

Addendum Number: One

Project: Halifax County Courthouse
Halifax County
357 Ferrell Lane
Halifax, NC 27839

Date: November 4, 2025

TO ALL CONTRACTORS:

This addendum is hereby made apart of the bid documents to the same extent as if originally included therein. This addendum must be acknowledged on the “Bid Form” located within the scope sheet/”Advertisement for Bids” located within the RFP section of our website link. (<https://www.danddcc.com/bidsets/halifax-county-courthouse/>) New scope sheets/advertisement for bids will be issued along with their associated bid forms for affected scopes of work. These scopes are as follows:

ALL SCOPES

RFI's

- 1) We would like to ask you about the scope of work for the openings at the Halifax County Courthouse. The drawings do not seem to specify if the doors/windows listed in the schedules are supposed to be new fabrications, or existing elements to be restored.
 - a. See Door/Window Schedule on sheet A3.1.1. All NEW doors and windows are tagged on floor plan and referenced back to the schedule. No existing doors / windows are tagged with the exception of any demo.
- 2) Could you please clarify what the scope for the doors and windows is?
 - a. Scope sheets are provided in the "Request for Proposal" section on the website
- 3) What the existing keying system is for the courthouse?

- a. There are several different keying systems in the courthouse. Yale is the most used. Ilco is acceptable and less expensive. Durability and accessibility to parts are the main issues to address. If Ilco keys fit the criteria, cost effective, durability and accessibility. Halifax County has no issue with making Ilco the standard system forward.
- 4) Do you have any information on what the existing fire alarm system is for this site?
 - a. Not at this time. Subs were given the opportunity to review fire alarm panel during Pre-Bid walk-through.
- 5) I was looking at the above-mentioned project and I see that all the Flooring is one package. Would you, the Owner, consider breaking out the Hard Tile or would it just be too small?
 - a. Hard tile will remain in the flooring package.
- 6) Estimating is reviewing this project and was wondering if there were any elevations for the vanities in 3004 and 3005 below? They're just trying to determine if these get just aprons (or if they also get removable PLAM ADA panels as well).
 - a. See updated drawings.
- 7) About how many months would you expect this project to last (from start to completion)?
 - a. 400 days
- 8) Time duration on this project
 - a. 400 days from NTP
- 9) Off hours working hours what time can we start and what time do the contractors have to be gone?
 - a. Contractors must give ample time for courthouse staff to arrive and leave the premises and not be hindered. Courthouse operations begin at 8:30AM and cease at 5PM. Contractor working hours have not been set yet.
- 10) Can the 3rd. floor be wired in M/C cable or does it need to be conduit?
 - a. Conduit.
- 11) In my opinion the Switch Board on the 1st Floor will take CEC at least 5 days to change out.
 - a. See explanation on line 16 below.
- 12) Need a Raiser for the Voice/Data we need something from the 1st. floor MDF to the 3rd. floor IDF conduit and cable.
 - a. coordinate with Matt Rathbone 919-890-2161
- 13) Is there going to be provision for the drywall contractor to open up walls on the 1st. & 2nd. floors for the Data main feeder conduit and so we can also get conduit up from the fire alarm panel.

- a. There are already pathways from first floor to second floor. Scope sheets have been changed to reflect this.
 - 14) No demo on electrical drawing E1.1.1 for new HVAC units shown on right side building drawing E2.2.1.
 - a. Mech RM 183 and many of the surrounding offices are shown as demolished. Key note #3 on E1.1.1
 - 15) Would the architect be open for a substitution for the 1" mini blinds? I partnered with a manufacturer and get great material prices for window treatments.
 - a. See spec section 012500
 - 16) The CT Cabinet and Meter Base shown on the drawing E2.2.1 is all new. To get the CT Cab. & Meter Base installed we will have to dig up and find the existing conduits & wiring in between the MDS and Transformer. At that point we will need to pull back the wire from the Transformer and turn the conduits out from the transformer side and the MDS side into the new CT Cab. and probably have to repull wire from both sides. Please advise on that as it will take well over a week to do this and demo and install new MDS.
 - a. Correct. Although most of the cabling can be abandoned once found. New secondaries can be ran alongside the abandoned ones. Dominion can be available for a Friday Power down and then come back early in the week for a reconnection. Dominion will own everything from the CT to the transformer. Owner will have responsibility from CT to MDS. Re-purpose existing raceways exiting building and tie into CT. Seth Wright is our point of contact and is willing to help keep the downtime as short as possible. His Cell: 252-326-9431
 - 17) Is a P&P bond required for the millwork scope?
 - a. P&P bonds must be made available upon request from the GC. Please list % rate on new provided bid forms.
 - 18) Please confirm that there are no solid surface (or other millwork) windowsills on this project. They were referenced in 064100 Part 2.07B but none were found on the drawings. Please advise.
 - a. See Sheet A3.2.1
 - 19) Please confirm that there are no file drawers on this project. None were found on the drawings.
 - a. No file drawers.
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Below is a list of pages that have been modified by this addendum. These modifications may be found on the pages attached below.

