EFFW-1 and EFFW-2 (Field House)**

b. Electrical Room: **EF-2 (Athletic Bldg), EFFW-3 (Field House)**
c. Storage Rm**.: EF-5 (Athletic Bldg)**

Q. Run Status (On/Off) of all units indicated above shall also be provided and shall be capable of being accessed for on-line programming. Status shall be by means of the local motor controller through the use of adjustable current sensing relays, using a current sensing relay on the evaporator fan motor for status on all A/C units, and other EMS controlled fan for other air and fluid handling equipment. Coordinate with control equipment furnished.

R. Failure Alarm Status for the following EMS controlled items shall be provided through the EMS:

1. Combined Safety Alarm, one (1) for Split DX AC Unit and EMS controlled exhaust fan.
2. Low/High Temperature Alarms for each temperature sensor installed, four (4) Deg.F. above or below setpoint, adjustable.
3. High Relative Humidity Alarm for each space relative humidity sensor installed; on a rise above 65% R.H., adjustable.
4. Emergency overflow Condensate Pan (all Split DX A/C equipment) Moisture Detection/High Water Level Alarm: De-energize unit served and send alarms to the EMS.
5. Polar ionizer failure alarm for each polar ionizer installed.

S. Provide cumulative run time logging and indication for equipment noted in Paragraph "P", above.

T. Provide analog indication for the following:

1. For each Split Direct Expansion (DX) A/C Units:

   a. Space temperature, Deg.F.
   b. Supply air temperature, Deg.F.
   c. Mixed air temperature, Deg F.
   d. For FCUFW-1 provide a duct mounted discharge temperature sensors in the duct serving the Electrical Room as well.

2. For Computer Room AC Units (CRAC) Units **(Press Box):**

   a. Space temperature, Deg. F.
   b. Space humidity, % RH.

3. For Package Terminal AC Units (PTAC) Units (Press Box):

   a. Space temperature, Deg. F.

4. Provide indication of outside air temperature in Deg.F for this building **(Athletic Bldg, use this for all sequences at this facility).**
5. Provide indication of outside air relative humidity level in % RH for this building**(Athletic Bldg, use this for all sequences at this facility).**
6. Provide indication of outside air carbon dioxide in PPM for this Building (**Athletic Bldg, use this for all sequences at this facility).**
7. Space Temperature, Degrees F.:

   a. Electrical Room: **Main Elec FW04 (Field House) and Elec. Rm 114 (Athletic Bldg).**
   b. IDF Room **(Athletic Bldg).**

8. Provide indication of space relative humidity level in % RH for the following spaces:

    a. Assembly area **(Athletic Bldg).**

U. Building Computer Software Management features

1. Provide minimum of 15 User Selectable Passwords with a minimum of three levels of access. Highest level provides system access, secondary level provides access for command to field devices only, lowest level provides monitoring capabilities only with no field control allowed. Password access will be logged with time/date stamp and associated user ID.
2. Provide a minimum of 16 Point Group Summaries with each point inclusion selectable by system operator. Summaries will have a minimum of six (6) character identifiers for each group. A separately selectable All Points Summary shall be available to the operator for a view of the complete system. Alarm Summaries, listing all points in an alarm status shall be provided, and shall be Owner definable.
3. Trend logs and summaries:

    a. The Central Computer Workstation (CPU), shall be provided with, as a part of this contract, the ability to periodically trend any hardware, software, or simulated point within any of the attached DDC panels, for this project, at an Owner selectable interval of a minimum of once per second, up to at least once per 1000 minutes.
    b. The trending programming for selected points and all feature attributes of these points shall be accomplished online at the CPU with no disruption of dynamic communication with the remote DDC panels. The operator shall be able to add, delete, and modify points and attributes at any time while online. Online programmable attributes shall include:

        1) Point addition, deletion, and modification
        2) Sampling intervals and ranges
        3) Historical samples to be stored per individual point
        4) Dynamic data values
        5) Engineering units of each point

4. Online editing capabilities shall be provided for, but not limited to the following:

    a. Add/Delete Points
    b. Modify Engineering Units
    c. Modify/Create Point Groups
    d. Adjust Set Points
    e. Adjust Individual Start/Stop Times
    f. Trend Selected Points
    g. Observe Any System Point, Hardware, or Software

    This editing capability shall be for both CPU resident programs and remote DDC panel programs.

5. English language shall be used for all inputs, outputs, and display. Code or computer language will not be acceptable.
6. Remote DDC Field Communication: Communication between the Central Computer Workstation and the remote DDC panels shall be achieved via digital transmission utilizing a distributed polling technique for recognition of all field points, both software and hardware points status, issuing of commands, programming of DDC units, etc. Additionally provide software for the existing Central Computer to allow the same interaction/communication features as noted for the Computer Workstation Building. Data transmission shall be via

hardware connection compatible with electric category Type 3002, as described in Bell System Technical Publications for Data Transmission using 9600 Baud Rate.

7. New field panels/controllers shall be able to communicate with the existing front end system same as currently exists.
8. CRT Format:
    a. The CPU CRT format shall include and display in an individually dedicated and protected area of the viewing screen the following Dynamic information:
        1) The current time, date, and day of week (including Holidays).
        2) Sequential as occurred alarms.
        3) Visual indication of alarm or off normal conditions which are active.
        4) Current operator identification.
        5) Operator work area to display various forms of point information issue commands, and data base information relevant to current activities.
    b. Operator will have full access to the system for issuing commands, etc. while this display is active.
    c. Provide a graphic software package and programming to result in a schematic illustration for each controlled piece or group of pieces, of equipment to illustrate all related controlled variables, setpoints and operating parameters. Additionally provide a building floor plan with room numbers and locations of all space sensors and controlled equipment. The user shall be able to click on any feature to pull up related system graphics.
9. Provide a building floor plan with room numbers and locations of all space sensors and controlled equipment for display on the Central workstation. The user shall be able to click onto any feature to pull up related system graphics.
    a. The graphics pages, sequence of windows (pages), shall all be formatted similar to other recently completed projects in the district.
    b. The room names, as applicable, and room numbers shall match those that exist in each building. Plan sheet room numbers shall not be used. Provide training to the Owner to allow them to change room numbers displayed (which shall be easily made by technicians with little EMS experience).

2.11 DDC SYSTEM GRAPHICS

A. Graphic Requirements:

1. Graphic Pages:
    a. Hierachy:
        1) The organization of graphic pages shall be from a global level down to a very detailed level through a series of links.
        2) Linking shall allow the operator to move down the hierarchy, up the hierarchy and laterally within the hierarchy.
    b. Hierarchy Outline:
        1) Site Plan Page: A visual representation of the site (map). One page or multiple linked pages depending on the size of the site plan.

a) Link to individual building graphic pages.
b) Display outdoor weather conditions.

2) Utility Management Page: A summary of data on the utility consumption for the site.

a) Link up to the site plan.
b) Display:
(1) Utility consumption data.
(2) Demand data.
(3) Voltages, currents and power factors.
(4) Demand control actions currently in effect.
c) Presenting the utility management data may require more than one graphic page to effectively report the data from multiple meters.

3) Building Graphic Page: Typically a picture of the building. One page per building.

a) Link to floor plans within building.
b) Link to central plant graphics where the plant serves the entire building.
c) Link to delivery systems if the delivery system serves the entire building.
d) Link up to the site plan.

4) Floor Plan Page: This will be a two dimensional plan of a floor area. A minimum of one page per floor per building is required. Where floor plans are large, multiple linked pages are required. For each control zone the value of the controlled parameters shall be displayed. This will typically be lighting status, temperature and relative humidity if relative humidity is a controlled variable.

a) Link up to the Building page.
b) Link up to the Site Plan page.
c) Link to any delivery system that serves the floor plan area (air handling unit is typical).
d) Link to time schedule that affect the systems that serve the area.
e) Link to Terminal Unit Summary page where multiple zones on the floor are served by unitary control devices.
f) Individual control zones shall be identified.
g) The location of terminal equipment serving each zone shall be shown.
h) The location of sensors installed in the occupied space shall be shown.
i) Where room numbers are available, they shall be shown. Revise room numbers in graphics to match the actual room numbers selected and installed in the facility; if not matched to construction drawing room numbers.

5) Delivery System Page: A graphical representation of an air delivery system such as a D/X air handling unit, 100% outside air unit. One page for each delivery system.

a) If the Delivery System serves a specific floor area, link up to the Floor Area page.
b) Link up to the Building page.
c) Link up to the Site Plan page.

d) If the Delivery System supplies multiple terminal devices, link to a Terminal Unit Summary page.
e) Link to a Delivery System Configuration page.
f) The graphical representation of the equipment shall be 3-dimensional and represent the true physical characteristics of the installed system.
g) Display:
    (1) Process variables.
    (2) Commands to end devices.
    (3) Status of end devices.
    (4) Status of different modes (economizer on/off, mechanical cooling enabled/disabled, occupied/unoccupied).
    (5) Alarm points.
h) Link to any time schedules that affect the system operation.
i) Link to any pre-configured trend charts for the system.

6) Delivery System Configuration Page: On this page the operator is given access to the configuration parameters for the delivery system. Typically, this page presents data in a tabular format. The type of data on this page is not changed frequently, but the operator may wish to view it frequently. One page per delivery system is required.

a) Display.
    (1) Set Points.
    (2) Turning Parameters.
    (3) Calibration Parameters.
    (4) Timing Parameters.
    (5) Application Parameters.
    (6) Reset Schedules
    (7) Lead Lag Information.
    (8) Time Schedules.
b) Link up to the Delivery System page.
c) Link up to the Building page.
d) Link up to the Site Plan page.

7) Terminal Equipment Summary Page: On this page the dynamic data and set points that are associated with multiple terminal units are presented in a tabular format. The objective is to present a summary of terminal unit performance for an area of the facility. One page is required for each group of terminal units. In the tabular data, do not use less than 12 pt. font size. Multiple linked pages may be used if there are a large number of terminals served by one delivery system.

a) Display in the table:
    (1) Process variables.
    (2) Set points for each process.
    (3) Command to each end device.
    (4) Status of each end device.
b) Link to the page for each Terminal Unit.
c) Link up to the Delivery System page.
d) Link up to the Floor Plan page.
e) Link up to the Building page.
f) Link up to the Site Plan page.

8) Terminal Unit Page: A graphical representation of a terminal unit such as a D A/C unit and 100% outside air unit. One page for each terminal unit.

a) Link up to the Terminal Summary page.
b) Link up to the Floor Plan page.
c) Link up to the Building page.
d) Link up to the Site Plan page.
e) The graphic representation of the equipment shall be 3-dimensional and shall represent the actual installed terminal unit.
f) Display:
(1) Process variables.
(2) Command to end devices.
(3) Status of end devices.
(4) Set points for each process.
(5) Modes (auto, heat, cool, etc.).
(6) Capacity indicators (terminal load, % heat, % cool, etc.).
(7) Reset schedules.
(8) Occupancy commands and status.
(9) Alarm points.

c. For all points on a graphic page that are subject to being under manual or test mode, the display shall indicate when test mode or manual mode has been applied to the point.

d. Graphic Page Requirements:

1) The sequence of control defines the buildings and all of the equipment items for which graphic pages shall be constructed as described above.
2) The Contractor shall develop similar additional graphic pages to be defined during the construction period as follows:

a) Up to five additional pages per building.
b) Up to twenty additional global pages.

2. User Groups:

a. The Contractor shall configure four user groups, one for each level of security. The group names shall be representative of the “names” below:

1) Administrators.
2) Engineers.
3) Operators.
4) Viewers.

3. Users:

a. The Contractor shall configure two users in each group. The name and passwords shall be representative of the “names” below:

1) Administrators Group:

a) Admin1 / Admin1
b) Admin2 / Admin2

2) Engineers Group:

a) Engr1 / Engr1
b) Engr2 / Engr2

3) Operators Group

a) Oper1 / Oper1
b) Oper2 / Oper2

4) Viewers Group

a) View1 / View1
b) View2 / View2

b. With the exception of the Viewers Group, these users shall not be added to the system until all testing has been completed and the system has been accepted. The Contractor shall accept all responsibility for actions the result from the unauthorized issuance of user names and passwords above the level of viewers prior to system acceptance unless specifically instructed to do so in writing by the Owner.

4. Alarm Processing:

a. All alarms required by the sequence of control shall be fully configured for delivery to the operator workstations and the alarm files.
b. A common alarm file shall be established to receive alarms from all of the field devices.
c. A separate alarm file shall be established on a per building basis to receive just the alarms from that building.
d. The alarm messages shall be descriptive and include as a minimum:

1) System identification.
2) Date.
3) Time to the second.
4) Nature of the alarm such as high value, low value, or fail to start.

e. The system shall be configured to send an alarm message on return to normal.
f. All users shall receive all alarms.

5. Reports:

a. The sequence of control includes the requirements for variables to be trended. The data server is setup to collect all of this data. The operators have the ability to look at the historical trend data on a log basis or in a graphical format as needed. It can be very beneficial to the owner for performance assessments or energy management to have a set of standard reports that analyzes the data and puts it in a format to drive management decisions. Typical examples are:

1) Run time reports on equipment.
2) Performance deviation reports that compare actual performance with specified performance. An example would be the average deviation from set point for space temperature, discharge air temperatures on air handling units, etc.
3) Equipment efficiency reports such as measurements of the KW per TON for a chiller over time.

b. In this section of the specification, a description of the reports to be prepared should be described. The contractor is best qualified to set these reports up during construction rather than leave this responsibility to the owner after acceptance.

2.12 WEB BROWSER INTERFACE (EXISTING TO BE REUSED OR NEW)

A. Provide Internet/Intranet Connectivity utilizing a Web Browser as follows:

1. Shall be a “Server” based product that provides browser access to Ethernet enabled automation controllers. Access is accomplished by utilizing standard internet search browser. No other “client” side software shall be necessary to view and utilize the system. The “Server” hosting the Web Application can be located anywhere on the Internet. The software functions by taking real-time data from the active automation systems and combining that information with the appropriate graphic file in an HTML format to be viewed by the web browser. The number of simultaneous users connected to the web application shall only be limited by the capability of the server hosting the application. The application should be able to service multiple sites.
2. The graphics utilized for this system shall not require external applications to convert the images for use between the web server-based application and the traditional graphical user interface. Graphics shall be interchangeable between applications.
3. Web Browser Server shall receive server-based software which shall support Microsoft’s .NET standards for the exchange and interoperability of information and data.
4. Server-based software upgrades shall be free to the owner for up to five (5) years after Substantial Completion.

B. The Server (existing) shall be reused.

C. The Web Browser Interface shall include the following user configuration requirements:

1. Usernames and passwords can be setup via the Web Browser Interface. Physical access to the server is not required but will be password protected.
    a. Individual user names/passwords are to be utilized.
    b. Usernames/passwords can be specifically unique to allow the user to be automatically redirected to a specific site, and or graphic display when logging into the system.
2. Passwords can be configured to allow the user to modify setpoints or not.
3. All user configuration functions shall be provided through an intuitive graphical user interface.
4. Web Browser Interface shall not require any external applications, “Client Side” software or “Plug-Ins” to connect, view, or control any aspect of the building automation system.
5. Access to the installed automation system shall be performed through Microsoft Internet Explorer.

D. Site Graphics shall meet the following requirements:

1. Graphics displayed through the Web Browser Interface must be the same graphic images provided through the Graphical User Interface described above. No external applications are to be required to interchange graphic images between the web server application and the graphical user interface.
2. Trend data must be able to be displayed graphically and in “spread sheet” format without the addition of any additional client-side software, plug-Ins, or additional applications. Digital Start/Stop Logging shall be able to be displayed and printed from the browser interface without the addition of any additional “client side” software, plug-Ins, or additional applications.
3. The display and printing of alarm data shall be performed without the addition of any “client side” software, plug-Ins, or additional applications.

4. Points that are manually overridden shall be displayed on the graphic screen by an icon adjacent to the overridden point to provide a quick visual indication of any points on the screen that are overridden.
5. The viewing and modification of weekly schedules shall be performed in a graphically intuitive manner that is consistent with the non-Web Enabled application. This shall be performed without the addition of any “client side” software, plug-Ins, or additional applications.
6. The viewing and modification of annual holiday schedules shall be performed in a graphically intuitive manner that is consistent with the non-Web Enabled application. This shall be performed without the addition of any “client side” software, plug-Ins, or additional applications.
7. “Right clicking” on the point and modifying the value shall perform the editing of point values.
8. Points can be placed in “manual” or “automatic” mode from the Web Browser, providing password restrictions for the user allow such functionality.

2.13 ELECTRICAL WIRING

A. All low (under 120 volt) and medium (120 volt and higher) voltage wire, wiring, and conduit required for the operation of the control system shall be the responsibility of this section of the specifications and shall be installed as described and in full accordance with the requirements of Division 26 of these Specifications.

B. The control manufacturer shall be responsible for supplying complete and approved wiring diagrams and installation supervision of the wiring of the control system and shall perform all necessary set-up and calibration labor.

C. Starters, furnished in other sections of these specifications, shall be installed under Division 26, but all wiring from auxiliary contacts or relays shall be under this section of the specifications.

D. All wiring, including Class 2 signal wiring, shall be installed as a Class 1 electrical system as defined by the National Electrical Code (NEC).

E. All control conduits with #8 conductor or smaller (cross-sectional area) shall have one (1) spare conductor each run in conduits carrying 5 or more conductors. Spare conductor shall be same size as the majority of conductors sized in the conduit. Conduits with 9 or more conductors shall have two spare conductors. Terminate spare conductors at control panels in an acceptable manner and tag wires as “spare”.

F. The electrician shall be licensed by the City and local authorities having jurisdiction over the area in which the work is to be performed.

G. All class 1 control wiring conduit shall be run with not more than 30% fill based on inside conduit diameters and cross-sectional area. This provision is for future modifications or additions to the control system.

H. All conduit carrying shielded twisted pair cabling, communication, or signal, Class 2 wiring, shall be sized for a maximum of 40% fill based on inside conduit diameter and cross-sectional area. This provision is for future modifications or additions to the control system.

I. All wiring shall be run in conduit. All Class 1 power wiring shall be run in conduit. All Class 2 signal wiring, low voltage control type, shall be run in conduit. No exposed wiring of any kind will be allowed. Class 2 signal wiring may be installed above accessible lay-in ceilings only if run-in plenum rated cable supported independently from structure and run parallel and perpendicular to the structure.

J. All conduit shall be 3/4 inch size minimum, except raceways terminating at control devices manufactured with 1/2" knock-outs, i.e., conduit from junction box to smoke or fire detectors (local single device wiring only).

K. Electrical Systems Installer on project may perform temperature control conduit and wiring installation on project only that this portion of work shall be bid directly to the Temperature Control Systems Installer, and all work in relation to temperature control wiring shall be done subordinate to this Section of the Specifications. Wiring terminations shall be under this Section of the specifications.

L. Under this Section of Specifications, furnish and install, at an early stage of construction (when walls are being constructed) galvanized steel back boxes for all wall mount space sensors, suitably secured with 3/4" EMT routed to four inches (4") above an accessible ceiling. Install with pull wire for installation of sensors and related wiring at a later stage of construction. For existing construction, either fish flexible conduit down accessible walls, use surface mounted wiremold components on masonry walls (color to be approved by Architect) in finished areas, or use surface mounted EMT in unfinished areas.

M. Work Not Included Under this Section of Specifications: The Electrical Systems Installer shall provide:

1. Branch circuit and motor feeder circuit conductors, raceway, connections, and overcurrent protection for each motor or item of equipment furnished by the Owner or other Contractors.
2. Installation of motor controllers furnished by the Owner or other Contractors, along with branch circuit and motor feeder circuit conductors, raceway, and connections in accordance with the manufacturer's approved wiring diagrams.
3. Disconnect switches, where indicated on the drawings or required by codes, except as provided as an integral part of manufactured equipment.
4. Power supply conductors, raceway, connections, and over-current protection for input power to HVAC Temperature Controls, HVAC Automation, and HVAC Energy Management Systems in accordance with approved rough-in and connection diagrams furnished by the system suppliers only when shown on Division 26 Drawings.
5. The above represents an outline of the work for the purpose of describing one division of the work which is acceptable to ensure that all work is contained within the General Contract. The Contractor is fully responsible for the installation of complete, operating systems in accordance with the functional intent of the specifications.
6. Nothing herein shall be construed to confine the Contractor from assigning the work to any single member or group of systems installers deemed best suited for executing the work to effect completion of the contract. Refer to specific bidding instructions of the General Contract for the actual division of the work.

N. Work Included Under this Section of the Specifications: The Mechanical Systems Installer shall provide:

1. Motors and equipment, erected in place and ready for final connection of power supply wiring, along with manufacturer's approved wiring diagrams.
2. Motor controllers, in suitable enclosures and of the type and size in accordance with the manufacturer's recommendations and NEMA requirements, along with properly sized overload elements or devices which are normally provided as part of manufactured equipment.
3. Disconnecting switches or devices which are normally provided as a part of manufactured equipment.

4. Rough-in and connection diagrams for input power supply and connections for the HVAC Temperature Control, HVAC Automation, and HVAC Energy Management Systems.
5. The above represents an outline of the work for the purpose of describing one division of the work which is acceptable to ensure that all work is contained within the General Contract. The Contractor is fully responsible for the installation of complete, operating systems in accordance with the functional intent of the specifications.

O. Contractor, under this section of the Specifications, shall insure the furnishing and installation of:

1. All new branch circuit wiring, conduits, protective devices and accessories for power wiring to serve new control panels, control transformers, electric control dampers and valve actuators, combination fire-smoke dampers and any other control system power requirements where not shown to be performed by others. Field verify spare electrical circuits available where applicable. Do not tap into existing branch circuits without approval by the Owners Representative. Run all new circuits back to electrical feeder panels.
2. Conductors and raceways for the HVAC temperature control, HVAC automation, and HVAC Energy Management System in accordance with approved rough-in and connection diagrams furnished by the system suppliers.
3. Termination of all conductors, raceways, devices, and connections for low voltage systems for the HVAC Temperature Control, HVAC Automation, and HVAC Energy Management Systems in accordance with the provisions of Division 26, and approved systems shop drawings to provide complete operating systems in accordance with the functional requirements of the specifications.

P. Wire all safety devices in series to include freezestats, and static pressure high limit controls; any single device when tripped, shall de-energize air handling equipment.

Q. Wiring Requirements shall also include the following:

1. The conduit/wiring system required for the Temperature Controls and Energy Management System shall be a complete, separate, independent system. Conduit sharing with other unrelated electrical systems is not permitted.
2. All wiring shall be labeled at both ends and at any spliced joint in between. Wire and tubing shall be tagged using 3M, Scotch Code Write On Wire Marker Tape Identification System; product number SWD-R-11954 with 3/4" x 5/16" write-on area or SLW 12177 with 1" x 3/4" write-on area and with 3M Scotch Code SMP Marking Pen. In addition to tagging at field device end and at spliced joints, a tag shall be placed 6" after entering each DDC panel. Identification and tag information shall be included in engineering/wiring submittal which must be submitted for Owner approval prior to beginning work. Tag information shall coincide with equipment/point information as written in the specification Input/Output summary.
3. Digital Input (D.I.) wiring (Class 2) may be run in a common conduit with Digital Output (D.O.) Wiring (Class 1) where local codes permit.
4. Analog Input (A.I.), Analog Output (A.O.), Digital Input (D.I.), and Network Communications Trunk (N.C.T.) wiring may be run in a common conduit.
5. Digital Output (D.O.) wiring run in a common conduit with Analog Input (A.I.), Analog Output (A.O.), or Network Communication Trunk (N.C.T.) is not permitted under any circumstances.
6. AC line power to DDC panel shall be #12 THHN.
7. Digital Output (D.O.) wiring shall be #14 THHN.

8. Digital Input (D.I.), Analog Input 4-20 mA (A.I.) and Analog Output (A.O.) wiring shall be #18 TSP (twisted shielded stranded pair with drain wire).
9. Analog Input or voltage types (A.I.) wiring shall be #18 TSP (twisted shielded stranded pair with drain wire).

2.14 GENERAL

A. System shall be installed complete with DDC panels, remote panels, thermostats, sensors, , control dampers, all actuators, switches, relays, alarms, etc., and control piping in accordance with the extent of the sequences of operation. Provide all auxiliary equipment required. All controls shall be installed under this section of work.

B. Control Systems manufacturer shall submit a complete and final check list verifying final calibration and set points for each system prior to final construction review.

C. Complete control drawings shall be submitted for approval before field installation is started. The submittals shall give a complete description of all control devices and show schematic piping and wiring, as well as a written sequence for each operation.

D. All control dampers shall be furnished by Control manufacturer and shall be set in place, under other sections of the specifications, and be adjusted for proper operation, including the installation of necessary linkages with actuators under this section of specifications. Contractor shall also furnish, under other sections of the specifications, install any necessary blank-off plates required to fill duct when damper size is smaller than the duct. All outside and relief air damper frames and blank-off plates shall be caulked air tight with non-hardening silicone caulking to the ductwork or frame opening.

E. Work under this section shall regulate and adjust the control system, including all controllers, thermostats, relays, , motors, and other equipment provided under this contract. They shall be placed in complete operating condition subject to the approval of the TAB firm. Contractor shall cooperate fully with the balancing agency in the testing, check-out and adjustment of the various systems. Contractor, under other sections of these specifications, shall install all wells, valves, and automatic dampers.

F. Control system herein specified shall be free from defects in workmanship and material under normal use and service. If, within twelve (12) months from the date of "Substantial Completion", any of the equipment herein described is proven to be defective in workmanship or material (except electrical wiring done by others), it shall be adjusted, repaired, or replaced free of charge.

PART 3 EXECUTION

3.1 SEQUENCE OF OPERATION – SPLIT DX AC UNITS WITH ELECTRIC HEAT **(ATHLETC BLDG. AND EXISTING FIELD HOUSE BLDG.)**

A. The direct digital control system shall monitor and control each A/C unit. An electronic room temperature sensor shall, through a local terminal unit DDC Controller, one per unit, control its DX Cooling (minimum 1-stage for all units), and multi-stage electric heater to provide the following sequences:

1. The DDC controller shall be of the automatic change-over type to provide for a heating and a cooling set point to be software interlocked to prevent the cooling set point from being set below the heating set point and vice-versa. Provide for a minimum 2 Deg.F. dead band between set points, adjustable up to 5 Deg.F.
2. Include optimized start and stop features for unit control where the space temperature is compared to the ambient outdoor air temperature to calculate the minimum run time necessary to attain the normal mode set point by the occupied time scheduled.

3. Upon a need for mechanical cooling, the DX cooling system shall be energized in such a manner as to maintain a stable space temperature set point of 72 Deg.F (adj.). On a rise above set point the 1st stage of cooling, first compressor, shall be energized. For multi-stage units the additional compressor or stage will only be energized upon a further rise above set point and when the previous compressor or stage has been on longer than 5 minutes, adjustable. On a decrease in demand for cooling the compressors or stages shall be cycled off in reverse order to being energized. On a further decrease in space temperature, the first stage compressor shall be cycled off. Each stage of cooling shall have a minimum off time of approximately 5 minutes (Variable as determined through PID loop control).
4. The heating temperature set point shall be **70** Deg. F., adjustable. On a drop below set point the 1st stage of heating, electric heating coil, shall be energized. For multi-stage units the additional stage will only be energized upon a further drop below set point and when the previous stage has been on longer than 5 minutes, adjustable. On a decrease in demand for heating the heating coil stages shall be cycled off in reverse order to being energized. On a further increase in space temperature, the first stage heat shall be cycled off. Each stage of heating shall have a minimum off time of approximately 5 minutes (Variable as determined through PID loop control).
5. Space temperature sensors will also be used to operate the units in the unoccupied modes of operation.
6. During the optimized start morning “warm-up” mode (winter), the air unit fan motor will be cycled on and the unit **electric heat** will be energized, as required, to bring space temperature to the normal heating set point. During this mode the outdoor air damper will be closed **(for units with motorized dampers, all new units).** When the space reaches warm-up set point, one (1) Deg.F. below the heating set point, the unit will then be allowed to operate in the “occupied” mode. Warm-up shall occur not more than once each day. The discharge air temperature high limit control sequence shall remain in control during the morning warm-up mode.
7. During the optimized start morning cool-down (summer) mode, the air unit fan motor will be cycled on and the unit cooling system will operate at the capacity as required to bring the space temperature to the normal cooling set point. When the space reaches cool-down set point, one (1) Deg.F. higher than the cooling set point, the unit will operate in the occupied mode and the space temperature sensor will control as described above. Cool-down shall occur not more than once each day.
8. During the night set-forward and night set-back modes the equipment will be cycled as required to maintain those set points; on at 85 Deg.F. and off at 80 Deg. F., adjustable, for set-forward and on at 55 Deg.F. and off at 60 Deg.F., adjustable, for night set-back. The discharge air temperature high limit control sequence shall remain in control during the night set-back mode.
9. For all units, the compressors shall cycle on and off in sequence with the supply fan to maintain set point. The supply fan shall not be operated without a compressor operating.

B. For each **new** AC unit, furnish and install a condensate overflow pan water detection, or float switch in the P-trap of the units, which shall de-energize the unit and send an alarm to the EMS when high water level is detected.

C. For multiple units serving a common space, units shall stage on to maintain space temperature for portion of space served.

D. The compressors and electric heaters shall cycle on and off in sequence with the supply fan to maintain set point. The supply fan shall not be operated without a compressor or heater operating.

E. Unit Ionization Device:

1. Each unit provided with an ionization device (see mechanical schedules for listing) shall be enabled/disabled via interlocking with the supply fan control. After a 1-minute delay on a call for supply fan operation, the ionization devices shall be enabled. The EMS shall monitor the device for faults via dry contacts provided on the device. An alarm shall be generated if a fault is observed

F. Unit safety circuit shall consist of fire alarm system interlock for all units over 2000 CFM and overflow alarm in condensate drain pan

G. Two temperature sensors shall be provided for the following units:

UNIT DESIGNATION	PRIMARY SENSOR LOCATION	SECONDARY SENSOR LOCATION
A/C-1	AD Office	Lobby

The primary sensor shall control heating and cooling set point, unless the space temperature in secondary space is greater/less than 2.5 Deg.F., difference from set point. When this occurs, the secondary sensor shall control the heating set point until such time as it is within 1 Deg.F. of space set point. Once this temperature is reached, the primary space temperature sensor shall return to being the control sensor for the unit.

3.2 ELECTRIC UNIT HEATERS

A. Electric unit heaters shall be controlled by manufacturer furnished thermostats set at 68 Deg.F. (adjustable). On a fall in temperature below 68 Deg.F., the unit heaters shall be energized. On a 2 Deg.F., adjustable, rise above set point, the heater will be de-energized.

B. Mount thermostats, under this Section of Specifications, on wall where indicated on the Drawings.

3.3 SEQUENCE OF OPERATION - EXHAUST AIR FANS

A. Install fan speed control switches at a convenient location on direct drive fans on the load side of the disconnect. Refer to equipment schedules on the Drawings for direct drive fan designation. Fan speed controllers are furnished with the fans as specified under other Sections of these Specifications.

B. Where fans are designated to be thermostatically controlled on a rise in space temperature above 78 Deg.F., the respective fan controlled shall be energized. When a fan is energized, the respective make-up air dampers. Where indicated on the Drawings, shall be opened. On a fall in temperature to 75 Deg.F., the fan shall stop, and interlocked dampers shall be closed. Where fans are to be interlocked dampers shall be closed. Where fans are to be interlocked with heaters serving the same space, coordinate the furnishing of combination heating-cooling thermostats (individual thermostats for the fan and heater not allowed) such that heating and cooling cannot occur simultaneously.

C. Interlock small exhaust fans where the fan voltage is 120 volt, with the wall switch lights, when the voltage of the two match and where scheduled on the Drawings under this Section of these Specifications, unless shown to be performed on the Electrical Drawings of Division 26.

D. Other exhaust fans shall be interlocked, be provided with locally manually controlled motor rated toggle switches with pilot lights where manual switches are scheduled and where specified in other sections of these specifications.

E. EMS controlled fans shall run continuously during normal occupied mode and be de-energized during all other modes of operation.

3.4 SEQUENCE OF OPERATION – TECH. ROOM SPLIT DIRECT EXPANSION (DX) AIR CONDITIONING UNIT

A. Wall mounted and discharge air temperature sensors shall be provided and installed under this section of specifications for monitoring and alarm purposes only.

B. A unit manufacturer furnished thermostat, furnished under other Sections of these Specifications, shall be installed under this Section of Specifications. The cooling set point shall be 72 Deg. F., adjustable. On a rise in space temperature above set point, energize the cooling system. On a 1-2 Deg.F., adj., drop below cooling set point, the system shall either be de-energized or shall stage to first stage compressor and the re-heat coil shall be activated.

C. For each suspended (above ceiling) AC unit, furnish and install a condensate overflow pan water detection, or float switch, which shall de-energize the unit and send an alarm to the EMS when water is detected in the pan.

D. Provide for EMS monitoring of the space temperature and humidity for this room.

3.5 SEQUENCE OF OPERATION – PACKAGED TERMINAL AIR CONDITONING (PTAC) UNIT (PRESSBOX)

A. Wall mounted space air temperature sensor shall be provided and installed under this Section of Specifications for monitoring and alarm purposes only.

B. A unit manufacturer furnished thermostat, furnished under other Sections of these Specifications, shall be installed under this Section of Specifications. The cooling set point shall be 72 Deg.F., adjustable and the heating set point shall be 70 Deg F, adjustable. On a rise in space temperature above set point, energize the cooling system. On a 1-2 Deg.F., adjustable, drop below cooling set point, the system shall be de-energized and the compressor and fan shall both cycle off. One a drop in space temperature below the heating set point energize the heating system. On a 1-2 Deg F., adjustable, drop below heating set point the system shall be de-energized..

3.6 SEQUENCE OF OPERATION - NIGHT SET-BACK

A. A night set-back mode shall be provided to keep equipment from operating except as needed to heat the space to protect the building systems from freezing and potential water damage.

B. Designate one space temperature sensor in the building, to be located on an interior partition within 8 feet of a Northern exposure, selection as recommended by the balancing agency, to be used for night set-back control. Sensor, adjustable, shall be set for 55 Deg.F.

C. Below set-back setpoint, respective air handling equipment shall receive a control signal, fans shall be energized, and related respective pump(s) shall be started if not already energized.

D. Lockout cooling, ventilation cycles, morning warm-up and cool-down modes, night set-up mode, close all outside and relief air dampers.

3.7 SEQUENCE OF OPERATION - MORNING WARM-UP MODE

A. A warm-up mode shall be provided to warm the building, or area served by a system, to within 1 Deg.F. of the normal occupied heating setpoint, adjustable, through the building Energy Management System optimized start feature.

B. Warm-up shall function the same as night setback, except the setpoint shall be as noted above.

C. Lockout the warm-up mode after the cycle is completed until the following scheduled cycle, generally not to occur more than once per day.

D. Lockout cooling system, ventilation cycles, night set-back, morning cool-down, night set-up, close all outside and relief air dampers.

3.8 ELECTRICAL INTERLOCKS

A. Certain electrical interlocks shall be as listed herein and in other sections of these specifications.

B. All electrical interlocks shall be made by means of auxiliary contacts on motor starters or shall be accomplished with separate relays unless indicated otherwise. No motor power lead shall be utilized in an interlock circuit, unless indicated otherwise. Each separate control power lead serving a starter shall be provided with a disconnecting switch suitably identified and housed, which may be a toggle switch or other suitable disconnecting device, of proper capacity and number of poles.

3.9 DDC CONTROL

A. Provide complete DDC Control for all equipment as indicated elsewhere herein.

B. Not more than one local unitary direct digital controller shall be utilized per AHU/piece of equipment.

C. Separate monitoring only control points not associated with specific pieces of equipment and which are global in nature are desired to be grouped together in a separate controller, or controllers, other than dedicated equipment controllers.

D. Each DDC controller used as the main building network controller shall have its own real time clock.

END OF SECTION

SECTION 23 8113

PACKAGED TERMINAL AIR CONDITIONERS

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

A. Comply with Division 1 - General Requirements and referenced documents.

B. Comply with all other Division 23 Sections as applicable. Refer to other Divisions for coordination of work with other trades as required.

1.2 SYSTEM DESCRIPTION

A. Work shall include installing packaged terminal A/C (PTAC) units where indicated on the Drawings to meet scheduled capacities.

B. Contractor shall connect all required controls, field installed accessories, appurtenances, supports, foundations, etc. to make a complete and operational system.

1.3 QUALITY ASSURANCE

A. All equipment and materials shall be new and of the best quality complying with all standards specified herein.

B. All equipment and materials shall be installed in a workmanlike manner by experienced mechanics and as recommended by the equipment manufacturer or as detailed.

C. All products shall meet the 2018 version of the International Energy Conservation Code (IECC).

D. All units shall meet the Energy Star® guidelines for energy efficiency.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's descriptive literature and installation instructions and method for the configuration of equipment proposed, including wiring diagrams, piping connections, sizing and other descriptive literature necessary to evaluate the Submittals for compliance with specifications.

B. Shop Drawings: Submit in accordance with Section 23 0500.

1.5 PRODUCT HANDLING

A. Deliver all equipment to the site where it shall be covered and protected. Material not properly protected and stored and which is damaged or defaced during construction shall be replaced at no cost to the Owner.

B. Storage and protection of materials shall be in accordance with Section 23 0500.

1.6 INSTALLATION, OPERATION, AND MAINTENANCE BROCHURES

A. Furnish all installation manuals required by a qualified mechanical system installer for proper installation of equipment. Manuals shall be provided with equipment and be attached thereto.

B. Complete bound Operating and Maintenance Brochures shall be submitted a minimum of 30 days prior to completion of construction.

PART 2 PRODUCTS

2.1 PACKAGED TERMINAL AIR CONDITIONING (P.T.A.C.) UNITS

A. Furnish and install air-cooled packaged terminal air conditioners as indicated on the Drawings.

B. Total and sensible cooling capacities shall be as scheduled on the Drawings.

C. Electric resistance heat in coils shall be provided with a minimum of **8,500 Btuh (2.5KW)** of heating capacity. Refer to Drawings.

D. Controls shall be factory wired and completely enclosed within the unit and be accessible from the top. Adjustable thermostat shall automatically cycle compressor to maintain space conditions. Remote thermostat shall be of the vapor filled type used with a heater to permit cold weather starting and operation at 35 Deg.F. outdoor temperature when unit is on cooling cycle. Fan control shall consist of a 3-position switch for high, medium and low fan speeds for both cooling and heating. Ventilation control shall be a 2-position control to introduce fresh air to the room or to close the vent. All ventilation air shall be 100% filtered.

E. Compressor shall be rubber shock mounted and internally spring isolated for quiet operation and vibration isolation. Compressor shall be in a hermetically sealed steel case and sprayed with black epoxy paint and have an onboard filter line dryer. Compressor shall be provided with an integral high pressure switch. System shall be fully charged with R-410A.

F. Evaporator and condenser coils shall have copper tubing as the primary heat transfer surface with aluminum fins for the secondary surface. A capillary restrictor shall be the metering device for the refrigeration system.

G. Evaporator and condenser fans shall be direct driven type with a common motor of a minimum 1/6 horsepower. Condenser fan shall be propeller type with a slinger ring for condensate removal.

H. Room panel shall be acoustically insulated and provide for top air discharge with a minimum of two adjustable discharge patterns.

I. Wall sleeve shall be a one-piece sleeve, U-channel reinforced for added strength, for wall installations. It shall be fabricated from minimum 18 gauge zinc clad steel and shall include outside grille. Finish on sleeve shall be baked-on epoxy-resin enamel. Grille and sleeve shall be shipped with closure panel at both the front and rear of sleeve and with installation instructions on inside panel. Outside grille shall be architecturally louvered extruded aluminum and mounted in sleeve from inside room. Finish on outside grille shall be anodized aluminum finished with baked on paint finish, color selected by Architect. Sleeve shall be no more than 42 inches wide, 16-1/16 inches high and 14-1/8 inches deep.

J. Unit and sub base chassis shall be slide-out type and shall be shipped separate from the sleeve.

K. Furnish fully skirted sub base kit with hard wired electrical disconnect switch for permanently connected unit, with 208 volts, single phase service. Unit shall be U.L. listed.

L. Provide manufacture furnished bottom condensate drain connection for condensate to discharge out bottom of unit on building side of wall sleeve.

M. Acceptable Manufacturers:

1. Amana.
2. General Electric.
3. Sanyo.
4. LG.

2.2 THERMOSTATS

A. Furnish and install new low voltage, 24 volt, remote thermostats for all new PTAC units.

B. Thermostats shall be as manufactured by PTAC manufacturer.

C. Thermostats shall be single or multi-stage type to match staging capacity of units furnished. Thermostats shall be automatic change-over type to switch from cooling to heating and vice-versa.

D. Thermostats shall be programmable type and shall not require the use of batteries to retain time schedules and programming. Thermostats shall allow for seven-day and five-day a week, two weekend days, timed schedules. Provide for an offset of 2 Deg.F. between cooling and heating set points, a night set-back set point, a night set-up set point, and an after hours override, all with adjustable limits.

PART 3 EXECUTION

3.1 DELIVERY AND PROTECTION

A. Deliver all equipment to each site. All equipment shall be handled carefully to avoid damage and be protected from exposure to the weather and dirt. All equipment shall be examined upon delivery to the site and evidence of abuse, damage, or exposure to weather and dirt shall be grounds for refusal to accept individual pieces of equipment. Rejected items shall be replaced promptly at no cost.

B. During construction, take all steps necessary to protect equipment from damage or vandalism. All damage or vandalism shall be repaired at no cost to the Owner.

3.2 OPERATING PROCEDURES AND REQUIREMENTS

A. Three (3) copies of the operating and service instructions, in illustrated and bound form, shall be furnished by the manufacturer.

B. At start-up, the equipment manufacturer shall furnish skilled personnel to supervise, check out performance, make any required adjustments, place all units in service, and instruct the Owner's personnel for a full period of two (2) HOURS per 15 units furnished. Additionally, start-up personnel shall fill out the attached start-up form, in legible handwriting or be typed, for each and every unit installed.

C. The manufacturer of each item of equipment shall provide complete power and wiring diagrams to the Electrical and Control Systems installers, respectively. Drawings shall show all required external wiring and arrangements of electrical connections.

3.3 WARRANTY

A. Transfer all Warranties to Owner for a full one (1) year period after the A/C systems are put into sustained operation to obtain building cooling effect for the benefit of occupancy by the Owner, Substantial Completion.

B. Transfer any and all other warranties as applicable over to the Owner at the completion of construction, Substantial Completion, including extended four (4) year compressor warranties, as applicable, on refrigeration equipment.

END OF SECTION

COMMUNICATIONS

DIVISION 27

27 05 00	GENERAL COMMUNICATION SYSTEMS REQUIREMENTS
27 10 30	DATA AND TELEPHONE CABLE PLANT
27 51 25	SOUND REINFORCEMENT SYSTEMS

SECTION 27 05 00

GENERAL COMMUNICATION SYSTEMS REQUIREMENTS

PART 1 - GENERAL

1.1 WORK INCLUDES

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

B. Communication Systems complete including cabling, special backboxes, hardware and all other required devices and equipment.

C. Installation of system equipment per specifications.

D. To supply in a timely manner to the electrical contractor special backboxes for installation as required.

E. Coordinate wireway, raceway, power, and outlet requirements with the builder and the electrical contractor.

F. Communication Systems Contractors shall provide and install prior to cable installation plastic snap in bushings at each box opening, passage through a metal stud, and at the end of all open conduit stubs or sleeves to protect the cabling from damage.

G. Furnishing of all required materials, equipment, tools, scaffolding, labor, and transportation necessary for the complete installation of the communication systems as shown on the drawings and as specifi herein.

H. Cable pathways, conduit, and cable support systems shall be complete with bushings, de-burred, cleaned, and secure prior to installation of cable.

I. It is the intent of these specifications to provide complete installations although every item necessary may not be specifically mentioned or shown.

1.2 WORK TO BE INCLUDED BY THE ELECTRICAL CONTRACTOR IN BASE CONTRACT PROPOSAL

A. Provide utility services conduit as outlined on drawings as required.

B. All required conduit for accessibility to attic space.

C. Furnishing and installation of all required standard back boxes and conduit.

D. Installation of special back boxes supplied by the Division 27 contractor(s).

E. Furnishing and installation of all floor boxes, surface raceways, and other wireways which are detailed or specified under Division 26.

F. Provide equipment-mounting boards as outlined on drawings.

G. Provide equipment grounding system, conductors, and bus bars and as outlined in Division 26.

H. Provide 120-volt power and hook-up to equipment provided in Division 27.

I. Coordination of requirements of Division 27 with the Builder.

1.3 WORK NOT INCLUDED

A. Contractors shall make no agreement that obligates the Owner to pay any company providing communications, monitoring, or other services. Contractors shall not make selection, purchase, or installation of interconnect instruments/equipment to be used on this project.

1.4 RELATED SECTIONS

A. The conditions of the Division 0, Division 1, Division 26 requirements, and the contract requirements that include the General Conditions and the Supplementary Conditions apply to work of this division.

B. Section 26 05 34 - Provisions For Communication, Security, and Safety Systems.

1.5 CODES, STANDARDS, AND THEIR ABBREVIATIONS

A. General:
   1. Perform all work in strict accordance with the requirements and recommendations stated in the codes and standards except when requirements are exceeded by the contract documents.
   2. In addition to the requirements outlined in other sections of the specifications the following standards are imposed as applicable to the work in each instance:
      a. OSHA Safety and Health Regulations for Construction.
      b. NFPA No. 70 National Electrical Code.
      c. NESC National Electrical Safety Code, ANSI Standard C2.
      d. NEiS National Electrical Installation Standards.
      e. Local Codes and Ordinances.

B. Where local codes or practices exceed or conflict with the NEC, it shall be the Contractor's responsibility to perform the work in accordance with the local code prevailing and local interpretations thereof. Any such additional work shall be performed at no additional cost to the Owner.

C. Materials and components shall be UL listed and labeled by Underwriters Laboratories, Inc. for the intended use under the latest appropriate testing standard.

D. The Contractor shall obtain all permits required to commence work and, upon completion of the Work, obtain and deliver to the Owner's Representative a Certificate of Inspection and Approval from the State Board of Fire Underwriters, the City of Midlothian, Texas, and other authorities having jurisdiction. The Contractor shall pay required permit fees.

1.6 LIST OF ASSOCIATIONS AND STANDARDS:

ADA:	Americans with Disabilities Act.
ANSI:	American National Standards Institute, 1430 Broadway; New York, NY 10018.
ASTM:	American Society for Testing and Materials, 1916 Race Street; Philadelphia, PA 19103.
BICSI:	(RCDD5 Standards), 8610 Hidden River Parkway, Tampa, FL 33637

CBM:	Certified Ballast Manufacturers Association, 2116 Keith Building; Cleveland, Ohio 44115.
IEEE:	Institute of Electrical and Electronics Engineers, 345 East 47th Street; New York, NY 10017.
ICEA:	Insulated Cable Engineers Association, P.O. Box P, South Yarmouth, MA 02664.
NEC:	National Electrical Code; NFPA No. 70.
NECA:	National Electrical Contractors Association, Inc., 7315 Wisconsin Ave.; Washington, DC 20014.
NEMA:	National Electrical Manufacturers Association, 155 East 44th Street; New York, NY 10017.
NESC:	National Electrical Safety Code, ANSI Standard C2.
NFPA:	National Fire Protection Association, 60 Batterymarch Street; Boston, MA 02110.
OSHA:	Occupational Safety and Health Administration, US Department of Labor; Washington, DC 20402.
TAS:	Texas Accessibility Standards (TAS) Article 9102.
UL:	Underwriters Laboratories, Inc., 333 Pfigsten Road; Northbrook, IL 60062.

A. Nothing in the Contract Documents shall be construed to permit work not conforming to these codes.

B. When two or more codes or standards are applicable to the same work, then the stricter code or standard shall govern.

C. The date of the code or standard is that in effect on the date of issue stated on the contract documents, except when a particular publication date is specified.

D. The Contractor shall comply with all State, Federal, NFPA, local codes and ordinances that may alter any part of the plans or specifications. The Contractor shall bear all costs for correcting any deficiencies due to non-compliance.

E. Where local codes and ordinances are not in writing or on record but local precedence have been set, the Owner shall pay for any additional resulting cost.

1.7 DEFINITIONS

A. Approval: It is understood that approval must be obtained from the Architect in writing before proceeding with the proposed work. Approval by the Architect of any changes, submitted by the Contractor, will be considered as general only to aid the Contractor in expediting his work.

B. The Builder: The primary contractor engaged to oversee the construction project. They may be technically described as a Construction Manager, General Contractor, Managing Construction Contractor, et cetera.

C. The Contractor: The Contractor engaged to execute the work included a particular section only, although he may be technically described as a Subcontractor to the Builder. If the Contractor, engaged to execute said work, employs Sub-Contractors to perform various portions of the work included under a particular Section, they shall be held responsible for the execution of this work, in full conformity with Contract Document requirements. The Contractor shall cooperate at all times and shall be responsible for the satisfactory cooperation of his Subcontractors with the other Contractors on the job so that all of the various sections and phases of work may be properly coordinated without unnecessary delays or damage.

D. The Electrical Contractor: The Electrical Contractor shall be engaged to execute the work included Division 26 only.

E. PDF file or .pdf: The filename extension associated with “Portable Document Format” files, which are multi-platform computer files in the ISO 32000-1:2008 open standard format developed and licensed by Adobe Systems. These files are a digital electronic representation of text, documents, images, and technical drawings in a font and color-accurate fixed-layout format that is platform and display resolution independent. PDF files can be electronically transmitted, viewed, or printed with various free PDF reader application programs, and may allow markups/comments with various PDF editing application programs.

F. Provide: Defined as requiring both the furnishing and installation of the item or facility indicated, complete in all respects and ready for operation unless otherwise specifically noted.

1.8 SCHEDULE OF VALUES, APPLICATION FOR PAYMENT

A. The Contractor shall in accordance with the General Provisions of the Contract, including General and Supplementary Conditions, and Division 1, complete a Schedule of Values and Applications for Payment. When a portion of this work separately funded, including donations or an E-Rate program, the contractor shall accommodate this in the Schedule of Values and Applications for Payment. For E-Rate eligible portions of this work, the contractor will be required to participate in the E-Rate program, comply with all E-Rate regulations, and provide billing as needed. The contractor shall coordinate with the Owner to file Form 471 or latter edition and/or other forms as may be required.

1.9 WARRANTY

A. The Contractor shall warranty his work against defective materials and workmanship for a period of one year from date of acceptance of the job.

B. Neither the final payment nor any provisions in Contract Documents shall relieve the Contractor of the responsibility for faulty materials or workmanship.

C. He shall remedy any defects due thereto, and pay for any damage to other work resulting there from, which shall appear within a period of one year from date of substantial completion.

D. The Owner shall give notice of observed defects with reasonable promptness.

E. This Warranty shall not be construed to include the normal maintenance of the various components of the system covered by these specifications.

1.10 SITE VISIT

A. Before submitting a proposal, each proposed contractor shall examine all plans and specifications relating to the work, shall visit the site of the project, and become fully informed of the extent and character of the work required, including all required utilities.

B. No consideration will be granted for any alleged misunderstanding of the materials to be furnished or the amount of work to be done, it being fully understood that the tender of a proposal carries with it the agreement to all items and conditions referred to herein, or indicated on the accompanying plans or required by nature of the site of which may be fairly implied as essential to the execution and completion of any and all parts of the work.

1.11 SUBMITTALS

A. Submittal procedures shall be per Division 1 - General Requirements.

B. Provide a complete submittal for each section as specified.

C. Submit complete submittal package within 30 calendar days after award of this work for approval. Equipment is not to be ordered without approval. Partial submittals are not acceptable for review. Each submittal shall include a dated transmittal.

D. Submittal may be electronically transmitted in PDF file format (preferred) or paper copies may be provided in quantities indicated in Division 1. Paper copies shall be organized including index tabs in a 3-ring black binder of sufficient size.

E. For each submittal provide a cover sheet with the name and location of the project, the name, address and telephone number of the Contractor, and the name, address and telephone number of the submitting sub-contractor. Include on or after the cover sheet sufficient space for review stamps.

F. Each Product data submittal shall include:
   1. A cover sheet with the name and location of the project, the name, address, and telephone number of the Contractor, and the name, address, and telephone number of the submitting sub-contractor. Include on or after the cover sheet sufficient space for review stamps.
   2. An indication of any deviations from Contract Document requirements, including variations and limitations. Show any revisions to equipment layout required by use of selected equipment.
   3. A product data index and complete equipment list including for each product submitted for approval the manufactures name and part number, including options and selections.
   4. Cut-sheets or catalog data illustrating the physical appearance, size, function, compatibility, standards compliance, and other relevant characteristics of each product on the equipment list. Indicate by prominent notation (an arrow, circle, or other means) on each sheet the exact product and options being submitted.
   5. Submit design data, when the scope of work requires, including calculations, schematics, risers, sequences, or other data.
   6. When the contract requires extended product warranties, submit a sample of warranty language.
   7. Any resubmittal shall include a complete revised equipment list and any product data that is revised.

G. Submit shop or coordination drawings, when specified or the required for the scope of work, which include information that will allow to the Contractor to coordinate interdisciplinary work and when necessary guide the manufacturer or fabricator in producing the product. Shop or coordination drawings shall be specifically prepared to illustrate the submitted portion of work, this may require diagrams, schedules, details, and accurate to scale equipment and device layouts prepared using a CAD or BIM engineering drawing program. Shop drawings shall be dedicated drawings by the contractor and include a border containing the contractors information.

H. The Engineer's review of submittals is only for confirmation of adherence to design of project and does not relieve the Contractor of final responsibility for furnishing all materials required for a complete working system and in complying with the Contract Documents in all respects.

1.12 PROJECT RECORD DOCUMENTS

A. The Contractor shall keep a set of plans on the job, noting daily all changes made in connection with the final installation including exact dimensioned locations of all new and uncovered existing utility piping outside the building.

B. Upon submitting his request for final payment, he shall turn over to the Architect/Engineer, for subsequent transmittal to the Owner revised plans showing "as installed" work.

C. In addition to the above, the Contractor shall accumulate during the jobs progress the following data in PDF file format (preferred) or paper copies to be turned over to the Architect/Engineer for checking and subsequent delivery to the Owner:
   1. All warranties, guarantees, and manufacturer's directions on equipment and material covered by the Contract.
   2. PDF file or paper copies of all Shop Drawing prints and CAD or BIM engineering drawing program files.
   3. Any software programs, data/programming files, passwords, special interface cables, or keys that may be needed to maintain or access equipment.
   4. Set of operating instructions. Operating instructions shall also include recommended maintenance and seasonal changeover procedures.
   5. Any and all other data and/or plans required during construction.
   6. Repair parts lists of all major items and equipment including name, address, and telephone number of local supplier or agent.
   7. The first page, or pages, shall have the names, addresses, and telephone numbers of the following:
      a. Builder and all Contractors.
      b. Major Equipment Suppliers
      c. Submit communication systems warranties.

1.13 TRAINING

A. Upon completion of the work and at a time designated by the Architect, provide formal training sessions for the Owner's operating personnel to include location, operation, and maintenance of all communication systems equipment and systems.

B. See other sections for time requirements.

1.14 PLANS AND SPECIFICATIONS

A. The intent of the project drawings is to establish the types of systems and functions, but not to set forth each item essential to the functioning of the system.

B. Electrical drawings are generally diagrammatic and show approximate location and extent of work.

C. Install the work complete including minor details necessary to perform the function indicated. Provide communication systems (including all hook-ups) complete in every respect and ready to operate.

D. If clarification is needed, consult the Architect/Engineer.

E. Review pertinent drawings and adjust the work to conditions shown. Where discrepancies occur between drawings, specifications, and actual field conditions, immediately notify the Architect/Engineer for his interpretation.

F. The Architect/Engineer reserves the right to make any reasonable change in the location of any part of this work without additional cost to the Owner.

1.15 PRODUCT SUBSTITUTIONS

A. Descriptions and details, acceptable manufacturers' names listed, and specific manufacturer and model number items indicated in the plans and specifications shall establish a standard of quality, function, and design. Manufacturers and model numbers listed "no exceptions" shall not be substituted without specific notice in an addendum. Otherwise, where a specific manufacturer's product is indicated, products of other manufacturers listed as acceptable may be submitted for approval based on the substitute product being, in the opinion of the Engineer, of equivalent or better quality than that of the product specified.

B. Proposed contractors wishing to propose systems which differ in manufacturer, features, functions, or operating characteristics from those outlined in these specifications must do so in writing to the specifying authority at least ten (10) days prior to the proposal opening.

C. For manufacturers equipment or models other than that specified, the proposed contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment. Proposals must include detailed information showing all deviations from the system as specified and include relevant technical and cost data. This shall include a complete description of the proposed substitution, drawings, catalog cuts, performance data, test data, or any other data or information necessary for evaluation.

D. The Engineer will consider all such submittals and the Architect will issue an addendum listing items that the Engineer considers acceptable. Only such items as specified or approved as acceptable will be installed on this project.

E. Substitute products for which the proposed contractor does not obtain prior approval will not be considered acceptable for this project. Final approval of the alternate system shall be based on the decision of the Owner and Architect. Prior approval to make a proposal for this project does not automatically ensure the system will be an acceptable equivalent.

F. The Contractors' proposal represents that the contract proposal price is based solely upon the materials, equipment, and labor described in the Contract Proposal Documents (including addenda, if any) and that he contemplates no substitutions or extras.

G. The manufacturer of the proposed substitute unit shall provide samples for evaluation, when required, at no charge and non-returnable.

H. Requests for substitution are understood to mean that the Contractor:
   1. Has personally investigated the proposed substitution and determined that it is equivalent or superior in all respects to that specified.
   2. Will provide the same guarantee for the substitution that he would for that specified.
   3. Will, at no cost to the Owner, replace the substitute item with the specified product if the substitute item fails to perform satisfactorily.
   4. After Award of the Contract, substitutions will be considered only under one or more of the following circumstances:
      a. The substitution is required for compliance with subsequent interpretations of code or insurance requirements.
      b. The specified product is unavailable through no fault of the Contractor.
      c. The manufacturer refuses to warranty the specified products as required.

d. Subsequent information indicates that the specified product is unable to perform properly or to fit in the designated space.
e. In the Engineer's sole judgment, the substitution would be in the Owner's best interest.
f. Revisions to the electrical system caused by substitutions shall be under the supervision of the Engineer, at a standard hourly rate charged by the Engineer. Charges from the Engineer, Architect, and Electrical Contractor shall be paid by the Contractor originating the changes.

1.16 FUTURE USE CABLING

A. When cabling is installed for future use, it shall be identified with a tag of sufficient durability to withstand the environment involved.

B. Locations and Existing Conditions:
1. Location and condition of any existing equipment or services, when shown, have been obtained from substantially reliable sources, are shown as a general guide only, without guarantees as to accuracy.
2. The Contractor will examine the site, verify all requirements, service points, and availability of all services required to complete this project. No consideration will be granted for any alleged misunderstanding of the materials and labor to be provided as necessitated by nature of the site including those items that may be fairly implied as essential to the execution and completion of any and all parts of this project.

1.17 IMPLEMENTATION

A. Verify phasing in regard to systems and coordinate before energizing any system.

B. When required during phases of construction to maintain existing systems in service in particular areas, provide temporary wiring and connections as necessary to accommodate construction.

1.18 OPERATION OF NEW EQUIPMENT PRIOR TO PROJECT COMPLETION

A. When the phasing of a project requires that communication systems are operable in certain areas and the Owner needs to operate the equipment the contractor shall make such provisions. The warranty period shall commence on new equipment when it is operated for the beneficial use of the Owner. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, properly adjust, and complete all punch list items before final acceptance by the Owner. In these cases, the date of acceptance and the start of the warranty may be different dates.

1.19 PROTECTION OF EQUIPMENT AND MATERIALS

A. The Contractor shall take such precautions as may be necessary to protect his apparatus from damage.

B. This shall include the creation of all required temporary shelters to protect any apparatus above the floor of the construction and the covering of apparatus in the completed building with tarpaulins or other protective covering.

C. Failure to comply with the above to the satisfaction of the Owner's inspector will be sufficient cause for the rejection of the equipment in question and its complete replacement by the Contractor.

1.20 FINAL OBSERVATION

A. It shall be the duty of the Contractor to make a careful observation trip of the entire project, assuring themselves that the work on the project is ready for final acceptance before calling upon the Architect/Engineer to make a final observation.

B. To avoid delay of final acceptance of the work, the Contractor shall have all necessary bonds, warranties, receipts, affidavits, et cetera, called for in the various articles of these specifications, prepared and signed in advance, together with a letter of transmittal, listing each paper included, and shall deliver the same to the Architect/Engineer at or before the time of said final observation. The Contractor is cautioned to check over each bond, receipt, et cetera, before preparing for submission to verify that the terms check with the requirements of the specifications.

C. The following and other provision of Division 1 General Conditions will be required at time of final completion:
   1. Final clean up completed.
   2. All systems are fully operational, all material and devices installed.
   3. As built (as installed) drawings and operations manuals.

1.21 PROHIBITED MATERIALS

A. No new asbestos, lead, or materials containing these substances shall be permitted in this project. The Contractor shall consult the Architect concerning these materials if their presence is suspected. All work in or around existing asbestos or lead materials is at the sole risk of the Contractor and his personnel.

1.22 CUTTING AND PATCHING

A. Notify the Builder sufficiently ahead of construction of any floors, walls, ceiling, roof, et cetera, of any openings that will be required for his work.

B. The Contractor shall see that all sleeves required for his work are set at proper times to avoid delay of the job.

C. All necessary cutting of walls, floors, partitions, ceilings, et cetera, as required for the proper installation of the work under this Contract shall be done at the Subcontractor or at the Subcontractor's expense in a neat and workmanlike manner, and as approved by the Architect/Engineer.

D. Patching of openings and/or alterations shall be provided by the communications Subcontractor or at the Subcontractor's expense in an approved manner.

E. No joists, beams, girders, or columns shall be cut by any Contractor without first obtaining written permission of the Architect/Engineer.

F. All openings in firewalls and floors shall be completely sealed after installation for a completely airtight installation. Sealing material shall be non-combustible and UL approved. The installed sealing assembly shall not cause the fire rating of the penetrated structure to be decreased.

G. All openings in exterior walls shall be sealed watertight.

H. Seal voids around conduits penetrating fire-rated assemblies and partitions using fire stopping materials and methods in accordance with NFPA and local codes.

1.23 MANUFACTURERS' INSTRUCTIONS

A. All equipment and devices shall be installed in accordance with the drawings and specifications, manufacturer's instructions, and applicable codes.

B. Where specifications call for installation of a product to be in accordance with manufacturer's instructions and/or where manufacturer's instructions are required for installation of a product, it shall be the contractor's responsibility to obtain the necessary applicable manufacturer's instructions and install the product in accordance with the manufacturer's instructions.

C. It shall be the Contractor's responsibility to install all equipment, materials, and devices shown on the plans and as called out in these specifications even if manufacturer's instructions are absolutely unattainable.

1.24 INSTALLATION

A. Cooperation with trades of adjacent, related or affected materials or operations, and or trades performing continuations of this work under subsequent contracts are considered a part of this work. In order to effect timely and accurate placing of work and to bring together, in the proper and correct sequence, the work of such trades, including work provided under a Division 1 allowance.

B. The Communications Contractor shall coordinate installation of the communication systems with the Builder, Electrical, Mechanical, and Plumbing Contractors to ensure a complete working system for the Owner.

C. Where required for accessibility all conduit and boxes for all communication systems shall be provided by the Electrical contractor as specified, including systems in Division 27, any and all allowances shall be included. Normally low voltage wiring shall run open and supported in accessible attic space. All low voltage wiring in exposed areas such as gyms, stages, shops, and field houses shall be enclosed in conduit. Coordinate with, and verify with Division 26 to provide required conduit and boxes at locations and heights as required.

D. Conduit, innerduct, track, or raceway shall conceal and protect wiring in exposed areas, within walls, through in- accessible areas, floors, chases, under slab, crawlspaces, or underground.

E. All conduit, duct, track, and raceway runs shall be spaced apart to allow for maintenance, such as the installation of couplings, without disturbing adjacent pathways.

F. All work must be performed by workers skilled in their trade. The installation must be complete whether the work is concealed or exposed.

G. Provide stainless screw/bolt hardware wherever stainless devices are used and in potentially wet areas.

H. Coordinate the actual locations of devices and outlets and equipment with building features and mechanical equipment as indicated on architectural, structural, and mechanical drawings. Review with the Architect any proposed changes in outlet or equipment location. Relocation of devices, before installation, of up to 3 feet from the position indicated, may be directed without additional cost. Remove and relocate outlets placed in an unsuitable location when so requested by the Architect.

PART 2 - PRODUCTS

A. Not Applicable

PART 3 - EXECUTION

A. Not Applicable

END OF SECTION

SECTION 27 10 30

DATA AND TELEPHONE CABLE PLANT

PART 1 - GENERAL

1.1 WORK INCLUDES

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

B. Provide all equipment, materials, labor, supervision, and services necessary for or incidental to the installation and testing of a complete data (computer network) and telephone cable plant providing all permanent premise cabling and wiring devices required to support a facility wide computer network system and telephone system and as shown or indicated on the drawings and/or as specified.

C. All other electronic equipment, telephone-switching units and cross connect; telephone sets, network switching equipment, transceivers, fiber optic patch cords/attenuators, routers, network interface cards, computers, and software are not included in this section.

D. It shall be the responsibility of the Electrical Contractor to provide and install all conduit systems, standard boxes, ground bus bars (See Section 26 05 34), and operating power for the data and telephone cable plant as outlined on the project drawings. The Data and Telephone Cable Plant Contractor shall coordinate all system requirements with and provide any special back boxes to the Electrical Contractor prior to installation of conduit.

E. The station (horizontal) cabling shall extend from each designated data and telephone jack to the nearest IDF or the MDF in a star topology.

F. Conduct spool Testing, as described in Part 3, for all requirements shall be performed on all cable spools before installation.

G. Conduct final testing, as described in Part 3, for all requirements shall be performed with all labeling, cable, supports, wiring devices, and connectors in place. The cable shall not be disturbed for any reason after successful final testing. A certification report shall be provided for each cable run.

H. Provide all documentation and training as outlined in these specifications.

I. Provide an extended warranty as outlined in these specifications.

1.2 RELATED SECTIONS

A. Section 26 05 34 - Provisions for Communication, Security, and Safety Systems.

B. Section 27 05 00 - General Communication Systems Requirements.

1.3 CODES AND REGULATIONS

A. Perform all work in strict accordance with the requirements and recommendations stated in the codes and standards except when requirements are exceeded by the contract documents.

B. The equipment, materials, and installation shall confirm to the latest version of all applicable codes, standards and regulations of authorities having jurisdiction including the following:
   1. NFPA 70, National Electrical Code.
   2. NFPA 101, Code for Safety to Life from Fire in Buildings and Structures.
   3. ANSI/EIA/TIA-569-A Commercial Building Standard for Telecommunications Pathways and Spaces.
   4. ANSI/IEEE Standard 802.3, also known as ISO 8802-3 - Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications. Ethernet UTP 10 Base-T, Fiber Optic 10 Base-FX.
   5. ANSI/TIA/EIA-568-3 Commercial Building Telecommunications Cabling Standard.
   6. ANSI/TIA/EIA-568-B.2-10:2008 Transmission Performance Specifications for 4-Pair 100 Ohm Augmented Category 6 Cabling.
   7. ANSI/TIA-568-C.2 Commercial Building Telecommunications Cabling Standard.
   8. ANSI/TIA-569-C Commercial Building Standard for Telecommunications Pathways and Spaces.
   9. ANSI/TIA/EIA-606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
   10. ANSI/TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications.
   11. CENELEC EN 50289-1-14 Coupling attenuation or screening attenuation of connecting hardware.
   12. DIN IEC 60068 Basic environmental testing procedures.
   13. EIA-364 Electrical Connector/Socket test Procedures Including Environmental Classifications.
   14. IEC 60603-7-51. Ed. 1.0 Detailed specification for 8-way, shielded free and fixed connectors, for data transmissions with frequencies up to 500 MHz
   15. IEEE 802.3-2002 Information Technology - Telecommunication & Information Exchange Between Systems - LAN/MAN - Specific Requirements - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications.
   16. IEEE 802.3ae IEEE Standard for Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications-Media Access Control (MAC) Parameters, Physical Layer and Management Parameters for 10Gig Operation.
   17. IEEE 802.3an Physical Layer for 10Gig (10GBASE-T) operation over balanced twisted pair structured cabling systems
   18. IEEE Standard 802.3u Fast Ethernet UTP 100 Base-Tx, 100 Base-T, 100 Base-T4, Fiber Optic 100 Base-FX.
   19. ISO / IEC 60603-7-1 First Edition. 2002 Detailed Specification for 8-way, shielded free and fixed connectors with common mating features
   20. ISO/IEC 11801 ed. 2.1 Amd 2:2008 Information Technology - Generic Cabling for Customer Premises
   21. TIA/EIA TSB 67 Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems.
   22. TIA/EIA-758 Customer-Owned Outside Plant Telecommunications Cabling Standard
   23. Universal Service Ordering Code (USOC).
   24. All applicable parts will be Underwriters Laboratories, Inc. approved.
   25. All applicable parts will be FCC Class B approved.
   26. International Building Codes (IBC).
   27. Americans with Disabilities Act.
   28. Texas Accessibility Standards.
   29. Local and State Building Codes.
   30. All requirements of the local Authority Having Jurisdiction (AHJ).

1.4 SUBMITTALS

A. Submittal procedures: See Section 27 05 00.

B. Submit a complete submittal package within 30 calendar days after award of this work for approval. Equipment is not to be ordered without approval. Partial submittals are not acceptable for review. Each submittal shall include a dated transmittal.

C. Submittal may be electronically transmitted in PDF file format (preferred) or paper copies may be provided in quantities indicated in Division 1. Paper copies shall be organized including index tabs in a 3-ring black binder of sufficient size.

D. Quality Assurance Submittal: The selected contractor must be a **local certified Panduit One Partner with current Platinum Status and an active deploy competency certificate.** The Contractor must be a certified Integrator/Installer authorized by **Panduit** (the Manufacturer) to provide a **Panduit Structured Cabling System 25-year Warranty (no exceptions)** to the Owner covering all network cable and connectivity hardware products comprising this installation site. All UTP cable and all wiring devices installed shall be products of one approved manufacturer or joint manufacturers program and approved for use in their extended warranty program. The Contractor and Manufacturer shall jointly provide the Owner an extended warranty of the installed system against defects in material or workmanship for a period of twenty-five (25) years from the date of substantial completion. Provide a copy of contractor **Panduit One Partner with current Platinum Status** certification to provide a **Panduit Structured Cabling System** and sample warranty text.

E. Product Data Submittal including special boxes, cable, and other material as requested by the Architect including:
   1. A cover sheet with the name and location of the project, the name, address, and telephone number of the Contractor, and the name, address, and telephone number of the submitting sub-contractor. Include on or after the cover sheet sufficient space for review stamps.
   2. An indication of any deviations from Contract Document requirements, including variations and limitations. Show any revisions to equipment layout required by use of selected equipment.
   3. A product data index and complete equipment list including for each product submitted for approval the manufactures name and part number, including options and selections.
   4. Cut-sheets or catalog data illustrating the physical appearance, size, function, compatibility, standards compliance, and other relevant characteristics of each product on the equipment list. Indicate by prominent notation (an arrow, circle, or other means) on each sheet the exact product and options being submitted.
   5. Submit design data, when the scope of work requires, including calculations, schematics, risers, sequences, or other data.
   6. Submit a sample of the extended product warranty language.
   7. Any resubmittal shall include a complete revised equipment list and any product data that is revised.

F. Submit shop drawings locating all components of the system. Shop or coordination drawings shall include information that will allow to the Contractor to coordinate interdisciplinary work and when necessary guide the manufacturer or fabricator in producing the product. Shop or coordination drawings shall be specifically prepared to illustrate the submitted portion of work, this may require diagrams, schedules, details, and accurate to scale equipment and device layouts prepared using a CAD or BIM engineering drawing program.

1.5 QUALIFICATIONS OF A PROPOSED CONTRACTOR

A. Proposed contractors who do not currently possess the necessary qualifications, trained and experienced personnel, financial capacity, and meet the other requirements herein described will be disqualified.

B. The proposed contractor, as a business entity, shall be a **local certified Panduit One Partner with current Platinum Status and an active deploy competency certificate,** an authorized distributor and designated representative of the equipment manufacturer, with full extended warranty privileges. The proposed contractor shall have been actively engaged in the business of selling, installing, and servicing commercial building commercial cable systems for a period of at least 5 years.

C. Recently formed companies are acceptable only if specific pre-approval is requested, and granted by the Architect/Engineer, based on experience of key personnel, current and completed projects, and all licensing requirements are met 10 working days prior to the contract proposal date.

D. The proposed contractor shall have an office within 150-miles of the job site, staffed with trained technicians who are qualified and licensed to supervise the installation, to be responsible that the system is installed as submitted, to conduct system start up and perform a 100 percent operational audit of all installed devices, to instruct the Owners representatives in the proper operation of the system, and to provide service throughout the warranty period. The contractor shall be capable of dispatching technicians to repair a system within six hours of a service request.

E. The proposed contractor shall be fully experienced in the design and installation of the type of system herein specified, and shall furnish with the contract proposal an itemized list of the installations of the type specified herein. The list shall include the name of the project, date of completion, the amount of the contract, the name, and telephone number of a qualified person to contact for reference. This list must contain at least two (2) projects within a 150-mile radius of the school district to allow school administration officials to visit the job site for review of the system installation and service. Each reference project listed must utilize equipment by the same manufacturer as the proposed system.

F. The contractor shall employ factory-trained technicians capable of supporting the maintenance of the system. No contract employees are allowed unless they have been to the factory service school within the last 18 months. A certificate of this training shall be provided with the contractors' submittal.

G. The proposed contractor shall not have any grievances or complaints of record regarding workmanship, code compliance, or service response. A proposed contractor that has any prior finding(s) of a code violation or has any litigation in process concerning the installation of a cable plant is unacceptable.

H. The ability of a proposed contractor to obtain plans and provide a performance bond shall not be regarded as the sole qualification of the contractors' competency and responsibility to meet the requirements and obligations of the contract.

I. The Builder shall be satisfied that a proposed Contractor meets all the requirements expressed herein before including the Contractor's proposal in the project.

J. The Owner may investigate, as they deem necessary to determine the ability of the proposed Contractor to perform the work. The proposed contractor shall furnish to the Owner with any information or data requested for this purpose.

K. The Owner reserves the right to reject any contract proposal if the evidence submitted, or their investigation, fails to indicate that the Contractor is qualified to fulfill of any part of the contract or to complete the work contemplated therein.

L. The Owner reserves the right to reject the proposal of any contractor who has previously failed to perform properly, or complete on time, contracts of a similar nature.

PART 2 - PRODUCTS

2.1 GENERAL

A. All cable and wiring devices provided shall be listed and labeled by Underwriters Laboratories, Inc. for the intended use under the latest appropriate testing standard.

B. Label the cable run designator on both ends of all cables, patch panel jacks, termination cabinet connectors, and all jack wall plates and housings. In addition, label the cable run designator(s) on the ceiling grid bar at jack locations that are concealed above a drop ceiling; including those for wireless access points, cameras, projectors, etc. Labels shall be polymer film Turn-Tell flexible non-smear, or equivalent, machine printed labels complying with EIA/TIA 606 standards. Utilize a Panduit PanTher LS8EQ Printer with R Series Turn-Tell labels, or equivalent.

C. Only equipment devices have been shown on the contract drawings. Specific wiring between equipment has not been shown.

D. All equipment and components shall be new, and the manufacturers' current model. All like devices shall be of the same manufacturer and model number.

E. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., cable shall not be supported by or lay on suspended ceilings). Fasteners and supports shall be adequate to support the required load.

F. Installation subject to approval, inspection, and test of the Architect/Engineer.

2.2 SPECIAL REQUIREMENTS FOR CATEGORY 6A CABLE DROPS

A. The Category 6A standard covers several variations including UTP unshielded and F/UTP F/FTP shielded/grounded cabling and connectivity, however nothing in this specification should be misconstrued to indicate that any system other than a U/UTP solution incorporating reduced diameter station (horizontal) cable and connectors with a non-conductive, non-grounded, metallized material tape isolation wrap designed to minimize alien crosstalk would be acceptable.

B. Category 6: The Augmented Category 6 end-to-end solution provided shall be a Panduit TX6A 10Gig UTP Cabling System, per configuration one (up to 100 meters) and three of the ANSI/TIA-568-C.2 Category 6A standard, and shall be compliant with the IEEE 803.3ae standard for up to 10Gig networking (10GBASE-T Ethernet channel performance). The system shall fully support a network operating at a swept frequency of 500 MHz, with backward compatibility for 10/100/1000Base-T network equipment. The data cable plant shall include station (horizontal) copper data cabling, workstation outlets, racks, patch panels, patch cables, and fiber optic network backbone cabling.

C. Category 6A: The structured cable system provided shall constitute a Category 6A UTP (also designated U/UTP) (unshielded twisted pair) solution incorporating station (horizontal) cable with a non-conductive, non-grounded, metallized material tape isolation wrap placed directly beneath the outer jacket. The jack modules shall also feature a suppression barrier to provide extended frequency isolation. In addition, the cable system shall support advanced PoE applications at extended operating temperatures. This isolation shall suppress both electric and magnetic coupling between adjacent cables, reducing alien crosstalk, and allowing for a 20% reduction in overall cable diameter in comparison to Category 6A UTP cable without an isolation wrap. The isolation barriers shall eliminate the need for field testing for alien crosstalk.

D. The lighter, smaller-diameter, lower thermal resistance, Category 6A cable shall enable efficient use of pathway spaces for improved energy efficiency with better airflow through racks and cabinets improving space utilization and thermal management for advanced PoE applications up to 25W per device at extended operating temperatures up to 167°F (75°C).

E. In comparison with earlier types of Category 3 through 6 UTP network cables, Category 6A UTP cable requires a larger installed bend radius necessitating cable pathways larger in dimension and with wider contact areas in order to prevent cable deformation, including all wire management, tray, conduits, backboxes, and support devices. 10Gig patch panels and electronics, including switches, may feature a lower density layout and increased power requirements requiring additional rack space and design provisions to dissipate heat.

F. The contractor shall design and implement the cable pathways and supports to overcome installation and management challenges associated with Category 6A UTP cable as specified herein when compared to Category 3 through 6 UTP cable types. Category 6A UTP is a stiffer cable designed to operate at a high frequency and with higher wattage loads, which will require mitigation of heat dissipation issues.

G. The former installation practice of tightly routed “combed, dressed, and bundled” cable trunks, which was common with Category 5 cable, is prohibited. Limit UTP cable bundles to 48 cables. Network cables shall be routed with adequate air space and by neatly randomized pathways to ensure adequate airflow. The complete system shall yield overall channel performance in a high-density physical infrastructure environment and shall achieve 10 Gbit/sec performance with minimum alien crosstalk.

2.3 ACCEPTABLE MANUFACTURES

A. Descriptions and details, acceptable manufacturers' names listed, and specific manufacturer and model number items indicated in the plans and specifications shall establish a standard of quality, function, and design. Manufacturers and model numbers listed "no exceptions" shall not be substituted without specific notice in an addendum. Otherwise, where a specific manufacturer's product is indicated, products of other manufacturers listed as acceptable may be submitted for approval based on the substitute product being, in the opinion of the Engineer, of equivalent or better quality than that of the product specified.

B. Proposed contractors wishing to propose any product substitution must do so in writing to the specifying authority at least ten (10) days prior to the proposal opening.

C. For manufacturers equipment or models other than that specified, the proposed contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment. Proposals must include detailed information showing all deviations from the system as specified.

D. Substitute products for which the proposed contractor does not obtain prior approval will not be considered acceptable for this project. Final approval of any alternate products shall be

based on the decision of the Owner and Architect. Prior approval to make a proposal for this project does not automatically insure products will be an acceptable equivalent.

E. It is the responsibility of the Contractor to provide all features and functions as outlined in these specifications. The functions and features specified are vital to the operation of this facility; therefore, inclusion in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of this specification.

F. The selected contractor must be a certified Integrator/Installer authorized by one of the Manufacturers listed below to provide an extended warranty to the Owner covering all network cable and connectivity hardware products comprising this installation site. All UTP cable, fiber optic cable, and all wiring devices installed shall be products of one approved manufacturer or joint manufacturers program and approved for use in their extended warranty program. The Contractor and Manufactured shall jointly provide the Owner an extended warranty of the installed system against defects in material or workmanship; provide a copy of contractor certification.

G. The manufacturers model numbers, functions, and features described in this specification section are those of the **Panduit and General Cable PanGen Plus 6 and 6A Structured Cabling Solution with a 25 year warranty (no exceptions)** per District standards, no exceptions, and this shall constitute the quality and performance of the equipment to be furnished

2.4 SYSTEM DESCRIPTION

A. Provide a copper data structured cabling system that meets and exceeds the Category 6 or Category 6A standards as indicated and shall provide improved electrical performance by reducing harmful NEXT and Alien NEXT interference.
   1. The Category 6 data network copper cabling system runs shall support up to 1-Gigabit Ethernet using parallel transmission schemes.
   2. The Category 6A data network copper cabling system (wireless access point drops only) runs shall support up to 10-Gigabit Ethernet using parallel transmission schemes.

B. Each jack shall be terminated and mounted in a suitable faceplate for all wall, enclosure, millwork, floor box, modular furniture, etc. locations.

C. All wall plates shall have machine printed labels meeting EIA/TIA 606 standards inserted behind built-in clear plastic windows, or engraved plastic nameplates permanently attached, indicating cable run identification number(s). Engraved labels shall be 1/16" thick two ply black/white acrylic sheet engraving stock with all sides beveled.

D. All jacks shall be suitable for data grade use; only the rating, color, icons, and marking cable shall be different.

E. This system shall allow all the additional equipment required to complete the telephone system and computer network to be plugged in. This specification section does not specify or include any electronic equipment, telephone switching units or cross connect, telephone sets, modular telephone cords, network switching equipment, routers, fiber transceivers, network interface cards, computers, or software that constitute a complete computer network or telephone system.

F. All jacks shall be shielded 8-pin modular female connectors (RJ-45). All cabling and connectors provided shall meet and be tested to TIA/EIA 568-A Style B, Category 6 or Category 6A/Class E^A requirements.

G. All Category 6 data, telephone card access, clock, and camera jacks shall be wired with Category 6 copper cable supporting data transmission rates up to 250 MHz Media shall be 4-pair (8-wire), 100 □ unshielded twisted pair (UTP) cable. All related cabling, terminations and devices shall meet and be tested to Category 6 standards.

H. All Category 6A wireless access point jacks shall be wired with Category 6A UTP unshielded twisted pair copper cable supporting data a transmission rate of 500 MHz Media shall be 4-pair (8-wire), 100 □ unshielded twisted pair (UTP) cable. All related cabling, terminations and devices shall meet and be tested to Category 6A standards.

I. The cable plant will provide the permanent part of the building wiring (cable plant) required to provide connection for telephones, IP devices, and network computers.

2.5 WALL PLATE COLOR

A. Color of device/wall plates to best match project light switches and electrical outlets, coordinate with the Electric Contractor.

2.6 COLOR-CODING

A. Station (horizontal) cabling jackets shall be color-coded as follows:
   1. Blue Category 6 (data).
   2. Green Category 6 (CCTV)

B. Patch cords and jacks are to be color coded as follows and the jacks in the patch panels are to be grouped together for each designated color and use:
   1. Blue Data outlets, Category 6.
   2. Green CCTV camera outlets, Category 6

2.7 FIBER OPTIC SYSTEM COLOR CODING

A. Each type of fiber optic cabling shall feature distinctively colored cabling and jumper connectors:
   1. Any Multimode cabling and jumper connectors shall be Aqua.
   2. Any Single Mode cabling and jumper connectors shall be Yellow.

2.8 CABLE RUN DESIGNATOR LABELING SCHEME

A. Each patch panel jack, wall plate jack, terminal cabinet connector, and both ends of each cable run shall be labeled with a cable scheme run designator utilizing self-laminating, flexible vinyl film, non-smear, machine printed labels installed according to EIA/TIA 606 standards. Utilize a DYMO Rhino 5200 Label Printer or equivalent. All labeling shall conform to industry standards and best practices.

B. Labeling types and scheme and shall be verified and coordinated with the MISD Technology department prior to any installation.

2.9 DATA/TELEPHONE CABLING PLAN

A. Provide adjacent to the equipment rack in each MDF and IDF a plan view of all building areas covered by the equipment closet meeting the following requirements:
   1. Framed and secured to the wall and plan covered with clear acrylic panel.
   2. Size to clearly show all required information.
   3. "YOU ARE HERE" indicator with arrow.

4. Room names and numbers. Verify with Owner.
5. Show each device with symbol and identification address number as designated by owner.
6. Symbol legend.
7. True north arrow
8. Scale indicator

2.10 DATA/DESK TELEPHONE STATION WALL PLATES AND JACK INSERTS

A. Provide multiple jack modular wall plates where shown on plans or required. The number next to symbol on plans indicates the quantity of data lines/jacks at that location, single outlets are not numbered. The back of each jack wiring device shall have color-coded insulation displacement contact (IDC) type connections. The front shall have eight-position modular jack (RJ-45) and utilize T568B pin/pair assignments. One jack shall be provided at the end of each cable run. Each data or telephone jack shall be terminated and mounted in a suitable faceplate for all wall, enclosure, millwork, floor box, modular furniture, etc. locations. All terminations shall be made per the manufacturers' instructions with Panduit part number CWST wire snipping and stripping tool, and EGJT termination tool, or equivalent.

B. Data RJ-45 inserts to be Category 6 Panduit part number CJ688TGBU, Mini-Com TX6 Plus, blue color, Category 6 Mini-Com modular jacks.

C. CCTV Camera RJ-45 inserts to be Category 6 Panduit part number CJ688TGGR, Mini-Com TX6 Plus, green color, Category 6 Mini-Com modular jacks.

D. Provide blanks for unused ports to be Panduit part number CMBXX-X, Mini-Com Blank Modules.

E. Use a single gang faceplate with label window for all standard wall outlets, use NEMA duplex or Decora style frames as required for floor boxes, surface raceway, etc.
   1. Single gang faceplate with label window for up to two Mini-Com Modules Panduit part number CFPE2XXY.
   2. Single gang faceplate with label window for up to four Mini-Com Modules Panduit part number CFPE4XXY.
   3. NEMA duplex style faceplate frame for up to two Mini-Com Modules Panduit part number CF1062XXY.
   4. NEMA duplex style faceplate frame for up to four Mini-Com Modules Panduit part number CF1064XXY.
   5. Decora style faceplate frame for up to two Mini-Com Modules Panduit part number CFG2XX.
   6. Decora style faceplate frame for up to four Mini-Com Modules Panduit part number CFG4XX.
   7. Modular furniture faceplates for up to four Mini-Com Modules Panduit part number UICFFP4XX.

2.11 CEILING MOUNT PROJECTOR LOCATIONS

A. Provide a Category 6 non-keyed RJ-45 jack, mounted in an accessible location above the finished ceiling near the projector, and Category 6 cable to nearest MDF/IDF patch panel.

2.12 INTERIOR CAMERA LOCATIONS AND WIRELESS ACCESS POINT JACKS

A. Provide a surface mount housing Panduit part number CBXQ2XX "biscuit block" for one or two Mini-Com Modules (two Category 6A jacks for wireless access points) with Category

6/Category 6A non-keyed RJ-45 data jack, and Category 6/Category 6A cable to nearest MDF/IDF patch panel.

B. For drop ceiling mounting locations, surface mount housing to be mounted to structure or equivalent concealed above the finished ceiling.

C. For open structure mounting locations, provide a Wiremold/Legrand model WAPBRKT overhead device bracket with removable cover. The bracket shall be constructed of galvanized steel with a large capacity device compartment: 12 3/4" long x 9 1/2" wide x 3 1/8" deep. The bracket shall be securely attached to the overhead building structure by the included strap hardware or by an all thread rod.

D. Adjacent to jack provide a ¾” rigid threaded conduit stub passing through the exterior wall with a temporary threaded pipe-cap exposed, making the stub ready to thread-in to the device weather proof backbox/enclosure.

2.13 DATA UTP STATION (HORIZONTAL) CABLING, CATEGORY 6

A. NEC type CMP cable, GenSPEED 6000 Category 6 UTP cable, General Cable part number 7131900 with a Blue Plenum jacket.

2.14 CCTV CAMERA UTP STATION (HORIZONTAL) CABLING, CATEGORY 6

A. NEC type CMP cable, GenSPEED 6000 Category 6 UTP cable, General Cable part number 7131906 with a Green Plenum jacket.

2.15 MDF/IDF PATCH PANELS

A. Provide the required quantity of flat 19" rack mount patch panels at each MDF/IDF for all data and telephone jacks indicated on plans.

B. Patch Panels shall accept Category 6 (data and telephone) and Category 6A (wireless access points) non-shielded UTP Mini-Com Jack Modules and feature style RU labeling slots. Provide one color-coded Category 6 or Category 6A Mini-Com Jack Module for each cable run. One jack shall be used for each cable run to a wireless access point, data, or telephone jack.

C. Permanently mark patch panels with EIA/TIA 606 compliant machine printed labels.

D. Patch panels to be 48 port, flat, 2 RU high, Panduit part number CPPL48WBLY, provide each with one Panduit part number SRB19BLY strain relief bar.

2.16 WORKSTATION AND MDF/IDF PATCH CORDS

A. The Contractor shall provide one (1) 8 inch distribution frame patch cord and one (1) 10-foot workstation/equipment connection patch cord per installed run as indicated on the project plans.

B. Category 6 data and CCTV camera patch cords shall be Panduit TX6 PLUS UTP Category 6 compliant, 4-pair stranded cable with a modular 8-pin connector for RJ-45 ports factory installed on each end.

C. Category 6A Wireless patch cords shall be Panduit TX6A 10Gig F/UTP Category 6A compliant, 4-pair stranded cable with a modular 8-pin connector for RJ-45 ports factory installed on each end.

D. Blue (data) patch cords to be:
   1. Panduit part number UTPSP8INBUY Blue (8 inch) Category 6 or equivalent.
   2. Panduit part number UTPSP10BUY Blue (10 foot) Category 6 or equivalent.

E. Green (CCTV Camera) patch cords to be:
   1. Panduit part number UTPSP8INGRY Green (8 inch) Category 6 or equivalent.
   2. Panduit part number UTPSP10GRY Green (10 foot) Category 6 or equivalent.

2.17 INDOOR/OUTDOOR SINGLE-MODE FIBER OPTIC DATA BACKBONE CABLE (ARMORED)

A. Exterior data backbone runs shall consist of twelve-fiber single-mode optic cable with loose tube fibers, 125µm buffer coating, interlocking aluminum armored construction, UV resistant cable sheathing and Dry water-blocking technology. Single-mode glass strands shall be 9/125µm OS2 optical fiber. Outer jackets to provide 2,000 N/cm crush resistance and 2,000 impacts w/1.6 N-cm impact resistance.

B. Provide twelve (12) single-mode fibers per run with all fibers terminated with duplex LC style connectors and bulkhead splice bushings at each end. Labeling shall note cable type, run designation, "Tx" for the transmit fiber connectors, and "Rx" for the receive fiber connectors.

C. Portions of fiber optic backbone cables run underground shall be fully enclosed in continuous underground or overhead conduit for additional protection.

D. Single-mode Plenum Rated Indoor/Outdoor Interlocking Armored Cable shall be:
   1. General Part Number AP0121ANU-ILPA 12-fiber 9/125µm (OS2) distribution cable.
   2. General Part Number AP0061ANU-ILPA 6-fiber 9/125µm (OS2) distribution cable

E. At the MDF termination end for each run, install a Panduit part number ACG24K Interlock-Armor Cable Grounding Kit or equivalent connected to the telecommunications room ground bar.

2.18 RACK MOUNT FIBER OPTIC TERMINATION CABINETS

A. Provide in racks requiring fiber optic cable termination a rack mount cabinet with removable door and cover for easy access. Shall contain a fiber radius hoop, integral strain relief bars, and plastic grommets at each cable entrance and exit. Cabinet to be 18-gauge steel, dual compartment, with a dividing plate fitted with pre-drilled coupler plates for LC duplex style bulkhead connectors. Mount in the top of rack, above the patch panels. Size for the number of terminations required plus 25% spare fiber optic connector mounting holes. To be rack mount Panduit OPTICOM QuickNet, FRME4 in the MDF and FRME1U in the IDF locations.

B. For MDF to IDF single mode fiber runs, provide Panduit LC OPTICOM part number FAP6WBUDLCZ LC, FAPs loaded with six LC duplex 9/125µm single mode fiber (OS2) fiber optic adapters (Blue) with zirconia ceramic split sleeves.

C. Mount on the lower portion of each rack one AC outlet strip. Provide a Tripp Lite part number IBAR12-20ULTRA horizontal power strip.

D. All termination cabinets shall bear a warning label similar to the following: CAUTION - Never look into the end of a fiber optic cable or connector when using laser light output. Permanent eye damage can result. When cabinet is open wear eye protection and avoid touching unterminated fiber optic cable ends. Fiber fragment splinters can be difficult to remove.

E. Permanently mark terminations with EIA/TIA 606 compliant machine printed labels noting cable type, run designation, "Tx" for the transmit fiber connectors, and "Rx" for the receive fiber connectors.

2.19 FIBER OPTIC JUMPERS

A. For the new single mode fiber backbone runs, provide two (2) duplex fiber optic patch cords in each closet. Fiber Optic jumpers shall be Panduit part number F92ELNLNSNM002, 2 meter lengths.

2.20 19" OPEN EQUIPMENT RACKS

A. In the MDF, provide two (2) Four Post Racks, to accommodate the drop count and owner provided network equipment. Dimensions to be 84" high x 19” wide, with 6” wide uprights with cable management provisions and rack space "U" identification markers. Rack shall be securely bolted to the floor and the overhead ladder rack. Four post rack to be Chatsworth Product Inc. (CPI) Part No. 15217-703 Cable Rack.

B. Mount of each side of each rack, one vertical cable organizer with black finish. Provide Panduit Vertical Cable Mangers part number PR2VD10 for cable quantities with front and rear doors.

C. Ladder type cable tray shall be routed over all floor mounted racks from wall to wall, provided all necessary hardware to attach the ladder rack to the top of the floor rack and to the walls. All field cuts shall be filed smooth, dressed square, and painted to match. Utilize tray splicing, support, and coupling hardware supplied by and installed as recommended by the manufacturer. Cable tray and rack shall be securely supported and grounded. Cable tray shall be of heavy duty tubular steel construction with black powder coat finish, 18" wide, with cross members at 12" intervals. Provide CPI part number 10250-718 Tubular Runway. At the top of each rack, provide a CPI part number 10506-718 6” elevation kit, CPI part number 10595-718 Top Plate and CPI part number 12101-711 Radiused Drop Out Waterfall. At each wall, provide a CPI part number 11421-718 18” Angle Wall Support Bracket. Provide single support hanger brackets and 5/8” all-thread rod hanger supports from the building structure at any span that exceeds 60” from other support (rack and wall mounting locations), at intervals of 60” on center maximum.

D. Mount fiber termination cabinets in the top portion of the rack and then the patch panels. Reserve the lower 50% of rack space for mounting of network electronics by the Owner.

2.21 WIRELESS ACCESS POINTS

A. These shall be owner furnished and contractor installed (OFCI).

2.22 IDF EQUIPMENT BACKBOARDS

A. Provide a 4' x 8' x 3/4" C/D, exterior grade, plywood panel(s) as required, anchored to wall as required at no less than six points per panel. Equipment backboards are to be attached to wall studs or internal bracing with 1/4” minimum toggle bolts with washers. Plywood shall be new. Paint with fire retardant paint meeting UL 723 requirements - two full coats - color to be white unless otherwise directed by Architect.

2.23 GROUNDING

A. In the new intermediate (secondary) telecommunications room (IDF) provide a 1/4" x 4" x 10” to 12" long copper ground bar with insulated wall mounting brackets - Panduit part number GB4B0612TPI-1, Newton Instrument Company ordering number 0030580010, or approved equivalent.

B. The telecommunications grounding backbone, #2 AWG insulated wire minimum, shall bond each telecommunications ground bar to the building ground system.

2.24 CABLE ROUTING AND INSTALLATION

A. System wiring and equipment installation shall be in accordance with good engineering practices as established by the EIA and the NEC. Wiring shall meet all state and local electrical code requirements.

B. The performance of the provided cabling system will be required to support of the 10Gig network 10GBASE-T standard. The contractor shall avoid outdated industry practices that can create worst-case conditions regarding heat dissipation and alien crosstalk. This includes the practice in which a large number of cables are routed together in a smooth very tightly packed form and the bundles are tie wrapped at close intervals (usually referred to as a “combed and laced”). A 10GBASE-T solution requires:
   1. Cable management strap installation shall not exceed 3 times per meter (once every foot). Plastic Tie wraps shall never be used. Cable management straps must not distort the cable jackets.
   2. Cable tray vertical depths no more than 6 inches, with hardware providing sweeping edges and well controlled entry points.
   3. Limit UTP cable bundles to 48 cables.
   4. Equipment cords may be bundled by combing to eliminate crossovers and may be tie wrapped, although separate minimum lengths may be required. Bundling is typical for long equipment cords. Cross-connect cords and work area cords shall not be combed and bundled, these cord applications shall be randomly placed or routed separately.

C. For initial installation, the maximum fill capacity for pathways (i.e. conduit, raceways, trays, baskets) shall be 40 percent.

D. Cable pathways, conduit, and cable support systems shall be complete with bushings, de-burred, cleaned, and secure prior to installation of cable.

E. All wiring shall test free from opens, grounds, or shorts. All communications cable shall be supported from the building structure and bundled. Do not attach any supports to joist bridging or other lightweight members.

F. The support system shall provide a protective pathway to eliminate stress that could damage the cabling. The cable shall not be crushed, deformed, skinned, crimped, twisted, or formed into tight radius bends that could compromise the integrity of the cabling.

G. Communications cable must not be fastened to electrical conduits, mechanical ductwork/piping, sprinkler pipes, or routed to obstruct access to hatches, doors, utility access panels, or service work areas. Do not route cables through fire doors, ventilation shafts, grates, or parallel with line voltage electrical conductors. Communication cables shall not be run loose on ceiling grid or ceiling tiles.

H. Support shall be provided by mounting appropriate fasteners that may be loaded with multiple cables. Provided that the weight load is carried by the support rod or wire, the support assembly may attach to the ceiling grid for lateral stabilization. The required support wires for the ceiling grid or light fixtures shall not be utilized. Any fastener attached to the ceiling grid shall not interfere with inserting or removing ceiling tiles. The cable pathway of supports must be positioned at least 12 inches above the ceiling grid.

I. Communication cables shall be run in conduits, where stubs are provided, from wall or floor jacks to accessible areas above finished ceilings. Conduit shall be required only within walls and concealed spaces to provide access.

J. Provide bushings to protect the cable from damage for conduit ends, box openings, and passage through metal studs.

K. Communication cables shall be run in bundles above accessible ceilings and supported from building structure. Limit UTP cable bundles to 48 cables. Cabling shall be loosely bundled with cable Velcro hook ties randomly spaced at 30 to 48 inches on center, cable ties shall not be tight enough to deform cabling and shall not be used to support the cabling.

L. Both ends of all cables, all terminal blocks, patch panels, and network system components shall be labeled utilizing self-laminating, flexible vinyl film, non-smear, machine printed labels according to EIA/TIA 606 standards. Utilize a Panduit PanTher™ LS8E Printer or equivalent.

M. Each cable run shall include a three-foot service loop with Velcro hook ties located in the ceiling above the rack. This is to allow for future re-termination or repair.

N. All cabling shall be placed with regard to the environment, EMI/RFI interference, and its effect on communication signal transmission.

O. Non-conductive fiber optic cable is immune from EMI/RFI interference. Give priority when selecting a route to minimize exposure to possible cable damage from maintenance or service of all systems in the attic space.

P. Do not route any data cable within two feet of any light fixture, HVAC unit, service access area, electric panel, or any device containing a motor or transformer.

Q. Communication cable will not be installed in the same conduit, raceway, tray, duct, or track with line voltage electrical cable without a metallic barrier meeting NEC requirements.

R. Maximum cable pulling tension should not exceed 25 pounds force (110 N) or the manufactures recommendation, whichever is less.

S. Any pulling compounds utilized must be thin film lubricants approved by the cable manufacturer and shall not degrade the strength or electrical characteristics of the cable.

T. No terminations or splices shall be installed in or above ceilings.

U. Cable bends shall not be tighter that the manufacturers' suggested bend radius.

V. Mount all equipment firmly in place. Route cable in a professional, neat and orderly installation.

W. Provide for adequate ventilation to all equipment racks and take precautions to prevent electromagnetic or electrostatic hum.

2.25 UTP CABLE TERMINATION PRACTICES

A. Insulation Displacement Contact (IDC) connectors shall be used and installed per the manufactures' recommendations.

B. Strip back only as much cable jacket as required to terminate.

C. Preserve wire-pair twists as closely as possible to point of termination (0.5" maximum) to keep signal impairment to a minimum.

D. Avoid twisting cable jacket during installation.

E. Take care to insure all data UTP wiring devices are installed as T568B wiring, T568A devices use a different pair assignment and should not be mixed.

F. Panduit part number CWST wire snipping and stripping tool, and EGJT termination tool, or equivalent.

G. Score for removal approximately 3" of cable jacket using a manufacturers recommend stripping tool set to cut through the outer jacket. Note that the suppression barrier tape is not to be grounded.

H. Gently bend the cable's jacket back and forth to free it and remove that portion of the outer jacket.

I. Snip the end of the suppression barrier tape, split it, fold it down and trim it even with the outer jacket.

J. Bend back the four pairs and cut the center spline. It is not necessary to provide a completely flush cut as attempting to do so may damage the conductors.

K. Trim the pairs to length per the per the manufactures' recommendations.

L. Without untwisting or pre-arranging the pairs, feed each pair into the correct opening in the jack stuffer housing.

M. Push the cable fully into the jack stuffer housing.

N. Trim the pair ends of with the manufactures' recommended trimming tool.

O. Loosen the pair twists only enough to seat the conductors into the color-coded IDC slots.

P. Snip off the conductor ends flush with the jack stuffer housing.

Q. Insert the stuffer housing into the jack outer housing and clamp them tight using the manufactures' recommended termination tool.

R. Once the other end of the cable is terminated, test the cable from end to end with a cable tester. Be sure that all eight conductors have proper connection.

S. Data and Telephone Cable UTP T568B, Identical to AT&T 258A and WECO, Pin/Pair Assignments (All RJ-45 modular jacks):

Pin:	Line/Pair:	Color:
1	Tx 2	White/Orange Band
2	Rx 2	Orange
3	Tx 3	White/Green Band
4	Rx 1	Blue
5	Tx 1	White/Blue Band
6	Rx 3	Green
7	Tx 4	White/Brown Band
8	Rx 4	Brown

2.26 OPTICAL FIBER CABLE INSTALLATION AND TERMINATION PRACTICES

A. The following fiber optic connector installation methods are acceptable; fusion splice connection of factory made pigtail connectors, epoxy/polish style connectors, or non-epoxy compression cam gel style connectors. In each case, the connector manufactures' instructions shall be followed and the recommended tools and supplies, including break out kits when required, shall be used for termination and testing. All Fiber strands to be terminated including future use pairs.

B. During optical fiber connector termination, visually inspect all terminations with a 200-power microscope (minimum). Follow all of the connector manufacturers' recommendations. Unacceptable flaws in the terminations will include, but not be limited to, scratches, full or partial cracks, bubbles, pits, or residual dirt, dust, oil, moisture, grinding or sanding debris in the connector. The acceptable final inspection shall show a connector tip that is properly aligned and free of imperfections in 100% of the core and 80% of the cladding. Any connectors that fail testing shall be inspected and re-tested after rework.

C. During installation of optical fiber cable, do not allow pulling tension to exceed cable manufacturers' specification for the cable being installed. Only the strength member of the cable shall be subjected to the pulling tension.

D. Clean all optical fiber connector tips prior to inserting them into mating receptacles or bulkheads and re-install dust covers. Clean the tester launch cord prior to each insertion, as well.

2.27 CABLE SUPPORT

A. Conduit, duct, or track shall be used for communication cable in exposed areas.

B. Cable fill shall not exceed the manufacturers' instructions for each type of support.

C. All conduit, ducts, track, and raceways shall be supported from the structure at industry standard intervals for the size specified, utilizing proper anchoring devices.

D. Solid, ladder, or mesh cable tray/duct shall be required for narrow depth cable routes that would allow sags to rest upon the ceiling, electrical conduits, HVAC equipment, ducts, or lighting fixtures.

E. Vertical cable runs exceeding 12" in equipment closets shall require ladder or mesh type cable support tray. Attachment shall utilize appropriate mounting hardware and accessories for vertical placement and allow a minimum of 2" clearance between the wall and runway. Cable attachment shall be made by Velcro hook ties in a basket type configuration.

F. All vertical supports shall be attached to the building support structure or concrete ceiling with anchors load rated for 100-lbs. minimum. Down rods shall be a minimum of 1/4” diameter. Steel uni-strut cross supports shall be 2” minimum.

G. Cable runway or tray shall be grounded to an appropriate building ground at each end and bonded at each joint.

H. Rubber or plastic boots shall be installed at the ends of horizontal support rails to prevent cable damage or injuries to personnel.

2.28 BUSHINGS

A. Provide a plastic snap in bushing at each box opening, passage through a metal stud, and at the end of all open conduit stubs or sleeves prior to cable installation to protect the cabling from damage:
   1. Box openings - Thomas & Betts Knockout Bushing Series 3210, or equivalent.
   2. Metal stud passage - Thomas & Betts Twist It Bushing Catalog Number SB1216-SC, or equivalent.
   3. Conduit ends - Thomas & Betts Anti-Short Bushing Series 390 or Tite-Bite Combination couplings Series 442, or equivalent.

2.29 J-HOOKS

A. Attachments for cabling support shall be spaced at approximately 48 to 60 inches on center. Cable bundles shall not be allowed to sag down more than 12-inches mid-span between attachments.

B. All attachments shall be approved for Category 6A cabling. Attachments shall be Caddy part numbers as follow, or equivalent, sized as follows:
   1. CAT16HP, 1” diameter Capacity 7 to 10 Category 6A cables.
   2. CAT21HP, 1.31” diameter Capacity 12 to 24 Category 6A cables.
   3. CAT32HP, 2” diameter Capacity 25 to 35 Category 6A cables.
   4. CAT48HP, 3” diameter Capacity 48 Category 6A cables.
   5. Split bundles greater than 48 cables (maximum allowed bundle size) or provide cable tray.

C. Do not mix different signal strength cables on the same J-Hook (i.e. fire alarm with data and telephone cable). Multiple J-Hooks can be placed on the same attachment point, up to the rated weight load of the attachment device.

2.30 CABLE TIE WRAPS

A. Hook and loop cable management straps shall be furnished and installed to manage wire bundles as required. Straps shall be installed loosely to not deform or support cable.

B. Velcro hook cable ties shall be furnished and installed to attach wire bundles to supports and for appropriate wire management as required. Provide and install Panduit TAK-TY Plenum rated cable ties or equivalent.

C. Saf-T-Grip® Open Loop Series or equivalent for free vertical hanging cable. Chastworth Products Inc. part number 02006-201 Open Loop, 6” long (for 2” diameter bundles)

D. Saf-T-Grip® End Grommet Buckle Series or equivalent to mount cable along walls, backboards, and horizontal cable runs. Chastworth Products Inc. part number 05006-201 End Grommet & Buckle, 6” long (for 2” diameter bundles)

E. Hard plastic or metal tie wraps will not be allowed on any data cable (Category rated twisted pair).

2.31 MEASURING PULLING TAPE (MULE TAPE)

A. All future use innerduct and conduit cable pathways shall include a Measuring Pulling Tape (Mule Tape) made of woven Polyester, Aramid, Kevlar, or an equivalent fiber blend. Measuring Pulling Tape shall have a minimum tensile strength of 1250 lbf. or as required and shall be pre-lubricated for prevention of burn though and marked for measuring in feet. Measuring Pulling Tape installed in underground pathways shall incorporate a 22-gauge minimum solid corrosion resistant copper conductor for use in radio signal locating procedures.

2.32 LADDER TYPE CABLE TRAY

A. Ladder type cable tray shall be routed over all floor-mounted racks from wall to wall, provide all necessary hardware to attach the ladder rack to the top of the floor rack and to the walls. All field cuts shall be filed smooth, dressed square, and painted to match. Utilize tray splicing, support, and coupling hardware supplied by and installed as recommended by the manufacturer. Cable tray and rack shall be securely supported and grounded. See 19” Open Equipment Racks section.

2.33 CABLE TRAY (INSTALLED IN IT/CYBER SEC LAB)

A. Mesh constructed cable tray systems shall be utilized for high capacity and special pathway support requirements. Mesh cable tray shall be constructed from steel wires. All edges and welds are to be smooth and free of burs or sharp edges. Mesh tray assemblies shall be zinc plated after fabrication. All field cuts shall be filed smooth, dressed square, and touched up with zinc bearing paint to prevent rust formation. Mesh openings shall not exceed 2” x 4”. Provide size 6” wide x 2” deep as required for a 50% maximum initial fill rate. Provide straight sections, vertical offsets, tees, crosses, radiused bends, reducers, and radiused dropouts/waterfalls as required. Utilize tray splicing, support, and coupling hardware supplied by and installed as recommended by the manufacturer. Support from building structure. Provide WBT WBT2X6 series as required.

2.34 FIRE OR DRAFT STOPPING, PENETRATIONS, AND CORING

A. UL Listed fire stopping methods that match the fire rating of the wall or floor being penetrated are to be used at all fire barrier penetrations. Seal the interior of the conduit sleeve around the cables and around the outside of the sleeve on each side of the penetration with fire-stop caulk or putty, install according to the manufacturers’ instructions.

B. All penetrations through fire rated walls or floors shall feature a suitable length of metal conduit. Hole diameter shall not exceed ½” larger than the conduit or sleeve to be installed. The hole shall be neatly cut, not oversize or irregular. Do not share wall/floor penetrations with ductwork, piping, line voltage electrical conduits, etc.

C. All gypsum board or plaster penetrations shall tool cut using an appropriate hole saw / mandrel or manufactured assembly.

D. Draft/Noise Stopping - This Contractor prepares for and applies draft/noise stopping to all non-rated wall penetrations. Draft/Noise stopping shall minimize the movement of air and sound from enclosed areas to other parts of the building. This shall include but not limited to:
   1. Neatly cutting all non-rated wall/floor penetrations with a 1" maximum clearance. All gypsum board or plaster penetrations shall tool cut using an appropriate hole saw / mandrel or manufactured assembly. The hole shall be neatly cut, not oversize or irregular. Do not share wall/floor penetrations with two types of ductwork, piping, line voltage electrical conduits, communications cabling, etc.
   2. Provide and install non-combustible mineral wool, fiberglass, cellulose insulation, caulk, and sealant as required. Seal the interior of conduit sleeves around the cables and around the outside of the sleeve on each side of the penetration with caulk or putty, install according to the manufacturers' instructions.

E. The Contractor shall make every effort to coordinate with the building Architect, Engineer, Builder and Electrical Contractor to have sleeves placed in new construction so that later coring or drilling of building structural members will not be required. The Contractor must consult with the building Architect, Engineer, and Builder prior to drilling, coring, or sawing of any wall, floor, etc. All penetrations shall be made at approved, appropriate, locations.

F. Upon approval, the Contractor shall be required to supply all labor, equipment, tools, and materials to create any additional penetrations, and shall provide the sleeve, temporary and final fire stopping. Special care shall be taken not to stress, overheat, or penetrate any building support member. Coring shall be made with equipment appropriate for the dry penetration of concrete and block materials. Under no circumstances shall penetrations be made utilizing a chisel or percussion type equipment. Concrete, block, or plaster cores shall be made by dry saw/core methods only.

PART 3 - EXECUTION

3.1 WARRANTY, SERVICE, TESTING, CERTIFICATION

A. The Contractor must provide an extended warranty that is inclusive of the Manufacturer's warranty to the Owner covering all network cable and connectivity hardware products comprising this installation site. The Contractor and Manufactured shall jointly provide the Owner an extended warranty of the installed system against defects in material or workmanship for a period of no less than twenty years (period as is customary for the Manufacturer) from the date of substantial completion. Any equipment or cabling shown to be defective shall be replaced, repaired, or adjusted free of charge. All labor and materials shall be provided at no expense to the Owner.

3.2 UTP CABLE AND LINK TESTING

A. The System Contractor shall make a thorough inspection of the complete installation to ensure the following:
   1. Complete and functional system.
   2. Installed in accordance with manufacturers' instructions.
   3. All cabling shall test free from all grounds, opens, and shorts.
   4. A representative of the Owner may be present for all final testing. Coordinate final testing with Owner, schedule as near as possible to acceptance date.

B. Acceptance Testing: Test each conductor of every cable on the reel to verify length and continuity. Cables that have been damaged in transit must be replaced. Installed cable that proves to be defective will be replaced at the contractor's expense.

C. Final Testing: All UTP cabling will be certified to meet and or exceed the specifications as set forth for Permanent Link Testing of all 10GBASE-T electrical parameters including alien crosstalk performance. Testing shall meet TIA/EIA compliant standards appropriate for each device type including:
   1. Category 3 and 5e per TIA/EIA-568B / TIA Category 5 (1000BASE-T) per TIA TSB-95 / TIA
   2. Category 6-CLASS E/D Permanent Link Testing per TIA TSB-67 / TIA
   3. Category 6A/Class E_A per TIA/EIA-568B.2-10 / TIA TSB-155 / ISO/IEC 11801 Class C, D, and E / ISO/IEC 11801 Class E_A, F / EN 50173 Class C, D, E / EN 50173 Class F / ANSI TP-PMD; Networking Standards: IEEE 802.3 / I.

D. Test alien crosstalk (near-end and far-end loss) for a cabling system using a network analyzer with 100-Ω pair terminations as follows;
   1. Frequency range from 1 to 500 MHz (250 MHz for Category 6);
   2. The test device consists of two jacks; one jack is connected to a main test unit and the other to a remote test unit; the main test unit and the remote test unit are connected with a field tester communication channel (patch cord or link);
   3. Six-around-one cable-bundle configuration throughout the tested length;
   4. Cable ties placed 12 inches apart for the entire length of the bundle, except the last 3.2 feet from each end; no cable-tie-induced deformation of the bundle;
   5. Modeling four-connector channel configurations using the worst-case maximum and minimum configurations to determine the worst-case for different parameters;
   6. Long channels with 90 meters of permanent link, 5 meters between the consolidation point and the telecommunications outlet, 10 meters of patch cords used to connect active equipment and cross-connect panels;
   7. Measurement of alien crosstalk (near-end and far-end loss) between all pairs of the middle disturbed cable and each pair of all adjacent cables;
   8. Measurement of power sum of all 24 adjacent pair cables.

E. The cable tester shall a UL Level III tester or equivalent with the latest version of firmware and shall produce a printed report, noting label information, for each cable run. These reports are to be included in the close-out documentation. Testing shall be conducted with a Fluke DTX 1800, or equivalent, copper/fiber/OTDR cable analyzer with DTX 10 Gig kit including alien crosstalk communication modules, permanent link adapters, high-performance channel adapters, termination plugs, 8-pin modular couplers and analysis software. Certifications shall include the following parameters from up to 1 to 500 MHz for each pair of each cable installed:
   1. Characteristic Impedance 100 Ω +/- 15%
   2. Wire map (pin to pin and ground connectivity)
   3. Cable Length Permanent Link, station (horizontal) cable from patch panel to jack, should not exceed 295 feet (Channel length not to exceed 328 feet).
   4. Attenuation
   5. Pair to pair NEXT
   6. PSNEXT
   7. FEXT (Far end crosstalk)
   8. Pair to pair ELFEXT (Equal level far end crosstalk)
   9. PSELFEXT
   10. Return Loss
   11. PSACR
   12. Propagation Delay
   13. Delay Skew
   14. Alien Crosstalk

3.3 OPTICAL FIBER TESTING

A. Acceptance Testing: Test each strand of every optical fiber cable on the reel with an OTDR, to verify length and continuity. Fiber cables that have been damaged in transit must be replaced. Installed fiber cable that proves to be defective will be replaced at the contractor's expense.

B. Final Testing: After termination each individual fiber of each cable segment shall be tested using an OTDR, both to determine the installed length and continuity. All individual fibers of each cable segment will be tested using a power meter to determine the actual loss. These readings will be taken at the 850 nm and 1300 nm windows for Multimode and 1310 nm and 1550 nm windows for single-mode. Testing will be in both directions. The final readings shall be listed in the certification report. These readings must not be higher than the "Optimal Attenuation Loss." The OAL will be calculated using the manufacturers' factory certified test results, (dB/Km) converted to the actual installed lengths plus the manufacturers' best published attenuation losses for the connector and/or splice installed on this project. (0.20 for Connectors and 0.10 for splices.) The OAL shall be used for comparison with the end to end power loss test results prior to acceptance by the construction manager.

C. Fiber optic cable shall be subjected to bi-directional testing meeting EIA/TIA 568B, Section B.3, testing recommendations. The cable tester shall produce a printed report, noting label information, for each cable run. These reports are to be included in the close-out documentation.

3.4 DRAWINGS, MANUALS, AND TRAINING

A. As-built drawings and operating and maintenance manuals may be electronically transmitted in PDF file format (preferred) or paper copies may be provided in quantities indicated in Division 1. Paper copies shall be organized including index tabs in a 3-ring black binder of sufficient size.

B. Upon completion of the installation, and prior to final inspection, the Contractor shall furnish as-built drawings.

C. In addition, the contractor shall furnish complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets. Manuals shall include wiring diagrams to indicate internal wiring for each device and the interconnections between the items of equipment. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system. Provide a parts list with manufacturer and model number for commonly replaced parts. Include complete instructions for the inspection, testing, and maintenance of the system. Place final cable certification test results in manuals.

D. All cable paths and wiring methodology shall be documented. All cables shall have both ends labeled and included in the as-built documentation. Provide an MS Excel worksheet compatible format spreadsheet file cross referencing all cable run numbers, architectural room number, and owners room number for the origin and destination of each cable run.

E. A formal on-site training session shall be provided by the Contractor to the Owners Representative / Maintenance personnel and shall include instruction on the documentation, location, inspection, maintenance, testing, and operation of all system components. Provide a minimum of two (2) hours of documented general instruction.

END OF SECTION

SECTION 27 51 25

SOUND REINFORCEMENT SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section. Reference all Division 0, Division 1, Division 26 Division 27 specifications, Electrical Drawings, Audio-Visual Drawings, and Technical drawings for additional information. The Specification and the Drawings are complementary, they are not separate or different. They must be understood together.

B. This section requires that any proposed contractor provide for all of the following:
   1. Required licenses, insurance, and permits including payment of charges and fees
   2. Field verify all aspects of the job site.
   3. Retrieving all Owner Furnished Equipment (OFE), if any, performance test said equipment, and incorporate said equipment into the system(s) as required.
   4. Development and implementation of AV control system software code and control panel layouts, which shall become the property of the Owner
   5. Understanding and following all related recommendations from the manufacturers, applicable codes and standards, and all requirements of the Authority Having Jurisdiction (AHJ) that are associated with the project.
   6. Routing and connecting electrical power from locations provided by Electrical Contractor to equipment, as required per manufacturers' specification.
   7. Documentation of all final testing, programming, manufacturers' commissioning reports, and any other final documentation related to the system(s) installed.
   8. Education and training of any, and all required owner's personnel, owner's agents, and others as required on use of the system(s).
   9. Ability to honor all warranties for the full warranty period.

1.2 CONTRACTOR'S RESPONSIBILITIES

A. ACCOUNTABILITY
   1. Proposed contractor shall provide all products as called out in these specifications and complimentary drawings in their entirety with any required ancillary equipment to make all specified and drawn systems complete and operational. This includes installation material, programming, rigging hardware, testing equipment, and more.
   2. If any equipment is not listed in the specification or drawings that needs to be present, it is the responsibility of the proposed contractor to bring the required change to the equipment/system(s) to the attention of the Architect, Engineer and General Contractor during the bid phase, through a Request For Information (RFI)
   3. The Specifications and Drawings that have been developed and provided for this project have been designed in accordance with Owner and Architect requirements. Any alterations to system(s) designed in the Specifications and Drawings must be approved, in writing, by both the Architect and Engineer. Changes made without written authorization from the Architect and Engineer will be required to be reverted to the original design. This will be at the expensive of the contractor that made the changes.
   4. Absolutely ***NO*** claim for additional payment shall be permitted for the systems specified and drawn, unless a change is requested by the Owner and approved by the Architect and Engineer, and proper documentation is sent to the contractor to make said changes.

B. CONSTRUCTION DOCUMENTS
1. The Specifications and Drawings for the system(s) have been designed for this Client. These Specifications and Drawings are not to be reproduced, altered, manipulated, or reused in any way without the expressed authorization of the Architect and Engineer responsible for the overall project. If the AutoCAD, Revit, or other files are required, written request must be submitted through the Architect.
2. Contract Documents include Specifications, Drawings, Addendums, and other issued documents. They are all complimentary of each other. What is called for by any one of them is binding for all others and must be adhered to. Any discrepancies should be brought to the attention of the Architect and Engineer during the RFI phase of the bidding process.

C. RELATED WORK SPECIFIED ELSEWHERE
1. Electrical Work
a. Conduit, wireways, floor boxes, wall boxes, pull boxes, junction boxes, AC power circuits, and ground wiring to be provided by the awarded electrical contractor. Do not attempt to connect any equipment that does not simply “plug-in” to an electrical circuit. The jobsite’s licensed electrical contractor is responsible for all high voltage work.
2. Structural Work
a. Any structural alterations of the building structure must be approved by the Structural Engineer and Architect before any work can be performed. Once approved, the proper rigging contractor, erection contractor, steel contractor, or others need to perform the work. This does not relate to connecting Unistrut, threaded rod, clamps, or similar devices to the structural steel. However, loads must be taken into account. Verify with the Architect that all loads have been reported to the Structural Engineer and have been approved prior to suspending equipment.
3. Drywall/Paint Work
a. If the contractor must open a space that has been covered with drywall and/or paint, communicate this with the drywall and/or paint contractor and the general contractor to make sure that the work is properly covered up once complete.

1.3 LIST OF ASSOCIATIONS AND STANDARDS

A. Proposed contractor is to adhere to all of the following associations and standards.

ADA: Americans with Disabilities Act.
ANSI: American National Standards Institute, 1430 Broadway; New York, NY 10018.
ASTM: American Society for Testing and Materials, 1916 Race Street; Philadelphia, PA 19103.
BICSI: (RCDD5 Standards), 8610 Hidden River Parkway, Tampa, FL 33637
CBM: Certified Ballast Manufacturers Association, 2116 Keith Building; Cleveland, Ohio 44115.
IEEE: Institute of Electrical and Electronics Engineers, 345 East 47th Street; New York, NY 10017.
ICEA: Insulated Cable Engineers Association, P.O. Box P, South Yarmouth, MA 02664.
NEC: National Electrical Code; NFPA No. 70.
NECA: National Electrical Contractors Association, Inc., 7315 Wisconsin Ave.; Washington, DC 20014.
NEMA: National Electrical Manufacturers Association, 155 East 44th Street; New York, NY 10017.
NESC: National Electrical Safety Code, ANSI 2.
NFPA: National Fire Protection Association, 60 Batterymarch Street; Boston, MA 02110.
OSHA: Occupational Safety and Health Administration, US Department of Labor; Washington, DC 20402.

TAS: Texas Accessibility Standards (TAS) Article 9102.
UL: Underwriters Laboratories, Inc., 333 Pfigsten Road; Northbrook, IL 60062

B. Nothing in the Contract Documents shall be construed to permit work not conforming to these codes.

C. When two or more codes or standards are applicable to the same work, then the stricter code or standard shall govern.

D. The date of the code or standard is that in effect on the date of issue stated on the contract documents, except when a particular publication date is specified.

E. The Contractor shall comply with all State, Federal, NFPA, local codes and ordinances that may alter any part of the plans or specifications. The Contractor shall bear all costs for correcting any deficiencies due to non-compliance.

F. Where local codes and ordinances are not in writing or on record but local precedence have been set, the Owner shall pay for any additional resulting cost.

1.4 SUBMITTALS

A. Awarded Contractor is required to provide a complete Submittal Package to the General Contractor for approval prior to the commencement of any work. The Submittal Package is to be received within 30-Days of notification of project award.

B. Absolutely ***NO*** work may be performed without approval of the Submittal Package. Any work performed without an approved submittal may be required to be changed or removed at the contractor's expense.

C. Required Information for the Complete Submittal Package:
1. Awarded Contractor Information:
a. Resumes of Persons that will be working on the project
(1) Personnel List shall include
- Name
- Job Title
- Cell Phone Number
- Email Address
- Copies of Certifications (if applicable)

2. System(s) Contents
a. Complete Table of Contents
b. A Gantt Chart for the Project
c. List of Exclusions
d. Bill of Materials
e. Product Specification Sheets:
(1) Provide sheets on all specified equipment
(2) Organize data sheets in order that they appear in the specifications.
(3) On product sheets where more than one product is discussed, highlight the proper product to be use.
(4) Include product sheets for fire stopping material.
(5) Do not put Owner and/or Instructional Manuals in lieu of data sheets in the Submittals. Manuals are part of Close Out Documents. If a data sheet cannot be easily found on the Manufacturer's website, contact the Manufacturer directly and request the product sheet.

f. Shop Drawings
   (1) These drawings shall be detailed installation plans, elevation plans, one-line schematics, rack and furniture elevations, and more showing that the contractor has a full and clear understanding of how the systems are to function and be assembled.
   (2) Installation plans and elevation plans shall be drawn accurately to a 1/8" = 1'-0" scale and placed on the contractor's sheets with identifying borders.
   (3) These drawings shall also include the Structural Rigging and Mounting Details described below.

g. Fabrication Details
   (1) All custom fabrication details shall be drawn on the contractor's sheets, and approved prior to ordering custom materials or parts. These drawings shall include dimensions, material, color, and engraving required. Do not order these products until approved. Any products incorrectly ordered prior to approval, will be required to be replaced at the expense of the contractor, and claim for further payment or reimbursement for these errors will be denied.
   (2) Provide complete drawings on custom fabricated plates or panels. Drawings shall include dimensioned locations of components, component types, engraving information, plate material and color, and bill of material.

h. Schedules
   (1) Wiring Schedule showing source and destination of wiring and indicating which wiring is in conduit. Junction box schedule showing type of box, size, mounting, and location. Include this information with remainder of wiring diagrams.
   (2) Responsibility Schedule showing which work the contractor will be performing, and which work the contractor must coordinate with other trades.
   (3) Labeling Schedule showing the methods and designations of the labeling scheme used on the various wire throughout the project.

i. Submittal drawings must be drawn by the proposed contractor, and may not be simply copies of the contract documents.

j. Submittals which are not organized and setup in the proper formats as identified in this specification, will be rejected without review, and shall not be considered for approval.

k. Include any other pertinent data which is necessary to provide the work at the end of the specification.

3. Structural Rigging and Mounting Details:
   a. Any equipment being attached to structure by means of Rigging from Wire Rope, Shackles, Turnbuckles and more shall have a detail showing exactly how the equipment is to be attached to the structure, the amount of equipment weight being suspended, and the hardware being used to suspend the equipment. Be specific in listing the hardware being used.
   b. Any equipment being attached to the structure by means of Mounting, by lag bolts, toggle bolts, beam or perlin penetration, wall penetration, masonry penetration, anchor bolts, and any other type of mounting shall have a detail showing exactly how the equipment is to be attached to the structure. If mounting is overhead, then the detail shall also include the weight of equipment being suspended overhead and detailed hardware being used to suspend the equipment. Be specific in listing the hardware being use.

D. Resubmission Requirements
   1. If a Resubmission is required, either by Revise and Resubmit or an Overall Reject of the submittal, it is the requirement of the contractor to address all notes made to the submittal and resubmit in a prompt and timely manner.

2. If a submittal is sent back for Resubmission, the Resubmission shall be treated the same as the original submittal. No work may be performed without complete approval of the submittal either by a simple Review or Furnish As Correct statement from the Engineer.
3. To properly make a Resubmission, the contractor must address all notes made by the engineer, make the proper adjustments to the submittal, indicate what changes have been made to the submittal by highlight or cloud, and resubmit them through the proper channels.

1.5 CUSTOM SOFTWARE (AS REQUIRED)

A. Some Systems require custom software in order to function properly. This software can be anything from simple drag and drop presets, to DSP Layouts, to system specific line code with modules, and more. These programmed systems are to be setup and programmed for the specific system to which they are to provide control.

B. Any custom software required, must make the system(s) complete and operational.

C. A programming scope of work may or may not be included with the specification. It is the responsibility of the proposed contractor to identify, bid, and properly program the system(s) in the specification to fit the requirements and needs of the owner.

D. If graphics or other information are needed from the owner, the contractor must notify the General Contractor, Architect, and Engineer as soon as possible so this does not delay the project.

E. All programming must be approved by the Engineer before final acceptance and approval. Final payment may be held pending the final programming approval.

F. Any, and all custom software shall become property of the owner at the conclusion of the project. This includes, but is not limited to, custom graphics, custom line coding, custom DSP layouts, custom modules, and more. All must be turned over with the Close-Out Documents.

1.6 CONTRACTOR REQUIREMENTS

A. The Proposed Contractor must be experienced in the installation and service of similar systems, as those in this specification and the contract drawings. The proposed contractor should also possess the following:
1. A minimum of five (5) years of experience with the similar equipment and systems to those listed in this specification.
2. Have a minimum of three (3) similar sized and scoped projects with the past three (3) years.
3. Maintain active and authorized dealership with all brands listed in this specification.
4. Employ sufficient staff to complete the entire project and to honor the warranty period.
5. Employ CTS and CTS-I staff (certified by AVIXA) and assigned to, and active on this project.
6. A minimum of one (1) CTS employee to supervise each project, and on site during the construction phase.

1.7 DELIVERY, HANDLING & STORAGE

A. Products must be shipped in their original packaging from the manufacturer. If a product is damaged from the manufacturer, contact the manufacturer for an immediate replacement.

B. Products and equipment that are installed during the construction process must be covered to prevent damage, dust coverage, discoloration, and other issues. If a product or piece of equipment is damaged, covered in dust, discolored, or has other issues due to lack of proper protection, it is the responsibility of the contractor to have the equipment replaced.

C. Proper Wire Protection
   1. Any wiring pulled during the construction phase must:
      a. Be wrapped in a protective wrapping to protect all conductors
      b. Be suspended off the ground to prevent damage to the wire from lifts, trampling, and more.
      c. Protected from being painted. Painted wire voids wire warranty, and therefore must not happen.

D. Store any, and all equipment, wiring, products, and more in either an insured and bonded warehouse, an insured and bonded container, or a locked space on the job site, as indicated by the General Contractor. If equipment is located on the job site, the General Contractor must be notified, and a complete inventory of all equipment, wiring, and products must be provided to the General Contractor. Despite being stored on the job site, the equipment, wiring, and products are still the responsibility of the contractor, until installed.

1.8 PROJECT CONDITIONS

A. Though all parties try to make the job site a safe and orderly place to work, this is not always the case. It is the responsibility of the contractor to verify the conditions of the job site, by either a site visit, or contacting the General Contractor. This is with regards to building progress, weather conditions, other trade coordination, and more.

B. With regards to changes in the building design or construction, it is the contractor’s responsibility to stay informed on the building design or construction

C. Drawings show expected equipment and product locations, and some wiring paths. It is the contractor’s responsibility to verify these locations and paths are valid, prior to the installation of equipment.

D. It is the responsibility of the contractor and the contractor’s employees to keep a clean and functional job site. Contractor shall clean up any messes they make. There will not be a cleaning crew following behind the contractor.

E. Adhere to all jobsite safety regulations, set forth by the General Contractor, Architect, Engineer, OSHA, and/or any other Authority Having Jurisdiction (AHJ).

F. Contractor is responsible for any equipment, heavy machinery, and other tools used on the job site. This includes, but is not limited to scissor lifts, boom lifts, fork trucks, pipe threaders, cable pullers, saws, drills, and more. Any equipment, heavy machinery, and other tools brought on to the job site falls under this responsibility. If the contractor does not want other trades to use their equipment or is worried about theft, lock up the equipment, take the key, remove controllers, and any other types of protection. This responsibility extends to operating equipment, heavy machinery, and other tools in the proper manner. Improper use of equipment, heavy machinery, and other tools can cause injury and loss of life. Contractor to use all equipment, heavy machinery, and other tools safely and in the manner described by the manufacturer.

PART 2 PRODUCTS

2.1 GENERAL

A. Provide all equipment, hardware, materials, rigging, and more to provide a complete project. Some equipment required to make the system(s) functional, may not be listed. It is expected that the Contractor understand what equipment is required, and that said equipment is provided on the project.

B. All equipment, hardware, materials, rigging, and more shall be new-in-box, having never-before been used. This statement does not apply to any Owner Furnished Equipment (OFE).

C. Equipment listed in these specifications may have a short description or long description. Despite the length of the descriptive paragraph, provide the proper equipment, and set it to the proper settings to cover the

D. Do not alter equipment in any way, shape, or form that invalidates the warranty. If the warranty is invalidated, it will be the contractor's responsibility to honor the manufacturer's warranty.

E. Take care during installation to prevent scratches, dents, chips, etc.

2.2 ACCEPTABLE MANUFACTURERS

A. Model numbers and manufacturers included in this specification are listed as a standard of function, performance, and quality.

B. Refer to General and Supplementary Conditions and Division 1 Specifications Sections for equipment substitution procedure.

C. If a specified product has been discontinued by a manufacturer, provide the replacement model (as certified by the manufacturer) at no additional cost.

D. Where required, provide manufacturer's rack mount adapter or one manufactured by Middle Atlantic unless specified elsewhere.

E. Acceptable Manufacturers Include:

Atlas IED	Phoenix, AZ
BSS Audio	South Jordan, UT
Denon Professional	Cumberland, RI
Electro-Voice	Fairport, NY
Furman Contractor	Petaluma, CA
JBL Professional	Northridge, CA
Listen Technologies Corporation	Bluffdale, UT
Middle Atlantic Products	Fairfield, NJ
Neutrik	Charlotte, NC
QSC, LLC	Costa Mesa, CA
Radio Design Labs, Inc.	Prescott, AZ
Sennheiser	Old Lyme, CT
Shure Incorporated	Niles, IL
Soundcraft	Northridge, CA
West Penn Wire	Washington, PA

F. Other manufacturers must be approved by Architect/Engineer, unless indicated by these specifications.

2.3 ASSEMBLY COMMUNITY ROOM

A. Main Equipment Rack
   1. Wall Mounted Equipment Rack
   2. 12 rack Units
   3. Locking Front Door
   4. Locking Swivel Rack
   5. Acceptable Product:
      a. Middle Atlantic DWR-12-22
      b. Or Approved Equivalent
   6. Required Accessories
      a. Middle Atlantic LVFD-12 Ventilated Locking Door
      b. Middle Atlantic D2 Drawer

B. Power Conditioner System
   1. Rack Mounted Power Conditioning System
   2. 20-Amp 120-Volt AC Power
   3. 9 Outlets
   4. Front-mounted Switch
   5. Acceptable product:
      a. Middle Atlantic PD-920R
      b. Juice Goose JG11-20A
      c. Or equivalent

C. Digital System Processor/Mixer
   1. Processor and Mixer
   2. 12 Input Channels
   3. 8 Output Channels
   4. Euro-block type mic/line input and output connectors
   5. Custom programming included
   6. System must be programmed to duck for Intercom Paging
   7. Acceptable products:
      a. BSS BLU-100
      b. Or approved equivalent
   8. Required Accessories
      a. BSS BLU-10 Controller
      b. Or approved equivalent

D. Audio Network Switch
   1. 8-Port POE/POE+
   2. Gigabit speed
   3. Unmanaged switch
   4. Approved product
      a. Netgear GS108PP
      b. Or approved equivalent

E. Amplifier
   1. Two Channels of Amplification
   2. Minimum 250 Watts per Channel @ 70 Volts
   3. Acceptable products:
      a. Electro-Voice PA2250T
      b. Or approved equivalent

F. Loudspeakers
   1. Two-Way Loudspeaker
   2. 8-Inch Woofer
   3. .75-Inch High-Frequency Driver
   4. Frequency Response: 65 - 20,000Hz
   5. Power Handling: 60 Watts @ 70-Volts, 300 Watts @ 8 Ohms
   6. Approved product
      a. Electro-Voice EVid C8.2
      b. Approved equivalent

G. Wireless Microphones
   1. Digital Wireless Microphone Systems
   2. Shure QLX-D4 Wireless Microphone Receiver (Qty: 1)
   3. Shure QLX-D1 Belt-Pack Transmitter (Qty: 1)
   4. Shure QLX-D2/SM58 Handheld Vocal Microphone Transmitter (Qty: 1)
   5. Shure WL185 Lavaliere Microphone (Qty: 1)
   6. Shure UA844+SWB Wireless Microphone Antenna Combiner
   7. Shure UA860SWB Omnidirectional Dipole Antenna (Qty: 2) [WA]
   8. Shure UA8** Coaxial Antenna Cable (Length as required.) (Qty: 2)

H. Audio Wall Plates
   1. Microphone Input Plate
      a. Single Gang
      b. Single Female XLR Connector
      c. Acceptable products:
         (1) Ace Backstage
         (2) Rapco/Horizon
         (3) Or equivalent
   2. Auxiliary Input [AUX]
      a. 3.5 Audio Input
      b. Dual RCA Input
      c. Mono Summed Balanced Output
      d. Acceptable product
         (1) RDL D-CIJ3
         (2) Or equivalent

I. Audio-Video Input Wall Plate
   1. Single Gang
   2. HDMI Input
   3. HDBaseT Output
   4. Remote Power
   5. Acceptable product
      a. Crestron DM-TX-4KZ-100-C-1G-B-T
      b. Or approved equivalent

J. Projector
   1. Laser Light Source
   2. 1920 x 1200 Native Resolution
   3. 5,200 Lumens Brightness
   4. HDMI Input
   5. HDBaseT Input

6. Acceptable product
   a. Epson PowerLite L520U
   b. Or approved equivalent
7. Provide an audio feed to the local sound system.

K. Projection Screen
1. Ceiling Recessed
2. Electric
3. Includes Low-voltage Control
4. 72.5-Inch x 116-Inch Viewing Area
5. High Contrast Matte White
6. Acceptable product
   a. Da-Lite Advantage Series
   b. Equivalent by Draper, Inc.

L. Assistive Listening System
1. In Compliance with ADA General Guidelines 2010 Section 219 Per Americans with Disabilities Act (2010) Section 219 - Assistive Listening Systems
2. 219.1 General.
   a. “Assistive listening systems shall be provided in accordance with 219 and shall comply with 706.”
3. 219.2 Required Systems.
   a. “In each assembly area where audible communication is integral to the use of the space, an assistive listening system shall be provided.”
   b. EXCEPTION: “Other than in courtrooms, assistive listening systems shall not be required where audio amplification is not provided.”
4. 219.3 Receivers.
   a. “Receivers complying with 706.2 shall be provided for assistive listening systems in each assembly area in accordance with Table 219.3. Twenty-five percent minimum of receivers provided, but no fewer than two, shall be hearing-aid compatible in accordance with 706.3”
   b. EXCEPTIONS:
      (1) “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) “2. Where all seats in an assembly area are served by an induction loop assistive listening system, the minimum number of receivers required by Table 219.3 to be hearing aid-compatible shall not be required to be provided.”

Table 219.3 Receivers for Assistive Listening Systems

Capacity of Seating In Assembly Area	**Minimum Number of Required Receivers**	**Receivers Required to be Hearing-Aid Compatible**
50 or Less	2	2
51 to 200	2, plus 1 per 25 seats over 50 seats	2
201 to 500	2, plus 1 per 25 seats over 50 seats	1 per 4 receivers
501 to 1000	20, plus 1 per 33 seats over 500 seats	1 per 4 receivers
1001 to 2000	35, plus 1 per 50 seats over 1000 seats	1 per 4 receivers
2001 and over	55, plus 1 per 100 seats over 2000 seats	1 per 4 receivers

5. Equipment
   a. Transmitter
      (1) 72 MHz band (72.025 to 75.950 MHz)
      (2) +/-0.005% Channel Tolerance
      (3) Transmission Power: 72 MHz-8,000 ohm/Volts @ 3M Minimum
      (4) Signal-to-Noise Ratio 80dB with SQ Enabled
      (5) Line input with automatic level control
      (6) Rack mounting bracket for transmitter base unit
      (7) Remote antenna with cable and bracket
      (8) Acceptable Product:
      (9) Listen Technologies LT-800-072
      (10) Williams Sound PPA T45
   b. Required Accessories
      (1) Listen Technologies
         - LA-326 Rack Mount Kit
         - LA-122 Antenna
         - LA-30 Remote Antenna Kit
      (2) William Sound
         - RPK 005 Rack Mount Kit
         - ANT-024 Dipole Wall-Mount Antenna Kit
   c. Personal Receiver Sets - (Verify Quantities for Number of Seats)
      (1) 72 MHz band (72.025 to 75.950 MHz)
      (2) Compatible with ANSI S3.22 Hearing Aid Characteristics
      (3) Sensitivity: 2-Ohm/Volts max for 12Db SINAD
      (4) Antenna: Integral with earphone cord
      (5) Audio frequency response 40 Hz to 15 kHz minimum
   d. Distortion not to exceed 1.5% THD at rated output
      (1) Provide Rechargeable Batteries for each unit
      (2) Acceptable Product:
      (3) Listen Technologies LR-400-072
      (4) Williams Sound PPA R38N
   e. Required Accessories:
      (1) Listen Technologies
         - LA-164 Ear Buds
         - LA-166 Neck Loops
         - LA-365 Rechargeable Batteries
      (2) William Sound
         - EAR 022 Ear Buds
         - NKL 001 Neck Loops
         - BAT 026-2 Rechargeable Batteries
   f. Wall Plaque
      (1) Self-Adhesive
      (2) Availability and Type of assistive listening system
      (3) International Symbol of access for hearing loss
      (4) Meet ADA requirement
      (5) Mount as directed by Architect
      (6) Acceptable Products:
      (7) Listen Technologies
         - LA-304
      (8) Williams Sound
         - IDP 008

6. Charging Station
    a. Quantity as needed
    b. Acceptable Products
        (1) Listen Technologies
            - LA-317 4-Unit Charger
            - LA-321 8-Unit Charger
            - LA-311 16-Unit Charger
        (2) William Sound
            - CHG 3512 PRO 12-Unit Charger

2.4 CONFERENCE ROOM

A. Flat Panel Display
    1. 65-Inch Diagonal Viewing Area
    2. 3840 X 2160 Native Resolution
    3. HDMI Input
    4. 700 NITS Brightness
    5. Acceptable Products:
        a. LG 65UH7F-H

B. Flat Panel Display Mount
    1. Holds up to 175 lbs.
    2. 10 Degrees of Forward Tilt
    3. Acceptable Products:
        a. Premier Mounts P4263T
        b. Or approved equivalent

C. Audio-Visual Input Wall Plate [AVI]
    1. Single Gang
    2. 1 HDMI Female Connector with Pigtail
    3. Acceptable Products
        a. Panelcrafters Model PC-G1791-E-P-C
        b. Or equivalent
    4. Required Accessories:
        a. C2G Active High-Speed HDMI Cable (Length as required

D. Audio-Visual Output Wall Plate [AVO]
    1. Single Gang
    2. 1 HDMI Female Connector with Pigtail
    3. Acceptable Products
        a. Panelcrafters Model PC-G1791-E-P-C
        b. Or equivalent

2.5 CABLES & WIRING

A. All electrical conductors installed under this contract, except where otherwise specified, shall be soft drawn annealed stranded copper having a conductivity of not less than 98% of pure copper, and meet appropriate ratings (e.g. CMR, CMP, etc.)

B. Cable shall carry appropriate fire rating (e.g. CMR, CMP, OFNR, OFNP, etc.) on jacket of cable.

C. Where cables are routed through cable tray, provide tray rated cable of equal specification.

D. Where speaker cables are run exposed through a return air plenum, provide plenum rated cable of equal specification.

E. Shielded cables located in raceways shall have aluminum foil shield with drain wire.

F. The West Penn cables listed below are approved for use on this project and are listed to set the acceptable standard of performance. If field conditions or actual cable pathway requires tray or plenum cable, provide version of cable that meets required rating. Cables from Liberty, Commscope, Gepco, and Belden are also acceptable provided they meet the performance specifications of the approved listed cables.

G. Loudspeaker Cables adhere to table below

Wire Size	2Ω Load	4Ω Load	8Ω Load	70-Volt Load
22 AWG	**Up to 3 Feet**	**Up to 7 Feet**	**Up to 13 Feet**	**Up to 661 Feet**
20 AWG	**Up to 5 Feet**	**Up to 11 Feet**	**Up to 21 Feet**	**Up to 1,068 Feet**
18 AWG	**Up to 8 Feet**	**Up to 17 Feet**	**Up to 34 Feet**	**Up to 1,694 Feet**
16 AWG	**Up to 13 Feet**	**Up to 27 Feet**	**Up to 53 Feet**	**Up to 2,687 Feet**
14 AWG	**Up to 20 Feet**	**Up to 43 Feet**	**Up to 87 Feet**	**Up to 4,380 Feet**
12 AWG	**Up to 31 Feet**	**Up to 69 Feet**	**Up to 138 Feet**	**Up to 6,950 Feet**
10 AWG	**Up to 52 Feet**	**Up to 110 Feet**	**Up to 219 Feet**	**Up to 11,072 Feet**
8 AWG	**Up to 78 Feet**	**Up to 174 Feet**	**Up to 349 Feet**	**Up to 17,598 Feet**
6 AWG	**Over 78 Feet or Relocate Amp Rack with approval**	**Over 174 Feet or Relocate Amp Rack with approval**	**Over 349 Feet or Relocate Amp Rack with approval**	**Over 17,598 Feet or Relocate Amp Rack with approval**

1. Minimum of CMR Rated, but CMP Rated where required
2. Jacket color: black
3. Approved products:
   a. West Penn 454 (22 AWG)
   b. West Penn 25454 (22 AWG Plenum Rated where required)
   c. West Penn 222 (20 AWG)
   d. West Penn 25222 (20 AWG Plenum Rated where required)
   e. West Penn 224 (18 AWG)
   f. West Penn 25224 (18 AWG Plenum Rated where required)
   g. West Penn 225 (16 AWG)
   h. West Penn 25225 (16 AWG Plenum Rated where required)
   i. West Penn 226 (14 AWG)
   j. West Penn 25226 (14 AWG Plenum Rated where required)
   k. West Penn 227 (12 AWG)
   l. West Penn 25227 (12 AWG Plenum Rated where required)
   m. West Penn HA210 (10 AWG)
   n. West Penn 25210 (10 AWG Plenum Rated where required)
   o. West Penn C208 (8 AWG)
   p. Or approved equivalent(s)

H. Microphone/Line Level Wire:
1. Provide shielded 22 AWG cable
2. Bonded jacket
3. Minimum of CMR Rated, but CMP Rated where required
4. Jacket color: black
5. Acceptable Product:
   a. West Penn 454
   b. West Penn 25454 (Where required)

c. Or approved equivalent

I. Twisted Pair Cable:
1. Digital Media Shielded Twisted Pair:
a. 350 MHz ultra-high-performance shielded CAT5e (F/UTP)
b. NEC® Type CM and CSA® Type CMR rated
c. Meets HDBT requirements.
d. Color: Blue
e. Acceptable Product:
(1) Crestron DM-CBL-8G-NP
(2) Crestron - DM-CBL-8G-P (where required)
(3) Or approved equivalent
2. Low-Skew/Skew-Free Video Twisted Pair
a. Acceptable Product:
(1) Extron Skew-Free UTP 22-141-03
(2) Extron Skew-Free UTP-P 22-142-03 (where required)
(3) Or approved equivariant
3. Ethernet/LAN Cable (UTP):
a. Enhanced category 5e
(1) 4 pair, 24-AWG Bare Copper
(2) Minimum of CMR Rated, but CMP Rated where required
(3) Standard Termination T-568-B
(4) Color - Yellow
(5) Acceptable Product:
- West Penn 4245
- West Penn 254245 (Where required)
- Or approved equivalent
b. Enhanced category 6
(1) 4 pair, 23-AWG Bare Copper
(2) Minimum of CMR Rated, but CMP Rated where required
(3) Standard Termination T568B
(4) Color - Yellow
(5) Acceptable Product:
- West Penn 4246
- West Penn 254246 (Where required)
- Or approved equivalent
c. Enhanced category 6A
(1) 4 pair, 23-AWG Bare Copper
(2) Minimum of CMR Rated, but CMP Rated where required
(3) Standard Termination T568B
(4) Color - Yellow
(5) Acceptable Product:
- West Penn 4246A
- West Penn 254246A (Where required)
- Or approved equivalent

J. RF Antenna Cables (as required by manufacturer’s specifications)
1. RG-58/U Type
a. Minimum of CMR Rated, but CMP Rated where required
b. 20 (19x32) Tinned Copper Conductor
c. 100% Bi-Foil, Tinned Copper Braid Shield with 95% or better coverage
d. Nominal Impedance of 50Ω
e. Acceptable Products:
(1) West Penn 812

(2) West Penn 25812 (Where required)

2. RG-213/U Type
   a. Minimum of CMR Rated, but CMP Rated where required
   b. 13 (7x21) Tinned Copper Conductor
   c. Bare Copper Braid Shield with 95% or better coverage
   d. Nominal Impedance of 50Ω
   e. Acceptable Products:
      (1) West Penn 810
      (2) West Penn 25810 (Where required)
3. RG-8/U Type
   a. Minimum of CMR Rated, but CMP Rated where required
   b. 10 AWG Solid Tinned Copper Conductor
   c. 100% Bonded Bi-Foil + 90% Tinned Cu Braid Shield
   d. Nominal Impedance of 50Ω
   e. Acceptable Products:
      (1) West Penn 98G8
      (2) West Penn 2598G8 (Where required)

K. Other Misc. Cables:
   1. Acceptable Product:
      a. As per manufacturer specifications

PART 3 EXECUTION

3.1 GENERAL

A. All work specified and/or drawn in these construction documents shall be coordinated with other work and trade to allow for a seamless installation and system(s).

B. Use industry standards for all installation.

C. Use standard means and methods for installation and construction.

D. Equipment or products that are to be installed permanently must use a minimum of a five (5) time safety ratio and utilize a minimum of a Grade 5 Hardware Rating. For any equipment or products installed overhead, **ONLY USED OVERHEAD RATED HARDWARE**. Purchasing shackles, turnbuckles, wire rope, thimbles, and other equipment from Home Depot or Lowes may or may not be rated for overhead rigging. Contractor to verify that the hardware being used is properly rated.

E. Perform a site walk with the General Contractor and/or the Architect to verify locations for all equipment and products.

3.2 INSTALLATION

A. Cabling and Wiring:
   1. All cable shall be installed per manufacturer's specifications. Pay special attention to bend radius measurements.
   2. When transitioning from horizontal to vertical orientation with continuous cabling and wiring, provide support for the wire that accounts for the weight of the vertical cabling and wiring.
   3. Support all horizontal cabling and wiring at a maximum interval of forty-eight (48) inches. This may need to be shortened as more cables or wires are added to a bundle.

4. Cabling and Wires may be bundled in bundles of no more than fifty (50) per bundle.
5. Cable shall be installed above fire-sprinkler, HVAC, and other systems throughout the facility. No cable or wire shall be supported by other trades hardware, products, or supports. No cable or wire shall be laid on the ceiling grid. If a device must be connected that is located in the ceiling grid, service loops must be supported above the device, where the horizontal cable/wire transitions to vertical.
6. Cables and Wiring may not be supported by ceiling grid supports. All cables and wiring must be supported at the structure or on a wall.
7. Any damaged cable or wire must be removed and repulled. Cable splicing is not allowed under any circumstances.
8. All cables and wires shall be identified at BOTH ENDS, with a self-laminating label utilizing the labeling scheme shown in the submittals.
9. Cables and Wires must be pulled into place using no more than four (4) 90-degree turns. If pulling through a conduit that has more than four (4) 90-degree turns, notify the Electrical Contractor that the conduit run is unacceptable, and request it to be changed.
10. Cable or Wire Splicing is unacceptable and will be rejected. If a manufacturer cable or wire is sent with a package, or is to be used, but is too short to make the complete cable or wire run, replace the cable or wire with an equivalent cable or wire that is of proper length. Simply splicing the manufacture cable or wire is unacceptable and will be rejected.
11. Solder joints or connections shall be made using a Rosin-Core 60/40 solder and a minimum of 30-watt soldering iron with variable control.
12. Mechanical connections must be made with the manufacturer's recommended tools, whether punch down, crimp on, or compression. Make sure to use the proper tool for the job.
13. Avoid generating ground loops in the system. Shield wires are only to be connected to connectors at the control end of the cable or wire. Do not connect shield wires at both ends of the cable or wire, as this will not allow the interference anywhere to be grounded properly.
14. All cables and wires shall be separated into groups of like signals. (i.e. Mic/Line Wire, Speaker Wire, Video Wire, etc.)
15. Best practices say to keep signal wires completely away from electrical wires. This is not always achievable and therefore you must keep a minimum of twelve (12) inches is required between signal wires and paralleling electrical wires. If a signal wire must cross an electrical wire, it must be done at a 90-degree perpendicular crossing.
16. Any time multiple output or input connections are available on a piece of equipment or product, use the best possible connection for the system.
17. All conduits are to have bushings on entrances and exits. These are typically provided by the electrical contractor, but do not rely on the electrical contractor for these. The contractor is responsible for these bushings.

B. Equipment Housing Cabling and Wiring:
1. Lace, tie, or harness wire or cable as required herein, and in accordance with accepted professional practice. Dress, lace or harness all wire or cable to prevent mechanical stress on electrical connections; no wire or cable shall be supported by a connection point. Install cable and wire neatly tied in manageable bundles with cable lengths cut to minimize excess cable slack but still allow for service and testing. Provide horizontal support bars if cable bundles sag. Reference photos below for standard of quality.
2. Provide adequate service loops so that equipment mounted on rack slides may be pulled fully out, to their locked position without straining cable.
3. Neatly bundle excess AC power cable from housing mounted equipment with plastic cable ties.
4. Provide plastic cable ties or Velcro straps to bundle cabling and wiring. Electrical tape and adhesive backed cable tie anchors are not acceptable.
5. Install with connections completely visible and labeled.

6. Provide termination resistors, if required, of 5 per cent tolerance; fully visible and not concealed.

C. Cable Ties
1. Nylon cable ties, sometimes referred to as Zip-Ties, may be used, however, it is preferred that the Contractor use Velcro the majority of the time.
2. If Nylon cable ties are used, make sure they are not cinched down onto the cable or wire, causing damage to the wire.

3.3 GENERAL INSTALLATION

A. The Contractor shall supply all products as called out in these specifications and shown in the drawings. The Contractor shall also supply any equipment specifically identified

B. Do not reverse the polarity of any cable or wire, unless specifically detailed in the one-line diagrams from the Engineer.

C. Splicing Cables or Wires is unacceptable, no matter the reason. If a Cable or Wire is too short, pull another Cable or Wire. If the Cable or Wire is a manufacturer Cable or Wire, replace the Cable or Wire with another approved Cable or Wire of proper length.

D. Solder joints or connections shall be made using a Rosin-Core 60/40 solder and a minimum of 30-watt soldering iron with variable control.

E. Mechanical connections must be made with the manufacturer’s recommended tools, whether punch down, crimp on, or compression. Make sure to use the proper tool for the job.

F. All equipment and products shall be labeled and identified to match the one-line diagrams.

G. All cable shall have a label on both ends utilizing self-laminating, flexible vinyl film, Brady IDXPERT XSL-30-427 labels (or similar), with a White on Black Contrast, 1-1/2” in height and 0-3/4” wide. The laminate shall complete wrap around the printed area of the label, and secure smoothly without rippling. Handwritten labels and electrical wire maker labels will not be accepted. Do not write on the cable.

H. All equipment shall be held firmly in place with proper types of mounting hardware. All equipment shall be installed to provide reasonable safety to the operator. Supply adequate ventilation for all enclosed equipment items that produce heat.

I. Shields of audio cables shall be grounded at one end only, at the inputs of the various equipment items in the system.

J. System wiring and equipment installation shall be in accordance with good engineering practices as established by the EIA and the NEC. Wiring shall meet all state and local electrical code requirements.

K. All wiring shall test free from opens, grounds, or shorts. All communication cable shall be supported from the building structure and bundled. Do not attach any supports to joist bridging or other lightweight members.

L. The support system shall provide a protective pathway to eliminate stress that could damage the cabling. The cable shall not be crushed, deformed, skinned, crimped, twisted, or formed into tight radius bends that could compromise the integrity of the cabling.

M. In all exposed areas such as stages, gymnasiums, shops, field houses, janitors' closets, or mechanical / electrical rooms all communication cable shall be fully enclosed in conduit.

N. Communication cables shall be run in conduit stubs from wall boxes to accessible areas above finished ceilings. Conduit shall be required only within walls and concealed spaces to provide access.

O. Provide bushings to protect the cable from damage for conduit ends, box openings, and passage through metal studs.

P. Communication cables shall be run in bundles above accessible ceilings and supported from building structure. Cabling shall be loosely bundled with cable ties randomly spaced at 30 to 48 inches on center, cable ties shall not be tight enough to deform cabling and shall not be used to support the cabling.

Q. Communication cable must not be fastened to electrical conduits, mechanical ductwork/piping, sprinkler pipes, or routed to obstruct access to hatches, doors, utility access panels, or service work areas. Do not route cables through fire doors, ventilation shafts, grates, or parallel for more than four-feet with line voltage electrical conductors. Communication cables shall not be run loose on ceiling grid or ceiling tiles. Communication cable bundles shall not be cinched with zip ties, damaging the cable.

R. Support shall be provided by mounting appropriate fasteners that may be loaded with multiple cables. Provided that the weight load is carried by the support rod or wire the support assembly may attach to the ceiling grid for lateral stabilization. The require support wires for the ceiling grid or light fixtures shall not be utilized. Any fastener attached to the ceiling grid shall not interfere with inserting or removing ceiling tiles. The cable pathway of supports must be positioned at least 12 inches above the ceiling grid.

S. All cabling shall be placed with regard to the environment, EMI/RFI interference, and its effect on communication signal transmission.

T. Do not route any data communication cable within two feet of any light fixture, HVAC unit, service access area, electric panel, or any device containing a motor or transformer.

U. Communication cable will not be installed in the same conduit, raceway, tray, duct, or track with line voltage electrical cable without a metallic barrier, meeting NEC requirements.

V. Maximum cable pulling tension should not exceed 25 pounds force (110 N) or the manufactures recommendation, whichever is less.

W. Any pulling compounds utilized must be approved by the cable manufacturer and shall not degrade the strength or electrical characteristics of the cable.

X. No terminations or splices shall be installed in or above ceilings.

Y. Cable bends shall not be tighter that the manufacturers' suggested bend radius.

Z. Mount all equipment firmly in place such that vibration or jarring will not activate an alarm, supervisory, or trouble signal. Route cable in a professional, neat and orderly installation.

AA. Provide for adequate ventilation to all equipment and take precautions to prevent electromagnetic or electrostatic hum.

BB. All conduit, ducts, track, and raceways shall be supported from the structure at industry standard intervals for the size specified, utilizing proper anchoring devices. Cable fill may not exceed the manufacturers' instructions for each type of support.

CC. All installation hardware shall be Grade 5 or higher and must be rated for overhead rigging where applicable. Verify grade of each nut, bolt, and other hardware prior to installation.

DD. Use Loctite "ThreadLocker" on nuts and bolts to make the connect tighter.

EE. Use lock or "split" washers inside of every nut. Double nutting and lock nuts are allowed, but lock or "split" washers are required.

FF. All eyebolts or eye nuts must be forged steel, not turned or welded.

GG. Shackles and Turnbuckles shall be used as necessary. All shackles and turnbuckles must be rated for overhead rigging and lifting. Secure shackle and turnbuckle pins with Locktite "ThreadLocker". Carabiners, Quick Links, and other similar devices are not to be used under any circumstances.

HH. 3/16" Aircraft Cable/Wire Rope is to be used to mount speakers, unless otherwise noted. Aircraft cable is to be secured using aluminum 3-16" x 1" wire rope swage sleeves, not copper. Avoid using wire rope clips.

II. Aircraft Cable/Wire Rope is preferred, but 3/8-Inch chain may be used as an alternate.

JJ. In either case, Wire Rope or Chain, **DO NOT** wrap a beam, perlin, truss, or other structural element without using a Web Sling or Roundsling properly rated for the load being installed. If a sling is not available, use Unistrut, Unistrut Beam Clamps, Forged Eyebolts, and other Grade 5 and Higher Hardware to properly attach to the structural element, and then attach the Wire Rope or Chain to the Eyebolt using proper Shackles and Turnbuckles. Connecting Links, Quick Links, Snap Links, Spring Clip Links, Snap Links, or any other type of non-welded or non-forged shall be accepted. If these are used, the contractor will be required to reinstall the equipment properly at the contractor's expense.

KK. DO NOT penetrate any steel structure to install bolts or other hardware. Again, attach unistrut to the steel, and attach the equipment to the unistrut. Penetrating steel can weaken the steel structure.

LL. Work
1. Perform Work in compliance with the applicable standards listed herein and governing codes and regulations of the authorities having jurisdiction and the Contract Documents.
    a. Drawings and specification requirements govern where they exceed Code and Regulation requirements.
    b. Where requirements between governing Codes and Regulations vary, the more restrictive provision applies.
    c. Nothing in the Contract Documents grants authority or permission to disregard or violate any legal requirements.

MM. Coordination
1. Coordinate with other trades as called for in the specifications and/or drawings, and as needed for any, and all associated work as required.
2. Submit Requests for Information (RFI) for any major changes or changes requiring additional cost. All RFIs must be submitted in a timely fashion. Do not wait until the end of the project to notify the engineer of issues that will hold up the project.

3.4 TERMINATION PRACTICES

A. Use Neutrik standards for all stripping and soldering practices.

B. Preserve wire twists as closely as possible to point of termination (0.5" maximum) to keep signal impairment to a minimum.

C. Avoid twisting cable jacket during installation.

D. Install Teflon tubing on drain or ground wires, to prevent the drain or ground wire making incorrect contact with other wires or the connector.

E. Install Heat Shrink on the end of the PVC jacket surrounding the wire pairs.

F. The Contractor shall observe proper circuit polarity and loudspeaker wiring polarity. Properly and clearly label all connections and wires as to function and polarity. Connectors shall be wired as follows:

1. 3-Pin XLR connectors

Pin Number	Connection	Wire Color
1	Ground (shield)	Bare
2	Positive + (High)	Red
3	Negative - (Low)	Black

2. 5-Lug Screw Terminals

Pin Number	Connection	Wire Color
1	Ground (shield)	Bare
2	Positive + (High)	Red
3	Negative - (Low)	Black
4	RVC	White
5	RVC Ground	Green

3.5 BUSHINGS

A. Provide a plastic snap in bushing at each box opening, passage through a metal stud, and at the end of all open conduit stubs or sleeves prior to cable installation to protect the cabling from damage:
1. Box openings - Thomas & Betts Knockout Bushing Series 3210, or equivalent
2. Metal stud passage - Thomas & Betts Twist It Bushing Catalog Number SB1216-SC, or equivalent
3. Conduit ends - Thomas & Betts Anti-Short Bushing Series 390 or Tite-Bite Combination Couplings Series 442, or equivalent

B. Bushings must be put on boxes, stud passages, and conduits prior to wires being run in the space. Bushings that are cut indicate that the bushing was put on after the wires were pulled, and the wires may be damaged. Therefore, the wire must be replaced. Verifying that the bushings are in place is the responsibility of the contractor pulling the wire.

3.6 J-HOOKS

A. Attachments for cabling support shall be spaced at approximately 48 to 60 inches on center. The cable bundle shall not be allowed to sag more than 12 inches mid-span between attachments. Attachments shall be sized as follows:
Single cables or bundles up to four cables may be supported directly by the building structure.
Bundles up to 1/2" dia. (Ten 1/4" cables) 2" bridle ring, Caddy #4BRT32 or equivalent

Bundles up to 3/4" dia. (Sixteen 1/4" cables)	3/4" J-Hook, Caddy #CAT12 or equivalent
Bundles up to 1-5/16" dia. (Fifty 1/4" cables)	1-5/16" J-Hook, Caddy #CAT21 or equivalent
Bundles up to 2" dia. (Eighty 1/4" cables)	2" J-Hook, Caddy #CAT32 or equivalent

B. Do not mix different signal strength cables on the same J-Hook (i.e. fire alarm with telephone/data cable). Multiple J-Hooks can be placed on the same attachment point, up to the rated weight load of the attachment device.

C. J-Hooks must be attached directly to structure where possible.

3.7 FIRESTOP

A. A fire-stop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure. Fire-stop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.

B. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate fire-stop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure).

C. Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly fire-stopped.

D. Fire-stop systems shall be UL Classified to ASTM E814 (UL 1479) and shall be approved by a qualified Professional Engineer (PE), licensed (actual or reciprocal) in the state where the work is to be performed.

E. A drawing showing the proposed fire-stop system, stamped/embossed by the PE shall be provided to the Owner's Technical Representative prior to installing the fire-stop system(s).

F. All fire-stop systems shall be installed in accordance with the manufacturer's recommendations and shall be completely installed and available for observation by the local authorities prior to cable system acceptance.

3.8 LABELING OF EQUIPMENT

A. Provide each terminal strip with a unique descriptor and a numerical designator for each terminal. Show terminal strip descriptor and designator on system schematic drawing.

B. Provide logical and legible cable and wiring label permanently affixed for easy identification.
   1. Labels on cables to be adhesive strip type covered with clear heat-shrink tubing. Factory stamped heat shrink tubing may be used in lieu of the adhesive strip style.
   2. Wiring designator to be an alpha-numeric code unique for each cable. Actual cable designation assignments to be determined by Contractor. Add cable designation codes to system schematic drawings.
   3. Locate the cable designator at the origination and destination of each circuit within 3 inches of the point of termination or connection. Provide cable designator on circuits with intermediate splice points with an additional suffix to indicate each segment.

3.9 ENGRAVING

A. Text font: 1/8-inch block sans serif characters unless noted otherwise.

B. On dark materials, provide white characters; on stainless steel or brushed natural aluminum plates, or light-colored materials, provide black characters.

C. Provide at least two lines of text with first line listing the general device name, e.g., amplifier. Second line to include schematic reference of the device, e.g., AMP-1.

D. Equipment label: black with white characters except where indicated.

3.10 COMMISSIONING

A. Prior to energizing or testing the system, ensure the following:
1. All products are installed in proper and safe manner according to manufacturer's instructions.
2. Insulation and shrink tubing are present were required.
3. Dust, debris, solder splatter, etc. is removed.
4. Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.
5. Labeling has been provided.
6. Temporary facilities and utilities have been properly disconnected, removed and disposed of off-site.
7. Products are neat, clean and unmarred and parts securely attached.
8. Broken work, including glass, raised flooring and supports, ceiling tiles and supports, walls, doors, etc. have been replaced or properly repaired, and debris cleaned up and discarded.

B. Prior to energizing the System verify and perform the following tests and adjustments in compliance with applicable EIA standards.
1. Electronic devices are properly grounded.
2. Test each AC power receptacle with a circuit checker for proper hot, neutral and ground connections.
3. Verify each individual component is operating properly.
4. Verify each individual component's performance meets the manufacturer's published performance for this unit.
5. Measure and record the DC resistance between the technical ground in any equipment rack or console and the main building ground. Resistance should be 0.15 ohms or less.

C. Audio Signal Paths
1. Verify operation from each source device through all switching, amplification and distribution devices.

D. Remote Input Verification Test
1. Using a microphone or portable signal generator, connect to each microphone/line level receptacle throughout the facility.
2. Verify that the receptacle under test appears at the correct input and is operating properly.
3. In a similar manner, check all remote tie-lines and media related lines for correct wiring and labeling.

E. RFI and Parasitic Oscillation
1. With systems operating check to ensure that all systems are free from spurious oscillation and radio frequency interference in the absence of audio signal.

F. Buzzes, Rattles and other Distortions
   1. Adjust the system for normal operating level in the space. Apply a slow sine wave sweep from 60 Hz to 3 KHz and listen carefully for buzzes, rattles and other objectionable distortions.
   2. Correct the cause of the defect. If the cause is not from the system. Bring the cause to the attention of the GC, indicating cause and suggestive corrective actions.

3.11 FINAL OBSERVATION & TESTING

A. Upon completion of installation, initial adjustments, tests, and measurements specified in Part 3, and submission and review of the results, a final observation and test shall be performed by the Owner or Owner's representative no earlier than two weeks after receipt of the written results.

B. Provide a minimum of one (1) person for observation and testing familiar with aspects of the System to assist the Owner.

C. The process of testing the System may necessitate moving and adjusting certain components.

D. Testing includes operation of each major system and any other components deemed necessary. Perform tests and provide required test equipment, tools and material required to make any necessary repairs, corrections, or adjustments.

E. The following procedures shall be performed on each System:
   1. Observation of the methods and means employed to incorporate the System within the facility.
   2. Verification of proper operation, from controlling devices to controlled devices.
   3. Verification of proper adjustment, balance, and alignment of equipment for optimum quality and to meet the manufacturer's published specifications. Establish and mark normal settings for each level control, and appropriately record these settings within the Record Documents.
   4. Other tests on equipment or systems deemed appropriate.

F. In the event the need for further adjustment or work becomes evident during testing, the Contractor is to continue his work until the System is acceptable at no addition to the contract price. If approval is delayed because of defective equipment, or failure of equipment or installation to meet the requirements of these specifications and any extension of the observation and testing period is required, the Contractor shall pay for additional time and expenses of the Owner at the standard rate in effect at that time.

3.12 CLEANUP AND REPAIR

A. The Contractor is required to clean-up any messes made while working on the job site, and to repair any damage caused during the installation process.

3.13 CLOSE-OUT DOCUMENTS

A. Contract Close-Out Documents are documents both indicating that the contract has been fulfilled as specified and drawn, as well as the owner documents. These documents will be presented to the general contractor prior to final payment for the general contractor to verify that all work has been completed.

B. Provide submittals in accordance with Conditions of the Contract and Division 1, Submittal Procedures section unless otherwise indicated, after substantial completion but prior to final observation.

C. Contract Close Out Documents include all of the following:
   1. Company Information
      a. Company Name
      b. Company Address City, State and Zip Code
      c. Company Phone Number
      d. List of Company Personnel that performed the work for the project
      e. Copies of all Personnel Certification that performed work on the project
   2. Copies of the Contract Documents for reference
   3. Copies of the Approved Submittals
   4. Copies of any changes and/or change orders

D. Owner Documents include all of the following
   1. Company Information
      a. Company Name
      b. Company Address City, State and Zip Code
      c. Company Phone Number
      d. List of Company Personnel that performed the work for the project
      e. Copies of all Personnel Certification that performed work on the project
   2. Table of Contents
   3. Statement of Warranty explaining what the warranty covers, as called out in these specifications, and explaining how the Owner is to obtain warranty services from the contractor.
   4. Printed Copies of Equipment Owner's and Instruction Manuals
      a. Documents that were included with the equipment will not be accepted
      b. All manuals shall be the same sized sheets. Printed front and back is acceptable.
      c. Manuals shall be organized in the order in which they appear in the specifications.
      d. If more than one system was installed, indicate the separation of systems by inserting dividers and labeling them properly. (i.e. Auditorium Sound System, Auditorium Video System, Gymnasium Sound System, etc.)
   5. A copy of the As-Built Drawings shall be printed on 11"x17" and folded so they fit with the other sheets. The As-Built Drawings shall reflect exactly how the system(s) were installed, and the labels that were used, to make tracing wires and connections easy.
   6. All Owner Documents shall be placed in a 3-Ring Binder of proper size to contain all documentation. The 3-Ring Binder shall be labeled both on the outside of the front flap, as well as on the binding of the 3-Ring Binder.
   7. A full-sized set of plans shall be included with the 3-Ring Binder.
   8. Copies of all Programming Software, Firmware, Codes, Modules Used, Graphics, and Uploaded Programs shall be included with the Owner Documents. These shall be presented on a single USB Thumb Drive with each copy of the Owner Documents.
      a. All Programming Software, Firmware, Codes, and Compiled and Uploaded Programs shall be completely Unlocked so the Owner can utilize them in the future.
   9. Three complete copies of the Owner Documents shall be presented to the general contractor with the Contract Close Out Documents.

3.14 DRAWINGS, MANUALS, AND TRAINING

A. As-built drawings and operating & maintenance manuals may be electronically transmitted in PDF format (preferred) or paper copies may be provided in quantities indicated in Division 1. Paper copies shall be printed 8-1/2"x11" copies of the manuals, organized including index tabs in a 3-ring black binder of sufficient size. Manuals that are shipped with the product WILL NOT be accepted as a substitute.

B. Upon completion of the installation, and prior to final inspection, the Contractor shall furnish as-built drawings. Reissuance of the Architect/Engineer drawings for the “as-built” drawings WILL NOT be accepted.

C. In addition, the contractor shall furnish complete operating & maintenance manuals listing the manufacturer’s name(s), including technical data sheets. Manuals shall include wiring diagrams to indicate internal wiring for each device and the interconnections between the items of equipment. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system. Provide a parts list with manufacturer and model number for commonly replaced parts. Include complete instructions for inspection, testing, and maintenance of the system including wiring diagrams. Include manufacturer’s operation, maintenance, and troubleshooting manuals. Include copies of manuals for each item that is powered or passive that impacts the system from an operational value or from a troubleshooting value. Also, copies of all programming sheets used to program the system. Maintain one (1) complete and up-to-date manual at the contractor’s place of business for the life of the system.

D. The Contractor shall conduct formal on-site training sessions. The sessions shall be conducted by the contractor. The personnel conducting the training shall have the proper qualifications to conduct said training. Provide documented general instructions as follows:
   1. Provide Instruction to the maintenance personnel to include the location, inspection, maintenance, testing, and operation of all system components. Provide a minimum of two (2) hours per system.
   2. Provide instruction to the designated users on the operation of the system(s) and how to utilize the system to their best benefit. Provide a minimum of two (2) hours per system.
   3. A log of each attendee of the training shall be included with the final documentation. Each attendee shall print and sign their name and include their email address and phone number as a record of their attendance.
   4. The individual conducting the training shall provide their direct contact information, including but not limited to, phone number and email address, for direct contact from anyone involved in the training.

3.15 WARRANTY

A. For **TWO (2) YEARS** following the date of substantial completion, the Contractor is required to warranty labor and products. The finished project is to be free of defects and deficiencies, and to operate as specified and drawn. All repairs and/or replacements during the warranty period are to be performed without claim for further payment.

B. This warranty is to be concurrent to the manufacturer’s warranty period.

C. Response times for the warranty periods are as follows:
   1. Answer/Return Initial Service requests within twenty-four (24) hours.
   2. Asses the issues within forty-eight (48) hours.
   3. Have issues repaired and/or replaced within five (5) business days of the Initial Service request.

D. Contact information for warranty services shall be included with the closeout documents.

E. Thirty (30) days prior to the end of the warranty period, the Contractor shall inspect all systems to make sure they are in proper working order. The Contractor shall also notify the Owner that the Contractual Warranty Period is about to expire, so that the Owner can also verify that everything is in proper working order.

END OF SECTION

ELECTRONIC SAFETY AND SECURITY

DIVISION 28

28 05 00 GENERAL ELECTRONIC SAFETY AND SECURITY SYSTEM REQUIREMENTS
28 13 27 BUILDING ACCESS CONTROL SYSTEM
28 21 23 VIDEO SURVEILLANCE SYSTEM

SECTION 28 05 00

GENERAL ELECTRONIC SAFETY AND SECURITY SYSTEM REQUIREMENTS

PART 1 – GENERAL

1.1 WORK INCLUDES

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

B. Electronic Safety and Security Systems complete including, cabling, special backboxes, hardware and all other required devices and equipment.

C. Installation of system equipment per specifications.

D. Supply in a timely manner to the electrical contractor special backboxes for installation as required.

E. Coordinate wireway, raceway, power, and outlet requirements with the builder and the electrical contractor.

F. Electronic Safety and Security Systems Contractors shall provide and install prior to cable installation plastic snap in bushings at each box opening, passage through a metal stud, and at the end of all open conduit stubs or sleeves to protect the cabling from damage.

G. Furnishing of all required materials, equipment, tools, scaffolding, labor, and transportation necessary for the complete installation of the Electronic Safety and Security systems as shown on the drawings and as specified herein.

H. Cable pathways, conduit, and cable support systems shall be complete with bushings, de-burred, cleaned, and secure prior to installation of cable.

I. It is the intent of these specifications to provide complete installations although every item necessary may not be specifically mentioned or shown.

1.2 WORK TO BE INCLUDED BY THE ELECTRICAL CONTRACTOR IN BASE CONTRACT PROPOSAL

A. Provide utility services conduit as outlined on drawings as required.

B. All required conduit for accessibility to attic space.

C. Furnishing and installation of all required standard back boxes and conduit.

D. Installation of special back boxes supplied by Division 28 contractor(s).

E. Furnishing and installation of all floor boxes, surface raceways, and other wireways which are detailed or specified under Division 26.

F. Provide equipment-mounting boards as outlined on drawings.

G. Provide equipment grounding system, conductors, and bus bars and as outlined in Division 26.

H. Provide 120-volt power and hook-up to equipment provided in Division 28.

I. Coordination of requirements of Division 28 with the Builder.

1.3 WORK NOT INCLUDED

A. Contractors shall make no agreement that obligates the Owner to pay any company providing communications, monitoring, or other services. Contractors shall not make selection, purchase, or installation of interconnect instruments/equipment to be used on this project.

1.4 RELATED SECTIONS

A. The conditions of the Division 0, Division 1, Division 26 requirements, and the contract requirements that include the General Conditions and the Supplementary Conditions apply to work of this division.

B. Section 26 05 34 - Provisions For Communication, Security & Safety Systems.

1.5 CODES, STANDARDS, AND THEIR ABBREVIATIONS

A. General:
   1. Perform all work in strict accordance with the requirements and recommendations stated in the codes and standards except when requirements are exceeded by the contract documents.
   2. In addition to the requirements outlined in other sections of the specifications the following standards are imposed as applicable to the work in each instance:
      a. OSHA Safety and Health Regulations for Construction.
      b. NFPA No. 70 National Electrical Code.
      c. NESC National Electrical Safety Code, ANSI Standard C2.
      d. NEiS National Electrical Installation Standards.
      e. Local Codes and Ordinances.

B. Where local codes or practices exceed or conflict with the NEC, it shall be the Contractor's responsibility to perform the work in accordance with the local code prevailing and local interpretations thereof. Any such additional work shall be performed at no additional cost to the Owner.

C. Materials and components shall be UL listed and labeled by Underwriters Laboratories, Inc. for the intended use under the latest appropriate testing standard.

D. The Contractor shall obtain all permits required to commence work. Upon completion of the Work, the Contractor shall obtain and deliver to the Owner's Representative a Certificate of Inspection and Approval from the State Board of Fire Underwriters, the City of Midlothian, Texas, and other authorities having jurisdiction. The Contractor shall pay required permit fees.

1.6 LIST OF ASSOCIATIONS AND STANDARDS:

ADA:	Americans with Disabilities Act.
ANSI:	American National Standards Institute, 1430 Broadway; New York, NY 10018.
ASTM:	American Society for Testing and Materials, 1916 Race Street; Philadelphia, PA 19103.
BICSI:	(RCDD5 Standards), 8610 Hidden River Parkway, Tampa, FL 33637
CBM:	Certified Ballast Manufacturers Association, 2116 Keith Building; Cleveland, Ohio 44115.

IEEE:	Institute of Electrical and Electronics Engineers, 345 East 47th Street; New York, NY 10017.
ICEA:	Insulated Cable Engineers Association, P.O. Box P, South Yarmouth, MA 02664.
NEC:	National Electrical Code; NFPA No. 70.
NECA:	National Electrical Contractors Association, Inc., 7315 Wisconsin Ave.; Washington, DC 20014.
NEMA:	National Electrical Manufacturers Association, 155 East 44th Street; New York, NY 10017.
NESC:	National Electrical Safety Code, ANSI Standard C2.
NFPA:	National Fire Protection Association, 60 Batterymarch Street; Boston, MA 02110.
OSHA:	Occupational Safety and Health Administration, US Department of Labor; Washington, DC 20402.
TAS:	Texas Accessibility Standards (TAS) Article 9102.
UL:	Underwriters Laboratories, Inc., 333 Pfigsten Road; Northbrook, IL 60062.

A. Nothing in the Contract Documents shall be construed to permit work not conforming to these codes.

B. When two or more codes or standards are applicable to the same work, then the stricter code or standard shall govern.

C. The date of the code or standard is that in effect on the date of issue stated on the contract documents, except when a particular publication date is specified.

D. The Contractor shall comply with all State, Federal, NFPA, local codes and ordinances that may alter any part of the plans or specifications. The Contractor shall bear all costs for correcting any deficiencies due to non-compliance.

E. Where local codes and ordinances are not in writing or on record, but local precedence have been set, the Owner shall pay for any additional resulting cost.

1.7 DEFINITIONS

A. Approval: It is understood that approval must be obtained from the Architect in writing before proceeding with the proposed work. Approval by the Architect of any changes, submitted by the Contractor, will be considered as general only to aid the Contractor in expediting his work.

B. The Builder: The primary contractor engaged to oversee the construction project. They may be technically described as a Construction Manager, General Contractor, Managing Construction Contractor, et cetera.

C. The Contractor: The Contractor engaged to execute the work included a particular section only, although he may be technically described as a Subcontractor to the Builder. If the Contractor, engaged to execute said work, employs Sub-Contractors to perform various portions of the work included under a particular Section, they shall be held responsible for the execution of this work, in full conformity with Contract Document requirements. The Contractor shall cooperate at all times and shall be responsible for the satisfactory cooperation of his Subcontractors with the other Contractors on the job so that all of the various sections and phases of work may be properly coordinated without unnecessary delays or damage.

D. The Electrical Contractor: The Electrical Contractor shall be engaged to execute the work included Division 26 only.

E. PDF file or .pdf: The filename extension associated with “Portable Document Format” files, which are multi-platform computer files in the ISO 32000-1:2008 open standard format developed and licensed by Adobe Systems. These files are a digital electronic representation of text, documents, images, and technical drawings in a font and color-accurate fixed-layout format that is platform and display resolution independent. PDF files can be electronically transmitted, viewed, or printed with various free PDF reader application programs, and may allow markups/comments with various PDF editing application programs.

F. Provide: Defined as requiring both the furnishing and installation of the item or facility indicated, complete in all respects and ready for operation unless otherwise specifically noted.

1.8 SCHEDULE OF VALUES, APPLICATION FOR PAYMENT

A. The Contractor shall in accordance with the General Provisions of the Contract, including General and Supplementary Conditions, and Division 1, complete a Schedule of Values and Applications for Payment. When a portion of this work separately funded, including donations or E-Rate, the contractor shall accommodate this in the Schedule of Values and Applications for Payment. For E-Rate eligible portions of this work, the contractor will be required to participate in the E-Rate program, comply with all E-Rate regulations, and provide billing as needed. The contractor shall coordinate with the Owner to file Form 471 or latter edition and/or other forms as may be required.

1.9 WARRANTY

A. The Contractor shall warranty his work against defective materials and workmanship for a period of one year from date of acceptance of the job.

B. Neither the final payment nor any provisions in Contract Documents shall relieve the Contractor of the responsibility for faulty materials or workmanship.

C. He shall remedy any defects due thereto and pay for any damage to other work resulting there from, which shall appear within a period of one year from date of substantial completion.

D. The Owner shall give notice of observed defects with reasonable promptness.

E. This Warranty shall not be construed to include the normal maintenance of the various components of the system covered by these specifications.

1.10 SITE VISIT

A. Before submitting a proposal, each proposed contractor shall examine all plans and specifications relating to the work, shall visit the site of the project, and become fully informed of the extent and character of the work required, including all required utilities.

B. No consideration will be granted for any alleged misunderstanding of the materials to be furnished or the amount of work to be done, it being fully understood that the tender of a proposal carries with it the agreement to all items and conditions referred to herein, or indicated on the accompanying plans or required by nature of the site of which may be fairly implied as essential to the execution and completion of any and all parts of the work.

1.11 SUBMITTALS

A. Submittal procedures shall be per Division 1 - General Requirements.

B. Provide a complete submittal for each section as specified.

C. Submit complete submittal package within 30 calendar days after award of this work for approval. Equipment is not to be ordered without approval. Partial submittals are not acceptable for review. Each submittal shall include a dated transmittal.

D. A submittal may be electronically transmitted in PDF file format (preferred) or paper copies may be provided in quantities indicated in Division 1. Paper copies shall be organized including index tabs in a 3-ring black binder of sufficient size.

E. Each Product data submittal shall include:
   1. A cover sheet with the name and location of the project, the name, address, and telephone number of the Contractor, and the name, address, and telephone number of the submitting sub-contractor. Include on or after the cover sheet sufficient space for review stamps.
   2. An indication of any deviations from Contract Document requirements, including variations and limitations. Show any revisions to equipment layout required by use of selected equipment.
   3. A product data index and complete equipment list including for each product submitted for approval the manufactures name and part number, including options and selections.
   4. Cut-sheets or catalog data illustrating the physical appearance, size, function, compatibility, standards compliance, and other relevant characteristics of each product on the equipment list. Indicate by prominent notation (an arrow, circle, or other means) on each sheet the exact product and options being submitted.
   5. Submit design data, when the scope of work requires, including calculations, schematics, risers, sequences, or other data.
   6. When the contract requires extended product warranties, submit a sample of warranty language.
   7. Any resubmittal shall include a complete revised equipment list and any product data that is revised.

F. Submit shop or coordination drawings, when specified or the required for the scope of work, which include information that will allow to the Contractor to coordinate interdisciplinary work and when necessary guide the manufacturer or fabricator in producing the product. Shop or coordination drawings shall be specifically prepared to illustrate the submitted portion of work, this may require diagrams, schedules, details, and accurate to scale equipment and device layouts prepared using a CAD or BIM engineering drawing program.

G. The Engineer's review of submittals is only for confirmation of adherence to design of project and does not relieve the Contractor of final responsibility for furnishing all materials required for a complete working system and in complying with the Contract Documents in all respects.

1.12 PROJECT RECORD DOCUMENTS

A. The Contractor shall keep a set of plans on the job, noting daily all changes made in connection with the final installation including exact dimensioned locations of all new and uncovered existing utility piping outside the building.

B. Upon submitting his request for final payment, he shall turn over to the Architect/Engineer, for subsequent transmittal to the Owner revised plans showing "as installed" work.

C. In addition to the above, the Contractor shall accumulate during the jobs progress the following data in PDF file format (preferred) or paper copies to be turned over to the Architect/Engineer for checking and subsequent delivery to the Owner:

1. All warranties, guarantees, and manufacturer's directions on equipment and material covered by the Contract.
2. PDF file or paper copies of all Shop Drawing prints and CAD or BIM engineering drawing program files.
3. Any software programs, data/programming files, passwords, special interface cables, or keys that may be needed to maintain or access equipment.
4. Set of operating instructions. Operating instructions shall also include recommended maintenance and seasonal changeover procedures.
5. Any and all other data and/or plans required during construction.
6. Repair parts lists of all major items and equipment including name, address, and telephone number of local supplier or agent.
7. The first page, or pages, shall have the names, addresses, and telephone numbers of the following:
   a. Builder and all Contractors.
   b. Major Equipment Suppliers
   c. Submit communication systems warranties.

1.13 TRAINING

A. Upon completion of the work and at a time designated by the Architect, provide formal training sessions for the Owner's operating personnel to include location, operation, and maintenance of all Electronic Safety and Security systems equipment and systems.

B. See other sections for time requirements.

1.14 PLANS AND SPECIFICATIONS

A. The intent of the project drawings is to establish the types of systems and functions, but not to set forth each item essential to the functioning of the system.

B. Electrical drawings are generally diagrammatic and show approximate location and extent of work.

C. Install the work complete including minor details necessary to perform the function indicated. Provide Electronic Safety and Security systems (including all hook-ups) complete in every respect and ready to operate.

D. If clarification is needed, consult the Architect/Engineer.

E. Review pertinent drawings and adjust the work to conditions shown. Where discrepancies occur between drawings, specifications, and actual field conditions, immediately notify the Architect/Engineer for his interpretation.

F. The Architect/Engineer reserves the right to make any reasonable change in the location of any part of this work without additional cost to the Owner.

1.15 PRODUCT SUBSTITUTIONS:

A. Descriptions and details, acceptable manufacturers' names listed, and specific manufacturer and model number items indicated in the plans and specifications shall establish a standard of quality, function, and design. Manufacturers and model numbers listed "no exceptions" shall not be substituted without specific notice in an addendum. Otherwise, where a specific manufacturer's product is indicated, products of other manufacturers listed as acceptable may be submitted for approval based on the substitute product being, in the opinion of the Engineer, of equivalent or better quality than that of the product specified.

B. Proposed contractors wishing to propose systems which differ in manufacturer, features, functions, or operating characteristics from those outlined in these specifications must do so in writing to the specifying authority at least ten (10) days prior to the proposal opening.

C. For manufacturers equipment or models other than that specified, the proposed contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment. Proposals must include detailed information showing all deviations from the system as specified and include relevant technical and cost data. This shall include a complete description of the proposed substitution, drawings, catalog cuts, performance data, test data, or any other data or information necessary for evaluation.

D. The Engineer will consider all such submittals and the Architect will issue an addendum listing items that the Engineer considers acceptable. Only such items as specified or approved as acceptable will be installed on this project.

E. Substitute products for which the proposed contractor does not obtain prior approval will not be considered acceptable for this project. Final approval of the alternate system shall be based on the decision of the Owner and Architect. Prior approval to make a proposal for this project does not automatically ensure the system will be an acceptable equivalent.

F. The Contractors' proposal represents that the contract proposal price is based solely upon the materials, equipment, and labor described in the Contract Proposal Documents (including addenda, if any) and that he contemplates no substitutions or extras.

G. The manufacturer of the proposed substitute unit shall provide samples for evaluation, when required, at no charge and non-returnable.

H. Requests for substitution are understood to mean that the Contractor:
   1. Has personally investigated the proposed substitution and determined that it is equivalent or superior in all respects to that specified.
   2. Will provide the same guarantee for the substitution that he would for that specified.
   3. Will, at no cost to the Owner, replace the substitute item with the specified product if the substitute item fails to perform satisfactorily.
   4. After Award of the Contract, substitutions will be considered only under one or more of the following circumstances:
      a. The substitution is required for compliance with subsequent interpretations of code or insurance requirements.
      b. The specified product is unavailable through no fault of the Contractor.
      c. The manufacturer refuses to warranty the specified products as required.
      d. Subsequent information indicates that the specified product is unable to perform properly or to fit in the designated space.
      e. In the Engineer's sole judgment, the substitution would be in the Owner's best interest.
      f. Revisions to the electrical system caused by substitutions shall be under the supervision of the Engineer, at a standard hourly rate charged by the Engineer. Charges from the Engineer, Architect, and Electrical Contractor shall be paid by the Contractor originating the changes.

1.16 FUTURE USE CABLING

A. When cabling is installed for future use, it shall be identified with a tag of sufficient durability to withstand the environment involved.

B. Locations and Existing Conditions:
   1. Location and condition of any existing equipment or services, when shown, have been obtained from substantially reliable sources, are shown as a general guide only, without guarantees as to accuracy.
   2. The Contractor will examine the site, verify all requirements, service points, and availability of all services required to complete this project. No consideration will be granted for any alleged misunderstanding of the materials and labor to be provided as necessitated by nature of the site including those items that may be fairly implied as essential to the execution and completion of any and all parts of this project.

1.17 IMPLEMENTATION

A. Verify phasing in regard to systems and coordinate before energizing any system.

B. When required during phases of construction to maintain existing systems in service in particular areas, provide temporary wiring and connections as necessary to accommodate construction.

1.18 OPERATION OF NEW EQUIPMENT PRIOR TO PROJECT COMPLETION

A. When the phasing of a project requires that electronic safety and security systems are operable in certain areas and the Owner needs to operate the equipment the contractor shall make such provisions. The warranty period shall commence on new equipment when it is operated for the beneficial use of the Owner. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, properly adjust, and complete all punch list items before final acceptance by the Owner. In these cases, the date of acceptance and the start of the warranty may be different dates.

1.19 PROTECTION OF EQUIPMENT AND MATERIALS

A. The Contractor shall take such precautions as may be necessary to protect his apparatus from damage.

B. This shall include the creation of all required temporary shelters to protect any apparatus above the floor of the construction and the covering of apparatus in the completed building with tarpaulins or other protective covering.

C. Failure to comply with the above to the satisfaction of the Owner's inspector will be sufficient cause for the rejection of the equipment in question and its complete replacement by the Contractor.

1.20 FINAL OBSERVATION

A. It shall be the duty of the Contractor to make a careful observation trip of the entire project, assuring themselves that the work on the project is ready for final acceptance before calling upon the Architect/Engineer to make a final observation.

B. To avoid delay of final acceptance of the work, the Contractor shall have all necessary bonds, warranties, receipts, affidavits, et cetera, called for in the various articles of these specifications, prepared and signed in advance, together with a letter of transmittal, listing each paper included, and shall deliver the same to the Architect/Engineer at or before the time of said final observation. The Contractor is cautioned to check over each bond, receipt, et cetera, before preparing for submission to verify that the terms check with the requirements of the specifications.

C. The following and other provision of Division 1 General Conditions will be required at time of final completion:
   1. Final clean up completed.
   2. All systems are fully operational, all material and devices installed.
   3. As built (as installed) drawings and operations manuals.

1.21 PROHIBITED MATERIALS

A. No new asbestos, lead, or materials containing these substances shall be permitted in this project. The Contractor shall consult the Architect concerning these materials if their presence is suspected. All work in or around existing asbestos or lead materials is at the sole risk of the Contractor and his personnel.

1.22 CUTTING AND PATCHING

A. Notify the Builder sufficiently ahead of construction of any floors, walls, ceiling, roof, et cetera, of any openings that will be required for his work.

B. The Contractor shall see that all sleeves required for his work are set at proper times to avoid delay of the job.

C. All necessary cutting of walls, floors, partitions, ceilings, et cetera, as required for the proper installation of the work under this Contract shall be done at the Subcontractor or at the Subcontractor's expense in a neat and workmanlike manner, and as approved by the Architect/Engineer.

D. Patching of openings and/or alterations shall be provided by the Electronic Safety and Security Subcontractor or at the Subcontractor's expense in an approved manner.

E. No joists, beams, girders, or columns shall be cut by any Contractor without first obtaining written permission of the Architect/Engineer.

F. All openings in firewalls and floors shall be completely sealed after installation for a completely airtight installation. Sealing material shall be non-combustible, and UL approved. The installed sealing assembly shall not cause the fire rating of the penetrated structure to be decreased.

G. All openings in exterior walls shall be sealed watertight.

H. Seal voids around conduits penetrating fire-rated assemblies and partitions using fire stopping materials and methods in accordance with NFPA and local codes.

1.23 MANUFACTURERS' INSTRUCTIONS

A. All equipment and devices shall be installed in accordance with the drawings and specifications, manufacturer's instructions, and applicable codes.

B. Where specifications call for installation of a product to be in accordance with manufacturer's instructions and/or where manufacturer's instructions are required for installation of a product, it shall be the contractor's responsibility to obtain the necessary applicable manufacturer's instructions and install the product in accordance with the manufacturer's instructions.

C. It shall be the Contractor's responsibility to install all equipment, materials, and devices shown on the plans and as called out in these specifications even if manufacturer's instructions are absolutely unattainable.

1.24 INSTALLATION

A. Cooperation with trades of adjacent, related or affected materials or operations, and or trades performing continuations of this work under subsequent contracts are considered a part of this work. In order to effect timely and accurate placing of work and to bring together, in the proper and correct sequence, the work of such trades, including work provided under a Division 1 allowance.

B. The Electronic Safety and Security Contractor shall coordinate installation of the Electronic Safety and Security systems with the Builder, Electrical, Mechanical, and Plumbing Contractors to ensure a complete working system for the Owner.

C. Where required for accessibility all conduit and boxes for all Electronic Safety and Security systems shall be provided by the Electrical contractor as specified, including systems in Division 28, any and all allowances shall be included. Normally low voltage wiring shall run open and supported in accessible attic space. All low voltage wiring in exposed areas such as gyms, stages, shops, and field houses shall be enclosed in conduit. Coordinate with and verify with Division 26 to provide required conduit and boxes at locations and heights as required.

D. Conduit, innerduct, track, or raceway shall conceal and protect wiring in exposed areas, within walls, through in- accessible areas, floors, chases, under slab, crawlspaces, or underground.

E. All conduit, duct, track, and raceway runs shall be spaced apart to allow for maintenance, such as the installation of couplings, without disturbing adjacent pathways.

F. All work must be performed by workers skilled in their trade. The installation must be complete whether the work is concealed or exposed.

G. Provide stainless screw/bolt hardware wherever stainless devices are used and in potentially wet areas.

H. Coordinate the actual locations of devices and outlets and equipment with building features and mechanical equipment as indicated on architectural, structural, and mechanical drawings. Review with the Architect any proposed changes in outlet or equipment location. Relocation of devices, before installation, of up to 3 feet from the position indicated, may be directed without additional cost. Remove and relocate outlets placed in an unsuitable location when so requested by the Architect.

1.25 ADDITIONAL MATERIALS: INCLUDE IN THE BASE CONTRACT PROPOSAL

A. All costs to provide five additional safety and security device locations including all cable and devices as directed by the Architect. Conduit and standard back boxes by Division 26 Electrical Contractor.

PART 2 – PRODUCTS

A. Not Applicable

PART 3 – EXECUTION

A. Not Applicable

END OF SECTION

SECTION 28 13 27

BUILDING ACCESS CONTROL SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDES

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

B. Expand the existing Owner's Lenel•S2 Security Building Access Control System as indicated on the project plans.

C. Provide all equipment, materials, labor, software, licensing, supervision, and services necessary for or incidental to the installation of a card reader operated door access control system expansion, as shown or indicated on the drawings and as specified.

D. This access control system shall provide for controlled entry doors to be released when a valid credential card is presented to the credential card reader located adjacent to the door. This system shall monitor for unauthorized entry attempts, control access to the building, and log entry information. The system shall in no way impede free emergency exit from the building. Exit from the building shall not require special effort or knowledge.

E. In shall be the responsibility of this Contractor to obtain all required approvals and certifications from authorities having jurisdiction.

F. It shall be the responsibility of the Electrical Contractor to provide and install all conduit systems, standard electrical boxes, and operating power for the building access systems as outlined on the project drawings. This Contractor shall coordinate all system requirements with and provide special back boxes to the Electrical Contractor prior to installation of conduit.

G. The electrical contractor shall provide 120-volt power as required to the security system through separate dedicated branch circuits, maximum 20 amperes each. Each such circuit shall be labeled at the power distribution panel as ACCESS CONTROL. The location of all circuit breakers serving the system shall be posted in the control unit cabinets. Each cabinet shall be grounded securely to the building grounding system.

H. Provide all testing, documentation, training, and warranty service as outlined in these specifications.

I. NOTE: All electric door locks shall be configured for fail-safe un-delayed egress operation and fail-secure to prevent unauthorized entry on loss of power.

1.2 RELATED SECTIONS

A. Section 26 05 34 - Provisions For Communication, Security & Safety Systems.

B. Section 27 10 30 - Data and Telephone Cable Plant.

C. Section 28 05 00 - General Electronic Safety and Security System Requirements.

1.3 CODES AND REGULATIONS

A. Perform all work in strict accordance with the requirements and recommendations stated in the codes and standards except when requirements are exceeded by the contract documents.

B. The equipment, materials, and installation shall confirm to the latest version of all applicable codes, standards and regulations of authorities having jurisdiction including the following:
   1. NFPA 70, National Electrical Code.
   2. NFPA 72, National Fire Alarm and Signaling Code.
   3. Americans with Disabilities Act.
   4. Texas Accessibility Standards.
   5. International Building Codes (IBC).
   6. Local and State Building Codes.
   7. All requirements of the local Authority Having Jurisdiction (AHJ).

1.4 SUBMITTALS

A. Submittal procedures: See Section 28 05 00.

B. Submit a complete submittal package within 30 calendar days after award of this work for approval. Equipment is not to be ordered without approval. Partial submittals are not acceptable for review. Each submittal shall include a dated transmittal.

C. Submittal may be electronically transmitted in PDF file format (preferred) or paper copies may be provided in quantities indicated in Division 1. Paper copies shall be organized including index tabs in a 3-ring black binder of sufficient size.

D. Quality Assurance Submittal:
   1. Letter from manufacturer stating that the Contractor is an Authorized Factory Distributor for the area where the project is located.
   2. The Contractor and Manufacturer shall supply sufficient information to indicate that the proposed system is based on the latest hardware, software technology available.
   3. Current copy of the Contractors Electronic Access Control Device Security Company license issued by the Texas Department of Public Safety Private Security Board.
   4. Calculations for device circuit current drop and battery backup calculations.

E. Product Data Submittal including special boxes, cable, and other material as requested by the Architect including:
   1. A cover sheet with the name and location of the project, the name, address, and telephone number of the Contractor, and the name, address, and telephone number of the submitting sub-contractor. Include on or after the cover sheet sufficient space for review stamps.
   2. An indication of any deviations from Contract Document requirements, including variations and limitations. Show any revisions to equipment layout required by use of selected equipment.
   3. A product data index and complete equipment list including for each product submitted for approval the manufactures name and part number, including options and selections.
   4. Cut-sheets or catalog data illustrating the physical appearance, size, function, compatibility, standards compliance, and other relevant characteristics of each product on the equipment list. Indicate by prominent notation (an arrow, circle, or other means) on each sheet the exact product and options being submitted.
   5. Submit design data, when the scope of work requires, including calculations, schematics, risers, sequences, or other data.
   6. Any resubmittal shall include a complete revised equipment list and any product data that is revised.

F. Submit shop drawings locating all components of the system, indicating circuit routing, cable type, and gauge. Shop or coordination drawings shall include information that will allow to the Contractor to coordinate interdisciplinary work and when necessary guide the manufacturer or fabricator in producing the product. Shop or coordination drawings shall be specifically prepared to illustrate the submitted portion of work, this may require diagrams, schedules, details, and accurate to scale equipment and device layouts prepared using a CAD or BIM engineering drawing program.

1.5 QUALIFICATIONS OF A PROPOSED CONTRACTOR

A. Proposed contractors who do not currently possess the necessary qualifications, trained and experienced personnel, financial capacity, and meet the other requirements herein described will be disqualified.

B. The Contractor shall be currently licensed under the Texas Department of Public Safety Private Security Board as an Electronic Access Control Service Installer Company to sell, install, and service private security systems.

C. The proposed contractor, as a business entity, shall be an authorized distributor and designated representative of the security panel manufacturer, with full warranty privileges, and shall have been actively engaged in the business of selling, installing, and servicing commercial building alarm systems for a period of at least 5 years.

D. Recently formed companies are acceptable only if specific pre-approval is requested, and granted by the Architect/Engineer, based on experience of key personnel, current and completed projects, and all licensing requirements are met 10 working days prior to the contract proposal date.

E. All employees working on the project must be registered alarm system installers. The Contractor shall employ factory trained technicians capable of supporting the maintenance of the system. No contract employees are allowed unless they have been to the factory service school within the last 18 months. A certificate of this training shall be provided with the Contractors submittal.

F. The contractor shall employ full time local technicians and installers. The manufacturer shall maintain a full time factory employed service staff for product support and service.

G. The proposed Contractor shall have an office within 150-miles of the job site, staffed with trained technicians who are qualified and licensed to supervise the installation, to be responsible that the system is installed as submitted, to conduct system start up and perform a 100 percent operational audit of all installed devices, to instruct the Owners representatives in the proper operation of the system, and to provide service throughout the warranty period. The contractor shall be capable of dispatching technicians to repair a system within six hours of a service request.

H. The proposed contractor shall be fully experienced in the design and installation of the type of security system herein specified and shall furnish with the contract proposal an itemized list of the installations of the type specified herein. The list shall include the name of the project, date of completion, the amount of the contract, the name, and telephone number of a qualified person to contact for reference. This list must contain at least two (2) projects within a 150-mile radius of the project to allow the owner to visit the job site for review of the system installation and service. Each reference project listed must utilize equipment by the same manufacturer as the proposed system.

I. The Contractor shall employ factory-trained technicians capable of supporting the maintenance of the system. No contract employees are allowed unless they have been to the factory service school within the last 18 months. A certificate of this training shall be provided with the contractors' submittal.

J. The Proposed Contractor shall not have any grievances or complaints of record regarding workmanship, code compliance, or service response. A Proposed Contractor that has any prior finding(s) of a code or license violation or has any litigation in process concerning the installation of a communication system is unacceptable.

K. The ability of a proposed Contractor to obtain plans and provide a performance bond shall not be regarded as the sole qualification of the Contractors' competency and responsibility to meet the requirements and obligations of the contract.

L. The Builder shall be satisfied that a proposed Contractor meets all the requirements expressed herein before including the Contractor's proposal in the project.

M. The Owner may investigate, as they deem necessary to determine the ability of the proposed Contractor to perform the work. The proposed Contractor shall furnish to the Owner with any information or data requested for this purpose.

N. The Owner reserves the right to reject any contract proposal if the evidence submitted, or their investigation, fails to indicate that the Contractor is qualified to fulfill of any part of the contract or to complete the work contemplated therein.

O. The Owner reserves the right to reject the proposal of any Contractor who has previously failed to perform properly, or complete on time, contracts of a similar nature.

PART 2 – PRODUCTS

2.1 GENERAL

A. The system provided shall be fully compatible and integrated with the Owners existing system hardware, software, credentials, and credential database.

B. Provide complete and satisfactorily operating Access Control System as described herein, using materials and equipment of types, sizes, ratings, and performances as indicated. Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction, in accordance with published product information. Coordinate the features of all materials and equipment so they form a functional system, with components and interconnections matched for optimum performance of specified functions.

C. The system and all components shall be tested and found suitable for the specified purpose as part of a commercial building security system by a nationally recognized approvals agency acceptable to the AHJ.

D. The control units, power supplies, batteries, subassemblies, software, firmware, and all cable, devices control units, power supplies, batteries, subassemblies, software, firmware, cable, and all accessories provided shall be listed and labeled by Underwriters Laboratories, Inc. for commercial security system use under the latest appropriate testing standard.

E. All date keeping hardware, firmware, and software provided shall be fully compliant with the calendar year designated in four-digit date format. Any time equations must function normally, leap year, and daylight savings time must be supported.

F. Only equipment devices have been shown on the contract drawings. Specific wiring between equipment has not been shown.

G. The system shall include but not be limited to all control units, power supplies, batteries, subassemblies, card sensors, software, firmware, and all cable, door release equipment, and all accessories required to provide a complete operating system.

H. All equipment and components shall be installed in strict compliance with manufacturers' recommendations and the requirements of the components UL listing. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, electrical requirements, cable types, and physical equipment sizes, etc., before beginning system installation. Refer to the manufacturers' riser / connection diagrams for all specific system installation/termination/wiring data.

I. All equipment and components shall be new, and the manufacturer's current model. All like devices shall be of the same manufacturer and model number.

J. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.2 ACCEPTABLE BUILDING ACCESS CONTROL SYSTEM MANUFACTURER

A. Descriptions and details, acceptable manufacturers' names listed, specific manufacturers' model numbers indicated in the project plans and specifications, and other pertinent information herein are intended to establish minimum standards of quality, compatibility, functions, features, and performance of the equipment to be furnished. Manufacturers and model numbers listed "no exceptions" shall not be substituted without specific notice in an addendum. Otherwise, where a specific manufacturer's product is indicated, products of other manufacturers listed as acceptable may be submitted for approval based on the substitute product being, in the opinion of the Engineer, of equivalent or better quality than that of the product specified.

B. Proposed contractors wishing to propose any product substitution must do so in writing to the specifying authority at least ten (10) days prior to the proposal opening.

C. For manufacturers equipment or models other than that specified, the proposed contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment. Proposals must include detailed information showing all deviations from the system as specified.

D. Substitute products for which the proposed contractor does not obtain prior approval will not be considered acceptable for this project. Final approval of alternate products shall be based on the decision of the Owner and Architect. Prior approval to make a proposal for this project does not automatically ensure products will be an acceptable equivalent.

E. It is the responsibility of the Contractor to provide all features and functions as outlined in these specifications. The functions and features specified are vital to the operation of this facility; therefore, inclusion in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of this specification

F. The existing system, which is the school District standard, and the manufacturers model numbers, functions, and features described in this specification section are those of the **Lenel•S2 Security** building access control system with **Mercury Access Technology** hardware, this shall constitute the quality, compatibility, features, and performance of the equipment to be furnished, **no exceptions**. Any other proposed manufactures devices or software must be pre-approved.

2.3 BUILDING ACCESS CONTROL SYSTEM INSTALLATION REQUIREMENTS

A. Contractors shall provide all material, labor, tools, and equipment required to perform the work described and make complete, safe, and functional systems.

B. Contractors shall pay for and acquire all permits and inspections required by controlling authority.

C. All work shall be installed in accordance with state, local, and national codes.

D. Contractors shall warrant his workmanship and materials for a period of one year from the date of acceptance upon completion of the project.

E. All work shall be done by mechanics skilled in the particular trade involved, under responsible supervision.

F. No surface mounted raceway or conduit will be accepted on any new construction job.

G. Seal all wall and floor penetrations with approved sealant.

H. Access control system cabling can share conduit with intrusion alarm system cabling.

I. All cabling must be suspended up off the ceiling grid.

J. Contractor must provide the Owner with all security equipment MAC addresses and network drop information.

K. The access control contractor shall provide and install all required parts and local cabling to get the system online and operational; this includes power supplies required to operate the electrified exit devices.