Specifications

- 1) Section 237413 _ Packaged Outdoor Central Station Air Handling Units
- 2) Section 238126 – Split-System Air-Conditioners
- 3) Section 265119 – LED Interior Lighting

Drawings

- 1) A7.1.1
- 2) A8.1
- 3) S4.0.2
- 4) S4.1.1
- 5) E1.1.1
- 6) M1.1
- 7) M2.1
- 8) M2.2
- 9) M7.1

SECTION 237413 - PACKAGED OUTDOOR CENTRAL STATION AIR HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ABBREVIATIONS

- A. ABMA American Bearing Manufacturers Association. (www.abma-dc.org)
- B. ANSI American National Standards Institute. (www.ansi.org)
- C. BAS Building Automation System.
- D. CFM Cubic Feet per Minute.
- E. DDC Direct-digital controls.
- F. ECM Electrically commutated motor.
- G. FPM Feet Per Minute.
- H. HP Heat pump
- I. RTU Rooftop unit. As used in this Section, this abbreviation means packaged, outdoor, central station air handling unit. This abbreviation is used regardless of whether the unit is mounted on the roof or on an equipment pad on the ground.
- J. RTU's Rooftop units. As used in this Section, this abbreviation means packaged, outdoor, central station air handling units. This abbreviation is used regardless of whether the units are mounted on the roof or on equipment pads on the ground.
- K. SS Stamped Steel
- L. VVT Variable-air volume and temperature.
- M. WG Water Gauge

1.3 DEFINITIONS

- A. Archival Quality: Will last a minimum of 20 years.

- B. Head end: Main temperature control computer system storing data accessible to the internet for WEB accessible systems and storing data accessible to the building system backbone for non-WEB accessible systems.
- C. HP Outdoor-Air Refrigerant Coil: Refrigerant coil in the outdoor-air stream to reject heat during cooling operations and to absorb heat during heating operations.
- D. Modulating: Able to electrically vary and stop in any position.
- E. Outdoor air: Air outside the building or taken from outdoors and not previously circulated through the building.
- F. Outdoor air measurement: Reporting of the volume of outdoor air taken into the building by RTU and reported to the building operator in CFM.
- G. Outdoor-Air Refrigerant Coil: Refrigerant coil in the outdoor-air stream to reject heat during cooling operations.
- H. Outdoor-Air Refrigerant-Coil Fan: The outdoor-air refrigerant-coil fan in RTUs. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.
- I. Record: Maintain in writing on original paper and maintain a copy in electronic format, file type Portable Document Format (*.PDF) is acceptable. Make paper copy available for inspection upon request by Owner, Owner's representative, Architect, or Architect's representative. Email electronic copy to requested email address when request is made by the Owner, Owner's representative, Architect, or Architect's representative. Document shall be "openable" by Owner and Architect's computer.
- J. Supply-Air Fan: Fan providing supply air to conditioned space.
- K. Supply air: Air entering a space from air-conditioning, heating, or ventilating equipment.
- L. Supply-Air Refrigerant Coil: Refrigerant coil in the supply-air stream to absorb heat (provide cooling) during cooling operations and to reject heat (provide heating) during heating operations. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.
- M. Two-position: Able to electrically move and stop in only two positions. Usually open or closed.

1.4 PERFORMANCE REQUIREMENTS

- A. Support: RTU supports shall comply with required wind and seismic performance requirements, including analysis by a qualified professional engineer.
- B. Wind-Restraint Performance shall comply with SEI/ASCE 7 for wind speed and building classification category. Provide minimum 10 lb/sq. ft. multiplied by the maximum area of the mechanical component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.