L. Where 110 Volt electrical receptacles as needed to accommodate system transformers, they shall be provided by the electrical contractor at exact locations coordinated with the access control contractor.

M. Where 110 Volt electrical receptacles as needed to accommodate door release hardware/ electrified exit devices, they shall be provided by the electrical contractor in an accessible location at 12” above the finished ceiling and within 20 feet of door location.

N. Data drops shall be provided by the cabling contractor for security equipment. See Section 27 10 30 - Data-Telephone Cable Plant.

O. Exterior card reader locations shall be prepared including a recessed single-gang weatherproof metal back box located approximately 44’’ centered from the ground and 12’’ off the opened door edge to the side, with a ½” secured rigid or flex conduit with pull string to an accessible interior location concealed above the finished ceiling.

P. Controlled door frames shall be prepared as detailed on the plans including a ½" secured rigid or flex conduit with pull string to an accessible interior location concealed above the finished ceiling.

Q. Continuous hinges with built in power transfers (concealed ribbon wire) are not acceptable.

R. Mag-locks are not acceptable.

2.4 RELATED WORK - NETWORK CONNECTIVITY

A. The system shall utilize the owner's Ethernet system backbone for all security devices communications.

B. No Ethernet cabling, network RJ-45 jacks, or patch cords are included in the scope of this Specification Section.

C. The Awarded Contractor from Section 27 will provide this Contractor with a terminated network drop at security devices, and the required TCP/IP configuration settings: static IP address, domain, gateway, and subnet mask.

D. This contractor will program and test all access control system devices for connection to the network.

E. This contractor will provide complete programming of all device parameters in accordance with the Owners requirements.

F. For each building access control system intelligent door controller (network controller) panel requiring an Ethernet network connection, the Division 27 contractor shall provide a dedicated data drop located above the ceiling at the panel location. The building access control system contractor shall provide and install a conduit pathway from the top of the panel up to the ceiling space with plastic snap in bushings at each conduit end or transition used for this connection. The Division 27 contractor shall provide the patch cable, and the building access control system contractor shall route and connect the patch cable between the faceplate jack above the ceiling and the panel Ethernet network connection jack.

2.5 ACCEPTABLE MANUFACTURES

A. All references to manufacturer's model numbers and other pertinent information herein are intended to establish minimum standards of performance, function, and quality. With approval, equivalent, compatible, UL listed equipment from other manufacturers may be substituted for the specified equipment as long as all requirements are met.

B. The system herein specified is the **Lenel•S2 Security Access Control System** software with **Mercury Access Technology** hardware, fully licensed solution, utilizing various door controller model numbers and this shall constitute the functionality, quality, compatibility, and performance of the system to be furnished, **no exceptions**.

2.6 PRIMARY SERVER DATABASE AND PROGRAMMING REQUIREMENTS

A. This site shall utilize the existing District server. Incorporate the new doors in this construction package into the existing data base.

B. Include any licensing requirements or fees for using the management software and accompanying client software. The contractor will load the most current software revision being used at the time of the software programming.

C. District programming requirements for the access control system will require unique and specialized programming. The feature set below will be required customized programming completed by vender of choice.
   1. Map navigation will be a complete as-built of the installation to include all access control icons to coincide with actual install.
   2. Program integration with the VMS for pop up video on alarm. Reference the drawings for camera locations that are tied to select doors or events.

D. Programming each panel at the location. Program each panel on the District network, IP addresses and VLAN configuration will be provided by the District.

2.7 ACCESS SYSTEM CONTROLLER BOARDS

A. Provide as required, Mercury Security intelligent controllers, door reader interface sub-modules and I/O modules for the additional doors per the drawings as follows:
   1. Intelligent multi-port Ethernet-enabled controller model S2-LP-1502.
   2. Card reader interface sub-controller module model S2-MR52-S3.
   3. Input module model S2-MR16IN-S3.
   4. Output module model S2-MR16OUT-S3.

2.8 ACCESS CONTROL SYSTEM PANELS/ENCLOSURES

A. Provide as required to house all modules, enclosures suitable for surface wall mounting and shall include battery backup power supplies where required. Each enclosure shall include a removable back plate for module mounting, a keyed lock, and tamper switch. Access power enclosures shall include a single AC power connection (for power supply), a pre-wired LSP power section. Each tamper switch shall be wired to a module input circuit for monitoring by the system.

B. Provide UL 294 listed power limited source, filtered and electronically regulated 12 VDC output power supplies with short circuit/thermal overload protection, and automatic switch over to stand-by battery backup when AC fails. Each power supply shall include a built-in charger and sealed type battery.

C. Power supply/chargers and batteries shall provide operating and emergency power to the system. Provide sufficient battery capacity for operation without AC power for all control modules, card readers, and electric unlocking/locking devices for a minimum of 4-hours (design calculations required). Include a 20% safety factor in battery calculations to ensure adequate performance for the service life of batteries.

D. Enclosures and power supplies shall be LifeSafety Power Inc., FlexPower, MCLASS Mercury series, or equivalent.

E. Each controller module shall be installed complete with fully licensed software.

2.9 ACCESS CONTROL SYSTEM LAYOUT PLANS

A. The Contractor shall provide a mock-up of the layout plan documents prior to mounting.

B. Provide mounted inside each Access Control System Panel/Enclosure cover, or adjacent to the panel location, an 8 ½” x 11” laminated layout plan including the following information:
   1. In the upper left corner of the layout provide the name of the installing company, phone number and Texas Security License number.

2. In the upper right corner of the page provide the Name of the campus and the MDF or IDF room I.D./location.
3. Under the room I.D. list:
   a. IP address of the panel
   b. Subnet mask.
   c. Gateway IP address
4. Place the service contract information (contact or department and phone number or just phone number will be acceptable).
5. Beneath the common information, provide a line diagram indicating each module location and the name of the device attached to each input on each card.

2.10 PROXIMITY CARD READERS

A. Controlled access door location as indicated on plans shall be provided with an entry card reader to allow access to authorized individuals as scheduled.

B. Each proximity card reader shall mount on a standard single-gang electrical wall box or on the surface of an interior or exterior wall.

C. Outdoor weatherproof back boxes shall be flush mounted and connected to a ½" threaded rigid pipe conduit and sealed. The reader casing shall be grounded to prevent electrostatic discharge from interfering with the operation of the reader.

D. Threaded conduit is required for outdoor applications and dielectric grease shall be used to coat field connections.

E. Manufacturer / Model: Provide HID Multiclass SE R40 card readers, match to existing District readers or standards, as required.

2.11 AUXILIARY POWER SUPPLY

A. Manufacturer/Model: Provide as required Altronix power supplies model AL600ULACM, Life Safety Power or approved equivalent.

2.12 DOOR RELEASE HARDWARE

A. Install all wiring and control devices necessary to enable limited access to the indicated points of entry. Each controlled access door shall be fitted with a door switch (above), control relay, and an electric latch or strike. Each controlled door shall be setup to allow entry as permitted by the building access system, to prevent unauthorized entry, and to allow free exit from the building without special knowledge or effort. Magnetic force holding or 'mag' locks are prohibited by this specification.

B. NOTE: All electric door locks shall be configured for fail-safe un-delayed free egress operation and fail-secure to prevent unauthorized entry on loss of power.

C. Verify exact hardware requirements with Division 08 and Door Hardware Schedules including door and frame preparation details.

D. Only when the door hardware does not include an integrated Request-to-Exit Switch, provide a request-to-exit sensor (see below).

2.13 DOOR SWITCHES (ACCESS SYSTEM DOOR CONTACTS)

A. Provide door switches where indicated on floor plans with conduit run to a nearby, accessible, junction box located above ceiling.

B. Door frame flush mount: Provide recessed magnetic contact door switch – GRI Telemark Corp. model 180-12-G, closed loop, 12” leads, gray, 0.50” diameter, with wire leads as required or equivalent.

2.14 REQUEST-TO-EXIT SWITCH OR SENSOR

A. The system shall not be programmed to unlock a door automatically from a request to exit signal, as this presents a security breach. The request to exit signal shall be used only to indicate a normal exit status, as opposed to a forced entry. Exit shall be made with the normal door hardware and shall not be impeded or assisted by the electronic system. Exit shall not be affected if the power is off and the battery backup exhausted.

B. When no request-to-exit switch is provided integrated into the door hardware (see above), provide at the exit side of each controlled door a request-to-exit passive infrared detector with x-y targeting and digital signal processing.

C. Request-to-Exit Sensor Manufacturer / Model: Provide Bosch Security Systems DS160 Series High Performance Request-To-Exit Detector, no exceptions.

2.15 CABLING (PLENUM RATED)

A. All exposed wiring shall be NEC type CMP, plenum cable.

B. All exterior cabling shall be in rigid metallic conduit. All connectors must be fastened, tied, and crimped for maximum reliability.

C. Avoid if at all possible, junctions or splicing - all junctions in cable shall be made by proper splicing techniques in a junction box.

D. All cabling is to be concealed where construction permits.

E. This contractor shall provide and install new and unused ASTM bare stranded copper conductor wire per ANSI/NEMA codes. Follow the manufacturer's instructions. All wire shall the type recommended by the manufacturer for security system applications.

F. All cable shall have a machine printed label located within 2” from every terminal block and within 6” from all other connections utilizing self-laminating flexible vinyl film labels.

G. Wire gauge shall be selected per circuit based on cable length and current requirements.

LOW VOLTAGE CABLE TYPES

Device	Conductors	Min. AWG	Description
RS-485 Serial Interface*	1-Pair Twisted	24	Overall Shield
Entry Intercom	4-Pair UTP	23	Category 6
Point Contact/Relay	1-Pair Twisted	22	Overall Shield
Two Point Contact/Relay	2-Pair Twisted	22	Overall Shield
Three Point Contact/Relay	3-Pair Twisted	22	Overall Shield
Four Point Contact/Relay	4-Pair Twisted	22	Overall Shield
Five Point Contact/Relay	5-Pair Twisted	22	Overall Shield
Six Point Contact/Relay	6-Pair Twisted	22	Overall Shield

Credential Reader (RS-485)	1-Pair Twisted	24	Overall Shield
Credential Reader (TTL)	6-Wire	18	Overall Shield
Composite	Multi-Conductor	22	Overall Shield
Low Voltage Power Combined	2-Pair Twisted	18	Unshielded
Low Voltage Power or Siren	1-Pair Twisted	18	Unshielded

LOW VOLTAGE CABLE TYPES

Device	Conductors	Min. AWG	Description
Low Voltage Power	1-Pair Twisted	16	Unshielded
Low Voltage Power	1-Pair Twisted	14	Unshielded
Low Voltage Power	1-Pair Twisted	12	Unshielded

* Belden 82841 or equivalent up to 4,000’ per RS-485 serial circuit.

2.16 CABLE TIES (PLENUM RATED)

A. HALAR Fluoropolymer plenum rated cable ties shall be furnished and installed to attach wire bundles to supports and for appropriate wire management as required.
   1. HALAR wire tie, 4.0”, miniature - Panduit PLT1M-C702 or equivalent.
   2. HALAR wire tie, 7.4”, standard - Panduit PLT2S-C702 or equivalent.
   3. HALAR wire tie, 11.6”, standard - Panduit PLT3S-C702 or equivalent.

2.17 SURGE AND AMPERAGE PROTECTION

A. Electrical surge protection shall be provided for all service entrance connections and on each copper pair that connects one building to another (i.e. any other portion of a building complex not under one continuous roof) at both exit points to prevent damage to equipment.

B. Security system circuit surge protectors shall be mounted in a standard grounded metallic electric box. Shall be Ditek, 12345-A Starky Road, Largo, Florida 34643 model numbers as follow, multiple pair units are available, or equivalent:
   1. Part No. DTK-1LVLP-X 2-wire protector for 12 Volt circuits.
   2. Part No. DTK-1LVLP-D 2 wire protector for 5 Volt circuits.
   3. Part No. DTK-Z8LVLP-GP 8-pair protector for RS-485 circuits.

2.18 CABLE ROUTING, INSTALLATION, AND SUPPORT

A. System wiring and equipment installation shall be in accordance with good engineering practices as established by the NFPA. Wiring shall meet all state and local electrical code requirements.

B. Cable pathways, conduit, and cable support systems shall be complete with bushings, de-burred, cleaned, and secure prior to installation of cable.

C. Before energizing the system check all cables for correct connections and test for short circuits, ground faults, continuity, and insulation.

D. In all exposed areas such as gymnasiums, shops, field houses, janitors’ closets, or mechanical / electrical rooms all access system cable shall be fully enclosed in conduit.

E. Access system cables shall be run in conduit stubs from wall boxes to accessible areas above finished ceilings. Conduit shall be required only within walls and concealed spaces to provide access. Provide bushings to protect the cable from damage for conduit ends, box openings, and passage through metal studs.

F. Access system cables shall be run in bundles above accessible ceilings and supported from building structure by j-hooks, conduit or cable tray. Cabling shall be loosely bundled with cable ties randomly spaced at 30 to 48 inches on center, cable ties shall not be tight enough to deform cabling and shall not be used to support the cabling.

G. Do not attach any supports to joist bridging or other lightweight members. The support system shall provide a protective pathway to eliminate stress that could damage the cabling.

H. Mount all equipment firmly in place such that vibration or jarring will not interfere with system operation. Route cable in a professional, neat, and orderly installation.

I. The cable shall not be crushed, deformed, skinned, crimped, twisted, or formed into tight radius bends that could compromise the integrity of the cabling.

J. Access system cable must not be fastened to electrical conduits, mechanical ductwork / piping, sprinkler pipes, or routed to obstruct access to hatches, doors, utility access panels, or service work areas. Do not route cables through fire doors, ventilation shafts, grates, or parallel for more than four-feet with line voltage electrical conductors. Access system cables shall not be run loose on ceiling grid or ceiling tiles.

K. Support shall be provided by mounting appropriate fasteners that may be loaded with multiple cables. If the weight load is carried by the support rod or wire, the support assembly may attach to the ceiling grid for lateral stabilization. The required support wires for the ceiling grid or light fixtures shall not be utilized. Any fastener attached to the ceiling grid shall not interfere with inserting or removing ceiling tiles. The cable pathway of supports must be positioned at least 12 inches above the ceiling grid.

L. All cable shall have a label on both ends utilizing self-laminating, flexible vinyl film, non-smear, machine printed labels.

M. Each cable run shall include a three-foot service loop with wire tie located in the ceiling above the control unit panel. This is to allow for future re-termination or repair.

N. Provide for adequate ventilation to all equipment housings and take precautions to prevent electromagnetic or electrostatic hum.

O. All conduit, ducts, track, and raceways shall be supported from the structure at industry standard intervals for the size specified, utilizing proper anchoring devices. Cable fill may not exceed the manufacturers' instructions for each type of support.

P. All conduit, duct, track, and raceway runs shall be spaced apart to allow for maintenance, such as the installation of couplings, without disturbing adjacent pathways.

Q. Each cable run shall be free of splices. No terminations, splices, or equipment will be installed in or above ceilings.

R. All cabling will be placed with regard to the environment, EMI/RFI interference, and its effect on communication signal transmission.

S. Do not route any communication cable within two feet of any light fixture, HVAC unit, service access area, electric panel, or any device containing a motor or transformer.

T. Access system cable will not be installed in the same conduit, duct, or track with line voltage electrical cable.

U. Maximum cable pulling tension shall not exceed 25 pounds force (110 N) or the manufactures recommendation, whichever is less.

V. Any pulling compounds utilized must be approved by the cable manufacturer and shall not degrade the strength or electrical characteristics of the cable.

2.19 TERMINATION PRACTICES

A. Strip back only as much cable jacket as required to terminate.

B. Do not "loop" over wiring terminals, the cable could come loose, and the condition not be detected as an open circuit or disconnected device.

C. Preserve wire twists as closely as possible to point of termination (0.5" maximum) to keep signal impairment to a minimum.

D. Avoid twisting cable jacket during installation.

2.20 BUSHINGS

A. Provide a plastic snap in bushing at each box opening, passage through a metal stud, and at the end of all open conduit stubs or sleeves prior to cable installation to protect the cabling from damage:
   1. Box openings - Thomas & Betts Knockout Bushing Series 3210, or equivalent.
   2. Metal stud passage - Thomas & Betts Twist It Bushing Catalog Number SB1216-SC, or equivalent.
   3. Conduit ends - Thomas & Betts Anti-Short Bushing Series 390 or Tite-Bite Combination Coupling Series 442, or equivalent.

2.21 CEILING MOUNTED DEVICE BOX HANGERS

A. All ceiling mounted devices including smoke detectors, heat detectors, remote power/status LEDs, ceiling mounted strobes and horn/strobes, et cetera, when mounted in a drop ceiling shall be supported by an electrical box hanger (Caddy #512 or #512A for deep boxes - 24" span), or equivalent. Box hangers shall be attached to the ceiling grid only for lateral stabilization, separate support wires shall be provided. The required support wires for the ceiling grid or light fixtures shall not be utilized. The backbox shall be flush and level with the bottom of the ceiling tile and the hole neatly cut for a finished appearance when the device is installed.

B. Device and box hanger assemblies shall not be supported solely by suspended ceilings. Fasteners and supports shall be adequate to support the required load.

2.22 J-HOOKS

A. Attachments for cabling support shall be spaced at approximately 48 to 60 inches on center. Each cable bundle shall be routed with enough slack to prevent damage to cables but not allowed to sag more than 12 inches mid-span between attachments. Attachments shall be sized as follows:
   Single cables or bundles up to four cables may be supported directly by the building structure.

Bundles up to 1/2" dia. (Ten 1/4" cables)	2" bridle ring, Caddy #4BRT32 or equivalent
Bundles up to 3/4" dia. (Sixteen 1/4" cables)	3/4" J-Hook, Caddy #CAT12 or equivalent
Bundles up to 1-5/16" dia. (Fifty 1/4" cables)	1-5/16" J-Hook, Caddy #CAT21 or equivalent

Bundles up to 2" dia. (Eighty 1/4" cables) 2" J-Hook, Caddy #CAT32 or equivalent
Split bundles greater than 2" dia. or provide cable tray.

B. Do not mix different signal strength cables on the same J-Hook (i.e. access system with telephone/data cable). Multiple J-Hooks can be placed on the same attachment point, up to the rated weight load of the attachment device.

2.23 COMMUNICATIONS CIRCUIT SURGE PROTECTION

A. Provide surge protection shall be provided for all exterior devices, communications service or antenna entrance connections, and for each circuit that connects one building to another (i.e. any other portion of a building complex not under one continuous roof) at both entry/exit points to prevent damage to equipment.

B. Each surge protector shall be mounted in a standard grounded metallic electric box or equipment backboard with a separate ground wire ran directly to the ground bus bar or equipment panel ground stud, do not daisy chain ground wires.

C. Surge protectors for low voltage communications signal and control circuits with a data rate from 200kbps to 2Mbps, nominal voltage as listed below AC or DC. Each module shall protect up to two pairs using hybrid design multi-stage SAD technology, shall be Ditek 2MHLP series field replaceable modules with MB Series mounting bases for one to five modules, or equivalent, model numbers as follows:
70 to 75 Volt circuit, 4 wire protector with base DTK-2MHLP75BWB.
48 to 50 Volt circuit, 4 wire protector with base DTK-2MHLP48BWB.
36 Volt circuit, 4 wire protector with base DTK-2MHLP36BWB.
24 Volt circuit, 4 wire protector with base DTK-2MHLP24BWB.
12 Volt circuit, 4 wire protector with base DTK-2MHLP12BWB.
0 to 6 Volt circuits, 4 wire protector with base DTK-2MHLP5BWB.

D. Surge protectors for low voltage communications high data rate voice, data and signaling data and loop circuits, or serial communication, nominal voltage as listed below AC or DC. Each module shall provide Line-Ground (All) protection modes, maximum surge current: 2,000 Amps per pair (6V-50V) or 9,000 Amps per pair (75V-130V), and maximum continuous current: 5 Amps to 0.15 Amps, shall be Ditek LVLP series or equivalent, model numbers as follows:
115 to 130-Volt circuit, 2-pair protector, 10-12 AWG, DTK-2LVLAWGRUV.
95-Volt circuit, 2-pair protector, 10-12 AWG, DTK-2LVLAWGSGR.
75-Volt circuit, 2-pair protector, 10-12 AWG, DTK-2LVLAWGSPK.
48 to 50-Volt circuit, 2-pair protector, 16-22 AWG, DTK-2LVLPOPX.
24 to 30-Volt circuit, 2-pair protector, 16-22 AWG, DTK-2LVLPLV.
12 to 14-Volt circuit, 2-pair protector, 16-22 AWG, DTK-2LVLPX
0 to 6-Volt circuit, 2-pair protector, 16-22 AWG, DTK-2LVLPD.
0 to 6-Volt circuit, 8-pair protector (RS-485, RS-232), 16-22 AWG, DTK-8LVLPLVD.

E. Surge protectors for access control devices, types and nominal voltage as listed below. Each module shall provide Line-Ground (All) protection modes, maximum surge current: 2,000 Amps per pair power and 500 Amps per pair data, and maximum continuous current of 3 Amps, shall be Ditek model numbers as follows or equivalent:
1. Wiegand credential reader surge protection 3-pair, 12 to 14-Volt terminal strip, Ditek DTK-3LVLPX.
2. Credential reader surge protection, 4-pair reader and 1-pair each: 12-Volt power, 24-Volt power, 5-Volt data, and 1-Volt signal, Ditek DTK-4LVLPCR.
3. Entry intercom system with data circuit surge protection 1-pair 12/24-Volt power supply, 2-pair 130-Volt voice line, and 1-pair 0 to 6-Volt data circuit, Ditek DTK-4LVTEP.

4. Entry intercom system with door release surge protection 1-pair 12/24-Volt power supply, 2-pair 130-Volt voice line, and 1-pair 24-Volt release solenoid circuit, Ditek DTK-4LVXR.

F. Surge protectors for Ethernet network runs rated up to Category 6A and operating at up to 10-Gigabit data rates. Each module shall protect up all four pairs using hybrid design multi-stage SAD technology which shall automatically reset to protect against multiple surges, Ethernet surge protectors shall be Ditek DTK-CAT6A series as follows:
1. DTK-110RJC6APOE with 110 to RJ-45 connections with PoE.
2. DTK-110C6APOE with 110 to 110 connections with PoE.
3. DTK-110RJC6A with 110 to RJ-45 connections without PoE.
4. DTK-110C6A with 110 to 110 connections without PoE.

G. Surge protectors for analog copper pair PSTN telephone service POTS/Trunk/C.O. line alarm Digital Communicator service lines shall be Ditek DTK-2MHTPWB, or equivalent, 2-pair/lines, maximum ring-up voltage 110V, includes base. In addition, At Telco service connection demarcation point locations servicing an alarm Digital Communicator, provide per line a Suttle Solutions Part # 635B-48, or equivalent, RJ31X surface mount jack with 8-conductor screw terminal board input and factory wired DATA and VOICE labeled, non-keyed RJ-45 output ports, with line seizure port shorting bar (1&4, 5&8) for alarm reporting device service.

H. Surge protectors for coaxial cable shall be suitable for analog and digital signals up to 2 Ghz, and shall feature 75 Ω nominal impedance, Center Pin - Shield, Shield - Ground protection modes, 20,000A surge current rating, a service voltage of 50VDC, and a clamping Voltage of 75VDC. Note: Insertion loss per surge protection module is 0.5dB, include signal attenuation from these devices in signal strength calculations. Surge protectors shall be Ditek VSP series, or equivalent, as follows:
1. Type 'F' connectors Ditek DTK-VSPA or Ditek DTK-VSPA2 (dual).
2. BNC connectors Ditek DTK-VSPBNCA or DTK-VSPBNCA2 (dual).
3. BNC connectors and 24-volt power connections Ditek DTK-PVP27B.
4. PTZ camera surge protection; BNC video, power and data Ditek DTK-DP4P.
5. HD-SDI video Ditek DTK-iBNCHD.
6. Type 'N' antenna connector Ditek DTK-VSPN.

2.24 FIRE STOPPING, DRAFT/NOISE STOPPING, PENETRATIONS, AND CORING

A. UL Listed fire stopping methods that match the fire rating of the wall or floor being penetrated are to be used at all fire barrier penetrations. Seal the interior of the conduit sleeve around the cables and around the outside of the sleeve on each side of the penetration with fire-stop caulk or putty, install according to the manufacturers' instructions.

B. All penetrations through fire rated walls or floors shall feature a suitable length of metal conduit. Hole diameter shall not exceed ½" larger than the conduit or sleeve to be installed. The hole shall be neatly cut, not oversize or irregular. Do not share wall/floor penetrations with ductwork, piping, line voltage electrical conduits, etc.

C. All gypsum board or plaster penetrations shall tool cut using an appropriate hole saw / mandrel or manufactured assembly.

D. Draft/Noise Stopping - All penetrations through non-rated walls shall include draft/noise stopping to minimize the transfer of air and sound between enclosed areas. This shall include but not limited to:

1. Neatly cutting all non-rated wall penetrations with a 1" maximum clearance. All gypsum board or plaster penetrations shall be tool cut using an appropriate hole saw / mandrel or manufactured assembly. The hole shall be neatly cut and not oversize or irregular. Do not share wall penetrations with other types of ductwork, piping, line voltage electrical conduits, communications cabling, etc.
2. Provide and install non-combustible mineral wool, fiberglass, cellulose insulation, caulk, and/or sealant as required. Seal the interior of conduit sleeves around the cables and around the outside of the sleeve on each side of the penetration with caulk or putty, install materials according to the manufacturers' instructions.

E. The Contractor shall make every effort to coordinate with the building Architect, Engineer, Builder, and Electrical Contractor to have sleeves placed in new construction so that later coring or drilling of building structural members will not be required. The Contractor must consult with the building Architect, Engineer, and Builder prior to drilling, coring, or sawing of any wall, floor, etc. All penetrations shall be made at approved, appropriate, locations.

F. Upon approval, the Contractor shall be required to supply all labor, equipment, tools, and materials to create any additional penetrations, and shall provide the sleeve, temporary and final fire stopping. Special care shall be taken not to stress, overheat, or penetrate any building support member. Coring shall be made with equipment appropriate for the dry penetration of concrete and block materials. Under no circumstances shall penetrations be made utilizing a chisel or percussion type equipment. Concrete, block, or plaster cores shall be made by dry saw methods only.

PART 3 - EXECUTION

3.1 SEQUENCE OF OPERATION

A. Scheduled automatic door unlocking/locking of specific entry doors shall be programmed to require verification before being enacted. A credential card from a select group at the local facility (including the manager/assistant manager, etc. as requested) must be presented at the facility within a two-hour period prior to the scheduled unlocking event. This is to prevent the entrance doors from be unlocked when no one is present to supervise and unlocked building, such as due to an unavoidable delay or other unscheduled occurrence. If a scheduled unlocking event is delayed, and a credential card from the select group is presented within two hours after the unlocking event was scheduled, the unlocking shall be enacted immediately.

B. This access control system shall provide for controlled access through entry doors and into restricted areas when a valid credential card is presented to the credential card reader located adjacent to the door, only if the users group access rights and time schedules allow for access. This system shall monitor for unauthorized entry attempts, control access to the building, and log entry information. The system shall in no way impede free emergency exit from the building. Exit from the building shall not require special effort or knowledge. Controlled door locks shall fail secure from outside entry on loss of power and backup power.

C. Door Forced and/or Door Held Open alarms shall have the capacity to be locally annunciated via Auxiliary Output relays on the individual controllers. This annunciation shall be controlled as follows. A direct one-to-one relationship shall be able to be programmed between the Door Forced and/or Door Held Open alarm and the auxiliary output. When either condition exists, the auxiliary output is energized. When either condition is cleared, the auxiliary output is de-energized.

D. Controlled doors using a retractable latch strike shall, on a valid credential card read, activate the output to retract the door latch and immediately allow the exit door to be entered by standard pull lever operation; the door may then be opened without retracting the latch bolt. When the door closes, the latch bolt shall ride over the strike lip. The installation shall include dual switch monitoring, the strike shall have two SPDT contacts; one switch shall monitor the tripper, which is depressed when the latch bolt is inserted into the strike pocket. The second switch shall monitor the condition of the strike lip, indicating open or closed and locked conditions.

E. Controlled doors with frame or mullion retractable strike, on a valid credential card read, activate the output to retract the door strike and immediately allow the exit door to be entered by standard pull lever operation; the door may then be opened without retracting the latch bolt. When the door closes the beveled latch bolt shall ride over the lip and fall into the electric strike pocket. The installation shall include dual switch monitoring, the strike shall have two SPDT contacts; one switch shall monitor the tripper, which is depressed when the latch bolt is inserted into the strike pocket. The second switch shall monitor the condition of the strike lip, indicating open or closed and locked conditions.

F. Controlled doors with a crash bar shall include electric latch retraction and a request-to-exit switch, the access control system shall, on a valid credential card read, activate the output to retract the latch bolt and immediately allow the door to be entered by standard pull handle operation.

G. Where required, the system shall interface with electric door openers utilized for ADA access. This interface shall interconnect to door control interface to mechanically open the door when a valid credential card is read, and the exterior door button is pressed. The exterior button shall also open the door when the door is scheduled to be unlocked without a credential card read. The interior door open button shall always be functional, allowing full egress, regardless of the status of the access control system; the interior button shall also be interfaced to the request to exit function.

H. The request-to-exit switch or sensor shall provide a means for the system to monitor the status of the controlled door and detect a forced entry condition. The request-to-exit signal shall be used only to indicate a normal exit status, as opposed to a forced entry. Exit shall be made with the normal door hardware and shall not be impeded or assisted by the electronic system. Exit shall not be affected if the power is off and the battery backup exhausted.

I. The access system door contact switch shall provide a means for the system to monitor the open/closed status of the controlled door and detect if the door is held open or left ajar after a valid credential card read.

3.2 TESTING, WARRANTY SERVICE

A. A factory trained representative of the manufacturer shall supervise the final connections and testing of the system and it shall be subject to the final acceptance of the Architect/Engineer and Owner.

B. This contractor will thoroughly test all components of the systems and devices proposed herein to assure equipment specifications are met. This contractor will start up, test, and debug systems to ensure that all aspects of the system are working, documented, and reporting properly.

C. This Contractor shall make a thorough inspection and test of the complete installed security system including all components and controls to ensure the following:
   1. Complete and functional system.
   2. Installed in accordance with manufacturer's instructions.
   3. Verify proper operation and processing of signals.

D. The installation will be verified through use of testing procedures designed to test all specific functions and requirements of your system under various operating conditions.

E. This Contractor shall provide a warranty of the installed system against defects in material or workmanship for a period of three (3) years from the date of substantial completion. Any equipment or wiring shown to be defective shall be replaced, repaired, or adjusted free of charge. All labor and materials shall be provided at no expense to the Owner. All equipment will carry a three-year warranty or manufacturer's warranty whichever is greater."

3.3 DRAWINGS, MANUALS, AND TRAINING

A. Upon completion of the installation, and prior to final inspection, the Building Access Control Contractor shall furnish four (4) hard copies and one (1) electronic CAD and PDF copy on CD-R of as-built drawings. In addition, the Building Access Control contractor shall furnish four (4) hard copies and one (1) electronic PDF copy on CD-R of a complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets. Manuals shall include wiring diagrams to indicate internal wiring for each device and the interconnections between the items of equipment. Provide the Owner a copy of the panel control software including the licensed program, site specific data file, and passwords that the Owner may require to maintain the system. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system. Provide a parts list with manufacturer and model number for commonly replaced parts. Include complete instructions for the inspection, testing, and maintenance of the system. Include copies of all programming sheets used to configure the system. As-built drawings and operating and maintenance manuals may be electronically transmitted in PDF file format (preferred) or paper copies may be provided in quantities indicated in Division 1. Paper copies shall be organized including index tabs in a 3-ring black binder of sufficient size.

B. Provide the Owner a copy of the panel control software including the licensed program, site specific data file, and passwords that the Owner may require to maintain the system.

C. Formal on-site training sessions shall be conducted by this Contractor. It shall be the responsibility of this Contractor to coordinate time and location of training sessions with the Owner.

END OF SECTION

SECTION 28 21 23

VIDEO SURVEILLANCE SYSTEM

PART 1 GENERAL

1.1 WORK INCLUDES

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

B. Expand the existing IP based video surveillance system, adding new devices and including related work as herein specified and as indicated on the drawings.

C. Provide all equipment, materials, labor, supervision, and services necessary for or incidental to the expansion the video surveillance, digital recording, security monitoring systems as shown or indicated on the drawings and/or as specified.

D. The primary purpose of this system is to provide continuous monitoring of entrances, exits, and sensitive areas.

E. The client software shall provide authorized users password protected network access to live and archive video with extensive search tools.

F. All equipment will feature battery backup to allow operation during power outages of at least one hour.

G. In shall be the responsibility of the Video Surveillance System Contractor to obtain all required approvals and certifications from authorities having jurisdiction.

H. The Electrical Contractor shall provide a qualified electrical sub-contractor to provide 120-volt power as required to the system through separate dedicated branch circuits, maximum 20 amperes each. Each such circuit shall be labeled at the power distribution panel as SURVEILLANCE SYSTEM. The location of all circuit breakers serving the Video Surveillance System shall be posted in the control unit cabinets. Each cabinet and all surge protection devices shall be grounded securely to the building grounding system.

I. Provide all testing, documentation, training, and warranty service contract as outlined in these specifications.

1.2 RELATED SECTIONS

A. Section 26 05 34 - Provisions For Communication, Security, and Safety Systems.

B. Section 27 10 30 - Data and Telephone Cable Plant.

C. Section 28 05 00 - General Electronic Safety and Security System Requirements.

D. Section 28 13 27 – Building Access Control System.

1.3 CODES AND REGULATIONS

A. Perform all work in strict accordance with the requirements and recommendations stated in the codes and standards except when requirements are exceeded by the contract documents.

B. The equipment, materials, and installation shall confirm to the latest version of all applicable codes, standards and regulations of authorities having jurisdiction including the following:
   1. NFPA 70, National Electrical Code.
   2. Americans with Disabilities Act.
   3. Texas Accessibility Standards.
   4. International Building Codes (IBC).
   5. Local and State Building Codes.
   6. All requirements of the local Authority Having Jurisdiction (AHJ).

1.4 SUBMITTALS

A. Submittal procedures: See Section 28 05 00.

B. Submit a complete submittal package within 30 calendar days after award of this work for approval. Equipment is not to be ordered without approval. Partial submittals are not acceptable for review. Each submittal shall include a dated transmittal.

C. Submittal may be electronically transmitted in PDF file format (preferred) or paper copies may be provided in quantities indicated in Division 1. Paper copies shall be organized including index tabs in a 3-ring black binder of sufficient size.

D. Quality Assurance Submittal:
   1. Letter from manufacturer stating that the Contractor is an Authorized Factory Distributor for the area where the project is located.
   2. The Contractor and Manufacturer shall supply sufficient information to indicate that the proposed system is based on the latest hardware, software technology available.

E. Product Data Submittal including special boxes, cable, and other material as requested by the Architect including:
   1. A cover sheet with the name and location of the project, the name, address, and telephone number of the Contractor, and the name, address, and telephone number of the submitting sub-contractor. Include on or after the cover sheet sufficient space for review stamps.
   2. An indication of any deviations from Contract Document requirements, including variations and limitations. Show any revisions to equipment layout required by use of selected equipment.
   3. A product data index and complete equipment list including for each product submitted for approval the manufactures name and part number, including options and selections.
   4. Cut-sheets or catalog data illustrating the physical appearance, size, function, compatibility, standards compliance, and other relevant characteristics of each product on the equipment list. Indicate by prominent notation (an arrow, circle, or other means) on each sheet the exact product and options being submitted.
   5. Submit design data, when the scope of work requires, including calculations, schematics, risers, sequences, or other data.
   6. Any resubmittal shall include a complete revised equipment list and any product data that is revised.

F. Submit shop drawings locating all components of the system, indicating circuit routing, cable type, and gauge. Shop or coordination drawings shall include information that will allow to the Contractor to coordinate interdisciplinary work and when necessary guide the manufacturer

or fabricator in producing the product. Shop or coordination drawings shall be specifically prepared to illustrate the submitted portion of work, this may require diagrams, schedules, details, and accurate to scale equipment and device layouts prepared using a CAD or BIM engineering drawing program.

1.5 QUALIFICATIONS OF A PROPOSED CONTRACTOR

A. Proposed contractors who do not currently possess the necessary qualifications, trained and experienced personnel, financial capacity, and meet the other requirements herein described will be disqualified.

B. The proposed Contractor shall be currently licensed by the State Board of Private Investigators and Private Security Agencies to sell, install, and service security systems.

C. The proposed contractor, as a business entity, shall be an authorized distributor and designated representative of the security panel manufacturer, with full warranty privileges, and shall have been actively engaged in the business of selling, installing, and servicing commercial surveillance systems for a period of at least 5 years.

D. Recently formed companies are acceptable only if specific pre-approval is requested, and granted by the Architect/ Engineer, based on experience of key personnel, current and completed projects, and all licensing requirements are met 10 working days prior to the contract proposal date.

E. All employees working on the project must be registered security system installers. The Contractor shall employ factory trained technicians capable of supporting the maintenance of the system. No contract employees are allowed unless they have been to the factory service school within the last 18 months. A certificate of this training shall be provided with the Contractors submittal.

F. The proposed contractor shall employ full time local technicians and installers. The manufacturer shall maintain a full time factory employed service staff for product support and service.

G. The proposed contractor shall provide proof from Wisenet that they are a certified dealer and have locally trained technicians (DFW metroplex) for the manufactured products proposed in this solution.

H. The proposed contractor will utilize the authorized manufacturer components and distribution channels in provisioning this Project. Contractors must be prepared to submit authorized manufacturer factory training certificates.

I. The proposed contractor will have a minimum of ten (10) years of recent experience with the proposed manufacturer’s products and will provide a letter of validation from the manufacturer.

J. The proposed contractor shall have previous project experience within the Midlothian Independent School District.

K. The proposed contractor will comply with all federal, state and local statutes regarding qualifications of firms.

L. The proposed contractor will have adequately trained personnel in the usage of such tools and equipment and will provide a quantity of certified technicians as part of their submittal

response. A certified technician will remain a part of the installation and programming team for the entire duration of this project.

M. The contractor must have previously established offices located within 120 miles of the Owners Administration Building, staffed with trained technicians who are qualified and licensed to supervise the installation, to be responsible that the system is installed as submitted, to conduct system start up and perform a 100 percent operational audit of all installed devices, to instruct the Owners representatives in the proper operation of the system, and to provide service throughout the warranty period. The contractor shall be capable of dispatching technicians to repair a system within six hours of a service request.

N. The proposed contractor shall provide proof of licensing by the Texas Board on Private Security run by the Department of Public Safety.

O. The Owner may investigate, as they deem necessary to determine the ability of the proposed Contractor to perform the work. The proposed Contractor shall furnish to the Owner with any information or data requested for this purpose.

P. The Proposed Contractor shall not have any grievances or complaints of record regarding workmanship, code compliance, or service response. A Proposed Contractor that has any prior finding(s) of a code or license violation or has any litigation in process concerning the installation of a communication system is unacceptable.

Q. The Owner reserves the right to reject bid of any bidder who has previously failed to perform properly, or complete on time, contracts of a similar nature.

R. The Owner reserves the right to reject any contract proposal if the evidence submitted, or their investigation, fails to indicate that the Contractor is qualified to fulfill of any part of the contract or to complete the work contemplated therein.

S. The proposed contractor shall have bonding capacity with bid bond, payment/performance bond to support the total value of the project.

T. The proposed contractor shall provide (3) examples of similar size & scope projects specifically within the K-12 market.

U. The proposed contractor shall provide a proposed project implementation team, including resumes.

V. The proposed contractor shall provide a proposed Installation Schedule.

W. The proposed contractor shall have a 24/7 service hotline with a 4hour onsite response time.

X. The proposed contractor shall be fully experienced in the design and installation of the type of security system herein specified and shall furnish with the contract proposal an itemized list of the installations of the type specified herein. The list shall include the name of the project, date of completion, the amount of the contract, the name, and telephone number of a qualified person to contact for reference. This list must contain at least two (2) projects within a 150-mile radius of the school district to allow school administration officials to visit the job site for review of the system installation and service. Each reference project listed must utilize equipment by the same manufacturer as the proposed system.

Y. The Contractor shall employ factory-trained technicians capable of supporting the maintenance of the system. No contract employees are allowed unless they have been to the

factory service school within the last 18 months. A certificate of this training shall be provided with the contractors' submittal.

Z. The ability of a proposed Contractor to obtain plans and provide a performance bond shall not be regarded as the sole qualification of the Contractors' competency and responsibility to meet the requirements and obligations of the contract.

AA. The Builder shall be satisfied that a proposed Contractor meets all the requirements expressed herein before including the Contractor's proposal in the project.

PART 2 PRODUCTS

2.1 GENERAL

A. Provide complete and satisfactorily operating Video Surveillance System as described herein, using materials and equipment of types, sizes, ratings, and performances as indicated. Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction, in accordance with published product information. Coordinate the features of all materials and equipment so they form an integrated system, with components and interconnections matched for optimum performance of specified functions.

B. The system shall support future connection of security system input devices that may include motion detectors, door/window contacts, and/or building security, access, or intercom system alarm/alert conditions. Contact output devices and interconnect cabling are not specified in this section.

C. All field wiring shall be individually supervised for opens or shorts to security devices.

D. The system and all components shall be tested and found suitable for the specified purpose as part of a commercial security surveillance system by a nationally recognized approval agency acceptable to the AHJ.

E. All date keeping hardware, firmware, and software provided shall be fully compliant with the calendar year designated in four-digit date format. Any time equations must function normally, leap year, and daylight savings time must be supported.

F. The control units, power supplies, batteries, subassemblies, software, firmware, and all cable, detection, and notification devices control units, power supplies, batteries, subassemblies, software, firmware, and all cable, cameras, recording equipment, and all accessories provided shall be listed and labeled by Underwriters Laboratories, Inc. for commercial security system use under the latest appropriate testing standard including but not limited to the following:

UL 13	Power Limited Circuit Cables
UL 50	Enclosures for Electrical Equipment.
UL 444	Communications Cables.
UL 497B	Protectors for Data Communications and Fire Alarm Circuits.
UL 603	Power Supplies for Use with Burglar-Alarm Systems.
UL 634	Connectors and Switches for Use with Burglar-Alarm Systems.
UL 639	Intrusion Detection Systems.
UL 910	Test for Cable Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables Used in Spaces Transporting Environmental Air.
UL 983	Surveillance Camera Units
UL 1479	Fire Tests of Through-Penetration Firestops.

UL 1581	Electrical Wires, Cables, and Flexible Cords.
UL 60950-1	Standard on Information Technology Equipment Safety.

G. The system shall include but not be limited to all control units, power supplies, batteries, subassemblies, keypads, software, firmware, and all cable, detection, notification, and all accessories required to provide a complete operating system.

H. All equipment and components shall be installed in strict compliance with manufacturers' recommendations and the requirements of the component's UL listing. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, electrical requirements, cable types, and physical equipment sizes, etc., before beginning system installation. Refer to the manufacturers' riser / connection diagrams for all specific system installation / termination / wiring data.

I. All equipment and components shall be new, and the manufacturer's current model. All like devices shall be of the same manufacturer and model number.

J. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

K. Only equipment devices have been shown on the contract drawings. Specific wiring between equipment has not been shown.

L. Installation is subject to approval, inspection, and test of the Architect/Engineer.

2.2 ACCEPTABLE MANUFACTURES

A. Descriptions and details, acceptable manufacturers' names listed, and specific manufacturer and model number items indicated in the plans and specifications shall establish a standard of quality, function, and design. Manufacturers and model numbers listed "no exceptions" shall not be substituted without specific notice in an addendum. Otherwise, where a specific manufacturer's product is indicated, products of other manufacturers listed as acceptable may be submitted for approval based on the substitute product being, in the opinion of the Engineer, of equivalent or better quality than that of the product specified.

B. Proposed contractors wishing to propose any product substitution must do so in writing to the specifying authority at least ten (10) days prior to the proposal opening.

C. For manufacturers equipment or models other than that specified, the proposed contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment. Proposals must include detailed information showing all deviations from the system as specified.

D. Substitute products for which the proposed contractor does not obtain prior approval will not be considered acceptable for this project. Final approval of alternate products shall be based on the decision of the Owner and Architect. Prior approval to make a proposal for this project does not automatically ensure products will be an acceptable equivalent.

E. It is the responsibility of the Contractor to provide all features and functions as outlined in these specifications. The functions and features specified are vital to the operation of this facility; therefore, inclusion in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of this specification.

F. It is the responsibility of the Contractor to provide all features and functions as outlined in these specifications. The functions and features specified are vital to the operation of this facility; therefore, inclusion in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of this specification.

G. The system herein specified incorporates **Wisenet WAVE Enterprise Video Management Software (VMS) with fully licensed solution with Wisenet IP Cameras**, and this shall constitute the functionality, quality, compatibility, and performance of the system to be furnished, **no exceptions.** Any other proposed suppliers' systems must be pre-approved.

2.3 RELATED WORK - NETWORK CONNECTIVITY

A. Refer to Section 27 10 30 - Data and Telephone Cable Plant for all Ethernet network drop connections. All Ethernet cabling and jacks used to connect to the building network shall be provided as indicated on the plans under Section 27 10 30. All system devices provided in this section that require a network connection shall be coordinated with contractor.

B. All system devices provided in this section that require a network connection shall be coordinated with district IT department to be assigned TCP/IP configuration settings including a static IP address, domain, gateway, and subnet mask.

C. This contractor will implement all device network configuration and device programming required to provide a complete and functional system under this specification including any special connecting network jumpers and all other types of cabling, and interconnect wires and cables required.

2.4 RELATED WORK – BUILDING ACCESS CONTROL SYSTEM INTEGRATION WITH THE VIDEO SURVEILLANCE SYSTEM

A. See Section 28 13 27 Building Access Control System.

2.5 NETWORK VIDEO MANAGEMENT SOFTWARE (NVMS)

A. Expand the existing system to accommodate all new devices added including programing for similar and appropriate operation and performance, provide additional licensing as required.

2.6 LICENSING

A. The contractor shall include all required licensing.

2.7 NETWORK VIDEO RECORDERS (NVR)

A. Utilize the Districts existing video surveillance equipment. Expand as necessary to accommodate the additional IP cameras.

2.8 IP NETWORK VIDEO SURVEILLANCE CAMERAS

A. Each camera provided shall be in compliance with industry certifications and standards including Class B Electromagnetic Emissions Certifications, Class B Electromagnetic Immunity Certifications, and UL 60950 Certification.

B. Each camera shall feature a 100/1000 Ethernet-port with standard RJ-45 socket and meet IEEE 802.3af (Power over Ethernet) up to IEEE 802.3at Class 4 PoE Plus, IEEE 802.1X (Authentication), IPv4 (RFC 791) and IPv6 (RFC 2460) network standards.

C. Provide IP cameras were shown on the drawings. All cameras may not be used:
   1. Hanwha 5MP IR Dome Interior Camera, model XND-8080R.
   2. Hanwha 5MP IR Dome Interior/Exterior Camera, model XNV-8080R.
   3. Hanwha 8MP (2Mx4ea.) Multi-sensor 360º Camera, model PNM-9084QZ.
   4. Fisheye Camera, model XNF-8010R.

D. Provide accessories as required:
   1. SHD-3000F4 flush housing.
   2. SBP-201HM, SBP-300HM5, SBP-300HM6, SBP-317HM hanging mounts.
   3. SBP-276HMW pendent cap
   4. SBP-300WM1 mounting arm.
   5. SBP-300B wall mount base.
   6. SBP-300KM wall corner mount.

2.9 12 VDC CAMERA POWER SUPPLY/CHARGERS

A. Provide general purpose low voltage power supply/chargers as required for CCTV camera power, UL listed and labeled. The filtered and electronically regulated power output supply shall supply up to sixteen (16) individually fused 12 VDC output circuits to provide operating power to the surveillance cameras. The power supply shall provide a minimum total output of 10 amps at 12 VDC with battery backup. Provide a UL listed cabinet suitable for surface mounting. Cabinet dimensions 13” high x 13.5” wide x 3.25” deep. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and a painted standard finish. The back box and door shall be constructed of 0.060" minimum steel with provisions for electrical conduit connections into the sides and top. All components shall be securely mounted, all cable routed, and tie wrapped in a neat, professional manner. Power supply/chargers shall draw up to 1.45 amps at 115VAC / 60Hz input and 12 VDC @ 10-amp continuous supply current to 16 fuse protected regulated 12VDC outputs rated @ 3.5 amperes each. Unit shall include a built-in .7-amp charger for sealed lead acid or gel type batteries. Provide as required Altronix model SMP10PM12P16, or equivalent supervised power supply/chargers, each with two 12VDC/7AH batteries.

2.10 CABLING

A. See Section 27 10 30 - Data and Telephone Cable Plant. The Surveillance system contractor shall provide all necessary jumper cabling to interconnect the network video recording hardware and network video Ethernet PoE switches with building LAN network. Standard patch cables at camera locations and network closet patch panels shall be provided by data cable plant contractor.

B. All exterior cabling shall be in rigid metallic conduit. All connectors must be fastened, tied, and crimped for maximum reliability.

C. All cabling is to be concealed where construction permits.

2.11 COMMUNICATIONS CIRCUIT SURGE PROTECTION

A. Provide surge protection shall be provided for all exterior devices, communications service or antenna entrance connections, and for each circuit that connects one building to another (i.e. any other portion of a building complex not under one continuous roof) at both entry/exit points to prevent damage to equipment.

B. Each surge protector shall be mounted in a standard grounded metallic electric box or equipment backboard with a separate ground wire ran directly to the ground bus bar or equipment panel ground stud, do not daisy chain ground wires.

C. Surge protectors for low voltage communications signal and control circuits with a data rate from 200kbps to 2Mbps, nominal voltage as listed below AC or DC. Each module shall protect up to two pairs using hybrid design multi-stage SAD technology, shall be Ditek 2MHLP series field replaceable modules with MB Series mounting bases for one to five modules, or equivalent, model numbers as follows:
   1. 70 to 75 Volt circuit, 4 wire protector with base DTK-2MHLP75BWB.
   2. 48 to 50 Volt circuit, 4 wire protector with base DTK-2MHLP48BWB.
   3. 36 Volt circuit, 4 wire protector with base DTK-2MHLP36BWB.
   4. 24 Volt circuit, 4 wire protector with base DTK-2MHLP24BWB.
   5. 12 Volt circuit, 4 wire protector with base DTK-2MHLP12BWB.
   6. 0 to 6 Volt circuits, 4 wire protector with base DTK-2MHLP5BWB.

D. Surge protectors for Ethernet network runs rated up to Category 6A and operating at up to 10-Gigabit data rates. Each module shall protect up all four pairs using hybrid design multi-stage SAD technology which shall automatically reset to protect against multiple surges, Ethernet surge protectors shall be Ditek DTK-CAT6A series as follows:
   1. DTK-110RJC6APOE with 110 to RJ-45 connections with PoE.
   2. DTK-110C6APOE with 110 to 110 connections with PoE.
   3. DTK-110RJC6A with 110 to RJ-45 connections without PoE.
   4. DTK-110C6A with 110 to 110 connections without PoE.

E. Surge protectors for coaxial cable shall be suitable for analog and digital signals up to 2 Ghz, and shall feature 75 Ω nominal impedance, Center Pin - Shield, Shield - Ground protection modes, 20,000A surge current rating, a service voltage of 50VDC, and a clamping Voltage of 75VDC. Note: Insertion loss per surge protection module is 0.5dB, include signal attenuation from these devices in signal strength calculations. Surge protectors shall be Ditek VSP series, or equivalent, as follows:
   1. Type 'F' connectors Ditek DTK-VSPA or Ditek DTK-VSPA2 (dual).
   2. BNC connectors Ditek DTK-VSPBNCA or DTK-VSPBNCA2 (dual).
   3. BNC connectors and 24-volt power connections Ditek DTK-PVP27B.
   4. PTZ camera surge protection; BNC video, power and data Ditek DTK-DP4P.
   5. HD-SDI video Ditek DTK-iBNCHD.
   6. Type 'N' antenna connector Ditek DTK-VSPN.

2.12 ALL EQUIPMENT SHALL BE LOCATED AND INSTALLED AS FOLLOWS

A. Mount all equipment firmly in place. Route cable in a professional, neat and orderly installation.

B. All equipment shall be placed with regard to the environment, EMI/RFI interference, and its effect on communication signal transmission.

C. Do place any equipment within two feet of any light fixture, HVAC unit, service access area, electric panel, or any device containing a motor or transformer.

D. No terminations, splices, or equipment shall be installed in or above ceilings.

E. Provide for adequate ventilation for all equipment and take precautions to prevent electromagnetic or electrostatic hum.

PART 3 - EXECUTION

3.1 TESTING, WARRANTY, SERVICE

A. A factory trained representative of the manufacturer shall supervise the final connections and testing of the system and it shall be subject to the final acceptance of the Architect/Engineer and Owner.

B. The Video Surveillance System Contractor shall make a thorough inspection and test of the complete installed system including all components such as motion detectors, and controls, to ensure the following:
   1. Complete and functional system.
   2. Installed in accordance with manufacturer's instructions.
   3. Confirm at the headend, with an ohm meter, that each cable run is not open or shorted prior to connection of equipment.
   4. Confirm that each camera is located, properly aimed, and focused for the intended coverage area.
   5. Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
   6. Rectify deficiencies indicated by tests and completely re-test work affected by such deficiencies at Contractor's expense.
   7. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

C. The Contractor shall provide a single written document outlining the warranty of the manufacturers products to be free from defects in materials and workmanship for a period of no less than three (3) years, starting with the date of substantial completion.

D. The manufacturer shall provide any software maintenance patches and version updates or upgrades at no-additional cost to Owner for a period of at least five (5) years, starting with the date of substantial completion.

E. The contractor shall provide a warranty of the installed system against defects in material or workmanship for a period of one (1) year from the date of substantial completion. Any equipment or wiring shown to be defective shall be replaced, repaired, or adjusted free of charge. All labor and materials shall be provided at no expense to the Owner. All equipment will carry a one year warranty or manufacturer’s warranty whichever is greater.

3.2 DRAWINGS, MANUALS, AND TRAINING

A. As-built drawings and operating and maintenance manuals may be electronically transmitted in PDF file format (preferred) or paper copies may be provided in quantities indicated in Division 1. Paper copies shall be organized including index tabs in a 3-ring black binder of sufficient size.

B. Upon completion of the installation, and prior to final inspection, the Contractor shall furnish as-built drawings.

C. In addition, the contractor shall furnish complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets. Manuals shall include wiring diagrams to indicate internal wiring for each device and the interconnections between the items of equipment. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system. Provide a parts list with manufacturer and model number for commonly replaced parts. Include complete instructions for the inspection, testing, and maintenance of the system. Include copies of all programming sheets used to configure the system.

D. Provide the Owner a copy of the system software including the licensed program, site specific data file, and passwords that the Owner may require to maintain the system.

E. Formal on-site training sessions shall be conducted by the Video Surveillance System contractor. It shall be the responsibility of the Contractor to coordinate time and location of training sessions with the Owner. Provide documented general instruction as follows:
   1. Provide instruction to the maintenance personnel to include the location, inspection, normal maintenance, testing, and operation of all system components. Provide a minimum of four (4) hours—two 2-hour sessions separated by a minimum of two weeks.
   2. Provide instruction to designated personnel on the functions and operation of the system provided including capabilities, limitations, and the meaning of status messages. State the proper procedure for testing, routine maintenance, and request for service. Provide detailed instruction on the operation of the system operation. Provide a minimum of four (4) hours—two 2-hour sessions separated by a minimum of two weeks.

END OF SECTION

SECTION 28 3100

FIRE ALARM MULTIPLEX SYSTEMS

(PERFORMANCE SPECIFICATION)

PART 1 GENERAL

1.1 DESCRIPTION OF THE WORK

A. Provide for the design and installation of the fire alarm system, with suggested minimum device coverage as indicated. Additional devices may be required for NFPA approved coverage based on conditions not known at the time of issue.

B. Provide Surge Protection Devices (SPDs) / TVSS surge suppression as required by NFPA 72 for all underground circuits.

C. Required system features:

1. The fire alarm system shall comply with requirements of NFPA Standard No. 72 for protected premises signaling systems except as modified and supplemented by this specification. The system shall be supervised either electrically or by software-directed polling of field devices. The system shall also be listed by Underwriter's Laboratories under the category of Control Unit System (UOJZ) and Control Unit Accessories (UOXX).
2. Multiplex communication conductors.
3. Control of auxiliary devices, such as fan shut down, etc.
4. Battery standby system - 24 hour.
5. Remote station annunciator contacts.
6. Microprocessor based monitoring and control system.
7. Multiplex communication conductors. (Class A)
8. Remote station annunciator, refer to drawings for location(s)
9. The system shall be 100% field programmable without the need for external computers or PROM programmers, and shall not require the replacement of memory IC's.
10. Provide integrated dialer for outside monitoring of facility.
11. Interface to Kitchen Hood Fire Extinguishing System.
12. Interface to Fire Doors and associated release mechanisms.
13. Door Hold Open devices and release mechanisms.
14. Provide integrated IP Fire Alarm Communicator, UL Listed for monitoring
15. Provide Farenhyte VisorALARM PLUS IP Receiver.
16. Provide integrated UDAC for Outside Monitoring to transmit system status Monitoring Service.

D. System shall consist of the following components or their functional equivalents:

1. Microprocessor based central processing unit.
2. Remote Annunciator Panels. (Quantity as indicated on plans)
3. Annunciator.
4. Automatic detecting devices.
5. Manual devices.
6. Alarm and warning devices.

E. Fire alarm system shall be expandable by the addition of the required modules to the basic system.

F. Each zone shall consist of not more than eight manual or automatic devices.

G. Auditorium or public assembly zones shall be capable of individual switching in the projection booth, stage area, or other designated area to comply with appropriate sections of NFPA 101 regarding assembly occupancies.

H. Each designated zone shall transmit separate and different alarm, supervisory and trouble signals to the Fire Command Center (FCC) and designated personnel in other buildings at the site via a multiplex communication network.

I. The system shall be an active/interrogative type system where each addressable device is repetitively scanned, causing a signal to be transmitted to the main fire alarm control panel (FACP) indicating that the device and its associated circuit wiring is functional. Loss of this signal at the main FACP shall result in a trouble indication as specified hereinafter for the particular input.

J. At the time of Bidding, provide unit cost for owner directed changes for the following devices:

1. Smoke Detectors
2. Audio / Visual Devices
3. Visual Only Devices
4. Duct Detectors
5. Pull Stations

K. Contractor to design and provide all equipment, accessories, and materials in accordance with the contract documents to provide a complete and operating system.

L. Conduits, boxes and other raceways required for the Fire Alarm system should be provided by the Fire Alarm Contractor, as required for a compliant design, including any revisions following the approved drawings by the Fire Alarm Contractor.

M. System to be designed in accordance with all applicable codes including local ordinances, by an experienced and licensed Fire Alarm designer.

N. Building is to be designed to the code minimum but also to include the additional devices / requirements stipulated within this specification. If additional devices indicated require additional design requirements to be code compliant, that is to be taken into account during bidding and designing in order to design and build a fully compliant system.

O. Review and possible changes to design are subject to review by the local Fire Marshal (or authority having jurisdiction), up to Final Testing and Acceptance by AHJ.

P. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, analog addressable intelligent fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panels, auxiliary control devices, annunciators, power supplies and wiring as shown on the drawings and specified herein. The extent of fire alarm system work is shown on drawings and in schedules, and is hereby defined to include furnishing and installing of a system with the following sequence of operation:

1. Either manual activation of a fire alarm station or activation of an automatic initiating device energizes fire alarm signaling devices, sounding a non-coded alarm, providing zone identification at the fire alarm control panel and annunciator panels.
2. Provide DACT provisions for Outside Monitoring to transmit system status. Transmission format shall be verified with the Owner before programming. Services for Outside Monitoring by Owner under separate contract.
    a. Provide GSM backup on dialer.

Q. The Fire Alarm Installation Contractor shall be knowledgeable and experienced in work of a similar nature to determine the extent of the work required, and to prepare shop drawings illustrating the extent of the work to be undertaken, and to pursue the work of the Fire Alarm

System installation. The contractor shall review the Architectural, Plumbing, Electrical, Mechanical and Fire Alarm Drawings to fully understand the scope of work. The contractor shall supervise, release, engage and/or monitor all devices required by Code or Local Authority whether specifically indicated on drawings or addressed in specifications. The installing contractor is responsible for meeting all required local and national codes.

R. This section of the specification includes the final design, furnishing, installation, connection and testing of the microprocessor controlled, analog addressable intelligent fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panels, auxiliary control devices, annunciators, power supplies and wiring as specified herein. The extent of fire alarm system work required is defined to include furnishing and installing of a system with the following sequence of operation:

1. Either manual activation of a fire alarm station or activation of an automatic initiating device energizes fire alarm signaling devices, sounding a non-coded alarm, providing zone identification at the fire alarm control panel and annunciator panels.
2. Services for Outside Monitoring by Midlothian ISD under separate contract.

S. The contractor shall be an authorized provider and installer of the specified equipment, and shall be knowledgeable and experienced in work of a similar nature to determine the extent of the work required, and to prepare shop drawings illustrating the extent of the work to be undertaken, and to pursue the work of the Fire Alarm System installation. The contractor shall review the Architectural, Plumbing, Electrical, Mechanical and Fire Alarm Drawings to fully understand the scope of work. The contractor shall supervise, release, engage and/or monitor all devices required by Code or Local Authority whether specifically indicated on drawings or addressed in specifications.

T. Sub-contracting of the fire alarm system or system components is not allowed. Responding proposer shall provide approved manufacturers certification with proposal.

U. The contractor shall utilize the final, approved current campus building and room identification for programming of fire alarm zones. Devices shall be labeled with building names and either room names, numbers or both as directed by the owner.

V. Sub-contracting of the fire alarm system or system components is not allowed. Responding proposer shall provide approved manufacturers certification with proposal.

W. Provide for the design and installation of the fire alarm system, with suggested minimum device coverage as indicated. Additional devices may be required for NFPA approved coverage based on conditions not known at the time of issue.

X. Provide an integrated tie-in of the addressable Fire Alarm system to the Building DDC Building Control system, as follows:

1. Upon detection of smoke at any duct smoke detectors (where required by NFPA 134 or local code), provide fan shut-down for the all of the air handlers noted to have a supply drop serving that local area.
2. Fire Alarm Contractor shall coordinate all required work with the Building Automation contractor for this tie-in.

Y. Fire Alarm contractor shall provide all duct smoke detectors as shown on mechanical plans, coordinate with mechanical contractor for installation on all units scheduled to be rated at over 2000cfm.

1. Fire Alarm Contractor shall coordinate with the mechanical contractor for all required work related to air handler fan shut-down.
2. Fire Alarm Contractor shall provide all duct detector devices, enclosures to the mechanical for installation, and the mechanical contractor shall provide fan shut down.

1.2 SCOPE OF THE WORK

A. An intelligent reporting, microprocessor controlled fire detection and emergency alarm communication system shall be installed in accordance with the specifications, and all applicable codes.

B. The system shall be designed such that each signaling line circuit (SLC) shall be limited to only 80% of its total capacity used during the initial installation.

C. The FACP and peripheral devices shall be manufactured 100% by a single manufacturer (or division thereof).

D. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final check-out and to ensure the systems integrity.

E. Coordinate with District for availability and set up of monitoring telephone lines.

1.3 PERFORMANCE

A. Alarm and trouble signals shall be digitally encoded by listed electronic devices onto an NFPA Style 6 looped multiplex communication system.

B. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded onto NFPA Style 6 Signaling Line Circuits.

C. Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style D).

D. Notification Appliance Circuits (NAC) shall be wired Class B (NFPA Style Y).

E. Power for initiating devices and notification appliances must be from the main fire alarm control panel to which they are connected.

F. A single ground or open on any system signaling line circuit, initiating device circuit, or notification appliance circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.

G. Alarm signals arriving at the main FACP shall not be lost following a power failure (or outage) until the alarm signal is processed and recorded.

H. Horn circuits and control equipment shall be arranged such that loss of any one (1) horn circuit will not cause the loss of any other horn circuit in the system.

1.4 SYSTEM OPERATION

A. When a fire alarm condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:

1. The System Alarm LED shall flash.
2. A local piezo-electric signal in the control panel shall sound.
3. The 80-character LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
4. All system output programs assigned via control-by-event equations to be activated by the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.
5. The audio portion of the system shall sound the proper signal to the appropriate zones.

1.5 QUALITY ASSURANCE

A. Provide fire alarm system produced by one of the following manufacturers, while meeting or exceeding the minimum performance specification included herein.

1. Honeywell – Farenhyte, Black Series, is the preferred manufacturer of the fire alarm system, acceptable equal by;

a. Other approved in writing prior to bid.

B. Provide electrical products which have been tested, listed and labeled by Underwriters Laboratories, Inc., and which comply with NEMA Standards.

C. The National Fire Protection Association publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Use current locally adopted editions of the standards.

1. No. 72A Local Protective Signaling Systems.
2. No. 72D Proprietary Protective Signaling Systems.
3. No. 72E Automatic Fire Detectors.
4. No. 90A Installation of air conditioning and ventilating systems.
5. No. 101 Life Safety Code.

D. The contractor furnishing and installing the equipment shall show satisfactory evidence with the shop drawings that they maintain stocks of replacement parts, and maintain a service department which is fully capable of maintaining the equipment.

E. Fire alarm systems shall be installed by an agent having a current certificate of registration with the State Fire Marshal's Office of the Texas State Board of Insurance, in accordance with state law. A "Fire Alarm Installation Certificate" shall be provided as required by the Office of the State Fire Marshall.

F. Warranty:

1. The Contractor shall warrant his work against defective materials and workmanship for a period of one year from the date of acceptance of the entire project, unless specific longer term is specified with Individual System Specification.
2. Neither Final Payment nor any provisions in Contract Documents shall relieve the Contractor of the responsibility for faulty materials or workmanship.
3. Contractor shall remedy any defects due thereto, and pay for any damage to other work resulting therefrom, which shall appear within a period of five years from the date of acceptance of the entire project (substantial completion).
4. The Owner shall give notice of observed defects with reasonable promptness.
5. This Guarantee shall not be construed to include the normal maintenance of the various components of the system covered by these specifications.

G. Project Record Documents:

1. The Contractor shall keep a set of plans on the job, noting daily all changes made in connection with the final installation including exact dimensioned locations of all new and uncovered existing utility piping outside the Building.
2. Upon submitting request for Final Payment, Contractor shall turn over to the Architect-Engineer, for subsequent transmittal to the Owner, clean, neatly marked set of reproducible plans showing “as installed” work.
3. In addition to the above, the Contractor shall accumulate during the Job’s progress the following data, in multiple duplication (three each), prepared in 3-ring binders of sufficient size, black in color, neat in appearance and turned over to the Architect-Engineer for checking and subsequent delivery to the Owner:

    a. All warranties, guarantees and manufacturer’s direction on equipment and material covered by the Contract
    b. Approved fixture/equipment brochures
    c. Copies of approved Shop Drawings
    d. Set of operating instructions. Operating instructions shall also include recommended maintenance and seasonal changeover procedures.
    e. Any and all data and/or plans required during construction.

f. Repair parts lists of all major items and equipment including name, address and telephone number of the local supplier or agent.
g. The first page or pages shall have the name, addresses and telephone numbers of the following; General Contractor and all sub-contractors, Major Equipment Suppliers.

H. Training:

1. Upon completion of the work and at a time designated by the Owner's representative, provide a formal training session for the Owner's operating personnel to include location, operation and maintenance of all the mechanical, electrical and plumbing equipment and systems.
2. Before proceeding with instruction, prepare a typed outline in triplicate listing the subjects that will be covered. Submit the outline for review by the Owner's representative one week prior to training session.
3. At the conclusion of the instruction, obtain signatures of the attendees on each copy of the outline to signify that they have proper understanding of the operation and maintenance of the systems. Submit the signed outlines to the Owner's representative and Engineer as a condition of final acceptance.

I. Plans and Specifications:

1. The plans show diagrammatically the locations of the various lines, ducts, conduits, fixtures and equipment and the method of connecting and controlling them. It is not intended to show every connection in detail and all fittings required for a complete system.
2. The Systems shall include, but are not limited to, the items shown on the plans.
3. Exact locations of these items shall be determined by reference to the general plans and measurements of the Building and in cooperation with other Contractors, and in all instances, shall be subject to the approval of the Architect-Engineer.
4. The Architect-Engineer reserves the right to make any reasonable change in the location of any part this work without additional cost to the Owner.

J. Utilities, Locations and Elevations:

1. Locations and elevations of the various utilities within this scope of work have been obtained from the City, Owner and/or other substantially reliable sources and are offered separately from the Contract Documents, as a general guide only, without any guarantees as to the accuracy.
2. The Contractor shall examine the site, shall verify to his own satisfaction the locations, elevations and the availability / characteristics (voltage/phase/pressure/capacity) of all utilities and services required, and shall adequately inform himself as to their relation to the work; the submission of bids or proposals shall be deemed evidence thereof.
3. The Contractor shall coordinate all services with the respective Utility Company or Agency during construction; coordinate changes made by Utility Companies or Agencies to the design of the project, and coordinate with the Owner, Architect-Engineer, and Utility the scheduling of any shutdowns or delays that may occur in providing service.
4. The Contractor shall verify location / depth / direction of flow, conduct all necessary tests, inspections, coordinate with Owner's representatives and Utilities, and check for existing underground utilities before ditching / trenching / drilling.
5. The Contractor shall be responsible for repair of any cut of damaged lines or utilities he uncovers and disrupts. There are lines and utilities that may not be shown on the plans.

1.6 SUBMITTALS

A. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
3. Show annunciator layout and main control panel module layout, configurations and terminations.

B. Manuals:

1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s) including technical data sheets.
2. Wiring diagrams shall indicate internal wiring for each item of equipment and the interconnections between the items of equipment.
3. Provide a clear and concise description of operation which gives, in detail, the information required to properly operate the equipment and system.
4. Approvals will be based on complete submissions of manuals together with shop drawings.

C. Software Modifications:

1. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

D. Certifications:

1. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling (fire alarm) system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.

B. All equipment and components shall be installed in strict compliance with each manufacturer's recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc. before beginning system installation. Refer to the riser/connection diagram for all specific system installation/termination/wiring data.

C. All Equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place. (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

D. The main fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution Panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod.

2.2 MAIN FIRE ALARM CONTROL PANEL AND FIRE COMMAND CENTER:

A. Control Panel

1. Control Panel with Emergency Communications System

a. The fire alarm control panel (FACP) shall be the Farenhyt IFP-50 addressable control panel. The FACP must have a 2.5 amp power supply and be capable of expansion to a maximum of 50.5 total amps via bus connected expander modules that supervise low battery, loss of AC and loss of communication.
b. The FACP must be capable of supporting 50 addressable points. The communication protocol on the SLC loop must be digital. The use of shielded cable or twisted pair is not required.
c. The panel must have a built in 80 character LCD annunciator with the capability of having an additional eight supervised remote annunciators connected in the field.
d. The FACP must have Day/Night sensitivity capabilities on detectors and be capable of supporting 50 analog addressable points. The FACP must support a minimum of two programmable notification circuits.
e. The FACP must have a built in UL approved digital communicator. The communicator must allow local and remote up/downloading of system operating options, event history, and detector sensitivity data. The FACP must automatically test the smoke detectors in compliance with NFPA standards to ensure that they are within listed sensitivity parameters and be listed with Underwriters Laboratories for this purpose.
f. The FACP must compensate for the accumulation of contaminants that affect detector sensitivity (Drift Compensation). The FACP must have a maintenance alert feature (differentiated from trouble condition). The panel shall indicate a “Maintenance Alert” which means that the detector is still in an operational condition but should be cleaned before it enters a “Trouble” condition in which it will no longer function properly.
g. The FACP shall have a Jumpstart feature that can automatically enroll all properly connected and addressed accessories into a functional system without further programming. This is required by UL 864. Panels that do not have this feature will not be acceptable.
h. The main communication bus (SBUS RS485) shall be a class B configuration with a total Bus length of 6,000 feet. This communications bus must be fully supervised.

B. System Wiring

1. The Signaling Line Circuit (SLC) and data communication bus (SBUS) shall be wired with standard NEC 760 compliant wiring. No twisted, shielded or mid-capacitance wiring is required for standard installations. All FACP screw terminals shall be capable of accepting 14-18 AWG wire. All system wiring shall be in accordance with the requirements of NFPA 70, the National Electrical Code (NEC) and also comply with article 760 of the NEC.

C. Signaling Line Circuits

1. The SLC shall be capable of a wiring distance of 10,000 feet from the SLC driver module and be capable of supporting 50 devices. The communication protocol to SLC devices must be digital. Any SLC loop device, which goes into alarm, must interrupt the polling cycle for priority response from the FACP. The FACP must respond consistently to a device that goes into alarm on an SLC in under 3 seconds. The SLC shall be capable of functioning in a class A or class B configuration.

D. SLC Loop Devices

1. Devices supported must include photoelectric, ionization smoke detectors, heat detectors, contact monitoring modules and relay output modules. There is to be no limit to the number of any particular device type up to the maximum of 50 that can be connected to the SLC.

E. Addressable Detector Functions

1. The products of combustion detectors must communicate analog values using a digital protocol to the control panel for the following functions:

a. Automatic compliance with NFPA 72 standards for detector sensitivity testing.

b. Drift compensation to assure detector is operating correctly.
c. Maintenance alert when a detector nears the trouble condition
d. Trouble alert when a detector is out of tolerance
e. Alert control panel of analog values that indicate fire.

F. Programmable Notification Circuits

1. The FACP shall support 2 programmable notification circuits that are capable of being programmed as supervised reverse polarity notification circuits or supervised auxiliary power circuits that can be programmed as continuous, resettable or door holder power. These circuits can be configures as 2 Class B outputs or 1 Class A output.

G. Built-in Annunciators

1. The main control must have a built in annunciator with an 80 character LCD display and feature LED's for General alarm, Supervisory, System trouble, System silence, and Power. When in the normal condition the LCD shall display time and date based on a 200-year clock which is capable of automatic daylight savings time adjustments. The annunciator must be able to Silence, Acknowledge, and Reset alarms through the use of the keypad. The annunciators must be able to program up to 20 levels of user codes that will allow the limitation of operating system programming to authorized individuals.

H. Remote Annunciators

1. The fire system shall be capable of supporting up to eight remote LCD and eight LED remote annunciators. LED Remote annunciators shall have individually mapped LED's and reset and silence inputs. The reset and silence inputs must use the same firefighters key as the remote LCD annunciators. Remote annunciators shall be capable of operating at a distance of 6,000 feet from the main control panel on unshielded non-twisted cable.
2. The fire system shall be able to support up to eight I/O modules on the SBUS that shall be used to drive remote LED graphic style displays and accommodate up to eight dry contact type switch inputs. The I/O modules shall each drive up to 40 LEDs without requiring external power connections. The I/O module inputs shall be supervised and shall be suitable for alarm and trouble circuits as well as reset and silence switches.

I. Serial/Parallel Interface

1. The fire system shall be capable of supporting up to two serial/parallel interfaces (SK5824) that are capable of driving standard computer style printers. The interface shall be programmable for the serial and parallel ports and allow printing of events as they occur.

J. Distributed Power Modules

1. The fire system shall be capable of supporting up to eight Power Modules that provide 6 additional amps of power each. Each Power Module shall support 4 or 6 notification circuits not to exceed 6 amps total including the notification circuits. The notification circuits shall be capable of being programmed as described in paragraph 2.1.6 of this document.

K. Digital Communicator

1. The digital communicator must be an integral part of the control panel and be capable of reporting all zones or points of alarm, supervisory, and trouble conditions as well as all system status information such as loss of AC, low battery, ground fault, and loss of supervision to any remote devices with individual and distinct messages to a receiving point. The communicator must also be capable of up/downloading of all system programming options, Event history and Sensitivity compliance information to a PC on site or at a remote location. The communicator shall have an answering machine bypass feature that will allow the panel to respond to communication even on phone lines that have other communication equipment present. The communicator must be capable of reporting via SIA and Contact ID

formats. The communicator shall have a delayed AC loss report function which will provide a programmable report delay plus a 10-25 min random component to help ease traffic to the central station during a power outage.

L. Dry Contacts

1. The FACP shall have three form “C” dry contacts, one will be dedicated to trouble conditions, the other two will be programmable for alarm, trouble, supervisory, notification, pre-alarm, waterflow, manual pull, aux. 1 or aux. 2 conditions. The trouble contact shall be normal in an electrically energized state (fail-safe) so that any total power loss (AC and Backup) will cause a trouble condition. In the event that the Microprocessor on the FACP fails the trouble contacts shall also indicate a trouble condition.

M. Ground Fault Detection

1. A ground fault detection circuit shall be employed which can detect a ground fault on both the positive and negative side of each circuit. The ground fault detector shall operate the general trouble devices as specified but shall not cause an alarm to be sounded. Ground faults shall not interfere with normal operation, such as alarm, or other trouble conditions.

N. Overcurrent Protection

1. All low voltage circuits will be protected by microprocessor controlled power limiting or have self-restoring polyswitches for the following: smoke detector power, main power supply, indicating appliance circuits, battery standby power and auxiliary output.

O. Test Functions

1. A “Lamp Test” mode shall be a standard feature of the fire alarm control panel and shall test all LED’s and the LCD display on the main panel and remote annunciators.
2. A “Walk Test” mode shall be a standard feature of the fire alarm control panel. The walk test feature shall function so that each alarm input tested will operate the associated notification appliance for six seconds. The FACP will then automatically perform a reset and confirm normal device operation. The event memory shall contain the information on the point tested. the zone tripped, the zone restore and the individual points return too normal.
3. A “Fire Drill” mode shall allow the manual testing of the fire alarm system notification circuits. The “Fire Drill” shall be capable of being controlled at the main annunciator, remote annunciators and via a remote contact input.
4. A “Disable Mode” shall allow for any zone, point, group, or nac circuit to be Disabled without affecting the operation of the total fire systemA Lamp Test mode shall be a standard feature of the fire alarm control panel and shall test all LEDs and the LCD display on the main panel and remote annunciators.

P. Remote Input Capabilities

1. The control panel shall have provisions for supervised switch inputs for the purpose of Alarm reset and Alarm and Trouble silence.

Q. Notification Appliance Mapping Structure

1. All notification circuits and modules shall be programmable via a mapping structure that allows for a maximum of 125 output groups. Each of these groups shall have the ability to be triggered by any of the panels 125 zones. A group may be triggered from a zone individually, or may contain a global trigger for manual pull stations, fire drills and two different system alarms. Additionally each zone will individually control the cadence pattern of each of the groups that it is “Mapped” to so that sounders can indicate a variety of conditions. The zone shall be capable of issuing a different cadence pattern for each of the groups under its control. The mapping structure must also allow a group to be designated to “ignore cadence” for use with strobes and other continuous input devices. Zones shall have eight different output categories; Detector alarm, Trouble, Supervisory, Pre-alarm,

Waterflow, Manual pull, Zone auxiliary one and Zone Auxiliary two. Each of the categories shall have the ability to control from 1 to 8 output groups with a cadence pattern. The patterns are; March code, ANSI 3.41, Single Stroke Bell Temporal, California code, Zone 1 coded, Zone 2 coded, Zone 3 coded, Zone 4 coded, Zone 5 coded, Zone 6 coded, Zone 7 coded, Zone 8 coded, Custom output pattern 1, Custom output pattern 2, Custom output pattern 3, Custom output pattern 4 and Constant. In addition, synchronization is built-in for Amseco, Gentex, System Sensor, and Wheelock devices. This mapping/cadence pattern shall be supported by all system power supplies and Notification Expander Modules.

R. On-board Programmer

1. The FACP shall have an on board programmer which will allow for all system functions and options to be programmed. Any panel that does not have this capability will not be accepted.

S. Downloading Software

1. The fire alarm control panel must support up/downloading of system programming from a PC under Windows or NT environments. The FACP must also be able to upload the detector sensitivity test results and a 1000 event system event buffer to the PC. Communication shall take place over a direct connection to the PC and/or via the same telephone lines as the built in digital communicator and shall not require an external modem to be connected to the panel. The downloading software shall contain a code that will block unauthorized persons from accessing the panel via direct connection or over the phone lines.

T. Facility Management Software

1. The FACP must support a facility management capable of providing off site access to FACP data that is necessary to manage fire system operation. A software package capable of uploading the detector sensitivity test results and the 1000 event system event buffer to the PC shall be required as part of the bid package. Communication shall take place over a direct connection to the PC and/or via the same telephone lines as the built in digital communicator. The facility management package must be separate from the downloader package and must not be capable of affecting programmed system options

U. English Language Descriptions

1. The FACP shall provide the ability to have a text description of each system device, input zone and output group on the system. The use of individual lights to provide descriptions will not be acceptable.

2.3 System Operations

A. Alarm

1. When a device indicates an alarm or supervisory condition the control panel must respond within 3 seconds. The General Alarm or Supervisory Alarm LED on the annunciator(s) shall light and the LCD shall prompt the user as to the number of current events. All notification circuits associated with the alarm or supervisory condition shall activate. If the digital dialer is being utilized it shall transmit a signal to the digital alarm receiving unit. The alarm shall also cause the appropriate door holders and air handlers to shut down. If employed all elevators shall return to the main level or an alternate level when required by the elevator specification or building code. The alarm information must be stored in event memory for later review. Event memory shall be available at the main and all remote annunciators. The alarm memory must be capable of storing up to 1000 events.
2. When the alarmed device is restored to normal, the control panel shall be required to be manually reset to clear the alarm condition, except that the alarms may be silenced as programmed.

a. *Exception: When detectors are utilized in single station or multi-station applications they may be self- restoring.*

3. An alarm shall be silenced by pressing Silence at the main panel or by a code or Firefighter key at the remote annunciators. When silenced, this shall not prevent the resounding of subsequent events if another event should occur (subsequent alarm feature). When alarms are silenced the silenced LED on the control panel, and on any remote annunciators shall remain lit, until the alarmed device is returned to normal.

B. Trouble

1. When a device indicates a trouble condition, the control panel System Trouble LED should light and the LCD should prompt the user as to the number of current events. The trouble information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators.
2. When the device in trouble is restored to normal, the control panel shall be automatically reset, The trouble restore information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators. A trouble shall be silenced by pressing Silence at the main panel or by a code or Firefighter key at the remote annunciators. When silenced, this shall not prevent the resounding of subsequent events if another event should occur.

C. Supervision Methods

1. The SLC loop shall be electrically supervised for opens and ground faults in the circuit wiring, and shall be so arranged that a fault condition on any loop will not cause an alarm to sound. Additionally, every addressable device connected to the SLC will be supervised and individually identified if in a fault condition. The occurrence of any fault will light a trouble LED and sound the system trouble sounder, but will not interfere with the proper operation of any circuit which does not have a fault condition.

D. System Cabinet

1. Mounting

a. The system cabinet shall be red and configured for surface mounting.

E. Audible System Trouble Sounder

1. An audible system trouble sounder shall be an integral part of the control unit. Provisions shall also be provided for an optional supervised remote trouble signal.

F. Power Supply and Charger

1. The entire system shall operate on 24 VDC, filtered switch mode power supply with the rated current available of 9 Amps. The FACP must have a battery charging circuit capable of complying with either of the following requirement:

a. Sixty (60) hours of battery standby with five (5) minutes of alarm signaling at the end of this sixty (60) hour period (as required per NFPA 72 remote station signaling requirements) using rechargeable batteries with automatic charger to maintain standby gel-cell batteries in a fully charged condition.
b. Twenty-four (24) hours of battery standby with five (5) minutes of alarm signaling at the end of this twenty-four (24) hour period (as required per NFPA 72 central station signaling requirements) using rechargeable batteries with automatic charger to maintain gel-cell batteries in a fully charged condition.

2. The power supply shall comply with U.L. Standard 864 for power limiting.
3. The FACP will indicate a trouble condition if there is a loss of AC power or if the batteries are missing or of insufficient capacity to support proper system operation in the event of AC

failure. A “Battery Test” will be performed automatically every minute to check the integrity of the batteries. The test must disconnect the batteries from the charging circuit and place a load on the battery to verify the battery condition.

4. In the event that it is necessary to provide additional power one or more of the model 5495, 5499 or 5496 Distributed Power Modules shall be used to accomplish this purpose.

G. Connectors and Circuits

1. Connections to the light and power service shall be on a dedicated branch circuit in accordance with the National Fire Alarm Code NFPA 72, National Electrical Code (NEC) NFPA 70, and the local authority having jurisdiction (AHJ). The circuit and connections shall be mechanically protected.
2. A circuit disconnecting means shall be accessible only to authorized personnel and shall be clearly marked “FIRE ALARM CIRCUIT CONTROL”.

H. Accessory Components

1. The FACP shall support the following devices on the RS-485 data bus:

a.	6815	Signaling Line Circuit Expander (SLC) Module
b.	5824	Printer Interface Module
c.	RA-2000	LCD Remote Annunciator
d.	5865-3	LED Remote Annunciator
e.	5865-4	LED Remote Annunciator with reset and silence switches
f.	5880	LED I/O module
g.	RPS-1000	Intelligent Distributed Power Module
h.	5495	Remote Addressable Power Supply 6.0 Amp

2. The FACP shall support the operation of 159 detectors and 159 addressable module total devices per SLC loop without regard to device type.

I. Provide fire alarm system products in sizes and capacities indicated, complying with manufacturer's published product information on standard materials and components designed and constructed for applications indicated.

J. Provide required basic wiring materials as specified in Division 26 sections. Comply with manufacturer's instructions and recommendations.

K. Horn/Strobes: Provide manufacturer's standard construction fire alarm speaker, System Sensor Spectr- Alert Advance. UL listed to Standard 1971 and shall meet the following criteria:

1. Wall Mount Mount:

a. Indoor- System Sensor L-Series, P2RL, red, wall-mountable, clear lens, 2-wire, horn strobe marked "FIRE". Selectable strobe settings: 15, 30, 75, 95, 110, 135, and 185 cd.
b. Outdoor- System Sensor P2RHK a red, two-wire, outdoor horn strobe with selectable high-candela strobe settings of 135, 150, 177 and 185 sound output where required for coverage.

2. Ceiling Mount:

a. Indoor - System Sensor L-Series, PC2RL, red, ceiling-mountable, clear lens, 2-wire, horn strobe marked "FIRE". Selectable strobe settings: 15, 30, 75, 95, 115, 150 and 177 cd.

L. Strobes: Provide manufacturer's standard construction fire alarm strobe, with flashing xenon light visual signal. UL listed to Standard 1971. Strobe lights shall meet the requirements of the ADA, UL Standard 1971 and shall meet the following criteria:

1. Strobes: Provide manufacturer's standard construction fire alarm strobe, System Sensor L-Series. UL listed to Standard 1971. . Strobe lights shall meet the requirements of the ADA, UL Standard 1971 and shall meet the following criteria:
    a. Ceiling Mount:
        1) Indoor - System Sensor L-Series Strobe SCWL, Dual voltage (25/70.7 Vrms) with candela setting as required for coverage.
    b. Wall Mount:
        1) Indoor - System Sensor L-Series Strobe SRL, red, wall-mounted, clear lens, strobe marked "FIRE". Selectable strobe settings: 15, 30, 75, 95, 110, 135, and 185 cd..
2. The maximum pulse duration shall be 2/10 of one second.
3. Strobe intensity shall meet the requirements of UL 1971.
4. The flash rate shall meet the requirements of UL 1971.

M. Addressable Devices - General

1. Addressable devices shall provide an address-setting means using rotary decimal switches.
2. Addressable devices shall use simple to install and maintain decade (numbered 0 to 9) type address switches. Devices which use a binary address or special tools for setting the device address, such as a dip switch are not an allowable substitute.
3. Detectors shall be analog and addressable, and shall connect to the fire alarm control panel's Signaling Line Circuits.
4. Addressable smoke and thermal detectors shall provide dual (2) status LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. If required, the flashing mode operation of the detector LEDs can be programmed off via the fire control panel program.
5. The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. Sensitivity can be automatically adjusted by the panel on a time-of-day basis.
6. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
7. The detectors shall be ceiling-mount and shall include a separate twist-lock base which includes a tamper proof feature.
8. The following bases and auxiliary functions shall be available:
    a. Sounder base rated at 85 DBA minimum.
    b. Form-C Relay base rated 30VDC, 2.0A.
    c. Isolator base.
9. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.
10. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (PHOTO, THERMAL).

N. Addressable Pull Box (Pull station): Provide manufacturer's standard construction, red enclosure, manual fire alarm stations, double action semi flush mounting, Silent Knight SK-PULL-DA, addressable.

1. Addressable pull boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
3. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75" or larger. Provide "Stopper II" with local audible alarm at each pull station location. Provide "Weather Stopper II" with local audible alarm at exterior locations. (Verify with Each Authority Having Jurisdiction on acceptance of audible alarm on pull station covers.) Where allowed by Local Authority. Provide without audible alarm where audible alarm is not allowed.

O. Intelligent Photoelectric Smoke Detector: Provide manufacturer's standard construction automatic photoelectric type smoke detector, Silent Knight SK Protocol type with base, SK-PHOTO-W.

1. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

P. Intelligent Thermal Detectors (Heat Detector)

1. Thermal detectors shall be intelligent addressable devices rated at 135°F and have a rate-of-rise element rated at 15° F per minute. It shall connect via 2 wires to the fire alarm control panel signaling line circuit, Silent Knight, SK Protocol type with base, SK-HEAT-W.

Q. Intelligent Duct Smoke Detector: (Duct Detector) Provide manufacturer's standard construction automatic smoke detectors, duct type, with sampling tubes, Silent Knight SK Protocol type, SK-DUCT with SK-PHOTO-W smoke detector and housing, with auxiliary contacts for fan shut down as required. (Provided and installed by Fire Alarm Contractor, Addressable Device.)

1. The in-duct smoke detector housing shall accommodate either an intelligent ionization detector or an intelligent photoelectric detector, of that provides continuous analog monitoring and alarm verification from the panel.
2. Duct detectors located above ceiling level shall have device labeled alarm LED test/reset switch in ceiling below detector and clearly readable from floor level. Provide with manufacturers optional accessory remote test/reset for ceiling mount.
3. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

R. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLC loops. Silent Knight SK-MONITOR or SK-MINIMION.
2. The monitor module shall mount in a 4" square, 2" deep electrical box.
3. The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
4. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2" x 1-3" x 2". This version need not include Style D or an LED.

S. Addressable Control Module

1. Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification

appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay. Silent Knight SK-CONTROL.

2. The control module shall mount in a standard 4" square, 2" deep electrical box, or to a surface mounted backbox.
3. The control module NAC may be wired for Style Z or Style Y (Class A/B) with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation, or as a dry contact (FormC) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.
4. Audio/visual power shall be provided by a separate supervised power loop from the main fire alarm control panel or from a supervised, UL listed remote power supply.
5. The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.

T. Isolator Module

1. Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC loop. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC Loop. At least one isolator module shall be provided for each floor or protected zone of the building. Silent Knight SK-ISO.
2. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
3. The isolator module shall not require any address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
4. The isolator module shall mount in a standard 4" deep electrical box or in a surface mounted backbox. It shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

U. Cable

1. All cable shall be color red.

V. System Record Document Cabinet

1. 1. Provide wall mounted Fire Alarm record document cabinet, (1) per campus, exact location to verified with owner prior to installation. Cabinet to be constructed of 16ga. Steel, with a solid piano hinge for the door, and key lock. Provide with 4GB USB flash drive (or adequate size required for storage of all related documents, and software) equal to SRD ACE-11, by Space Age Electronics. Provide with custom project lettering with the campus name, and lock keyed to the fire alarm control panel.

2.4 BATTERIES AND EXTERNAL CHARGER:

A. Battery:

1. Shall be 12 volt, Gell-Cell type.
2. Battery shall have sufficient capacity to power the fire alarm system for not less than 24 hours plus 5 minutes of alarm upon a normal AC power failure.
3. The batteries are to be completely maintenance free.
4. Final battery size to be calculated & confirmed by system installer based on actual system loads.
5. External, physical dimension shall allow for placement within system enclosure.

B. External Battery Charger:

1. Shall be completely automatic, with constant potential charger maintaining the battery fully charged under all service conditions. Charger shall operate from a 120-volt 60 hertz source.
2. Shall be rated for fully charging a completely discharged battery within 60 hours while simultaneously supplying any loads connected to the battery.
3. Shall have protection to prevent discharge through the charger.
4. Shall have protection for overloads and short circuits on both AC and DC sides.
5. Final battery charger characteristics to be calculated & confirmed by system installer based on actual system loads.

C. Microprocessor based monitoring and control system.

1. The monitoring and control system shall consist of a central processing unit, (CPU), Display Interface Assembly DIA, Remote Annunciator Panels. The system shall be of modular construction, with components connected together using multiplex wiring techniques to provide Fire Detection and Evacuation signals. System shall be Silent Knight IFP-1000 ESC Intelligent, Addressable, and Analog Multiplex Life Alarm or approved equal. CPU shall be surface or flush wall mounted control units where shown. Unit shall have all necessary components to completely supervise and operate the system. Power wiring shall be for single phase operation. Unit shall include the following functional equivalents, as required:

    a. Zone modules.
    b. Power supplies.
    c. Emergency battery for 60 hour backup.
    d. Battery charging circuit.
    e. Auxiliary relays.
    f. Common module.
    g. Controls: System reset, acknowledge, lamp test, trouble, silence.
    h. Indicators: Common alarm, common trouble, AC power failure, low battery, and power on.
    i. Other equipment and components as required for system operation.

2. System shall provide LCD annunciation to indicate system monitor point status, and toggle switches to allow operation of the system control points. Unit shall function as a zone annunciator and control center to initiate alarm or building evacuation function. Control center and Remote Annunciator shall be wall mounted, located as shown, with battery backup, self-contained power supply supplied by 120 volt emergency power if available or by dedicated 120 volt normal power circuit.

D. Provide fire alarm system products in sizes and capacities indicated, complying with manufacturer's published product information on standard materials and components designed and constructed for applications indicated.

E. Provide required basic wiring materials as specified in Division 26 sections. Comply with manufacturer's instructions and recommendations.

F. Tamper switches and water flow alarms, when furnished with sprinkler system, shall be connected to Fire Alarm System.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install system and materials in accordance with manufacturer's instructions and roughing in drawings, and details on the drawings. Install electrical work and use electrical products complying with requirements of applicable Division 16 sections of these specifications.

B. The term "wiring" is defined to include the providing of wire, conduit and miscellaneous materials as required for mounting and connecting the electrical devices. All wiring and devices shall be fully concealed unless otherwise approved by Engineer.

C. Install a complete wiring system as required by the local authority for fire alarm system conductor shall be two twisted pair fire alarm cable in a separate conduit system. Provide multi- conductor instrument harness bundle in place of single conductors where a number of conductors can be run along a common path. Fasten flexible conductors bridging cabinets and doors neatly along hinge side, and protect against abrasion. Tie and support conductors neatly.

D. Install a flashing lights and speakers where required by the Local Authority Having Jurisdiction.

E. Manual stations are to be set 48" above finished floor. Alarm devices are to be set at 80" aff maximum. Alarm devices in Activity rooms, Gymnasiums and other similar use areas shall be suitably protected with substantial wire guards, not less than 11 gauge, and 1" x 2" mesh.

F. Number code or color code conductors, appropriately and permanently for identification and servicing of system.

G. Provide and install new duct detectors in air handling equipment. Fire Alarm contractor will need to coordinate with the mechanical contractor for final tie-in and set-up.

3.2 CONNECTIONS

A. The Contractor shall make provisions for and shall connect initiating devices to the Fire Alarm System which may be furnished under other sections of these specifications, whether specifically indicated on the Electrical Series drawings or not. This Contractor shall furnish wiring, make final connections to auxiliary devices furnished under other sections of the specifications, and provide interface devices such as relays where required, some of these components may be outside buildings:

1. Door Hold Open devices.
2. Fire Door release devices.
3. Duct detectors.
4. Kitchen hood fire extinguishing equipment.
5. Other dry or wet sprinkler system initiating devices.

B. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

C. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

D. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

3.3 TYPICAL OPERATION:

A. Actuation of any manual station, smoke detector, heat detector or water flow switch shall cause the following operations to occur unless otherwise specified:

1. Activate all programmed horn circuits.
2. Actuate strobe units until the panel is reset.
3. Light the associated indicators corresponding to active horn circuits.
4. Release all magnetic door holders, Stage Draft doors and Fire doors to adjacent zones on the floor from which the alarm was initiated.
5. Return all elevators to the primary or alternate floor of egress.

6. A smoke detector in any elevator lobby shall, in addition to the above functions, return all elevators to the primary or alternate floor of egress.
7. Smoke detectors in the elevator machine room or top of hoistway shall return all elevators in to the primary or alternate floor. Smoke detectors or heat detectors installed to shut down elevator power shall do so in accordance with ANSI A17.1 requirements and be coordinated with the electrical contractor.
8. Duct type smoke detectors shall, in addition to the above functions, shut down the ventilation system or close associated control dampers as appropriate.
9. Activation of any sprinkler system low pressure switch, on valve tamper switch, shall cause a system supervisory alarm indication.

3.4 TEST:

A. Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.

1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
2. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
3. Verify activation of all flow switches.
4. Open initiating device circuits and verify that the trouble signal actuates.
5. Open signaling line circuits and verify that the trouble signal actuates.
6. Open and short notification appliance circuits and verify that trouble signal actuates.
7. Ground initiating device circuits and verify response of trouble signals.
8. Ground signaling line circuits and verify response of trouble signals.
9. Ground notification appliance circuits and verify response of trouble signals.
10. Check installation, supervision, and operation of all intelligent smoke detectors using walk test.
11. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

B. The entire fire alarm system shall be tested in accordance with NFPA standards and other applicable standards. Results of such testing shall be recorded on forms approved for the purpose, certified and submitted to the Owner's representative with final documents.

3.5 FINAL INSPECTION:

A. At the final inspection a factory trained representative of the manufacturer of the major equipment shall demonstrate that the systems function properly in every respect.

3.6 INSTRUCTION:

A. Provide instruction as required for operating the system. "Hands-on" demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation."

3.7 ZONES

A. Zones shall be identified and scheduled on the Shop Drawing Submittal using current building designations, room names and numbers.

END OF SECTION

MIDLOTHIAN ISD

STADIUM ADDITIONS AND RENOVATIONS

CONSTRUCTION DOCUMENTS

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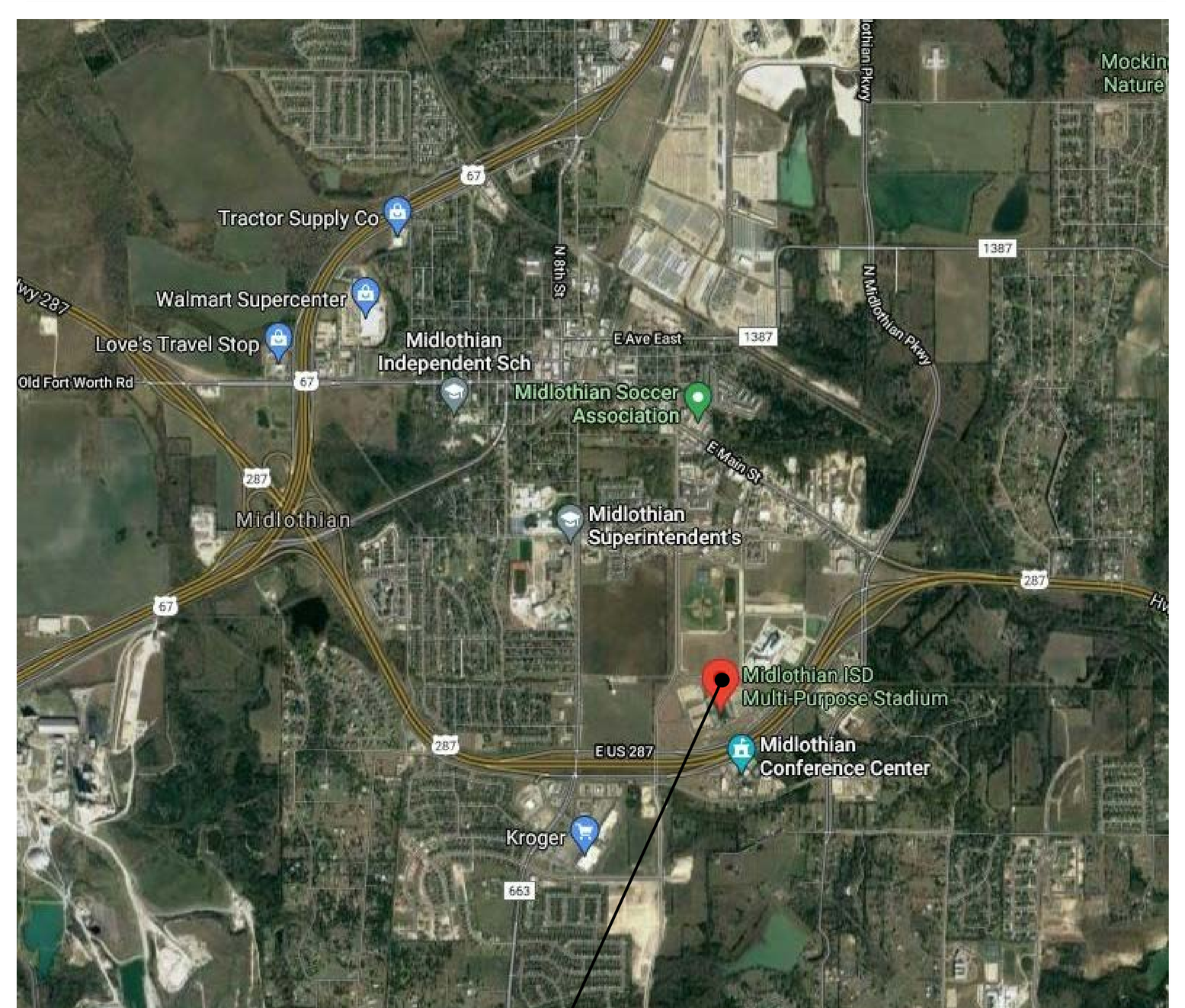
VICINITY MAP



MIDLOTHIAN ISD Multi-Purpose Stadium
1800 S 14th ST.
Midlothian, TX 76065

SHEET INDEX

general

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G-010	TAS DETAILS	10/07/2021		
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civil

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architectural

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AD103	DEMOLITION SITE PLAN	10/07/2021	2	10/27/2021
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A-103	PRESSBOX FLOOR PLAN	10/07/2021	1	10/18/2021
A-104	FIELD HOUSE FLOOR PLAN & RCP	10/07/2021		
A-112	CONCESSION RCP	10/07/2021		
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A-121	ROOF PLAN	10/07/2021		
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A-202	BUILDING ELEVATIONS	10/07/2021	1	10/18/2021
A-301	BUILDING SECTIONS	10/07/2021		
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A-403	INTERIOR DETAILS	10/07/2021	2	10/27/2021
A-404	ENLRGD PLANS, INT. ELEV.-ALT BID #2	10/07/2021	2	10/27/2021
A-501	EXTERIOR DETAILS	10/07/2021	2	10/27/2021
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structure

SHEET #	DESCRIPTION	ORIG. ISSUE	REV. DELTA #	REV. DATE
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S-102	SPECIAL INSPECTIONS			
S-103	PERSPECTIVES			
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S-201A	FOUNDATION & ROOF FRAMING PLAN ALTERNATE BID #6		1	10/18/2021
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S-602	CONCRETE REPAIR PHOTOS ALTERNATE BID #1			
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mechanical

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M-101	FLOOR PLAN - LEVEL 1 - ATHLETIC OFFICE - HVAC	10/07/2021	1	10/18/2021
M-104	FLOOR PLAN - FIELD HOUSE -HVAC	10/07/2021	2	10/27/2021
M-123	FLOOR PLAN - PRESS BOX - HVAC	10/07/2021	2	10/27/2021
M-201	FLOOR PLAN - LEVEL 1 - ATHLECTIC OFFICE - HVAC PIPING	10/07/2021		
M-301	ENLARGED PLAN - MECH ROOM - HVAC	10/07/2021	2	10/27/2021
M-302	MECHANICAL ROOM SECTIONS - HVAC	10/07/2021	2	10/27/2021
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MPE-105	ROOF PLAN - CONCESSION (ALTERNATE) - MPE	10/07/2021	1	10/18/2021
•MPE-103	ROOF PLAN - ATHLETIC OFFICE - MPE	10/07/2021	1	10/18/2021
M-102	FLOOR PLAN - CONCESSIONS HVAC (ALTERNATE)	10/07/2021	1	10/18/2021
M-113	FLOOR PLAN - PRESSBOX-HVAC	10/07/2021	2	10/27/2021

fire protection

SHEET#	DESCRIPTION	ORIG. ISSUE	REV. DELTA #	REV. DATE
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plumbing

SHEET #	DESCRIPTION	ORIG. ISSUE	REV. DELTA #	REV. DATE
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P-101	UNDERFLOOR PLAN - ATHLECTIC OFFICE - PLUMBING	10/07/2021	1	10/18/2021
P-102	UNDERFLOOR PLAN-CONCESSIONS RESTROOMS-PLUMBING	10/07/2021	1	10/18/2021
P-201	FLOOR PLAN - ATHLECTIC OFFICE - PLUMBING	10/07/2021	1	10/18/2021
P-202	FLOOR PLAN - CONCESSIONS PLUMBING	10/07/2021	1	10/18/2021
P-301	PLUMBING DETAILS	10/07/2021		

electrical

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E-103	FLOOR PLAN-PRESSBOX POWER	10/07/2021	2	10/27/2021
E-201	FLOOR PLAN - LEVEL 1 - ATHLECTIC OFFICE - LIGHTING	10/07/2021	1	10/18/2021
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E-203	FLOOR PLAN - LEVEL 1 - PRESS BOX - LIGHTING	10/07/2021		
E-213	FLOOR PLAN - LEVEL 2 - PRESS BOX - LIGHTING	10/07/2021	2	10/27/2021
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E-701	ELECTRICAL RISER & SCHEDULES	10/07/2021	2	10/27/2021
E-702	ELECTRICAL DETAILS	10/07/2021		
•ED-102	DEMOLITION PLANS - ELECTRICAL	10/07/2021		

technology

SHEET #	DESCRIPTION	ORIG. ISSUE	REV. DELTA #	REV. DATE
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ET1.1	ELECTRICAL COMMUNICATIONS FLOOR PLAN - ATHLETICS OFFICE	10/07/2021		
ET 1.2	COMMUNICATIONS FLOOR PLAN-CONTROL ROOM	10/07/2021	2	10/27/2021

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REGISTERED ARCHITECT
BRIAN C. HARLAN
19569
STATE OF TEXAS
10/07/2021

MIDLOTHIAN ISD
STADIUM ADDITIONS AND RENOVATIONS
1800 S 14 ST. MIDLOTHIAN, TX 76065

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100 Walter Stephenson Rd.
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OWP PROJECT NO.: 2021-154-00
DATE OF ISSUE: 10.07.2021

REVISIONS

DELTA	DESCRIPTION	DATE
1	ADDENDUM 2	10/18/2021
2	ADDENDUM 3	10/27/2021

PROJECT TEAM: ED TEXAS
DRAWN BY: EA

PROJECT PHASE: CONSTRUCTION DOCUMENTS

SHEET CONTENTS: TITLE SHEET

SHEET NO.: G-001

KEYNOTES - SITE

130	CHAIN LINK FENCE. FIELD VERIFY TO MATCH EXISTING FENCE.(TYP)
131	EXISTING CHAIN LINK FENCE TO REMAIN.(TYP)
132	CONCRETE WALKWAY. REF.CIVIL
133	PROTECTIVE COVER BY AVADEK OR APPROVED EQUAL.
134	GALVANIZED CANOPY. REF. STRUCT.
135	CONCRETE AREA FOR STORAGE EQUIPMENT.
136	STANDING SEAM METAL ROOF. REF.ROOF PLAN.
137	EXISTING CONCRETE SIDEWALK.
138	PAVERS IN SAND. REF. CIVIL
139	ACCESSIBLE PARKING SPACE WITH POLE SIGNAGE
140	NEW PARKING SPACE WITH STRIPING
141	ACCESSIBLE WALKWAY STRIPING

SITE PLAN GENERAL NOTES

A. Contractor shall remove all existing vegetation, site improvements, etc. whether or not specifically indicated on the drawings to facilitate the completion of all required new work. Contractor shall visit the site and verify all quantities and items that are required to be removed prior to submittal of this proposal.

B. Slope all grades and pavement away from building(s) to provide positive drainage, unless noted otherwise.

C. Finish grade at sidewalks, buildings, etc., as required to provide smooth transition to grade.

D. Angles indicated are 45 degrees unless noted otherwise.

E. Construction debris shall be removed from the site on a continuing basis for the duration of construction.

F. Concrete walks shall have expansion joints at a maximum spacing of 20 feet O.C. and control joints at 5 feet O.C., unless noted otherwise.

G. Perform all clearing, grubbing and earthwork in accordance with the Geotechnical Report, unless more restrictive requirements exist.

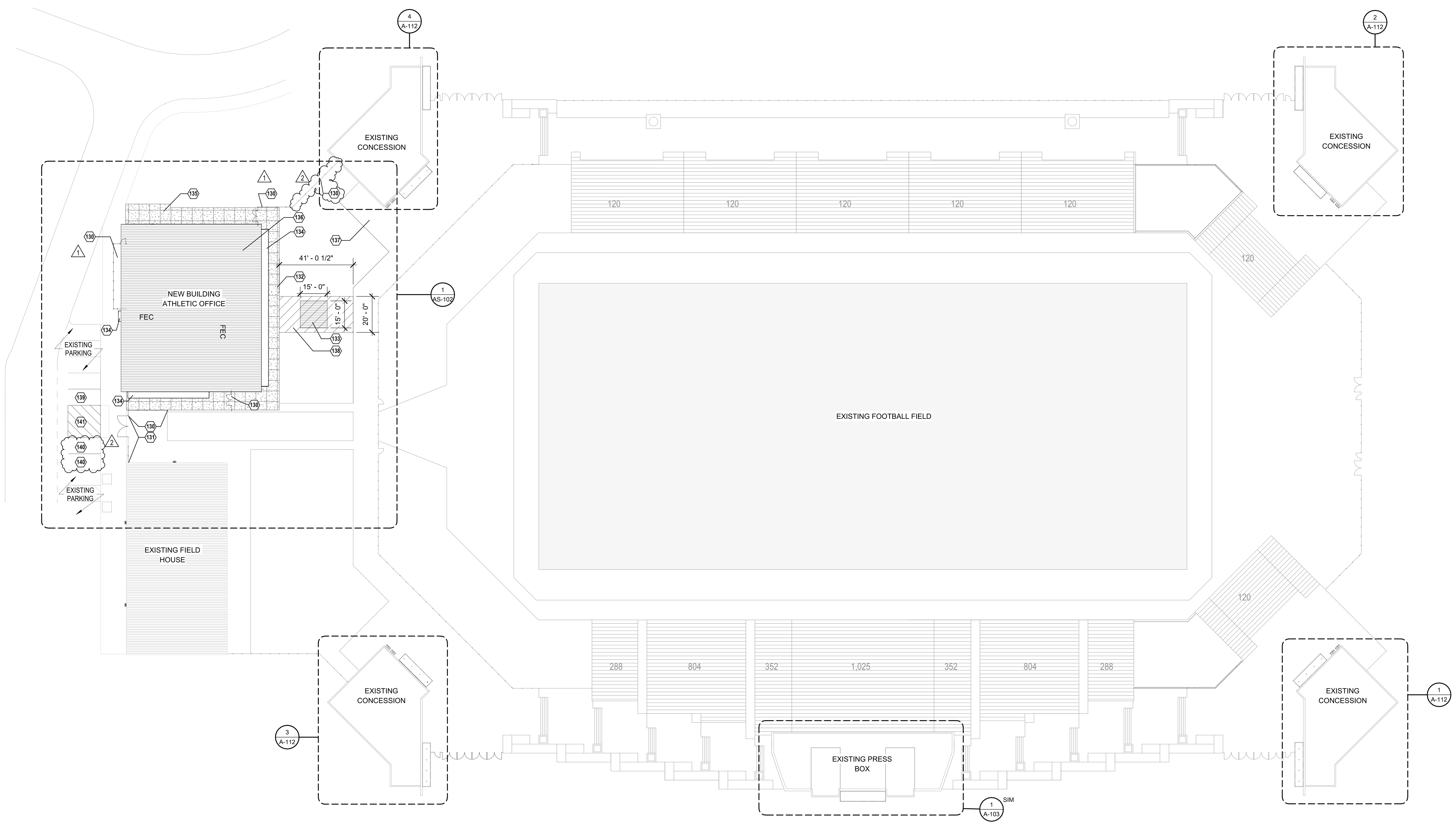
H. Should slopes of greater than 1:20 (5%) occur at pavement locations, notify architect immediately.

I. All proposed imported fill material shall be tested by a qualified testing agency to verify that it meets all specification requirements prior to placing on site.

J. Dimensions are to outside face of stem walls/foundations unless noted otherwise.

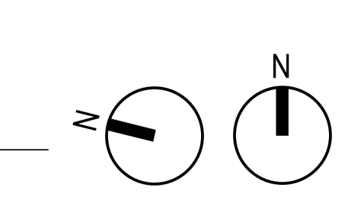
K. All areas disturbed by construction, staging, etc. shall be restored to their original condition by the General Contractor. General Contractor is responsible for documenting original condition.

L. All sidewalks at building entryways shall be "keyed" into building slab to prevent differential movement.



1 SITE PLAN - ARCHITECTURAL

1" = 30'-0"



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REGISTERED ARCHITECT BRIAN C. HARLAN 19569 STATE OF TEXAS

10/07/2021

MIDLOTHIAN ISD

STADIUM ADDITIONS AND RENOVATIONS

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1	ADDENDUM 2	10.18.2021
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PROJECT TEAM	DRAWN BY
ED TEXAS	EA/KN

PROJECT PHASE

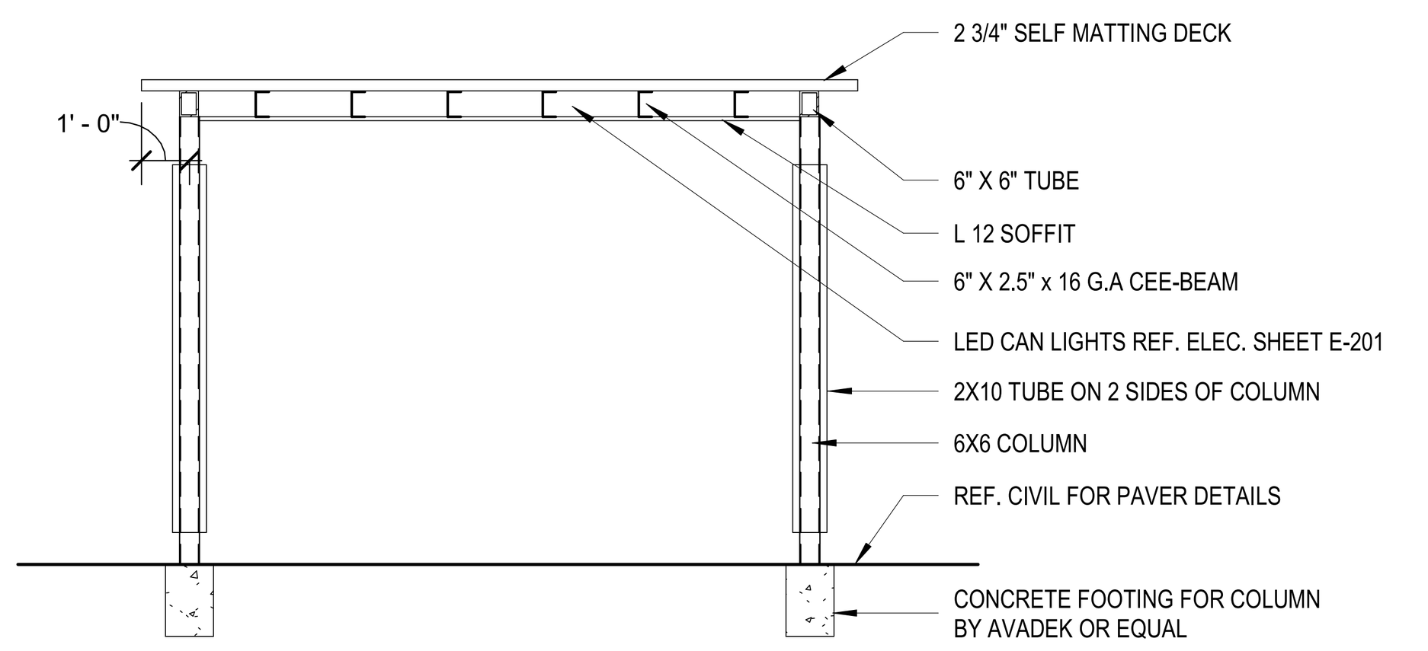
CONSTRUCTION DOCUMENTS

SHEET CONTENTS

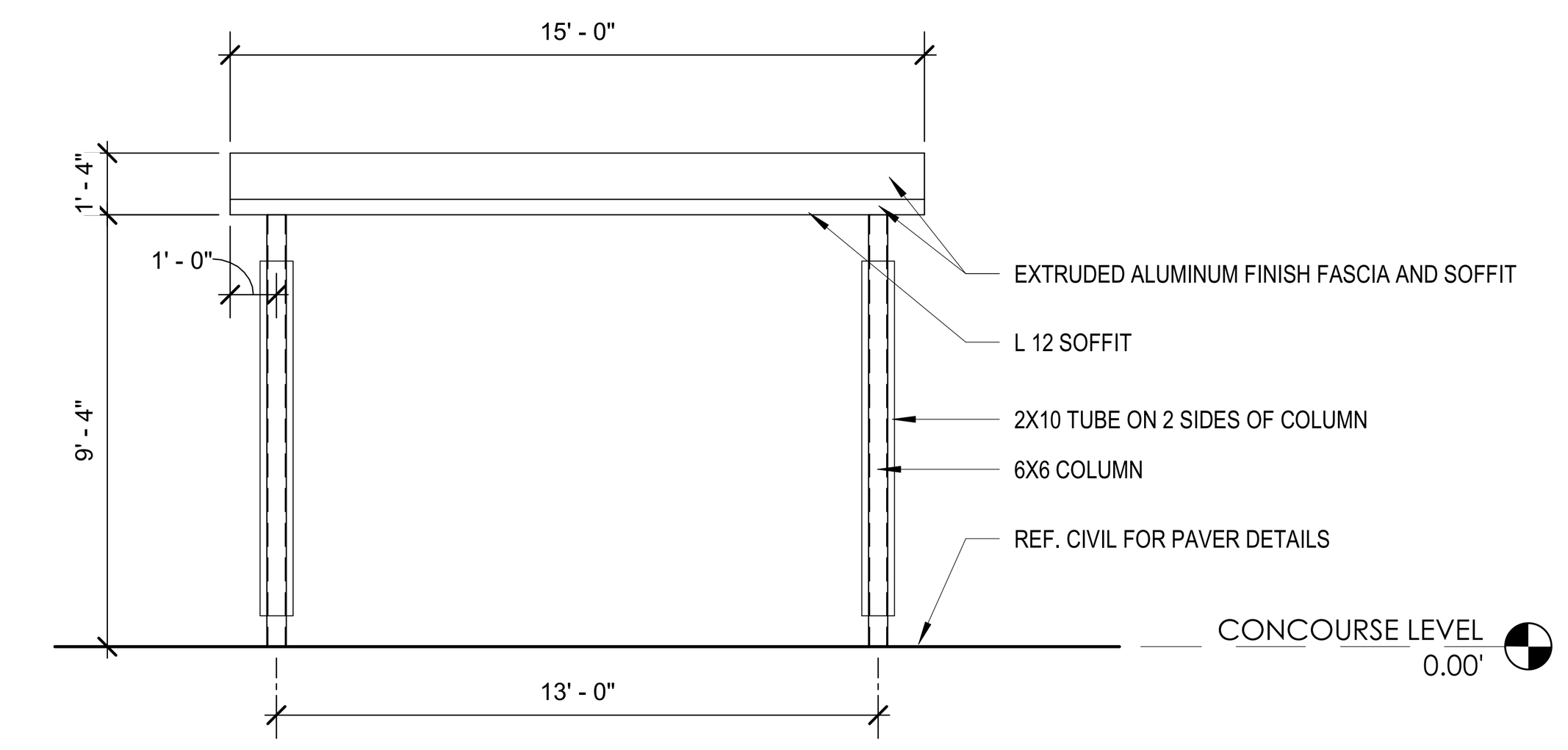
ARCHITECTURAL SITE PLAN

SHEET NO.

AS-101



3 OUTDOOR AREA SECTION
1/4" = 1'-0" REF 1 / AS-102



2 OUTDOOR COVERED AREA ELEVATION
1/4" = 1'-0" REF 1 / AS-102

SITE PLAN GENERAL NOTES

A. Contractor shall remove all existing vegetation, site improvements, etc. whether or not specifically indicated on the drawings to facilitate the completion of all required new work. Contractor shall visit the site and verify all quantities and items that are required to be removed prior to submittal of this proposal.

B. Slope all grades and pavement away from building(s) to provide positive drainage, unless noted otherwise.

C. Finish grade at sidewalks, buildings, etc., as required to provide smooth transition to grade.

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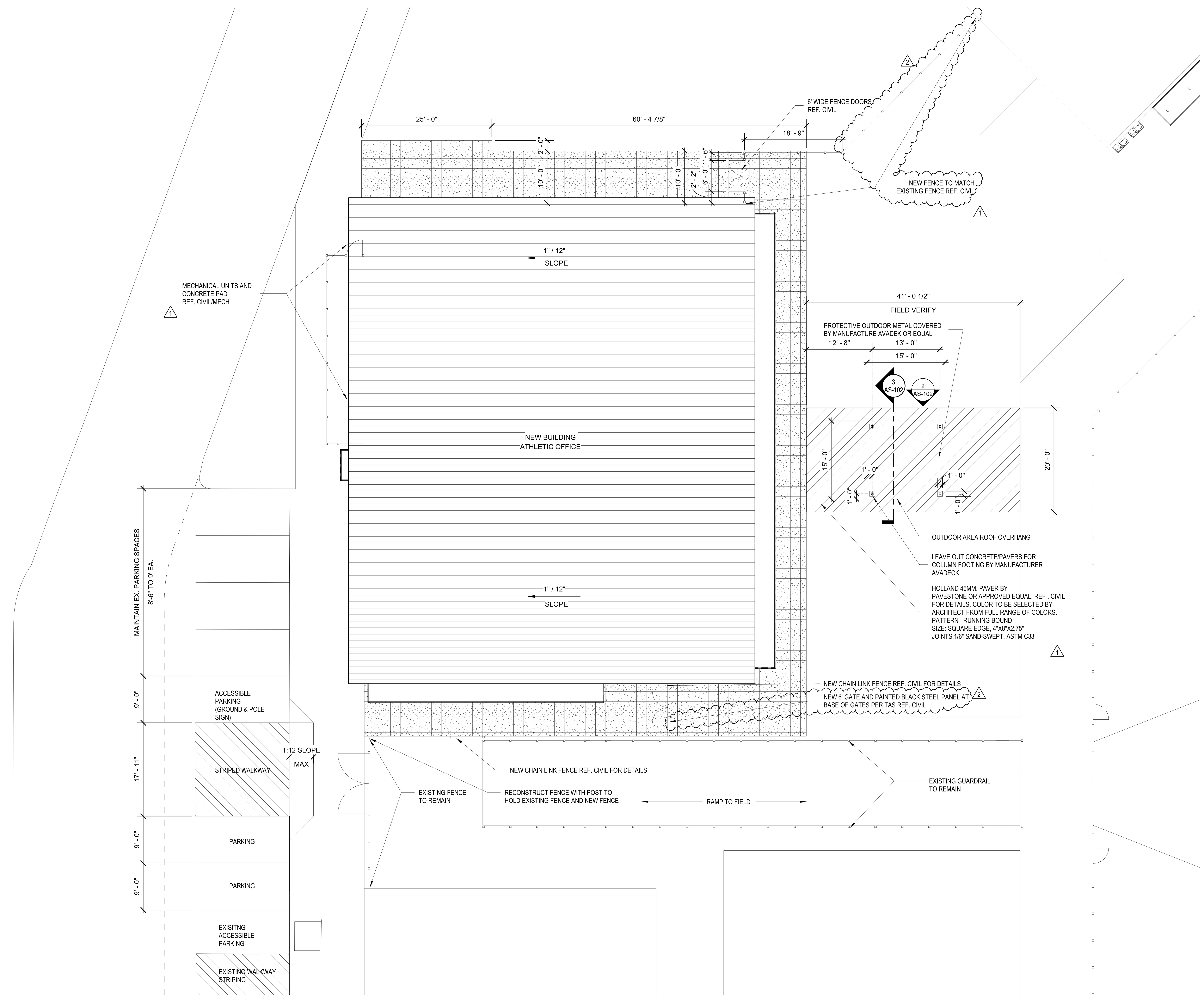

1 SITE PLAN - NEW BUILDING ATHLETIC OFFICES
1" = 10'-0" REF 1 / A-202

N TRUE N PLAN

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10/07/2021

MIDLOTHIAN ISD

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1	ADDENDUM 2	10/18/2021
2	ADDENDUM 3	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	KN

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
ENLARGED SITE PLAN

SHEET NO.
AS-102

10/27/2021 1:03:19 PMorcutt | winslow / 2021-154-00 / STADIUM ADDITIONS AND RENOVATIONS - MIDLOTHIAN ISD / CONSTRUCTION DOCUMENT / AS-102- ENLARGED SITE PLAN / KN
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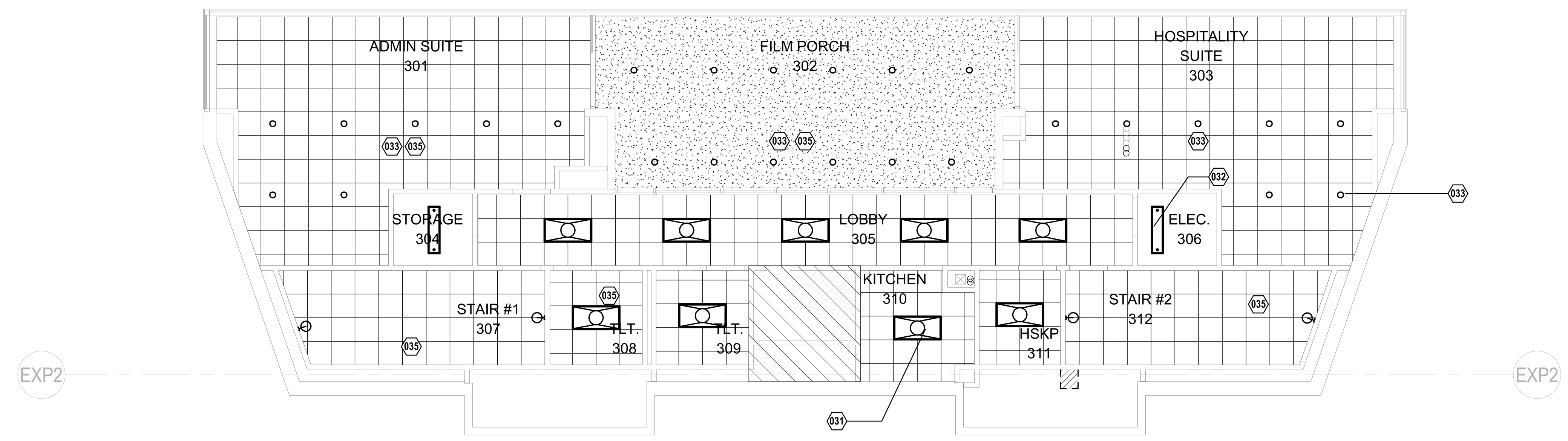
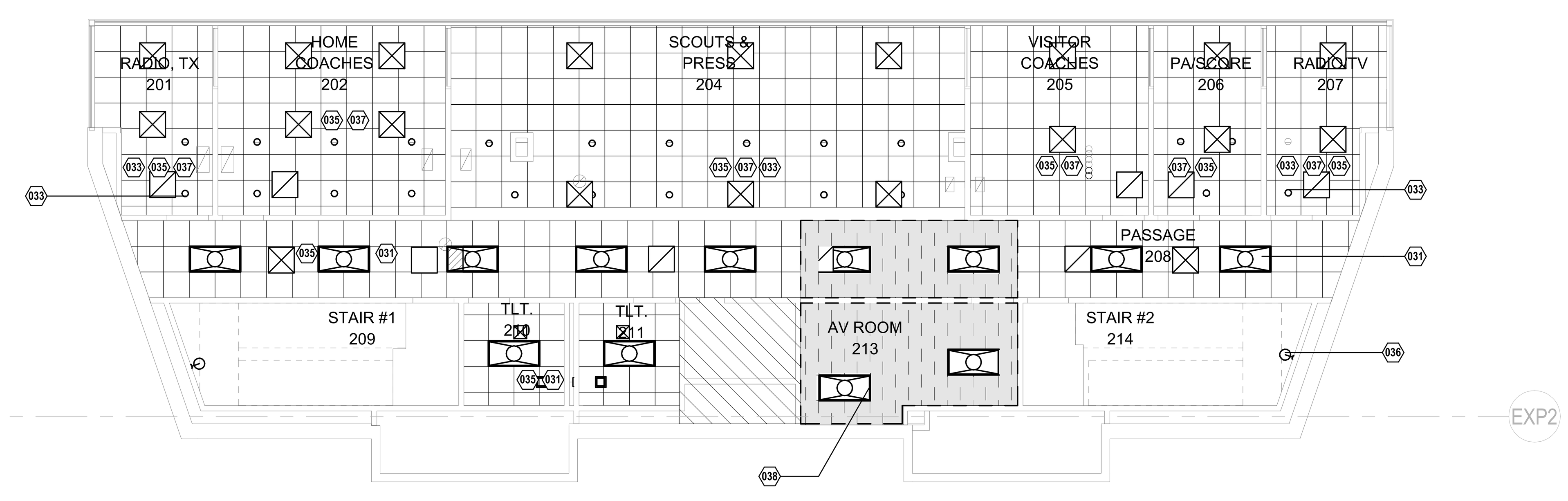
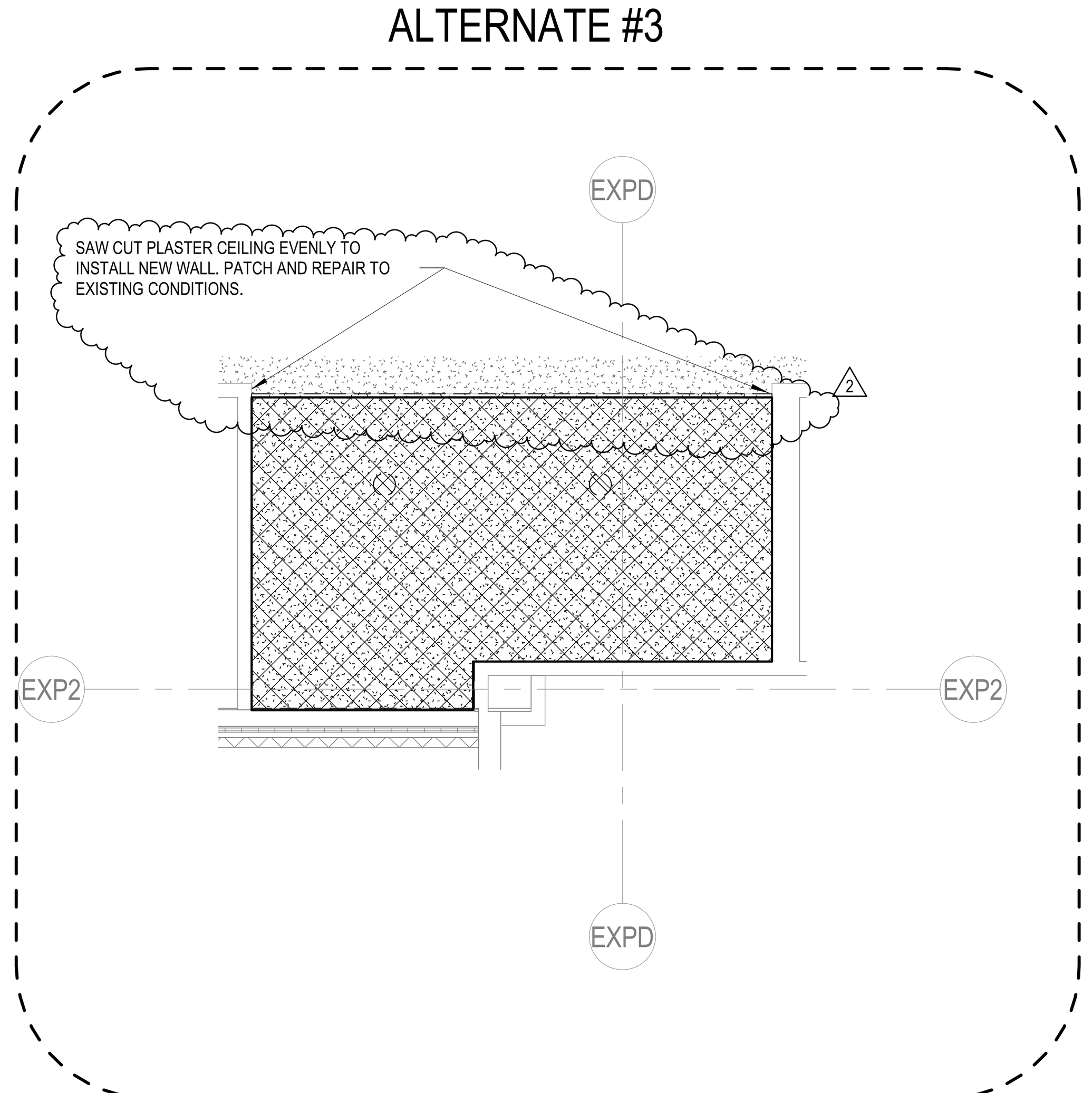


4 DEMOLITION PRESS BOX UPPER LEVEL - RCP
1/8" = 1'-0"

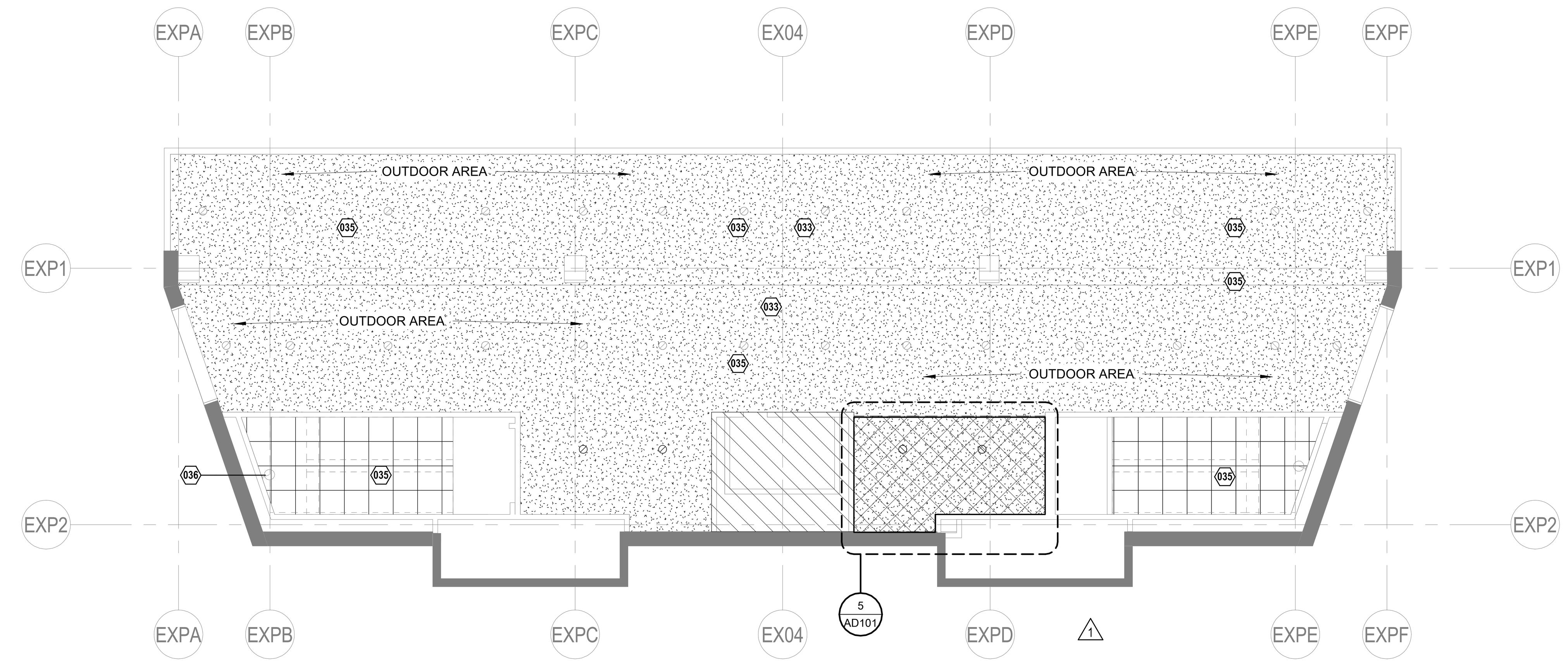


3 DEMOLITION PRESS BOX LOWER LEVEL - RCP
1/8" = 1'-0"

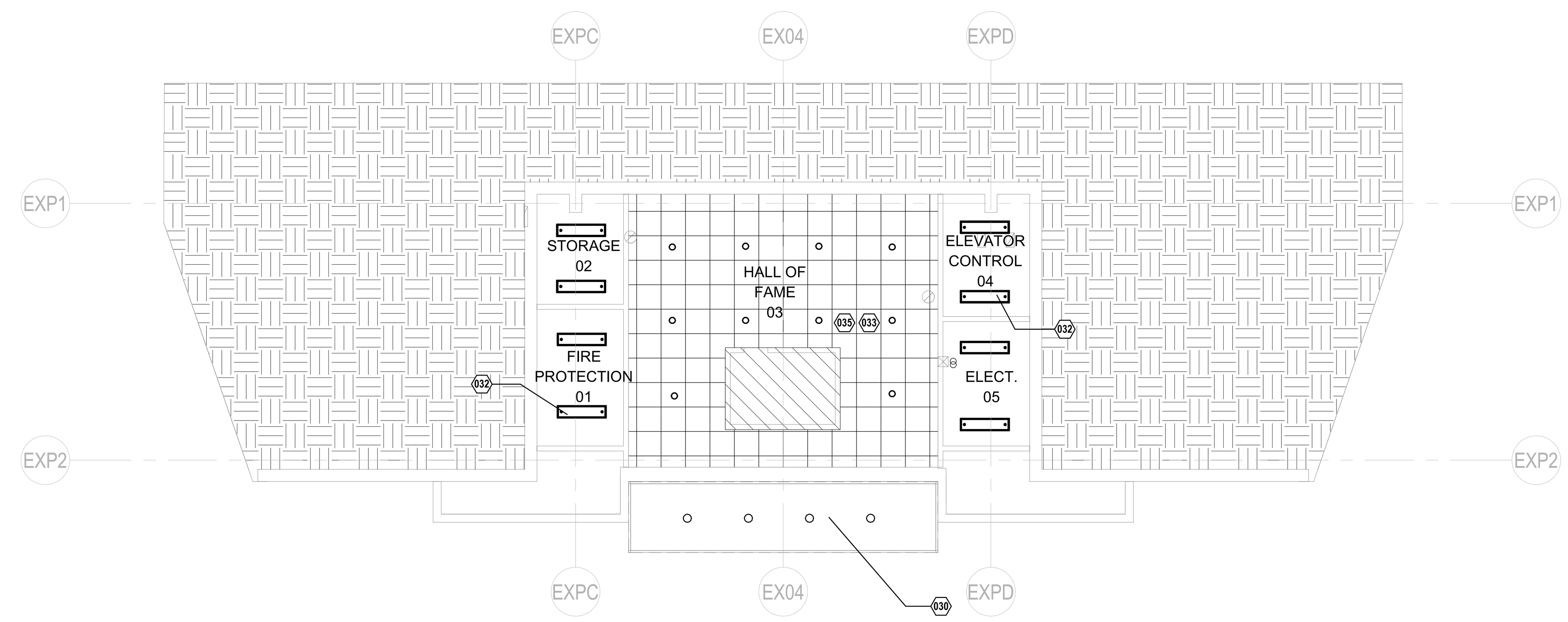
ALTERNATE #3



5 DEMO CEILING AND LIGHTS (ALTERNATE #3)
1/4" = 1'-0" REF 2 / AD101



2 DEMOLITION PRESS BOX PORCH LEVEL - RCP
1/8" = 1'-0"



1 DEMOLITION PRESS BOX ENTRY LEVEL - RCP
1/8" = 1'-0"

DEMOLITION PLAN GENERAL NOTES

A. Sawcut and remove existing concrete floor slab to accommodate new utility work. Compact trench backfill and patch floor slab to match existing.

B. Coordinate demolition with new construction. All demolition and repair necessary to accomplish new construction shall be included. Contractor shall remove all existing improvements whether or not specifically indicated on the drawings to facilitate the completion of all required work. Contractors shall visit the site and verify all quantities and items required to be removed.

C. Where gypsum board is to remain, patch, tape and float portion of wall to match adjacent new finish.

D. Contractor to coordinate demolition so all wiring, conduit, equipment, etc. to remain is not damaged. Certain items may be temporarily removed and replaced later during course of restoration. General Contractor will be required to incorporate this work into their schedule. The systems may include, but are not limited to the following: EMS/controls, electrical power and lighting, data, audiovisual, security, intercom, CATV, etc. Contractor to tag and loop wire to remain back to control panels, typical.

E. Any plumbing to be demolished shall have piping terminated above finished ceiling, below finished floor, and behind finished walls. All drain/waste/vent piping to be capped and sealed at all openings per requirements of AHJ.

F. Remove existing ceiling grid, suspension wires, lighting fixtures, conduits, exit signs, speakers, smoke detectors, curtain tracks, HVAC diffusers and return grilles, and any other ceiling mounted apparatus in all areas of demolition, UNO.

G. Remove floor and wall covering typical throughout areas of demolition (UNO) and any other areas as affected by demolition/new construction. Parge, float and/or prepare floor and wall surfaces to receive new finishes.

H. Contractor shall remove and replace any fireproofing or firestopping damage during demolition or new construction to conform to proper rating.

I. Contractor shall provide full height temporary partitions with UL rating as needed to separate the construction activity, noise, and dirt from adjacent areas (refer to proposed Phasing Plan).

J. Contractor shall coordinate any shutdown required during demolition with Owner.

K. Contractor to maintain or repair fire and smoke ratings of existing floor, roof and wall assemblies throughout.

KEYNOTES - DEMOLITION (CEILING)

030	RELAMP RECESSED CAN LIGHTS IN EXTERIOR CANOPY TYP. REF. ELECT.
031	RELAMP 2X4 LIGHT FIXTURES TYP. REF. ELECT.
032	RELAMP 1X4 LIGHT FIXTURES TYP. REF. ELECT.
033	RELAMP RECESSED CAN LIGHTS TYP. REF. ELECT.
034	RELAMP WALL-PACK LIGHTS AT EXISTING FIELD HOUSE TYP. REF ELEC.
035	EXISTING ITEMS TO STAY ACOUSTICAL CEILING TILES, GYPSUM BOARD, AND PLASTER CEMENT CEILING TYP. DO NOT REMOVE CEILING.
036	RELAMP WALL MOUNTED LIGHTS TYP. REF. ELECT.
037	REMOVE EXISTING ROLLER SHADE TYP.
038	RELAMP 2X4 LIGHT FIXTURE AND UNINSTALL/REINSTALLED LIGHT FIXTURE HOUSING. DEMOLISHING CEILING.

DEMOLITION CEILING LEGEND

RELAMP LIGHT FIXTURE ONLY (RE: ELEC.)

RELAMP LIGHT FIXTURE ONLY (RE: ELEC.)

RELAMP RECESSED CAN LIGHT ONLY (RE: ELEC.)

RELAMP PENDENT LIGHT FIXTURE ONLY (RE: ELEC.)

RELAMP SURFACE MOUNTED OR SUSPENDED LIGHT FIXTURE ONLY (RE: ELEC.)

RCP LEGEND

NO WORK AREA

DEMO CEILING AND LIGHTS

DEMO CEILING AND LIGHTS ALTERNATE BID #3

N

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REGISTERED ARCHITECT BRIAN C. HARLAN 19569 STATE OF TEXAS
10/07/2021

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1	ADDENDUM 2	10/18/2021
2	ADDENDUM 3	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	EA

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
DEMOLITION CEILING PLANS

SHEET NO.
AD101

10/27/2021 2:39:35 PMorcutt | winslow / 2021-154-00 / STADIUM ADDITIONS AND RENOVATIONS - MIDLOTHIAN ISD / CONSTRUCTION DOCUMENT / AD101- DEMOLITION CEILING PLANS / EA
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DEMOLITION LEGEND

DEMO CHAIN LINK FENCE

DEMOLITION SITE PLAN GEN. NOTES

A. Perform all site preparation work, remove all materials, clear and grub site in accordance with the requirements of the Geotechnical Engineering Report.

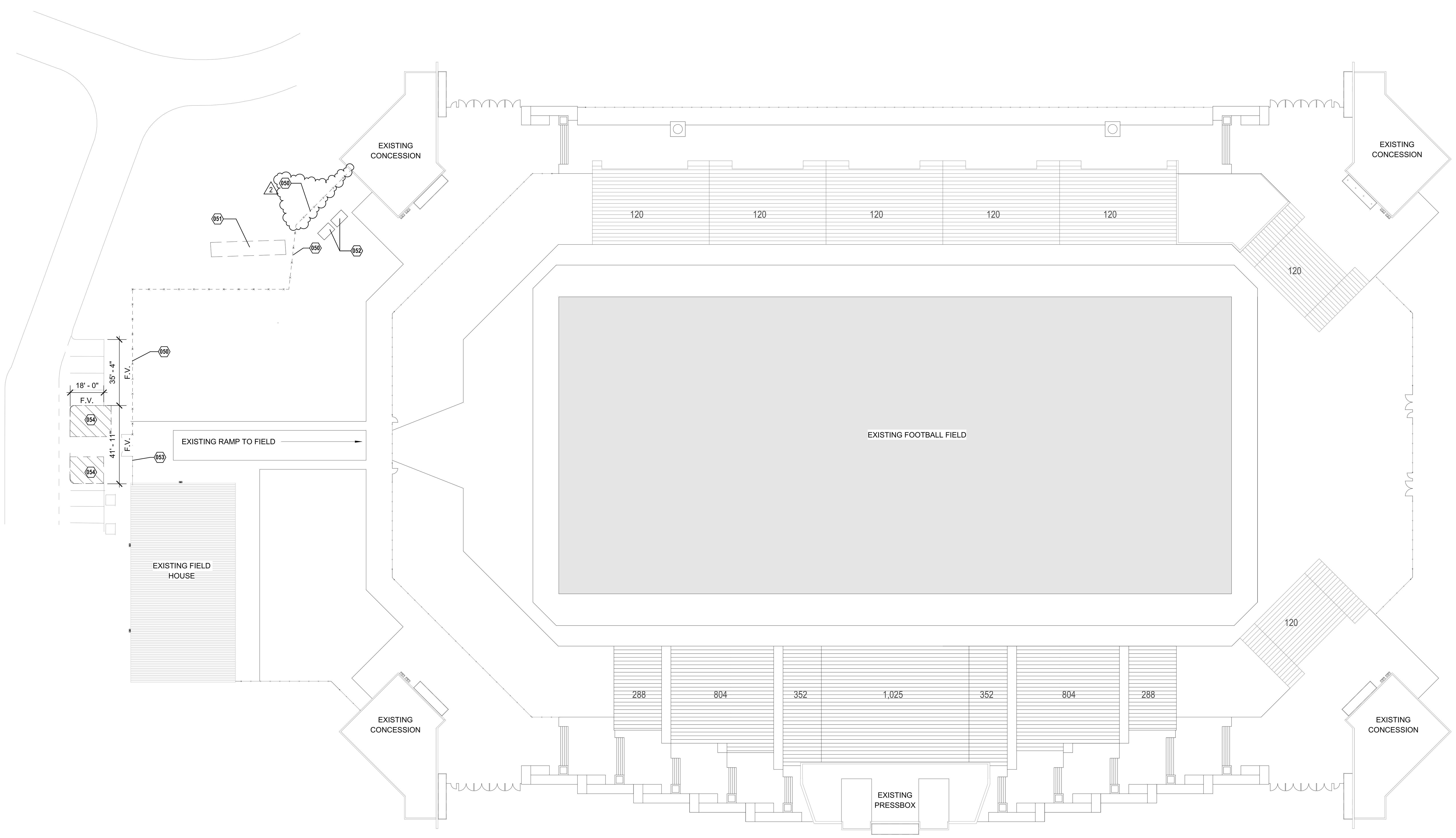
B. The Contractor is responsible for protecting all existing improvements to remain, and shall repair or replace them in kind to the satisfaction of the Owner and Architect if damaged, at no additional cost to the Owner.

C. Contractor shall remove all existing vegetation, site improvements, etc. whether or not specifically indicated on the drawings to facilitate the completion of all required work. Contractor shall visit the site and verify all quantities and items required to be removed prior to bidding.

D. Underground utilities may exist in locations other than those shown. Contractor shall take care to locate and protect underground utilities that are to remain in service

KEYNOTES - DEMOLITION (SITE)

050 REMOVE EXISTING CHAIN LINK FENCE
051 REMOVE EXISTING SHIPPING CONTAINER TO 315 E. AVENUE E. COORDINATE WITH OWNERFOR FINAL LOCATION.
052 RELOCATE OUTDOOR GRILL. COORDINATE WITH OWNER FOR NEW LOCATION.
053 EXISTING CHAIN LNK FENCE TO REMAIN TYP.
054 DEMO CONCRETE PAVING, REF. CIVIL



1 DEMOLITION SITE PLAN - ARCHITECTURAL

1" = 30'-0"

N TRUE

N PLAN

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REGISTERED ARCHITECT BRIAN C. HARLAN 19569 STATE OF TEXAS

10/07/2021

MIDLOTHIAN ISD

STADIUM ADDITIONS AND RENOVATIONS

1800 S 14 ST. MIDLOTHIAN, TX 76065

CLIENT CONTACT

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OWP PROJECT NO.	DATE OF ISSUE
2021-154-00	10.07.2021

REVISIONS

DELTA	DESCRIPTION	DATE
2	ADDENDUM 3	10.27.2021

PROJECT TEAM	DRAWN BY
ED TEXAS	EA

PROJECT PHASE

CONSTRUCTION DOCUMENTS

SHEET CONTENTS

DEMOLITION SITE PLAN

SHEET NO.

AD103

10/26/2021 11:16:28 AM orcutt | winslow / 2021-154-00 / STADIUM ADDITIONS AND RENOVATIONS - MIDLOTHIAN ISD / CONSTRUCTION DOCUMENT / AD103- DEMOLITION SITE PLAN / EA
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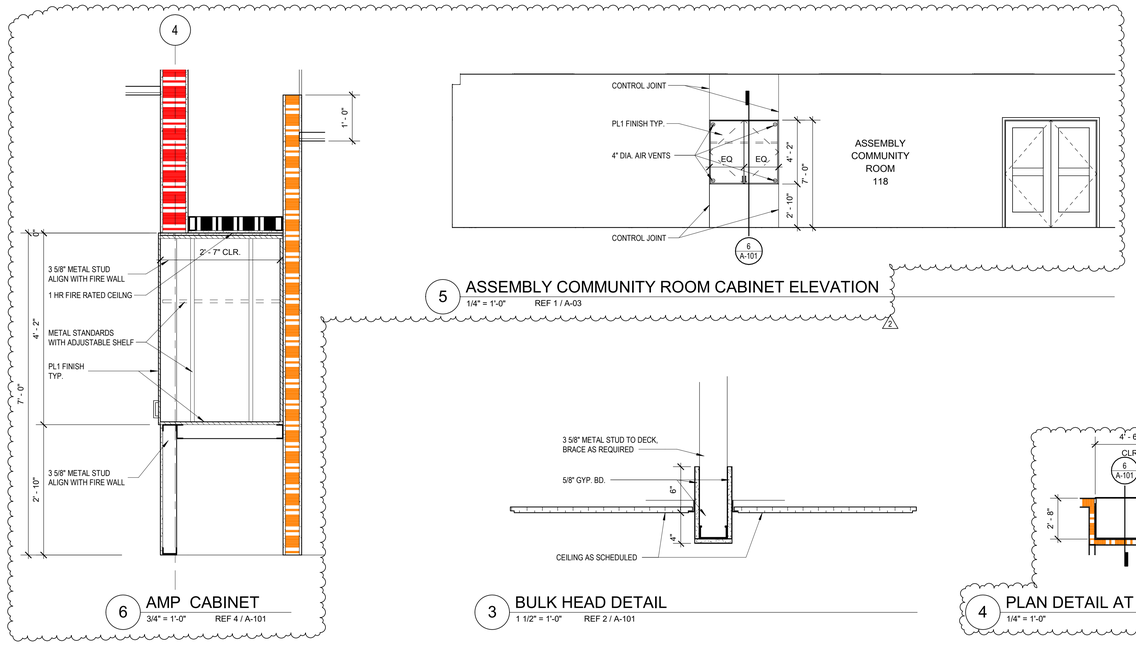
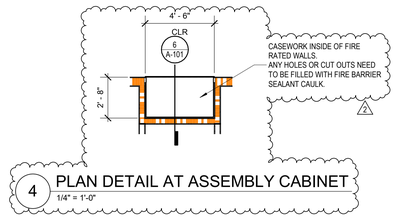


6 AMP CABINET
3/4" = 1'-0" REF 4 / A-101

5 ASSEMBLY COMMUNITY ROOM CABINET ELEVATION
1/4" = 1'-0" REF 1 / A-03

3 BULK HEAD DETAIL
1 1/2" = 1'-0" REF 2 / A-101



4 PLAN DETAIL AT ASSEMBLY CABINET
1/4" = 1'-0"

REFL. CEILING PLAN GEN. NOTES

- OPEN — EXPOSED TO STRUCTURE ABOVE
- 10'-0" / AC1 — HEIGHT ABOVE FINISHED FLOOR / CEILING TYPE
- CEILING MOUNTED 2x4 LED
- CEILING MOUNTED 2x2 LED
- RECESSED DOWNLIGHT LED
- FIXTURE CABLE HUNG 1x4 LED
- SUPPLY DIFFUSER (SEE MECH.)
- RETURN DIFFUSER (SEE MECH.)
- EMERGENCY LIGHT (SEE ELEC.)
- CEILING MOUNTED EMERGENCY EXIT LIGHT (SEE ELEC.)
- WALL MOUNTED EMERGENCY EXIT LIGHT (SEE ELEC.)

FLOOR PLAN LEGEND

- FEC — FIRE EXTINGUISHER CABINET
- MB1 — 4'-0" X 6'-0" MARKERBOARD. MOUNT AT 3'-0" A.F.F.
- LCD — [75"] INTERACTIVE LCD, WALL MOUNTED WITH POWER & AV CONNECTION. LCD AND MOUNT BY OWNER, INFRASTRUCTURE BY CONTRACTOR. CONTRACTOR TO COORDINATE WITH OWNER ON SPECIFIC MODEL AND INFRASTRUCTURE REQUIREMENTS.
- PC — PROJECTION SCREEN
- WALL TYPE NUMBER (W-S1-A) / WALL TYPE — WALL CONDITION (See G-006 for Wall Conditions Diagram)

WALL TYPE: SEE WALL CONDITIONS DIAGRAM & DETAILS
Type: S=Steel Stud M=Masonry
C=Concrete W=Wood
F=Steel Stud or Channel Furring

GENERAL FLOOR PLAN NOTES

A. Keynotes and legends are typical for all floor plan sheets, and may not apply to each sheet.

B. Dimensions are to face of masonry, concrete and studs and centerline of columns unless noted otherwise.

C. See enlarged floor plans and details for specific locations of plumbing fixtures.

D. Field verify all dimensions prior to fabrication of any cabinetry, frames, structural items, etc.

E. Provide painted access panels in walls and ceilings at concealed items, such as valves, shock absorbers, controls, switches, etc., and any other items that may require access. It is the Contractor's responsibility to determine access panel locations.

F. Not Used.

G. Seal all penetrations in fire rated assemblies as required by all applicable codes. Permanently label all penetrations and assemblies.

H. Verify and coordinate all requirements for owner furnished items, prior to performance of any work that is to accommodate and interface with such items.

I. All angles are increments of 45 degrees unless noted otherwise.

J. Extend wall envelope insulation from floor line to meet roof insulation.

K. Provide "Fry" reveal FDM 625-75 or equal at all gypsum board to masonry or concrete transitions.

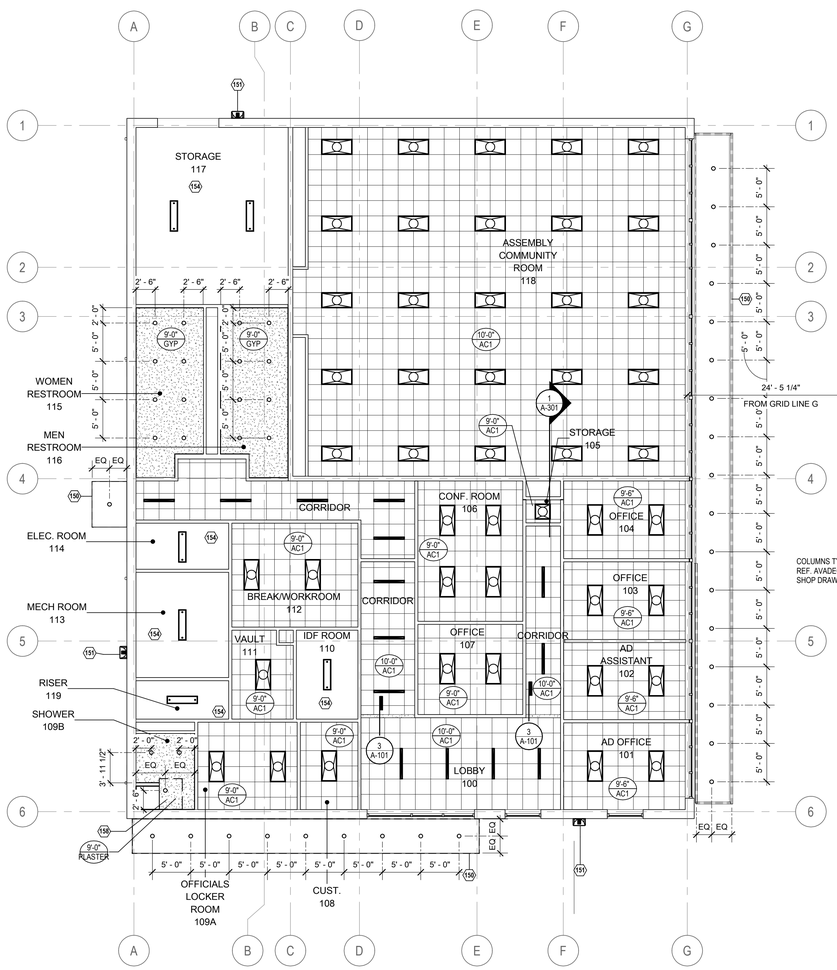
L. All frame walls to be Type S01 and all furring walls to be F01, unless noted otherwise.

KEYNOTES - RCP

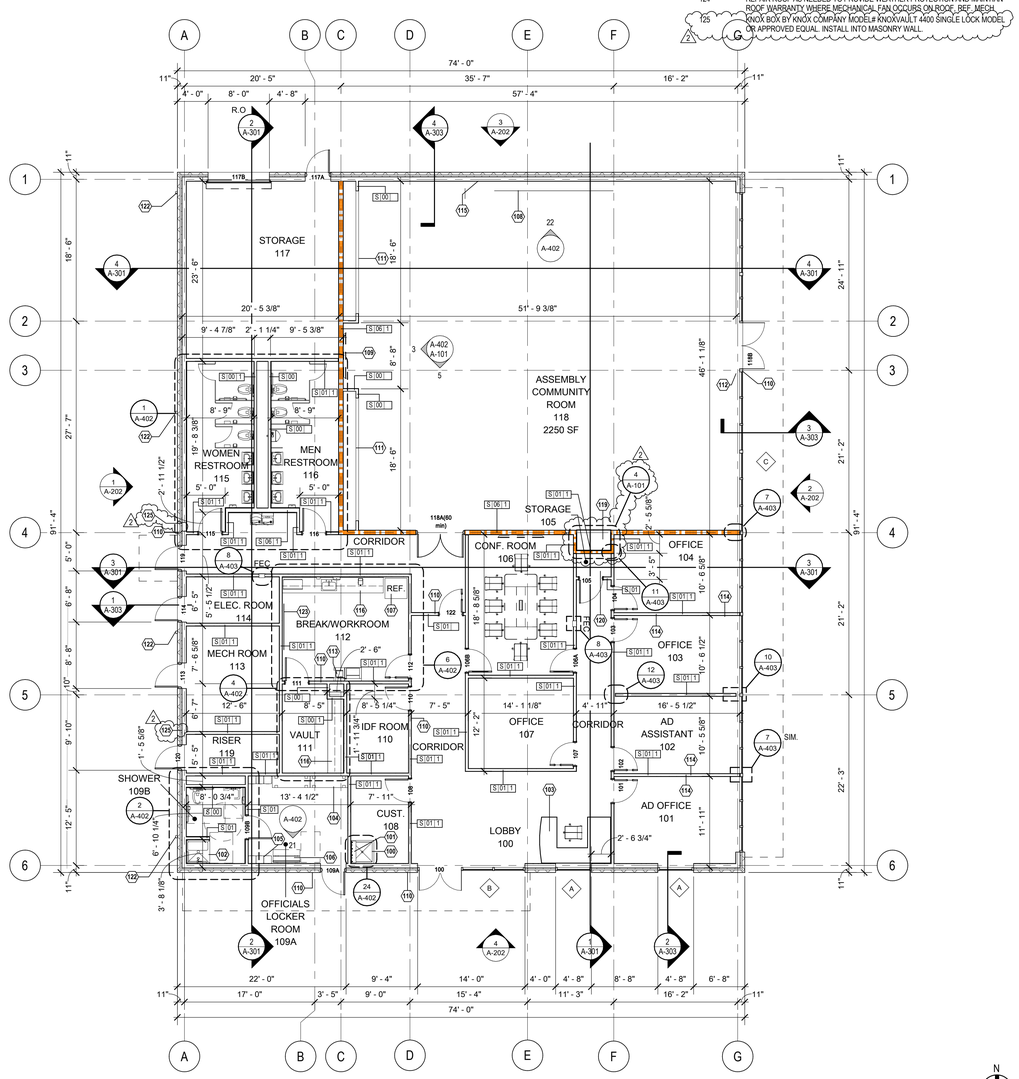
150	METAL CANOPY REF. STRUCT.
151	RELAMP WALL MOUNTED LIGHTS, REF. ELEC
152	RELAMP LIGHT FIXTURE ONLY, RELAMPING ALL EXISTING LIGHT FIXTURE IN THE ROOM ONLY, REF. ELECT.
153	EXTERIOR WALL-PACK LIGHTS TYP. REF. ELECT.
154	OPEN TO DECK
155	EXISTING ITEMS TO STAY ACOUSTICAL CEILING TILES, GYPSUM BOARD, AND PLASTER CEMENT CEILING TYP. DO NOT REMOVE CEILING.
156	LED CAN LIGHTS AT OUTDOOR COVERED AREA.
157	1 HOUR FIRE RATED GYPSUM BOARD CEILING.
158	CEILING PLASTER W/METAL LATH SYSTEM AND LIGHT FIXTURES REF. ELEC
159	CEILING TILES AND LIGHT FIXTURES REF. ELECT.

KEYNOTES - PLAN

100	MOP SINK, REF. PLUMB.
101	MOP RACK REF.PLUMB.
102	PROVIDE CURTAIN SHOWER AND CURTAIN RODS.
103	FURNITURE, BY OWNER
104	BENCHES, BY OWNER
105	METAL LOCKERS TYP.
106	ACCESIBLE BENCH, FLOOR MOUNTED
107	FULL SIZE REFRIGERATOR, BY OWNER
108	MOTORIZED PROJECTION SCREEN
109	FLAT SCREEN TV, BY OWNER
110	CARD READER, REF. TECH
111	TROPHY CASE WITH LED LIGHTS REF. ELECT.
112	PAINT STRUCTURAL COLUMNS
113	LARGE COPY MACHINE REF. ELECT. OFOI
114	MARKER WALL, FLOOR TO CEILING, FULL WIDTH
115	MARKER WALL, FLOOR TO CEILING, 12' WIDE CENTER ON PROJECTOR SCREEN
116	UPPER AND LOWER CASEWORK. REF. INTERIOR ELEVATIONS
117	RELOCATE BABY CHANGING STATION. SEE FLOOR PLAN FOR NEW LOCATION.
118	NEW LOCATION FOR BABY CHANGING STATION
119	NOTCHED WALL FOR AMP LOCATION.
120	STORAGE SHELVING BY OWNER.
121	ROLLER SHADES TYP. REF. SPEC
122	DOWNSPOUT LOCATION TYP. REF. CIVIL FOR STORM DRAIN CONNECTION
123	TACK BOARD. GC TO INSTALL. REF. SPEC
124	REPAIR ROOF AS NEEDED TO PROVIDE WEATHER PROTECTION AND MAINTAIN ROOF WARRANTY WHERE MECHANICAL FAN OCCURS ON ROOF. REF. MECH.
125	KNOX BOX BY KNOX COMPANY MODEL# KNOXVAULT 4400 SINGLE LOCK MODEL OR APPROVED EQUAL. INSTALL INTO MASONRY WALL.



2 ATHLETIC OFFICE RCP
1/8" = 1'-0" REF 1 / A-202



1 ATHLETIC OFFICE FLOOR PLAN
1/8" = 1'-0" REF 1 / A-202

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10/07/2021

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2	ADDENDUM 3	10/27/2021

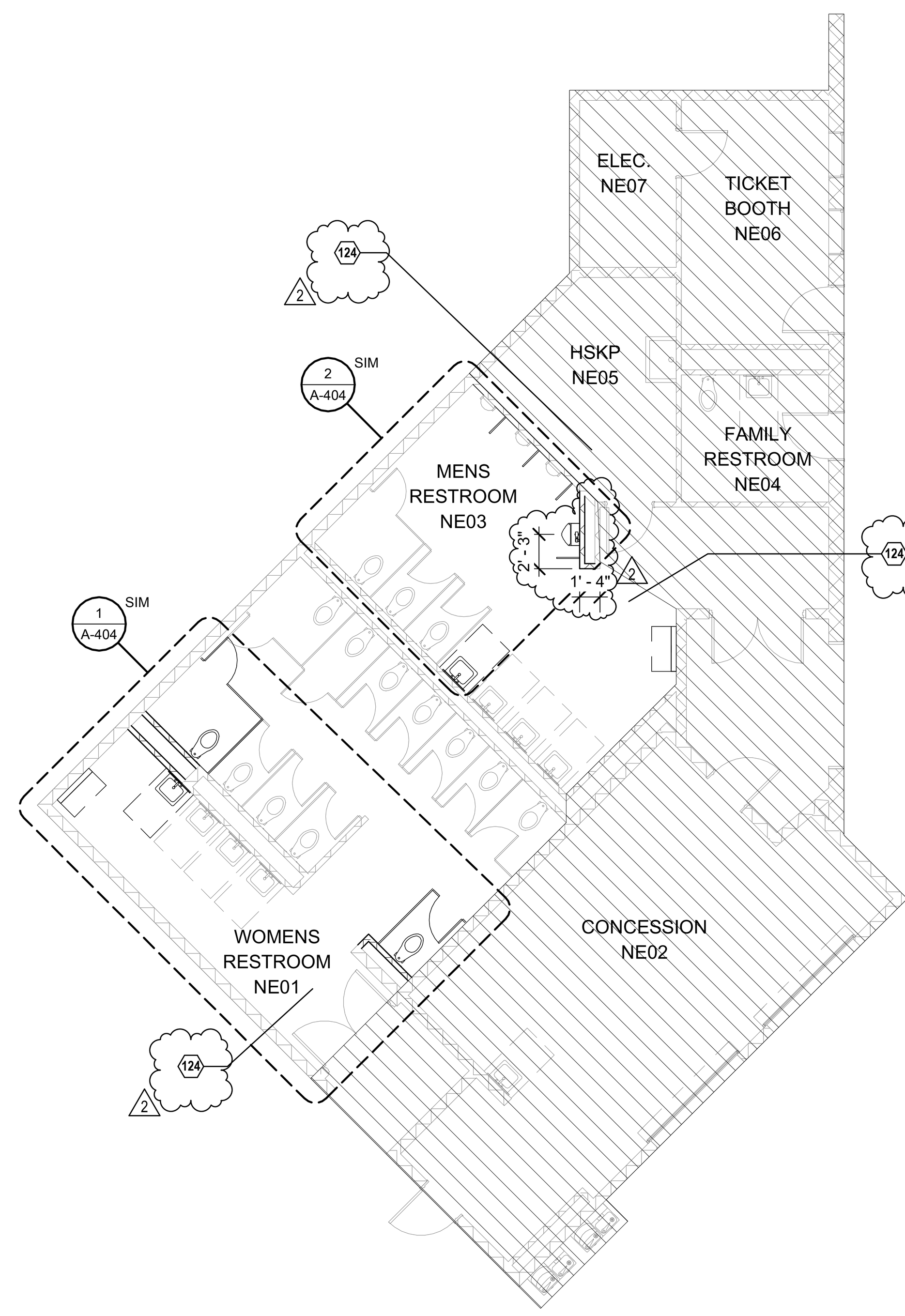
PROJECT TEAM	DRAWN BY
ED TEXAS	EA

PROJECT PHASE
CONSTRUCTION DOCUMENTS

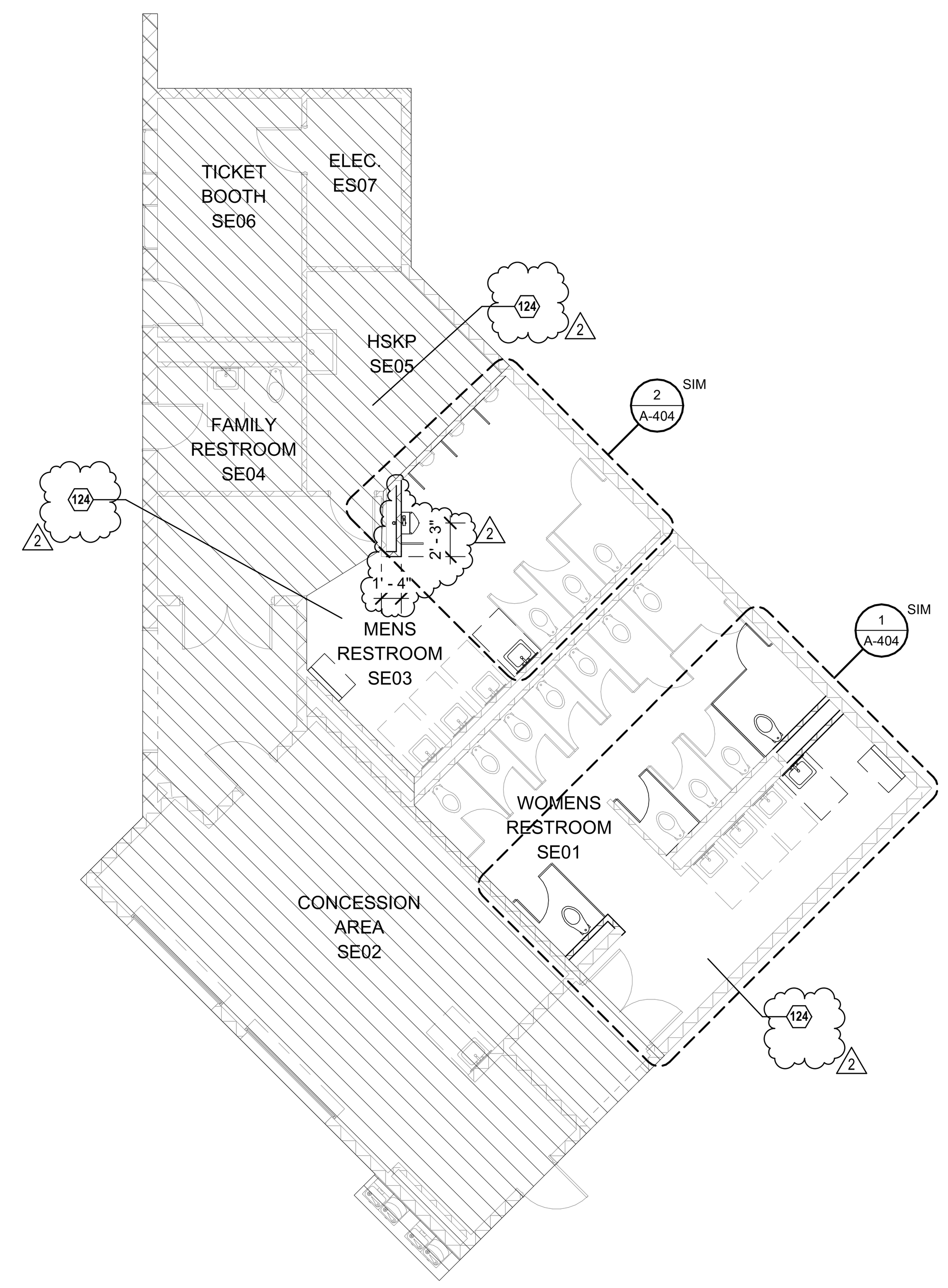
SHEET CONTENTS
ATHLETIC OFFICE FLOOR PLAN & RCP

SHEET NO.
A-101

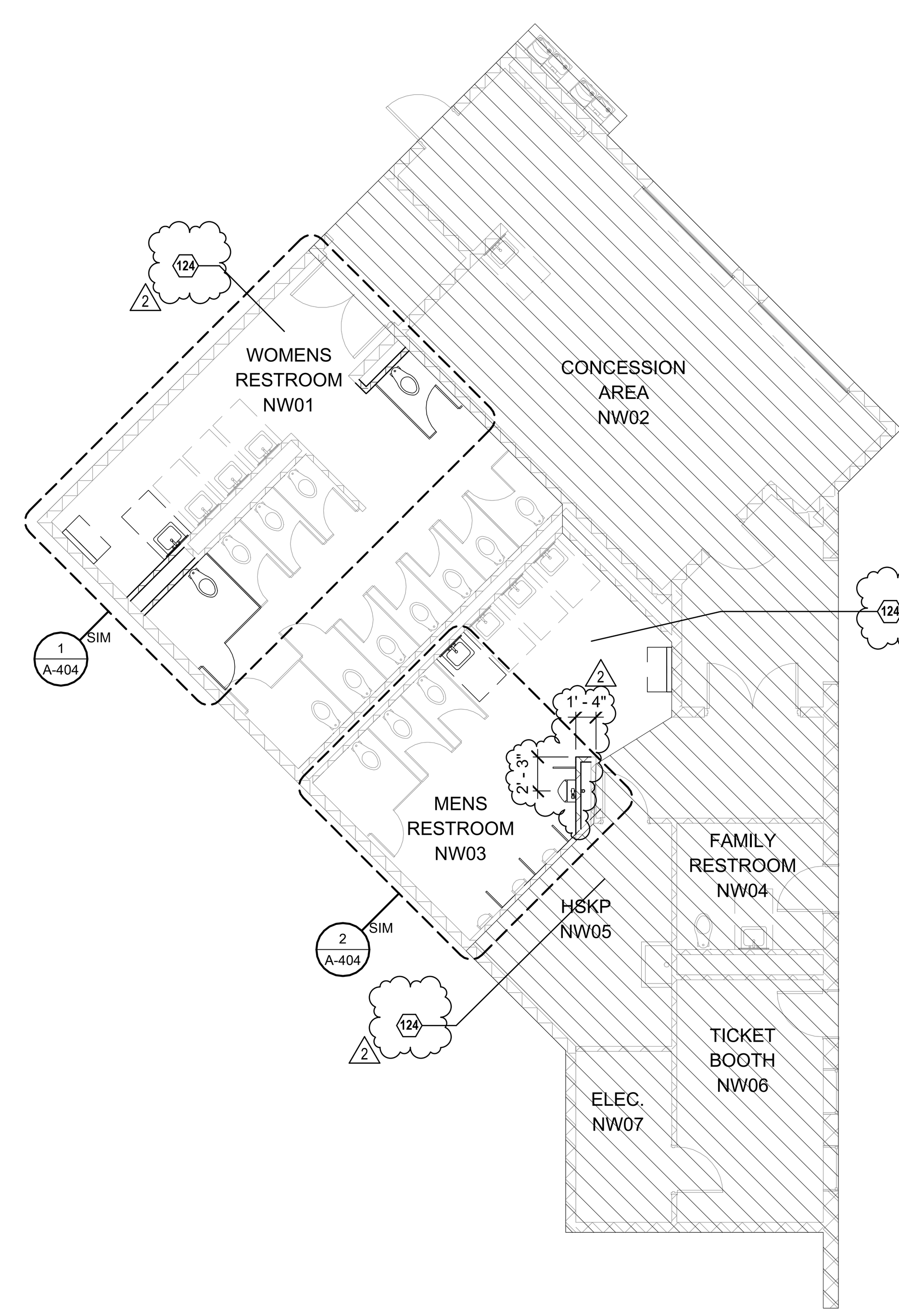
ALTERNATE BID #2: STADIUM BLEACHER ADDITION AND RESTROOM RENOVATIONS



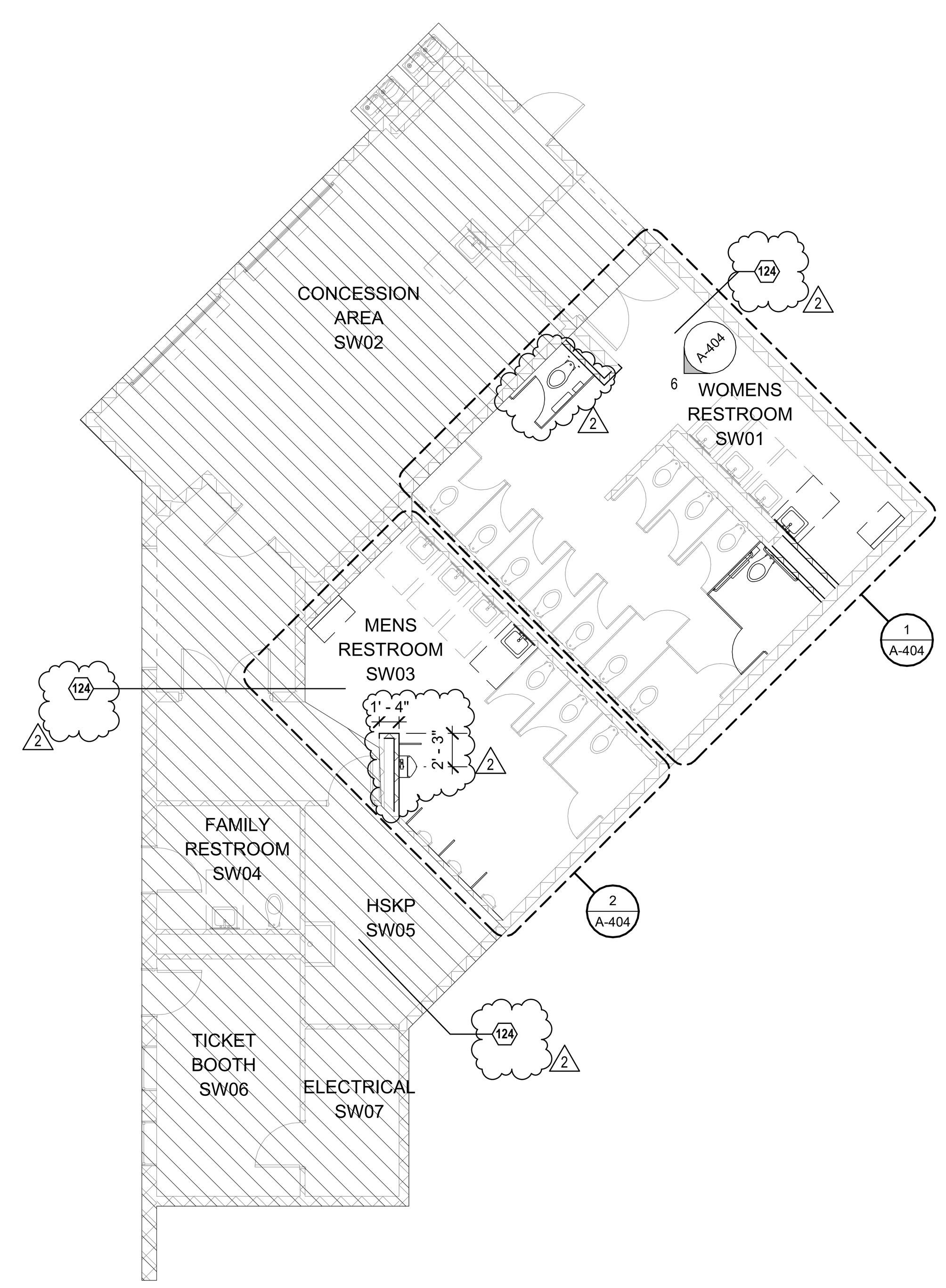
4 CONCESSION FLOOR PLAN - NORTHEAST (ALTERNATE #2)
1/8" = 1'-0" REF 1 / A-202



2 CONCESSION FLOOR PLAN - SOUTHEAST (ALTERNATE #2)
1/8" = 1'-0" REF 1 / A-202



3 CONCESSION FLOOR PLAN - NORTHWEST (ALTERNATE #2)
1/8" = 1'-0" REF 1 / A-202



1 CONCESSION FLOOR PLAN - SOUTHWEST (ALTERNATE #2)
1/8" = 1'-0" REF 1 / A-202

GENERAL FLOOR PLAN NOTES

A. Keynotes and legends are typical for all floor plan sheets, and may not apply to each sheet.

B. Dimensions are to face of masonry, concrete and studs and centerline of columns unless noted otherwise.

C. See enlarged floor plans and details for specific locations of plumbing fixtures.

D. Field verify all dimensions prior to fabrication of any cabinetry, frames, structural items, etc.

E. Provide painted access panels in walls and ceilings at concealed items, such as valves, shock absorbers, controls, switches, etc., and any other items that may require access. It is the Contractor's responsibility to determine access panel locations.

F. Not Used.

G. Seal all penetrations in fire rated assemblies as required by all applicable codes. Permanently label all penetrations and assemblies.

H. Verify and coordinate all requirements for owner furnished items, prior to performance of any work that is to accommodate and interface with such items.

I. All angles are increments of 45 degrees unless noted otherwise.

J. Extend wall envelope insulation from floor line to meet roof insulation.

K. Provide "Fry" reveal FDM 625-75 or equal at all gypsum board to masonry or concrete transitions.

L. All frame walls to be Type S01 and all furring walls to be F01, unless noted otherwise.

KEYNOTES - PLAN

100	MOP SINK, REF. PLUMB.
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105	METAL LOCKERS TYP.
106	ACCESIBLE BENCH, FLOOR MOUNTED
107	FULL SIZE REFRIGERATOR, BY OWNER
108	MOTORIZED PROJECTION SCREEN
109	FLAT SCREEN TV, BY OWNER
110	CARD READER, REF. TECH
111	TROPHY CASE WITH LED LIGHTS REF. ELECT.
112	PAINT STRUCTURAL COLUMNS
113	LARGE COPY MACHINE REF. ELECT. OFOI
114	MARKER WALL, FLOOR TO CEILING, FULL WIDTH
115	MARKER WALL, FLOOR TO CEILING, 12' WIDE CENTER ON PROJECTOR SCREEN
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125	KNOX BOX BY KNOX COMPANY MODEL# KNOXVAULT 4400 SINGLE LOCK MODEL OR APPROVED EQUAL. INSTALL INTO MASONRY WALL.

FLOOR PLAN LEGEND

NO WORK AREA

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REGISTERED ARCHITECT
BRIAN C. HARLAN
19569
STATE OF TEXAS
10/07/2021

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REVISIONS

DELTA	DESCRIPTION	DATE
2	ADDENDUM 3	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	Author

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
CONCESSION FLOOR PLAN-ALT BID #2

SHEET NO.
A-102

N

10/27/2021 3:04:43 PMorcutt | winslow / 2021-154-00 / STADIUM ADDITIONS AND RENOVATIONS - MIDLOTHIAN ISD / CONSTRUCTION DOCUMENT / A-102- CONCESSION FLOOR PLAN-ALT BID #2 / Author
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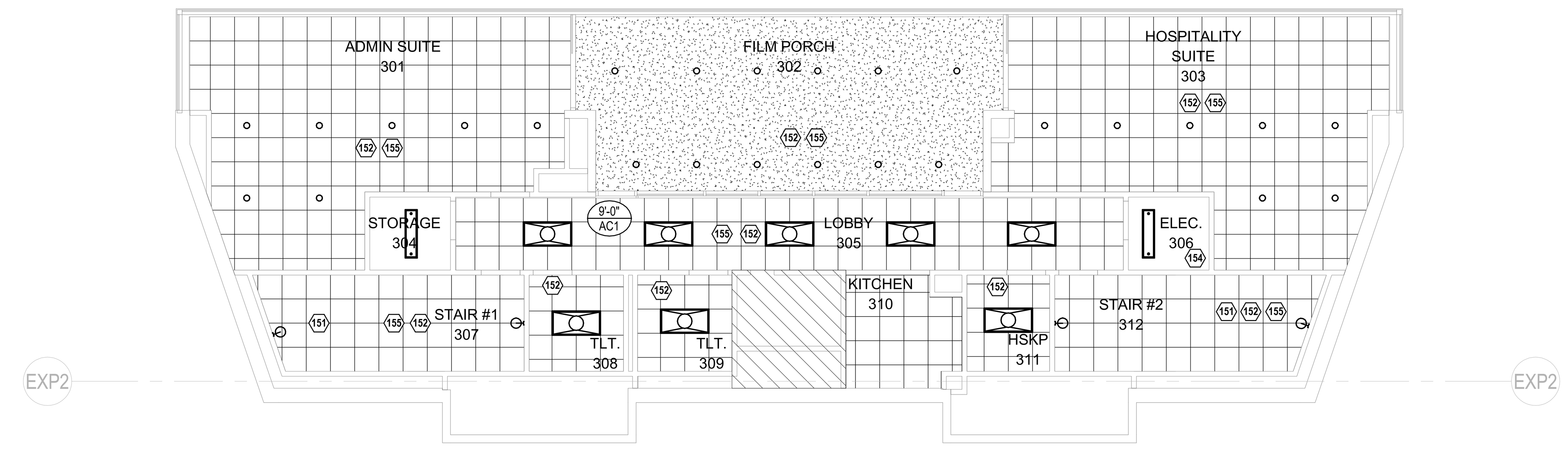
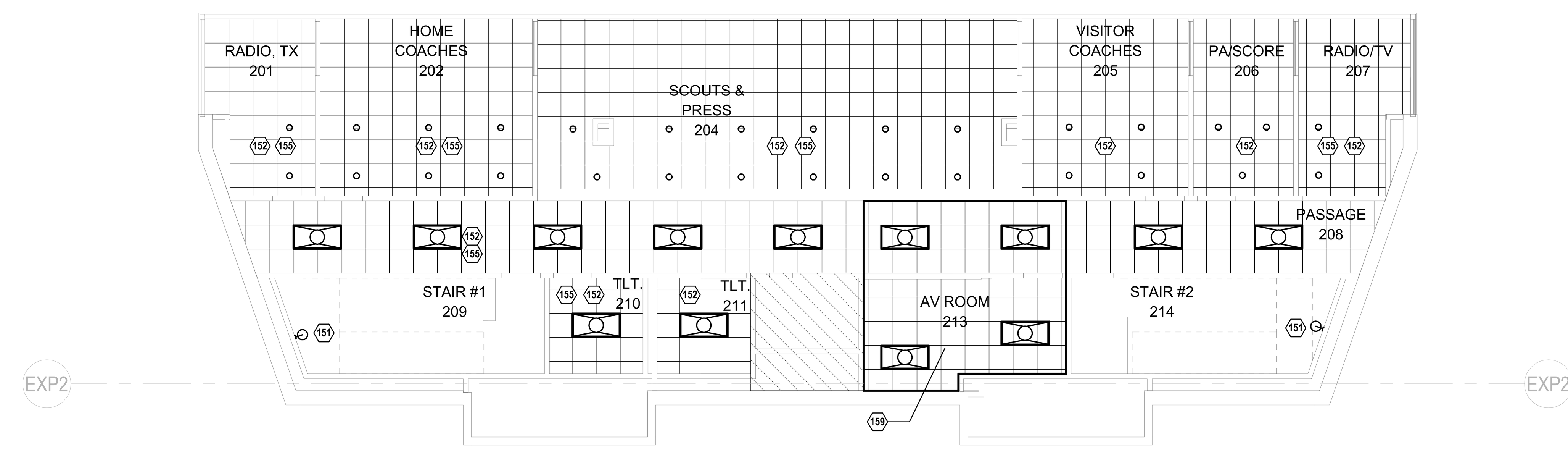
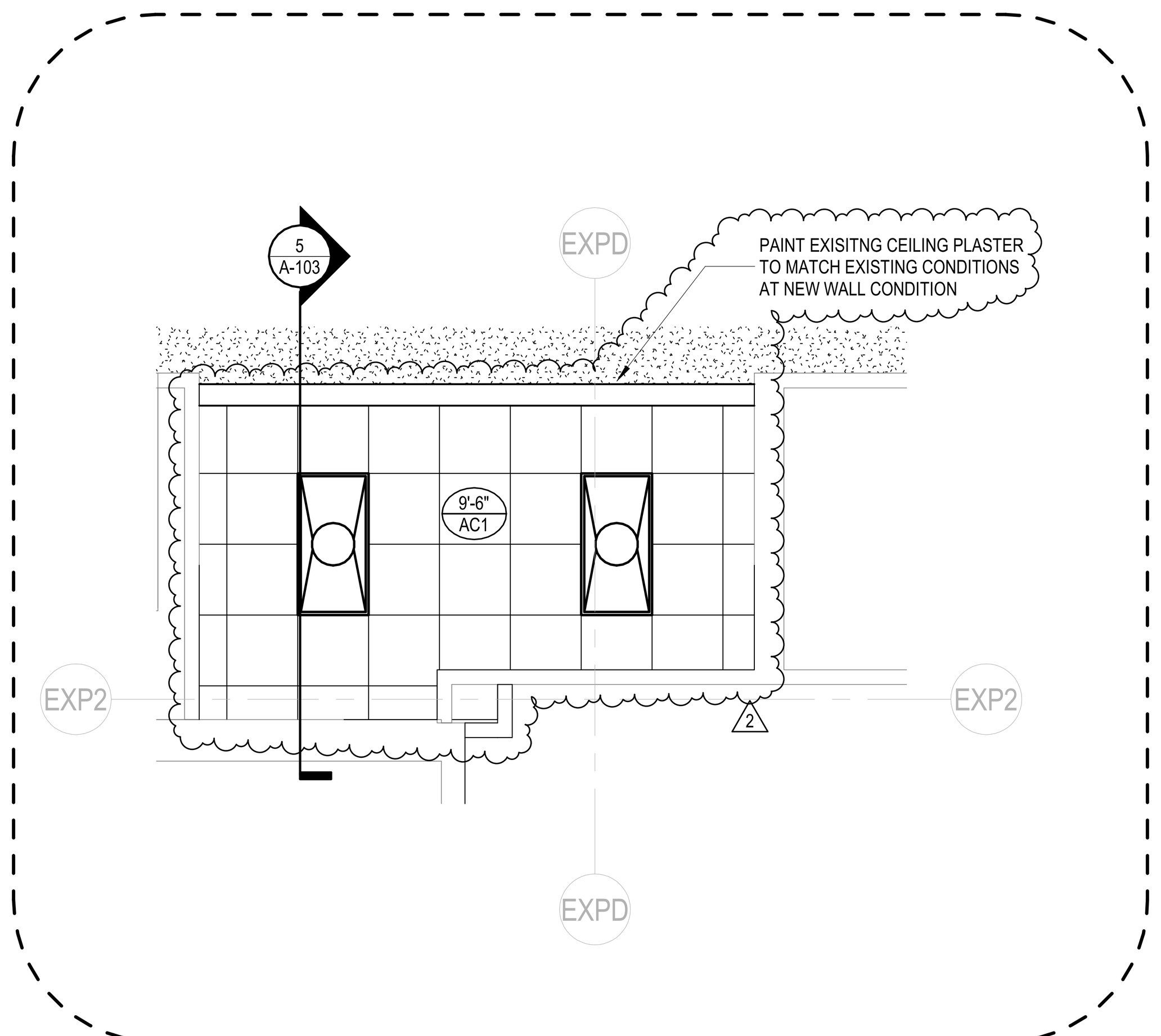


4 PRESS BOX UPPER LEVEL - RCP
1/8" = 1'-0" REF 1 / A-201

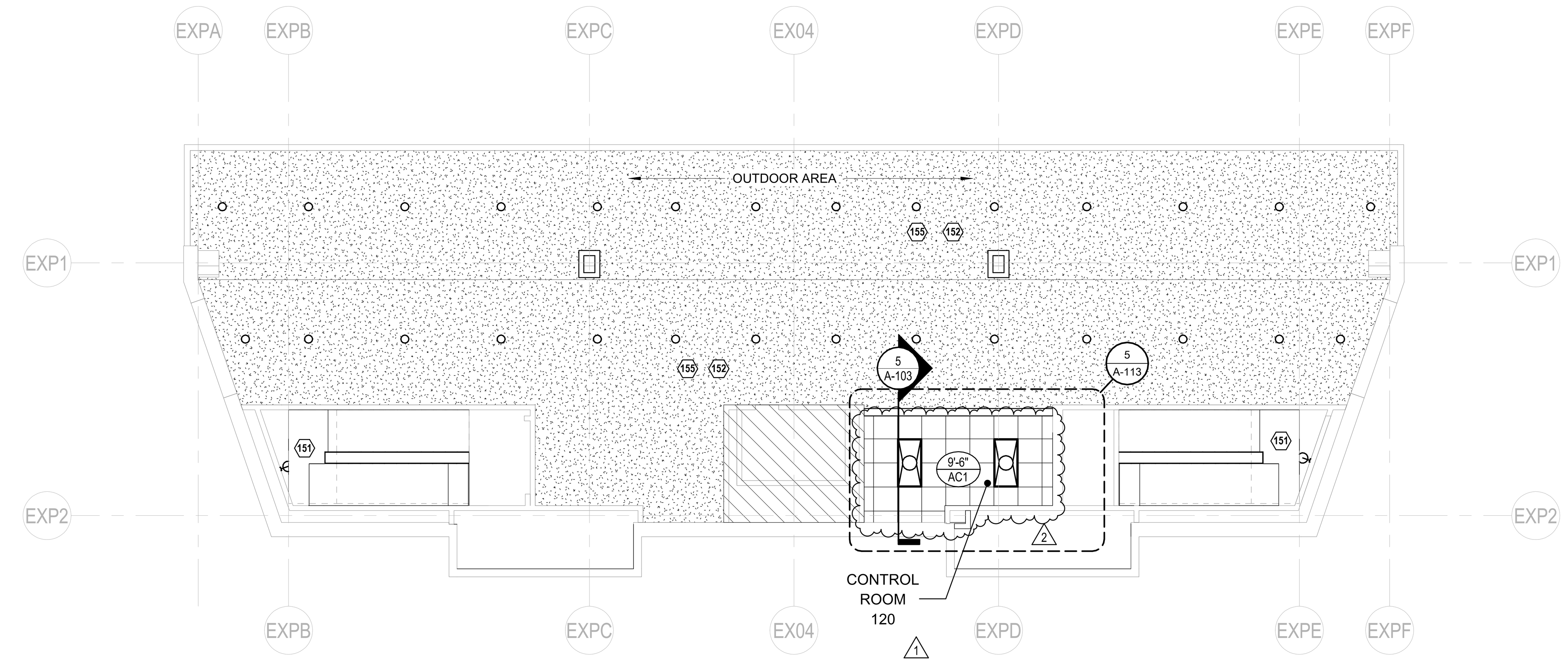


3 PRESS BOX LOWER LEVEL - RCP
1/8" = 1'-0" REF 5 / A-103

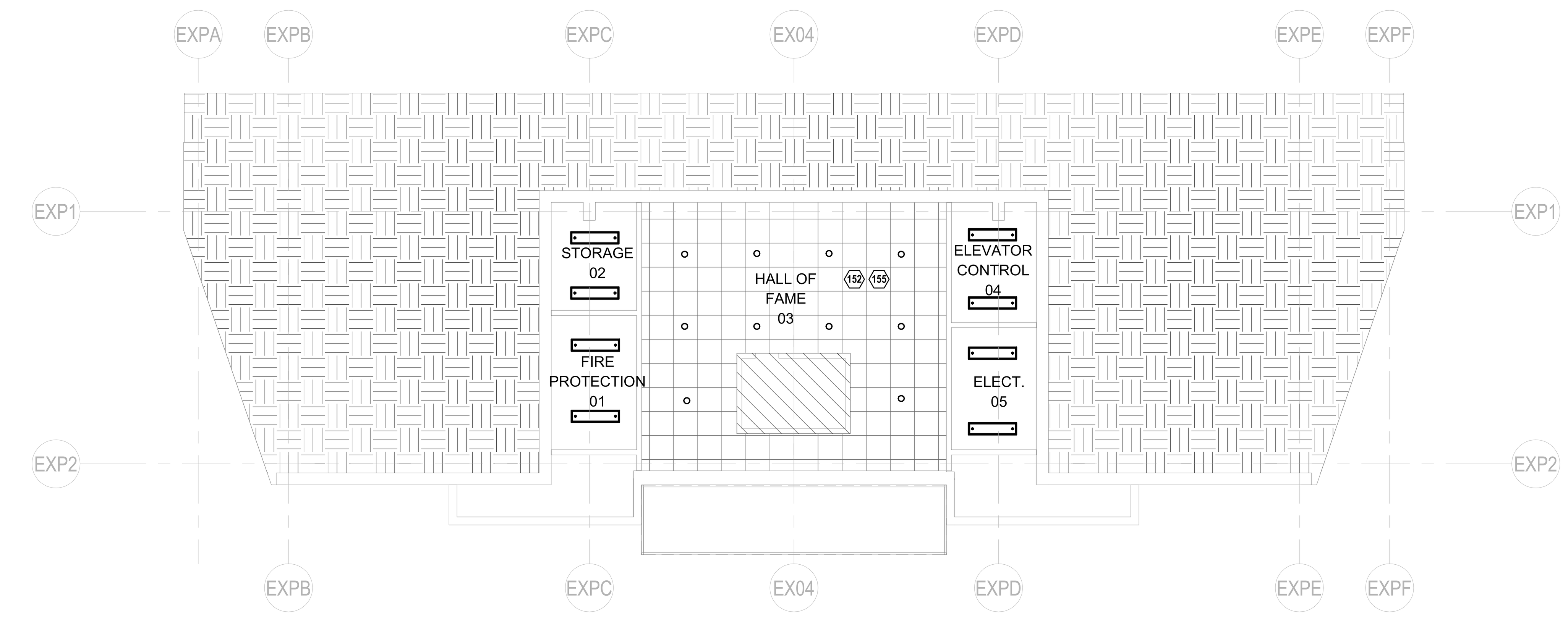
ALTERNATE #3



5 PORCH LEVEL - ENLARGED CEILING PLAN
1/4" = 1'-0" REF 2 / A-113



2 PRESS BOX PORCH LEVEL - RCP
1/8" = 1'-0" REF 5 / A-103



1 PRESS BOX ENTRY LEVEL - RCP
1/8" = 1'-0" REF 1 / A-201

GENERAL DIMENSION NOTES

A. THE CONTRACTOR SHALL TAKE FIELD MEASUREMENTS AND VERIFY FIELD CONDITIONS AND SHALL CAREFULLY COMPARE SUCH FIELD MEASUREMENTS, CONDITIONS, AND OTHER INFORMATION KNOWN TO THE CONTRACTOR WITH THE CONTRACT DOCUMENTS BEFORE COMMENCING ACTIVITIES. ERRORS, INCONSISTENCIES OR OMISSIONS DISCOVERED SHALL BE REPORTED TO THE ARCHITECT AT ONCE.

B. THE CONTRACTOR SHALL NOT SCALE DRAWINGS.

C. DIMENSIONS ARE NOT ADJUSTABLE UNLESS NOTED WITH PLUS/MINUS TOLERANCE.

D. DIMENSIONS ARE INDICATED AS FOLLOWS UNLESS OTHERWISE NOTED:

E. COLUMNS - FROM CENTERLINE TO CENTERLINE

F. METAL STUD PARTITIONS - FROM FACE OF STUD TO FACE OF STUD

G. WOOD STUD PARTITIONS - FROM FACE OF STUD TO FACE OF STUD

H. CONCRETE - FROM FACE OF CONCRETE TO FACE OF CONCRETE

I. MASONRY - FROM FACE OF MASONRY TO FACE OF MASONRY

J. EXTERIOR WALL - FROM EXTERIOR FACE OF WALL TO INTERIOR FACE OF STUD

K. INTERIOR ELEVATION - FROM FINISHED FLOOR TO FINISHED CEILING OR FINISHED WALL TO FINISHED WALL

L. DOOR SHALL BE LOCATED 6" FROM CLEAR OPENING TO ADJACENT WALL UNLESS OTHERWISE NOTED.

M. ALL FLOOR TO FLOOR AND CEILING HEIGHTS SHOWN ON DRAWINGS ARE FROM FINISH FLOOR.

GENERAL FLOOR PLAN NOTES

A. Keynotes and legends are typical for all floor plan sheets, and may not apply to each sheet.

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C. See enlarged floor plans and details for specific locations of plumbing fixtures.

D. Field verify all dimensions prior to fabrication of any cabinetry, frames, structural items, etc.

E. Provide painted access panels in walls and ceilings at concealed items, such as valves, shock absorbers, controls, switches, etc., and any other items that may require access. It is the Contractor's responsibility to determine access panel locations.

F. Not Used.

G. Seal all penetrations in fire rated assemblies as required by all applicable codes. Permanently label all penetrations and assemblies.

H. Verify and coordinate all requirements for owner furnished items, prior to performance of any work that is to accommodate and interface with such items.

I. All angles are increments of 45 degrees unless noted otherwise.

J. Extend wall envelope insulation from floor line to meet roof insulation.

K. Provide "Fry" reveal FDM 625-75 or equal at all gypsum board to masonry or concrete transitions.

L. All frame walls to be Type S01 and all furring walls to be F01, unless noted otherwise.

KEYNOTES - RCP

150	METAL CANOPY REF. STRUCT.
151	RELAMP WALL MOUNTED LIGHTS, REF. ELEC
152	RELAMP LIGHT FIXTURE ONLY, RELAMPING ALL EXISTING LIGHT FIXTURE IN THE ROOM ONLY, REF. ELECT.
153	EXTERIOR WALL-PACK LIGHTS TYP. REF. ELECT.
154	OPEN TO DECK
155	EXISTING ITEMS TO STAY ACOUSTICAL CEILING TILES, GYPSUM BOARD, AND PLASTER CEMENT CEILING TYP. DO NOT REMOVE CEILING.
156	LED CAN LIGHTS AT OUTDOOR COVERED AREA.
157	1 HOUR FIRE RATED GYPSUM BOARD CEILING.
158	CEILING PLASTER W/METAL LATH SYSTEM AND LIGHT FIXTURES REF. ELEC
159	CEILING TILES AND LIGHT FIXTURES REF. ELECT.

RCP LEGEND

NO WORK AREA

REFL. CEILING PLAN GEN. NOTES

OPEN — EXPOSED TO STRUCTURE ABOVE

10'-0" AC1 — HEIGHT ABOVE FINISHED FLOOR / CEILING TYPE

SUPPLY DIFFUSER (SEE MECH.)

RETURN DIFFUSER (SEE MECH.)

EMERGENCY LIGHT (SEE ELEC.)

CEILING MOUNTED EMERGENCY EXIT LIGHT (SEE ELEC.)

WALL MOUNTED EMERGENCY EXIT LIGHT (SEE ELEC.)

N

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REGISTERED ARCHITECT BRIAN C. HARLAN 19569 STATE OF TEXAS
10/07/2021

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STADIUM ADDITIONS AND RENOVATIONS
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REVISIONS

DELTA	DESCRIPTION	DATE
1	ADDENDUM 2	10/18/2021
2	ADDENDUM 3	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	EA

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
PRESS BOX RCP

SHEET NO.
A-113

10/27/2021 2:48:16 PMorcutt | winslow / 2021-154-00 / STADIUM ADDITIONS AND RENOVATIONS - MIDLOTHIAN ISD / CONSTRUCTION DOCUMENT / A-113- PRESS BOX RCP / EA
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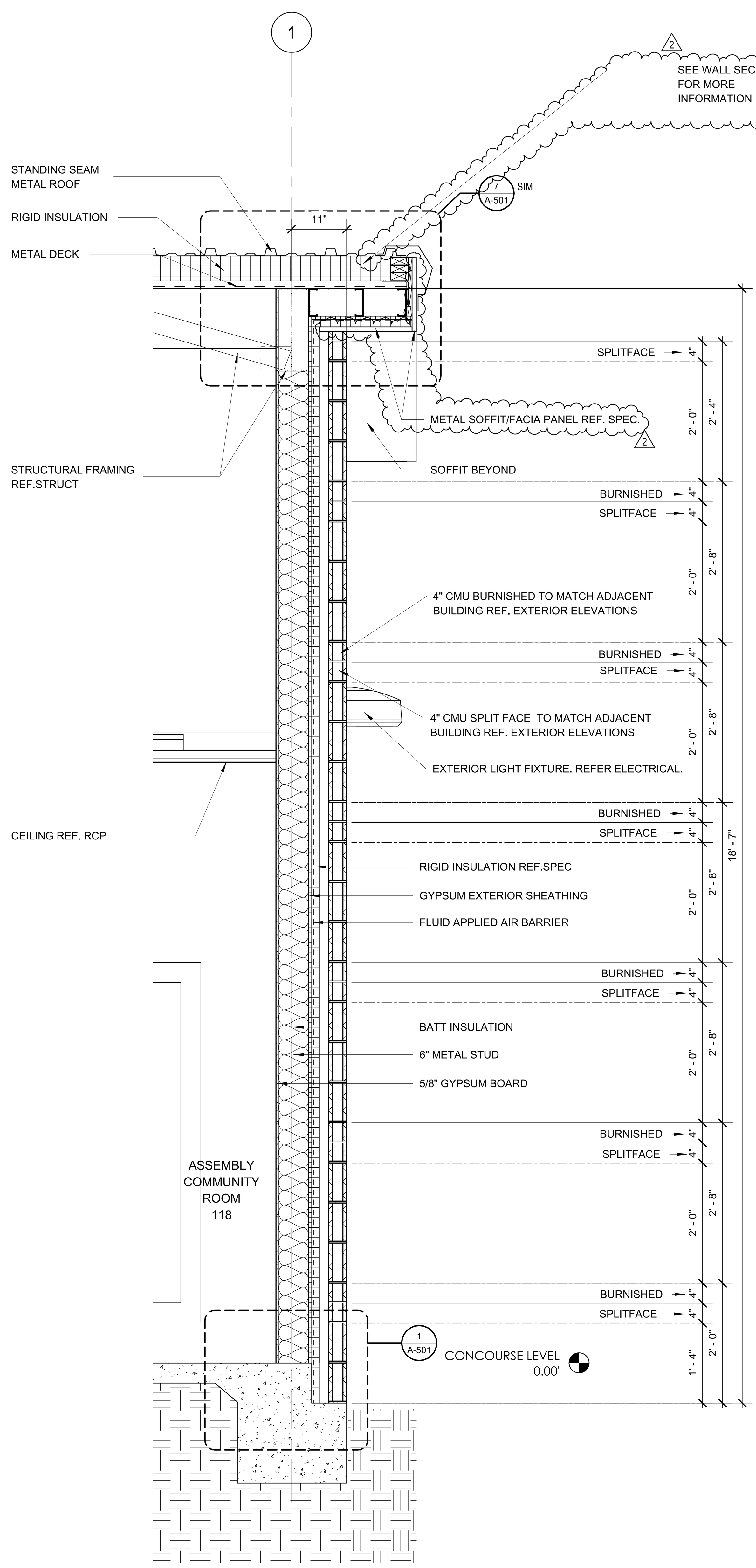
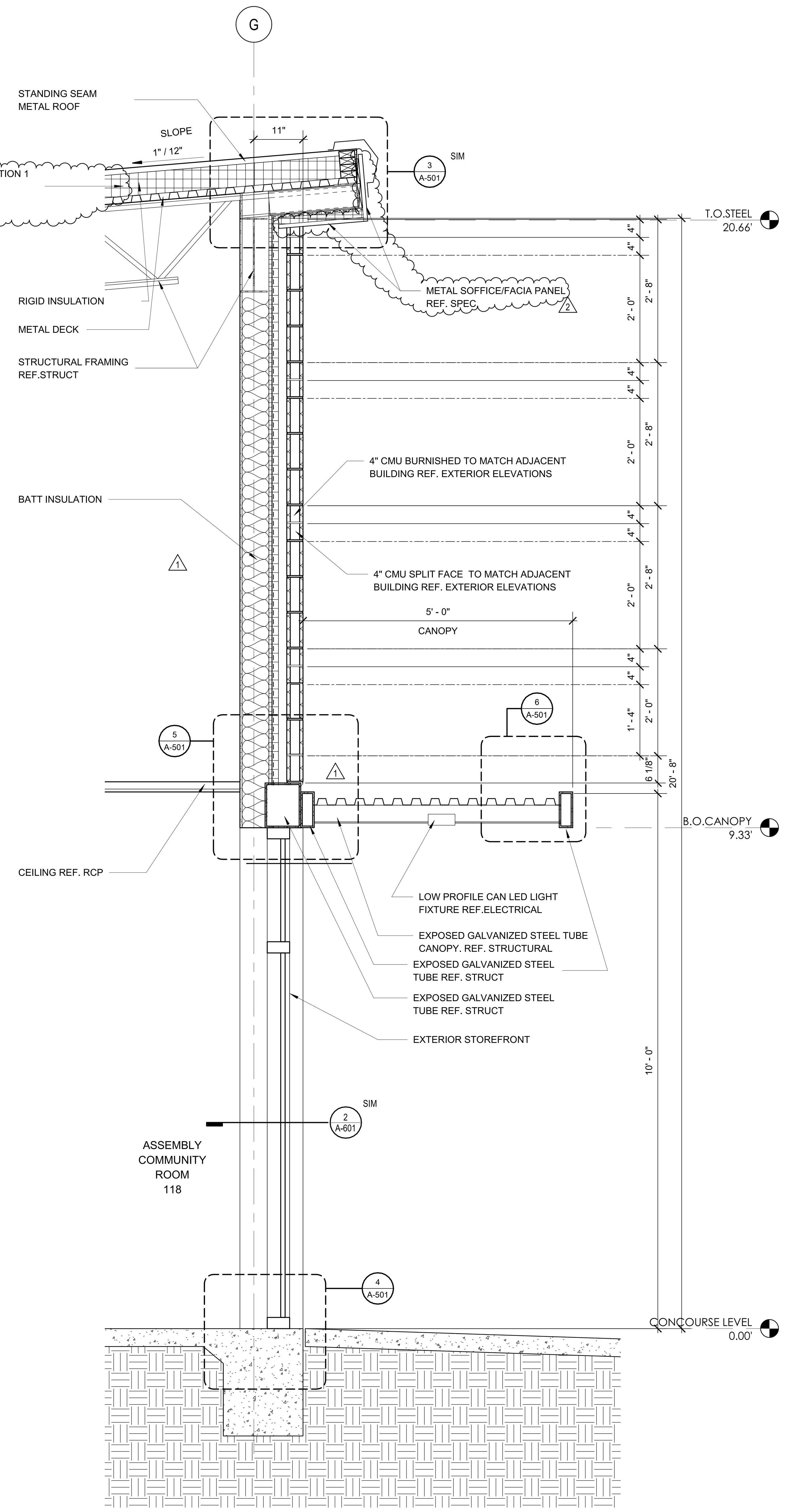


4 CMU WALL SECTION - EAST
3/4" = 1'-0" REF 1 / A-101



3 CMU WALL SECTION - SOUTH
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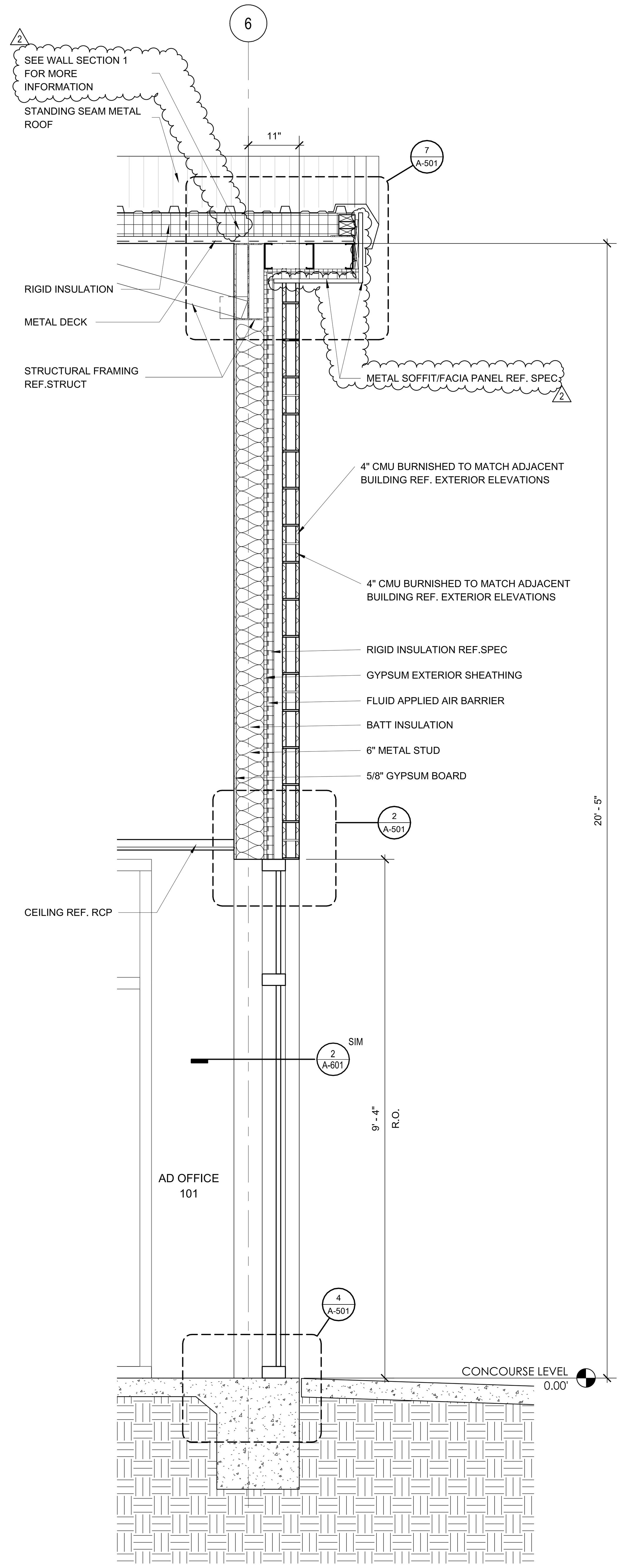

2 CMU WALL SECTION - WEST
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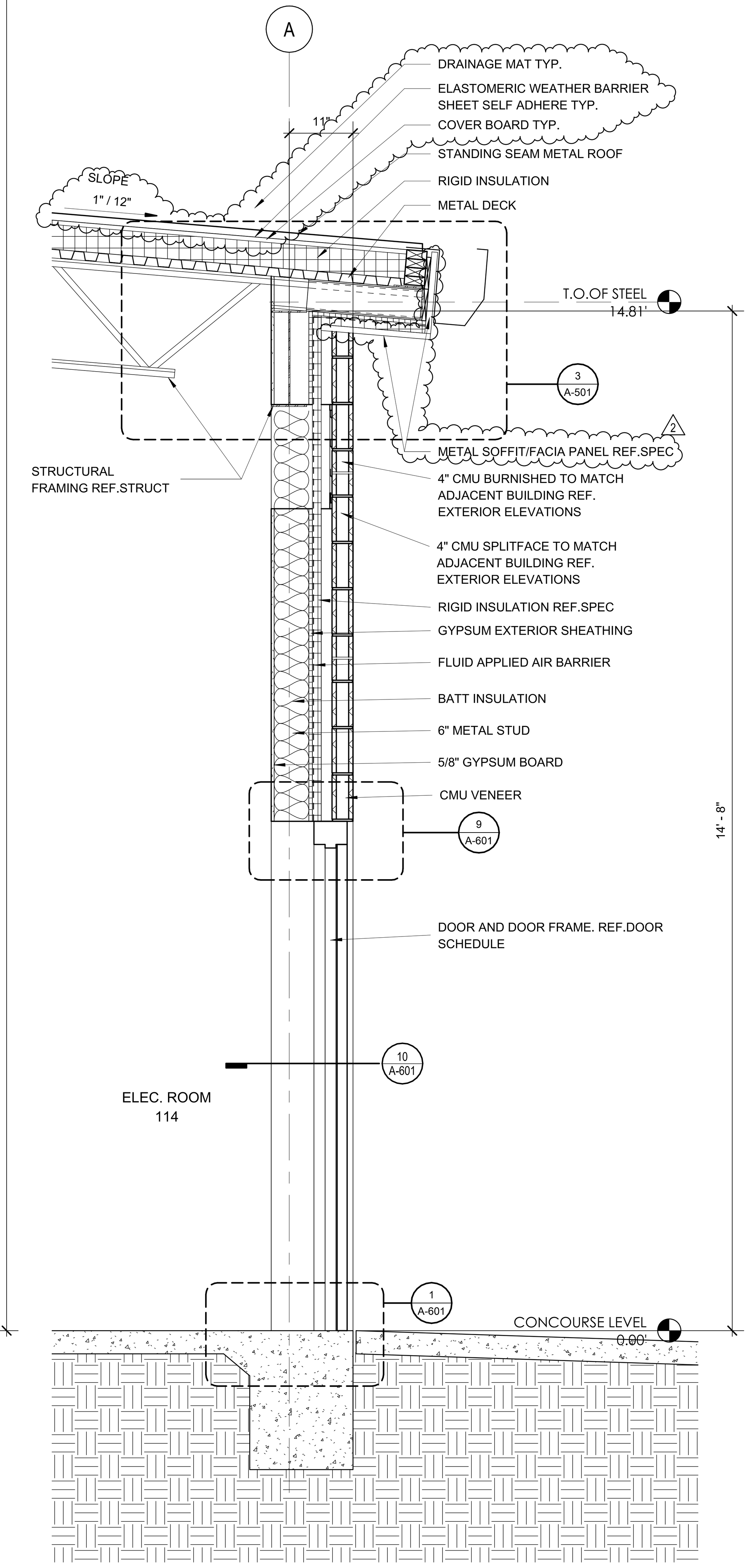

1 CMU WALL SECTION - NORTH
3/4" = 1'-0" REF 1 / A-101

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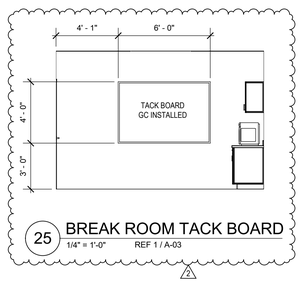
ED TEXAS	EA

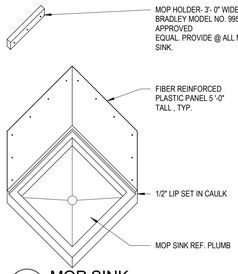
PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
WALL SECTIONS

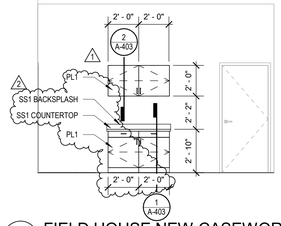
SHEET NO.
A-303



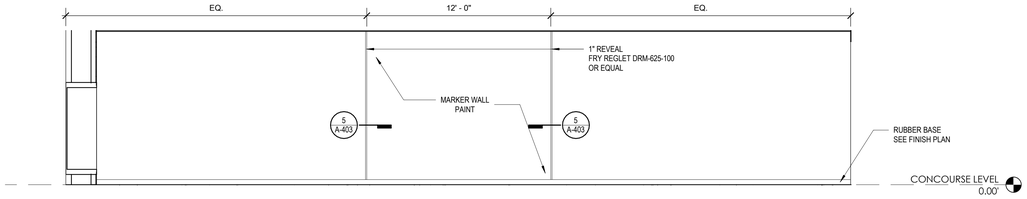
25 BREAK ROOM TACK BOARD
1/4" = 1'-0" REF 1 / A-03



24 MOP SINK
1/2" = 1'-0" REF 1 / A-101



23 FIELD HOUSE NEW CASEWORK
1/4" = 1'-0" REF 1 / A-104



22 ASSEMBLY COMMUNITY ROOM ELEVATION
1/4" = 1'-0" REF 1 / A-03

TOILET PLAN GENERAL NOTES

A. ALL TOILET ROOM WALLS TO DECK, UNLESS NOTED OTHER WISE.

B. PROVIDE ACOUSTICAL BATT INSULATION IN STUD WALLS SURROUNDING TOILET ROOM.

C. PROVIDE WALL MOUNTED DOOR STOPS IN RESTROOMS.

D. REFER TO SHEETS G010 AND G011 FOR ADA DETAILS AND ACCESSORY INFORMATIOIN TYPE.

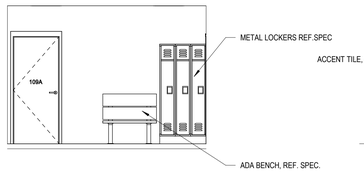
E. COORDINATE INSTALLATION OF REQUIRED BLOCKING AND STABILIZING FOR FIXTURES.

F. THE STRUCTURAL STRENGTH OF GRAB BARS AT ACCESSIABLE WATER CLOSET SHALL COMPLY WITH TAS 4.26.3.

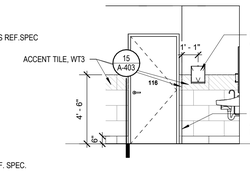
CASEWORK FINISH LEGEND

PL1 - MILLWORK LAMINATE, WILSONART, FRENCH LINEN 5016-60, MATTE

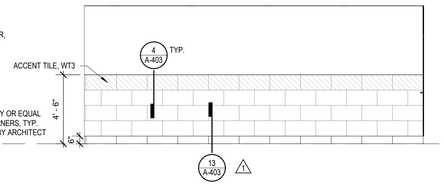
SS1 - SOLID SURFACE COUNTERTOP WITH 4" BACKSPLASH, CORIAN, EVEREST



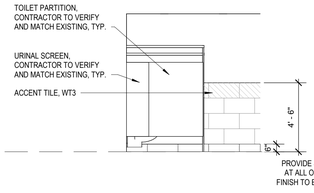
21 OFFICIALS' LOCKER ROOM
1/4" = 1'-0" REF 1 / A-03



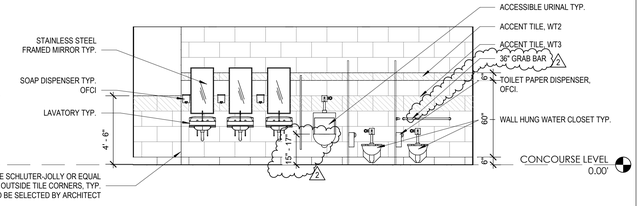
20 MENS' RR 116 - ELEVATION
1/4" = 1'-0" REF 1 / A-402



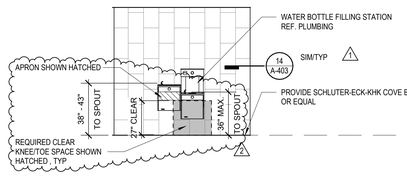
19 MENS' RR 116 - ELEVATION
1/4" = 1'-0" REF 1 / A-402



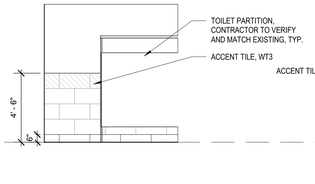
18 MENS' RR 116 - ELEVATION
1/4" = 1'-0" REF 1 / A-402



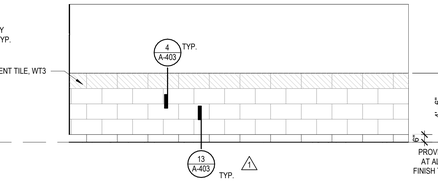
17 MENS' RR 116 - ELEVATION
1/4" = 1'-0" REF 1 / A-402



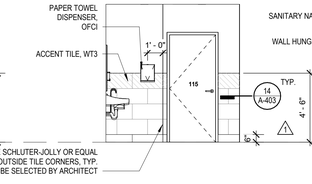
16 WATER FOUNTAIN ELEVATION
1/4" = 1'-0" REF 1 / A-402



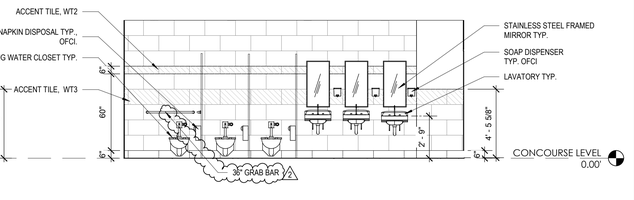
15 ATHLETIC OFFICE WOMENS RR ELEVATION
1/4" = 1'-0" REF 1 / A-402



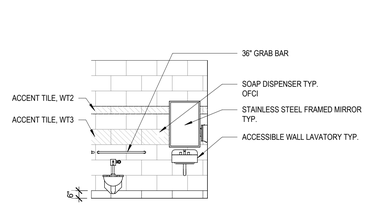
14 ATHLETIC OFFICE WOMENS RR ELEVATION
1/4" = 1'-0" REF 1 / A-402



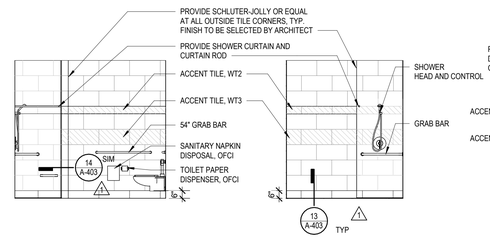
13 ATHLETIC OFFICE WOMENS RR ELEVATION
1/4" = 1'-0" REF 1 / A-402



12 ATHLETIC OFFICE WOMENS RR ELEVATION
1/4" = 1'-0" REF 1 / A-402



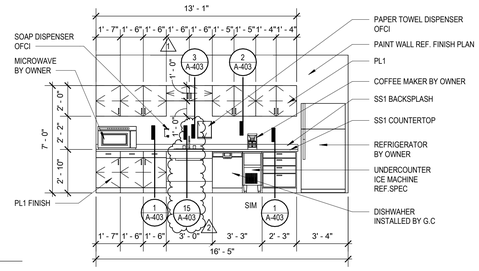
11 SHOWER ROOM
1/4" = 1'-0" REF 2 / A-402



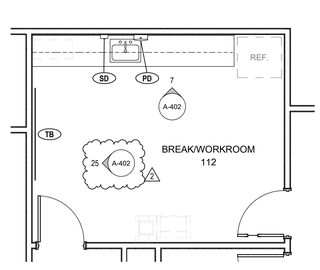
10 TAS SHOWER
1/4" = 1'-0" REF 2 / A-402

9 TAS SHOWER
1/4" = 1'-0" REF 2 / A-402

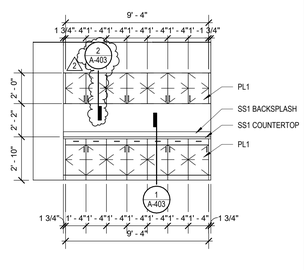
8 SHOWER ROOM
1/4" = 1'-0" REF 2 / A-402



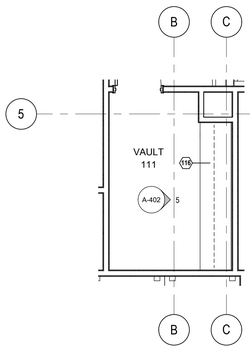
7 CASEWORK ELEVATION - BREAKROOM
1/4" = 1'-0" REF 1 / A-03



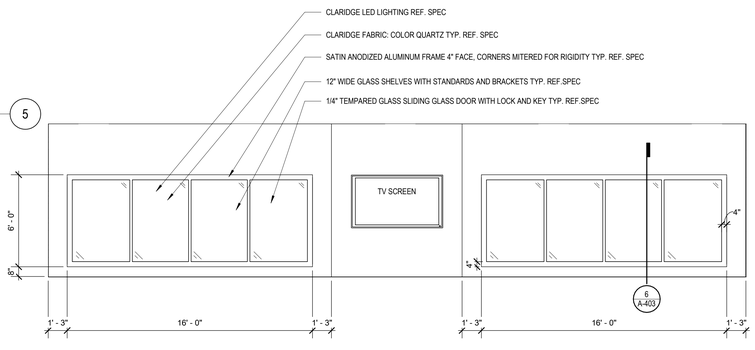
6 DETAIL PLAN - CASEWORK
1/4" = 1'-0" REF 1 / A-101



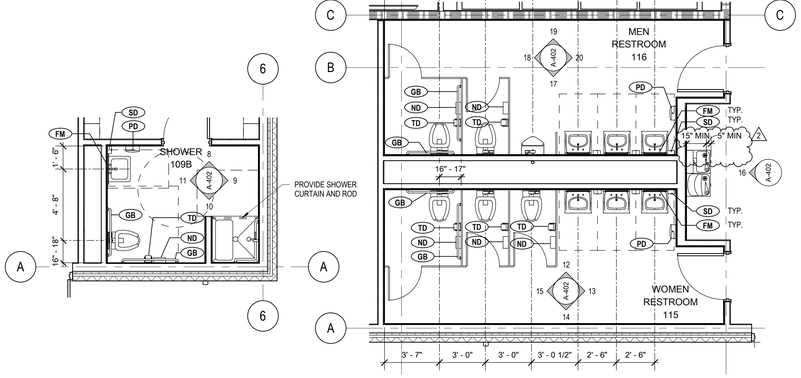
5 CASEWORK ELEVATION - VAULT
1/4" = 1'-0" REF 1 / A-03



4 DETAIL PLAN - VAULT
1/4" = 1'-0" REF 1 / A-101



3 INTERIOR ELEVATION - TROPHY CASE
1/4" = 1'-0" REF 1 / A-101



2 ENLARGED DETAIL PLAN - SHOWER
1/4" = 1'-0" REF 1 / A-101

1 ENLARGED DETAIL PLAN - RESTROOMS
1/4" = 1'-0" REF 1 / A-101

TOILET ACCESSORIES LEGEND

- URINAL
- WATER CLOSET
- VANITY SINK
- ELECTRIC DRINKING FOUNTAIN W/ BOTTLE FILLER
- FLOOR DRAIN
- BCS — BABY CHANGING STATION
- GRAB BARS
- SH — SHELF
- SD — SOAP DISPENSER
- PT — RECESSED PAPER TOWEL DISPENSER & WASTE RECEPTACLE
- TD — TISSUE DISPENSER
- ND — SANITARY NAPKIN DISPENSER OWNER FURNISHED CONTRACTOR INSTALLED
- M — MIRROR
- FM — FRAMED MIRROR

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REGISTERED ARCHITECT
BRYAN C. NASH
19569
STATE OF TEXAS

10/07/2021

MIDLOTHIAN ISD

STADIUM ADDITIONS AND RENOVATIONS

1800 S 14 ST. MIDLOTHIAN, TX 76065

CLIENT CONTACT
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100 Walter Stephenson Rd.
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-- F

OWP PROJECT NO.	DATE OF ISSUE
2021-154-00	10.07.2021

REVISIONS

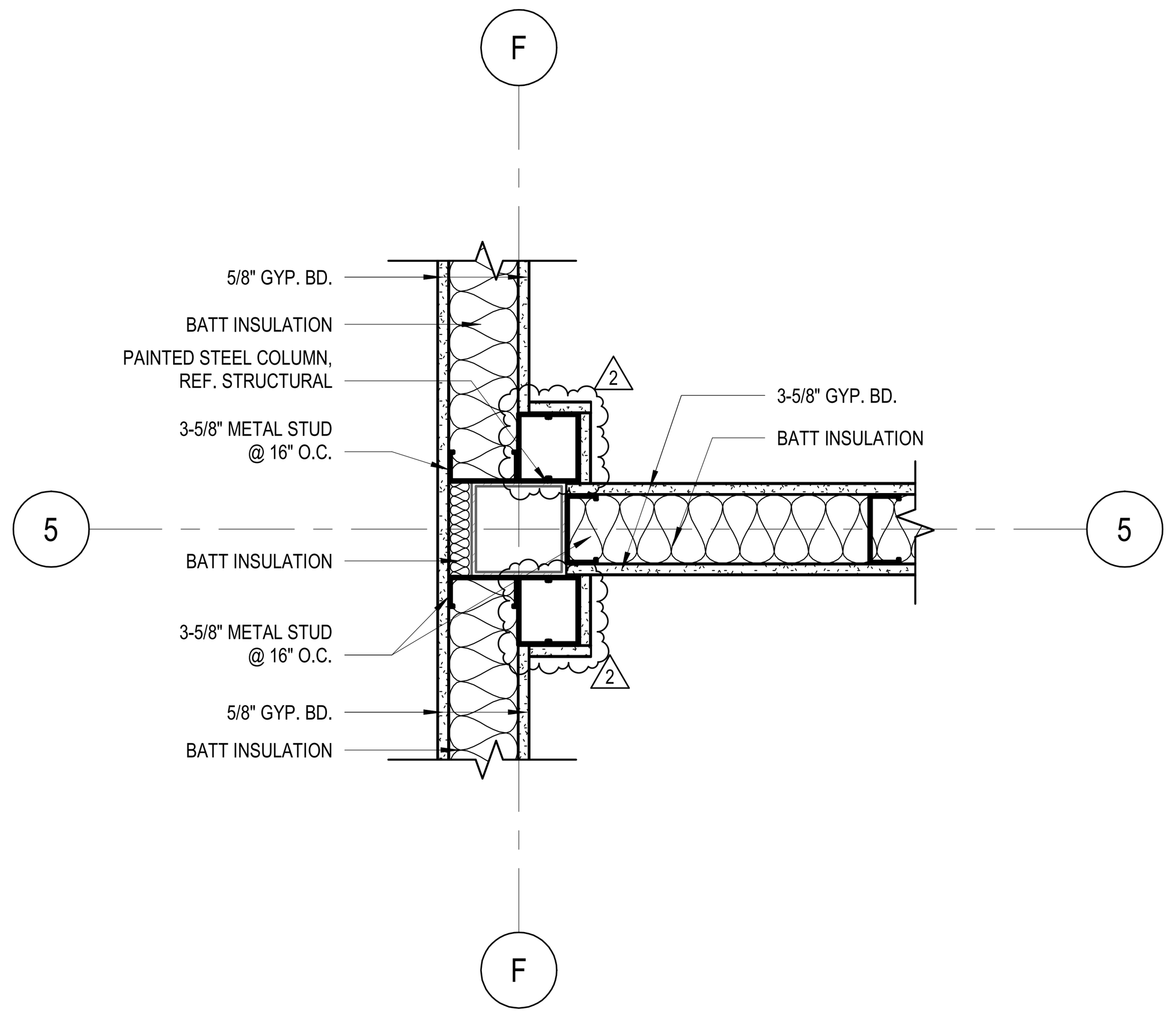
DELTA	DESCRIPTION	DATE
1	ADDENDUM 2	10/18/2021
2	ADDENDUM 3	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	EA/KN

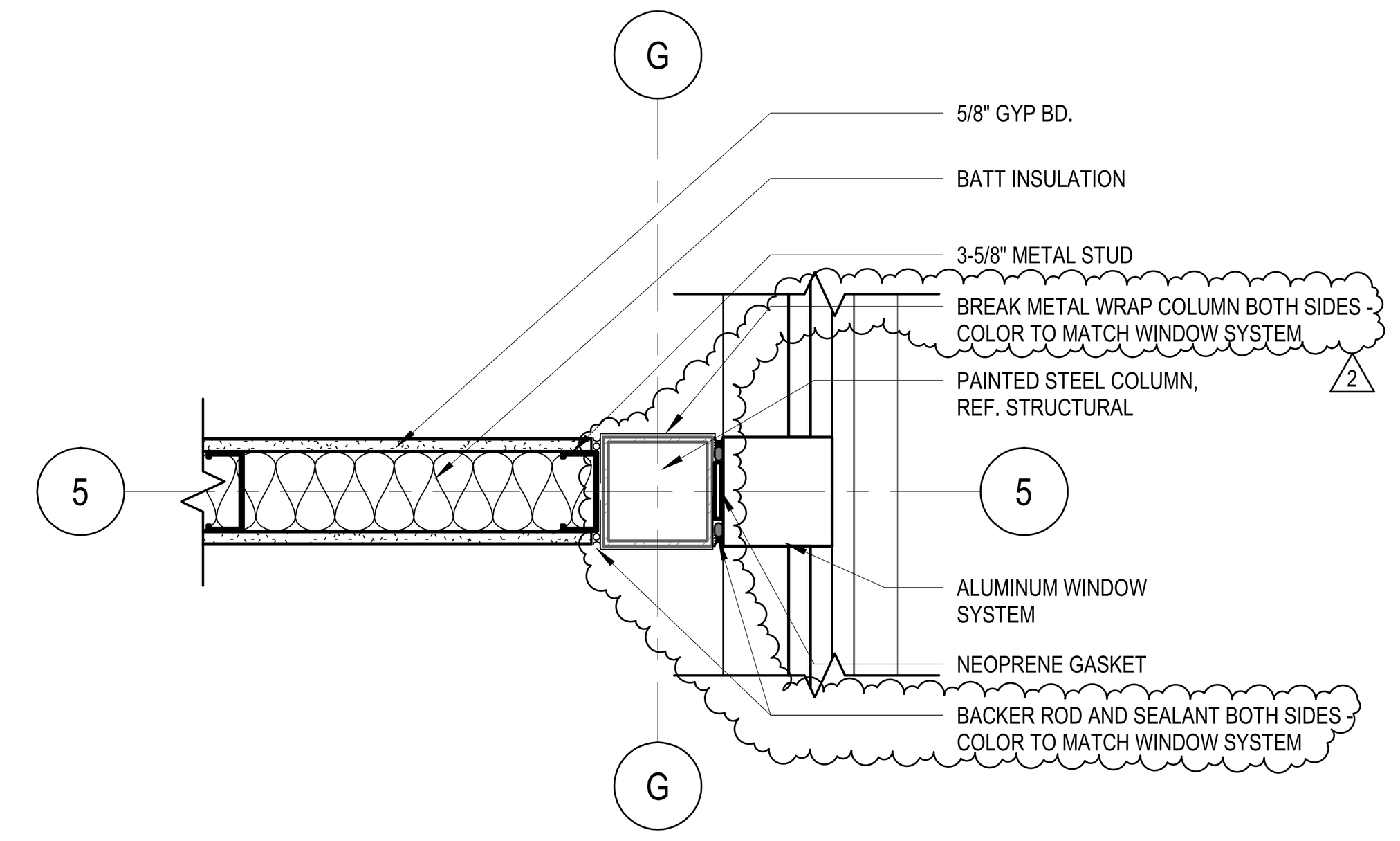
PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
ENLARGED PLANS, INTERIOR ELEVATION, CASEWORK DETAILS

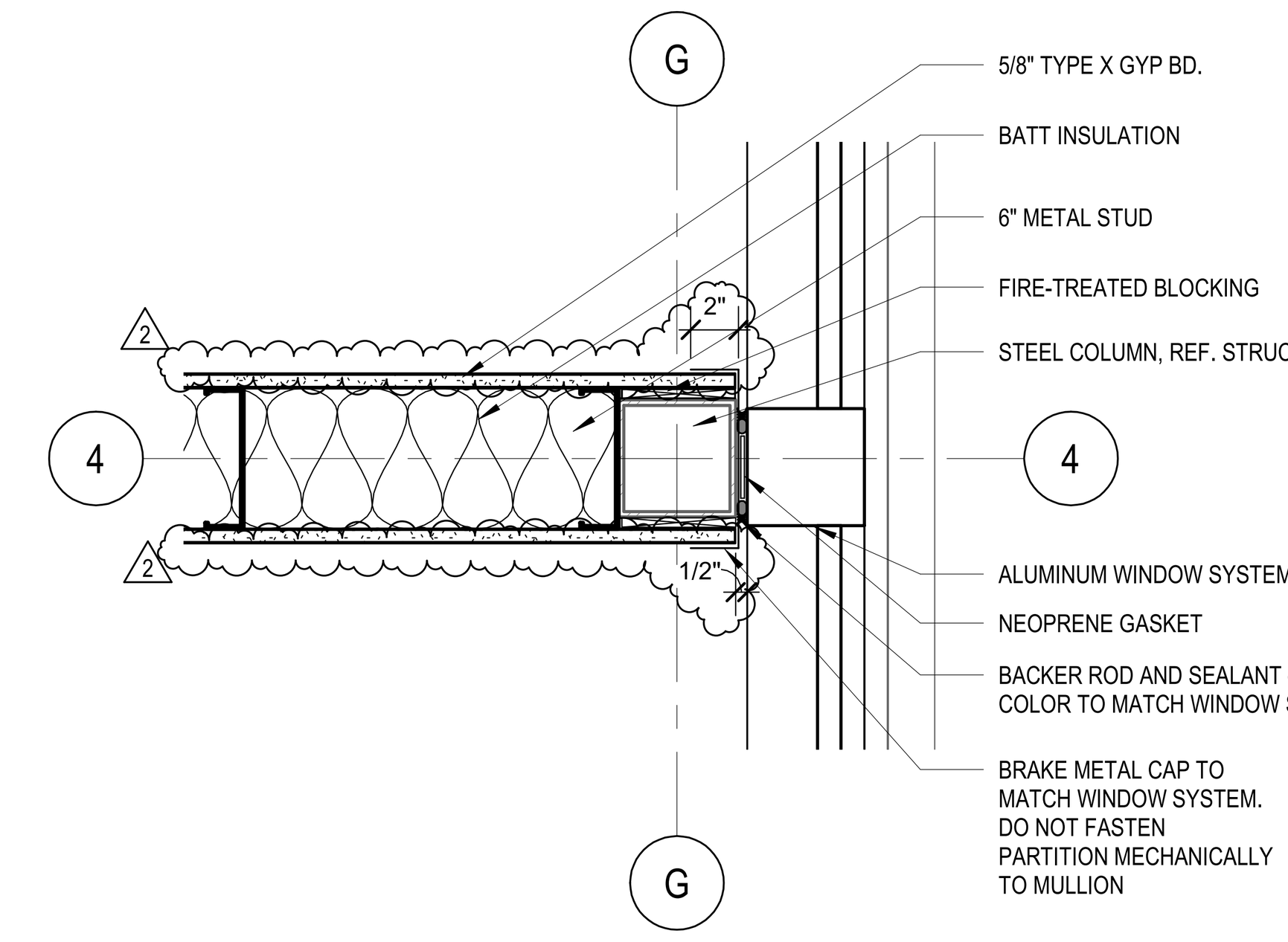
SHEET NO
A-402



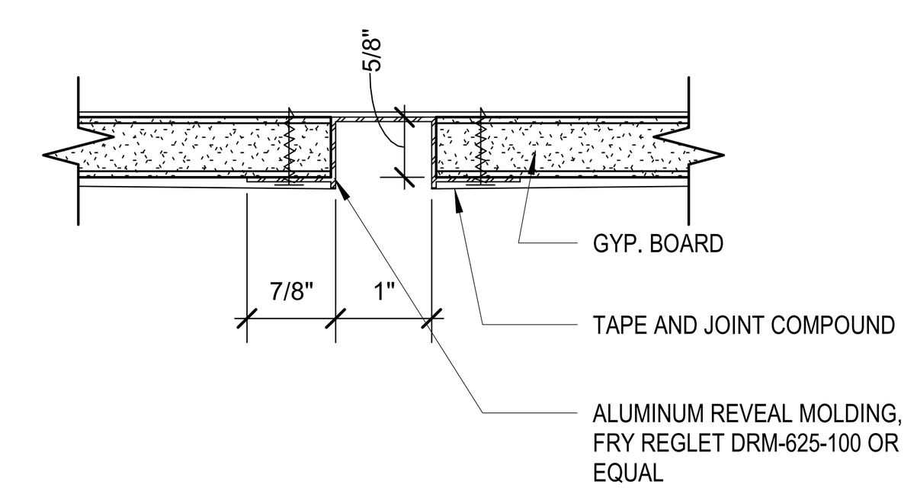
12 WALL INTERSECTION AT COLUMN
1 1/2" = 1'-0" REF 1 / A-101



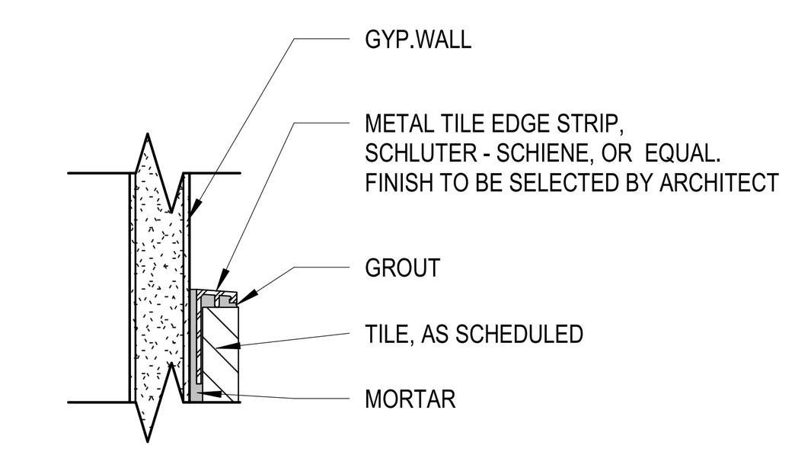
10 WALL AND COLUMN AT MULLION
1 1/2" = 1'-0" REF 1 / A-101



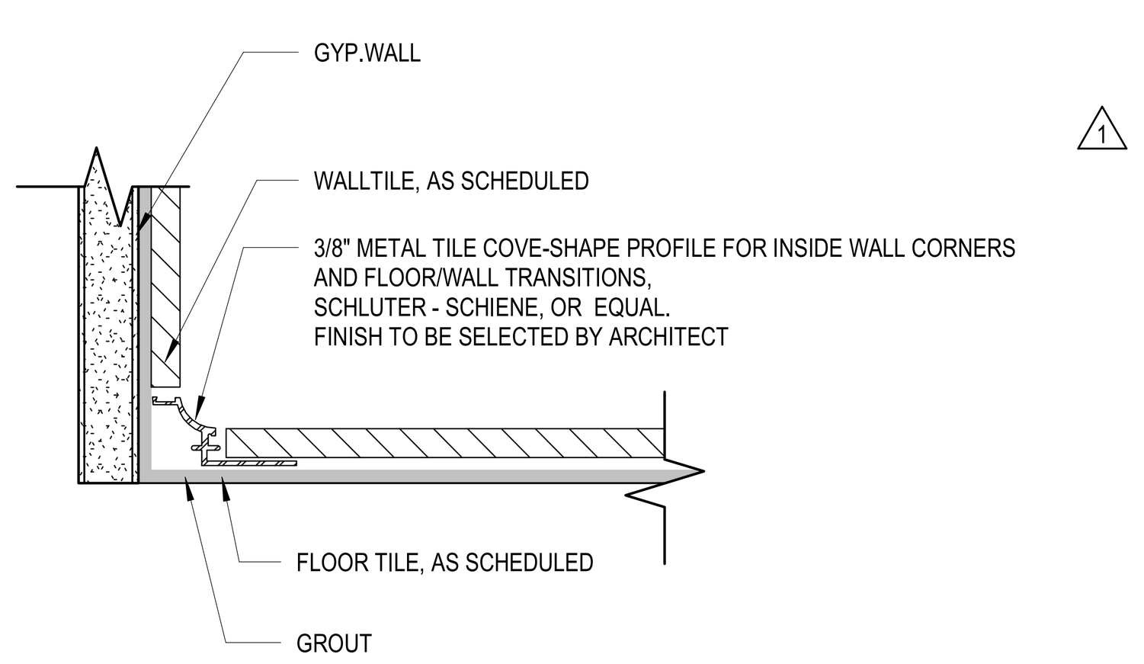
7 FIRE-RATED WALL AT MULLION
1 1/2" = 1'-0" REF 1 / A-101



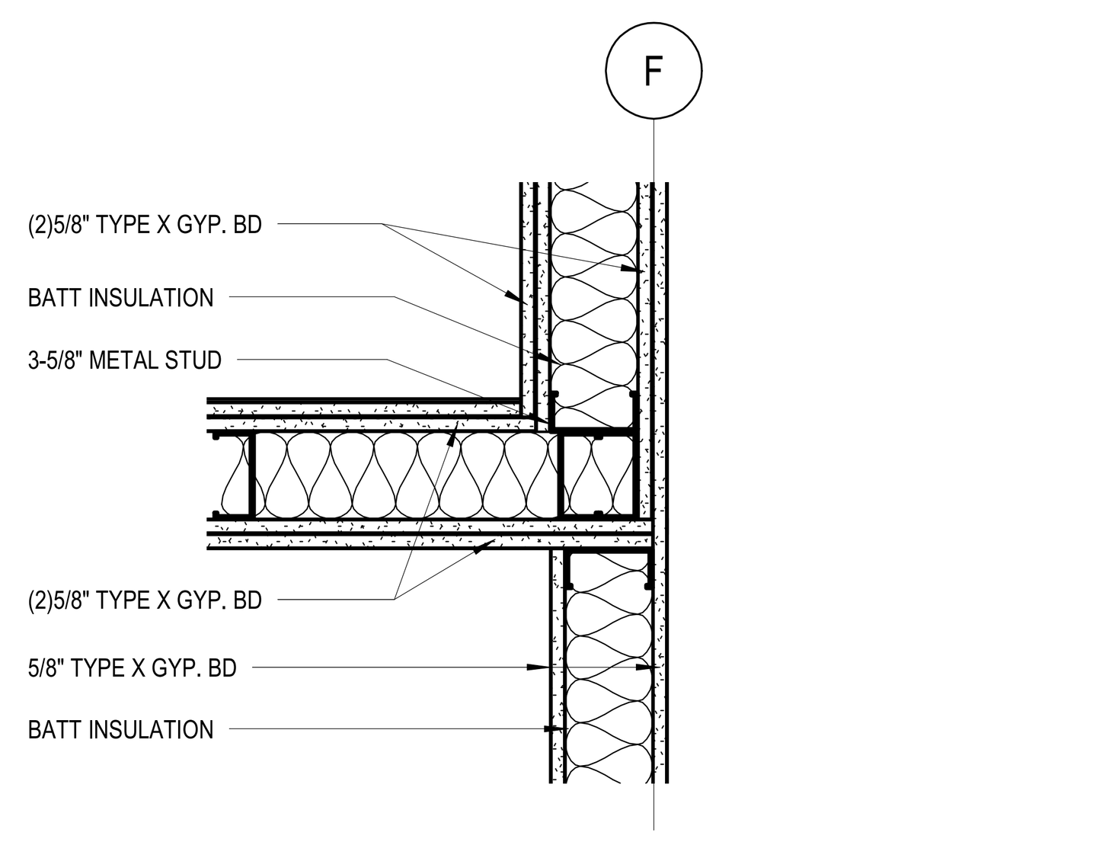
5 GYP. REVEAL DETAIL
6" = 1'-0" REF 22 / A-402



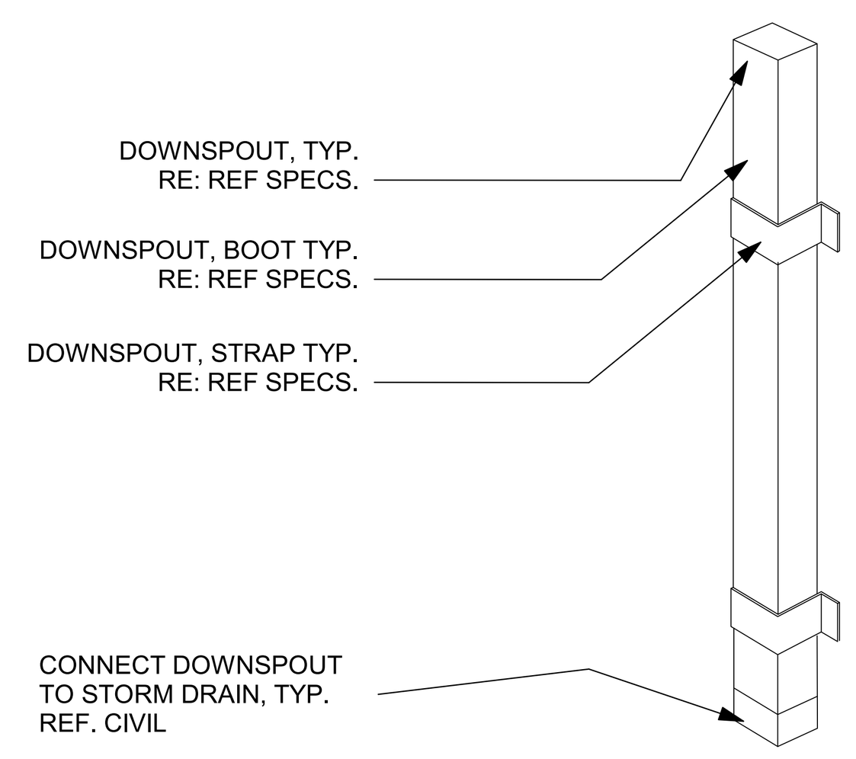
4 TILE EDGE DETAIL
6" = 1'-0" REF 14 / A-402



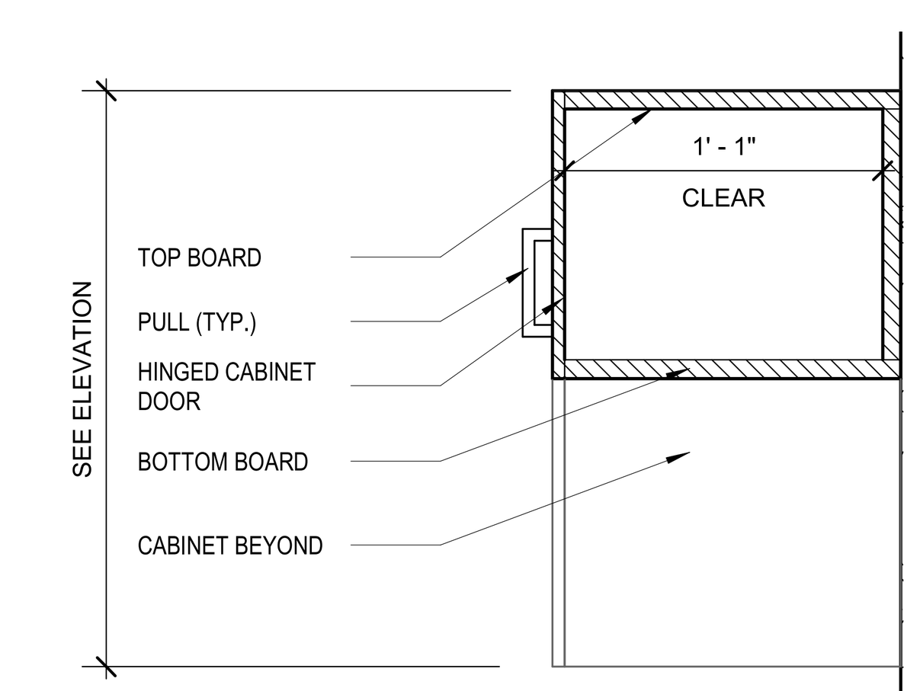
13 TILE EDGE DETAIL AT BASE
6" = 1'-0" REF 10 / A-402



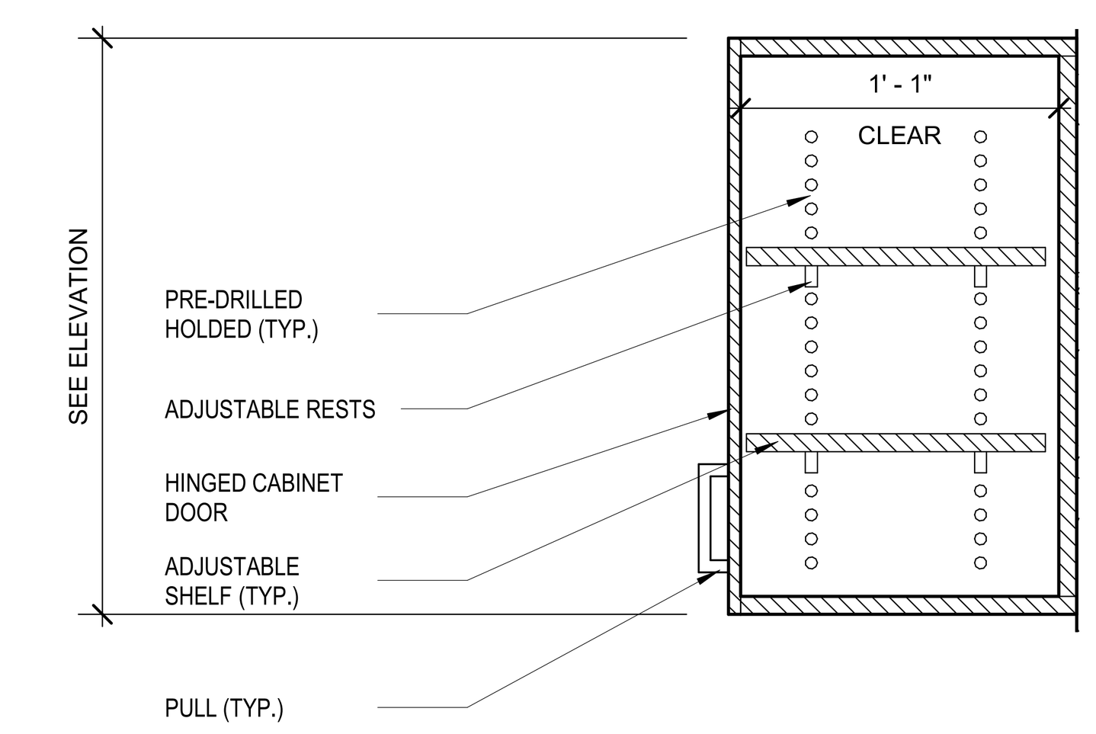
11 PLAN DETAIL AT FIRE-RATED WALL
1 1/2" = 1'-0" REF 1 / A-101



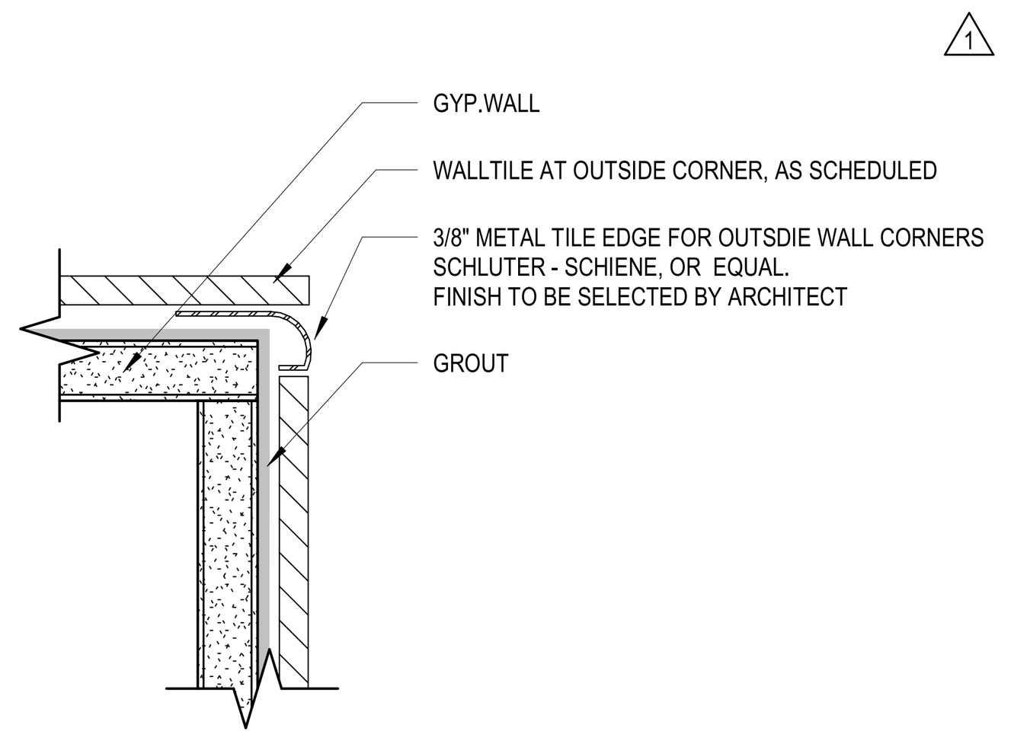
9 DOWNSPOUT BOOT
1" = 1'-0"



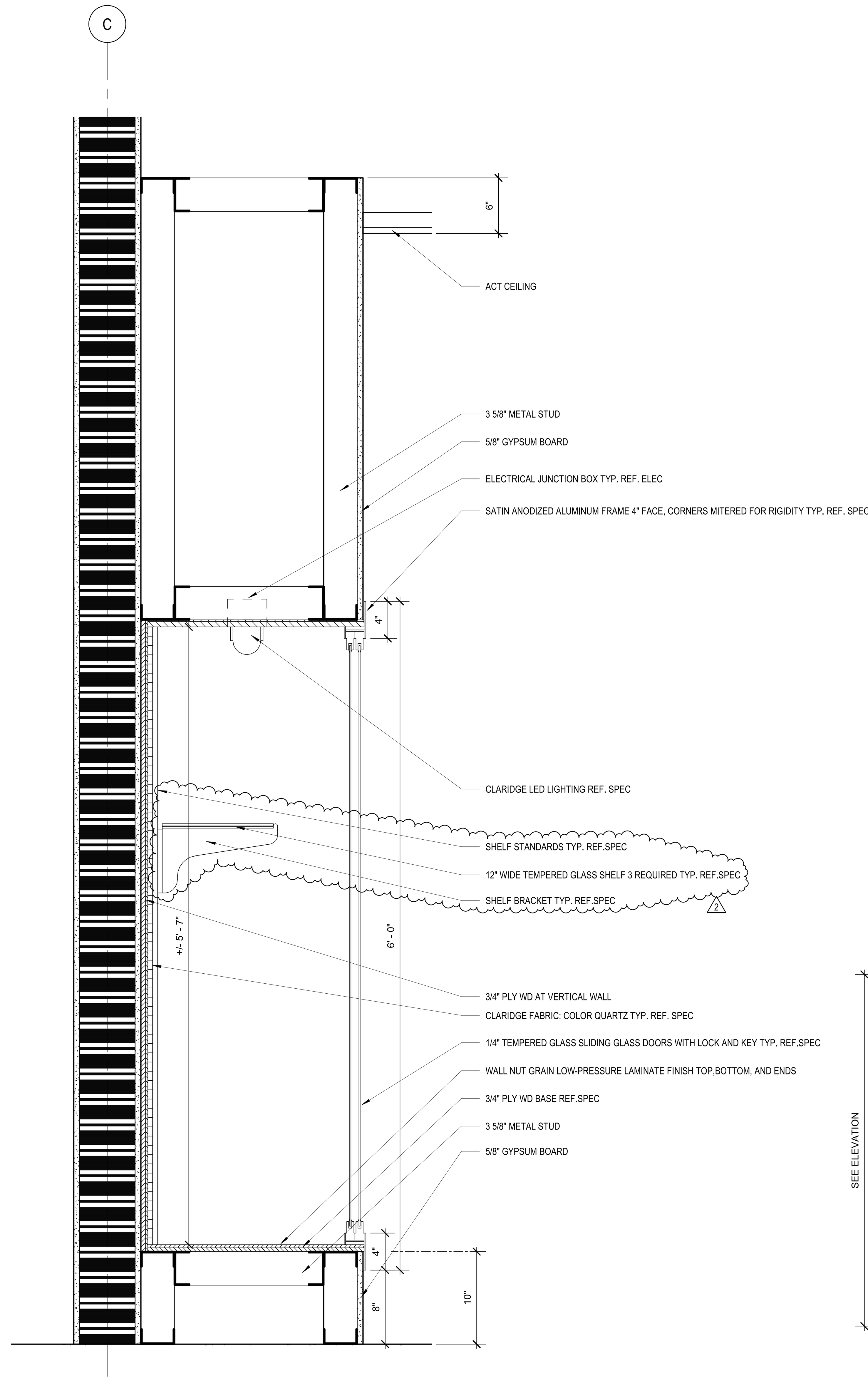
3 UPPER CASEWORK SMALL
1 1/2" = 1'-0" REF 6 / A-402



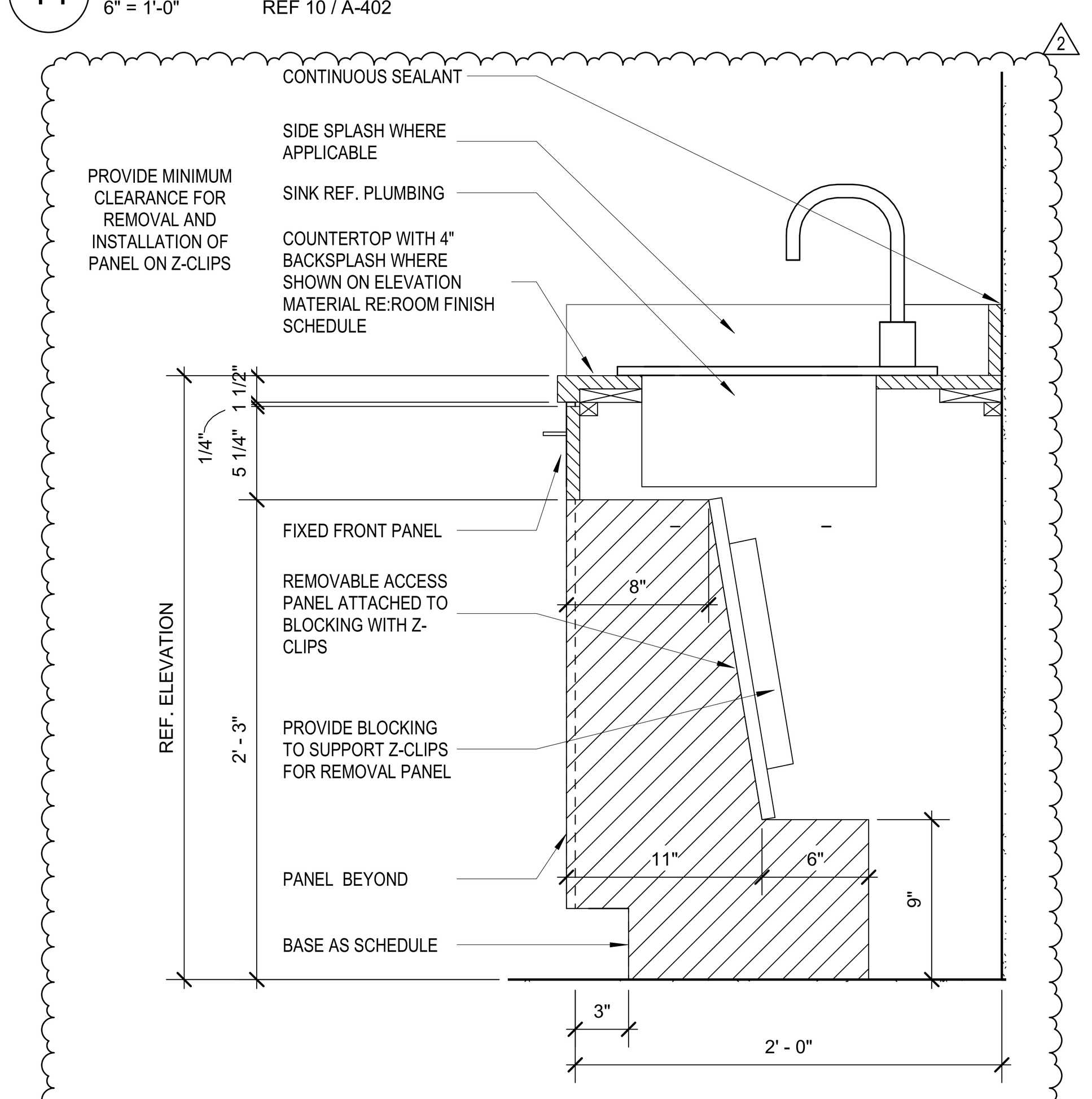
2 UPPER CASEWORK LARGE
1 1/2" = 1'-0" REF 5 / A-402



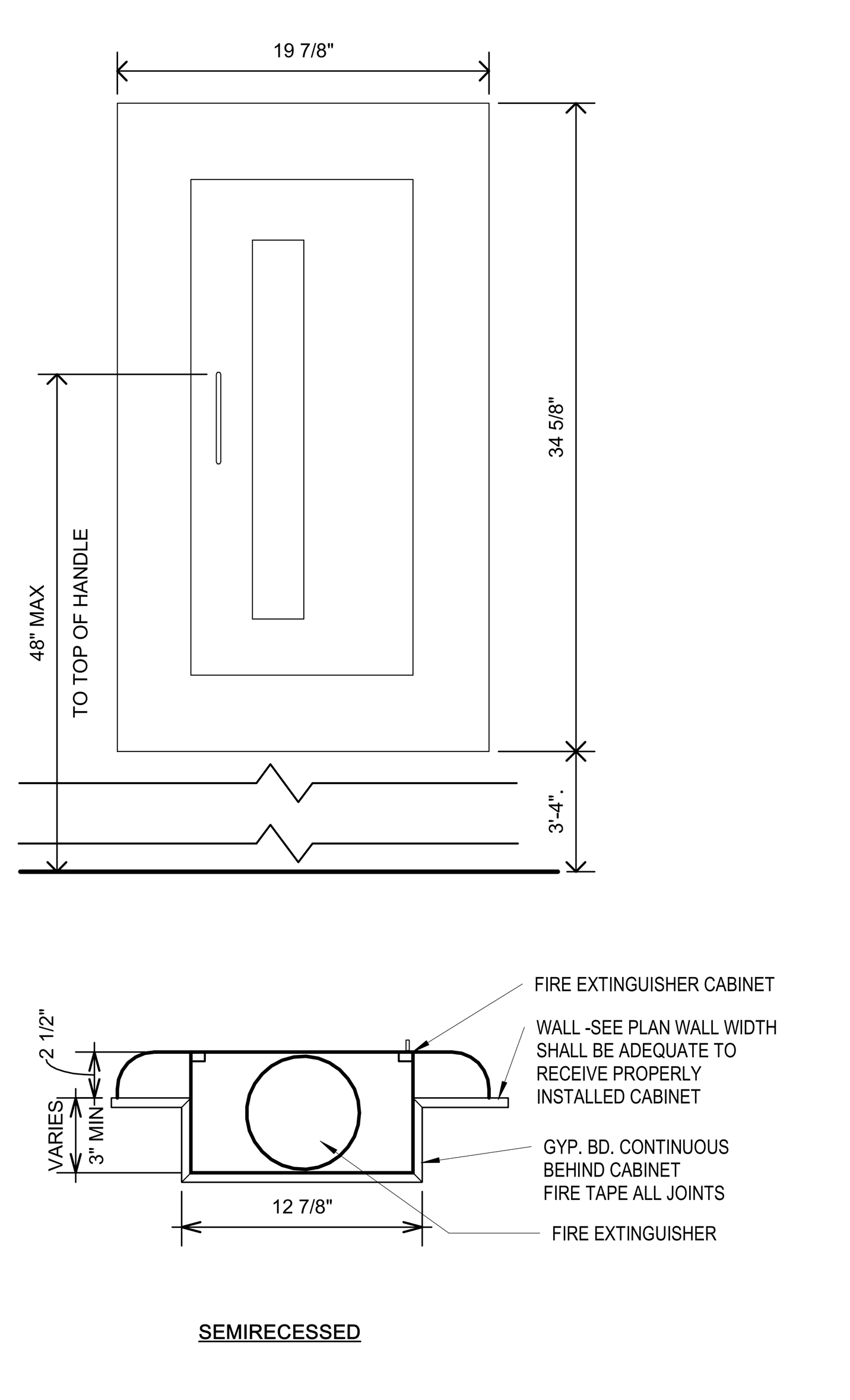
14 TILE EDGE DETAIL AT OUTSIDE CORNER
6" = 1'-0" REF 10 / A-402



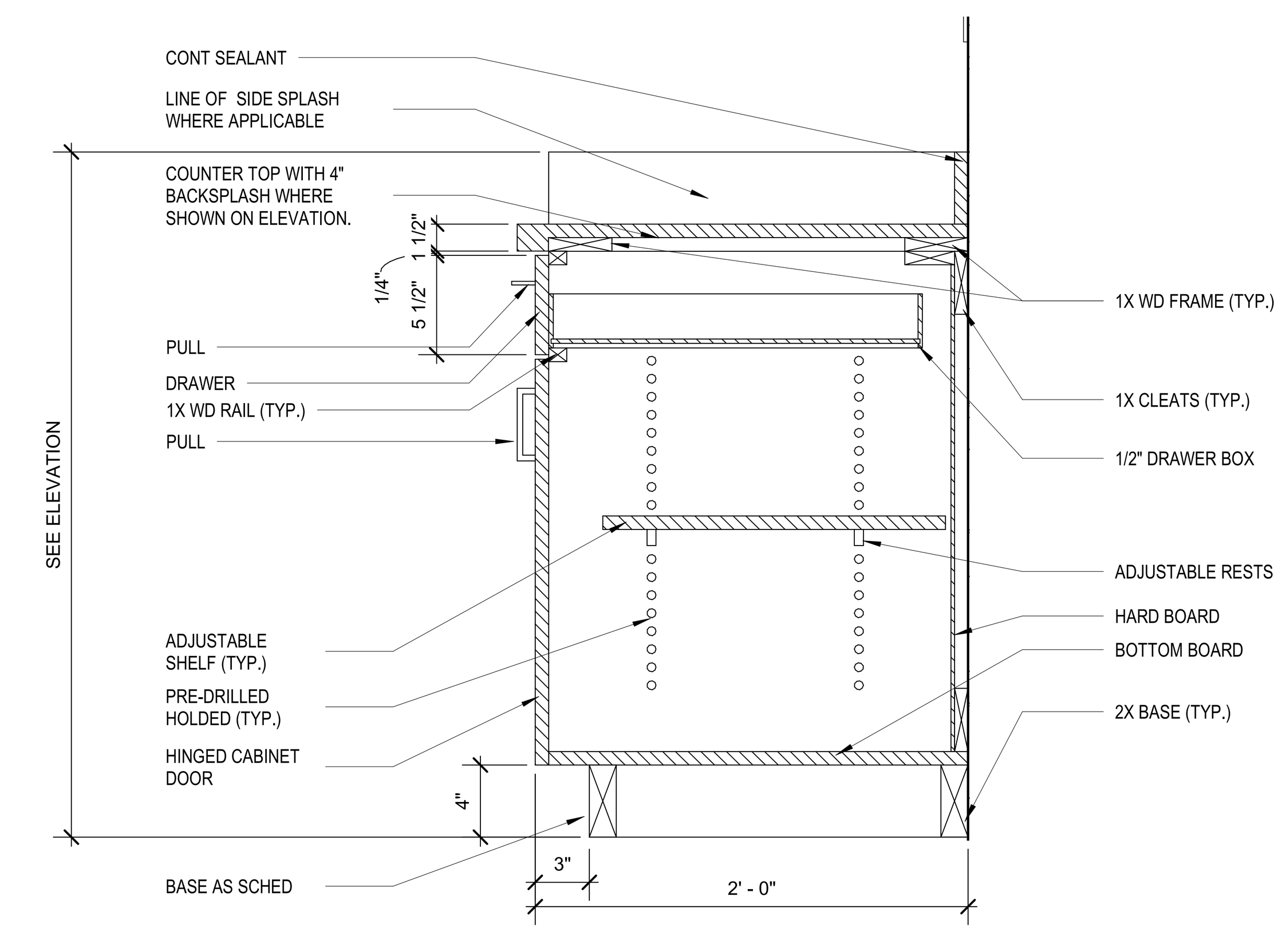
6 TROPHY CASE
1 1/2" = 1'-0" REF 3 / A-402



15 TAS SINK CABINET
1 1/2" = 1'-0" REF 6 / A-402



8 FIRE EXTINGUISHER
1 1/2" = 1'-0" REF 1 / A-101



1 BASE CABINET
1 1/2" = 1'-0" REF 5 / A-402

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REGISTERED ARCHITECT BRIAN C. HARLAN 19569 STATE OF TEXAS
10/07/2021

MIDLOTHIAN ISD
STADIUM ADDITIONS AND RENOVATIONS
1800 S 14 ST. MIDLOTHIAN, TX 76065

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OWP PROJECT NO.	DATE OF ISSUE
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REVISIONS

DELTA	DESCRIPTION	DATE
1	ADDENDUM 2	10/18/2021
2	ADDENDUM 3	10/27/2021

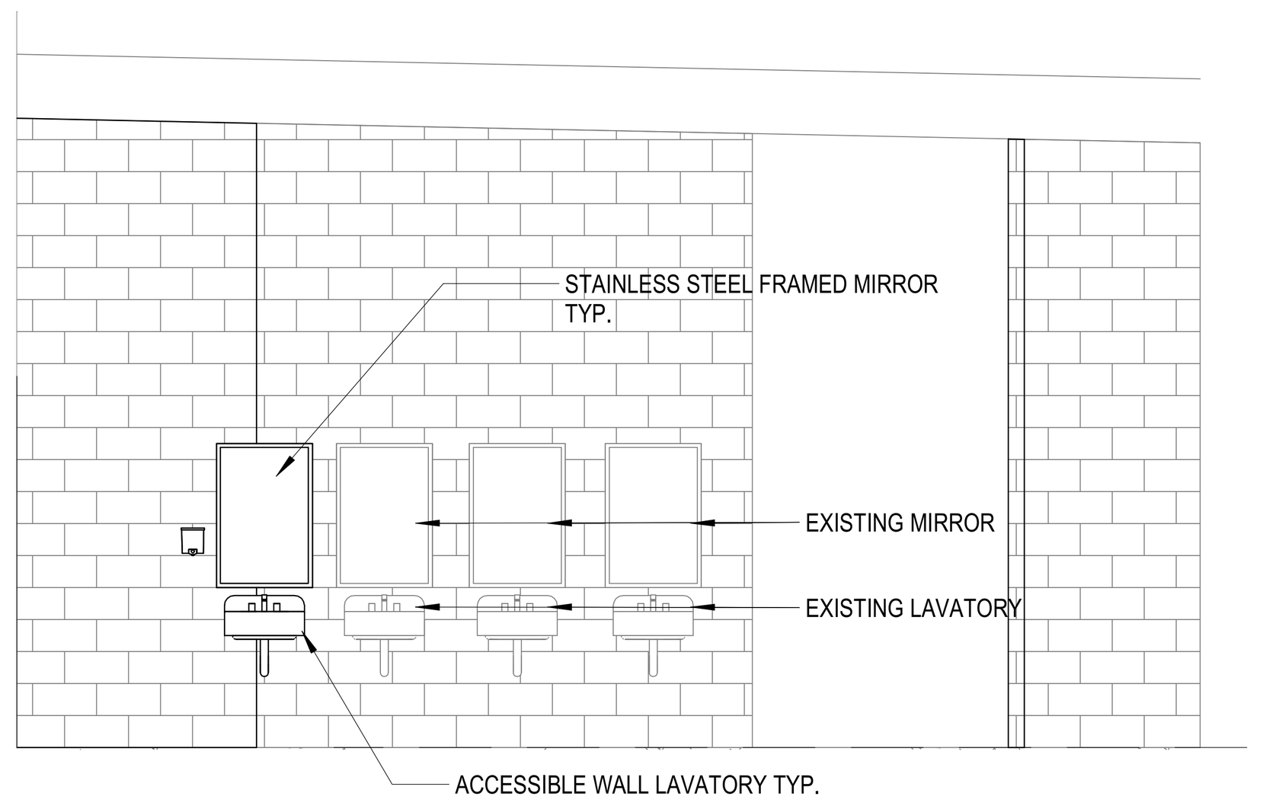
PROJECT TEAM	DRAWN BY
ED TEXAS	EA

PROJECT PHASE
CONSTRUCTION DOCUMENTS

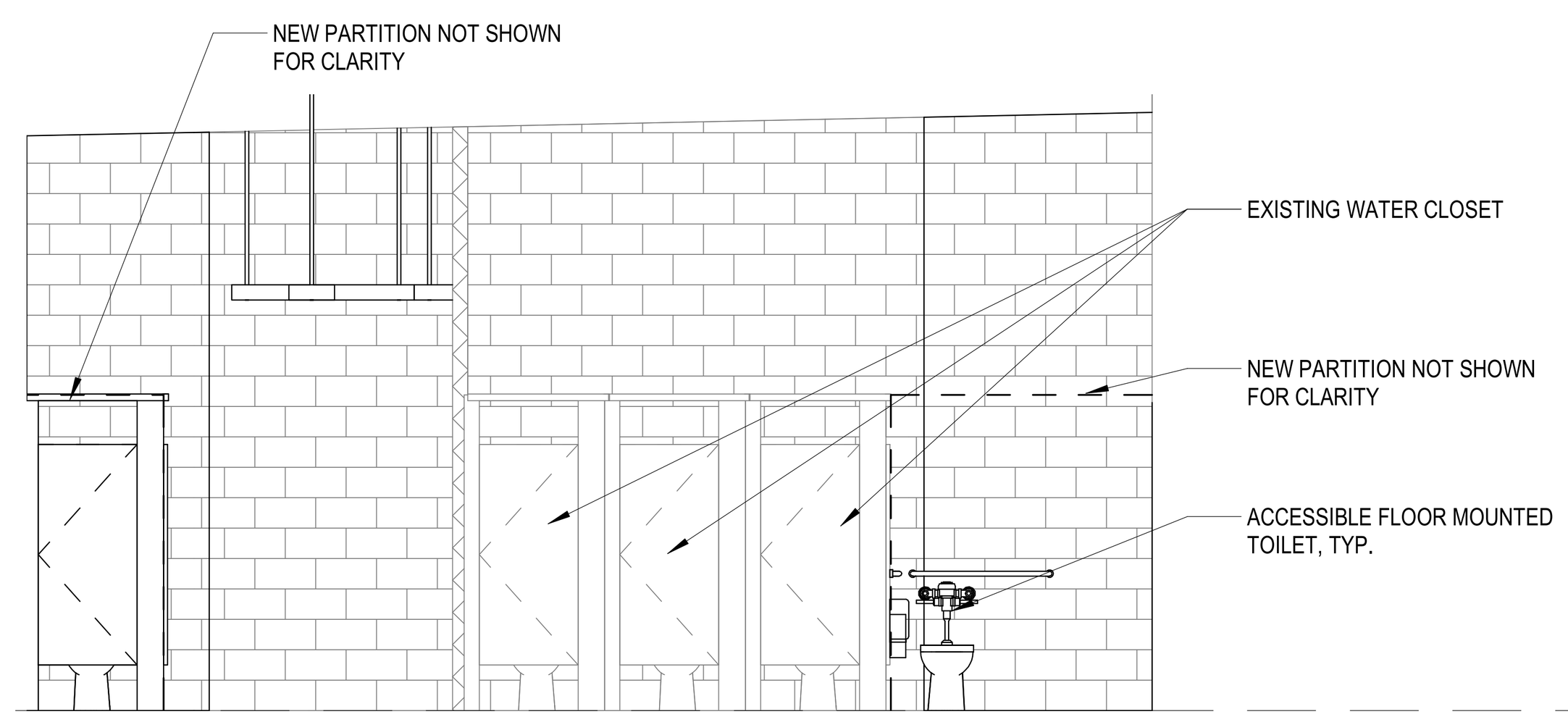
SHEET CONTENTS
INTERIOR DETAILS

SHEET NO.
A-403

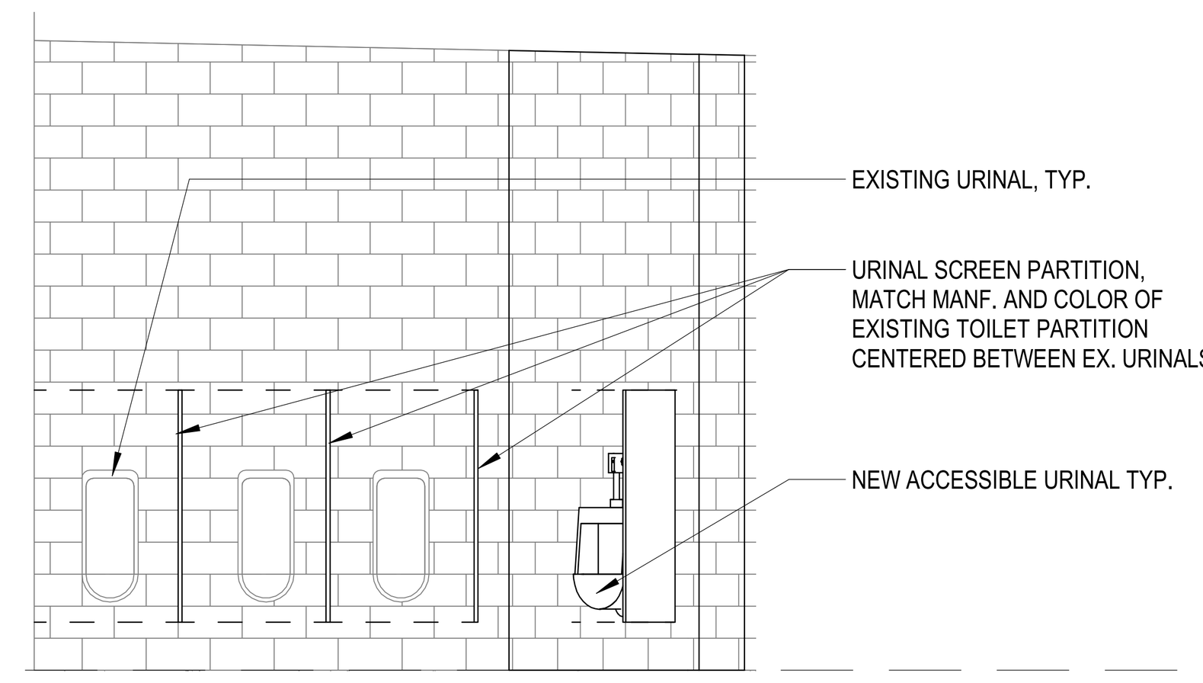
ALTERNATE BID #2: STADIUM BLEACHER ADDITION AND RESTROOM RENOVATIONS



6 CONSESSION WOMENS RR ELEVATION D
1/4" = 1'-0" REF 1 / A-102



5 CONCESSION WOMENS RR ELEVATION (TYP.)
1/4" = 1'-0" REF 1 / A-404



4 CONCESSION MENS RR ELEVATION (TYP.)
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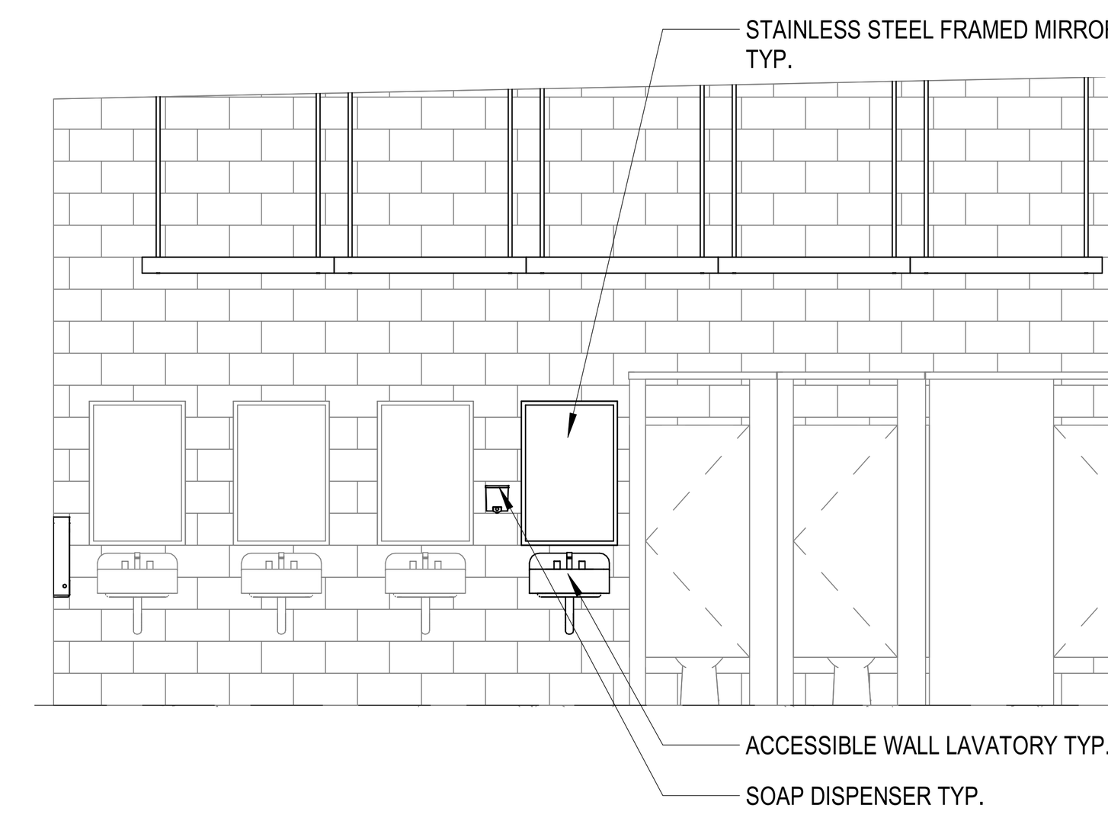
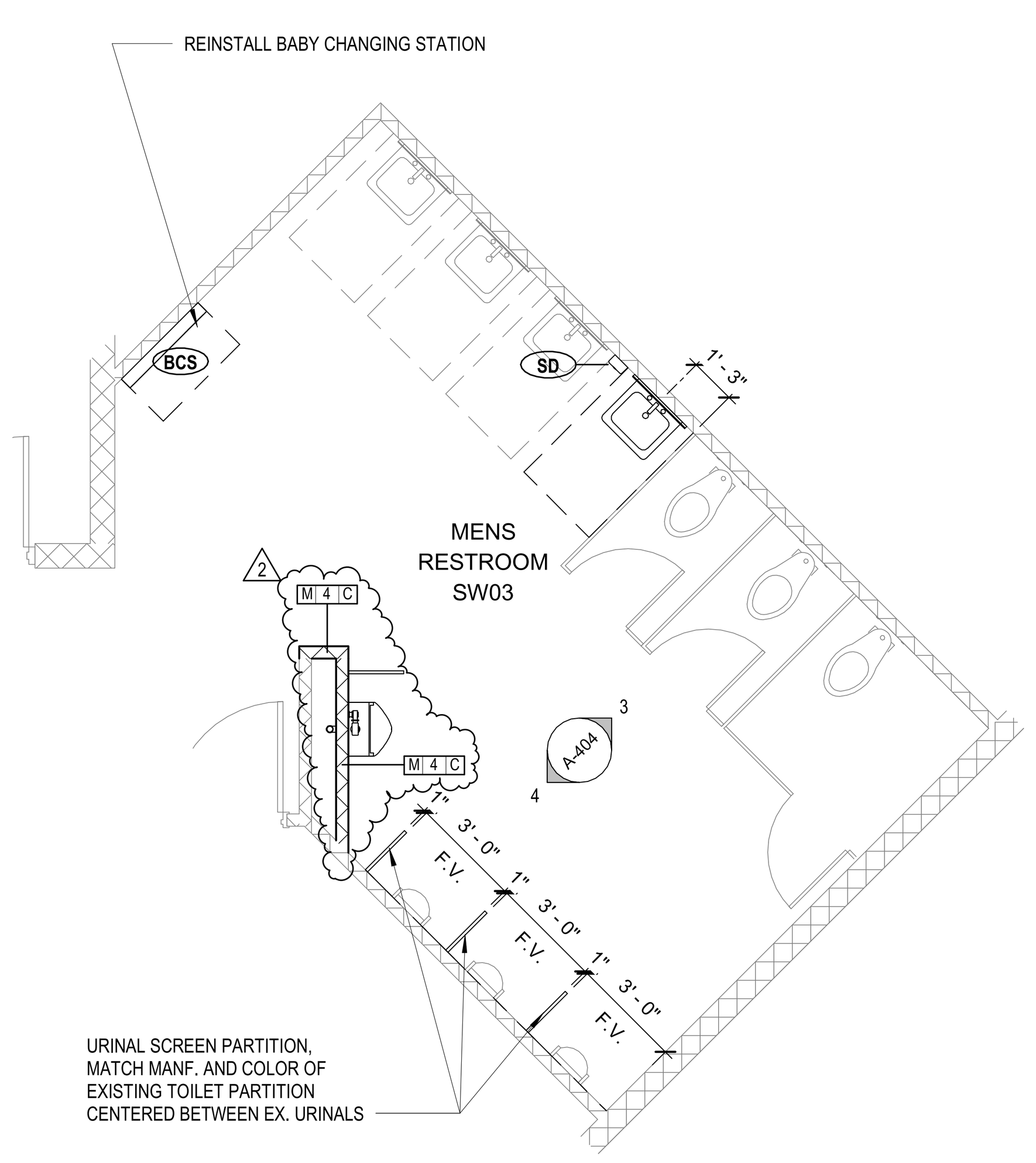
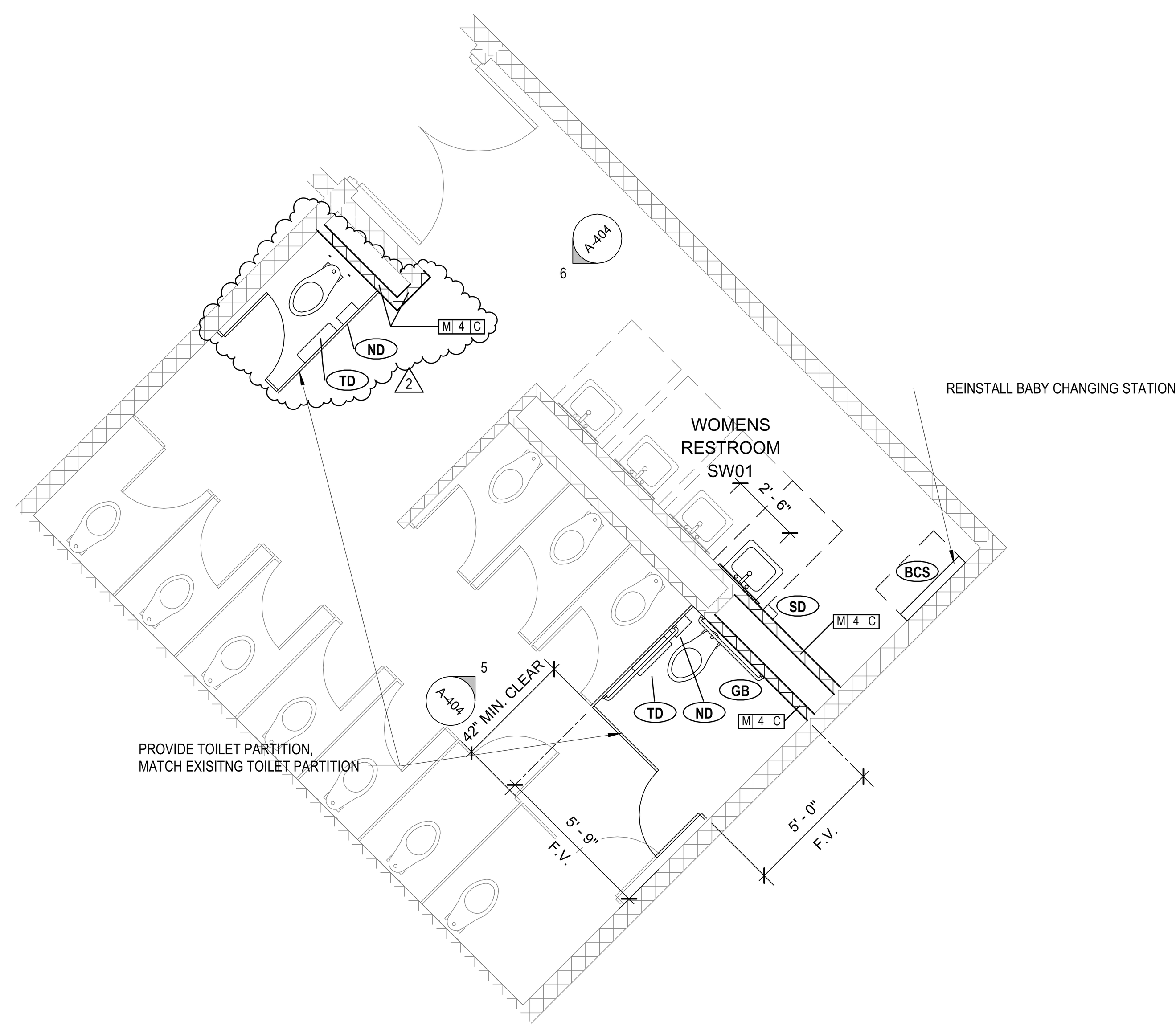


3 CONCESSION MENS RR ELEVATION (TYP.)
1/4" = 1'-0" REF 2 / A-404



2 DETAIL PLAN - CONCESSION MENS RESTROOM
1/4" = 1'-0" REF 1 / A-102



1 ENLARGED PLAN - CONCESSION RR
1/4" = 1'-0" REF 1 / A-102

TOILET ACCESSORIES LEGEND

- URINAL
- WATER CLOSET
- VANITY SINK
- ELECTRIC DRINKING FOUNTAIN W/ BOTTLE FILLER
- FLOOR DRAIN
- BCS BABY CHANGING STATION
- GRAB BARS
- SH SHELF
- SD SOAP DISPENSER
- PT RECESSED PAPER TOWEL DISPENSER & WASTE RECEPTACLE
- TD TISSUE DISPENSER
- ND SANITARY NAPKIN DISPENSER OWNER FURNISHED CONTRACTOR INSTALLED
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PROJECT TEAM	DRAWN BY
ED TEXAS	EA/KN

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
ENLRGD PLANS, INT. ELEV.-ALT BID #2

SHEET NO.
A-404

10/27/2021 3:06:59 PMorcutt | winslow / 2021-154-00 / STADIUM ADDITIONS AND RENOVATIONS - MIDLOTHIAN ISD / CONSTRUCTION DOCUMENT / A-404- ENLRGD PLANS, INT. ELEV.-ALT BID #2 / EA/KN
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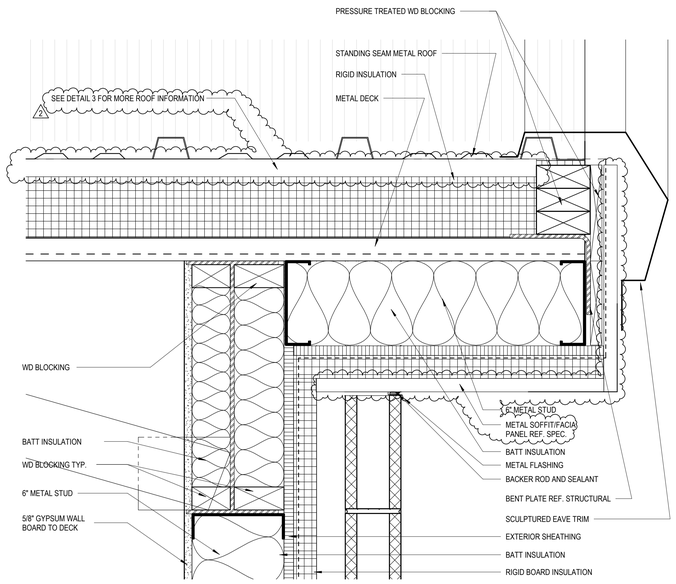
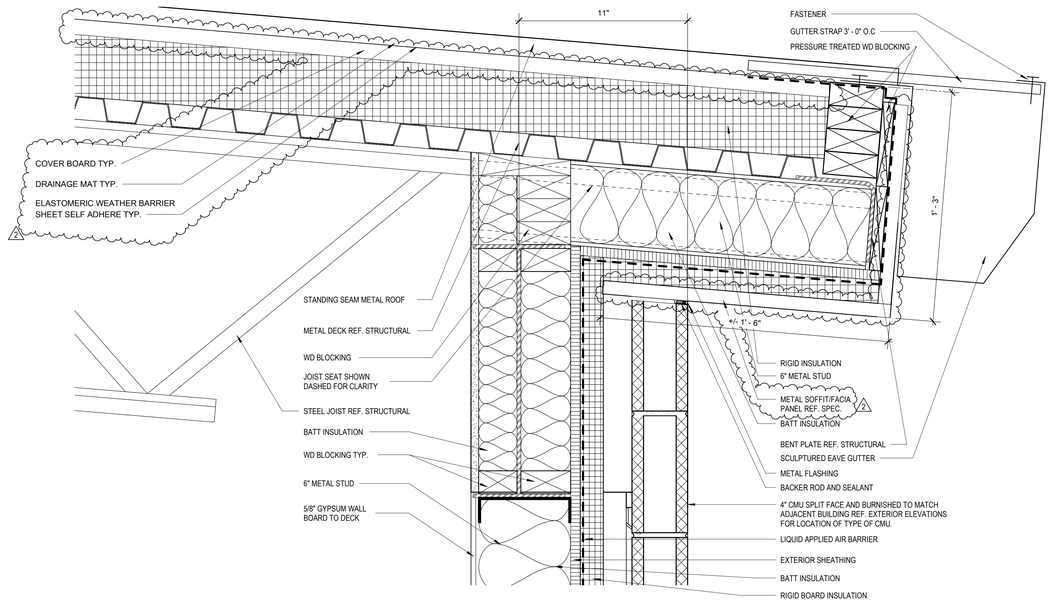
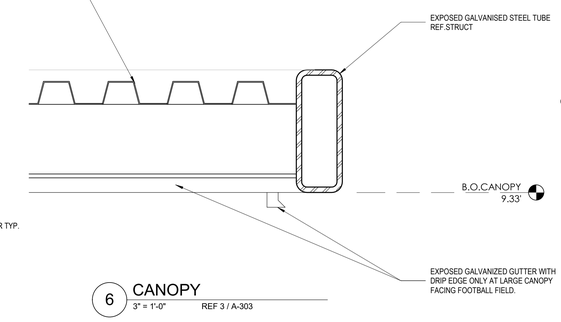


7 METAL PANEL AT ROOF EAVE
3" = 1'-0" REF 2 / A-303



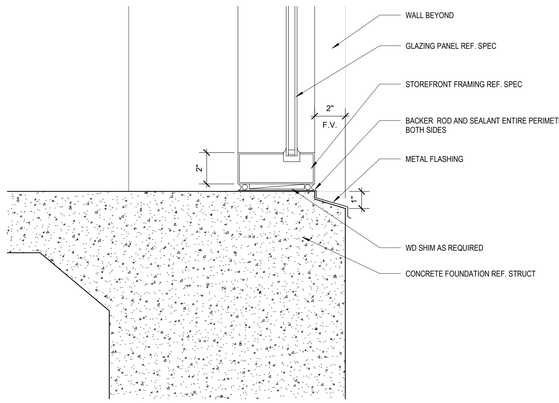
3 METAL PANEL AT ROOF
3" = 1'-0" REF 1 / A-303

5 STOREFRONT HEAD AT CANOPY
3" = 1'-0" REF 3 / A-303

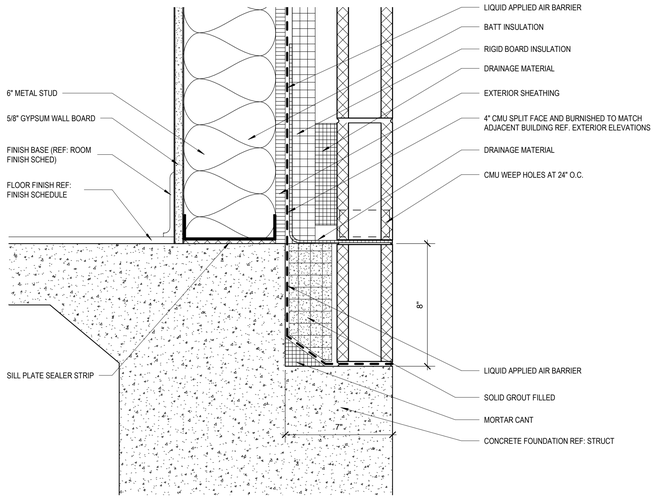


6 CANOPY
3" = 1'-0" REF 3 / A-303

2 STOREFRONT HEAD AT BRICK
3" = 1'-0" REF 2 / A-303



4 STOREFRONT SILL AT FOUNDATION
3" = 1'-0" REF 2 / A-303



1 FOUNDATION AT BRICK LEDGE
3" = 1'-0" REF 4 / A-303

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REGISTERED ARCHITECT BRYAN C. NASH 19569 STATE OF TEXAS

10/07/2021

MIDLOTHIAN ISD STADIUM ADDITIONS AND RENOVATIONS

1800 S 14 ST. MIDLOTHIAN, TX 76065

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OWP PROJECT NO.	DATE OF ISSUE
2021-154-00	10.07.2021

REVISIONS

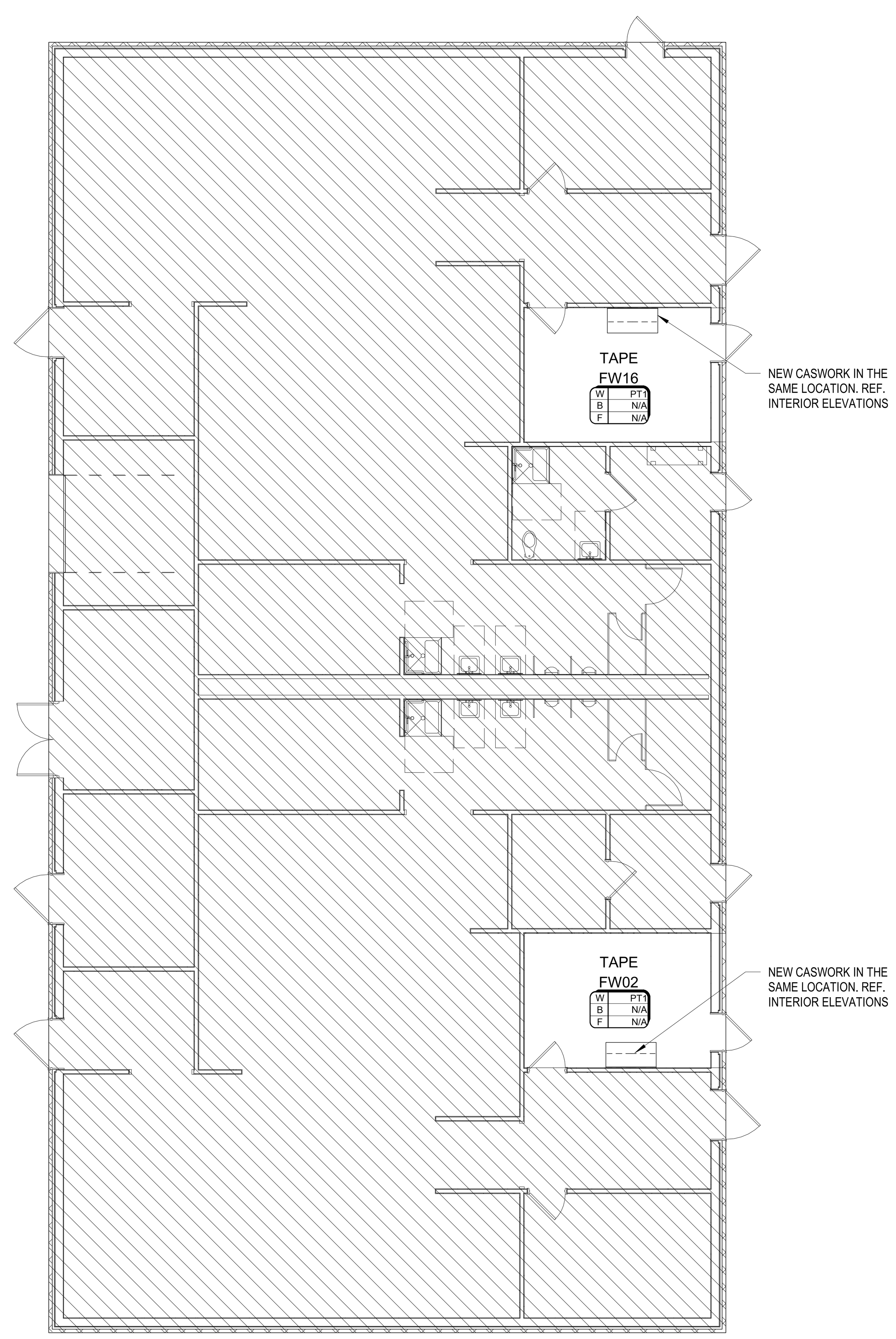
DELTA	DESCRIPTION	DATE
1	ADDENDUM 2	10/18/2021
2	ADDENDUM 3	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	EA

PROJECT PHASE
CONSTRUCTION DOCUMENTS

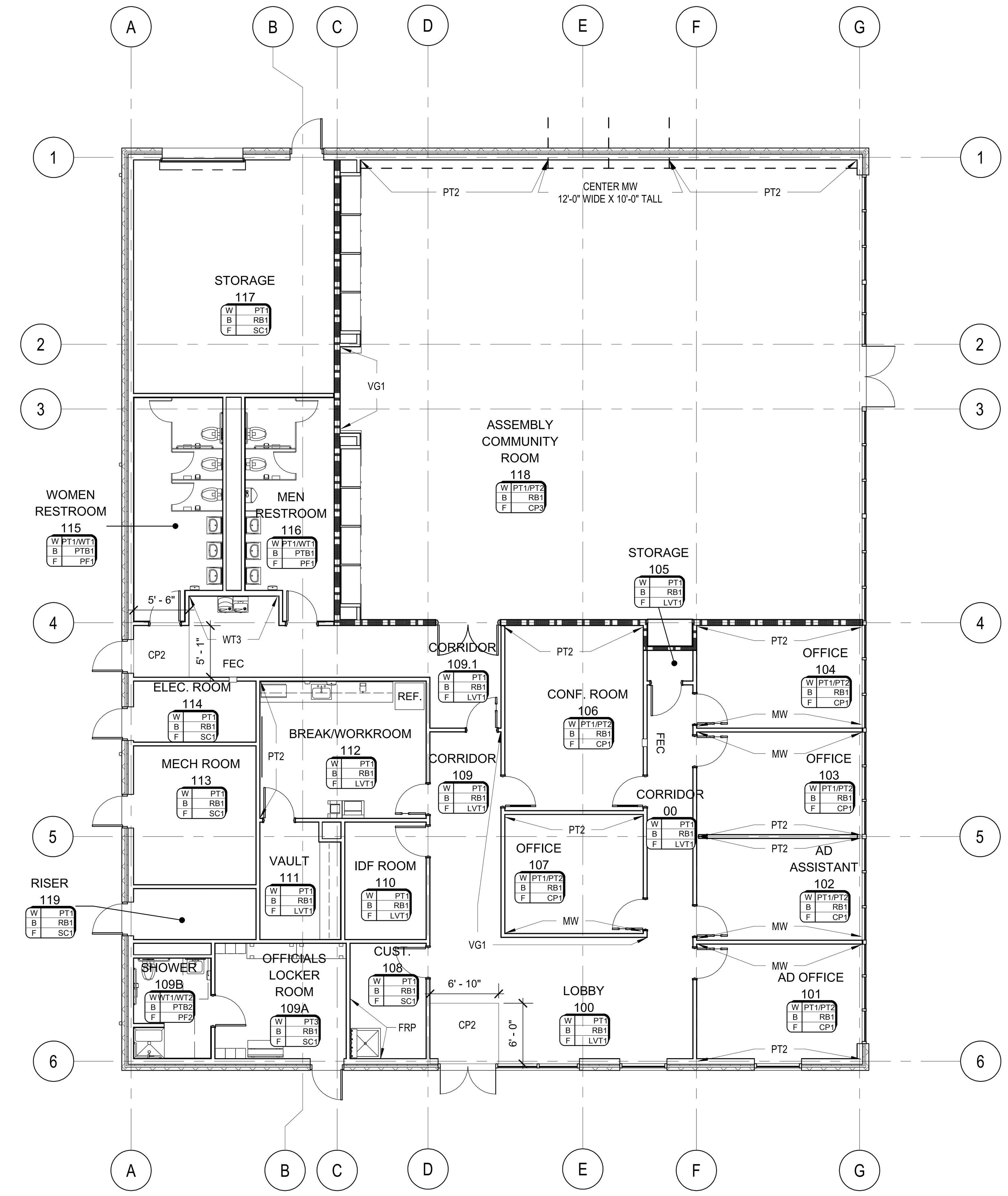
SHEET CONTENTS
EXTERIOR DETAILS

SHEET NO.
A-501



2 EXISTING FIELD HOUSE

1/8" = 1'-0" REF 1 / A-202



1 NEW BUILDING ATHLETIC OFFICES FINISH PLAN

1/8" = 1'-0" REF 1 / A-202

FINISH PLAN GENERAL NOTES

A. All flooring materials to meet at center of doorway UNO.

B. All flooring materials continue under casework to toe kick or under open counter to wall.

C. Door frames to be painted Sherwin Williams SW9179 Anchors Aweight, Finish: Semi-gloss enamel, UNO.

D. Refer to Reflected Ceiling Plan sheet(s) for soffit ceiling finishes.

FINISH PLAN LEGEND

WALLS:

PT1 - WALL PAINT, FIELD
MANUFACTURER : SHERWIN WILLIAMS (OR EQUAL)
COLOR: SW7008 ALABASTER
FINISH: SEMI-GLOSS

PT2 - WALL PAINT, ACCENT
MANUFACTURER : SHERWIN WILLIAMS (OR EQUAL)
COLOR: SW7643 PUSSYWILLOW
FINISH: SEMI-GLOSS

2 PT3 - WALL PAINT, FIELD
MANUFACTURER : SHERWIN WILLIAMS (OR EQUAL)
COLOR: SW9179 ANCHORS AWEIGH
FINISH: EPOXY

PT4 - WALL PAINT, FIELD
MANFACTURER : SHERWIN WILLIAMS (OR EQUAL)
COLOR: MATCH EXISTING, GC TO VERIFY
FINISH: EPOXY

MW - MARKER WALL SURFACE
MANUFACTURER: JOT-A-WALL (OR EQUAL)
COLOR: DRY ERASE WALL COVERING

2 VG1 - VINYL GRAPHIC AND APPLIED LETTERS AT ACCENT WALLS. ARTWORK AND QUOTES TO BE DETERMINED. PROVIDE LEVEL 5 FINISH. BY OWNER.

WT1 - WALL TILE, FIELD
MANUFACTURER : CROSSVILLE
COLLECTION: SHADES 2.0
COLOR: SHD44 MIST UPS
SIZE: 12" X 24"
GROUT: MAPEI 27 SILVER

WT2 - WALL TILE, ACCENT
MANUFACTURER : CROSSVILLE
COLLECTION: SHADES 2.0
COLOR: SHD44 MIDNIGHT UPS
SIZE: 6" X 24"
GROUT: MAPEI 27 SILVER

2 WT3 - WALL TILE, ACCENT
MANUFACTURER : CROSSVILLE
COLLECTION: SHADES 2.0
COLOR: NTR06-FILM NOIR HON
SIZE: 12" X 24"
GROUT: COLOR TO MATCH TILE

FRP: 5'-0 HEIGHT FRP PANEL, SEE SPECIFICATIONS, SUBMIT MANUFACTURER'S STANDARD COLORS FOR SELECTION.

BASE:

RB1 - RUBBER BASE,
MANUFACTURER: TARKETT
STYLE: BASEWORKS THERMOSET RUBBER (TYPE TS)
BASE COLOR: 20 CHARCOAL
HEIGHT: 4" COVED

PTB1 - STACKING COVE BASE MATCHING FLOORING PF1.

PTB2 - STACKING COVE BASE MATCHING FLOORING PF2.

FLOOR:

CP1 - CARPET TILE (OFFICES, CONFERENCE)
MANUFACTURER: TARKETT
COLLECTION: FABRIC + FORM COLLECTION
STYLE: AIDA CLOTH G0052, ETHOS MODULAR WITH OMNICOAT TECHNOLOGY
COLOR: INDIGO RUN 57206
SIZE: 9" X 36 PLANK
INSTALL: VERTICAL ASHLAR

CP2 - WALK OFF CARPET
MANUFACTURER: TARKETT
COLLECTION: POWERBOND & MODULAR
STYLE: ASSERTIVE ACTION 04837, ETHOS MODULAR WITH OMNICOAT TECHNOLOGY
COLOR: STEELWORK 26202
SIZE: 24" X 24" PLANK
INSTALL: QUARTER TURN

CP3 - CARPET TILE (ASSEMBLY COMMUNITY ROOM)
MANUFACTURER: TARKETT
COLLECTION: POWERBOND HYBRID
STYLE: CARTOGRAPHY 04843, ETHOS MODULAR WITH OMNICOAT TECHNOLOGY
COLOR: EDGE SHADOW 15613
SIZE: 18" X 36" PLANK
INSTALL: VERTICAL ASHLAR

LVT1 - LUXURY VINYL TILE
MANUFACTURER: TANDUS CENTIVA
COLLECTION: CONTOUR COLOR WEAVE
COLOR: C169 ANGORA
SIZE: 18" X 18"

PF1 - FLOOR TILE, RESTROOMS
MANUFACTURER: CROSSVILLE
COLLECTION: NOTORIOUS STONE
COLOR: FIRM NOIR NTR06
SIZE: 12" X 24"
GROUT: MAPEI 47 CHARCOAL

PF2 - FLOOR TILE, SHOWER
MANUFACTURER: CROSSVILLE
COLLECTION: SHADES 2.0
COLOR: SHD44 MIST
SIZE: 2 X 2 MOSAIC
GROUT: EPOXY - MAPEI 27 SILVER

SC1- SEALED CONCRETE

COUNTERTOP WITH 4" BACKSPLASH:

SS1 - SOLID SURFACE
MANUFACTURER: CORIAN
COLOR: EVEREST

MILLWORK LAMINATE:

PL1 - PLASTIC LAMINATE (BASE CABINET)
MANUFACTURER: WILSONART
COLOR: FRENCH LINEN 5016-60, MATTE

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REGISTERED ARCHITECT
BRIAN C. HARLAN
19569
STATE OF TEXAS
10/07/2021

MIDLOTHIAN ISD

STADIUM ADDITIONS AND RENOVATIONS

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-- F

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2021-154-00	10.07.2021

REVISIONS

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2	ADDENDUM 3	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	EA/KN

PROJECT PHASE

CONSTRUCTION DOCUMENTS

SHEET CONTENTS

FLOOR FINISH PLAN

SHEET NO.

A-701

N

10/27/2021 10:57:03 AM orcutt | winslow / 2021-154-00 / STADIUM ADDITIONS AND RENOVATIONS - MIDLOTHIAN ISD / CONSTRUCTION DOCUMENT / A-701- FLOOR FINISH PLAN / EA/KN
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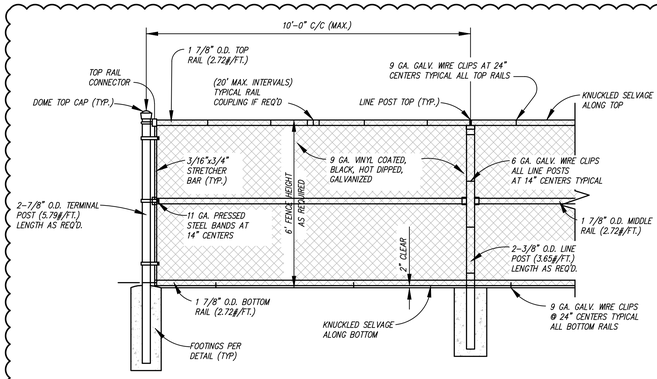
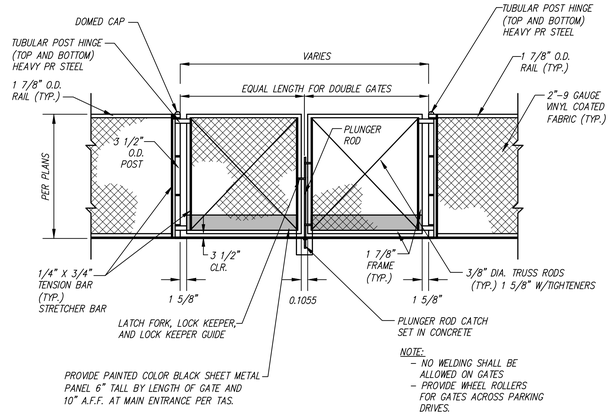


8' HIGH CHAIN-LINK FENCE

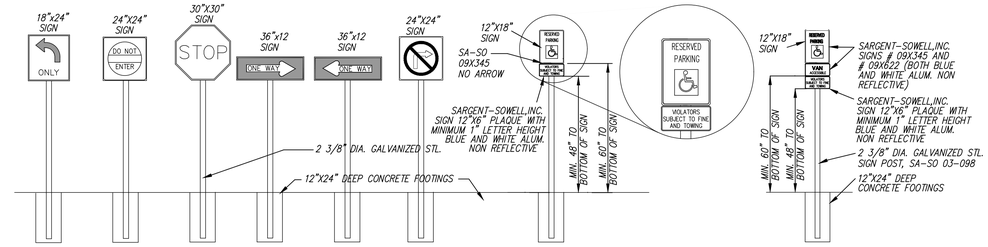
N.T.S.

NOTE: ALL FENCING SHALL HAVE MOWSTRIP OR INSTALLED IN CONC. SIDEWALK



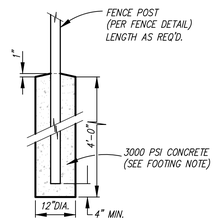
VINYL COATED CHAIN LINK DOUBLE GATE

N.T.S.



TRAFFIC SIGN DETAILS

N.T.S.

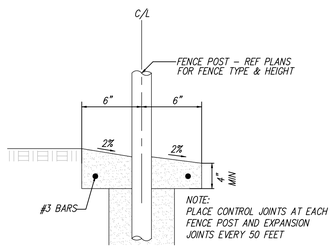


CORNER, GATE OR LINE POST FOOTING

FOOTING DETAILS

N.T.S.

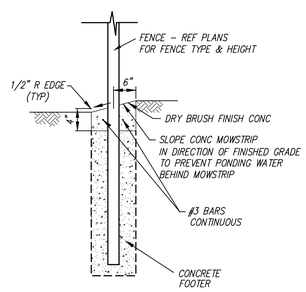
FOOTING NOTE: THE CORNER, GATE & LINE POST FOOTINGS SHALL BE CONSIDERED SUBSIDIARY TO THE RESPECTIVE FENCE CONSTRUCTION. NO SEPARATE PAY.



MOW STRIP SECTION

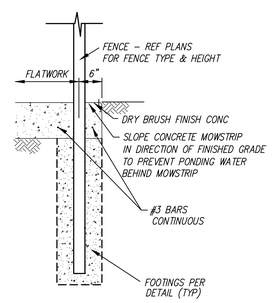
N.T.S.

NOTE: MOW STRIP TO BE PROVIDED ON ALL FENCE TYPES.



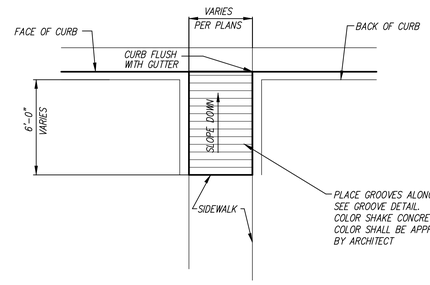
FENCE W/ MOWSTRIP

N.T.S.



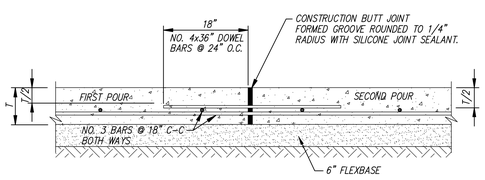
FENCE ADJACENT TO FLATWORK

N.T.S.



TYPE 'C'

N.T.S.



CONSTRUCTION BUTT JOINT

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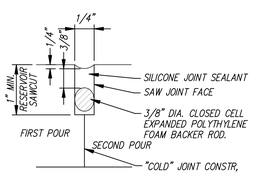

CONSTRUCTION BUTT JOINT SEAL

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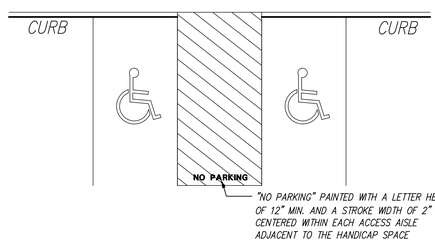
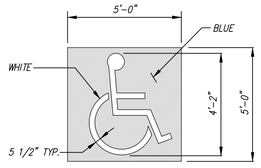


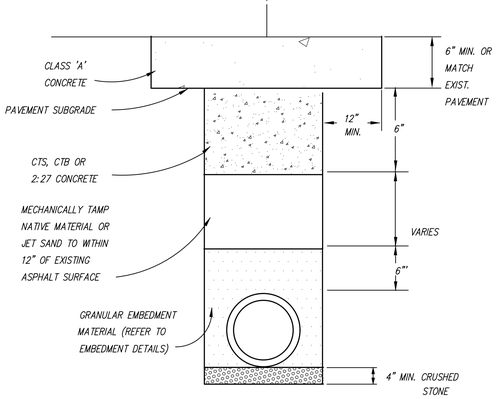
HANDICAP LOADING ZONE STRIPING DETAIL

N.T.S.



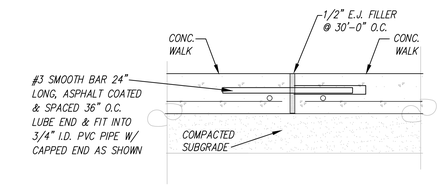
PAINTED HANDICAP PARKING LOGO

N.T.S.



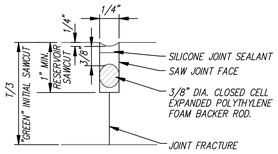
CONCRETE PAVEMENT REPAIR

N.T.S.



TYPICAL CONC. WALK EXPANSION JOINT

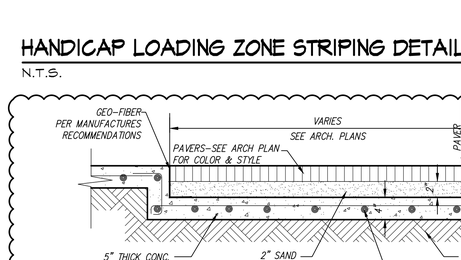
N.T.S.



NOTE:
1. POLYETHYLENE FOAM BACKER ROD DOES NOT SIT ON BOTTOM OF SAW
2. SILICONE BEAD HAS GENERAL WIDTH TO DEPTH RATIO OF 2:1.

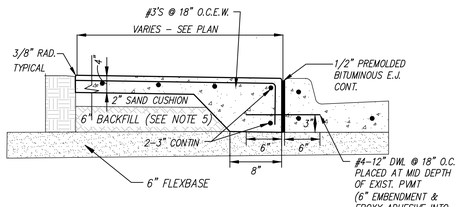
SAWED DUMMY JOINT SEAL

N.T.S.



BRICK PAVERS (FLATWORK/SIDEWALK SECTION)

N.T.S.



SIDEWALK W/ THICKENED EDGE (ADJACENT TO BACK OF CURB)

N.T.S.

SIDEWALK GENERAL NOTES:

1. ALL CONSTRUCTION MATERIALS, METHODS AND PLACEMENT NOT DETAILED BELOW SHALL MEET OR EXCEED THE STANDARD SPECIFICATIONS OF THE NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS UNLESS SUPERCEDED BY CITY STANDARD SPECIFICATIONS.

2. REINFORCED CONCRETE SIDEWALK SHALL BE A MINIMUM 4 FEET WIDE, A MINIMUM OF 4 INCHES THICK AND SHALL BE CLASS "A" CONTAINING A MINIMUM OF 5 SACKS OF TYPE I CEMENT PER YARD. AGGREGATE SHALL CONSIST OF A MINIMUM OF 50% CRUSHED STONE. ALL CONCRETE PLACED SHALL CONTAIN SUFFICIENT AIR ENTRAINING AGENT TO YIELD 5% ± 1% AIR CONTENT.

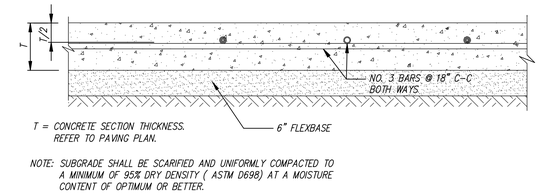
3. CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/8 INCH.

4. ALL REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM A-615 GRADE 60. REINFORCING STEEL SHALL BE PLACED WITH A MINIMUM OF 1-1/2" OF COVER FOR #5 BARS OR SMALLER. WHERE REINFORCING BARS ARE SPLICED. A 30 DIAMETER LAP SHALL BE USED.

5. SUBGRADE SHALL CONSIST OF NATIVE SOIL COMPACTED TO A DENSITY NOT LESS THAN 95% ASTM D698 WITHIN 0 TO +4% OF OPTIMUM.

6. SIDEWALKS SHALL BE FINISHED BY LIGHTLY BROOMING SURFACE TRANSVERSELY TO DIRECTION OF MAIN TRAFFIC OR WHERE ADJACENT SIDEWALKS DIFFER FROM THIS STANDARD, NEW SIDEWALKS SHALL CONFORM TO ADJACENT SIDEWALK (E.G. EXPOSED AGGREGATE).

7. AN APPROVED WHITE PIGMENTED CURING COMPOUND SHALL BE APPLIED TO THE SURFACE OF THE PAVEMENT AS SOON AS IT HAS BEEN PLACED AND FINISHED.

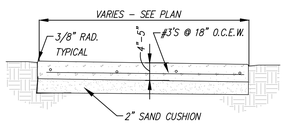


T = CONCRETE SECTION THICKNESS. REFER TO PAVING PLAN.

NOTE: SUBGRADE SHALL BE SCARIFIED AND UNIFORMLY COMPACTED TO A MINIMUM OF 95% DRY DENSITY (ASTM D698) AT A MOISTURE CONTENT OF OPTIMUM OR BETTER.

TYPICAL CONCRETE SECTION

N.T.S.



TYPICAL SIDEWALK/FLATWORK

N.T.S.

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MIDLOTHIAN ISD STADIUM ADDITIONS AND RENOVATIONS

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468-856-5000 T

OWP PROJECT NO. 2021-154-00

DATE OF ISSUE 10.07.2021

REVISIONS

DELTA	DESCRIPTION	DATE
1	ADDENDUM NO. 2	10/18/2021
2	ADDENDUM NO. 3	10/27/2021

PROJECT TEAM: TNP

DRAWN BY: TNP

PROJECT PHASE: 100% CDs

SHEET CONTENTS: SITE & PAVING DETAILS

SHEET NO. C1.10

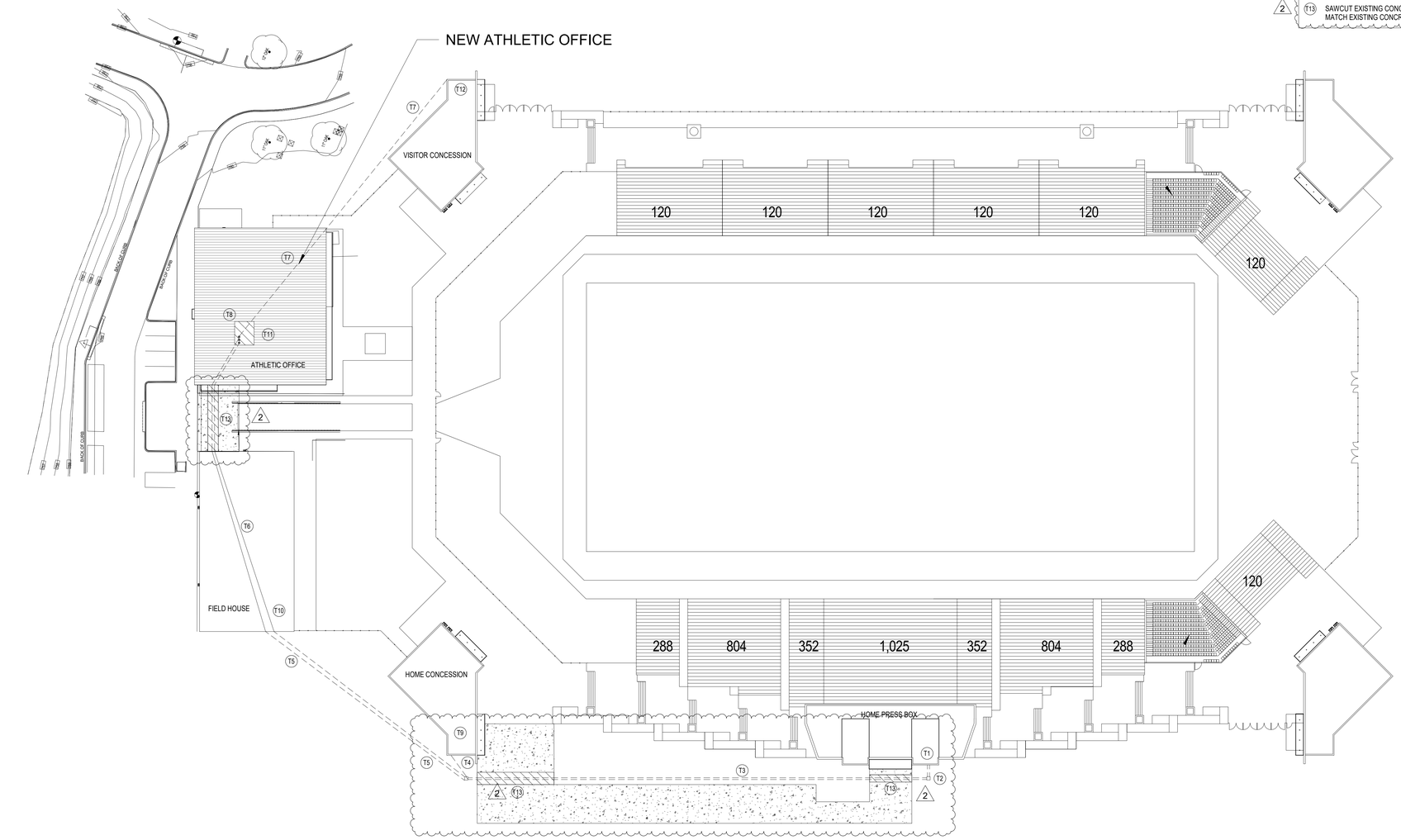
TNP PROJECT NO. OWP21246
TBPELS: ENGR F-230; SURV 10011600, 10011601, 10194381
GBPE: PEF007431; TBAE: BR 2673

ELECTRICAL COMMUNICATION GENERAL NOTES

1. CONTRACTORS AND SUBCONTRACTORS SHALL VERIFY LOCATION, CONDUCT TEST AND INSPECTIONS, COORDINATE WITH UTILITIES, OWNER'S REPRESENTATIVES, AND CHECK FOR ALL UNDERGROUND UTILITIES AND LINES BEFORE DITCHING TAKES PLACE. CONTRACTOR AND SUBCONTRACTORS PERFORMING THESE DUTIES SHALL BE RESPONSIBLE FOR ANY REPAIRS OF CUT OR DAMAGED LINES AND UTILITIES NOT SHOWN ON PLANS.
2. COORDINATE WITH DIVISION 26 CONTRACTOR PRIOR TO INSTALLATION.

ELECTRICAL COMMUNICATION SITE PLAN NOTES

- T1 IDF EQUIPMENT ROOM IN PRESSBOX.
- T2 EXISTING OUTDOOR EQUIPMENT VAULT. FIELD VERIFY EXACT LOCATION. PROVIDE 6 STRAND FIBER OPTIC CABLES TO EACH CONCESSION STAND AND FIELDHOUSE AND ONE 12 STRAIND FIBER OPTIC CABLE TO NEW ATHLETIC OFFICE BUILDING.
- T3 PROVIDE TWO 3" CONDUITS EXTENDING FROM VAULT UNDERGROUND TO PULL BOX AT HOME CONCESSION STAND. SAWCUT OR BORE AS REQUIRED.
- T4 EXTEND ONE 3" CONDUIT FROM PULL BOX UNDERGROUND TO EXTERIOR WALL ON HOME CONCESSION BUILDING, STUB UP IN ACCESSIBLE ATTIC SPACE IN ELECTRICAL ROOM. SAWCUT OR BORE AS REQUIRED.
- T5 EXTEND TWO 3" CONDUITS FROM PULL BOX UNDERGROUND TO EXTERIOR WALL ON FIELDHOUSE, STUB UP IN ACCESSIBLE ATTIC SPACE. SAWCUT OR BORE AS REQUIRED.
- T6 EXTEND TWO 3" CONDUITS ABOVE CEILING IN FIELDHOUSE, DOWN EXTERIOR WALL, AND UNDERGROUND TO IDF ROOM IN NEW ATHLETIC OFFICE BUILDING. SAWCUT OR BORE AS REQUIRED.
- T7 EXTEND ONE 3" CONDUIT UNDERGROUND TO EXTERIOR OF CONCESSION BUILDING, UP EXTERIOR WALL, STUB UP IN ACCESSIBLE ATTIC SPACE IN ELECTRICAL ROOM. SAWCUT OR BORE AS REQUIRED. .
- T8 NEW ATHLETIC OFFICE IDF EQUIPMENT ROOM.
- T9 PROVIDE 6 STRAND FIBER OPTIC CABLE FROM VAULT TO HOME CONCESSION ELECTRICAL ROOM.
- T10 PROVIDE 6 STRAND FIBER OPTIC CABLE FROM VAULT TO FIELDHOUSE.
- T11 PROVIDE 12 STRAND FIBER OPTIC CABLE FROM VAULT TO ATHLETIC OFFICE IDF ROOM.
- T12 PROVIDE 6 STRAND FIBER OPTIC CABLE FROM ATHLETIC OFFICE IDF TO VISITOR CONCESSION ELECTRICAL ROOM.
- 2 T13 SAWCUT EXISTING CONCRETE FOR UNDERGROUND CONDUITS. PATCH TO MATCH EXISTING CONCRETE SURFACE AS REQUIRED.



1 ELECTRICAL COMMUNICATIONS SITE PLAN
1" = 30'-0"

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STATE OF TEXAS
JAMES M. TATE III
102427
LICENSED
PROFESSIONAL ENGINEER
10-6-2021

MIDLOTHIAN ISD STADIUM ADDITIONS AND RENOVATIONS

1800 S 14 ST. MIDLOTHIAN, TX 76065

OWNER PROJECT NO.: --

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PROJECT TEAM	DRAWN BY
ED TEXAS	Author

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CONSTRUCTION DOCUMENTS

SHEET CONTENTS
ELECTRICAL COMMUNICATIONS SITE PLAN

SHEET NO.
ET1.0

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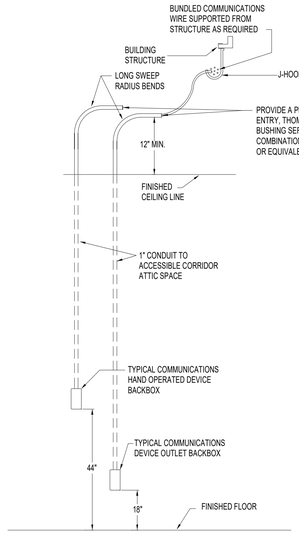
SUBMISSION OF BID WILL BE CONSIDERED ACKNOWLEDGMENT THAT THE CONTRACTOR HAS VISITED THE SITE AND HAS VERIFIED ALL EXISTING JOB CONDITIONS AND INCLUDED ANY NECESSARY MODIFICATION TO EXISTING AND NEW WORK REQUIRED FOR INSTALLATION OF A COMPLETE AND WORKING SYSTEM.



1 COMMUNICATIONS DEVICE BACKBOXES
N.T.S.

DATA CABLE PLANT SYMBOLS

◀ 2	DATA JACK, NUMBER DENOTES DATA LINE QUANTITY PER WALL PLATE - WALL MOUNTED DEVICE 18" A.F.F.

NOTES: 1. SOME SYMBOLS MAY NOT BE USED.
2. ACCESSIBLE DEVICES HIGHEST OPERABLE PART TO BE 48" MAXIMUM/18" MUNIMUM A.F.F. - REFER TO ARCHITECTURAL DRAWINGS.
3. DIMENSIONS GIVEN A.F.F. ARE TO BOTTOM OF BOX.

ELECTRICAL COMMUNICATIONS GENERAL NOTES

1. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL CONDUIT AND STANDARD BACKBOXES FOR SYSTEMS SHOWN ON THIS DRAWING IN BASE PROPOSAL.

2. IN ANY EXPOSED AREAS SUCH AS GYMNASIUMS, SHOPS, FIELD HOUSES, JANITORS CLOSETS, OR MECHANICAL/ELECTRICAL ROOMS ALL LOW VOLTAGE CABLING SHALL BE ENCLOSED IN CONDUIT.

3. ALL COMMUNICATIONS CABLING SHALL RUN DOWN THE CORRIDORS AND BRANCH OFF TO EACH CLASSROOM. TRUNKING SHALL BE RAN PRIMARILY PERPENDICULAR TO BUILDING WALLS AND SHALL NOT BE RAN OVER CLASSROOMS.

4. WHERE NO FINISHED CEILINGS ARE SCHEDULED ALL DEVICES, CONDUIT, AND BACKBOXES SHALL BE INSTALLED UP AGAINST BOTTOM OF DECK AND SHALL NOT PROTRUDE BELOW BOTTOM OF STEEL. THE ARCHITECT SHALL APPROVE ALL ROUTING OF ALL EXPOSED ROUGH-INS PRIOR TO PLACEMENT.

5. ANY SIGNAL, OUTLET OR OTHER DEVICE MOUNTED ON A COLUMN, PILASTER, OR SIMILAR WALL OFFSET SHALL BE CENTERED.

6. COORDINATE MOUNTING HEIGHT OF DEVICES ABOVE MILLWORK WITH ARCHITECTURAL PLANS.

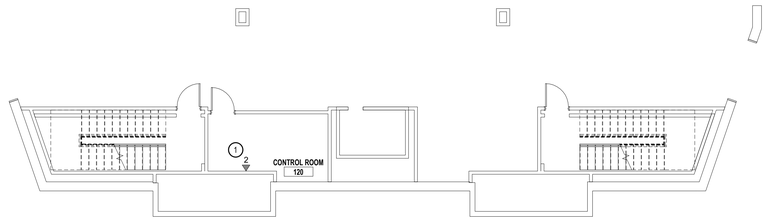
7. VERIFY MARKERBOARD, TACKBOARD, AND DOOR SWING LOCATIONS WITH ARCHITECTURAL PLANS - DO NOT INSTALL DEVICES IN THESE AREAS.

8. COORDINATE EXACT LOCATION OF ALL DEVICES, ETC. INSTALLED IN MOVEABLE FURNITURE WITH ARCHITECT AND OWNER.

9. CONFIRM ALL COMMUNICATIONS DEVICE LOCATIONS WITH ARCHITECT PRIOR TO ROUGH-IN. THE ARCHITECT RESERVES THE RIGHT TO LOCATE DEVICES ANYWHERE WITHIN EACH ROOM AND DETERMINE SURFACE RACEWAY ROUTING IF APPLICABLE.

10. COORDINATE EXACT MECHANICAL EQUIPMENT LOCATION AND TYPE WITH MECHANICAL PLANS AND MECHANICAL CONTRACTOR. DO NOT INSTALL CONDUIT WITHIN 3'-0" OF ANY HVAC DEVICE UNLESS THE DEVICE SERVES THAT UNIT.

11. REFER TO SPECIFICATION DIVISION 27 FOR ADDITIONAL INFORMATION.



1 ELECTRICAL COMMUNICATION FLOOR PLAN - CONCOURSE - CONTROL ROOM
1/8" = 1'-0"

ELECTRICAL COMMUNICATION PLAN NOTES

1 PROVIDE DATA OUTLET FOR OWNER PROVIDED EQUIPMENT. FIELD VERIFY AND COORDINATE WITH OWNER FOR EXACT LOCATION PRIOR TO INSTALATION.

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OWP PROJECT NO. DATE OF ISSUE
2021-154-00 10.27.2021

REVISIONS

DELTA	DESCRIPTION	DATE
2	ADDENDUM #3	10/27/2021

PROJECT TEAM
ED TEXAS

DRAWN BY
Author

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
ELECTRICAL COMMUNICATIONS FLOOR PLAN - CONTROL ROOM

SHEET NO.
ET1.2
2

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SUBMISSION OF BID WILL BE CONSIDERED ACKNOWLEDGMENT THAT THE CONTRACTOR HAS VISITED THE SITE AND HAS VERIFIED ALL EXISTING JOB CONDITIONS AND INCLUDED ANY NECESSARY MODIFICATION TO EXISTING AND NEW WORK REQUIRED FOR INSTALLATION OF A COMPLETE AND WORKING SYSTEM.

STRUCTURAL NOTES

GENERAL:

GN-1 THE DETAILS DESIGNATED AS "TYPICAL DETAILS", APPLY GENERALLY TO THE AREAS IN THE DRAWINGS WHERE CONDITIONS ARE SIMILAR TO THOSE DESCRIBED IN DETAILS.

GN-2 THE GENERAL CONTRACTOR SHALL VERIFY AND COORDINATE REQUIREMENTS OF OTHER TRADES (ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING, ETC.) WITH THE STRUCTURAL DOCUMENTS PRIOR TO FABRICATION OR INSTALLATION OF ANY STRUCTURAL MEMBERS.

GN-3 THE CONTRACTOR AND FABRICATOR SHALL VERIFY QUANTITIES, DIMENSIONS AND CONDITIONS THOROUGHLY WITH THE CONTRACT DOCUMENTS AND THEN NOTIFY THE ARCHITECT/ENGINEER OF ANY DISCREPANCIES OR INCONSISTENCIES BEFORE SUBMITTING SHOP DRAWINGS AND PROCEEDING WITH THE WORK. DO NOT SCALE DRAWINGS FOR DIMENSIONS.

GN-4 COMPLETED SHOP DRAWINGS SHALL BE PROVIDED, AS SPECIFIED, FOR FABRICATED ITEMS AND SHALL BE REVIEWED BY THE GENERAL CONTRACTOR PRIOR TO FABRICATION. STRUCTURAL DRAWINGS SHALL NOT BE REPRODUCED FOR SHOP DRAWINGS. USE OF STRUCTURAL DRAWINGS WITHOUT PERMISSION IS GROUNDS FOR REJECTION OF SHOP DRAWINGS. THE STRUCTURAL ENGINEER WILL REVIEW SHOP DRAWINGS FOR THE LIMITED PURPOSE OF CHECKING FOR CONFORMANCE WITH INFORMATION GIVEN AND THE DESIGN CONCEPT EXPRESSED IN THE CONTRACT DOCUMENTS. THEREFORE, CLOUDED DIMENSIONS, INDICATED ON ANY SHOP DRAWINGS, THAT ARE RELATIVE TO EXISTING STRUCTURES SHALL BE VERIFIED BY THE CONTRACTOR AND FABRICATOR. AS A MINIMUM, THE FOLLOWING SHOP DRAWINGS SHALL BE SUBMITTED AS WELL AS SHOP DRAWINGS LISTED IN THE DEFERRED SUBMITTAL SECTION OF THESE NOTES:

A. CONCRETE MIX DESIGN FOR EACH TYPE OF CONCRETE TO BE USED.
B. CONCRETE REINFORCING STEEL SHOP DRAWINGS INCLUDING PLACEMENT DRAWINGS.
C. STRUCTURAL STEEL SHOP DRAWINGS.
D. METAL DECK DRAWINGS.
E. OPEN WEB STEEL JOISTS.
F. CARTONS FORMS
G. VOID RETAINERS

GN-5 SHOP DRAWINGS NOT PREVIOUSLY REVIEWED BY THE GENERAL CONTRACTOR SHALL BE RETURNED WITHOUT REVIEW BY STRUCTURAL ENGINEER.

GN-6 GENERAL CONTRACTOR SHALL INSPECT JOB FOR COMPLETION BEFORE SCHEDULING ANY OBSERVATION BY THE ENGINEER.

GN-7 SEE ARCH'L. AND MEP DRAWINGS FOR LOCATIONS AND SIZES OF SLAB OPENINGS, SLEEVES, INSERTS, ANCHORS AND BOLTS REQUIRED BY VARIOUS TRADES.

GN-8 PLUMBING CONDUITS AT FOUNDATION SHOULD HAVE FLEXIBLE CONNECTIONS TO SUSTAIN A MAXIMUM DIFFERENTIAL MOVEMENT OF 1 INCH.

GN-9 THE STRUCTURE HAS BEEN DESIGNED TO RESIST DESIGN LOADS ONLY AS A COMPLETED STRUCTURE. CONTRACTOR SHALL CONSIDER CONSTRUCTION LOADS APPLIED TO THE PARTIALLY COMPLETED STRUCTURE UNTIL PERMANENT CONNECTIONS ARE MADE, AND ENCLOSED PERMANENTLY AS PER CONSTRUCTION DOCUMENTS. TEMPORARY BRACING SHALL BE PROVIDED BY THE CONTRACTOR IN ALL DIRECTIONS. WHEN REQUIRED, BY THE CONSTRUCTION DOCUMENTS OR THE STRUCTURAL ENGINEER, CONTRACTOR SHALL PROVIDE CALCULATIONS SEALED BY A LICENSED STRUCTURAL ENGINEER IN THE STATE OF TEXAS WHICH VERIFY THE MEANS OF STRUCTURALLY MAINTAINING THE INTEGRITY OF THE COMPLETED PORTION OF THE STRUCTURE.

GN-10 THE CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING THE ADEQUACY OF THE STRUCTURE TO SUPPORT CONSTRUCTION LOADS. THE STRUCTURAL ENGINEER IS NOT RESPONSIBLE TO DESIGN OR CHECK THE STRUCTURE FOR CONSTRUCTION ACTIVITIES.

GN-11 THE ENGINEER SHALL NOT HAVE CONTROL OF, AND SHALL NOT BE RESPONSIBLE FOR, CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES, FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, FOR THE ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTOR, OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE FAILURE OF ANY OF THEM TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

GN-12 PERIODIC SITE OBSERVATIONS BY FIELD REPRESENTATIVES OF ALPHA CONSULTING ENGINEERS, INC. ARE SOLELY FOR THE PURPOSE OF DETERMINING IF THE WORK OF THE CONTRACTOR IS PROCEEDING IN ACCORDANCE WITH THE INTENT OF THE STRUCTURAL CONTRACT DOCUMENTS. THESE LIMITED SITE OBSERVATIONS ARE NOT INTENDED TO BE A CHECK OF THE QUALITY OR QUANTITY OF THE WORK, BUT RATHER PERIODIC IN AN EFFORT TO INFORM THE OWNER OF DEFECTS AND DEFICIENCIES IN THE WORK OF THE CONTRACTOR.

GN-13 ASSUMPTIONS HAVE BEEN MADE BY THIS OFFICE REGARDING EXISTING CONDITIONS. ACTUAL CONDITIONS MAY VARY FROM THOSE ASSUMED. FIELD VERIFICATION OF EXISTING CONDITIONS MAY BE REQUIRED TO PROVIDE ADEQUATE SHOP DRAWINGS. THE CONTRACTOR IS TO COORDINATE EFFORTS AS REQUIRED AND IS TO REPORT ANY DISCREPANCIES REGARDING THE EXISTING CONDITIONS TO THE ENGINEER FOR POSSIBLE MODIFICATIONS NEEDED TO THE CONTRACT DRAWINGS.

GN-14 PROTECT REMAINING EXISTING STRUCTURES. ANY DAMAGE TO AN EXISTING STRUCTURE SHALL BE REPAIRED TO EQUIVALENT OR BETTER CONDITION.

GN-15 PROVIDE CONTROL JOINTS AT 15'-0" ON CENTER MAXIMUM FOR BRITTLE FINISHES, UNLESS NOTED OTHERWISE BY ARCHITECT.

GN-16 IF CONFLICT EXISTS BETWEEN DRAWINGS, NOTES, AND SPECIFICATIONS; THE STRICTEST REQUIREMENTS SHALL GOVERN.

DESIGN LOADS:

DL-1 APPLICABLE CODES AND STANDARDS

BUILDING CODE OF JURISDICTION:	2018 INTERNATIONAL BUILDING CODE
STRUCTURAL CONCRETE CODE:	AMERICAN CONCRETE INSTITURE (ACI 318-14)
STRUCTURAL STEEL CODE:	AMERICAN INSTITUTE OF STEEL CONSTRUCTION (14th edition)

DL-2 LIVE DESIGN LOADS

TYPICAL GROUND FLOOR	100	PSF
TYPICAL ROOF	20	PSF

DL-3 DEAD DESIGN LOADS
ROOF

ROOFING/INSULATION	12	PSF
COLLATERAL	5	PSF
CEILINGS	3	PSF
SPRINKLERS	4	PSF

NOTES:
1. COLLATERAL LOAD INCLUDES LIGHTING, DUCTWORK, MISC FRAMING

DL-4 WIND DESIGN LOADS

WIND RISK CATEGORY	III
ULTIMATE WIND SPEED Vult	120 mph
NOMINAL DESIGN WIN SPEED Vasd	93 mph
10 YEAR MEAN RECURRENCE WIND SPEED	76 mph
WIND EXPOSURE CLASSIFICATION	C
DIRECTIONALITY FACTOR, Kd	0.85

SEE COMPONENTS & CLADDING WIND PRESSURE NOTES FOR WIND DESIGN INFORMATION NOT INCLUDED IN THIS SECTION.

DL-5 SEISMIC DESIGN LOADS

SEISMIC RISK CATEGORY	III
SEISMIC IMPORTANCE FACTOR	1.25
SITE CLASS	C
SEISMIC DESIGN CATEGORY	A

BASIC SEISMIC FORCE RESISTING SYSTEM - STRUCTURAL STEEL SYSTEM NOT SPECIFICALLY DETAILED FOR SEISMIC RESISTANCE.

RESPONSE MODIFICATION FACTOR R	3.0
SEISMIC RESPONSE COEFFICIENT	0.1
DESIGN BASE SHEAR	0.1W
ANAYLSIS PROCEDURE	ASCE 7-16

DL-6 MECHANICAL UNIT WEIGHTS INDICATED ON THE DRAWINGS ARE ASSUMED. NOTIFY ENGINEER OF DEVIATIONS IN WEIGHT OR LOCATION.

DEFERRRED DESIGN SUBMITTAL:

DD-1 SUBMITTALS LISTED IN DD-2 ARE TO BE DESIGNED, DETAILED, SIGNED AND SEALED BY A LICENSED PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF TEXAS. SEE PLANS AND SPECIFICATIONS FOR DESIGN REQUIREMENTS OF THESE ELEMENTS.

DD-2

ITEM	RESPONSIBLE FOR INSPECTION
o STEEL ROOF JOIST	SPECIAL INSPECTOR
o PRE-ENGINEERED CANOPIES	SPECIAL INSPECTOR
o LIGHT GAGE STRUCTURAL METAL STUDS	SPECIAL INSPECTOR

BUILDING PAD PREPARATION:

THE PROJECT GEOTECHNICAL REPORT AND ANY ADDENDUMS WERE USED IN THE DESIGN. THE GENERAL CONTRACTOR SHALL OBTAIN A COPY OF THIS INFORMATION AND BECOME FAMILIAR PRIOR TO THE BEGINNING OF ANY FOUNDATION WORK.

REPORT BY:	FUGRO CONSULTANTS LP
REPORT DATE:	SEPTEMBER 23, 2004
REPORT NUMBER:	0704-1252

UF-1 PROVIDE TEMPORARY PROVISION FOR DRAINAGE OF THE BUILDING PAD AREA DURING CONSTRUCTION AND PERMANENT DRAINAGE AWAY FROM BUILDING AFTER CONSTRUCTION.

UF-2 AT THE ENTIRE AREA OCCUPIED BY THE BUILDING REMOVE ANY VEGETATION, EXCAVATE TO A DEPTH OF 12 FEET BELOW FINAL SUBGRADE (BASE BID). PROOFROLL AREAS PRIOR TO PLACING ANY GRADE RAISING FILL. ANY SOFT, WET OR WEAK FILL, OR NATURAL SOILS DISCLOSED BY PROOFROLLING SHOULD BE REMOVED AND REPLACED WITH WELL-COMPACTED ON SITE SOILS. EXPOSED SUBGRADE SHALL BE RELATIVELY LEVEL. 2

ALTERNATE #5 - REMOVE TO A DEPTH OF 8 FEET BELOW FINAL SUBGRADE ELEVATION. PROVIDE ADD/DEDUCT UNIT COST FOR CUBIC YARD OF REMOVAL AND REPLACEMENT WITH ON SITE MOISTURE CONDITIONED SOIL.

UF-3 THE EXPOSED SUBGRADE SHALL BE SCARIFIED AND COMPACTED PER THE GEOTECHNICAL REPORT MENTIONED ABOVE.

UF-4 AFTER PROOFROLLING, RAISE GRADE TO 2 FEET BELOW FINAL SUBGRADE ELEVATION USING ON SITE MOISTURE CONDITIONED SOILS. CAP WITH 2 FEET OF IMPORTED SELECT FILL. 2

UF-5 PERFORM EARTHWORK DESCRIBED ABOVE BEFORE TRENCHING FOR GRADE BEAMS, MEP ITEMS, OR UTILITY LINES.

UF-6 EXCAVATE BEAM TRENCHES TO MEET PLANNED DIMENSIONS. PRIOR TO PLACEMENT OF CONCRETE, HAND COMPACT BOTTOM OF BEAM TRENCHES PER THE GEOTECHNICAL REPORT STANDING WATER SHOULD NOT BE PERMITTED IN THE BEAM TRENCHES AFTER FINAL COMPACTION AND BEFORE PLACEMENT OF CONCRETE. REMOVE LOOSE MATERIALS AND UNSUITABLE SOILS DUE TO RAINFALL OR BY DESICCATION.

UF-7 PLACE A VAPOR RETARDER WITH THE FOLLOWING REQUIREMENTS PER CONSTRUCTION DOCUMENTS:
UNDER SOIL SUPPORTED FOUNDATIONS: 15 MIL, CLASS A WITH A MAXIMUM WATER VAPOR PERMEANCE 0.009 PERMS.

PROVIDE A SMOOTH SUBGRADE TO PREVENT PROTRUSIONS THAT MAY CAUSE DAMAGE OR RUPTURE FILM. LAY FILM ON SUBGRADE INCLUDING BEAM AND FOOTING SOFFITS AND SIDES OF BEAMS AND FOOTINGS USING WIDEST PRACTICAL WIDTHS. LAP EDGES OF RETARDER A MIN. OF 6-INCHES, OR AS REQUIRED BY MANUFACTURER, WITH TOP LAP PLACED IN DIRECTION OF CONCRETE FLOW AND TAPE JOINTS. CUT FILM AROUND PIPES AND ROUGH-INS AND SEAL CUTS WITH PRESSURE SENSITIVE TAPE. 2

UF-8 AT AREAS OUTSIDE THE BUILDING LINE, SLOPE THE TOP SURFACE OF FILL A MIN. 5% FOR A DISTANCE OF 10 FEET TO MATCH FINISH GRADE SLOPE AND HOLD DOWN A MINIMUM OF 10 INCHES BELOW FINISH FLOOR LINE, GUTTER DOWNSPOUTS EXTEND AT LEAST THREE (3) FEET PAST THE EDGE OF BUILDING, UNLESS NOTED OTHERWISE ON THE CIVIL ENGINEERS CONSTRUCTION DOCUMENTS.

UF-9 THE OWNER IS TO EMPLOY AN INDEPENDENT TESTING LABORATORY TO TAKE DENSITY TESTS FOR SUBGRADE & EACH LIFT OF SELECT FILL TO MEET THE REQUIREMENTS FOR SPECIAL INSPECTIONS.

UF-10 IF UTILITY TRENCHES ARE REQUIRED, WE RECOMMEND THAT MEASURES BE TAKEN TO PROHIBIT TRANSMITTING WATER UNDER THE BUILDING PAD. REFERENCE GEOTECHNICAL REPORT OR CONTACT GEOTECHNICAL ENGINEER FOR BACKFILL REQUIREMENTS.

CONCRETE AND CONCRETE REINFORCEMENT:

CN-1 STRUCTURAL CONCRETE SHALL BE IN ACCORDANCE WITH THE CODE APPLICABLE EDITION OF "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE (ACI 318)", THE AMERICAN CONCRETE INSTITUTE.

CN-2 CONCRETE REINFORCEMENT SHALL BE NEW DOMESTIC DEFORMED BILLET STEEL, CONFORMING TO ASTM A 615, GRADE 60, EXCEPT WELDABLE REBARS ASTM A706, GR. 60, WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185, GRADE 70°

CN-3 DETAIL REINFORCING BARS AND PROVIDE BAR SUPPORTS AND SPACERS IN ACCORDANCE WITH ACI 315.

CN-4 REINFORCING SHALL BE PROPERLY CHAIRED AND TIED PER ACI 315 (SP66) AND CRSI (PLACING REINFORCING BARS) PRIOR TO PLACING CONCRETE.

CN-5 PLACEMENT OF REINFORCING STEEL SHALL BE OBSERVED BY THE OWNER'S INSPECTION AGENT PRIOR TO CONCRETE PLACEMENT UNLESS APPROVED OTHERWISE.

CN-6 CONCRETE SHALL BE NORMAL WEIGHT STONE AGGREGATE CONCRETE. PROVIDE ADMIXTURES AS REQUIRED TO IMPROVE WORKABILITY. PLASTIC CONCRETE TEMPERATURE SHALL NOT EXCEED 90 DEGREES PRIOR TO PLACEMENT. CONCRETE SHALL BE CURED FOR A MINIMUM OF 7 DAYS USING MOIST CURING PROCEDURES, OR CURING COMPOUNDS WHICH WILL NOT INTERFERE WITH THE BONDING OF FLOORING. THE FLYASH CONTENT SHALL NOT EXCEED 30% OF THE PERCENTAGE OF CEMENTITIOUS MATERIALS. IN ADDITION TO ABOVE THE CONCRETE SHALL MEET THE FOLLOWING REQUIREMENTS:

DESCRIPTION OF USE	28-DAY COMP DESIGN STRENGTH	SLUMP	MAX AGG. SIZE	MAX W/C RATIO	AIR CONTENT
DRILLED PIERS	3,000 PSI	5-7"	1-1/2"	N/A	N/A
GRADE BEAMS/FOOTINGS	3,000 PSI	3-5"	3/4"	0.50	4-6%
SLAB-ON-GRADE	3,500 PSI	3-5"	3/4"	0.50	N/A
HOUSEKEEPING SLABS	3,500 PSI	3-5"	3/4"	0.50	N/A

CN-7 PROVIDE A SET OF CYLINDERS IN ACCORDANCE WITH ASTM C 31 TO BE TAKEN BY AN INDEPENDENT TESTING LAB AT THE FREQUENCY SPECIFIED IN ACI 318 AND THE GOVERNING BUILDING CODE WITH LOCAL AMENDMENTS. COMPRESSION TEST RESULTS SHALL BE REPORTED TO THE ENGINEER WITHIN 24 HOURS.

CN-8 FORMWORK SHALL REMAIN IN PLACE AND NO SUBSEQUENT CONSTRUCTION WILL BE ALLOWED UNTIL CONCRETE HAS REACHED 75% OF DESIGN COMPRESSIVE STRENGTH.

CN-9 PORTLAND CEMENT SHALL CONFORM TO ASTM - C150, TYPE I/II.

CN-10 NO WELDING OF REINFORCING BARS OR TORCHING TO BEND REINFORCING BARS SHALL BE ALLOWED WITHOUT THE SPECIFIC APPROVAL OF THE STRUCTURAL ENGINEER.

CN-11 CONCRETE COVER SHOULD BE AS FOLLOWS:
A. FOOTINGS AND OTHER PRINCIPAL STRUCTURAL MEMBERS IN WHICH CONCRETE IS CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH - 3 INCHES.

B. WHERE CONCRETE SURFACES, AFTER REMOVAL OF FORMS, ARE EXPOSED TO WEATHER OR EARTH - 2 INCHES.

C. WHERE SURFACES ARE NOT DIRECTLY EXPOSED TO WEATHER OR EARTH:
SLAB ON GRADE (FROM TOP OF SLAB) 1 1/2 INCHES
SLABS, WALLS
No. 11 BARS AND SMALLER 3/4 INCHES
BEAMS
PRIMARY REINF., TIES, STIRRUPS, SPIRALS 1 1/2 INCHES

CN-12 MECHANICAL AND ELECTRICAL CONDUIT CAN NOT BE PLACED IN BEAMS PARALLEL TO BEAM REINFORCING. PROVIDE A MINIMUM OF 1 1/2" CLEAR BETWEEN CONDUIT AND PARALLEL REINFORCING. DO NOT "BUNDLE" CONDUITS. CONDUITS SHALL BE PLACED IN THE MIDDLE ONE THIRD OF THE SLAB THICKNESS OR BEAM DEPTH.

CN-13 SET AND BUILD INTO FORM WORK ANCHORAGE DEVICES AND OTHER EMBEDDED ITEMS REQUIRED FOR OTHER WORK THAT IS ATTACHED TO OR SUPPORTED BY CAST-IN-PLACE CONCRETE. REBAR PROJECTING FROM CONCRETE SHALL BE SECURED IN PLACE PRIOR TO PLACING CONCRETE.

CN-14 TYPICAL LAP REINFORCING IS 30 BAR DIAMETERS UNLESS NOTED OTHERWISE.

CN-15 WELDED WIRE FABRIC SPLICE LENGTH SHALL BE AT LEAST ON SPACING OF CROSSWIRES PLUS 2-INCHES BUT NO LESS THAN 6-INCHES.

CN-16 SPLICING OF REINFORCING BARS UNLESS NOTED OTHERWISE
1. TOP BARS IN BEAMS, SLABS SHALL BE SPLICED AT MIDSPAN BETWEEN SUPPORTS.
2. BOTTOMS BARS IN BEAMS, SLABS SHALL BE SPLICED AT SUPPORTS.
3. VERTICAL BARS IN PIERS SHALL NOT BE SPLICED.

CN-17 CONCRETE SHALL BE FORMED BOTH SIDES AT GRADE BEAMS WITH RETAINED VOIDS BELOW AND ANY LOCATIONS EXPOSED TO VIEW.

CN-18 FORMED VOIDS - PROVIDE RETAINED VOID SPACES BETWEEN BOTTOM OF STRUCTURAL MEMBERS AND SUBGRADE AS FOLLOWS:
GRADE BEAMS 8-INCHES (NOT REQUIRED AT FOOTINGS)

STRUCTURAL STEEL:

SS-1 STRUCTURAL STEEL SHALL CONFORM TO THE 2010 "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS" OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION, AISC 360-10.

SS-2 WELDING: CODE APPLICABLE EDITION OF THE STRUCTURAL WELDING CODE - STEEL, AMERICAN WELDING SOCIETY (AWS D1.1 AND AWS D1.3).

SS-3 VERIFY THE SIZE AND LOCATION OF ROOF OPENINGS FOR MECHANICAL AND ELECTRICAL REQUIREMENTS AND COORDINATE WITH MECHANICAL AND ELECTRICAL CONTRACTOR PRIOR TO FABRICATION OF MATERIALS.

SS-4 STEEL SHALL BE MEET THE FOLLOWING REQUIREMENTS:

WIDE FLANGES	ASTM A992 Gr. 50
OTHER ROLLED SHAPES, PLATES, BARS	ASTM A36
PIPE (Fy 35ksi)	ASTM A53 Gr. B
HOLLOW STRUCTURAL SECTIONS - HSS (Fy 46ksi)	ASTM A500 Gr. B
ERECTION BOLTS	ASTM A307
ANCHOR BOLTS	ASTM F1554 Grade 36
HIGH STRENGTH ANCHOR BOLTS	ASTM F1554 Grade 105
DEFORMED BAR ANCHORS (DBA)	ASTM A706 Grade 60

SS-5 STEEL SHALL BE CLEANED PER SSPC-SP2. STEEL SHALL BE PAINTED WITH ONE SHOP COAT OF RED OXIDE PRIMER, MINIMUM OF 1.5 MILS (DRY FILM THICKNESS). DO NOT PAINT STRUCTURAL STEEL AND ANCHOR RODS THAT ARE TO BE EMBEDDED IN CONCRETE OR TO RECEIVE FIREPROOFING.

SS-6 WELDING SHALL BE PERFORMED BY WELDERS HOLDING VALID CERTIFICATES, IN ACCORDANCE WITH SECTION 4 OF THE AWSD1.1 "STRUCTURAL WELDING CODE-STEEL", AND HAVING CURRENT EXPERIENCE IN THE TYPE OF WELDS AS SHOWN ON THE DRAWINGS. WELDS SHALL BE PERFORMED USING E70XX SERIES LOW HYDROGEN RODS. WELDS SHALL BE VISUALLY INSPECTED IN ACCORDANCE WITH SECTIONS 6.5 AND 6.9 OF THE AWSD1.1 "STRUCTURAL WELDING CODE-STEEL". VISUAL INSPECTIONS OF WELDS SHALL BE PERFORMED BY AN INDEPENDENT TESTING AGENCY. UNLESS NOTED OTHERWISE ON THE PLANS, SHOP FABRICATED OR FIELD ASSEMBLED ADJOINING STEEL MEMBERS SHALL BE CONNECTED USING CONTINUOUS, ALL AROUND/BOTH SIDES OF MEMBER FILLET WELDS IN ACCORDANCE WITH THE MINIMUM SIZE FILLET WELD BELOW. UNLESS NOTED OTHERWISE ON THE PLANS, THE CONTRACTOR MAY SHOP WELD OR FIELD WELD AT THEIR DISCRETION.

MINIMUM SIZE OF FILLET WELDS:

MATERIAL THICKNESS OF THINNER PART JOINED(IN.)	MINIMUM SIZE OF FILLET WELD(IN.)
UP TO 1/4	3/16
OVER 1/4 TO 1/2	1/4
OVER 1/2 TO 3/4	5/16
OVER 3/4	3/8

LEG DIMENSIONS OF FILLET WELDS. SINGLE PASS WELDS MUST BE USED.

SS-7 BOLTED BEAM CONNECTIONS SHALL BE SIMPLE FRAMED SHEAR CONNECTIONS USING A.S.T.M. A325N BOLTS AND SHALL BE IN ACCORDANCE WITH THE "SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH STRENGTH BOLTS." JOINT TYPES FOR SIMPLE FRAMED SHEAR CONNECTIONS SHALL BE "SNUG-TIGHTENED JOINTS" AND SHALL BE INSTALLED AND VISUALLY INSPECTED PER SECTIONS 8.1 AND 9.1 RESPECTIVELY OF THE "SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH STRENGTH BOLTS." VISUAL INSPECTION OF BOLTED CONNECTIONS SHALL BE PERFORMED BY AN INDEPENDENT TESTING AGENCY. UNLESS NOTED OTHERWISE IN THE CONSTRUCTION DOCUMENTS THE CONNECTIONS MUST BE DESIGNED TO SUPPORT ONE-HALF THE TOTAL UNIFORM LOAD CAPACITY SHOWN IN THE "MAXIMUM UNIFORM LOAD TABLES", SHOWN IN PART 3 OF THE AISC MANUAL OF STEEL CONSTRUCTION. DIRECT TENSION INDICATOR (DTI) BOLTS SHALL BE PERMITTED. THE STEEL FABRICATOR SHALL PROVIDE CONNECTION DESIGN CALCULATIONS SEALED AND SIGNED BY A REGISTERED ENGINEER LICENSED IN THE STATE OF TEXAS FOR CONNECTIONS NOT SPECIFICALLY DETAILED ON THESE STRUCTURAL DRAWINGS.

SS-8 IN FRAMED BEAM CONNECTIONS, WELDS MAY BE SUBSTITUTED FOR BOLTED CONNECTIONS IN ACCORDANCE WITH TABLE 10-2 OF THE AISC MANUAL OF STEEL CONSTRUCTION. TO OBTAIN WELDED CONNECTION IT IS RECOMMENDED SUCH CONNECTIONS BE CHOSEN FROM TABLE 10-3 OF THE AISC MANUAL OF STEEL CONSTRUCTION.

SS-9 THE CONTRACTOR SHALL REVIEW SHOP AND FIELD WELD REQUIREMENTS FOR COMPATIBILITY WITH THE CONSTRUCTION SEQUENCE. PROPOSED REVISIONS FROM SHOP TO FIELD WELDS OR FROM FIELD TO SHOP WELDS SHALL BE IDENTIFIED BY THE CONTRACTOR ON THE SHOP DRAWINGS.

SS-10 DRY PACK SHALL BE 5,000 PSI FIVE STAR NON-SHRINK GROUT OR EQUIVALENT. INSTALL DRY PACK UNDER BEARING PLATES BEFORE FRAMING MEMBER IS INSTALLED. AT COLUMNS, INSTALL DRY PACK UNDER BASE PLATES AFTER COLUMN HAS BEEN PLUMBED BUT PRIOR TO FLOOR OR ROOF INSTALLATION.

SS-11 MECHANICAL UNITS (SUCH AS A/C UNITS, HEATER UNITS, ETC.) ARE NOT TO BE HUNG FROM STRUCTURE WITHOUT THE ENGINEER'S APPROVAL, UNLESS SHOWN ON THE STRUCTURAL DRAWINGS.

SS-12 CONTRACTOR SHALL PROVIDE PROTECTION FOR EXISTING CONSTRUCTION DURING FIELD WELDING OPERATIONS. A FIRE EXTINGUISHER SHALL BE ON THE JOB SITE AND IN THE IMMEDIATE WORKING AREA OF FIELD WELDING.

SS-13 EDGE ANGLE SUPPORTS SUPPORTING ROOF DECK SHALL BE SPLICED ONLY OVER SUPPORTS.

OPEN-WEB STEEL JOISTS:

SJ-1 STEEL JOISTS AND BRIDGING SHALL CONFORM TO CODE APPLICABLE STEEL JOIST INSTITUTE SPECIFICATIONS. JOISTS AND JOIST BRIDGING SHALL BE DESIGNED TO RESIST A NET UPLIFT PRESSURE. FOR NET UPLIFT CALCULATION DEAD LOAD CONSISTS OF SELF WEIGHT OF JOIST AND DECK.

SJ-2 JOIST ERECTION PRECAUTION (OSHA REQUIREMENT) AT COLUMNS NOT FRAMED BY BEAMS IN AT LEAST TWO DIRECTIONS. THE JOIST CLOSEST TO THE COLUMN ON BOTH SIDES OF THE BEAM SHALL HAVE ITS SEAT BOLTED TO THE BEAM TO POSITIVELY STAY THE BEAM LATERALLY UNTIL THE JOIST SEAT IS WELDED.

SJ-3 TYPICAL STEEL JOIST SEAT ANCHORAGE TO BE DESIGNED BY JOIST MANUFACTURER FOR APPLICABLE FORCES.

SJ-4 STEEL JOIST DESIGN REQUIREMENTS:
A. TOTAL LOAD DEFLECTION SHALL NOT EXCEED L/240.
B. JOISTS SUPPORTING ROOF DRAIN PIPES:
DESIGN JOIST TO SUPPORT TYPICAL ROOF LOADING AND 250 LBS OF GRAVITY LOAD AT EACH ROOF DRAIN PIPE SUPPORT. SEE PLAN FOR ROOF DRAIN PIPE LOCATION. ROOF DRAIN PIPE SUPPORT SHALL NOT EXCEED 12'-0".
C. IN ADDITION OF ABOVE REQUIREMENT, DESIGN JOIST TO SUPPORT 250 LBS OF SERVICE GRAVITY LOAD AT ANY JOIST PANEL POINT TYPICAL.

SJ-5 HANGERS SUPPORTING MECHANICAL EQUIPMENT, SPRINKLER LINES, ETC., FROM THE CHORD OF STEEL JOISTS AND JOIST GIRDERS, SHALL BE LOCATED AT THE PANEL POINTS OF THE JOISTS OR THE JOIST CHORD SHALL BE REINFORCED TO SUPPORT THE ADDITIONAL LOAD. PLUMBING LINES GREATER THAN 4" DIAMETER AND BUNDLES OF PLUMBING LINES RUNNING PERPENDICULAR TO THE STEEL JOISTS SHALL BE SUPPORTED AT EVERY STEEL ROOF JOIST AND EVERY SECOND STEEL FLOOR JOIST. NO LATERAL OR VERTICAL LOADS SHALL BE APPLIED TO JOIST BRIDGING.

SJ-6 BRIDGING AND BRACING OF JOISTS SHALL BE IN PLACE PRIOR TO PLACING ANY DECKING.

SJ-7 DURING THE CONSTRUCTION PERIOD, THE CONTRACTOR SHALL PROVIDE MEANS FOR ADEQUATE DISTRIBUTION OF CONCENTRATED LOADS SO THAT THE LOAD CARRYING CAPACITY OF ANY JOIST IS NOT EXCEEDED.

SJ-8 DAMAGED JOISTS SHALL BE REPLACED. MODIFICATION OR REPAIR OF JOISTS IS NOT PERMITTED UNLESS APPROVED IN WRITING BY THE JOIST MANUFACTURER'S ENGINEER.

SJ-9 JOISTS SHALL HAVE APPROX. CAMBER IN ACCORDANCE WITH TABLE 4.6-1 FOR K-SERIES, OR TABLE 103.6-1 FOR LH AND DLH-SERIES, SJI ADAPTED STANDARD SPECIFICATIONS.

SJ-10 TYPICAL JOIST SEAT DEPTHS SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE:

K SERIES	4	INCHES
LH/DLH SERIES	6	INCHES

FLOOR SLABS:

FS-1 SOIL SUPPORTED SLABS

LOCATION	OVERALL THICKNESS	TYP SLAB REINFORCING
TYPICAL UNLESS NOTED OTHERWISE	5.0-INCHES	#3 @ 18 EACH WAY

NOTES:
1. LOCATE TYPICAL SLAB REINFORCING 2 INCHES BELOW TOP OF SLAB.
2. SAWJOINTS:
A. SUBMIT PROPOSED SAWJOINT PLAN FOR APPROVAL PRIOR TO POURING CONCRETE SLAB.
B. SAWJOINTS SHALL BE A MAXIMUM OF 15 FEET ON CENTER EACH DIRECTION.
C. SAWJOINTS SHALL BE LOCATED ON COLUMN GRID LINES WHENEVER POSSIBLE.
D. THE RATIO OF SAWJOINTS SPACING IN EACH DIRECTION SHALL BE AS SQUARE AS POSSIBLE. RATIO SHALL NOT EXCEED 1.5 TO 1.

FS-2 HOUSEKEEPING SLABS

LOCATION	THICKNESS	REINFORCING
TYPICAL UNLESS NOTED OTHERWISE	4-inches	WWF6x6-W2.9xW2.9

NOTES:
1. REINFORCEMENT SHALL BE CENTERED IN THE SLAB, UNO.
2. REFER TO MECHANICAL DRAWINGS FOR PAD LOCATIONS AND COORDINATE WITH EQUIPMENT.

METAL DECK:

MD-1 METAL ROOF DECK SHALL BE FURNISHED WITH A MINIMUM TWO SPAN CONDITION, UNLESS NOTED OR DETAILED OTHERWISE, ROOF DECK SIZE SHALL CONFORM TO THE FOLLOWING MINIMUM, MATERIAL AND SECTION PROPERTIES:
METAL ROOF DECK COATING:
G60 GALVANIZED COATING TYPICAL

MD-2 METAL ROOF DECK SCHEDULE

DECK MARK	DECK GAUGE	SDI DECK TYPE	DECK DEPTH (IN)	SHEET WIDTH (IN)	MIN Ip IN4/FT	MIN Sp IN3/FT	MIN Sn IN3/FT	MATERIAL STANDARD
RA	22	WR	1.5	36	0.155	0.186	0.192	ASTM A653 SS GR50

MD-3 METAL ROOF CONNECTION SCHEDULE

CONN @ INST MARK	CONN@ SUPPORTS (W/N)	SIDELAP SUPPORTS EDGES (IN)	REQ'D SHEAR CONN NO/SPAN	NOTES
I	36/7	6	2	1,2

NOTES:
1. REFER TO OVERALL FRAMING PLAN FOR DECK MARK AND INSTALLATION MARK AT ROOF.
2. SHEAR CAPACITY OF ROOF DIAPHRAGM CONNECTION:

DECK MARK	INST MARK	MAX DECK SPAN	DIAPHRAGM SHEAR CAPACITY
RA	I	6'-0"	328 PLF

MD-4 SUPPORTS AND PARALLEL EDGE CONNECTIONS SHALL BE 5/8 INCH PUDDLE WELDS. SIDELAP CONNECTIONS SHALL BE #10 TEK SCREWS.

MD-5 FIELD WELDING OF DECK SHALL BE IN STRICT ACCORDANCE WITH ANSI/AWS D1.3 STRUCTURAL WELDING CODE - SHEET STEEL. EACH WELDER MUST DEMONSTRATE AN ABILITY TO PRODUCE SATISFACTORY WELDS USING A PROCEDURE SUCH AS SHOWN IN THE STEEL DECK INSTITUTE MANUAL OF CONSTRUCTION WITH STEEL DECK OR AS DESCRIBED IN ANSI/AWS D1.3.

MD-6 DECK MANUFACTURER SHALL FURNISH RIDGE, VALLEY PLATES, AND FLAT PLATES AT CHANGE OF DECK DIRECTION TO PROVIDE A FINISHED SURFACE FOR THE APPLICATION OF ROOF INSULATION AND ROOF COVERING.

MD-7 PRIOR TO START OF FABRICATION, STEEL FABRICATOR SHALL PROVIDE COMPLETE ERECTION AND FABRICATION DRAWINGS SHOWING LAYOUT AND TYPES OF DECK PANELS, ANCHORAGE DETAILS, SUPPLEMENTARY FRAMING AND ACCESSORIES.

EXTERIOR NON LOAD BEARING LIGHT GAUGE COLD FORMED METAL FRAMING NOTES:

LG-1 STRUCTURAL MEMBERS SHALL BE DESIGNED IN ACCORDANCE WITH THE CODE APPLICABLE EDITION OF THE AMERICAN IRON AND STEEL INSTITUTE (AISI) "SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS".

LG-2 THE TOP TRACK OF THE STUD WALL SYSTEM SHALL BE SLIP JOINTED TO ACCOMMODATE A MINIMUM 1-INCH VERTICAL DEFLECTION OF THE STRUCTURE ABOVE.

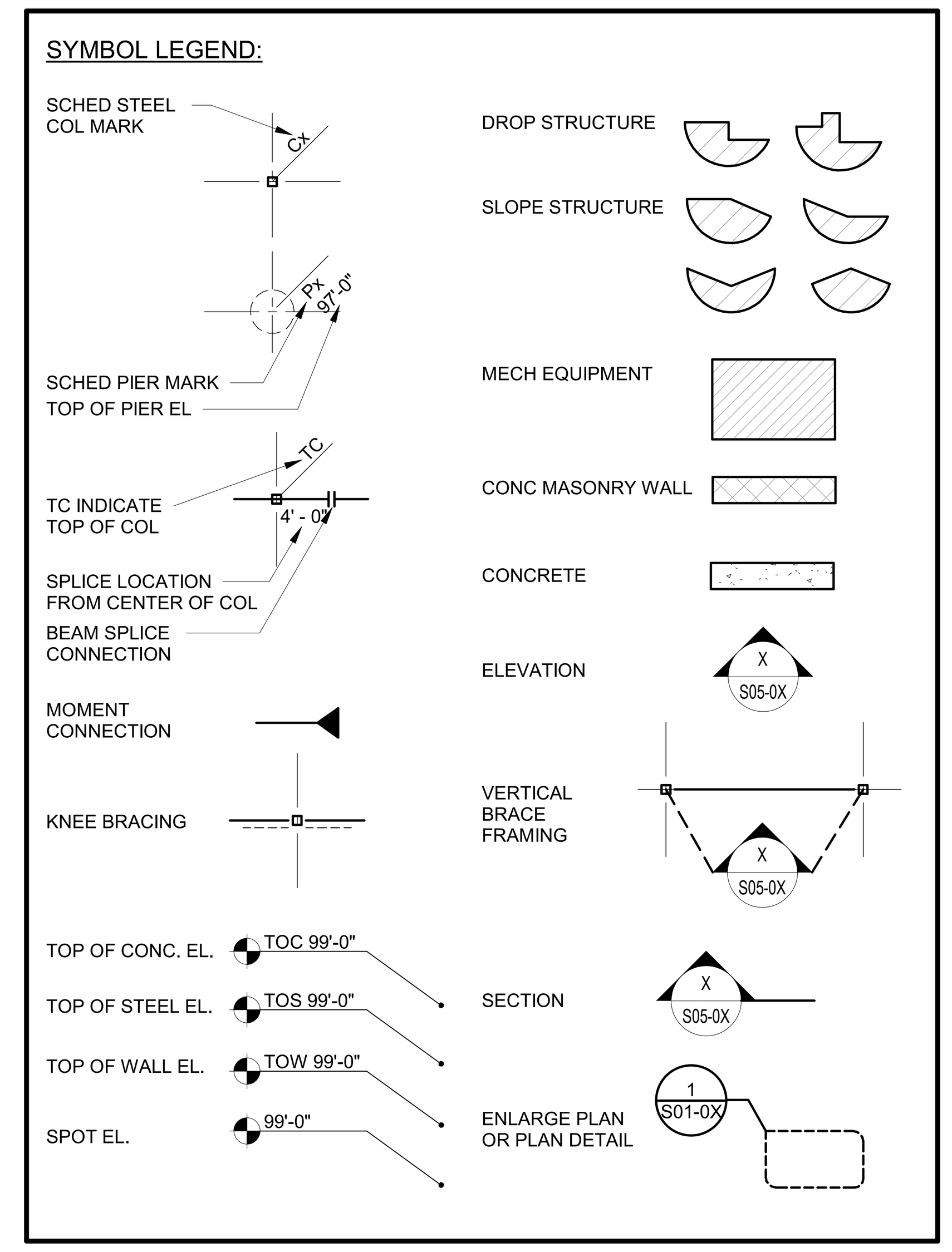
LG-3 THE EXTERIOR METAL STUD WALL FRAMING AND CONNECTIONS TO THE BUILDING SUPERSTRUCTURE SHALL BE DESIGNED BY A REGISTERED ENGINEER LICENSED IN THE STATE OF TEXAS AND HAVING THREE (3) YEARS OR MORE EXPERIENCE IN THE DESIGN OF LIGHT GAGE COLD FORMED METAL FRAMING. THE EXTERIOR METAL STUD WALL FRAMING AND CONNECTIONS TO THE BUILDING SUPERSTRUCTURE SHALL BE DESIGNED TO RESIST THEIR OWN WEIGHT, DEAD LOADING OF ATTACHED FINISHES AND CODE REQUIRED WIND LOADS. SEALED AND SIGNED SHOP DRAWINGS AND CALCULATIONS SHALL BE SUBMITTED FOR REVIEW.

LG-4 THE LATERAL DEFLECTION OF EXTERIOR METAL STUD WALL FRAMING SHALL COMPLY WITH THE FOLLOWING LIMITS:
METAL SIDING L/240
MASONRY VENEER L/600

ABBREVIATIONS

&	- AND	ICF	- INSULATED CONCRETE FORM
@	- AT	ID	- INSIDE DIAMETER
C	- CENTERLINE	IN	- INCH
°	- DEGREE	INV	- INVERTED
Ø	- DIAMETER	INT	- INTERIOR
#	- NUMBER/POUND	JST	- JOIST
AB	- ANCHOR BOLT	JT	- JOINT
AESS	- ARCHITECTURALLY EXPOSED STRUCTURAL STEEL	K	- KIP (THOUSAND POUNDS)
		L	- ANGLE
APPROX	- APPROXIMATE	LBS	- POUND
ARCH	- ARCHITECT/ARCHITECTURAL	LDH	- LONG DIMENSION HORIZONTAL
ADH	- ADHESIVE	LF	- LINEAR FOOT
ALT	- ALTERNATE	LLH	- LONG LEG HORIZONTAL
BP	- BASE PLATE	LG	- LONG
BL	- BUILDING LINE	LLV	- LONG LEG VERTICAL
BUR	- BUILT-UP ROOF	MAX	- MAXIMUM
BM	- BEAM	MECH	- MECHANICAL
BW	- BOTH WAYS	MEZZ	- MEZZANINE
BOT	- BOTTOM	MFR	- MANUFACTURER
BLDG	- BUILDING	MID	- MIDDLE
BSMT	- BASEMENT	MIN	- MINIMUM
BRG	- BEARING	MISC	- MISCELLANEOUS
BTWN	- BETWEEN	MAS	- MASONRY
CANT	- CANTILEVER	NS	- NEAR SIDE
CFMF	- COLD FORMED METAL FRAMING	NOM	- NOMINAL
CIP	- CAST-IN-PLACE	NTS	- NOT TO SCALE
CJ	- CONSTRUCTION JOINT	OC	- ON CENTER
CLG	- CEILING	OD	- OUTSIDE DIAMETER
CLR	- CLEAR	OH	- OPPOSITE HAND
CMU	- CONCRETE MASONRY UNITS	OPNG	- OPENING
COL	- COLUMN	OPP	- OPPOSITE
CONC	- CONCRETE	P/C	- PRECAST
CONN	- CONNECTION	PREFAB	- PREFABRICATED
CONST	- CONSTRUCTION	PSF	- POUND PER SQUARE FOOT
CONT	- CONTINUOUS	PSI	- POUND PER SQUARE INCH
CONTR	- CONTRACTOR	PL	- PLATE
DBA	- DEFORMED BAR ANCHOR	R	- RISER
DE	- DECK EDGE	RAD.	- RADIUS
DEMO	- DEMOLITION	RD	- ROOF DRAIN
DIA	- DIAMETER	REF	- REFERENCE
DIAG	- DIAGONAL	REINF	- REINFORCING/REINFORCED
DIM	- DIMENSION	REQD	- REQUIRED
DL	- DEAD LOAD	SPAC	- SPACES/SPACING
DBL	- DOUBLE	SCHED	- SCHEDULE
DN	- DOWN	SECT	- SECTION
DWL	- DOWEL	SHT	- SHEET/SHEATHING
DWG	- DRAWING	SIM	- SIMILAR
EA	- EACH	SPEC	- SPECIFICATION
EF	- EACH FACE	SL	- SLOPE
EJ	- EXPANSION JOINT	SSS	- STANDARD STRUCTURAL STEEL
EL/ELEV	- ELEVATION	STIFF	- STIFFENERS
EQ	- EQUAL	STIR	- STIRRUPS
EQUIP	- EQUIPMENT	SQ	- SQUARE
EW	- EACH WAY	STD	- STANDARD
EXIST	- EXISTING	STL	- STEEL
EXP	- EXPANSION	STR	- STAIR
EXT	- EXTERIOR	STRUCT	- STRUCTURE/STRUCTURAL
FDN	- FOUNDATION	SYM	- SYMMETRICAL
FD	- FLOOR DRAIN	T	- TREAD
FS	- FAR SIDE	T&B	- TOP AND BOTTOM
FIN	- FINISH	THK	- THICK/THICKNESS
FLD	- FIELD	TOC	- TOP OF CONCRETE
FLR	- FLOOR	TOJ	- TOP OF JOIST
FT	- FOOT OR FEET	TOS	- TOP OF STEEL
FTG	- FOOTING	TOW	- TOP OF WALL
GA	- GAGE	TYP	- TYPICAL
GALV	- GALVANIZED	UNO	- UNLESS NOTED OTHERWISE
GC	- GENERAL CONTRACTOR	VERT	- VERTICAL
GR	- GRADE	w/	- WITH
HK	- HOOK	WP	- WORK POINT
HORIZ	- HORIZONTAL	WWF	- WELDED WIRE FABRIC
HCA	- HEADED CONCRETE ANCHOR	WWM	- WELDED WIRE MESH
HS	- HIGH STRENGTH		
HSA	- HEADED STUD ANCHOR		

SYMBOL LEGEND:



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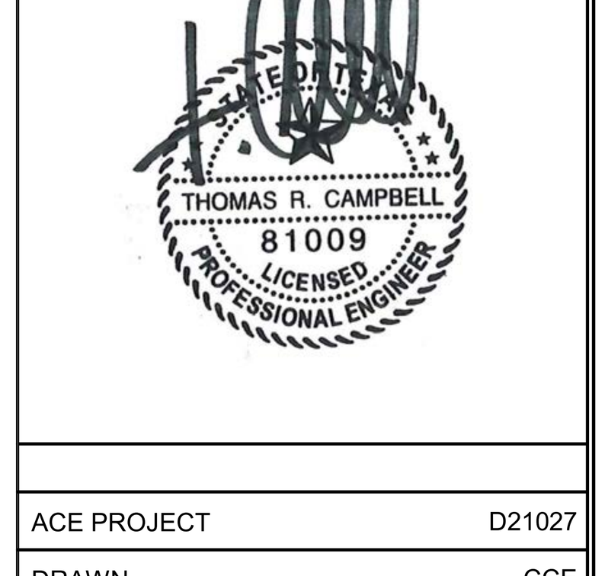

ACE PROJECT	D21027
DRAWN	CCE
DESIGNED	CCE
CHECKED	TC
DATE	Issue Date

Revisions

	Revision Date	Revision
1	10/18/2021	ADDENDUM #2
2	10/27/2021	ADDENDUM #3

DRAWING TITLE
STRUCTURAL NOTES

SHEET NUMBER
S-101

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STATE OF TEXAS — NATHAN P. HART — 93906 — LICENSED PROFESSIONAL ENGINEER — 10/27/21

GENERAL SITE NOTES:

1. EXTEND STORM DRAIN, SANITARY SEWER, DOMESTIC WATER, AND FIRE MAIN PIPING FROM LOCATIONS SHOWN ON THE SITE AS REQUIRED, AND CONNECT TO STUB-OUTS SHOWN ON CIVIL ENGINEERING DRAWINGS.
2. CONTRACTOR SHALL BACK FILL ALL TRENCHES WITH NATIVE SOILS WHERE ALL PIPES AND CONDUITS PASS UNDER EXTERIOR GRADE BEAMS. NATIVE SOIL BACK FILL SHALL EXTEND TO 2'-0" ON EITHER SIDE OF THE GRADE BEAM. REFER TO THE GEOTECHNICAL REPORT FOR THE DEFINITION AND REQUIREMENTS FOR NATIVE SOILS.
3. ALL UNDERGROUND AND ABOVE GRADE ELECTRICAL INSTALLATIONS SHOWN ON THE SITE SHALL BE WEATHERPROOF.
4. ALL EXISTING SITE UTILITIES SHALL BE FLAGGED AND MARKED PRIOR TO CONSTRUCTION. THESE FLAGS SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION. ALL UTILITIES ARE TO REMAIN ACTIVE UNLESS NOTED OTHERWISE IN THE CONSTRUCTION DOCUMENTS.
5. USE LONG RADIUS BENDS FOR ALL OFFSETS IN ELECTRICAL AND TELECOMMUNICATION LINES SHOWN.

NOTES BY SYMBOL '◯':

(1) APPROXIMATE ROUTING OF EXISTING UNDERGROUND FEEDER BELIEVED TO BE SERVING THE EXISTING CONCESSION BUILDING AS INDICATED. REFER TO CIVIL DRAWINGS. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY EXISTING FEEDER AT THE START OF CONSTRUCTION. ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE ALL EXISTING CONDUCTORS BACK TO SOURCE.

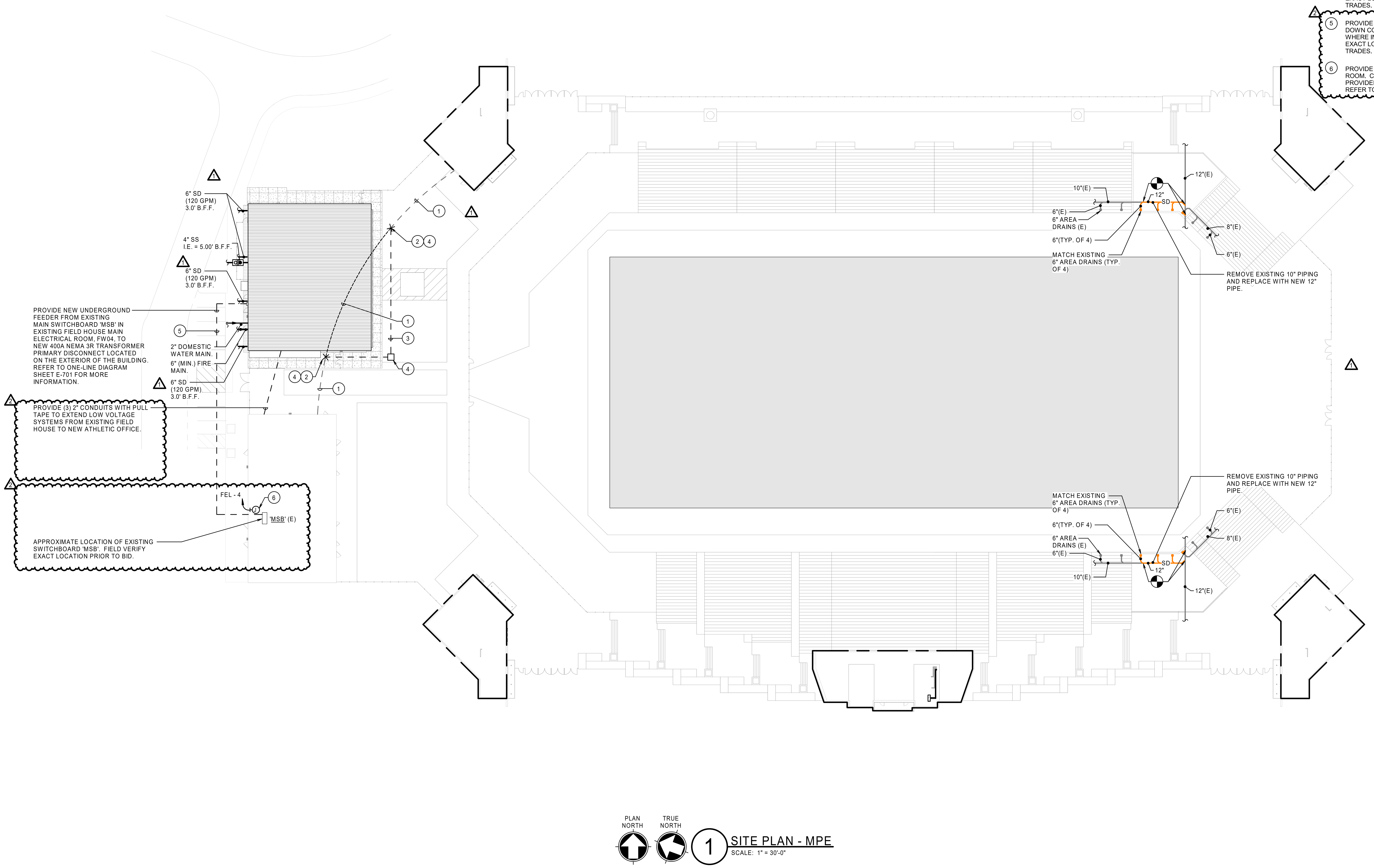
(2) 'X' DENOTES THE APPROXIMATE POINT OF INTERCEPTION OF THE EXISTING CONDUIT. ELECTRICAL CONTRACTOR SHALL INTERCEPT EXISTING CONDUIT AT THIS POINT AND REMOVE ALL CONDUIT BETWEEN THE TWO POINTS. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY AND DETERMINE EXACT POINT OF INTERCEPTION.

(3) FROM POINT OF INTERCEPTION ELECTRICAL CONTRACTOR SHALL EXTEND EXISTING BURIED CONDUIT SO THAT THE RELOCATED FEEDER RUNS OUTSIDE OF THE CONSTRUCTION AREA (AS INDICATED) AND DOES NOT CONFLICT WITH NEW WORK. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY AND DETERMINE EXACT PATH OF NEW CONDUIT. COORDINATE REROUTE WITH ALL OTHER TRADES. PROVIDE NEW UNDERGROUND PULL BOXES AS SHOWN. PROVIDE NEW CONDUCTORS TO RECONNECT EXISTING ELECTRICAL EQUIPMENT. NEW CONDUCTORS SHALL MATCH EXISTING CONDUCTORS.

(4) PROVIDE THREE (3) GROUND-MOUNTED ELECTRICAL PULL-BOXES WITH BOLT DOWN COVER. PROVIDE PULL-BOX AT BOTH POINTS OF INTERCEPTION AND WHERE INDICATED. ELECTRICAL CONTRACTOR SHALL COORDINATE THE EXACT LOCATION OF THESE PULL-BOXES WITH ALL EXISTING AND OTHER TRADES.

(5) PROVIDE THREE (3) GROUND-MOUNTED ELECTRICAL PULL-BOXES WITH BOLT DOWN COVER. PROVIDE PULL-BOX AT BOTH POINTS OF INTERCEPTION AND WHERE INDICATED. ELECTRICAL CONTRACTOR SHALL COORDINATE THE EXACT LOCATION OF THESE PULL-BOXES WITH ALL EXISTING AND OTHER TRADES.

(6) PROVIDE 120V POWER FOR EMS SYSTEM IN FIELDHOUSE MAIN ELECTRICAL ROOM. COORDINATE EXACT ELECTRICAL REQUIREMENTS WITH EMS SYSTEM PROVIDER. EMS SYSTEM CONDUIT TO UNITS BY EMS SYSTEM INSTALLER. REFER TO MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.



1 SITE PLAN - MPE
SCALE: 1" = 30'-0"

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OWP PROJECT NO.	DATE OF ISSUE
2021-154-00	10.07.2021

REVISIONS

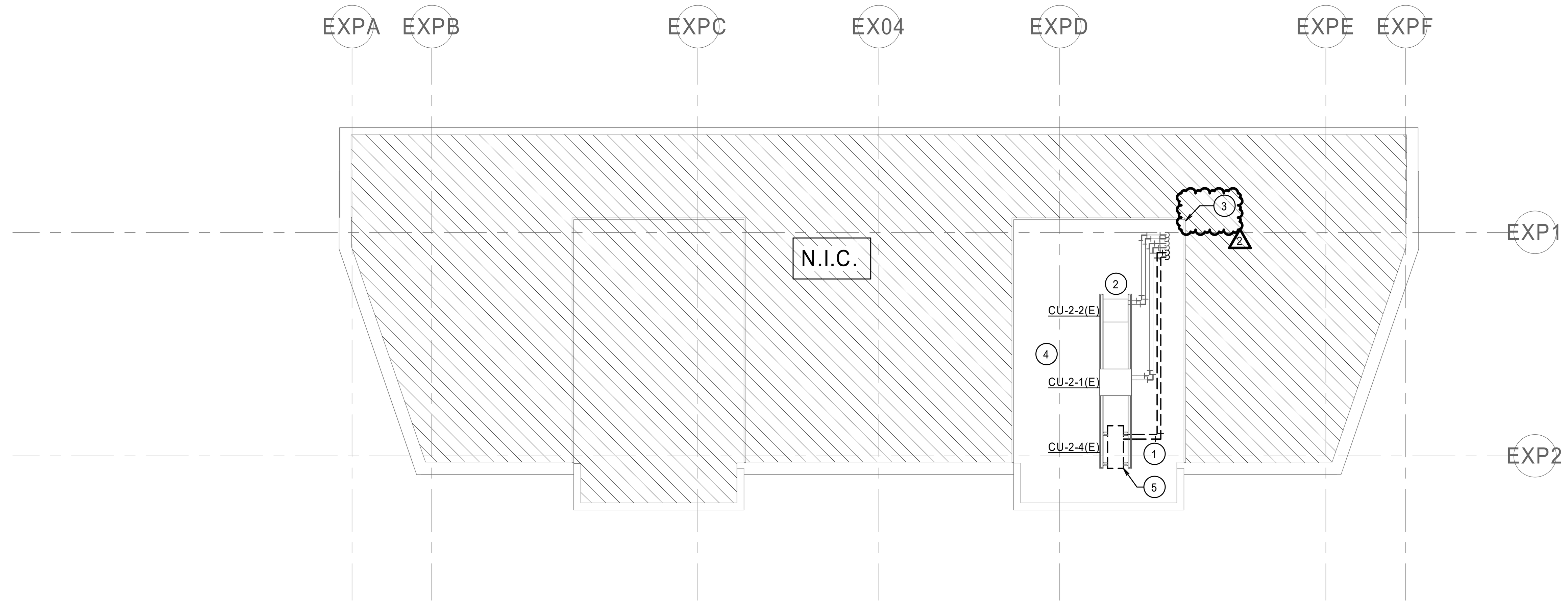
DELTA	DESCRIPTION	DATE
1	ADDENDUM 02	10/18/2021
2	ADDENDUM 03	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	RWB

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
SITE PLAN - MPE

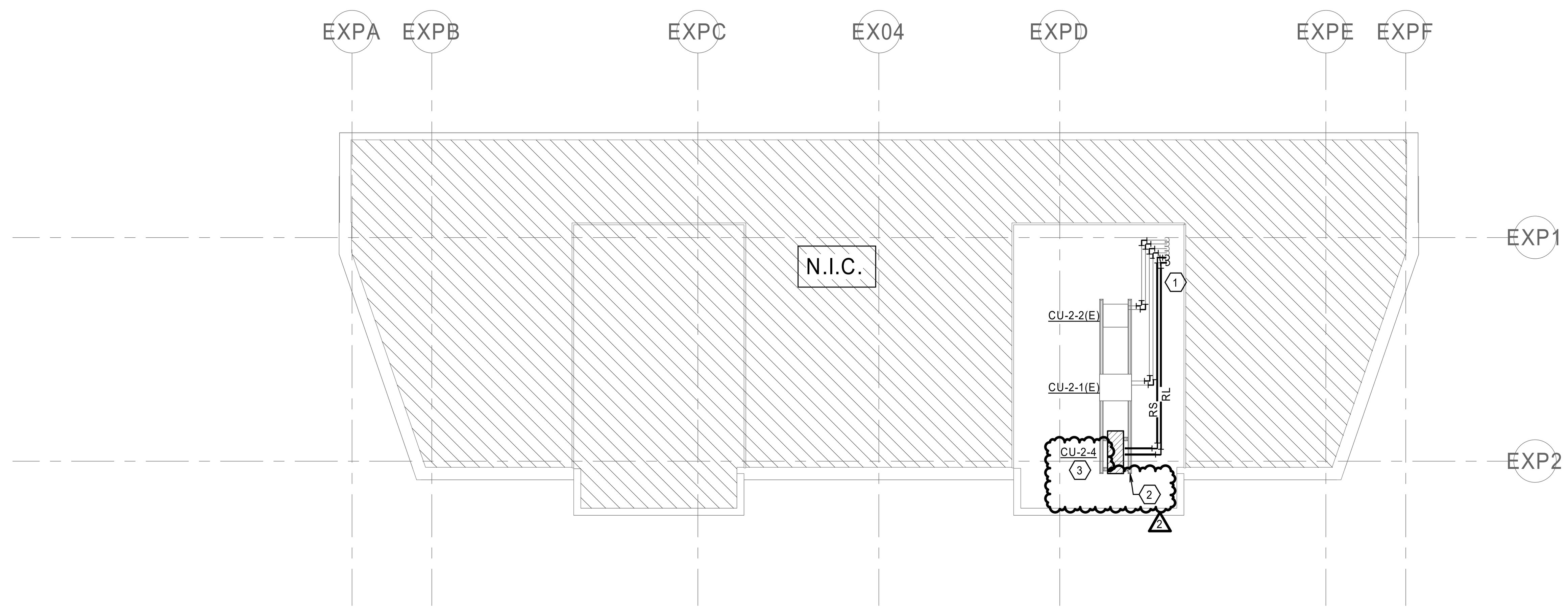
SHEET NO.
MPE-102



PLAN NORTH TRUE NORTH

2 ROOF PLAN - DEMOLITION PRESS BOX - MPE

SCALE: 1/8" = 1'-0"



PLAN NORTH TRUE NORTH

1 ROOF PLAN - PRESS BOX - MPE

SCALE: 1/8" = 1'-0"

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GENERAL ROOF DEMOLITION NOTES:

1. THE INFORMATION ON THE DEMOLITION DRAWINGS ARE NOT FROM "AS-BUILT" DRAWINGS BUT FROM ORIGINAL DRAWINGS. THIS INFORMATION IS INCLUDED FOR REFERENCE ONLY. CONTRACTOR WILL BE RESPONSIBLE FOR VISITING THE SITE PRIOR TO SUBMITTING A BID TO DETERMINE THE AMOUNT OF WORK THAT WILL BE REQUIRED. CONTRACTOR SHALL EXAMINE THE EXISTING BUILDING AND GENERALLY VERIFY THE LOCATION OF ALL EXISTING WORK AND BECOME INFORMED AS TO THE RELATION TO, AND EFFECT ON, THE WORK REQUIRED BEFORE SUBMITTING A BID. SUBMISSION OF A BID WILL CONSTITUTE EVIDENCE THAT THE CONTRACTOR HAS INSPECTED THE SITE OF THE PROPOSED WORK.

2. EXISTING MPE ITEMS TO BE REMOVED SHALL BE RETURNED TO THE OWNER OR DISPOSED OF AS DIRECTED BY THE DESIGNATED OWNER'S REPRESENTATIVE.

3. COORDINATE DEMOLITION WORK WITH THE BUILDING MAINTENANCE PERSONNEL AND OTHER TRADES PERFORMING WORK IN THE BUILDING PRIOR TO THE REMOVAL OF ANY ITEMS OF EQUIPMENT OR SYSTEMS THAT WILL EFFECT OTHER SYSTEMS WITHIN THE LIMIT OF NEW CONSTRUCTION OR OTHER AREAS OF THE BUILDING. THE BUILDING WILL BE OCCUPIED DURING CONSTRUCTION; AND, THEREFORE, UTILITIES MUST REMAIN IN OPERATION AT ALL TIMES. ANY REQUIRED OUTAGES MUST BE COORDINATED WITH THE OWNER.

4. PRIOR TO THE REMOVAL OF ANY MPE ITEMS OR EQUIPMENT, CONTRACTOR MUST VERIFY THE ORIGIN AND TERMINATION OF THOSE SYSTEMS AND CONFIRM THAT THE ITEMS BEING REMOVED DO NOT SERVE ANY ITEMS THAT ARE TO REMAIN (INCLUDING THOSE IN AREAS OUTSIDE THE CONTRACT LIMITS).

5. CONTRACTOR SHALL CONTACT CONTROLS SYSTEM INSTALLER BEFORE ANY DEMOLITION WORK IS STARTED TO ALLOW THEM TO TAG & IDENTIFY ITEMS TO REMAIN AND BE PROTECTED AND ITEMS TO BE REMOVED.

6. DO NOT ABANDON ANY ITEMS IN PLACE, REMOVE ALL COMPONENTS ASSOCIATED WITH EACH ITEM CALLED OUT TO BE REMOVED. WHERE ITEMS ARE REMOVED PATCH/REPLACE ROOF, WALLS, CEILING OR FLOOR, AS APPLICABLE, TO MATCH EXISTING FINISHES, WHERE NEW FINISHES ARE CALLED FOR PATCHING SHALL MATCH THE NEW FINISH.

7. REMOVE ELECTRICAL CONNECTIONS TO EXISTING MECHANICAL AND PLUMBING EQUIPMENT BEING REMOVED.

8. CONTRACTOR SHALL COORDINATE REMOVAL OF EXISTING UNITS WITH THE DISTRICT, ALLOWING THE DISTRICT TO REMOVE ANY EXISTING UNIT COMPONENTS FOR SPARE STOCK.

9. FEEDERS OR BRANCH CIRCUIT ELECTRICAL CONNECTIONS TO EXISTING MECHANICAL AND PLUMBING EQUIPMENT BEING REMOVED ARE TO BE DISCONNECTED AND REMOVED BACK SOURCE. WHERE CIRCUITS ARE RE-USED PROVIDE NEW DISCONNECT SWITCHES OR CIRCUIT BREAKERS FOR NEW EQUIPMENT AS INDICATED ON PLANS.

10. EXISTING 120V ROOFTOP RECEPTACLE BRANCH CIRCUIT SHALL REMAIN FOR REUSE WITH NEW WEATHERPROOF COVERED GFCI ROOFTOP RECEPTACLES WHEREVER APPLICABLE.

11. CONTRACTOR SHALL CAPTURE ALL EXISTING R-22 REFRIGERANT FROM ALL EQUIPMENT REMOVED AND PROVIDE TO DISTRICT IN STANDARD SIZE REFRIGERANT CONTAINERS. DISTRICT TO PROVIDE CONTAINERS FOR CONTRACTORS TO USE AND DISTRICT TO FILTER.

2

DEMOLITION NOTES BY SYMBOL '◯':

2

1. EXISTING CONDENSING UNIT AND ASSOCIATED REFRIGERANT PIPING TO BE REMOVED AND REPLACED WITH NEW. REFER TO PLAN '01' ON THIS SHEET FOR DETAILS. REMOVE EXISTING ELECTRICAL AND RE-INSTALL AS NEEDED.
2. EXISTING CONDENSING UNIT AND ASSOCIATED REFRIGERANT PIPING TO REMAIN AND BE RE-USED.
3. EXISTING SCREEN ENCLOSURE TO REMIAN AND BE RE-USED. CONTRACTOR TO PROTECT EXISTING ENCLOSURE THROUGHOUT CONSTRUCTION. (2)
4. ELECTRICAL CONTRACTOR TO COORDINATE ANY ELECTRICAL REQUIREMENTS IN THIS SPACE WITH MECHANICAL CONTRACTOR PRIOR TO DEMOLITION WORK. (1)
5. DISCONNECT EXISTING ELECTRICAL FEEDER TO EXISTING CONDENSING UNIT ON ROOF. ELECTRICAL FEEDER IS TO BE REUSED. PREPARE CONDUIT AND CONDUCTORS FOR EXTENSION TO NEW UNIT'S ELECTRICAL TERMINATION POINT. (2)

GENERAL MECHANICAL ROOF NOTES:

1. ALL ROOF PENETRATIONS SHALL BE MADE WATERTIGHT AND BE AS RECOMMENDED BY THE ROOF SYSTEM MANUFACTURER. REFER TO ARCHITECTURAL AND ROOFING SYSTEM CONSULTANT DRAWINGS.

2. LOCATE EQUIPMENT ON ROOF IN GENERAL LOCATIONS SHOWN.

3. MAINTAIN A MINIMUM OF 10'-0" CLEARANCE FROM PLUMBING VENTS AND EXHAUST FANS AND OUTSIDE AIR INTAKES.

4. COORDINATE ALL WORK WITH EXISTING STRUCTURAL AND ROOFING SYSTEMS INSTALLED TO INCLUDE SUPPORTS FOR EQUIPMENT.

5. ALL OUTDOOR ELECTRICAL DISCONNECT SWITCHES SHALL BE WEATHERPROOF.

NOTES BY SYMBOL '⬡':

2

1. NEW RS & RL REFRIGERANT PIPING DOWN THROUGH THE ROOF. RE-USE EXISTING OPENINGS. PATCH, REPAIR AND SEAL ROOF WATER THIGHT. PROVIDE NEW DOG HOUSE COVER AS REQUIRED FOR PIPING. PIPING TO BE SUPPORED FROM EXISTING STRUCURAL SUPPORTS FOR CONDENSING UNITS OR PROVIDED WITH REFRIGERANT PIPIE SUPPORTS. PROVIDE ALLUMINUM JACKETING ONALL NEW REFRIGERANT PIPING EXPOSED ON ROOF.
2. UNIT TO BE MOUNTED ON EXISTING STRUCTURAL SUPPORTS. REMOVE AND RE-INSTALL SUPPORTS AS NEEDED TO ALLOW FOR EXACT UNIT SUPPORT SPACING REQUIREMENTS.
3. RECONNECT EXISTING ELECTRICAL FEEDER (WHICH USED TO SERVE OLD UNIT) TO NEW ROOF UNIT. COORDINATE EXACT ELECTRICAL REQUIREMENTS WITH EQUIPMENT PROVIDER. EXTEND FEEDER TO ELECTRICAL TERMINATION AS REQUIRED..

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OWP PROJECT NO.	DATE OF ISSUE
2021-154-00	10.07.2021

REVISIONS

DELTA	DESCRIPTION	DATE
1	ADDENDUM 02	10/18/2021
2	ADDENDUM 03	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	RWB

PROJECT PHASE

CONSTRUCTION DOCUMENTS

SHEET CONTENTS

ROOF PLAN - PRESS BOX - MPE

SHEET NO.

MPE-104

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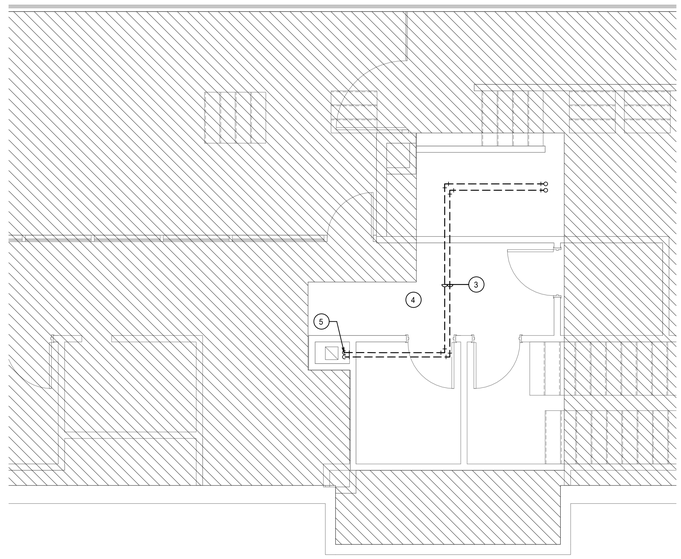
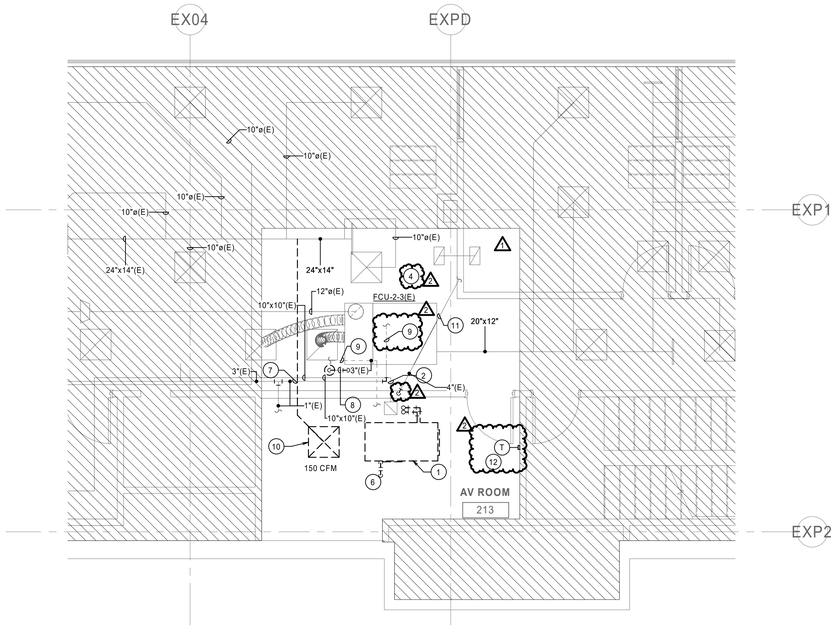


PLAN NORTH TRUE NORTH

2 DEMOLITION FLOOR PLAN - LEVEL 3 - MECHANICAL
SCALE: 1/4" = 1'-0"

NO MECHANICAL SCOPE IN HATCHED AREA.



PLAN NORTH TRUE NORTH

1 DEMOLITION FLOOR PLAN - LEVEL 2 - MECHANICAL
SCALE: 1/4" = 1'-0"

GENERAL MECHANICAL DEMOLITION NOTES:

1. THE INFORMATION ON THE DEMOLITION DRAWINGS ARE NOT FROM "AS-BUILT" DRAWINGS BUT FROM ORIGINAL DRAWINGS. THIS INFORMATION IS INCLUDED FOR REFERENCE ONLY. CONTRACTOR WILL BE RESPONSIBLE FOR VISITING THE SITE PRIOR TO SUBMITTING A BID TO DETERMINE THE AMOUNT OF WORK THAT WILL BE REQUIRED. CONTRACTOR SHALL EXAMINE THE EXISTING BUILDING AND GENERALLY VERIFY THE LOCATION OF ALL EXISTING WORK AND BECOME INFORMED AS TO THE RELATION TO, AND EFFECT ON, THE WORK REQUIRED BEFORE SUBMITTING A BID. SUBMISSION OF A BID WILL CONSTITUTE EVIDENCE THAT THE CONTRACTOR HAS INSPECTED THE SITE OF THE PROPOSED WORK.
2. EXISTING MPE ITEMS TO BE REMOVED SHALL BE RETURNED TO THE OWNER OR DISPOSED OF AS DIRECTED BY THE DESIGNATED OWNER'S REPRESENTATIVE.
3. COORDINATE DEMOLITION WORK WITH THE BUILDING MAINTENANCE PERSONNEL AND OTHER TRADES PERFORMING WORK IN THE BUILDING PRIOR TO THE REMOVAL OF ANY ITEMS OF EQUIPMENT OR SYSTEMS THAT WILL EFFECT OTHER SYSTEMS WITHIN THE LIMIT OF NEW CONSTRUCTION OR OTHER AREAS OF THE BUILDING. THE BUILDING WILL BE OCCUPIED DURING CONSTRUCTION; AND, THEREFORE, UTILITIES MUST REMAIN IN OPERATION AT ALL TIMES. ANY REQUIRED OUTAGES MUST BE COORDINATED WITH THE OWNER.
4. PRIOR TO THE REMOVAL OF ANY MPE ITEMS OR EQUIPMENT, CONTRACTOR MUST VERIFY THE ORIGIN AND TERMINATION OF THOSE SYSTEMS AND CONFIRM THAT THE ITEMS BEING REMOVED DO NOT SERVE ANY ITEMS THAT ARE TO REMAIN (INCLUDING THOSE IN AREAS OUTSIDE THE CONTRACT LIMITS).
5. CONTRACTOR SHALL CONTACT CONTROLS SYSTEM INSTALLER BEFORE ANY DEMOLITION WORK IS STARTED TO ALLOW THEM TO TAG & IDENTIFY ITEMS TO REMAIN AND BE PROTECTED AND ITEMS TO BE REMOVED.
6. DO NOT ABANDON ANY ITEMS IN PLACE, REMOVE ALL COMPONENTS ASSOCIATED WITH EACH ITEM CALLED OUT TO BE REMOVED. WHERE ITEMS ARE REMOVED PATCH/REPLACE ROOF, WALLS, CEILING OR FLOOR, AS APPLICABLE, TO MATCH EXISTING FINISHES, WHERE NEW FINISHES ARE CALLED FOR PATCHING SHALL MATCH THE NEW FINISH.
7. REMOVE ELECTRICAL CONNECTIONS TO EXISTING MECHANICAL AND PLUMBING EQUIPMENT BEING REMOVED.
8. WHEN EXISTING TEMPERATURE SENSORS ARE REMOVED AND NOT RE-INSTALLED AT SAME LOCATION OR HEIGHT, PATCH, REPAIR AND PAINT WALL TO MATCH EXISTING FINISH. REFER TO ARCH. DWGS.
9. WHEN EXISTING DUCTS ARE REMOVED AND NOT RE-INSTALLED, PATCH, REPAIR WALLS AND FLOORS AND RETURN TO ORIGINAL RATING.
10. CLEAN EXISTING RE-USED EXHAUST AND TRANSFER GRILLES FREE OF ALL DUST AND DEBRIS.
11. ALL EXISTING SECURITY AND OTHER CEILING MTD DEVICES NOT SHOWN TO BE REPLACED, SHALL REMAIN IN OPERATION DURING CONSTRUCTION AND BE REINSTALLED AS NEEDED. TEMPORARILY SUPPORT AS NEEDED.
12. PROVIDE FLOOR PROTECTION IN ALL AREAS OF DEMOLITON AND NEW WORK THROUGHOUT THE BUILDING FROM WORK AREA TO EXTERIOR OF BUILDING. FLOOR PROTECTION TO BE THE FULL WITDTH OF ALL CORRIDORS AND OTHER SPACES. FLOORING TO BE RAM BOARD TYPE OF EQUAL.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR COVERING, PROTECTING, AND MOVING AS NEEDED EXISTING FRUNITURE TO REMAIN. COVER EXISTING WALLS WHERE NEEDED. ANY EXISISTING WALL DAMAGED IN SCOPE OF WORK RE-PAINT AND MATCH EXISTING FINISHES.
14. CONTRACTOR HALL COORDINATE ALL DEMOLITION WITH EXISTING ELECTRICAL CONDUITS, CIRCUITS, SPRINKLER PIPING, LOW VOLTAGE WIRING, AND DATA TRAYS ABOVE CEILING. 1
15. CONTRACTOR SHALL CAPTURE EXISTING REFRIGERANT FROM EXISTING EQUIPMENT REMOVED AND PROVIDE DISTRICT IN STANDARD SIZE REFRIGERANT CONTAINERS. DISTRICT TO PROVIDE CONTAINERS FOR CONTRACTORS TO USE AND DISTRICT TO FILTER.

1 NOTES BY SYMBOL '◯':

1. EXISTING CRAC UNIT AND ASSOCIATED REFRIGERANT PIPING TO BE REMOVED BACK TO VERTICAL RISER IN CHASE. REMOVE CONDENSATE PIPING BACK TO HUB DRAIN. REMOVE ANY ASSOCIATED DUCTWORK AND CONTROLS IN THEIR ENTIRETY. 2
2. EXISTING EXHAUST DUCT TO REMAIN AND BE RE-USED.
3. REFRIGERANT PIPING TO BE REMOVED FROM VERTICAL RISER BACK TO CONDENSING UNIT ON ROOF.
4. REMOVE, PROTECT, AND RE-INSTALL EXISTING CEILING TILES FOR THE REMOVAL/RE-WORK OF EXISTING DUCTWORK AND PIPING AND INSTALLATION OF NEW EQUIPMENT AND PIPING. REFER TO ARCH DRAWINGS FOR DETAILS.
5. EXISTING REFRIGERANT PIPING IN VERTICAL IN CHASE TO REMAIN AND BE RE-USED. FLUSH AND CLEAN PRIOR TO RE-USE. CAP AFTER FLUSHED AND CLEANED.
6. EXISTING HUB DRAIN ABOVE CEILING TO BE REMOVED BACK TO MAIN RISER AND CAPPED WATER TIGHT.
7. EXISTING FIRE SPRINKLER PIPING TO REMAIN AND BE RE-USED. REVISE PIPING AS NEEDED TO ACCOMMODATE NEW CRAC UNIT INSTALLATION. 2
8. EXISTING CONDENSATE PIPING ASSOCIATED WITH FCU-2-3(E) AND HUB DRAIN TO REMAIN.
9. EXISTING VENT PIPING TO REMAIN AND BE RE-USED
10. EXISTING SUPPLY DIFFUSER AND ASSOCIATED DUCT WORK TO BE REMOVED BACK TO MAIN. RE-BALANCE THE REMAINING 6 SUPPLY DIFFUSERS (EXCLUDING RESTROOM) ASSOCIATED WITH THIS UNIT TO EACH HAVE ADDITIONAL 25 CFM.
11. EXISTING ROOF DRAIN PIPING TO REMAIN.
12. EXISTING THERMOSTAT TO REMAIN AND BE REMOVED AND REPLACED WITH NEW. 2

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OWP PROJECT NO. DATE OF ISSUE
2021-154-00 10.07.2021

REVISIONS

DELTA	DESCRIPTION	DATE
1	ADDENDUM 02	10/18/2021
2	ADDENDUM 03	10/27/2021

PROJECT TEAM: ED TEXAS
DRAWN BY: RWB
PROJECT PHASE: CONSTRUCTION DOCUMENTS
SHEET CONTENTS: DEMOLITION FLOOR PLANS - PRESS BOX - HVAC
SHEET NO.: MD-123

FILE PATH: C:\Users\rfadel\Documents\21056 Midlothian ISD Stadium Add & Renov RWB v2021_1.rvt
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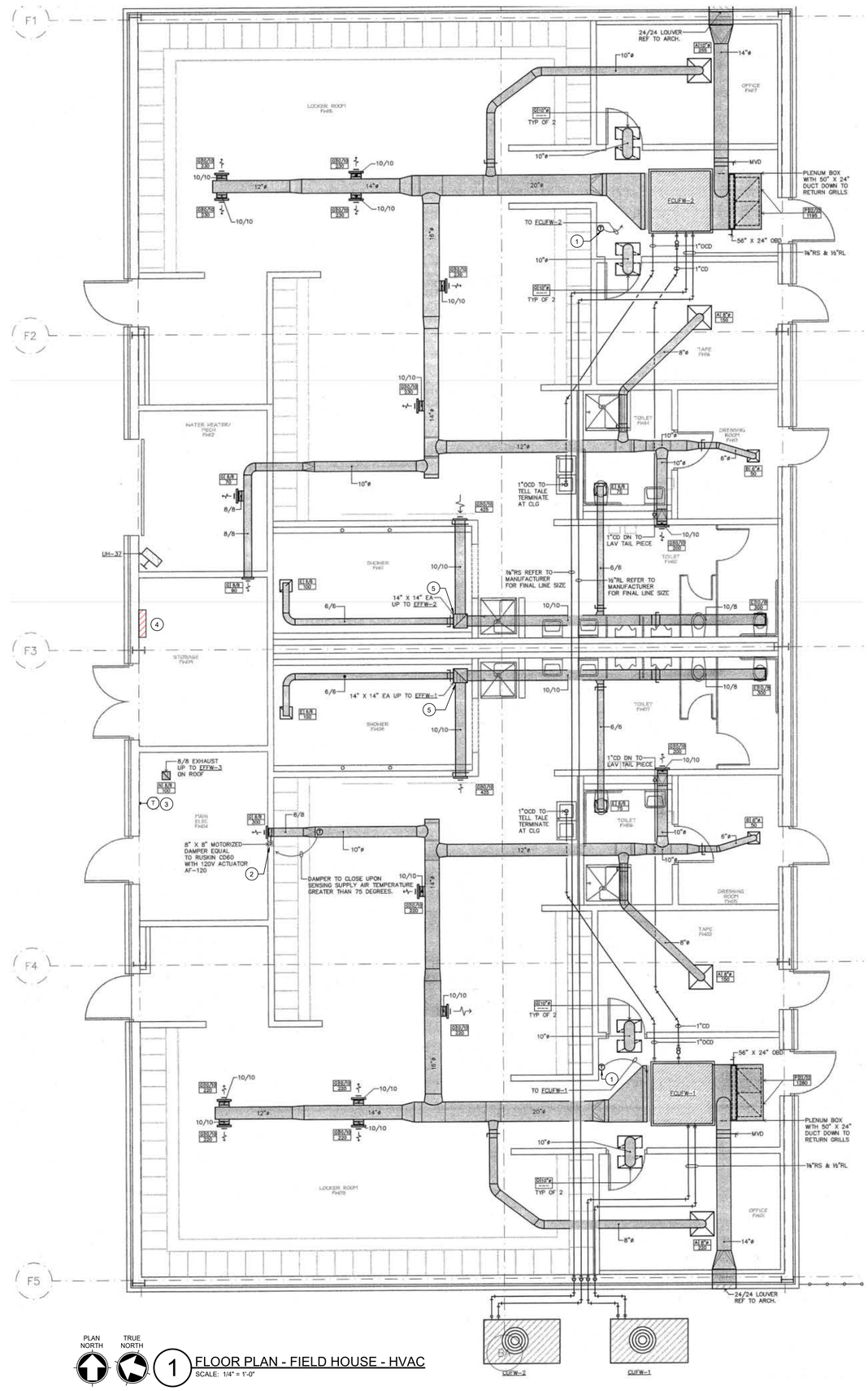
PLOT SCALE:As indicated



PLAN NORTH / TRUE NORTH

1 FLOOR PLAN - FIELD HOUSE - HVAC
SCALE: 1/4" = 1'-0"

GENERAL MECHANICAL NOTES:

1. ALL ROOF PENETRATIONS, FLASHING, ETC., SHALL BE MADE WATERTIGHT AND BE AS RECOMMENDED BY THE ROOF SYSTEM MANUFACTURER. VERIFY WITH OWNER WHAT ACCEPTABLE ROOFING SYSTEMS INSTALLER CAN BE USED.

NOTES BY SYMBOL "◯":

(1) INSTALL NEW DDC TEMPERATURE SENSOR IN PLACE OF EXISTING TEMPERATURE SENSOR. PATCH, REPAIR AND PAINT WALL AS NEEDED TO MATCH EXISTING FINISHES. NEW SENSOR TO BE MOUNTED AT MIN. 42" A.F.F.

(2) INSTALL NEW CONTROLS (TO INCLUDE NEW DUCT MOUNTED TEMPERATURE SENSOR) AND ACTUATOR FOR EXISTING MOTORIZED SUPPLY AIR DAMPER.

(3) PROVIDE NEW WALL MOUNTED TEMPERATURE SENSOR TO INTERLOCK WITH EXISTTING EXHAUST FAN. RUN EXPOSED CONDUIT ON WALL FOR CONTROL WIRING.

(4) NEW EMS CONTROL PANEL TO BE INSTALLED IN EITHER EXISTING ELEC. ROOM IF THERE IS WALL SPACE AVAIABLE OR IN STORAGE ROOM.

(5) PROVIDE NEW CONTACT FOR EXISTING EXHAUST FAN FOR EMS CONTROLS.

ALL HVAC EQUIPMENT, DUCTWORK, AND PIPING TO REMAIN. SCOPE OF WORK IN THIS BLDG. FOR HVAC LIMITED TO CONTROLS UPGRADE FROM STAND ALONE TO DDC TYPE CONTROLLED FROM MAIN EMS SYSTEM.

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2021-154-00 10.07.2021

REVISIONS

DELTA	DESCRIPTION	DATE
2	ADDENDUM 03	10/27/2021

PROJECT TEAM: ED TEXAS
DRAWN BY: Author

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
FLOOR PLAN - FIELD HOUSE - HVAC

SHEET NO.
M-104

FILE PATH: C:\Revit Local Files\2021\21056-Midlothian ISD Stadium Add & Reno-RWB-v2021_Jason.rvt
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PLOT SCALE:As indicated

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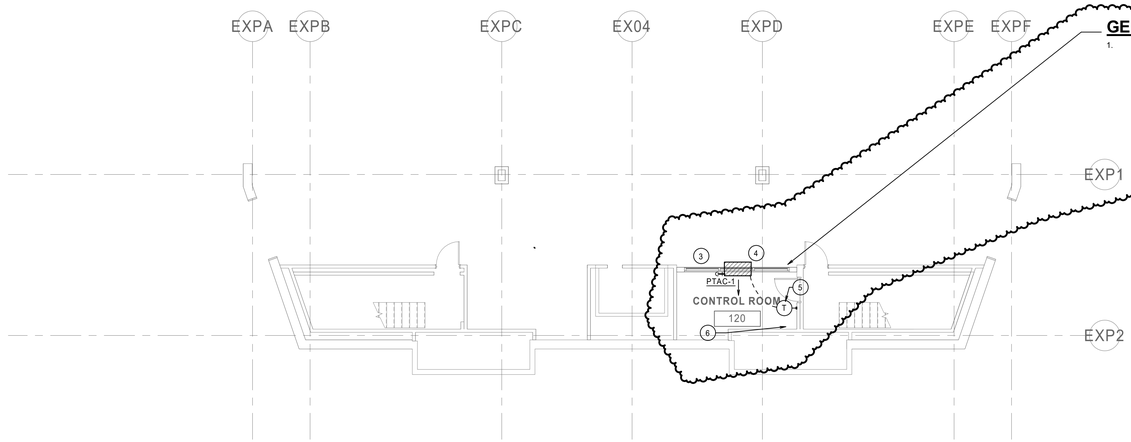


GENERAL FIRE SPRINKLER REWORK NOTE:

1. CONTRACTOR SHALL REWORK EXISTING WET SPRINKLER SYSTEM AS REQUIRED TO ACCOMMODATE AREAS OF NEW CONSTRUCTION, INCLUDING ALL AREAS OF RENOVATION, AREAS OF THE EXISTING BUILDING NOT CURRENTLY SPRINKLERED AND ADDITIONS. CONTRACTOR SHALL REWORK THE EXISTING FIRE RISER, FIRE HEADER, FIRE MAIN, DISTRIBUTION PIPING AND BRANCH PIPING AS REQUIRED IN ORDER TO ACCOMMODATE THE RENOVATED AREAS, AREAS OF NEW CONSTRUCTION AND AREAS OF THE BUILDING NOT CURRENTLY SPRINKLERED. RELOCATE AND / OR REPLACE EXISTING SPRINKER MAINS, BRANCH PIPING AND SPRINKLERS AS REQUIRED TO ACCOMMODATE CONSTRUCTION. PROVIDE NEW SPRINKLERS AS NECESSARY FOR COMPLETE COVERAGE. WHERE SPRINKLER PIPING IS REMOVED DISCONNECT & CAP ABOVE CEILING. CONTRACTOR SHALL FIELD VERIFY SCOPE OF WORK PRIOR TO BID SUBMITTAL.

GENERAL HVAC PIPING NOTES:

1. ALL RUN-OUT PIPING SHALL BE ROUTED AS GENERALLY INDICATED AND BE THE FULL SIZE SHOWN UP TO THE POINT OF CONNECTION TO THE UNIT. REDUCE AS REQUIRED UNLESS NOTED OTHERWISE.
2. SLOPE CONDENSATE DRAIN PIPING AND AUXILIARY DRAIN PIPING 1/8" PER FOOT TOWARD DRAIN. PROVIDE CLEANOUT AT MINIMUM OF EVERY 40'-0" ON CENTER AND AT ALL CHANGES IN DIRECTION.
3. ALL REFRIGERANT PIPING TO BE ROUTED APPROX. AS SHOWN AND SIZED ACCORDING TO MANUFACTURERS RECOMENDATIONS.
4. ALL CONDNSATE DRAINS ARE MINIMUM 3/4" UNLESS NOTED OTHERWISE.
5. COORDINATE ALL PIPING CONNECTIONS TO UNIT SUCH THAT NO PIPING CONNECTION SHALL CONFLICT WITH ANY UNIT ACCESS OR SERVICE CLEARANCE.
6. PIPING ABOVE CEILING SHALL BE ROUTED TIGHT TO STRUCTURE WITH ADEQUATE SPACE FOR INSULATION. COORDINATE WITH STRUCTURE, ARCHITECTURE, AND OTHER TRADES TO AVOID CONFLICTS.
7. ALL VALVES AND PIPING APPURTENANCES REQUIRING ACCESS SHALL BE INSTALLED SO THAT THEY ARE ACCESSIBLE.

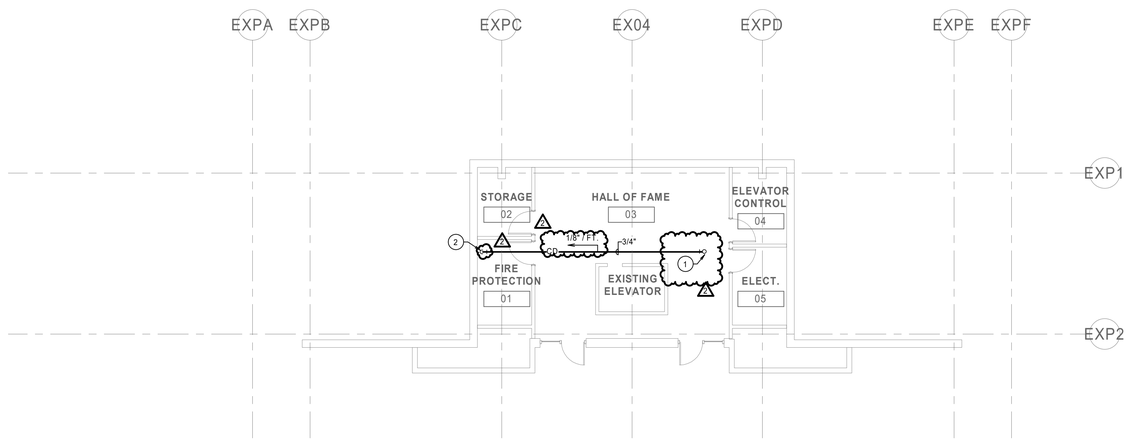
GENERAL MECHANICAL NOTES:

1. RECTANGULAR AND ROUND SUPPLY/RETURN AIR DUCTWORK IS TO BE EXTERNALLY INSULATED WITH 2" THICK ACOUSTICAL AND THERMAL WRAP TO MEET ENERGY CODE (2018 IECC) REQUIREMENTS WHERE CONCEALED ABOVE CEILING. RECTANGULAR TRANSFER AIR DUCT SHALL BE LINED WITH 1" LINER ONLY. ALL DUCTWORK EXPOSED IN MECHANICAL ROOMS AND ALL DUCTWORK WITHIN 10'-0" OF UNIT TO BE INTERNALLY LINED. PROVIDE MIN. 1 1/2" THICK INTERNAL LINER ON SUPPLY AIR DUCTWORK, 2" THICK INTERNAL LINER ON OUTSIDE AIR DUCTWORK, AND 1" THICK INTERNAL LINER ON RETURN AIR DUCTWORK. DUCTWORK SIZES SHOWN ARE NET INTERNAL AIR STREAM DIMENSIONS. SHEET METAL SIZES ARE TO BE INCREASED IN SIZE TO MAINTAIN THESE INTERNAL CLEAR DIMENSIONS. ROUND DUCTWORK IS TO BE EXTERNALLY WRAPPED WHERE CONCEALED AND INTERNALLY LINED SPIRAL SEAMED WHERE EXPOSED. FLEXIBLE ROUND DUCT SHALL HAVE A MINIMUM R-VALUE OF 6.0
2. BRANCH RUN-OUTS TO CEILING/COVE MOUNTED AIR DEVICES SHALL BE SAME SIZE AS NECK, UNLESS NOTED OTHERWISE. PROVIDE A TWIST-IN FLARED TAP WITH MANUAL VOLUME DAMPER AT MAIN DUCT TAP AND EXTENDED HANDLE AS SHOWN (REFER TO SPECIFICATIONS FOR DETAILS). EXTEND FLEXIBLE DUCTWORK A MAXIMUM OF 5'-0" FROM DIFFUSERS, INSTALL STRAIGHT AS POSSIBLE WITH LONG RADIUS BENDS WITH CLAMPS TO BE USED AT BOTH ENDS.
3. ALL DUCTWORK SHALL BE RUN CONCEALED ABOVE CEILINGS AS HIGH AS POSSIBLE & CONCEALED IN WALLS, CHASES, OR FURROUTS IN GENERAL LOCATIONS SHOWN, UNLESS NOTED OTHERWISE. THE CONTRACTOR SHALL COORDINATE WITH STRUCTURE, ARCHITECTURE, AND OTHER TRADES TO ENSURE CONFLICTS DO NOT OCCUR. ABOVE CEILING SPACE IS MINIMAL AND THE CEILINGS AND ROOF ARE VARIOUSLY SLOPED. CAUTION IS NECESSARY FOR PROPER INSTALLATION AND COORDINATION.
4. LOCATE CEILING MOUNTED AIR DEVICES APPROXIMATELY WHERE SHOWN. FOR EXACT LOCATION AND FRAME MOUNTING TYPES, REFER TO ARCHITECTURAL REFLECTED CEILING PLANS. ALL CEILING DIFFUSERS TO BE FOUR-WAY TYPE, UNLESS NOTED OTHERWISE BY AIR FLOW ARROWS ON FLOOR PLAN.
5. ALL ROOF PENETRATIONS, ROOF PIPE SUPPORTS, FLASHING, ETC., SHALL BE MADE WATERTIGHT AND BE AS RECOMMENDED BY THE ROOF SYSTEM MANUFACTURER. VERIFY WITH OWNER WHAT ACCEPTABLE ROOFING SYSTEMS INSTALLER CAN BE USED.
6. EXTEND DUCTWORK AS SHOWN THROUGH ROOF INSIDE CURB TO EACH DUCT CONNECTION TO/FROM A ROOF MOUNTED UNIT. TRANSITION TO FULL SIZE OF EQUIPMENT OPENING FROM DUCT SIZES SHOWN. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCT CONNECTIONS AT EACH ROOF MOUNTED UNIT.
7. SEAL ALL LONGITUDINAL AND TRANSVERSE DUCT JOINTS TO PREVENT DUCT AIR LEAKAGE TO INCLUDE DUCT AND ACCESSORY PENETRATIONS. DO NOT SEAL CONTROL/FIRE DAMPER CONTROL ROD PENETRATIONS. SEAL CLASS "A" REQUIRED.
8. COORDINATE EXACT LOCATIONS OF ALL TEMPERATURE, HUMIDITY, CARBON DIOXIDE, AND CARBON MONOXIDE SENSORS WITH ARCHITECT PRIOR TO INSTALLATION.
9. EXPOSED DUCTWORK SHALL BE INTERNALLY LINED AND RECEIVE A PAINT GRIP FINISH SO THAT PAINT MAY BE APPLIED IN ACCORDANCE WITH ARCHITECTURAL PLANS AND SPECIFICATIONS.
10. PROVIDE REQUIRED SERVICE CLEARANCE TO ALL ABOVE CEILING EQUIPMENT. COORDINATE LOCATION OF EQUIPMENT WITH ALL TRADES. ABOVE CEILING EQUIPMENT TO BE LOCATED AS CLOSE TO CEILING AS POSSIBLE BUT NO CLOSER THAN 6" ABOVE CEILING.
11. CONTRACTOR SHALL VERIFY WITH OWNER ON MECHANICAL EQUIPMENT TAGS AND SHALL MATCH WITH PERMANENT ROOM NUMBERS AS NEEDED PER OWNER'S DIRECTION. REFER TO ARCHITECTURAL DRAWINGS FOR ROOM NUMBERS.

PLAN NORTH / TRUE NORTH

1 FLOOR PLAN -PRESS BOX - PORCH LEVEL - HVAC

SCALE: 1/8" = 1'-0"



NOTES BY SYMBOL "◯":

1. CONDENSATE DRAIN DOWN FROM PORCH LEVEL FROM PTAC UNIT
2. 3/4" CD DOWN TO NEAREST FLOOR DRAIN, SECURE TO WALL IN VERTICAL AT THREE LOCATIONS.
3. CONDENSATE DRAIN PIPING DOWN TO LOWER LEVEL. DRAIN CONNECTION TO BE IN BOTTOM OF UNIT ON BLDG SIDE WALL. SEAL FLOOR PENETRATION WATERTIGHT
4. PROVIDE UNIT WITH CONDENSATE DRAIN KIT.
5. PROVIDE MANUFACTURER FURNISHED HARDWIRE, REMOTE THERMOSTAT CONTROL FOR PTAC UNIT. PROVIDE EMS TEMPERATURE SENSOR FOR MONITORING ONLY IN ROOM AS WELL.
6. EXISTING NON-FREEZE WALL HYDRANT TO REMAIN.

PLAN NORTH / TRUE NORTH

2 FLOOR PLAN - LEVEL 1 - PRESS BOX - HVAC

SCALE: 1/8" = 1'-0"

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PROJECT TEAM	DRAWN BY
ED TEXAS	RWB

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
FLOOR PLAN - PRESS BOX - HVAC

SHEET NO.
M-113

FILE PATH: C:\Users\nathan\Documents\21056\Midlothian ISD Stadium Add & Reno-RWB-r2021_hartRWB.rvt
DATE/TIME 10/25/2021 4:58:49 PM
PLOT SCALE 1/8" = 1'-0"

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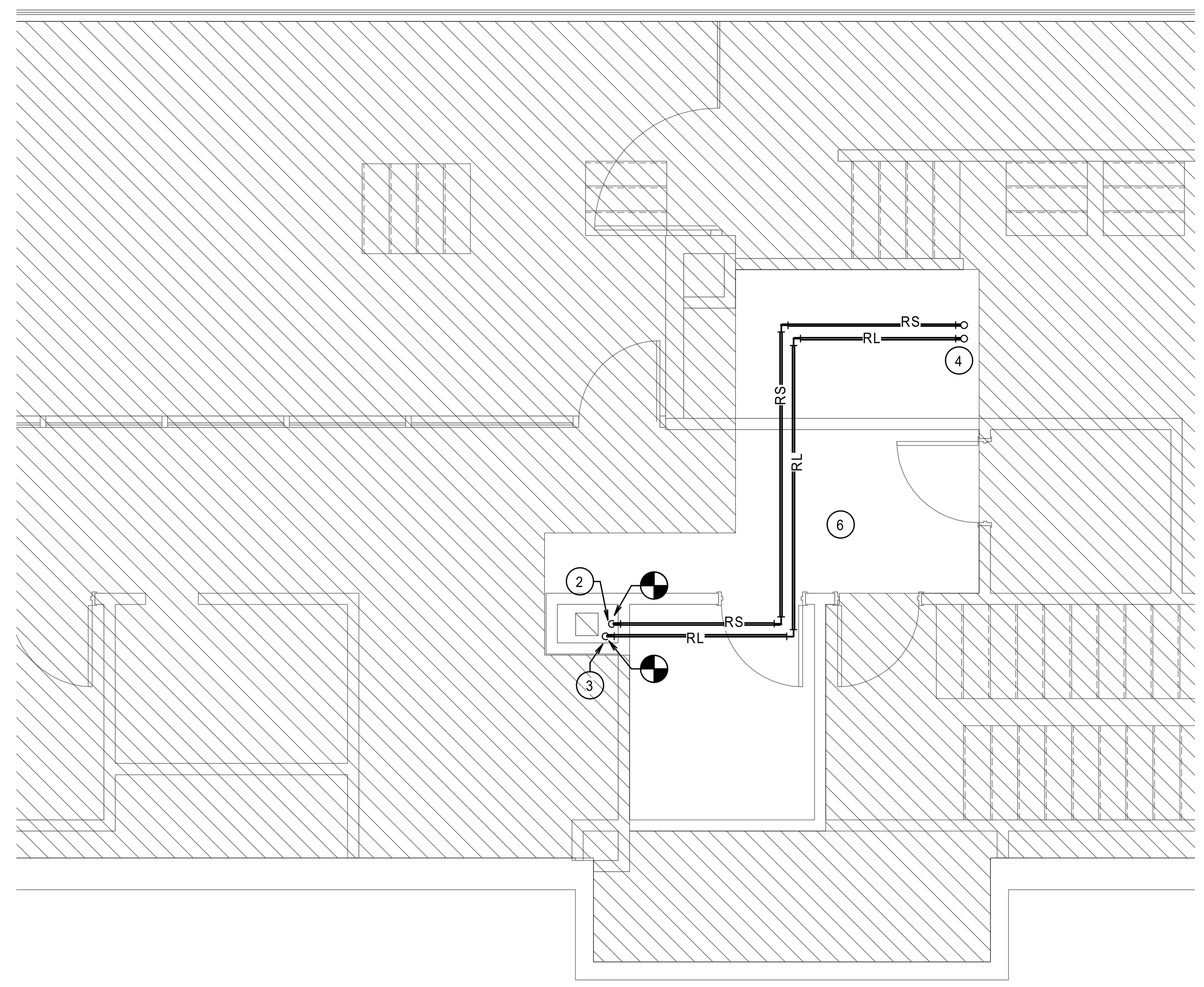
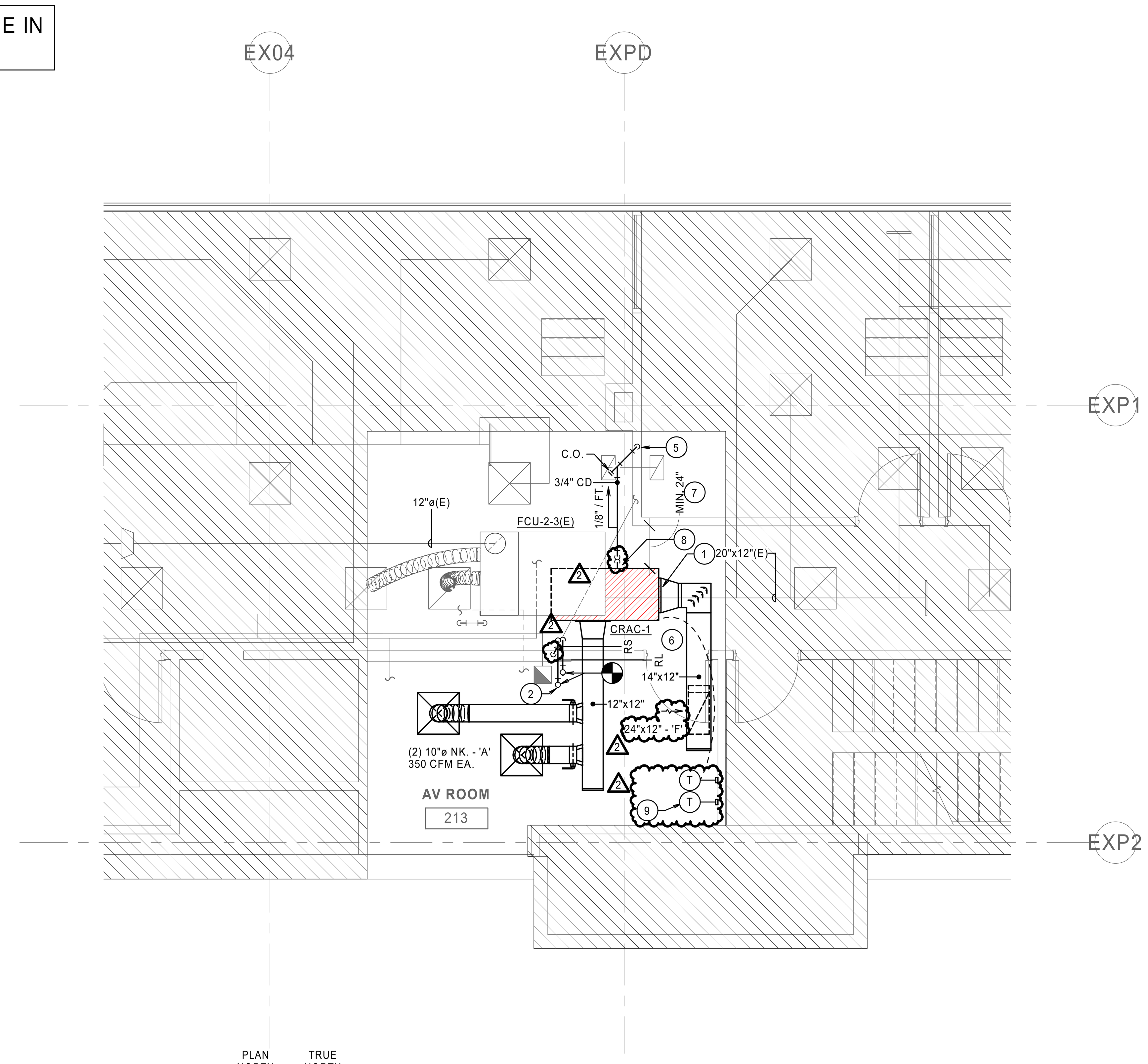


PLAN NORTH TRUE NORTH

2 FLOOR PLAN - LEVEL 3 - PRESS BOX - HVAC
SCALE: 1/4" = 1'-0"

NO MECHANICAL SCOPE IN HATCHED AREA



PLAN NORTH TRUE NORTH

1 FLOOR PLAN - LEVEL 2 - PRESS BOX - HVAC
SCALE: 1/4" = 1'-0"

GENERAL HVAC PIPING NOTES:

1. ALL RUN-OUT PIPING SHALL BE ROUTED AS GENERALLY INDICATED AND BE THE FULL SIZE SHOWN UP TO THE POINT OF CONNECTION TO THE UNIT. REDUCE AS REQUIRED UNLESS NOTED OTHERWISE.
2. SLOPE CONDENSATE DRAIN PIPING AND AUXILIARY DRAIN PIPING 1/8" PER FOOT TOWARD DRAIN. PROVIDE CLEANOUT AT MINIMUM OF EVERY 40'-0" ON CENTER AND AT ALL CHANGES IN DIRECTION.
3. ALL REFRIGERANT PIPING TO BE ROUTED APPROX. AS SHOWN AND SIZED ACCORDING TO MANUFACTURERS RECOMENDATIONS.
4. ALL CONDNSATE DRAINS ARE MINIMUM 3/4" UNLESS NOTED OTHERWISE.
5. COORDINATE ALL PIPING CONNECTIONS TO UNIT SUCH THAT NO PIPING CONNECTION SHALL CONFLICT WITH ANY UNIT ACCESS OR SERVICE CLEARANCE.
6. PIPING ABOVE CEILING SHALL BE ROUTED TIGHT TO STRUCTURE WITH ADEQUATE SPACE FOR INSULATION. COORDINATE WITH STRUCTURE, ARCHITECTURE, AND OTHER TRADES TO AVOID CONFLICTS.
7. ALL VALVES AND PIPING APPURTENANCES REQUIRING ACCESS SHALL BE INSTALLED SO THAT THEY ARE ACCESSIBLE.

GENERAL MECHANICAL NOTES:

1. RECTANGULAR AND ROUND SUPPLY/RETURN AIR DUCTWORK IS TO BE EXTERNALLY INSULATED WITH 2" THICK ACOUSTICAL AND THERMAL WRAP TO MEET ENERGY CODE (2018 IECC) REQUIREMENTS WHERE CONCEALED ABOVE CEILING. RECTANGULAR TRANSFER AIR DUCT SHALL BE LINED WITH 1" LINER ONLY. ALL DUCTWORK EXPOSED IN MECHANICAL ROOMS AND ALL DUCTWORK WITHIN 10'-0" OF UNIT TO BE INTERNALLY LINED. PROVIDE MIN. 1 1/2" THICK INTERNAL LINER ON SUPPLY AIR DUCTWORK, 2" THICK INTERNAL LINER ON OUTSIDE AIR DUCTWORK, AND 1" THICK INTERNAL LINER ON RETURN AIR DUCTWORK. DUCTWORK SIZES SHOWN ARE NET INTERNAL AIR STREAM DIMENSIONS. SHEET METAL SIZES ARE TO BE INCREASED IN SIZE TO MAINTAIN THESE INTERNAL CLEAR DIMENSIONS. ROUND DUCTWORK IS TO BE EXTERNALLY WRAPPED WHERE CONCEALED AND INTERNALLY LINED SPIRAL SEAMED WHERE EXPOSED. FLEXIBLE ROUND DUCT SHALL HAVE A MINIMUM R-VALUE OF 6.0
2. BRANCH RUN-OUTS TO CEILING/COVE MOUNTED AIR DEVICES SHALL BE SAME SIZE AS NECK, UNLESS NOTED OTHERWISE. PROVIDE A TWIST-IN FLARED TAP WITH MANUAL VOLUME DAMPER AT MAIN DUCT TAP AND EXTENDED HANDLE AS SHOWN (REFER TO SPECIFICATIONS FOR DETAILS). EXTEND FLEXIBLE DUCTWORK A MAXIMUM OF 5'-0" FROM DIFFUSERS, INSTALL STRAIGHT AS POSSIBLE WITH LONG RADIUS BENDS WITH CLAMPS TO BE USED AT BOTH ENDS.
3. ALL DUCTWORK SHALL BE RUN CONCEALED ABOVE CEILINGS AS HIGH AS POSSIBLE & CONCEALED IN WALLS, CHASES, OR FURROUTS IN GENERAL LOCATIONS SHOWN, UNLESS NOTED OTHERWISE. THE CONTRACTOR SHALL COORDINATE WITH STRUCTURE, ARCHITECTURE, AND OTHER TRADES TO ENSURE CONFLICTS DO NOT OCCUR. ABOVE CEILING SPACE IS MINIMAL AND THE CEILINGS AND ROOF ARE VARIOUSLY SLOPED. CAUTION IS NECESSARY FOR PROPER INSTALLATION AND COORDINATION.
4. LOCATE CEILING MOUNTED AIR DEVICES APPROXIMATELY WHERE SHOWN. FOR EXACT LOCATION AND FRAME MOUNTING TYPES, REFER TO ARCHITECTURAL REFLECTED CEILING PLANS. ALL CEILING DIFFUSERS TO BE FOUR-WAY TYPE, UNLESS NOTED OTHERWISE BY AIR FLOW ARROWS ON FLOOR PLAN.
5. ALL ROOF PENETRATIONS, ROOF PIPE SUPPORTS, FLASHING, ETC., SHALL BE MADE WATERTIGHT AND BE AS RECOMMENDED BY THE ROOF SYSTEM MANUFACTURER. VERIFY WITH OWNER WHAT ACCEPTABLE ROOFING SYSTEMS INSTALLER CAN BE USED.
6. EXTEND DUCTWORK AS SHOWN THROUGH ROOF INSIDE CURB TO EACH DUCT CONNECTION TO/FROM A ROOF MOUNTED UNIT. TRANSITION TO FULL SIZE OF EQUIPMENT OPENING FROM DUCT SIZES SHOWN. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCT CONNECTIONS AT EACH ROOF MOUNTED UNIT.
7. SEAL ALL LONGITUDINAL AND TRANSVERSE DUCT JOINTS TO PREVENT DUCT AIR LEAKAGE TO INCLUDE DUCT AND ACCESSORY PENETRATIONS. DO NOT SEAL CONTROL/FIRE DAMPER CONTROL ROD PENETRATIONS. SEAL CLASS "A" REQUIRED.
8. COORDINATE EXACT LOCATIONS OF ALL TEMPERATURE, HUMIDITY, CARBON DIOXIDE, AND CARBON MONOXIDE SENSORS WITH ARCHITECT PRIOR TO INSTALLATION.
9. EXPOSED DUCTWORK SHALL BE INTERNALLY LINED AND RECEIVE A PAINT GRIP FINISH SO THAT PAINT MAY BE APPLIED IN ACCORDANCE WITH ARCHITECTURAL PLANS AND SPECIFICATIONS.
10. PROVIDE REQUIRED SERVICE CLEARANCE TO ALL ABOVE CEILING EQUIPMENT. COORDINATE LOCATION OF EQUIPMENT WITH ALL TRADES. ABOVE CEILING EQUIPMENT TO BE LOCATED AS CLOSE TO CEILING AS POSSIBLE BUT NO CLOSER THAN 6" ABOVE CEILING.
11. CONTRACTOR SHALL VERIFY WITH OWNER ON MECHANICAL EQUIPMENT TAGS AND SHALL MATCH WITH PERMANENT ROOM NUMBERS AS NEEDED PER OWNER'S DIRECTION. REFER TO ARCHITECTURAL DRAWINGS FOR ROOM NUMBERS.

NOTES BY SYMBOL '○':

(1) NEW CRAC UNIT BELOW EXISTING AC UNIT. EXISTING FIRE SPRINKLER PIPING TO BE REVISED AS NEEDED TO ACCOMMODATE NEW UNIT INSTALLATION. NEW UNIT SHALL NOT BLOCK EXISTING UNIT ACCESS SECTIONS. UNIT TO BE LOCATED ABOVE EXISTING STORM DRAIN PIPING.

(2) CONNECT NEW RS & RL REFRIGERANT PIPING TO EXISTING VERTICAL PIPING RISER AT VERTICAL DROP IN EXISTING CHASE.

(3) EXISTING RS & RL REFRIGERANT PIPING DOWN TO LEVEL 2.

(4) RS & RL REFRIGERANT PIPING UP TO ROOF. RE-USE EXISTING ROOF OPENINGS. PATCH, REPAIR, SEAL WATER TIGHT AROUND THE PIPE PENETRATIONS.

(5) ROUTE CONDENSATE DRAIN PIPING INSIDE EXISTING WALL AND OUT TO TAIL PIECE OF SINK. ROUTE DOWN IN WALL TO BELOW SINK. REMOVE AND PUT BACK WALL ON PLAN EAST SIDE OF WALL. PATCH AND REPAIR TO MATCH EXISTING. REFER ARCH DRAWINGS.

(6) REMOVE, PROTECT, AND RE-INSTALL EXISTING CEILING TILES IN THE CORRIDOR TO ALLOW FOR NEW UNIT AND ASSOCIATED PIPING INSTALLATION.

(7) MIN. REQUIRED ACCESS CLEARANCE FOR NEW CRAC UNIT.

(8) CONDENSATE DRAIN WITH P-TRAP.

(9) THERMOSTAT FOR THE EMS CONTROL.

STATE OF TEXAS
NATHAN P. HART
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PROFESSIONAL ENGINEER
10/27/21

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OWP PROJECT NO.	DATE OF ISSUE
2021-154-00	10.07.2021

REVISIONS

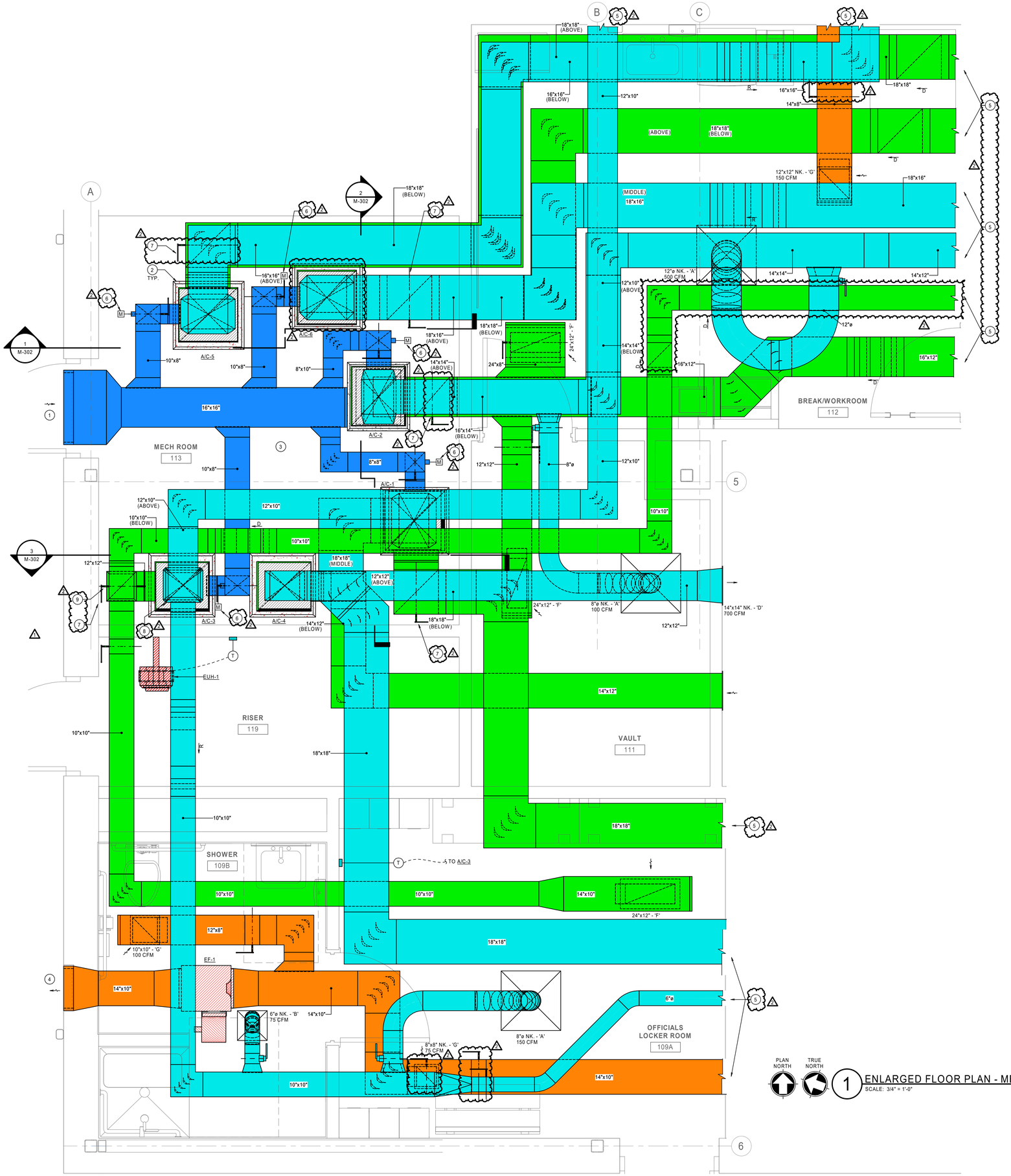
DELTA	DESCRIPTION	DATE
2	ADDENDUM 03	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	RWB

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
FLOOR PLAN - PRESS BOX - HVAC

SHEET NO.
M-123



PLAN NORTH / TRUE NORTH

1 ENLARGED FLOOR PLAN - MECHANICAL ROOM - HVAC

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

GENERAL MECHANICAL NOTES:

1. RECTANGULAR AND ROUND SUPPLY/RETURN AIR DUCTWORK IS TO BE EXTERNALLY INSULATED WITH 2" THICK ACOUSTICAL AND THERMAL WRAP TO MEET ENERGY CODE (2018 IECC) REQUIREMENTS WHERE CONCEALED ABOVE CEILING. RECTANGULAR TRANSFER AIR DUCT SHALL BE LINED WITH 1" LINER ONLY. ALL DUCTWORK EXPOSED IN MECHANICAL ROOMS AND ALL DUCTWORK WITHIN 10'-0" OF UNIT TO BE INTERNALLY LINED. PROVIDE MIN. 1 1/2" THICK INTERNAL LINER ON SUPPLY AIR DUCTWORK, 2" THICK INTERNAL LINER ON OUTSIDE AIR DUCTWORK, AND 1" THICK INTERNAL LINER ON RETURN AIR DUCTWORK. DUCTWORK SIZES SHOWN ARE NET INTERNAL AIR STREAM DIMENSIONS. SHEET METAL SIZES ARE TO BE INCREASED IN SIZE TO MAINTAIN THESE INTERNAL CLEAR DIMENSIONS. ROUND DUCTWORK IS TO BE EXTERNALLY WRAPPED WHERE CONCEALED AND INTERNALLY LINED SPIRAL SEAMED WHERE EXPOSED. FLEXIBLE ROUND DUCT SHALL HAVE A MINIMUM R-VALUE OF 6.0
2. BRANCH RUN-OUTS TO CEILING/COVE MOUNTED AIR DEVICES SHALL BE SAME SIZE AS NECK, UNLESS NOTED OTHERWISE. PROVIDE A TWIST-IN FLARED TAP WITH MANUAL VOLUME DAMPER AT MAIN DUCT TAP AND EXTENDED HANDLE AS SHOWN (REFER TO SPECIFICATIONS FOR DETAILS). EXTEND FLEXIBLE DUCTWORK A MAXIMUM OF 5'-0" FROM DIFFUSERS, INSTALL STRAIGHT AS POSSIBLE WITH LONG RADIUS BENDS WITH CLAMPS TO BE USED AT BOTH ENDS.
3. ALL DUCTWORK SHALL BE RUN CONCEALED ABOVE CEILINGS AS HIGH AS POSSIBLE & CONCEALED IN WALLS, CHASES, OR FURROUTS IN GENERAL LOCATIONS SHOWN, UNLESS NOTED OTHERWISE. THE CONTRACTOR SHALL COORDINATE WITH STRUCTURE, ARCHITECTURE, AND OTHER TRADES TO ENSURE CONFLICTS DO NOT OCCUR. ABOVE CEILING SPACE IS MINIMAL AND THE CEILINGS AND ROOF ARE VARIOUSLY SLOPED. CAUTION IS NECESSARY FOR PROPER INSTALLATION AND COORDINATION.
4. LOCATE CEILING MOUNTED AIR DEVICES APPROXIMATELY WHERE SHOWN. FOR EXACT LOCATION AND FRAME MOUNTING TYPES, REFER TO ARCHITECTURAL REFLECTED CEILING PLANS. ALL CEILING DIFFUSERS TO BE FOUR-WAY TYPE, UNLESS NOTED OTHERWISE BY AIR FLOW ARROWS ON FLOOR PLAN.
5. ALL ROOF PENETRATIONS, ROOF PIPE SUPPORTS, FLASHING, ETC., SHALL BE MADE WATERTIGHT AND BE AS RECOMMENDED BY THE ROOF SYSTEM MANUFACTURER. VERIFY WITH OWNER WHAT ACCEPTABLE ROOFING SYSTEMS INSTALLER CAN BE USED.
6. EXTEND DUCTWORK AS SHOWN THROUGH ROOF INSIDE CURB TO EACH DUCT CONNECTION TO/FROM A ROOF MOUNTED UNIT. TRANSITION TO FULL SIZE OF EQUIPMENT OPENING FROM DUCT SIZES SHOWN. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCT CONNECTIONS AT EACH ROOF MOUNTED UNIT.
7. SEAL ALL LONGITUDINAL AND TRANSVERSE DUCT JOINTS TO PREVENT DUCT AIR LEAKAGE TO INCLUDE DUCT AND ACCESSORY PENETRATIONS. DO NOT SEAL CONTROL/FIRE DAMPER CONTROL ROD PENETRATIONS. SEAL CLASS "A" REQUIRED.
8. COORDINATE EXACT LOCATIONS OF ALL TEMPERATURE, HUMIDITY, CARBON DIOXIDE, AND CARBON MONOXIDE SENSORS WITH ARCHITECT PRIOR TO INSTALLATION.
9. EXPOSED DUCTWORK SHALL BE INTERNALLY LINED AND RECEIVE A PAINT GRIP FINISH SO THAT PAINT MAY BE APPLIED IN ACCORDANCE WITH ARCHITECTURAL PLANS AND SPECIFICATIONS.
10. PROVIDE REQUIRED SERVICE CLEARANCE TO ALL ABOVE CEILING EQUIPMENT. COORDINATE LOCATION OF EQUIPMENT WITH ALL TRADES. ABOVE CEILING EQUIPMENT TO BE LOCATED AS CLOSE TO CEILING AS POSSIBLE BUT NO CLOSER THAN 6" ABOVE CEILING.
11. CONTRACTOR SHALL VERIFY WITH OWNER ON MECHANICAL EQUIPMENT TAGS AND SHALL MATCH WITH PERMANENT ROOM NUMBERS AS NEEDED PER OWNER'S DIRECTION. REFER TO ARCHITECTURAL DRAWINGS FOR ROOM NUMBERS.

NOTES BY SYMBOL '◯':

1. OUTSIDE AIR LOUVER WITH MIN. 3.25 SQ.FT. FREE AREA (6.5 SQ.FT. TOTAL AREA). MIN LOUVER SIZE SHALL BE APPOX. 30"X30". INSTALL LOUVER APPROX. 10'-10" A.F.F. REFER TO ARCH DRAWINGS FOR DETAILS. PROVIDE MIN 12 " DEEP LINED (2" THICK) PLENUM ON BACK OF LOUVER.
2. 4" THICK CONCRETE HOUSE KEEPING PAD WITH 1" CHAMFERED EDGES. EXTEND PAD TO BE 4" PAST PLENUM DIMENSIONS IN ALL DIRECTIONS.
3. FRONT OF UNIT WHERE UNIT ACCESS IS, SHALL NOT BE BLOCKED BY ANY DUCTWORK. COORDINATE UNIT LOCATION AND DUCTWORK PRIOR TO INSTALLATION.
4. EXHAUST AIR LOUVER WITH MIN. 0.55 SQ. FT. FREE AREA (1.1 SQ. FT TOTAL AREA). APPROXIMATE LOUVER SIZE SHALL BE MIN. 18" X 18". INSTALL LOUVER 11'-10" A.F.F.
5. REFER TO M-101 FOR CONTINUATION.
6. PROVIDE MOTORIZED OUTSIDE AIR DAMPER WITH MIN 6" X 6" ACCESS DOOR IN VERTICAL DUCT. PROVIDE MANUAL BALANCING DAMPER IN VERTICAL AS WELL.
7. PROVIDE BALANCING DAMPER IN RETURN AIR DUCT IN VERTICAL DUCT PRIOR TO PLENUM CONNECTION.
8. 14"X14" SUPPLY AIR DUCT MAIN TRANSITIONING TO 12"X10" DUCT AFTER THE 10"X10" DUCT TAKE OFF.
9. 12"X12" RETURN AIR DUCT MAIN TRANSITIONING TO 10"X10" DUCT AFTER THE 10"X10" DUCT TAKE OFF.

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REVISIONS

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1	ADDENDUM 02	10/18/2021
2	ADDENDUM 03	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	RWB

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
ENLARGED PLAN - MECH ROOM - HVAC

SHEET NO.
M-301

FILE PATH: C:\Users\hart\Documents\21056\Midlothian ISD Stadium Add & Reno-RWB-r2021_hartRWB.rvt
DATE/TIME: 10/26/2021 4:59:02 PM
PLOT SCALE: 3/4" = 1'-0"

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Consulting Engineers
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Suite 1100
Dallas, TX 75243
TX Firm #F-2176
(972) 788-4222
Project 21056-00

GENERAL MECHANICAL NOTES:

1. RECTANGULAR AND ROUND SUPPLY/RETURN AIR DUCTWORK IS TO BE EXTERNALLY INSULATED WITH 2" THICK ACOUSTICAL AND THERMAL WRAP TO MEET ENERGY CODE (2018 IECC) REQUIREMENTS WHERE CONCEALED ABOVE CEILING. RECTANGULAR TRANSFER AIR DUCT SHALL BE LINED WITH 1" LINER ONLY. ALL DUCTWORK EXPOSED IN MECHANICAL ROOMS AND ALL DUCTWORK WITHIN 10'-0" OF UNIT TO BE INTERNALLY LINED. PROVIDE MIN. 1 1/2" THICK INTERNAL LINER ON SUPPLY AIR DUCTWORK, 2" THICK INTERNAL LINER ON OUTSIDE AIR DUCTWORK, AND 1" THICK INTERNAL LINER ON RETURN AIR DUCTWORK. DUCTWORK SIZES SHOWN ARE NET INTERNAL AIR STREAM DIMENSIONS. SHEET METAL SIZES ARE TO BE INCREASED IN SIZE TO MAINTAIN THESE INTERNAL CLEAR DIMENSIONS. ROUND DUCTWORK IS TO BE EXTERNALLY WRAPPED WHERE CONCEALED AND INTERNALLY LINED SPIRAL SEAMED WHERE EXPOSED. FLEXIBLE ROUND DUCT SHALL HAVE A MINIMUM R-VALUE OF 6.0
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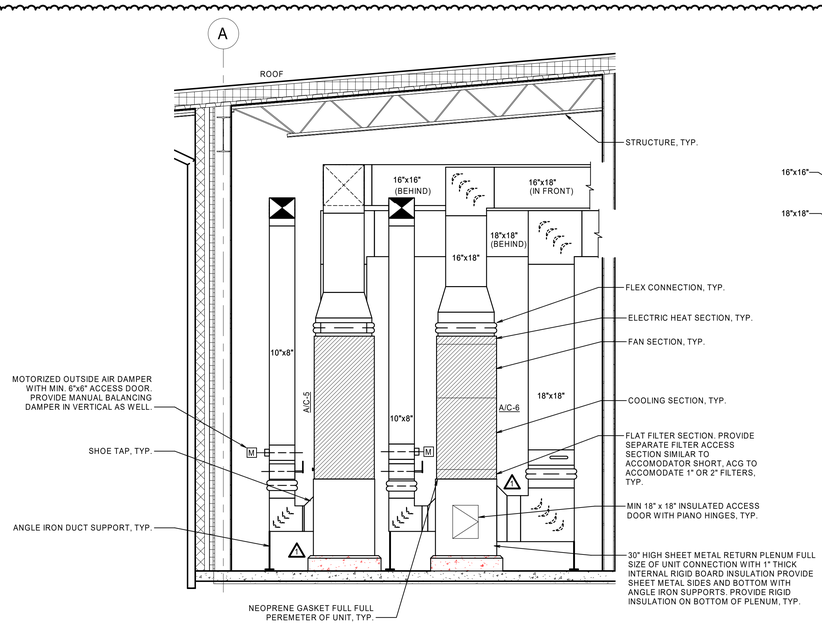
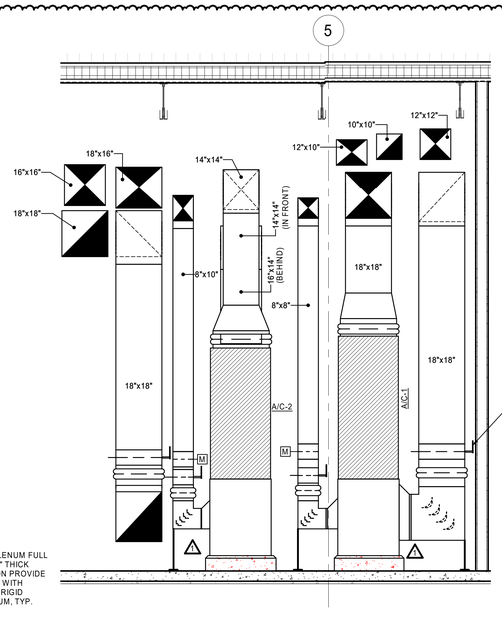


1 MECHANICAL ROOM SECTION - NORTH EAST
SCALE: 1/2" = 1'-0"



2 MECHANICAL ROOM SECTION - SOUTH EAST
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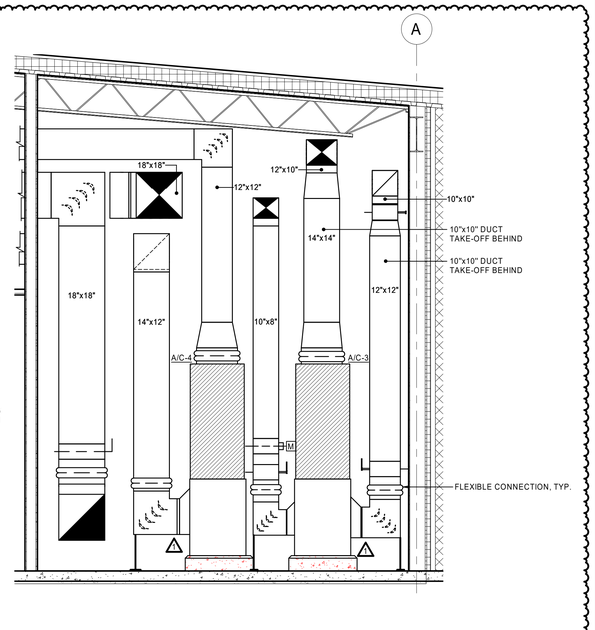

3 MECHANICAL ROOM SECTION - SOUTH WEST
SCALE: 1/2" = 1'-0"

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OWP PROJECT NO. DATE OF ISSUE
2021-154-00 10.07.2021

REVISIONS

DELTA	DESCRIPTION	DATE
1	ADDENDUM 02	10/18/2021
2	ADDENDUM 03	10/27/2021

PROJECT TEAM: ED TEXAS
DRAWN BY: RWB
PROJECT PHASE: CONSTRUCTION DOCUMENTS
SHEET CONTENTS: MECHANICAL ROOM SECTIONS - HVAC
SHEET NO.: M-302 (1)

FILE PATH: C:\Users\nhart\Documents\21056AMidlothian ISD Stadium Add & Reno-RWB-v2021_hartRWB.rvt
DATE/TIME: 10/20/2021 4:59:07 PM
PLOT SCALE: 1/2" = 1'-0"

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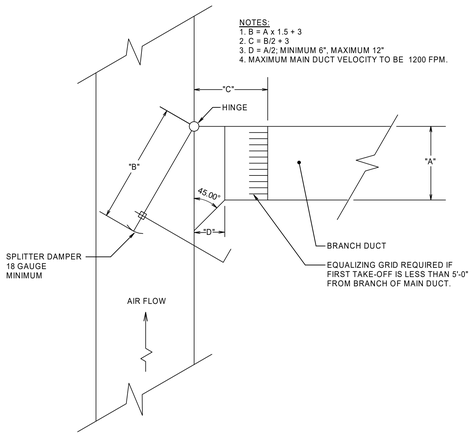

1 BRANCH DUCT DETAIL
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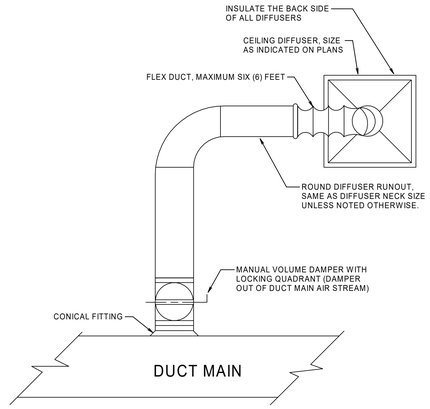

2 ROUND DIFFUSER TAP DETAIL
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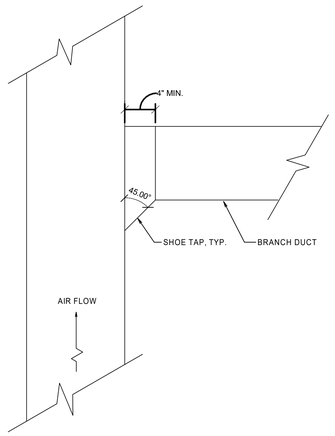

3 SHOE TAP DETAIL
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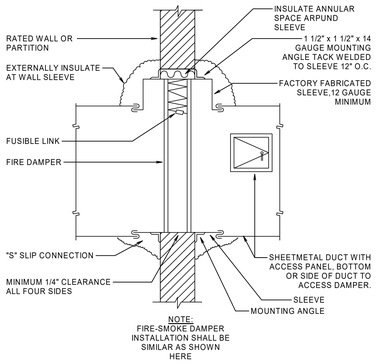

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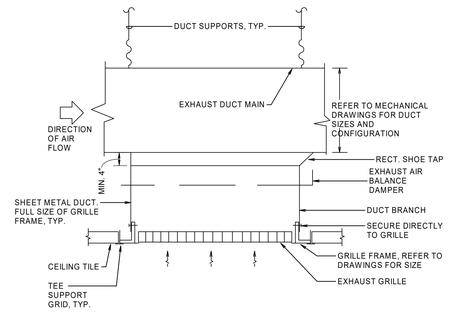

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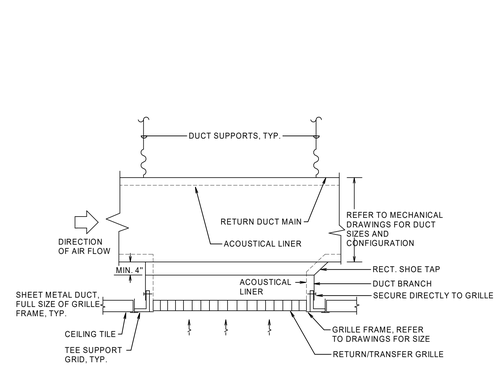
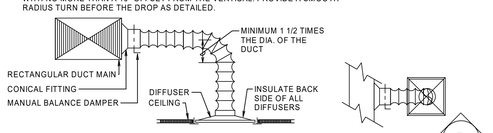


6 RETURN/TRANSFER AIR GRILLE DETAIL
NO SCALE

GENERAL NOTES:
1. FOR ROUND DUCT USE STRAIGHT SPIN-IN TYPE FITTINGS WITH SEPARATE LOCKING HANDLE BALANCING DAMPERS IN ALL AREAS WITH LAY-IN CEILINGS.
2. IN AREAS WITH HARD CEILINGS, USE SPIN-IN FITTINGS AND DAMPERS WITH REMOTE YOUNG REGULATORS LOCATED ON THE CEILING. ALTERNATELY PROVIDE CEILING ACCESS DOORS LARGE ENOUGH TO FACILITATE AIR BALANCING. THE NUMBER OF ACCESS PANELS SHALL BE MINIMIZED AND CONSOLIDATED. ALL ACCESS PANEL LOCATIONS SHALL BE APPROVED BY THE ARCHITECT PRIOR TO INSTALLATION.
3. MAXIMUM LENGTH OF FLEXIBLE DUCT USED SHALL NOT EXCEED 6'-0".
4. RIGID AND FLEX DUCT DIAMETER TO BE EQUAL TO NECK SIZE SHOWN UNLESS SPECIFICALLY NOTED OTHERWISE.
5. FLEXIBLE DUCT DROPS SHOULD BE STRAIGHT DOWN TO THE DIFFUSER NECK WITH NO MORE THAN A 10" OFFSET FROM THE VERTICAL. PROVIDE A SMOOTH RADIUS TURN BEFORE THE DROP AS DETAILED.



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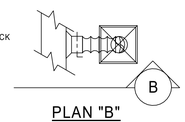

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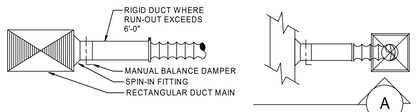
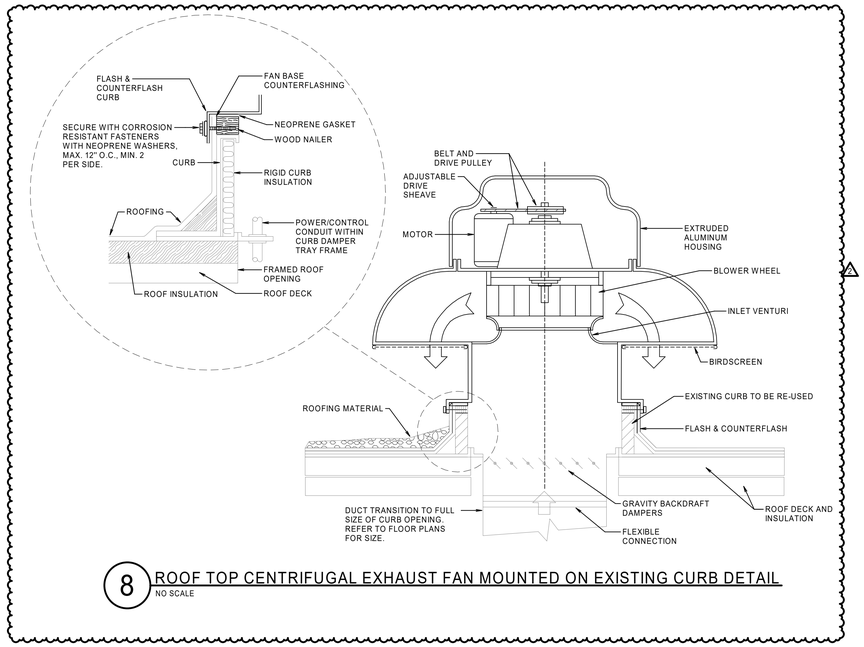


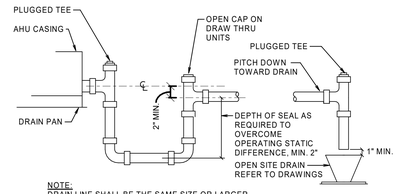
SECTION "A"

PLAN "A"

7 SUPPLY DIFFUSER DETAILS
NO SCALE



8 ROOF TOP CENTRIFUGAL EXHAUST FAN MOUNTED ON EXISTING CURB DETAIL
NO SCALE



NOTE:
DRAIN LINE SHALL BE THE SAME SIZE OR LARGER THAN THE CONNECTIONON THE DRAIN PAN. NO LINE SMALLER THAN 3/4" SHALL BE ALLOWED.

9 TYPICAL A/C UNIT CONDENSATE DRAIN TRAP DETAIL
NO SCALE

STATE OF TEXAS
NATHAN P. HART
93906
LICENSED
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10/27/21

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DATE OF ISSUE 10.07.2021

REVISIONS

DELTA	DESCRIPTION	DATE
2	ADDENDUM 03	10/27/2021

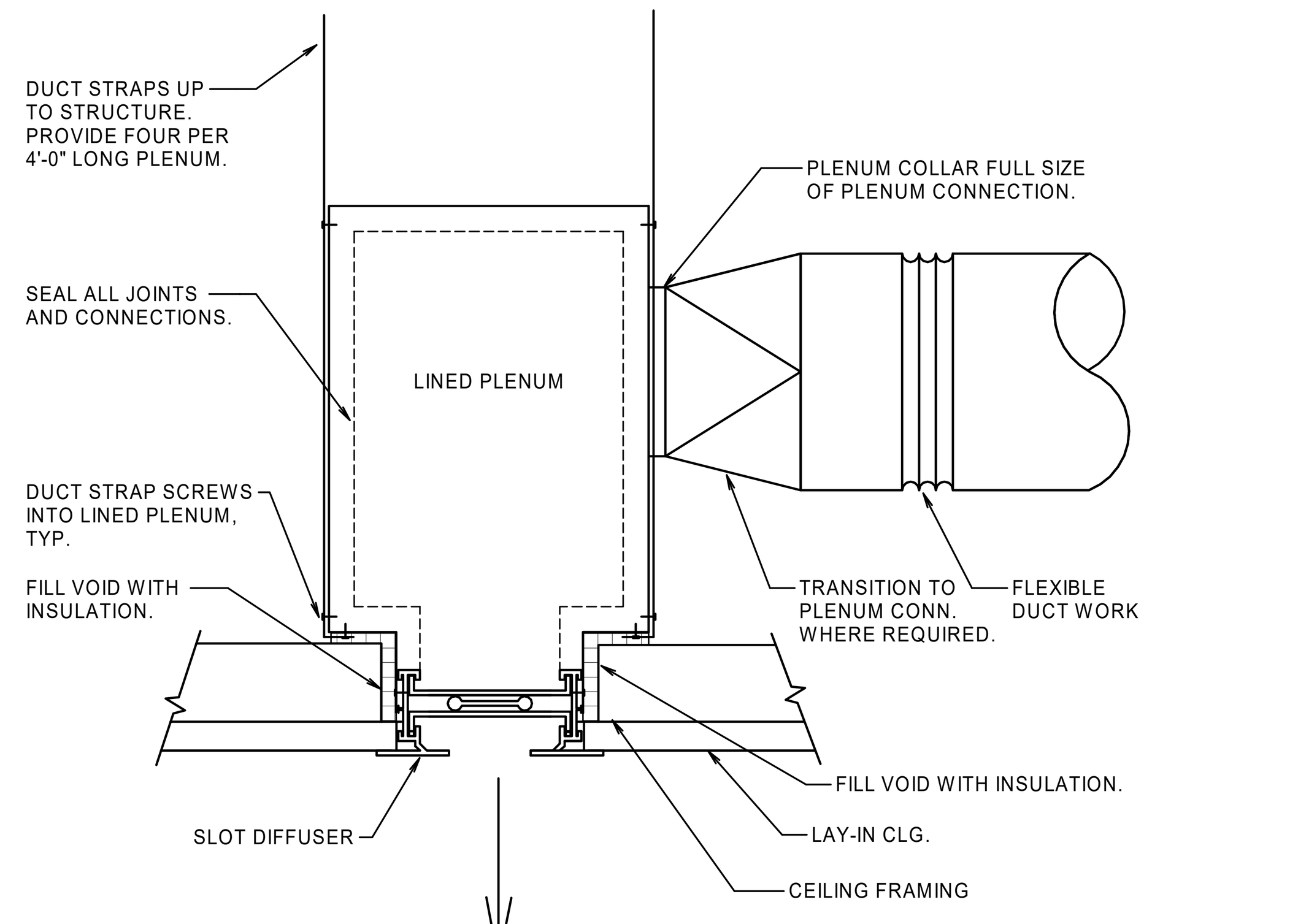
PROJECT TEAM: ED TEXAS
DRAWN BY: RWB

PROJECT PHASE: CONSTRUCTION DOCUMENTS

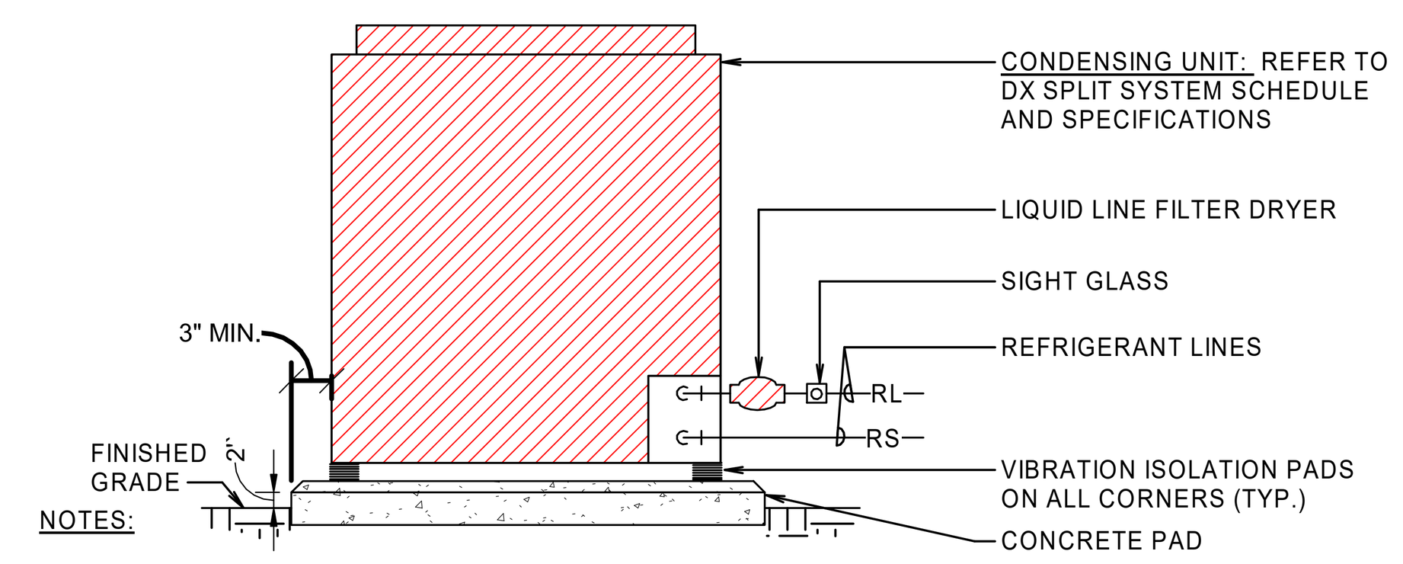
SHEET CONTENTS: MECHANICAL DETAILS

SHEET NO. M-401

FILE PATH: C:\Users\nathan\Documents\21058AMidlothian ISD Stadium Add & Reno-RWB-r2021_hartP4R5.rvt
DATE/TIME 10/26/2021 4:58:11 PM
PLOT SCALE 12" = 1'-0"



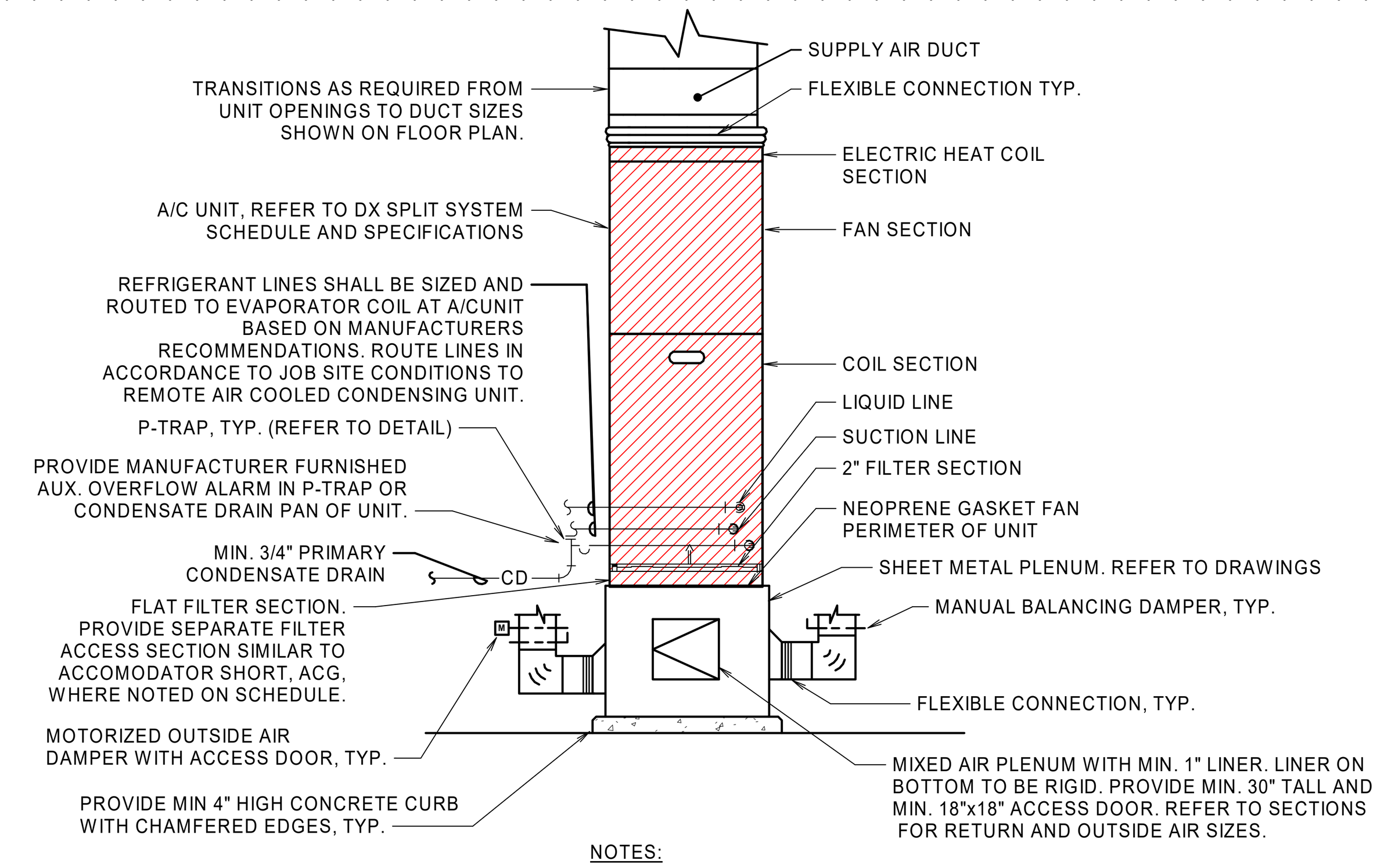
1 LINEAR SLOT DIFFUSER CEILING MOUNTING & HANGER DETAIL
NO SCALE



NOTES:

1. REFRIGERANT LINES SHALL BE SIZED AND PIPED FROM EVAPORATOR COIL AT INDOOR AIR HANDLING UNIT TO CONDENSING UNIT BASED ON MANUFACTURERS RECOMMENDATIONS.
2. ROUTE LINES IN EXTERIOR WALL, ON THE INTERIOR SIDE OF THE WALL INSULATION AND ABOVE CEILING ACCORDING TO JOB SITE CONDITIONS TO CONDENSING UNIT.
3. COMBINE CONDENSING UNITS ONTO ONE CONTINUOUS FORMED & POURED CONCRETE PAD W/ CHAMFERED EDGES WHERE POSSIBLE AND AS SHOWN. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS.
4. CLEARANCES FROM UNITS TO WALLS AND SCREENED ENCLOSURES SHALL BE BASED ON THE MANUFACTURERS RECOMMENDATIONS AND REQUIREMENTS. EACH UNIT SHALL BE SUPPORTED (ADDED SUPPORTS), AS REQUIRED TO KEEP TOP OF EACH UNIT EQUAL TO THE TOP OF ANY ENCLOSING WALLS.

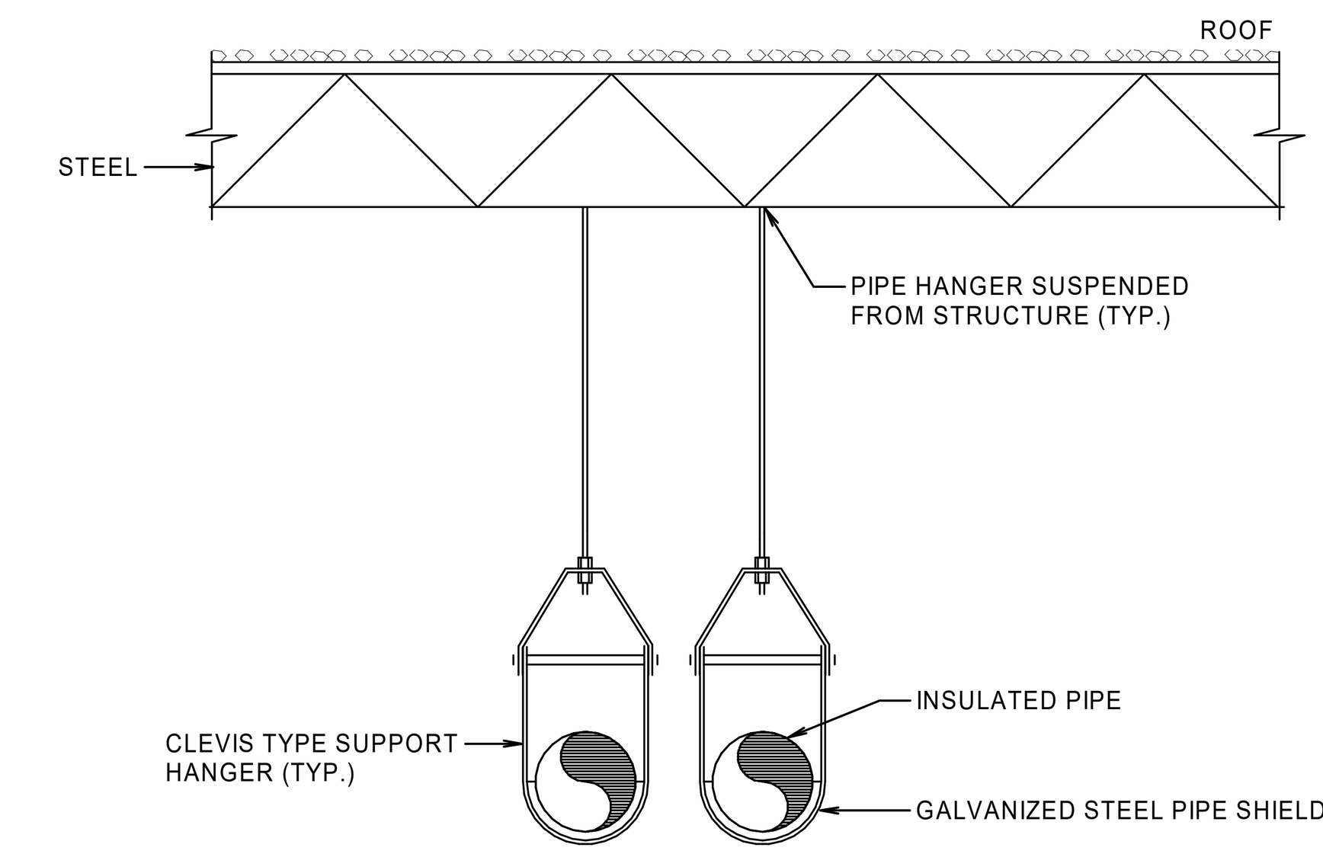
2 GROUND MOUNTED CONDENSING UNIT DETAIL
NO SCALE



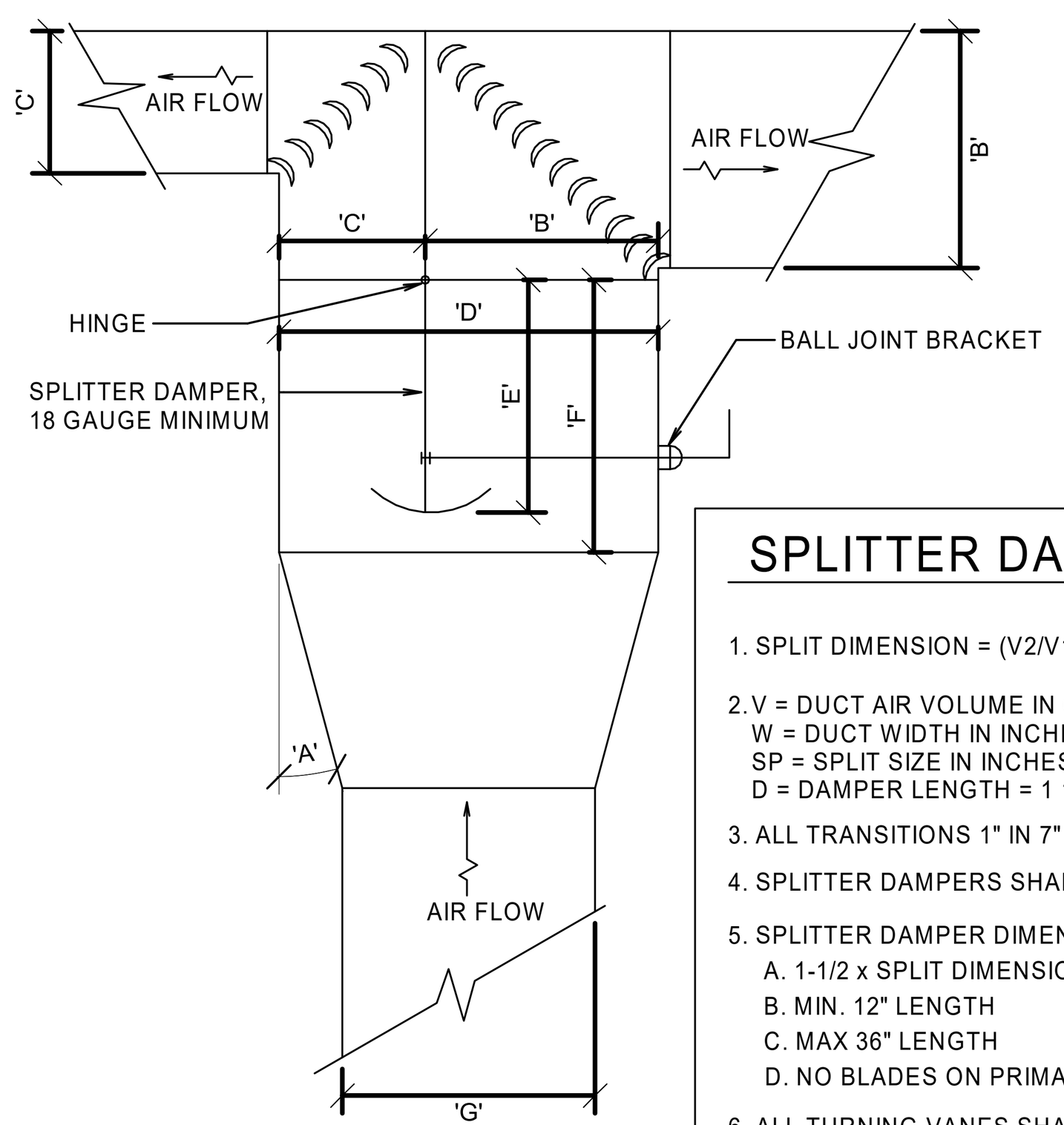
NOTES:

1. REFER TO HVAC FLOOR PLANS FOR EQUIPMENT LOCATIONS, SIZES, TYPES, AND CONTINUATION OF ALL DUCTWORK, PIPING AND GENERAL NOTES.
2. REFER TO HVAC FLOOR PLANS FOR DUCT SIZES AND CONFIGURATIONS.

3 VERTICAL A/C UNIT DETAIL
NO SCALE



4 INDOOR ABOVE CEILING PIPE SUPPORT DETAIL
NO SCALE



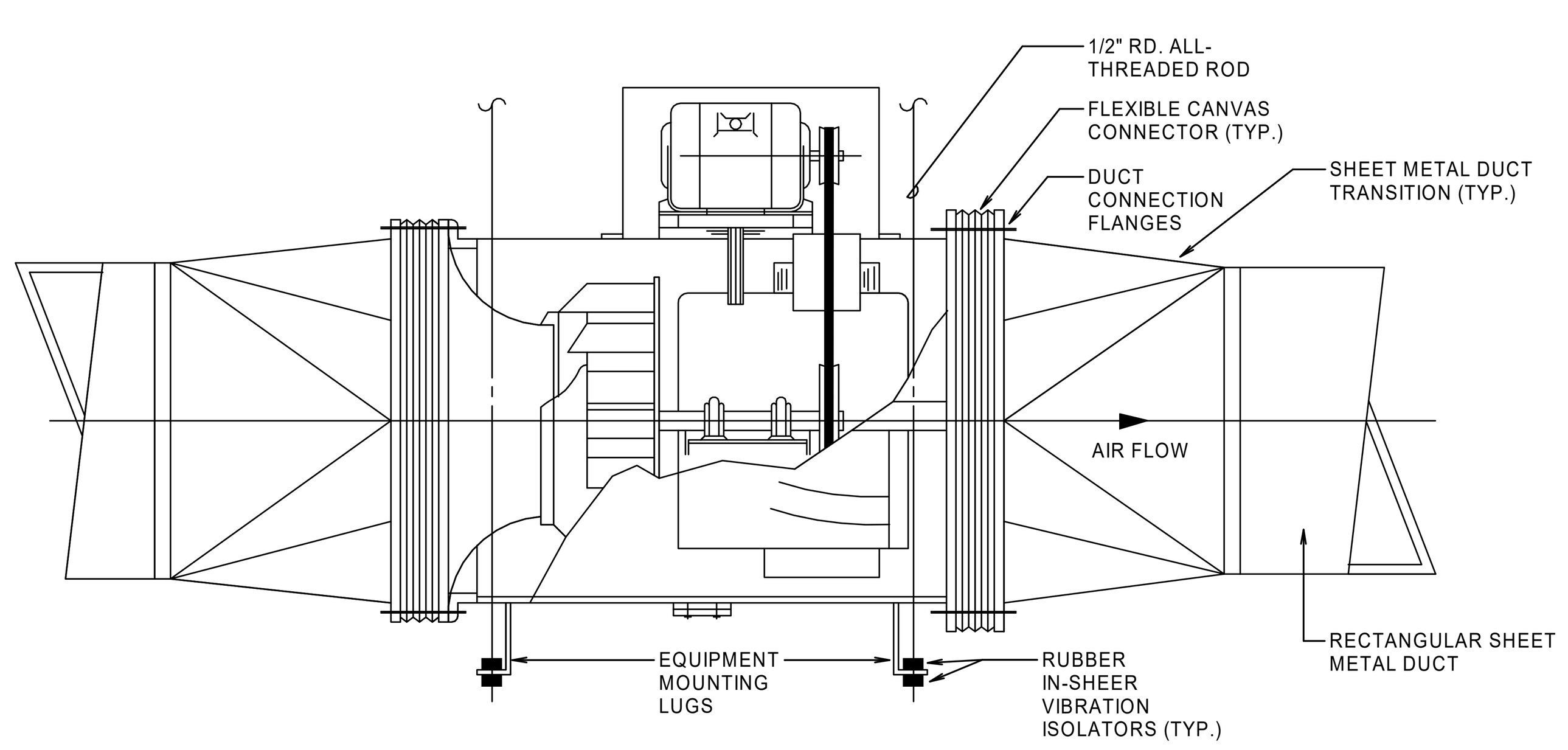
SPLITTER DAMPER NOTES

1. SPLIT DIMENSION = (V2/V1) X W1 (MIN. 4" SPLIT)
2. V = DUCT AIR VOLUME IN CFM
   W = DUCT WIDTH IN INCHES
   SP = SPLIT SIZE IN INCHES = W2
   D = DAMPER LENGTH = 1 1/2" x W2
3. ALL TRANSITIONS 1" IN 7"
4. SPLITTER DAMPERS SHALL BE MIN. 18 GA.
5. SPLITTER DAMPER DIMENSIONS:
   A. 1-1/2 x SPLIT DIMENSION
   B. MIN. 12" LENGTH
   C. MAX 36" LENGTH
   D. NO BLADES ON PRIMARY AIR (VAV SYSTEM) SPLITS
6. ALL TURNING VANES SHALL BE DOUBLE THICKNESS TYPE
7. SEE PLANS FOR DUCT SIZES.

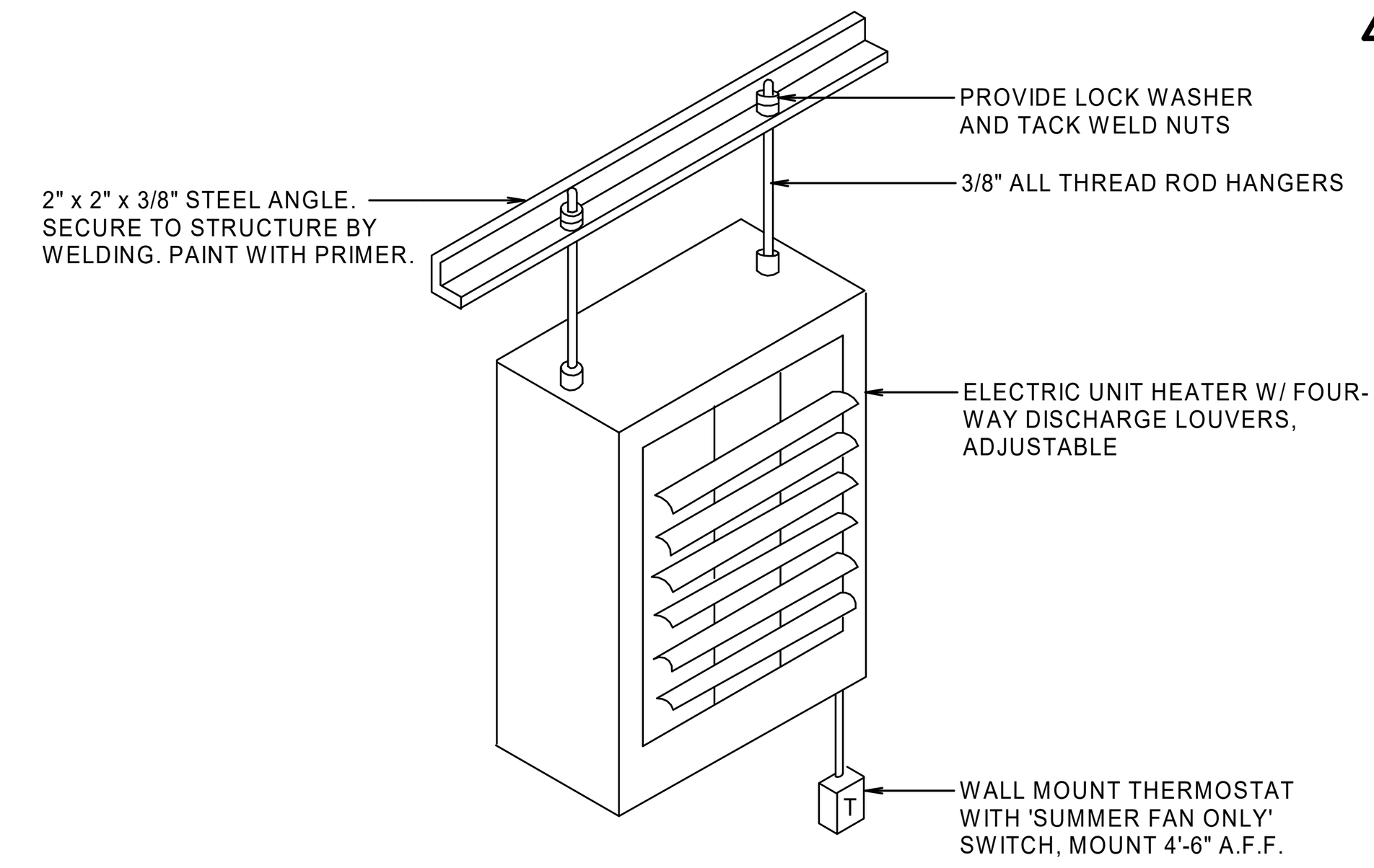
NOTES:

1. ANGLE "A" SHALL BE 15 DEGREES OR LESS
2. D= B + C
3. E= 1.5 X B
4. F= E + 3"
5. SEE FLOOR PLANS FOR DIMENSIONS B, C & G
6. DEPTH SHALL BE EQUAL TO THE DEEPEST OF THE THREE CONVERGING DUCTS
7. ANY CHANGES IN DEPTH OF DUCT SHALL OCCUR DOWNSTREAM OF TURN

5 SPLITTER DAMPER DETAIL
NO SCALE



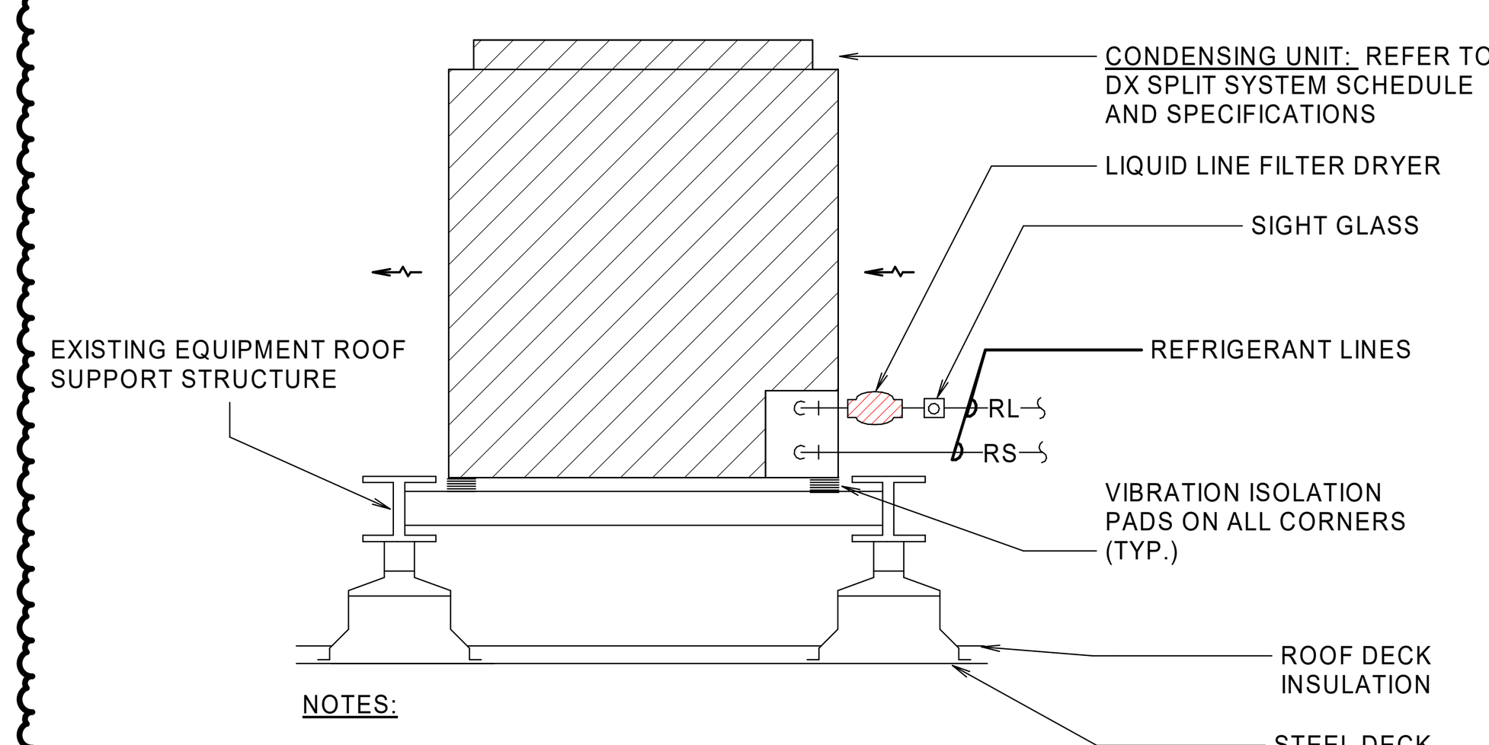
6 IN-LINE CENTRIFUGAL EXHAUST FAN DETAIL
NO SCALE



NOTES:

1. ALTERNATE UNIT MOUNTING IS TO USE MANUFACTURE SUPPLIED WALL MOUNTING BRACKET.
2. WHERE INTERLOCKED WITH EXHAUST FAN PROVIDE HEATING-COOLING THERMOSTAT AND ADJUST TO PREVENT SIMULTANEOUS HEATING AND EXHAUST.

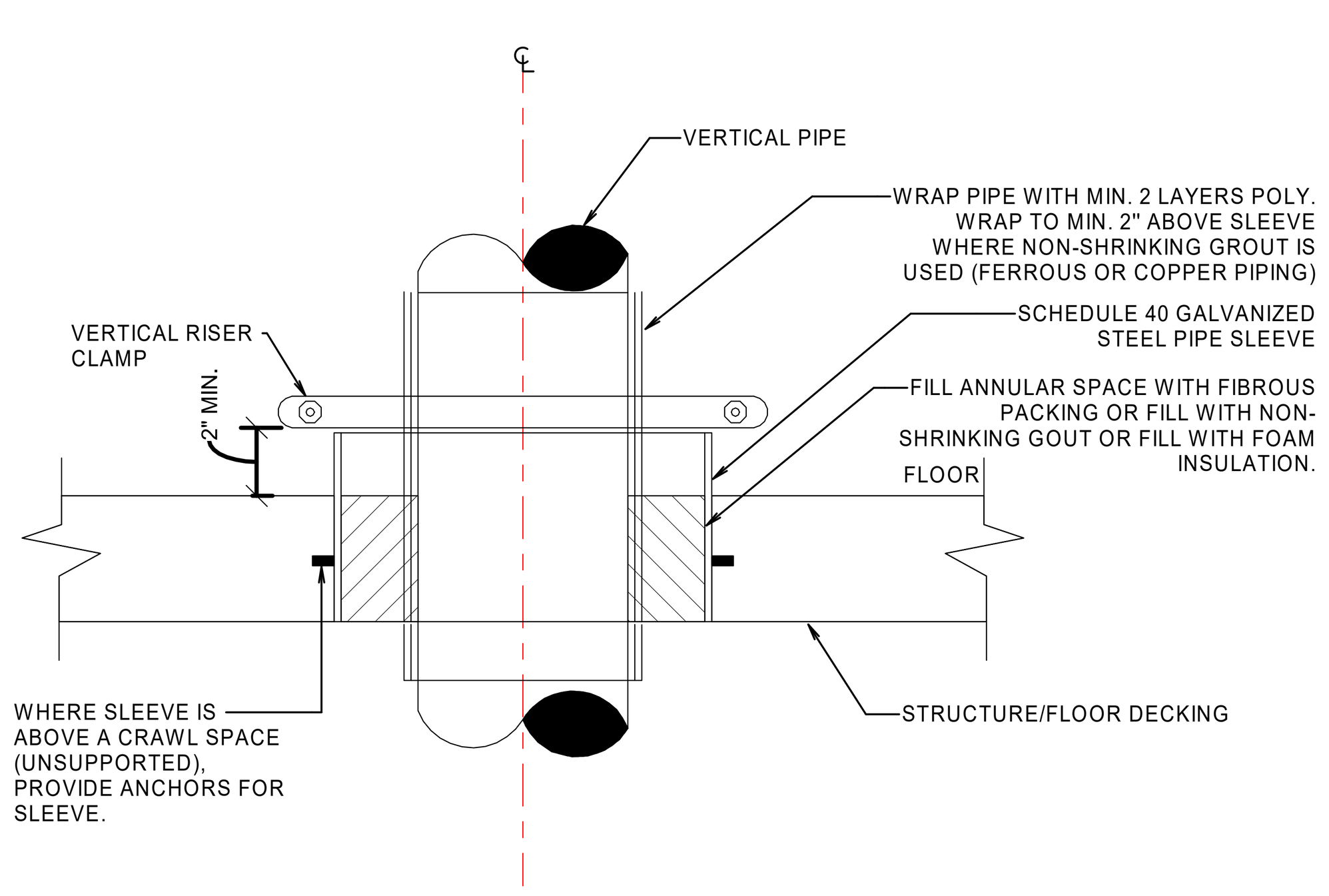
8 UNIT HEATER DETAIL - ELECTRIC
SCALE: 12" = 1'-0"



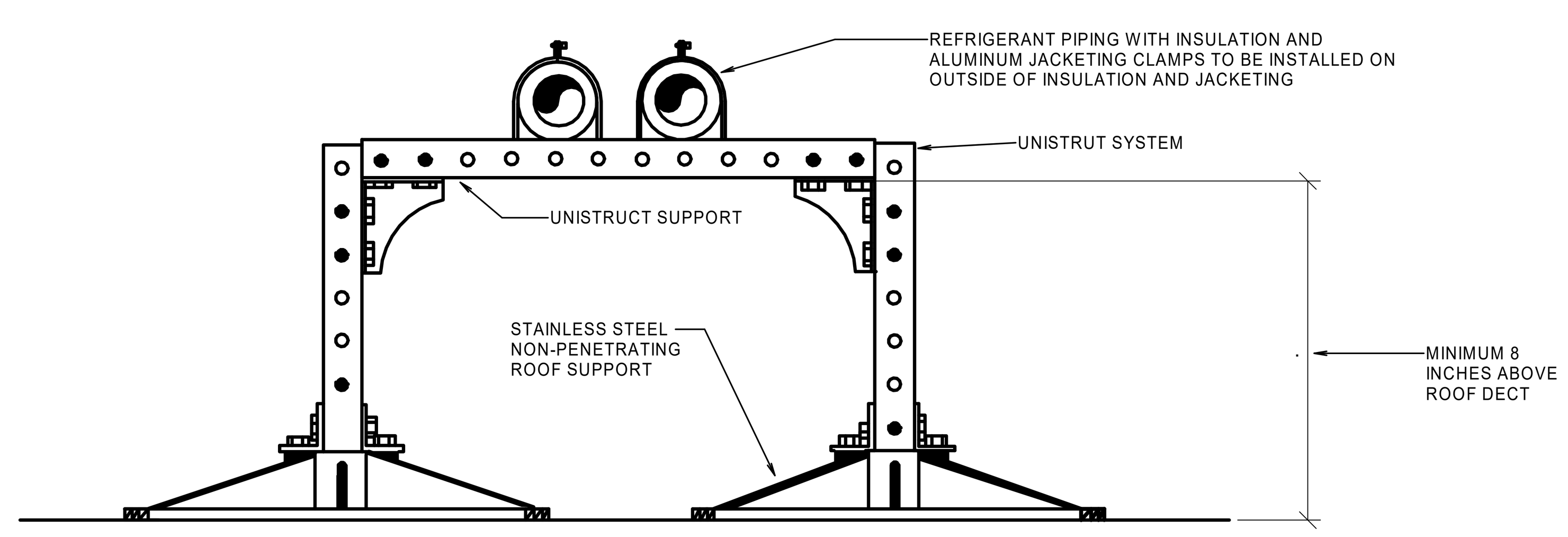
NOTES:

1. REFRIGERANT LINES SHALL BE SIZED AND PIPED FROM EVAPORATOR COIL AT INDOOR AIR HANDLING UNIT TO CONDENSING UNIT BASED ON MANUFACTURERS RECOMMENDATIONS.
2. CLEARANCES FROM UNITS TO WALLS AND SCREENED ENCLOSURES SHALL BE BASED ON THE MANUFACTURERS RECOMMENDATIONS AND REQUIREMENTS. EACH UNIT SHALL BE SUPPORTED (ADDED SUPPORTS), AS REQUIRED TO KEEP TOP OF EACH UNIT EQUAL TO THE TOP OF ANY ENCLOSING WALLS.

7 ROOF MOUNTED CONDENSING UNIT DETAIL
NO SCALE



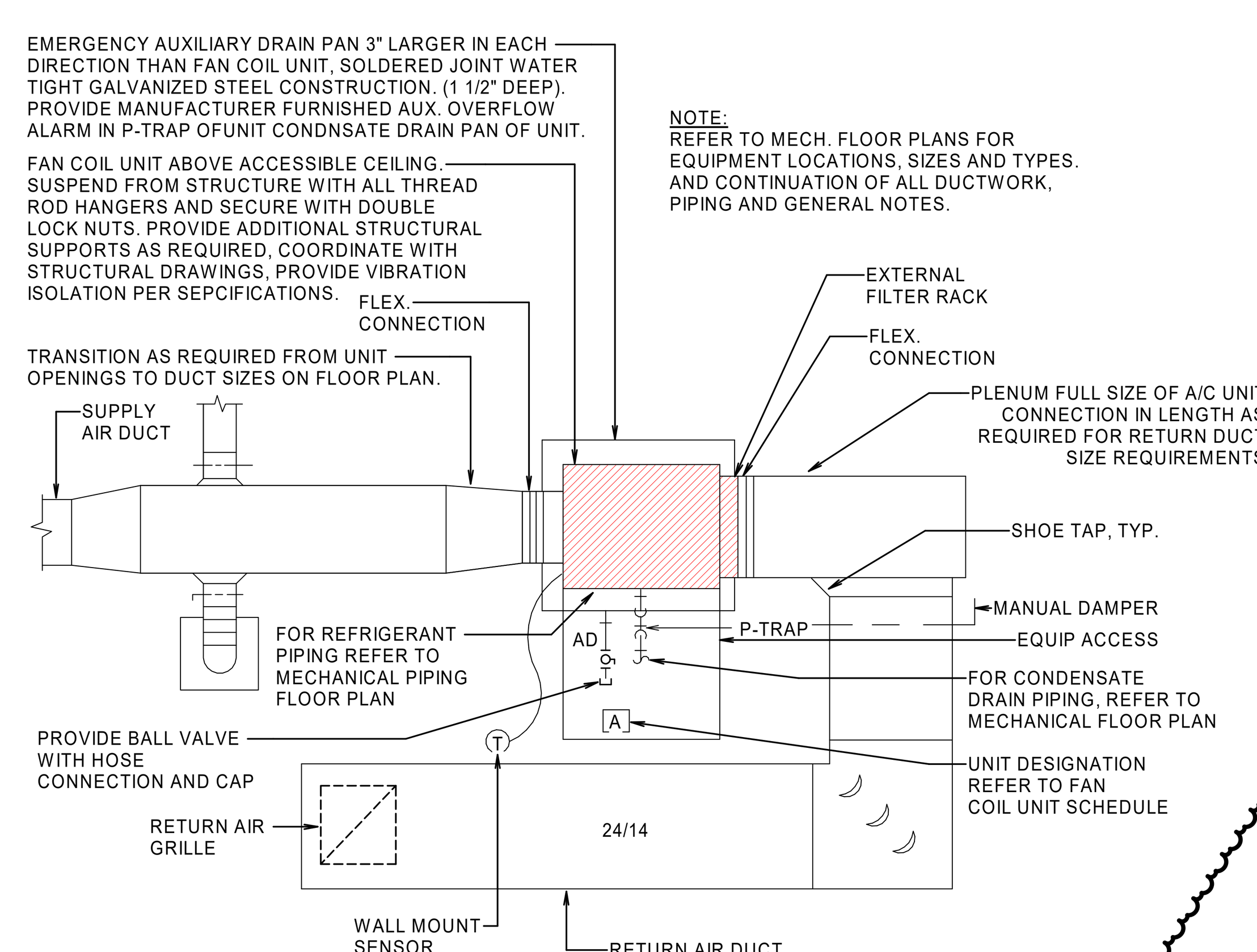
9 FLOOR PIPE PENETRATION DETAIL
NO SCALE



NOTES:

1. ALL EXPOSED STEEL TO BE GALVANIZED.
2. SUPPORT SPACING SHALL BE NO MORE THAN 8 FEET ON CENTERS, AND BE SUPPORTED WITHIN TWO FEET OF EACH SIDE OF EACH TEE, ELBOW, OR CHANGE IN DIRECTION.
3. PROVIDE RUBBER ROOF PIPE SUPPORT PAD BELOW ROOF SUPPORT.

10 ROOF REFRIGERANT PIPING SUPPORT DETAIL
NO SCALE



NOTE:
REFER TO MECH. FLOOR PLANS FOR EQUIPMENT LOCATIONS, SIZES AND TYPES. AND CONTINUATION OF ALL DUCTWORK, PIPING AND GENERAL NOTES.

11 TYPICAL FAN COIL A/C UNIT DETAIL
NO SCALE

RWB Consulting Engineers
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TX Firm #F-2176 (972) 788-4222 Project 21056-00

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STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER
10/7/21

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-- F

OWP PROJECT NO.	DATE OF ISSUE
2021-154-00	10.07.2021

REVISIONS

DELTA	DESCRIPTION	DATE
2	ADDENDUM 03	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	RWB

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
MECHANICAL DETAILS

SHEET NO.
M-402

RWB Consulting Engineers
12001 N Central Expy, Suite 1100, Dallas, TX 75243
TX Firm #F-2176, (972) 788-4222, Project 21056-00

COMPUTER ROOM AIR CONDITIONING UNIT

GENERAL	DESIGNATION	CRAC-1
	LOCATION	PRESS BOX 2ND LEVEL
	AREA SERVED	TECH. RM
	MANUFACTURER	LIEBERT
	MODEL	MMD18E
	WEIGHT, LBS	225
	MIN./MAX O.A., CFM	0
FAN DATA	AIR FLOW, CFM	750
	EXT. STATIC PRESSURE, IN. W.G.	0.3
	MIN. FAN MOTOR POWER, HP	0.5
FILTERS	TYPE	MERV 11
	THICKNESS	2"
COOLING COIL	TYPE	DX COILS; HORIZONTAL
	SENSIBLE LOAD, BTU/HR	15,900
	TOTAL LOAD, BTU/HR	17,000
	MIN. EFFICIENCY RATING (SEER / EER) @ AHRI	- / 10.3
	ENTERING AIR TEMPERATURE, °F DB	75.0
	ENTERING AIR TEMPERATURE, °F WB	61.1
	LEAVING AIR TEMPERATURE, °F DB	55.2
	LEAVING AIR TEMPERATURE, °F WB	52.9
	MIN. ROWS	3
	MAX. FINS PER IN.	14
	MAX. AIR PRESSURE DROP, IN. W.G.	1.0
HEATING SECTION	TYPE	ELECTRIC
	TOTAL CAPACITY, BTU/HR	57,750
	REQUIRED HEAT LOAD IN, KW	16.9
	SELECTED HEATING CAPACITY, KW	14.4
	ENTERING AIR TEMPERATURE, °F	61.3
	LEAVING AIR TEMPERATURE, °F	95.0
	NO. STAGES OF CONTROL	2
ELECTRICAL DATA	VOLTAGE	208
	PHASE	1
	FREQUENCY, HZ	60
	MIN. CIRCUIT AMPACITY, A	1.8
	MAX. OVERCURRENT PROTECTION, A	15
REMARKS		2, 3
CONDENSING UNIT		
GENERAL	DESIGNATION	CU-2-4
	LOCATION	ON ROOF
	UNIT SERVED	CRAC-1
	MANUFACTURER	LIEBERT
	MODEL	PFH020
	WEIGHT, LBS	200
	TOTAL NOMINAL CAPACITY, BTU/HR	18,000
	MAX. AMBIENT TEMP., °F	105.0
	MIN. AMBIENT TEMP., °F	22.0
	MIN. NO. STEPS OF CAPACITY CONTROL	1
ELECTRICAL DATA	VOLTAGE	208
	PHASE	1
	FREQUENCY, HZ	60
	MIN. CIRCUIT AMPACITY, A	14.8
	MAX. OVERCURRENT PROTECTION, A	25
REMARKS		1, 4

COMMENTS:
1. PROVIDE HAIL GUARD ON CONDENSER.
2. PROVIDE MANUFACTURER FURNISHED OVER-FLOW ALARM IN DRAIN PAN OR P-TRAP OF COOLING COIL.
3. PROVIDE MANUFACTURER FURNISHED FILTER BOX.
4. PROVIDE MANUFACTURER FURNISHED 230/277V AUTO TRANSFORMER TO WIRE CONDENSING UNIT TO EXISTING 277/1 ELEC. FEED.

SPLIT SYSTEM DX COOLING WITH ELECTRIC HEAT

GENERAL	DESIGNATION	A/C-1	A/C-2	A/C-3	A/C-4	A/C-5 , A/C-6
	LOCATION	MECH ROOM	MECH ROOM	MECH ROOM	MECH ROOM	MECH ROOM
	AREA SERVED	LOBBY & OFFICES	CONF. & BREAK RM	LOCKER	IDF	ASSEMBLY
	MANUFACTURER	TRANE	TRANE	TRANE	TRANE	TRANE
	MODEL	TEM6A0C48	TEM6A0C36	TEM6A0B24	TEM6A0B24	TEM6A0C60
	WEIGHT, LBS	175	150	120	120	175
	MIN./MAX O.A., CFM	275	325	200	0	350
FAN DATA	AIR FLOW, CFM	1,575	1,150	700	700	1750
	EXT. STATIC PRESSURE, IN. W.G.	0.75	0.75	0.75	0.5	0.75
	MIN. FAN MOTOR POWER, HP	0.75	0.5	0.33	0.33	0.75
FILTERS	TYPE	MERV 11	MERV 11	MERV 11	MERV 11	MERV 11
	THICKNESS	2"	2"	2"	2"	2"
COOLING COIL	TYPE	DX COILS; VERTICAL	DX COIL; VERTICAL	DX COIL; VERTICAL	DX COIL; VERTICAL	DX COIL; VERTICAL
	SENSIBLE LOAD, BTU/HR	41,430	32,630	19,200	14,920	41,775
	TOTAL LOAD, BTU/HR	43,375	33,850	22,775	20,420	53,865
	MIN. EFFICIENCY RATING (SEER / EER) @ AHRI	17.0 / 13.0	16.0 / 12.5	17.0 / 13.0	17.0 / 13.0	16.5 / 12.0
	ENTERING AIR TEMPERATURE, °F DB	78.2	81.1	81.3	73.6	79.0
	ENTERING AIR TEMPERATURE, °F WB	62.5	63.8	65.6	62.9	65.8
	LEAVING AIR TEMPERATURE, °F DB	54.0	55.0	56.0	54.0	57.0
	LEAVING AIR TEMPERATURE, °F WB	53.0	54.0	55.0	53.0	56.0
	MIN. ROWS	2	2	2	2	2
	MAX. FINS PER IN.	12	12	12	12	12
	MAX. AIR PRESSURE DROP, IN. W.G.	1.0	1.0	1.0	1.0	1.0
HEATING SECTION	TYPE	ELECTRIC	ELECTRIC	ELECTRIC	ELECTRIC	ELECTRIC
	TOTAL CAPACITY, BTU/HR	57,750	48,915	29,900	19,000	66,580
	REQUIRED HEAT LOAD IN, KW	16.9	14.3	8.8	5.6	19.5
	SELECTED HEATING CAPACITY, KW	14.4	14.4	7.2	7.2	18.0
	ENTERING AIR TEMPERATURE, °F	61.3	55.9	55.7	70.0	60.0
	LEAVING AIR TEMPERATURE, °F	95.0	95.0	95.0	95.0	95.0
	NO. STAGES OF CONTROL	2	2	1	1	2
ELECTRICAL DATA	VOLTAGE	208	208	208	208	208
	PHASE	1	1	1	1	1
	FREQUENCY, HZ	60	60	60	60	60
	MIN. CIRCUIT AMPACITY, A (CKT - 1, 2, 3, 4)	95.0 (52.0, 43.0)	92.0 (49.0, 43.0)	49.0	49.0	117.0 (36.0, 27.0, 27.0, 27.0)
	MAX. OVERCURRENT PROTECTION, A (CKT- 1, 2, 3, 4)	105 (60, 45)	95 (50, 45)	50	50	130 (40, 30, 30, 30)
REMARKS		2, 3, 5	2, 3, 5	2, 3, 7	2, 3, 7	2, 3, 5, 6
CONDENSING UNIT						
GENERAL	DESIGNATION	CU-1	CU-2	CU-3	CU-4	CU-5 , CU-6
	LOCATION	GROUND MTD.	GROUND MTD.	GROUND MTD.	GROUND MTD.	GROUND MTD.
	UNIT SERVED	AC-1	AC-2	AC-3	AC-4	AC-5 , AC-6
	MANUFACTURER	TRANE	TRANE	TRANE	TRANE	TRANE
	MODEL	4TTA7048	4TTA7036	4TTR7024	4TTR7024	4TTA7060
	WEIGHT, LBS	250	250	275	275	275
	TOTAL CAPACITY, BTU/HR	43,375	33,850	22,775	20,420	53,865
	MAX. AMBIENT TEMP., °F	105.0	105.0	105.0	105.0	105.0
	MIN. AMBIENT TEMP., °F	22.0	22.0	22.0	22.0	22.0
	MIN. NO. STEPS OF CAPACITY CONTROL	2	2	1	1	2
ELECTRICAL DATA	VOLTAGE	208	208	208	208	208
	PHASE	3	3	1	1	3
	FREQUENCY, HZ	60	60	60	60	60
	MIN. CIRCUIT AMPACITY, A	18.0	15.0	13.4	13.4	22.0
	MAX. OVERCURRENT PROTECTION, A	30	25	20	20	35
REMARKS		1, 4	1, 4	1, 4	1, 4	1, 4

COMMENTS:
1. PROVIDE HAIL GUARD ON CONDENSER.
2. PROVIDE MANUFACTURER FURNISHED OVER-FLOW ALARM IN DRAIN PAN OR P-TRAP OF COOLING COIL.
3. PROVIDE FILTER ACCESS KIT SIMILAR TO ACCOMODATOR SHORT, ACG, FOR RETURN.
4. PROVIDE LOW AMBIENT CONTROLS FOR CONDENSER UNIT AS NOTED IN SPECIFICATIONS.
5. PROVIDE MULTI-POINT POWER CONNECTION TO UNIT. REFER TO ELEC. DRAWINGS. PROVIDE THREE (3) OR FOUR (4) POINTS OF POWER CONNECTION: (1) FOR FAN, REMAINDER FOR ELECTRIC HEAT (1 OR 2) PER STAGE. REFER TO ELECTRICAL FOR MCA AND MCOP OF EACH CIRCUIT AND ASSOCIATED DISCONNECTING MEANS. MANUFACTURER TO FURNISH CAPABILITY FOR MULTI-POINT WIRING.
6. PROVIDE UNIT WITH BIPOLAR IONIZER LOCATED IN FAN SECTION OF THE UNIT. REFER TO MANUFACTURER RECOMMENDATIONS FOR EXACT MOUNTING LOCATION. PROVIDE CONTROL VOLTAGE POWER TO IONIZER FROM UNIT CONTROL POWER OR EMS CONTROL PANEL.
7. PROVIDE UNIT WITH SINGLE POINT SINGLE POINT WIRING FOR INDOOR UNIT TO ALLOW FOR FAN AND HEAT TO BE WIRED BY SINGLE CIRCUIT.

MECHANICAL LEGEND

RS	REFRIGERANT SUCTION
—RL—	REFRIGERANT LIQUID
—CD—	CONDENSATE DRAIN
—AD—	AUXILIARY DRAIN
1/8" / FT.	SLOPE DOWN IN DIRECTION OF ARROW WITH SLOPE SHOWN
	CAP
	RISE IN PIPING
	DROP IN PIPING
T	THERMOSTAT/TEMPERATURE SENSOR
H	HUMIDITY SENSOR
C	CARBON DIOXIDE SENSOR
THC	COMBINATION SENSOR (TEMPERATURE, HUMIDITY, & CARBON DIOXIDE)
F	FIRESTAT
S	DUCT SMOKE DETECTOR
$	WALL SWITCH
$T	WALL TIMER SWITCH
	SUPPLY AIR ARROW
	RETURN AIR ARROW
R	RISE IN DUCT
D	DROP IN DUCT
	SUPPLY DUCT RISE / DROP
	RETURN OR EXHAUST DUCT RISE / DROP
	MANUAL DAMPER
M	MOTORIZED DAMPER
F.D.	FIRE DAMPER
S.D.	SMOKE DAMPER
F.S.D.	FIRE-SMOKE DAMPER
	CONNECT TO EXISTING
	EXISTING WORK TO REMAIN
	EXISTING WORK TO BE REMOVED
	NEW WORK

NOTE: NOT ALL SYMBOLS ARE USED.

BI-POLAR IONIZATION

EQUIPMENT LOCATION	A/C-5	A/C-6
DESIGNATION	BP-1	BP-2
MANUFACTURER	PHENOMENAL AIRE	PHENOMENAL AIRE
MODEL	C6	C6
AIRFLOW (CFM)	1,750	1,750
VOLTAGE	24	24
POWER (VA)	12	12
COMMENTS	1	1

COMMENTS KEY:
1. INSTALL BIPOLAR IONIZER IN FAN SECTION OF THE UNIT. REFER TO MANUFACTURER RECOMMENDATIONS FOR EXACT MOUNTING LOCATION. PROVIDE CONTROL VOLTAGE. POWER TO IONIZER FROM UNIT CONTROL POWER OR EMS CONTROL PANEL.

GRILLES, REGISTERS, AND DIFFUSERS

DESIGNATION	TYPE	MOUNTING TYPE	MATERIAL	FINISH	MAX. N.C. LEVEL	OPPOSED DAMPER BLADE	EQUALIZING GRID	MANUFACTURER	MODEL	DESCRIPTION
A	SUPPLY DIFFUSER - LOUVERED	LAY-IN / SURFACE	STEEL	WHITE	30	NO	NO	TITUS	TMS	24"x24" FACE
B	SUPPLY DIFFUSER - LOUVERED	LAY-IN / SURFACE	STEEL	WHITE	30	NO	NO	TITUS	TMS	12"x12" FACE
C	SUPPLY DIFFUSER - SLOT	LAY-IN	ALUMINUM	WHITE	30	NO	NO	TITUS	FL-10-1	1 SLOT, 1" SLOT WIDTH, MANUFACTURER FURNISHED PLENUM, 48" LONG, BORDER TYPE 11, PROVIDE END CAPS
D	SIDEWALL SUPPLY REGISTER	SURFACE	STEEL	WHITE	30	YES	NO	TITUS	300FS	ADJUSTABLE DOUBLE DEFLECTION
E	RETURN GRILLE	SURFACE	ALUMINUM	WHITE	30	NO	NO	TITUS	355FL	35° FIXED DEFLECTION
F	RETURN AIR GRILLE	LAY-IN / SURFACE	ALUMINUM	WHITE	30	NO	NO	TITUS	50F	1/2"x1/2"x1" EGG CRATE WITH FRAMED BORDER; DO NOT STACK 1/2"
G	EXHAUST REGISTER	LAY-IN / SURFACE	ALUMINUM	WHITE	30	YES	NO	TITUS	355FL	35° FIXED DEFLECTION

DIRECT EXPANSION (DX) DUCTLESS SPLIT SYSTEM PACKAGED TERMINAL AIR CONDITIONER (PTAC) SCHEDULE

INDOOR AIR HANDLING UNIT	GENERAL	DESIGNATION	PTAC-1
		SERVES	CONTROL ROOM 120
		LOCATION	WALL MOUNTED
		MIN. O.A., CFM	65
		MAX. OPERATING WEIGHT, LBS.	113
		TOTAL DESIGN CFM	314 / 340
		EXT. S.P., IN. W.G.	--
		MIN. FAN MOTOR HP	--
		FAN, VOLTS/PHASE	208 / 1
		MIN. CIRCUIT AMPACITY	14.1
		MAX. OVERCURRENT PROTECTION (MOCP)	15
		SEER/EER	-- / 10.0
	COOLING COIL	ENT. AIR TEMP.-DB/WB - F°	77.4 / 60.0
		SENS. COOLING	12,500
		TOTAL COOLING, BTUH	16,700
		MIN. COIL FACE AREA, SQ. FT.	--
		MIN. ROWS/MAX F.P.I.	--
		MAX. A.P.D., IN. W.G.	--
	HEATING COIL	ENT. AIR. TEMP., F°	60.0
		TOTAL HEATING, BTUH	14,000
		KW	2.5
		VOLTS/PHASE	208 / 1
		MIN. NO. CAPACITY STEPS	1
	MANUFACTURER		AMANA
	MODEL NO.		PTC173G25A
	REMARKS		1, 2

REMARKS KEY:
1. PROVIDE CONDENSATE DRAIN KIT FOR UNIT.
2. PROVIDE REMOTE WALL MTD. THERMOSTAT.

FAN SCHEDULE

GENERAL DATA	DESIGNATION	EF-1	EF-2	EF-3	EF-4	EF-5
	AIR SYSTEM	EXHAUST	EXHAUST	EXHAUST	EXHAUST	EXHAUST
	SERVICE	LOCKER, CUST. & SHOWER	ELEC.	BREAK ROOM	RESTROOMS	STORAGE
	MOUNTING	IN-LINE	IN-LINE	IN-LINE	IN-LINE	IN-LINE
	TYPE	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL
	MIN. WHEEL DIAMETER, IN.	12.0	12.0	12.0	12.0	12.0
	DRIVE TYPE	BELT	BELT	BELT	BELT	BELT
	MANUFACTURER	COOK	COOK	COOK	COOK	COOK
	MODEL	120 SQNB OR71	120 SQNB OR91	120 SQNB OR71	120 SQNB OR81	120 SQNB OR91
	WEIGHT, LBS	50	50	50	50	50
PERFORMANCE DATA	AIR FLOW, CFM	275	500	150	450	500
	MIN. EXT. S.P., IN. W.G.	0.3	0.3	0.5	0.3	0.3
	MAX FAN RPM	1,330	1,070	1,200	1,200	1,070
ELECTRICAL DATA	MIN. MOTOR SIZE, HP	0.25	0.25	0.25	0.25	0.25
	VOLTAGE	120	120	120	120	120
	PHASE	1	1	1	1	1
	FREQUENCY, HZ	60	60	60	60	60
CONTROLS		EMS	THERMOSTAT	WALL SWITCH	EMS	THERMOSTAT
COMMENTS						

1. WALL SWITCHES: REFER TO MOTOR STARTER SWITCHES TO BE FURNISHED UNDER DIVISION 23 AND INSTALLED UNDER DIVISION 26 (RECESSED IN WALL).
2. EMS: FAN TO BE CONTROLLED BY ENERGY MANAGEMENT SYSTEM.
3. MOTOR STARTER CAN SUBSTITUTE AS FAN DISCONNECT WHERE NOT WALL MOUNTED AND LOCATED AT FAN MOOR. A DISCONNECT CANNOT SUBSTITUTE FOR A MOTOR STARTER.

ELECTRIC UNIT HEATER

GENERAL DATA	DESIGNATION	EUH-1 , EUH-3	EUH-2
	LOCATION	WALL OR STRUCTURE	WALL OR STRCTURE MTD.
	SERVICE	RISER RM , ELEC. RM	STORAGE RM.
	MANUFACTURER	QMARK	QMARK
	MODEL	MUH-03-81	MUH-05-81
FAN DATA	AIR FLOW, CFM	350	350
	FAN ROTATION, RPM	800	1,600
ELECTRICAL DATA	MOTOR SIZE, HP	1/100	1/100
	VOLTAGE	208	208
	PHASE	1	1
	FREQUENCY, HZ	60	60
HEATING DATA	OUTPUT, BTU/HR	17.0	17.0
	KW	3.0	5.0
	STAGES	1	1
CONTROLS	VOLTAGE	208	208
COMMENTS		1	1

COMMENTS KEY:
1. PROVIDE WITH MANUFACTURER BUILT-IN THERMOSTAT.
2. PROVIDE MANUFACTURER FURNISHED MOUNTING BRACKET.

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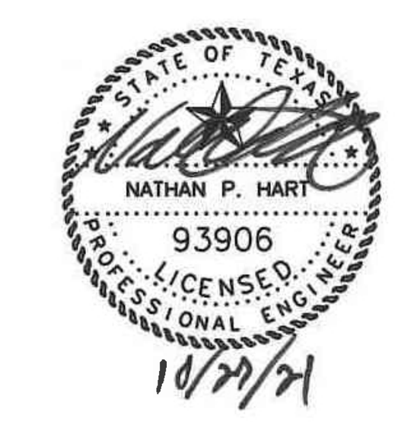

MIDLOTHIAN ISD
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OWP PROJECT NO.	DATE OF ISSUE
2021-154-00	10.07.2021

REVISIONS

DELTA	DESCRIPTION	DATE
1	ADDENDUM 02	10/18/2021
2	ADDENDUM 03	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	RWB

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
MECHANICAL SCHEDULES & LEGEND - HVAC

SHEET NO.
M-501

RWB
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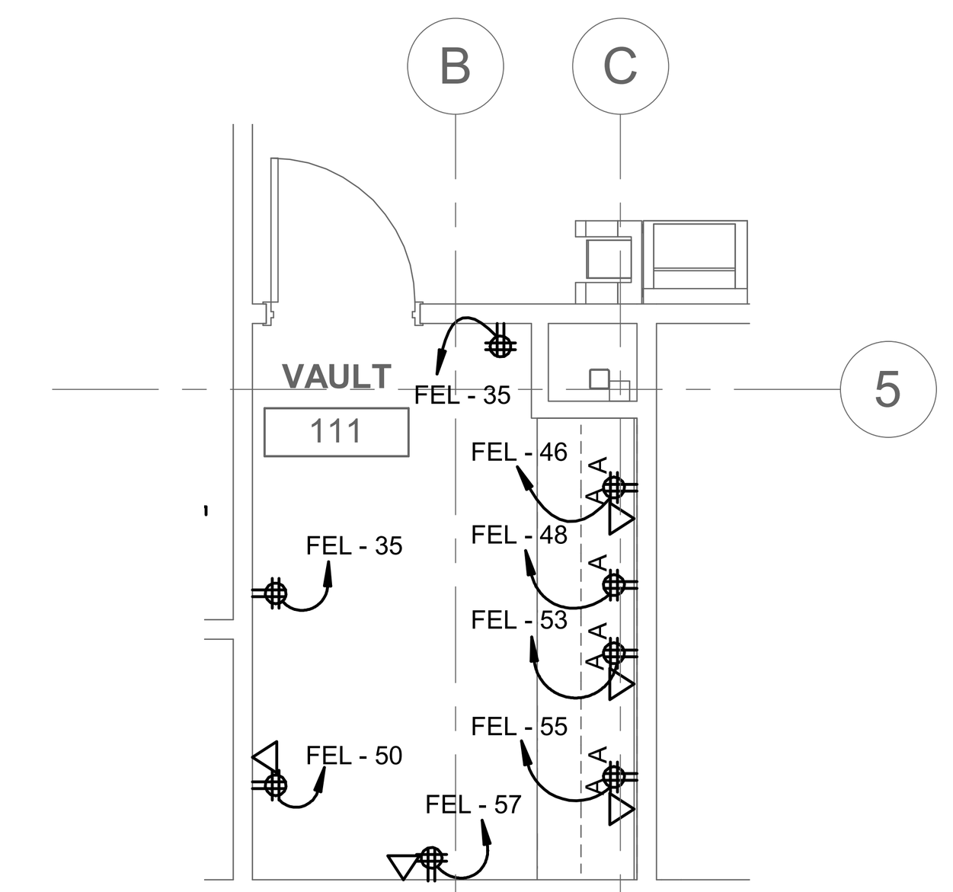
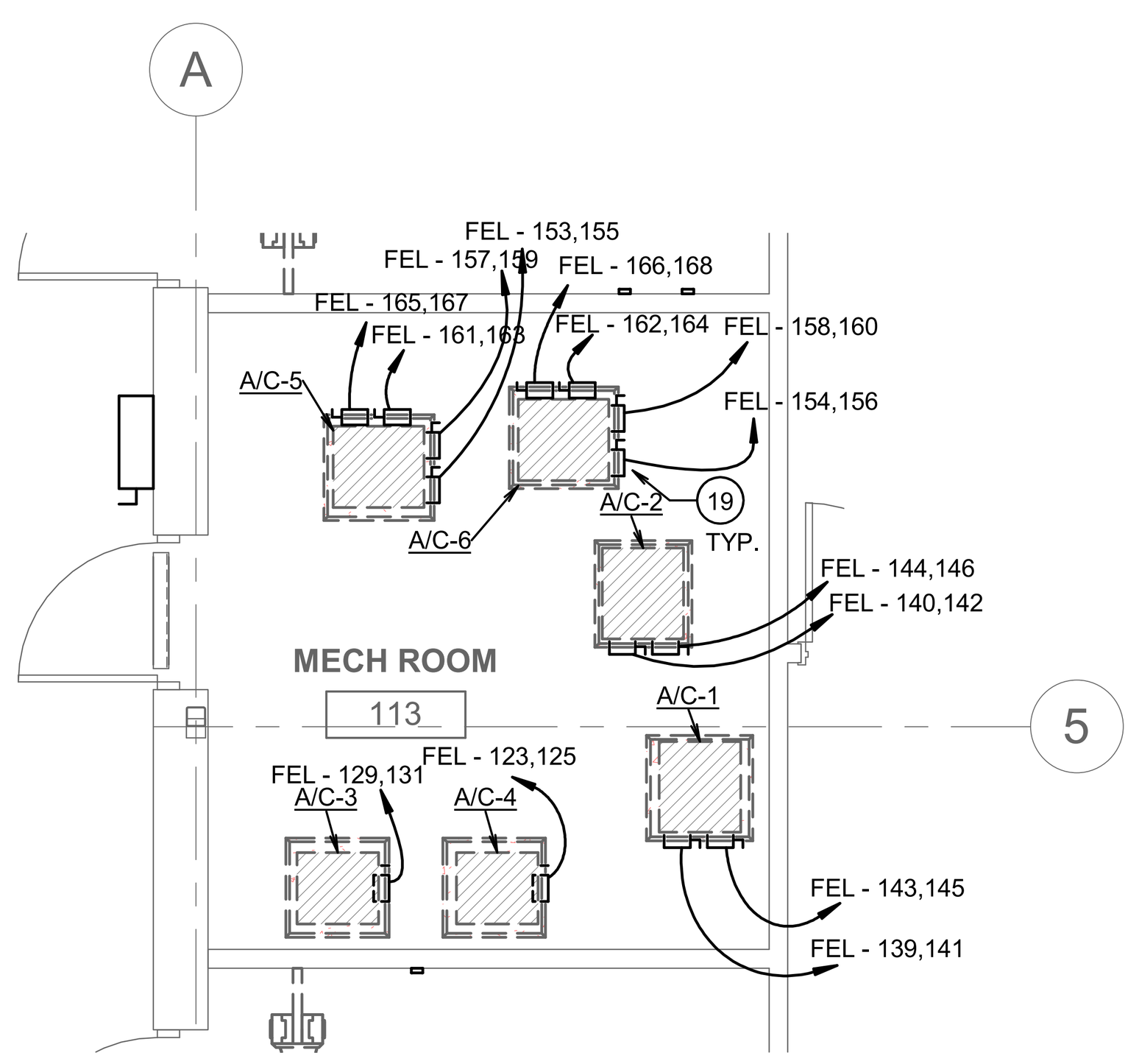
DAVID M. BOON
95609
2021-10-27



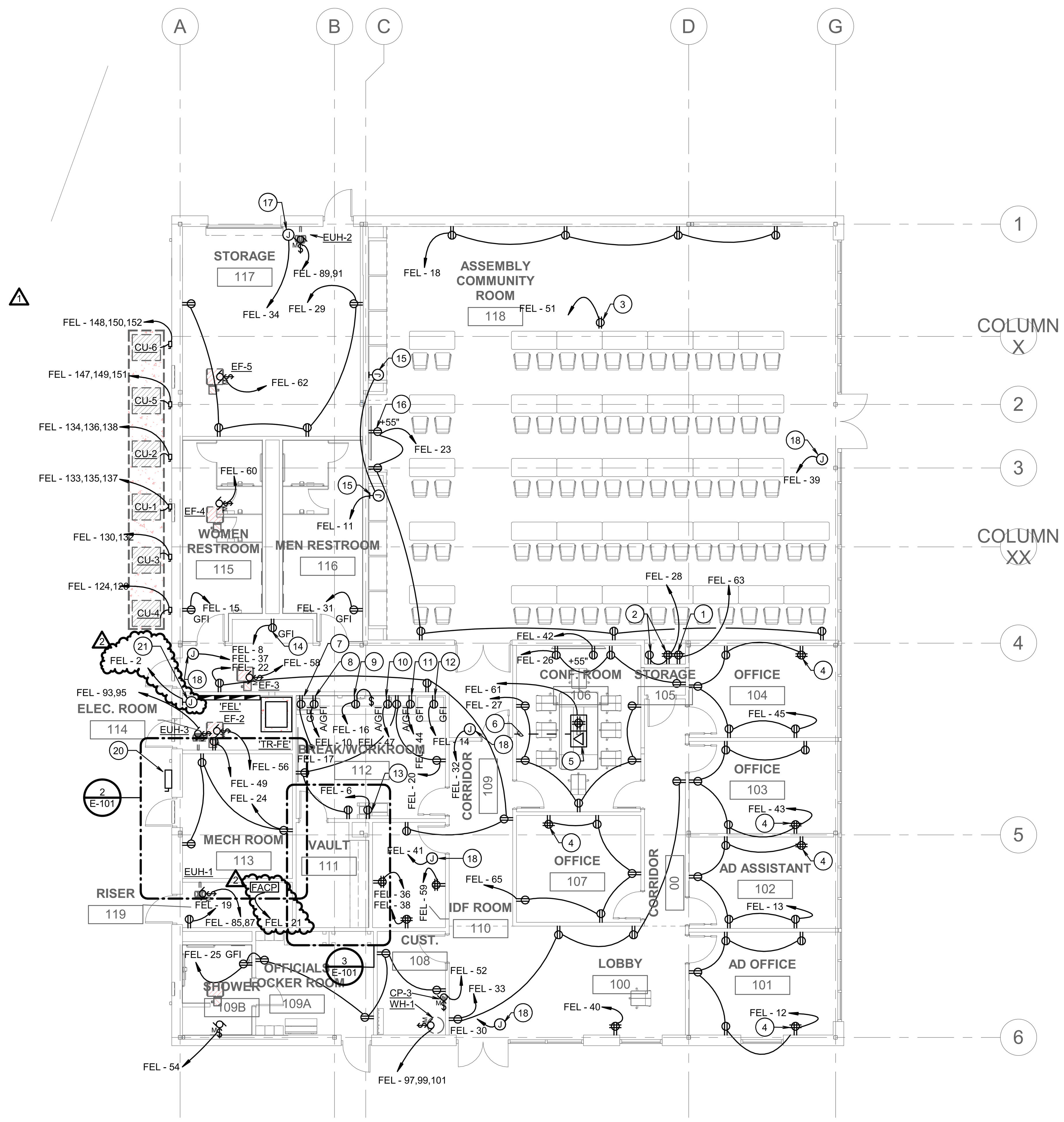
PLAN NORTH TRUE NORTH

3 ENLARGED FLOOR PLAN - VAULT 111 - POWER
SCALE: 1/4" = 1'-0"



PLAN NORTH TRUE NORTH

2 ENLARGED FLOOR PLAN - MECH ROOM 113 - POWER
SCALE: 1/4" = 1'-0"



PLAN NORTH TRUE NORTH

1 FLOOR PLAN - LEVEL 1 - ATHLETIC OFFICE - POWER
SCALE: 1/8" = 1'-0"

NOTES BY SYMBOL '◯':

1. DEDICATED 110V CIRCUIT FOR SOUND SYSTEM AMPLIFIER. REFER TO AV DRAWINGS FOR ADDITIONAL INFORMATION. EXTEND CIRCUIT TO SOUND SYSTEM EQUIPMENT AND MAKE FINAL CONNECTION. ARCHITECT DRAWINGS PRIOR TO ROUGH—IN. COORDINATE INSTALLATION AND EXACT LOCATION WITH AV SYSTEM INSTALLER.
2. ELECTRICAL DEVICE(S) FOR A/V EQUIPMENT. VERIFY EXACT ELECTRICAL REQUIREMENTS WITH EQUIPMENT USED. COORDINATE EXACT HEIGHT AND MOUNTING LOCATION WITH A/V DRAWINGS PRIOR TO ROUGH-IN.
3. 120V RECEPTACLE FOR PROJECTOR. VERIFY EXACT POWER REQUIREMENTS WITH EQUIPMENT MANUFACTURER. COORDINATE EXACT LOCATION WITH AV/TECHNOLOGY SYSTEM INSTALLER PRIOR TO INSTALLATION.
4. QUADRAPLEX RECEPTACLE ADJACENT TO DESK. COORDINATE EXACT LOCATION WITH ARCHITECT
5. RECESSED FLOOR BOX WITH CARPET COVER AND TRIM. PROVIDE WITH (1) ONE QUADRAPLEX RECEPTACLE INSIDE. PROVIDE PROVISIONS FOR UP TO (4) DATA DROPS IN FLOORBOX. COORDINATE COLOR OF COVER AND CARPET TYPE WITH ARCHITECTURAL DRAWINGS. COORDINATE EXACT LOCATION WITH ARCHITECT AND OWNER PRIOR TO INSTALLATION. REFER TO SPECIFICATIONS FOR MORE INFORMATION.
6. (1) CONDUIT BELOW FLOOR FOR POWER, SIZE PER NEC AND (1) 1" CONDUIT FOR DATA. TURN CONDUIT UP IN WALL TO ABOVE CEILING.
7. RECEPTACLE FOR ICE MACHINE. VERIFY EXACT ELECTRICAL REQUIREMENTS WITH MANUFACTURER. VERIFY EXACT LOCATION WITH ARCHITECTURAL DRAWINGS.
8. RECEPTACLE FOR MICROWAVE. VERIFY VOLTAGE AND PHASE OF EQUIPMENT TO BE USED. COORDINATE EXACT ROUGH—IN LOCATION WITH ARCHITECT.
9. RECEPTACLE UNDER COUNTER AT DISPOSAL THRU SWITCH ABOVE COUNTER. VERIFY EXACT ELECTRICAL REQUIREMENTS WITH MANUFACTURER. VERIFY EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH—IN.
10. RECEPTACLE FOR COFFEE MAKER. VERIFY VOLTAGE AND PHASE OF EQUIPMENT TO BE USED.
11. RECEPTACLE UNDER COUNTER AT DISHWASHER. VERIFY EXACT ELECTRICAL REQUIREMENTS WITH MANUFACTURER. VERIFY EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH—IN.
12. RECEPTACLE FOR REFRIGERATOR. VERIFY VOLTAGE AND PHASE OF EQUIPMENT TO BE USED.
13. 120V RECEPTACLE FOR COPIER. PROVIDE PLUG PER MANUFACTURERS RECOMMENDATIONS. ELECTRICAL CONTRACTOR TO MAKE FINAL CONNECTION. COORDINATE EXACT LOCAL ON WITH ARCHITECT.
14. GFCI RECEPTACLE FOR ELECTRIC WATER COOLER. MOUNT PER MANUFACTURER'S TEMPLATE.
15. PROVIDE 120V POWER FOR PRE-MANUFACTURED DISPLAY CASE. DISPLAY CASE TO BE CONTROLLED WITH ASSEMBLY COMMUNITY ROOM LIGHTS. COORDINATE EXACT ELECTRICAL REQUIREMENTS WITH MANUFACTURER. COORDINATE EXACT ROUGH-IN LOCATION WITH ARCHITECT.
16. RECEPTACLE FOR TV. COORDINATE EXACT MOUNTING HEIGHT WITH ARCHITECT. COORDINATE EXACT ELECTRICAL REQUIREMENTS WITH EQUIPMENT USED.
17. PROVIDE 120V POWER, DISCONNECT, AND CONTROLS FOR OVERHEAD DOOR. VERIFY VOLTAGE AND PHASE OF DOOR MOTOR PRIOR TO INSTALL. CONTROLS SHALL BE MOUNTED NEAR DOOR OPENING AT 42" AFF. VERIFY EXACT LOCATION WITH ARCHITECT.
18. PROVIDE 120V/20A CONNECTION FOR ELECTRICAL DOOR HARDWARE.
19. PROVIDE 208V POWER FOR HEATING ELEMENT OF INDOOR UNIT OF SPLIT SYSTEM. COORDINATE WITH MECHANICAL DRAWINGS FOR HEATING ELEMENTS WITH MULTIPLE CIRCUITS.
20. TRANSFORMER PRIMARY DISCONNECT SWITCH. PROVIDE 400A NEMA 3R RATED DISCONNECT SWITCH.
21. (2) PROVIDE 120V POWER FOR EMS SYSTEM IN ATHLETIC OFFICE MAIN ELECTRICAL ROOM. COORDINATE EXACT ELECTRICAL REQUIREMENTS WITH EMS SYSTEM PROVIDER. EMS SYSTEM CONDUIT TO UNITS BY EMS SYSTEM INSTALLER. REFER TO MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.

REFER TO TECHNOLOGY DRAWINGS FOR TECHNOLOGY DEVICE LOCATIONS, ADDITIONAL RACEWAY REQUIREMENTS, AUDIO/VISUAL EQUIPMENT AND ADDITIONAL INFORMATION.

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OWP PROJECT NO. 2021-154-00
DATE OF ISSUE 10.07.2021

REVISIONS

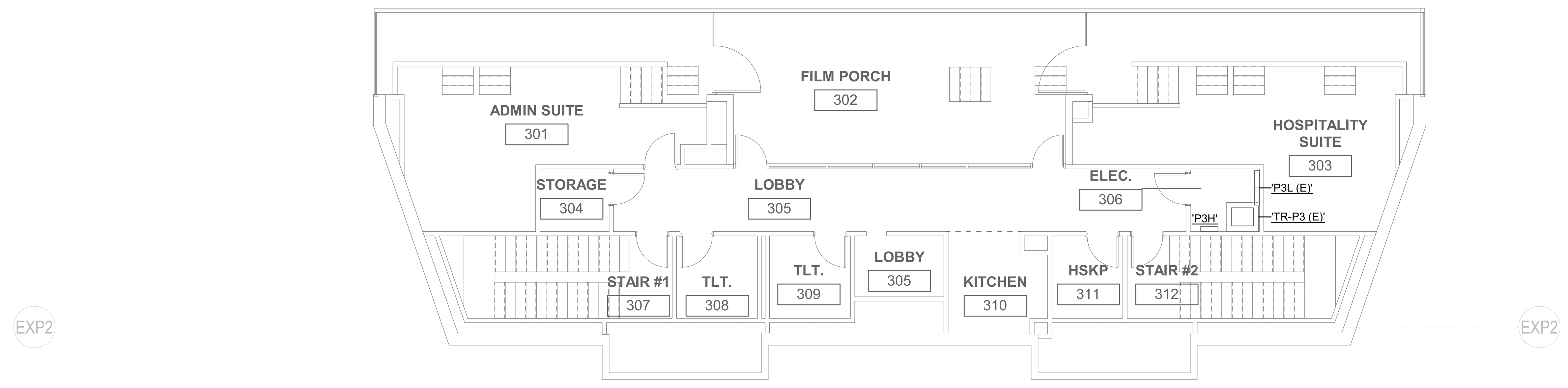
DELTA	DESCRIPTION	DATE
1	ADDENDUM 02	10/18/2021
2	ADDENDUM 03	10/27/2021

PROJECT TEAM: ED TEXAS
DRAWN BY: CI

PROJECT PHASE
CONSTRUCTION DOCUMENTS

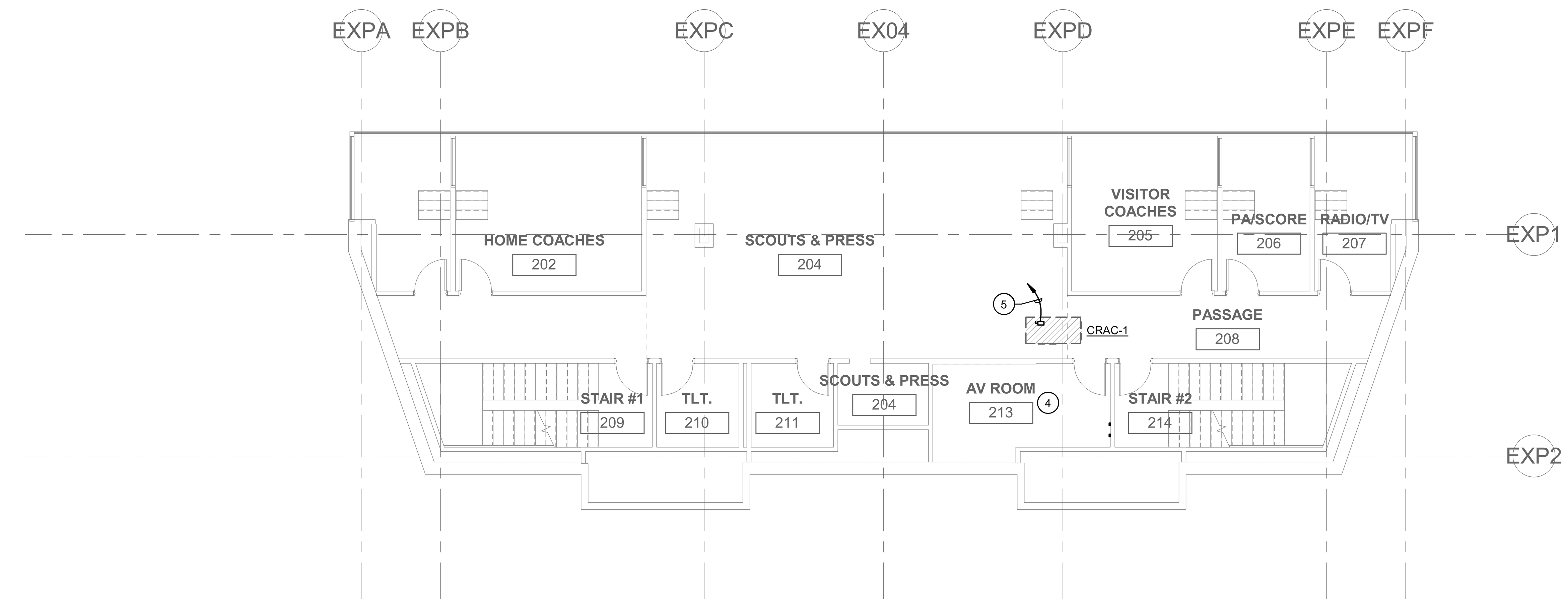
SHEET CONTENTS
FLOOR PLAN - LEVEL 1 - ATHLETIC OFFICE - POWER

SHEET NO.
E-101



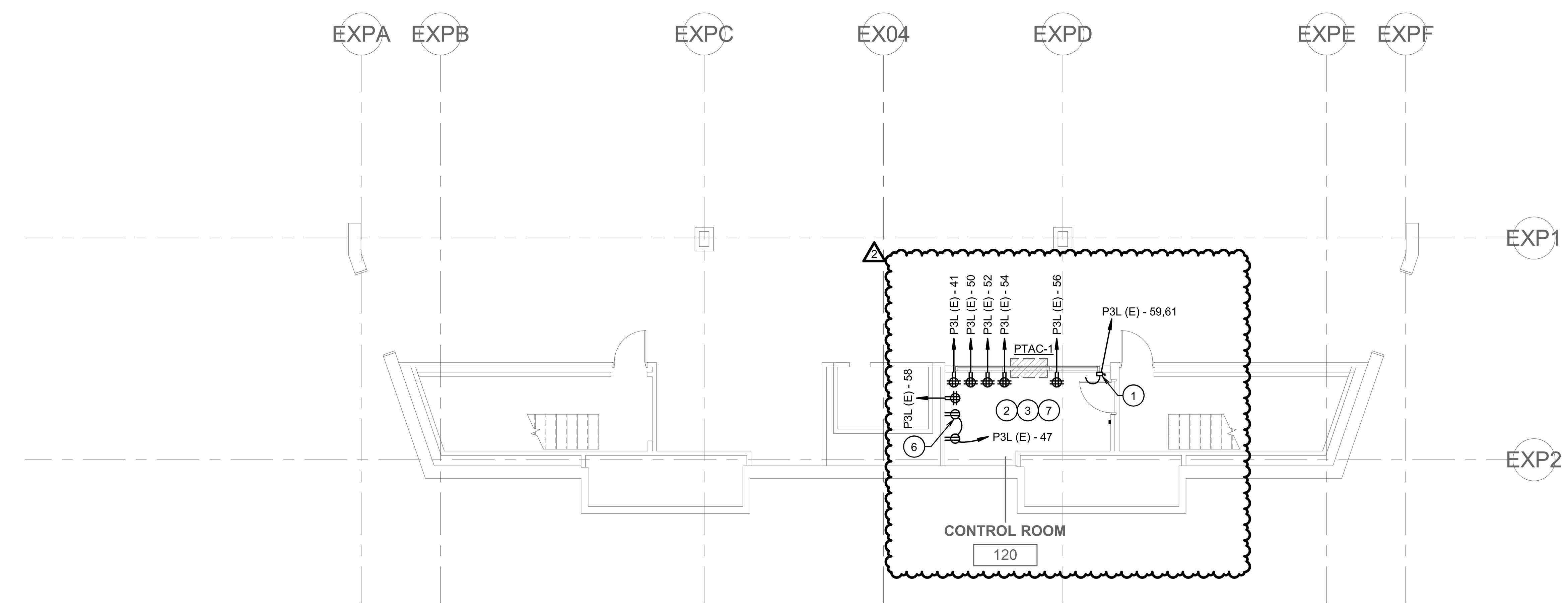
PLAN NORTH
TRUE NORTH

1 FLOOR PLAN - UPPER LEVEL - PRESS BOX - POWER
SCALE: 1/8" = 1'-0"



PLAN NORTH
TRUE NORTH

2 FLOOR PLAN - LOWER LEVEL - PRESS BOX - POWER
SCALE: 1/8" = 1'-0"



PLAN NORTH
TRUE NORTH

3 FLOOR PLAN - LOWER LEVEL - PRESS BOX - POWER
SCALE: 1/8" = 1'-0"

NOTES BY SYMBOL '◯':

1. PROVIDE 208V/1PH POWER AND 30A/2P/NF DISCONNECT SWITCH FOR PACKAGE TERMINAL AIR CONDITIONER (PTAC). REFER TO MECHANICAL DRAWINGS FOR MORE INFORMATION. COORDINATE ALL ELECTRICAL REQUIREMENTS WITH MECHANICAL CONTRACTOR AND EQUIPMENT PROVIDER.
2. COORDINATE EXACT ELECTRICAL DEVICE LOCATIONS FOR ALL NEW DEVICES IN THIS ROOM WITH NEW CONTROL ROOM EQUIPMENT TO BE PROVIDED PRIOR TO ROUGH-IN. PROVIDE SHOP DRAWINGS PROPOSING ROUGH-IN LOCATIONS FOR NEW ELECTRICAL OUTLETS. ARCHITECT AND OWNER'S IT DEPARTMENT ARE TO REVIEW AND APPROVE ALL NEW ELECTRICAL DEVICE LOCATIONS PRIOR TO ROUGH-IN.
3. FOR ALL NEW CIRCUITS TO THIS ROOM, ELECTRICAL CONTRACTOR SHALL PROVIDE SHOP DRAWINGS PROPOSING ELECTRICAL CONDUIT ROUTING FROM THIS ROOM TO EXISTING ELECTRICAL ROOM ON THE UPPER PRESS BOX LEVEL. THESE SHOP DRAWINGS SHALL BE SUBMITTED TO OWNER, ARCHITECT, AND ENGINEER FOR REVIEW. OWNER SHALL APPROVE CONDUIT ROUTING PRIOR TO ROUGH-IN.
4. DISCONNECT EXISTING ELECTRICAL CONNECTION TO EXISTING CRAC UNIT IN AV ROOM. PREPARE EXISTING ELECTRICAL FEEDER FOR EXTENSION TO NEW CRAC UNIT 'CRAC-1' IN NEW LOCATION.
5. EXTEND EXISTING ELECTRICAL FEEDER FROM EXISTING PANEL 'P3L' TO NEW CRAC UNIT. PROVIDE 30A/2P/NF DISCONNECT SWITCH AT UNIT.
6. DISCONNECT AND REMOVE EXISTING RECEPTACLE ON ELEVATOR WALL. REMOVE ALL ASSOCIATED RACEWAY, CONDUCTORS, HANGERS, AND SUPPORTS BACK TO SOURCE. PROVIDE NEW RECEPTACLE IN THE SAME LOCATION AS INDICATED.
7. ELECTRICAL CONTRACTOR SHALL COORDINATE ALL INSTALLATION OF RACEWAY ON EXISTING WALLS IN THIS ROOM WITH ARCHITECT PRIOR TO ROUGH-IN. EXISTING WALLS ARE BRICK AND STONE AND MAY REQUIRE ARCHITECTURAL FURR OUT. REFER TO ARCHITECTURAL PACKAGE FOR MORE INFORMATION.

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1	ADDENDUM 02	10/18/2021
2	ADDENDUM 03	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	Author

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
FLOOR PLAN - PRESS BOX - POWER

SHEET NO.
E-103 (1)

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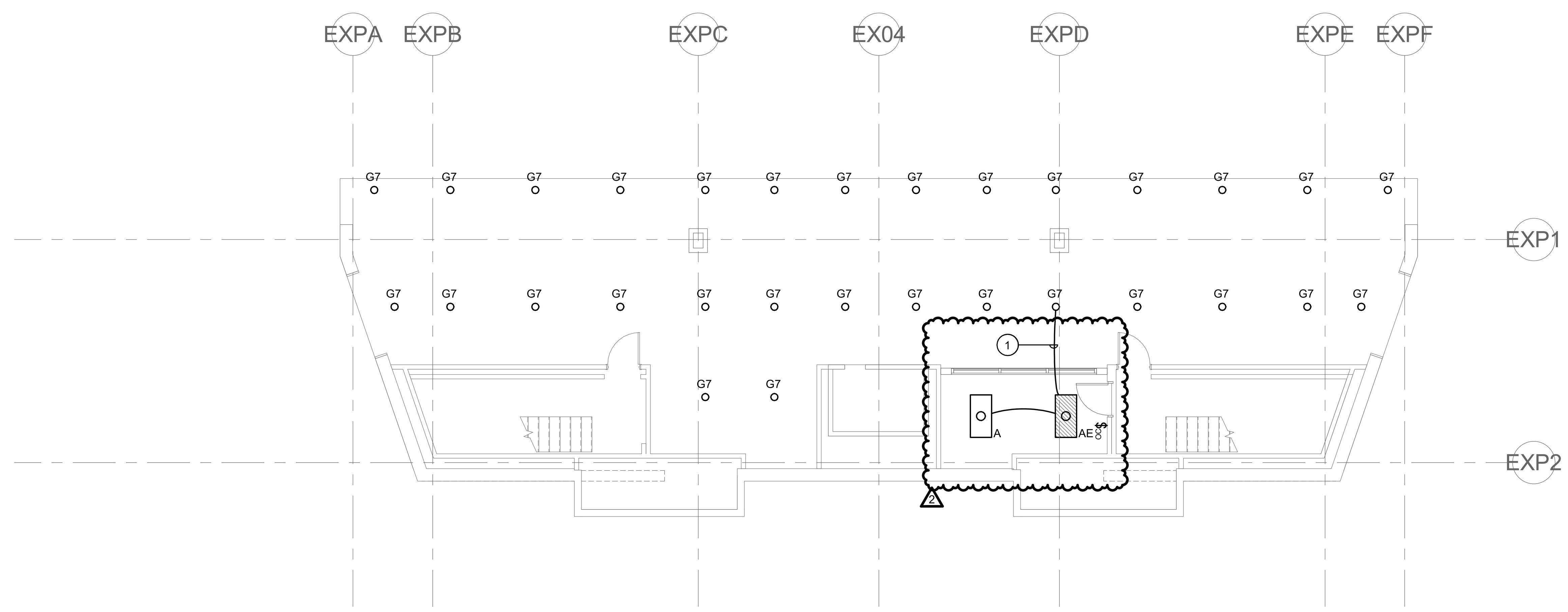

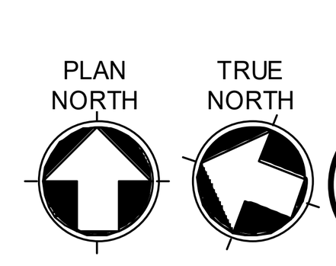

1 PRESS BOX PORCH LEVEL FLOOR PLAN - LIGHTING
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

1. ALL LIGHTING ON THIS SHEET TO BE RELAMPED WITH NEW LED LAMPS. CONFIRM EXACT REQUIREMENTS TO RELAMP FIXTURES PRIOR TO ORDERING.

NOTES BY SYMBOL '◯':

(1) CONNECT TO EXISTING LIGHTING CIRCUIT IN AREA. PROVIDE 2#12, 1#12G, 3/4"C

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REVISIONS

DELTA	DESCRIPTION	DATE
2	ADDENDUM 03	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	Author

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
FLOOR PLAN - LEVEL 2 - PRESS BOX - LIGHTING

SHEET NO.
E-213

FILE PATH: C:\Revit Local Files\2021\21056-Midlothian ISD Stadium Add & Reno-RWB-r2021_cinmanEPS2K.rvt
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PLOT SCALE: 1/8" = 1'-0"

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Project 21056-00

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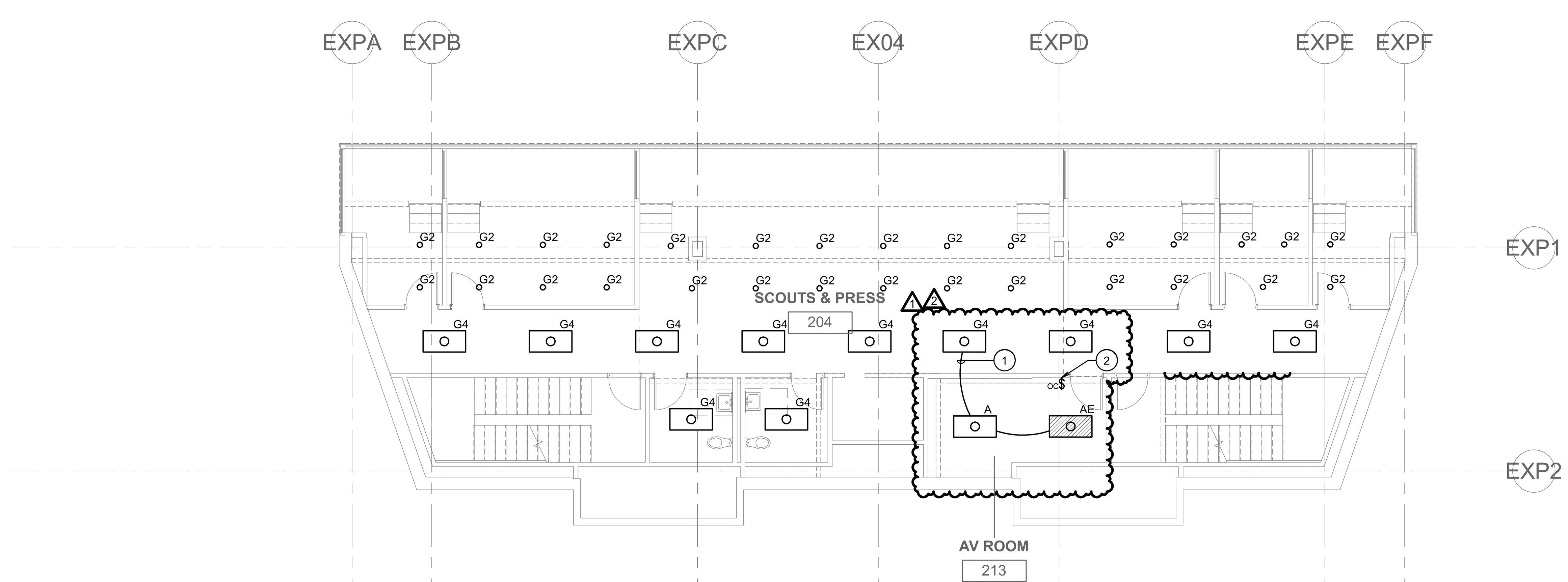

PLAN NORTH

TRUE NORTH

1 PRESS BOX LOWER LEVEL FLOOR PLAN - LIGHTING

SCALE: 1/8" = 1'-0"

GENERAL NOTES:

1. ALL LIGHTING ON THIS SHEET TO BE RELAMPED WITH NEW LED LAMPS. CONFIRM EXACT REQUIREMENTS TO RELAMP FIXTURES PRIOR TO ORDERING.

NOTES BY SYMBOL '○':

1. CONNECT TO EXISTING LIGHTING CIRCUIT IN AREA. PROVIDE 2#12, 1#12G, 3/4"C
2. DISCONNECT AND REMOVE EXISTING TOGGLE LIGHT SWITCH. PROVIDE NEW LV LIGHT SWITCH WITH INTEGRAL VACANCY SENSOR IN SAME LOCATION. REUSE EXISTING JUNCTION BOX AND RACEWAY WHERE POSSIBLE. FIELD VERIFY EXISTING CONDITIONS PRIOR TO ROUGH-IN.

MIDLOTHIAN ISD

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PROJECT TEAM	DRAWN BY
ED TEXAS	Author

PROJECT PHASE

CONSTRUCTION DOCUMENTS

SHEET CONTENTS

FLOOR PLAN - LEVEL 3 - PRESS BOX - LIGHTING

SHEET NO.

E-223

PANEL: FEL

Location:	ELEC. ROOM 114	**Volts:**	120/208 Wye	**A.I.C. Rating:**	22,000 A.I.C.
Supply From:	TR-FE	**Phases:**	3	**Mains Type:**	MCB
Mounting:	SURFACE	**Wires:**	4	**Mains Rating:**	600.0 A
Enclosure:	NEMA 1	**Sections:**	4		

CKT	REM	Load Name	BKR	Poles	Wire Size	A		B		C		Wire Size	Poles	BKR	Load Name	REM	CKT
1		EXIT SIGN LIGHTING	20	1	2 #12, #12G, 3/4" C	25	500					2#12, 1#12G, 3/4"C	1	20	EMS (OFFICE)		2
3		Lighting	20	1	2 #12, #12G, 3/4" C			126	500			2#12, 1#12G, 3/4"C	1	20	EMS (FIELDHOUSE)		4
5		Lighting	20	1	2 #12, #12G, 3/4" C					717	180	2 #12, #12G, 3/4" C	1	20	112 COPIER		6
7		Lighting	20	1	2 #12, #12G, 3/4" C	505	180					2 #12, #12G, 3/4" C	1	20	109 WATERCOOLER		8
9		Lighting	20	1	2 #12, #12G, 3/4" C			731	180			2 #12, #12G, 3/4" C	1	20	MICROWAVE		10
11		TROPHY CASE	20	1	2 #12, #12G, 3/4" C					1000	1080	2 #12, #12G, 3/4" C	1	20	101 QUAD RCPT		12
13		102 QUAD RCPT	20	1	2 #12, #12G, 3/4" C	1080	180					2 #12, #12G, 3/4" C	1	20	REFRIGERATOR		14
15		W RR 115 RCPT	20	1	2 #12, #12G, 3/4" C			180	180			2 #12, #12G, 3/4" C	1	20	GARBAGE...		16
17		ICE MAKER	20	1	2 #12, #12G, 3/4" C					180	720	2 #12, #12G, 3/4" C	1	20	ASSEMBLY 118...		18
19		RISER 119 RCPT	20	1	2 #12, #12G, 3/4" C	180	720					2 #12, #12G, 3/4" C	1	20	112 BREAKRM...		20
21		FACP RISER 119	20	1	2 #12, #12G, 3/4" C			500	720			2 #12, #12G, 3/4" C	1	20	HALLWAY 109...		22
23		118 RCPTS & TV	20	1	2 #12, #12G, 3/4" C					900	540	2 #12, #12G, 3/4" C	1	20	113 MECH RM...		24
25		108 & 109 RCPTS	20	1	2 #12, #12G, 3/4" C	900	540					2 #12, #12G, 3/4" C	1	20	105 & 106 RCPTS		26
27		CONF. 106 RCPTS	20	1	2 #12, #12G, 3/4" C			900	540			2 #12, #12G, 3/4" C	1	20	118 AV RACK		28
29		STORAGE 117...	20	1	2 #12, #12G, 3/4" C					720	500	2 #12, #12G, 3/4" C	1	20	DOOR - LOBBY 100		30
31		M RR 116 RCPT	20	1	2 #12, #12G, 3/4" C	180	500					2 #12, #12G, 3/4" C	1	20	DOOR - INT. HALL...		32
33		LOBBY RCPTS	20	1	2 #12, #12G, 3/4" C			720	500			2 #12, #12G, 3/4" C	1	20	STORAGE 117 DOOR		34
35		VAULT 111 RCPT	20	1	2 #12, #12G, 3/4" C					720	360	2 #12, #12G, 3/4" C	1	20	IDF 110 RCPT		36
37		DOOR - EXT. HALL...	20	1	2 #12, #12G, 3/4" C	500	360					2 #12, #12G, 3/4" C	1	20	IDF 110 RCPT		38
39		DOOR - ASSEMBLY	20	1	2 #12, #12G, 3/4" C			500	360			2 #12, #12G, 3/4" C	1	20	LOBBY DESK QUAD		40
41		DOOR - IDF 110	20	1	2 #12, #12G, 3/4" C					500	180	2 #12, #12G, 3/4" C	1	20	CONF. 106 TV		42
43		103 QUAD RCPT	20	1	2 #12, #12G, 3/4" C	1080	180					2 #12, #12G, 3/4" C	1	20	DISHWASHER		44
45		104 QUAD RCPT	20	1	2 #12, #12G, 3/4" C			1080	360			2 #12, #12G, 3/4" C	1	20	VAULT 111 RCPT		46
47		COFFEE MAKER	20	1	2 #12, #12G, 3/4" C					180	360	2 #12, #12G, 3/4" C	1	20	VAULT 111 RCPT		48
49		114 ELEC RM RCPT	20	1	2 #12, #12G, 3/4" C	180	360					2 #12, #12G, 3/4" C	1	20	VAULT 111 RCPT		50
51		118 - PROJECTOR	20	1	2 #12, #12G, 3/4" C			180	528			2 #12, #12G, 3/4" C	1	20	CP-1	2	52
53		VAULT 111 RCPT	20	1	2 #12, #12G, 3/4" C					360	696	2 #12, #12G, 3/4" C	1	20	EF-1	2	54
55		VAULT 111 RCPT	20	1	2 #12, #12G, 3/4" C	360	1176					2 #12, #12G, 3/4" C	1	20	EF-2	2	56
57		VAULT 111 RCPT	20	1	2 #12, #12G, 3/4" C			360	696			2 #12, #12G, 3/4" C	1	20	EF-3	2	58
59		IDF 110 RCPT	20	1	2 #12, #12G, 3/4" C					360	1176	2 #12, #12G, 3/4" C	1	20	EF-4	2	60
61		106 FLOOR RCPT	20	1	2 #12, #12G, 3/4" C	360	1176					2 #12, #12G, 3/4" C	1	20	EF-5	2	62
63		118 AV RACK	20	1	2 #12, #12G, 3/4" C			360	0			--	1	20	Spare	--	64
65		OFFICE 107 RCPTS	20	1	2 #12, #12G, 3/4" C					1080	0	--	1	20	Spare	--	66
67	--	Spare	20	1	--	0	0					--	1	20	Spare	--	68
69	--	Spare	20	1	--			0	0			--	1	20	Spare	--	70
71	--	Spare	20	1	--					0	0	--	1	20	Spare	--	72
73	--	Spare	20	1	--	0	0					--	1	20	Spare	--	74
75	--	Spare	20	1	--			0	0			--	1	20	Spare	--	76
77	--	Spare	20	1	--					0	0	--	1	20	Spare	--	78
79	--	Spare	20	1	--	0	0					--	1	20	Spare	--	80
81	--	Spare	20	1	--			0	0			--	1	20	Spare	--	82
83	--	Spare	20	1	--					0	0	--	1	20	Spare	--	84
85	2	EUH-1	20	2	2 #12, #12G, 3/4" C	1000	--					--	1	--	Space	--	86
87								1000	--			--	1	--	Space	--	88
89	2	EUH-2	30	2	2 #10, #10G, 3/4" C					2500	--	--	1	--	Space	--	90
91						2500	--					--	1	--	Space	--	92
93	2	EUH-3	20	2	2 #12, #12G, 3/4" C			1500	--			--	1	--	Space	--	94
95										1500	--	--	1	--	Space	--	96
97	2	WH-1	20	3	3 #12, #12G, 3/4" C	2000	--					--	1	--	Space	--	98
99								2000	--			--	1	--	Space	--	100
101										2000	--	--	1	--	Space	--	102
103	--	Space	--	1	--	--	--					--	1	--	Space	--	104
105	--	Space	--	1	--			--	--			--	1	--	Space	--	106
107	--	Space	--	1	--					--	--	--	1	--	Space	--	108
109	--	Space	--	1	--	--	--					--	1	--	Space	--	110
111	--	Space	--	1	--			--	--			--	1	--	Space	--	112
113	--	Space	--	1	--					--	--	--	1	--	Space	--	114
115	--	Space	--	1	--	--	--					--	1	--	Space	--	116
117	--	Space	--	1	--			--	--			--	1	--	Space	--	118
119	--	Space	--	1	--					--	--	--	1	--	Space	--	120
121	--	Space	--	1	--	--	--					--	1	--	Space	--	122
123	2	AC-4	50	2	2#6,#10G,3/4"C			4888	1394			2 #12, #12G, 3/4" C	2	20	CU-4	2	124
125										4888	1394						126
127	--	Spare	20	1	--	0	0					--	1	20	Spare	--	128
129	2	AC-3	50	2	2#6,#10G,3/4"C			4888	1394			2 #12, #12G, 3/4" C	2	20	CU-3	2	130
131										4888	1394						132
133	2	CU-1	30	3	3#10,#10G,3/4"C	2159	1799					3#10,#10G,3/4"C	3	25	CU-2	2	134
135								2159	1799								136
137										2159	1799						138
139	2	AC1 - HEAT 1	60	2	2#4,#10G,3/4"C	5200	5200					2#4,#10G,3/4"C	2	50	AC2 - HEAT 1	2	140
141								5200	5200								142
143	2	AC1 - HEAT 2	45	2	2#6,#10G,3/4"C					5200	5200	2#6,#10G,3/4"C	2	45	AC2 - HEAT 2	2	144
145						5200	5200										146
147	2	CU-5	35	3	3#8,#10G,3/4"C			2639	0			3#8,#10G,3/4"C	3	35	CU-6	2	148
149										2639	0						150
151						2639	0										152
153	2	AC5 - HEAT 1	40	2	2#8,#10G,3/4"C			4160	4160			2#8,#10G,3/4"C	2	40	AC6 - HEAT 1	2	154
155										4160	4160						156
157	2	AC5 - HEAT 2	30	2	2#10,#10G,3/4"C	3224	3224					2#10,#10G,3/4"C	2	30	AC6 - HEAT 2	2	158
159								3224	3224								160
161	2	AC5 - HEAT 3	30	2	2#10,#10G,3/4"C					3224	3224	2#10,#10G,3/4"C	2	30	AC6 - HEAT 3	2	162
163						3224	3224										164
165	2	AC5 - HEAT 4	30	2	2#10,#10G,3/4"C			3224	3224			2#10,#10G,3/4"C	2	30	AC6 - HEAT 4	2	166
167										3224	3224						168
					Total Load:	57,015 VA		65,477 VA		69,285 VA							
					Total Amps:	475.1 A		556.5 A		588.2 A							

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Lighting	2,104 VA	125.00%	2,630 VA		
Motor	21,448 VA	106.99%	22,948 VA	**Total Conn. Load:**	191,778 VA
Non-Coincidental	25,366 VA	0.01%	3 VA	**Total Est. Demand:**	160,501 VA
Other	500 VA	100.00%	500 VA	**Total Conn. Current:**	532.3 A
Receptacle	25,880 VA	69.32%	17,940 VA	**Total Est. Demand Current:**	445.5 A
Heating Space	116,480 VA	100.00%	116,480 VA		

General Notes:
A. PROVIDE FEED-THROUGH LUGS FOR FUTURE EXPANSION.
B. PROVIDE FULL SIZED PHASE, NEUTRAL AND GROUND BUSSES.

Remarks:
1. PROVIDE GFCI CIRCUIT BREAKER.
2. PROVIDE CIRCUIT BREAKER AND / OR FUSES PER EQUIPMENT MANUFACTURER'S SPECIFICATIONS.
3. BRANCH CIRCUIT SHALL BE 2 #12 & #12 GROUND IN 3/4" CONDUIT.
4. BRANCH CIRCUIT ROUTED THROUGH AND CONTROLLED BY SECONDARY CONTACTOR.
5. BRANCH CIRCUIT ROUTED THROUGH AND CONTROLLED BY UTILITY LAB CONTROLLER.

LIGHTING FIXTURE SCHEDULE

Type	Description	Manufacturer	Model	Lamp	Voltage	Wattage	Mounting/Comments
A	LED RECESSED 2X4 LIGHT FIXTURE	METALUX	24RTC-48-UNV-L835-CD-U	LED	UNV	39 W	RECESSED
A2	LED RECESSED 2X2 LIGHT FIXTURE	METALUX	22RTC-48-UNV-L835-CD-U	LED	UNV	37 W	RECESSED
AE	LED RECESSED 2X4 LIGHT FIXTURE WITH EMERGENCY BATTERY PACK	METALUX	24RTC-48-UNV-L835-CD-U	LED	UNV	39 W	RECESSED
B	LED RECESSED LINEAR FIXTURE	NEO-RAY	S124DR-S1020D835-GYP4F0-1-UDD	LED	UNV	36 W	RECESSED
BE	LED RECESSED LINEAR FIXTURE	NEO-RAY	S124DR-S1020D835-GYP4F0-1B2-UDD	LED	UNV	36 W	RECESSED
CE	LED SUSPENDED INDUSTRUAL 4' LIGHT FIXTURE	METALUX	4SNLED-LD5-52S-LC-UNV-EL14W-L835-CD1-U-SCF	LED	UNV	41 W	SUSPENDED
D	6" EXTERIOR DOWN LIGHT, WET LOCATION	HALO	HC620D010-HM612835-61MDH	LED	UNV	21 W	RECESSED
D2	8" DOWN LIGHT	HALO	HC820D010-HM81520835-81MD	LED	UNV	21 W	RECESSED
D2E	8" DOWN LIGHT WITH EMERGENCY BATTERY	HALO	HC820D010REM14-HM81520835-81MD	LED	UNV	21 W	RECESSED
DE	6" EXTERIOR DOWN LIGHT, WET LOCATION, WITH EMERGENCY BATTERY	HALO	HC620D010REM14-HM612835-61MDH	LED	UNV	21 W	RECESSED
F	LED WALLPACK LIGHT FIXTURE, WET LOCATION	RAB LIGHTING	SLIM-FC-37-N	LED	UNV	35 W	WALL MOUNTED
G1	EXISTING SUSPENDED FIXTURE TO BE RELAMPED	GREEN CREATIVE	13T8/4F/840/BYP	LED			
G2	EXISTING DOWN LIGHT TO BE RELAMPED	GREEN CREATIVE	9PLO/840/HYBM	LED			
G4	EXISTING 2X4 FIXTURE TO BE RELAMPED	GREEN CREATIVE	13T8/4F/840/GL/BYP	LED			
G5	EXISTING SURFACE MOUNTED LINEAR FIXTURE TO BE RELAMPED	GREEN CREATIVE	13T8/4F/840/BYP	LED			
G6	EXISTING DOWN LIGHT TO BE RELAMPED, PROVIDE EMERGENCY DRIVER FOR EMERGENCY FIXTURES	GREEN CREATIVE	17PLV/840/DIR	LED			
G7	EXISTING 8" DOWN LIGHT TO BE RELAMPED	GREEN CREATIVE	34HID/840/277/E26/DIM	LED			
X	EXIT SIGN, REFER TO PLANS FOR FACES AND ARROW CONFIGURATIONS	SURE-LITES	APXH7R	LED	MVOLT	5 W	REFER TO PLANS

NOTES:

1. ALL G FIXTURE TYPES ARE EXISTING FIXTURES TO BE RELAMPED. VERIFY COMPATIBILITY OF SCHEDULED LED LAMP WITH EXISTING FIXTURE PRIOR TO PURCHASING. ANY FIXTURES UNABLE TO BE RELAMPED WITH LED FIXTURES ARE TO BE REPLACED WITH EQUAL LED FIXTURE. ALL EXISTING FIXTURES SHOWN ARE TO BE RELAMPED. IF UNABLE TO BE RELAMPED, ARE TO BE REPLACED BY NEW LED FIXTURE.

PANEL: P3L (E)

Location:	ELEC. 306	**Volts:**	120/208 Wye	**A.I.C. Rating:**	FIELD VERIFY
Supply From:	TR-P3 (E)	**Phases:**	3	**Mains Type:**	MCB
Mounting:	SURFACE	**Wires:**	4	**Mains Rating:**	150.0 A
Enclosure:	NEMA 1	**Sections:**	2		

CKT	REM	Load Name	BKR	Poles	Wire Size	A		B		C		Wire Size	Poles	BKR	Load Name	REM	CKT
1	--	*EXISTING LOAD*	20	1	--	0	0					--	1	20	*EXISTING LOAD*	--	2
3	--	*EXISTING LOAD*	20	1	--			0	0			--	1	20	*EXISTING LOAD*	--	4
5	--	*EXISTING LOAD*	20	1	--					0	0	--	1	20	*EXISTING LOAD*	--	6
7	--	*EXISTING LOAD*	20	1	--	0	0					--	1	20	*EXISTING LOAD*	--	8
9	--	*EXISTING LOAD*	20	1	--			0	0			--	1	20	*EXISTING LOAD*	--	10
11	--	*EXISTING LOAD*	20	1	--					0	0	--	1	20	*EXISTING LOAD*	--	12
13	--	*EXISTING LOAD*	20	1	--	0	0					--	1	20	*EXISTING LOAD*	--	14
15	--	*EXISTING LOAD*	20	1	--			0	0			--	1	20	*EXISTING LOAD*	--	16
17	--	*EXISTING LOAD*	20	1	--					0	0	--	1	20	*EXISTING LOAD*	--	18
19	--	*EXISTING LOAD*	20	1	--	0	0					--	1	20	*SPARE*	--	20
21	--	*EXISTING LOAD*	20	1	--			0	0			--	1	20	*EXISTING LOAD*	--	22
23	--	*EXISTING LOAD*	20	1	--					0	0	--	1	20	*EXISTING LOAD*	--	24
25	--	*EXISTING LOAD*	20	1	--	0	0					--	1	20	*EXISTING LOAD*	--	26
27	--	*EXISTING LOAD*	20	1	--			0	0			--	1	20	*EXISTING LOAD*	--	28
29	--	*EXISTING LOAD*	20	1	--					0	0	--	1	20	*EXISTING LOAD*	--	30
31	--	*EXISTING LOAD*	20	1	--	0	0					--	1	20	*EXISTING LOAD*	--	32
33	--	*EXISTING LOAD*	20	1	--			0	0			--	1	20	*EXISTING LOAD*	--	34
35	--	*EXISTING LOAD*	20	1	--					0	0	--	1	20	*EXISTING LOAD*	--	36
37	--	*SPARE*	20	1	--	0	0					--	1	20	*EXISTING LOAD*	--	38
39	--	*EXISTING LOAD*	20	1	--			0	0			--	1	20	*EXISTING LOAD*	--	40
41	**1**	**CTRL RM QUAD**	**20**	**1**	**2#12, 1#12G, 3/4"C**					360	0	--	1	20	*EXISTING LOAD*	--	42
43	--	*EXISTING LOAD*	25	2	--	0	0					--	2	20	*EXISTING LOAD*	--	44
45								0	0								46
47	**1**	**CTRL RM RCPT**	**20**	**1**	**2#12, 1#12G, 3/4"C**					360	0	--	1	20	*EXISTING LOAD*	--	48
49	--	*EXISTING LOAD*	20	1	--	0	360					**2#12, 1#12G, 3/4"C**	**1**	**20**	**CTRL RM QUAD**	**1**	50
51	--	*EXISTING LOAD*	20	1	--			0	360			**2#12, 1#12G, 3/4"C**	**1**	**20**	**CTRL RM QUAD**	**1**	52
53	--	*EXISTING LOAD*	20	1	--					0	360	**2#12, 1#12G, 3/4"C**	**1**	**20**	**CTRL RM QUAD**	**1**	54
55	--	*EXISTING LOAD*	20	2	--	0	360					**2#12, 1#12G, 3/4"C**	**1**	**20**	**CTRL RM QUAD**	**1**	56
57								0	360			**2#12, 1#12G, 3/4"C**	**1**	**20**	**CTRL RM QUAD**	**1**	58
59	**1,2**	**PTAC-1**	**15**	**2**	**2#12, 1#12G, 3/4"C**					1248	--	--	1	--	*Space*	--	60
61						1248	--					--	1	--	*Space*	--	62
63	--	*Space*	--	1	--			--	--			--	1	--	*Space*	--	64
65	--	*Space*	--	1	--					--	--	--	1	--	*Space*	--	66
67	--	*Space*	--	1	--	--	--					--	1	--	*Space*	--	68
69	--	*Space*	--	1	--			--	--			--	1	--	*Space*	--	70
71	--	*Space*	--	1	--					--	--	--	1	--	*Space*	--	72
73	--	*Space*	--	1	--	--	--					--	1	--	*Space*	--	74
75	--	*Space*	--	1	--			--	--			--	1	--	*Space*	--	76
77	--	*Space*	--	1	--					--	--	--	1	--	*Space*	--	78
79	--	*Space*	--	1	--	--	--					--	1	--	*Space*	--	80
81	--	*Space*	--	1	--			--	--			--	1	--	*Space*	--	82
83	--	*Space*	--	1	--					--	--	--	1	--	*Space*	--	84
					Total Load:	1,968 VA		720 VA		2,328 VA							
					Total Amps:	18.0 A		6.0 A		21.0 A							

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Receptacle	2,520 VA	100.00%	2,520 VA		
HVAC	2,496 VA	125.00%	3,120 VA	**Total Conn. Load:**	5,016 VA
				Total Est. Demand:	5,640 VA
				Total Conn. Current:	13.9 A
				Total Est. Demand Current:	15.7 A

General Notes:
A. THIS IS AN EXISTING PANELBOARD SCHEDULE PROVIDED FOR REFERENCE ONLY. ELECTRICAL CONTRACTOR SHALL FIELD VERFIY ALL EXISTING ELECTRICAL PANEL CONDITIONS.
B. HALF-TONE & ITALICS REPRESENTS EXISTING LOADS ANTICIPATED TO REMAIN. BOLD, FULL-TONE REPRESENTS NEW LOADS.

Remarks:
1. PROVIDE NEW CIRCUIT BREAKER IN EXISTING SPACE(S).
2. PROVIDE CIRCUIT BREAKER AND / OR FUSES PER EQUIPMENT MANUFACTURER'S SPECIFICATIONS.
3. BRANCH CIRCUIT SHALL BE 2 #12 & #12 GROUND IN 3/4" CONDUIT.
4. BRANCH CIRCUIT ROUTED THROUGH AND CONTROLLED BY SECONDARY CONTACTOR.
5. BRANCH CIRCUIT ROUTED THROUGH AND CONTROLLED BY UTILITY LAB CONTROLLER.

TRANSFORMER SECONDARY COPPER

TAG	DESCRIPTION
50.4X	4#6, 1#8G, 3/4"C
100.4X	4#2, 1#8G, 1 1/2"C
225.4X	4#4/0, 1#2G, 3"C
300.4X	4-350, 1#2G, 3"C
400.4X	2 SETS OF 4#3/0, 1#1/0G, 2"C
600.4X	2 SETS OF 4-350, #3/0G, 3"C

FEEDER SCHEDULE - COPPER

TAG	DESCRIPTION	TAG	DESCRIPTION
15.3C	3#12, #12G, 3/4"C	15.4C	4#12, #12G, 3/4"C
20.3C	3#12, #12G, 3/4"C	20.4C	4#12, #12G, 3/4"C
25.3C	3#10, #10G, 3/4"C	25.4C	4#10, #10G, 3/4"C
30.3C	3#10, #10G, 3/4"C	30.4C	4#10, #10G, 3/4"C
35.3C	3#8, #10G, 3/4"C	35.4C	4#8, #10G, 1"C
40.3C	3#8, #10G, 3/4"C	40.4C	4#8, #10G, 1"C
45.3C	3#6, #10G, 3/4"C	45.4C	4#6, #10G, 1"C
50.3C	3#6, #10G, 3/4"C	50.4C	4#6, #10G, 1"C
60.3C	3#4, #10G, 1"C	60.4C	4#4, #10G, 1 1/2"C
70.3C	3#4, #8G, 1"C	70.4C	4#4, #8G, 1 1/2"C
80.3C	3#3, #8G, 1"C	80.4C	4#3, #8G, 1 1/2"C
90.3C	3#2, #8G, 1 1/2"C	90.4C	4#2, #8G, 1 1/2"C
100.3C	3#2, #8G, 1 1/2"C	100.4C	4#2, #8G, 1 1/2"C
110.3C	3#1, #6G, 1 1/2"C	110.4C	4#1, #6G, 1 1/2"C
125.3C	3#1, #6G, 1 1/2"C	125.4C	4#1, #6G, 1 1/2"C
150.3C	3#1/0, #6G, 1 1/2"C	150.4C	4#1/0, #6G, 2"C
175.3C	3#2/0, #6G, 2"C	175.4C	4#2/0, #6G, 2"C
200.3C	3#3/0, #6G, 2"C	200.4C	4#3/0, #6G, 2"C
225.3C	3#4/0, #4G, 2"C	225.4C	4#4/0, #4G, 3"C
250.3C	3-250, #4G, 3"C	250.4C	4-250, #4G, 3"C
300.3C	3-350, #4G, 3"C	300.4C	4-350, #4G, 3"C
350.3C	3-500, #3G, 3"C	350.4C	4-500, #3G, 4"C
400.3C	3-500, #3G, 3"C	400.4C	4-500, #3G, 4"C
	2 SETS OF 3#3/0, #3G, 2"C		2 SETS OF 4#3/0, #3G, 3"C
450.3C	2 SETS OF 3#4/0, #2G, 2"C	450.4C	2 SETS OF 4#4/0, #2G, 3"C
500.3C	2 SETS OF 3-250, #2G, 3"C	500.4C	2 SETS OF 4-250, #2G, 3"C
600.3C	2 SETS OF 3-350, #1G, 3"C	600.4C	2 SETS OF 4-350, #1G, 3"C
700.3C	2 SETS OF 3-500, #1/0G, 3"C	700.4C	2 SETS OF 4-500, #1/0G, 4"C
800.3C	3 SETS OF 3-300, #1/0G, 3"C	800.4C	3 SETS OF 4-300, #1/0G, 3"C
1000.3C	4 SETS OF 3-250, #2/0G, 3"C	1000.4C	4 SETS OF 4-250, #2/0G, 3"C
1200.3C	4 SETS OF 3-350, #3/0G, 3"C	1200.4C	4 SETS OF 4-350, #3/0G, 3"C
1600.3C	5 SETS OF 3-400, #4/0G, 3"C	1600.4C	5 SETS OF 4-400, #4/0G, 4"C
2000.3C	6 SETS OF 3-400, 250G, 3"C	2000.4C	6 SETS OF 4-400, 250G, 4"C
2500.3C	7 SETS OF 3-500, 350G, 4"C	2500.4C	7 SETS OF 4-500, 350G, 4"C
3000.3C	8 SETS OF 3-500, 400G, 4"C	3000.4C	8 SETS OF 4-500, 400G, 4"C
4000.3C	12 SETS OF 3-400, 500G, 3"C	4000.4C	12 SETS OF 4-400, 500G, 4"C

FEEDER SCHEDULE - ALUMINUM

TAG	DESCRIPTION	TAG	DESCRIPTION
125.3A	3#1/0, #4G, 1 1/2"C	125.4A	4#1/0, #4G, 2"C
150.3A	3#2/0, #4G, 1 1/2"C	150.4A	4#2/0, #4G, 2"C
175.3A	3#4/0, #4G, 2"C	175.4A	4#4/0, #4G, 3"C
200.3A	3-250, #4G, 3"C	200.4A	4-250, #4G, 3"C
225.3A	3-300, #2G, 3"C	225.4A	4-300, #2G, 3"C
250.3A	3-350, #2G, 3"C	250.4A	4-350, #2G, 3"C
300.3A	3-400, #2G, 3"C	300.4A	4-400, #2G, 3"C
350.3A	3-600, #1G, 4"C	350.4A	4-600, #1G, 4"C
400.3A	2 SETS OF 3-250, #1G, 3"C	400.4A	2 SETS OF 4-250, #1G, 3"C
450.3A	2 SETS OF 3-300, #1/0G, 3"C	450.4A	2 SETS OF 4-300, #1/0G, 3"C
500.3A	2 SETS OF 3-350, #1/0G, 3"C	500.4A	2 SETS OF 4-350, #1/0G, 3"C
600.3A	2 SETS OF 3-500, #2/0G, 3"C	600.4A	2 SETS OF 4-500, #2/0G, 4"C
700.3A	2 SETS OF 3-600, #3/0G, 4"C	700.4A	2 SETS OF 4-600, #3/0G, 4"C
800.3A	3 SETS OF 3-400, #3/0G, 3"C	800.4A	3 SETS OF 4-400, #3/0G, 4"C
1000.3A	3 SETS OF 3-600, #4/0G, 4"C	1000.4A	3 SETS OF 4-600, #4/0G, 4"C
1200.3A	4 SETS OF 3-500, 250G, 4"C	1200.4A	4 SETS OF 4-500, 250G, 4"C
1600.3A	5 SETS OF 3-600, 350G, 4"C	1600.4A	5 SETS OF 4-600, 350G, 4"C
2000.3A	6 SETS OF 3-600, 400G, 4"C	2000.4A	6 SETS OF 4-600, 400G, 4"C
2500.3A	8 SETS OF 3-600, 600G, 4"C	2500.4A	8 SETS OF 4-600, 600G, 4"C
3000.3A	9 SETS OF 3-600, 600G, 4"C	3000.4A	9 SETS OF 4-600, 600G, 4C
4000.3A	12 SETS OF 3-600, 2-400G, 4"C	4000.4A	13 SETS OF 4-500, 2-400G, 4"C

LIGHTING CONTROLS NARRATIVE:

GENERAL:

THE BUILDING SHALL BE PROVIDED WITH A NETWORKED LIGHTING CONTROLS SYSTEM WHICH INCLUDES A CENTRALIZED 365 DAY A YEAR TIMECLOCK SYSTEM WITH PHOTOCELL INPUT. THE TIMECLOCK SHALL BE PROVIDED ON THE FIRST FLOOR OF THE FACILITY IN THE MAIN ELECTRICAL ROOM AND A PHOTOCELL SHALL BE PROVIDED ON THE ROOF. INDIVIDUAL AREAS SHALL BE CONTROLLED ON / OFF / DIMMING BY INDIVIDUAL NETWORKED ROOM CONTROLLERS AND LOW-VOLTAGE SWITCHES AS NECESSARY.

ALL LIGHTING SHALL BE LED.

EMERGENCY LIGHTING POWER SHALL BE PROVIDED BY FACTORY INSTALLED REMOTE BATTERY PACKS AND SHALL PROVIDE 90 MINUTES OF EMERGENCY ILLUMINATION.

THE CONTRACTOR SHALL PROVIDE ALL PARTS, LABOR, WIRING, AND CONDUIT FOR A COMPLETE LIGHTING CONTROLS SYSTEM.

THE CONTRACTOR SHALL PROVIDE ALL LIGHTING CONTROLS, LIGHTING COTROLS PROGRAMMING, AND LIGHTING CONTROLS COMMISSIONING PER THE OWNER AND ARCHITECT'S DIRECTION AS PART OF THE BASE BID.

EXTERIOR LIGHTING:

BUILDING MOUNTED LIGHTING SHALL BE PHOTOCELL ON AND TIMECLOCK OFF VIA ROOM CONTROLLER MOUNTED INSIDE THE BUILDING. WHEN BUILDING LIGHTING IS BEING USED AS EXIT DISCHARGE LIGHTING A UL 924 DEVICE SHALL BE USED FOR EMERGENCY LIGHTING.

BUILDING EXIT DISCHARGE LIGHTING SHALL REMAIN ON AT ALL TIMES DURING DAYLIGHT HOURS PER NFPA 101 - LIFE SAFETY CODE.

INTERIOR LIGHTING:

EXIT SIGNS, STAIRWELL LIGHTING AND ENTRY VESTIBULE LIGHTING SHALL REMAIN ON AT FULL BRIGHTNESS AT ALL TIMES. UL 924 DEVICES SHALL BE PROVIDED FOR EMERGENCY POWER.

HALLWAY LIGHTING SHALL HAVE A ROOM CONTROLLER TIED TO THE BUILDINGS TIMECLOCK AND ONE OR MORE LOW-VOLTAGE ON / OFF / 2 HOUR OVERRIDE SWITCHES. HALLWAY LIGHTING SHALL TURN ON AND OFF VIA THE PROGRAMMED TIMECLOCK. 2 HOUR OVERRIDE SWITCHES SHALL PROVIDE 2 HOURS OF ADDITIONAL TIME ON AFTER HOURS WHEN PRESSED. A UL 924 DEVICE SHALL BE PROVIDED TO RETURN EGRESS LIGHTING TO 100% BRIGHTNESS IN THE EVENT OF A POWER LOSS.

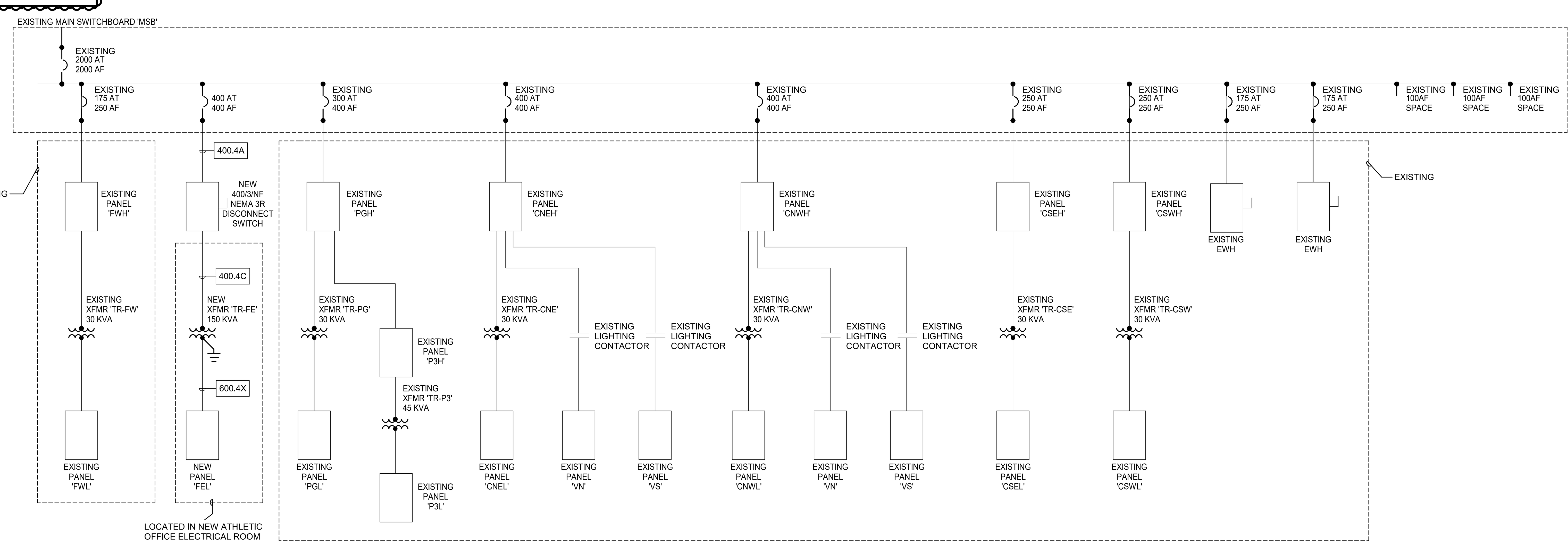
CLASSROOM AND ASSEMBLY ROOM LIGHTING SHALL BE BROKEN INTO TWO ZONES, TEACHING WALL AND GENERAL LIGHTING, AND HAVE A ROOM CONTROLLER, TWO LOW-VOLTAGE ON / OFF / DIMMING SWITCHES, AND A VACANCY SENSOR. LIGHTING SHALL BE ON / OFF / DIMMING CONTROLLED IN TWO ZONES WITH MANUAL ON AND AUTOMATIC OFF AFTER 15 MINUTES OF VACANCY. A UL 924 DEVICE SHALL BE PROVIDED TO RETURN EGRESS LIGHTING TO 100% BRIGHTNESS IN THE EVENT OF A POWER LOSS.

INDIVIDUAL OFFICES SHALL BE PROVIDED WITH WALL MOUNTED VACANCY SENSORS THAT SHALL BE PUSH BUTTON ON AND VACANCY OFF AFTER FIVE MINUTES OF VACANCY.

LARGE RESTROOMS SHALL HAVE A ROOM CONTROLLER, A SINGLE LOW-VOLTAGE ON / OFF / DIMMING SWITCH, AND ONE OR TWO VACANCY SENSORS MOUNTED ON THE CEILING. LIGHTING SHALL BE ON / OFF CONTROLLED AS A SINGLE ZONE WITH MANUAL ON AND AUTOMATIC OFF AFTER 15 MINUTES OF VACANCY. A UL 924 DEVICE SHALL BE PROVIDED TO RETURN EGRESS LIGHTING TO 100% BRIGHTNESS IN THE EVENT OF A POWER LOSS.

SMALL ROOMS SUCH AS JANITORS CLOSETS, INDIVIDUAL RESTROOMS, AND STORE ROOMS SHALL BE PROVIDED WITH WALL MOUNTED VACANCY SENSORS THAT SHALL BE PUSH BUTTON ON AND VACANCY OFF AFTER FIVE MINUTES OF VACANCY.

MECHANICAL AND ELECTRICAL ROOMS SHALL BE CONTROLLED VIA STANDARD ON / OFF TOGLE SIWTCHES PER NFPA 70 – NATIONAL ELECTRICAL CODE.



1 ELECTRICAL ONE-LINE DIAGRAM
NO SCALE

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OWP PROJECT NO.	DATE OF ISSUE
2021-154-00	10.07.2021

REVISIONS

DELTA	DESCRIPTION	DATE
1	ADDENDUM 02	10/18/2021
2	ADDENDUM 03	10/27/2021

PROJECT TEAM	DRAWN BY
ED TEXAS	Author

PROJECT PHASE
CONSTRUCTION DOCUMENTS

SHEET CONTENTS
ELECTRICAL RISER & SCHEDULES

SHEET NO.
E-701

FILE PATH: C:\Revit Local Files\2021\21056-Midlothian ISD Stadium Add & Reno-RWB-r2021_cinmanEPS2K.rvt
DATE/TIME:10/26/2021 4:59:26 PM
PLOT SCALE:As indicated