1.5 SUBMITTALS

- A. Pre-submittal Meeting: A representative of the manufacturer producing equipment being provided under this section of the specifications shall attend a meeting for the purpose of coordinating with the contractor performing work under section "Building Automation System". The meeting shall be held at a location of the Contractor's choosing. The Contractor shall arrange the meeting. Submittals shall be essentially complete at the time of the meeting so detailed coordination items can be discussed.
- B. Product Data: Provide manufacturer's technical data for each RTU, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, accessories, and mounting requirements.
- C. Exterior Color: Manufacturer's standard color shall be acceptable.
- D. Shop Drawings:
 - 1. Detail equipment assemblies, include:
 - a. Internal components
 - b. Dimensions
 - c. Weights
 - d. Loads
 - e. Supports
 - f. Required clearances.
 - 2. Provide method of field assembly.
 - 3. Indicate:
 - a. Components
 - b. Location
 - c. size of each field connection
 - 4. Provide Wiring Diagrams for:
 - a. Power
 - b. Control
 - 5. For RTU Support comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for support selection.
 - a. Calculations: Calculate requirements for selecting vibration isolation, seismic restraint where required, and for vibration isolation.
 - b. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system, curb slope, and curb dimensions.
 - c. Restraint: Detail fabrication and attachment of restraints. Indicate anchorage details, quantity, diameter, and connections.
- E. Coordination Drawings: Plans and other details, drawn to scale, on which the following items are indicated and coordinated using input from installers:
 - 1. Plan areas containing an RTU indicated at $\frac{1}{4}" = 1' - 0"$ or greater on construction drawings.
 - 2. Areas within 20 feet of section marks indicated on M2 series drawings where such section marks penetrate an RTU.

3. Structural members to which RTUs will be attached.
4. Related roof openings.
5. Related roof curbs, slope, dimensions and flashing.

F. Operation and Maintenance Data: For RTUs to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," Provide the following:

1. After successful completion of testing & balancing, or commissioning provide the following:
 - a. Completed Inspection & Testing form.
 - b. Record copy of site-specific software on DVD.
 - c. Maintenance, Inspection and Testing Records including, may not be limited to, the following:
 - 1) How to test installed components.
 - 2) Frequency of testing of installed components.
 - 3) Frequency of inspection of installed components.
 - 4) Manufacturer's user training manuals.
2. Manufacturer's required maintenance related to system warranty requirements.
3. Software and Firmware Operational Documentation:
 - a. Software operating and upgrade manuals.
 - b. Program Software Backup: On magnetic media or compact disk, complete with data files.
 - c. Device address list.
 - d. Printout of software application and graphic screens.

G. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

A. ARI Compliance:

1. Comply with ARI 210/240 and ARI 340/360 for testing and rating energy efficiencies for RTUs.
2. Comply with ARI 270 for testing and rating sound performance for RTUs.

B. ASHRAE Compliance:

1. Comply with ASHRAE 15 for refrigeration system safety.
2. Comply with ASHRAE 33 for methods of testing cooling and heating coils.
3. Comply with applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. System safety. Comply with one of the following:

1. ASHRAE 15 for refrigeration system safety.
2. ASHRAE/IESNA 90.1-2004 applicable requirements in Section 6 - "Heating, Ventilating, and Air-Conditioning."
3. NFPA 90A and NFPA 90B.

4. UL 1995.

- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to provide labor and materials to remove and replace components of RTU's that fail in materials or workmanship within the following warranty period.
1. Compressors: 5 years from date of Substantial Completion.
 2. VFD: 3 years from date of Substantial Completion.
 3. Remainder of unit: 3 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Carrier Corporation.
- B. Daikin Applied.
- C. Trane; American Standard Companies, Inc.

2.2 CASINGS

1. General:
 - a. Fabrication Requirements: Formed and reinforced double-wall insulated panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.
 - b. Exterior Material: Manufacturer's standard thickness galvanized steel with factory-painted finish, exterior color shall be manufacturer's standards, with pitched roof panels and knockouts with grommet seals for electrical and piping connections and lifting lugs.
 - c. Interior Material: Stainless steel with no finish or factory standard finish, with pitched roof panels and knockouts with grommet seals for electrical and piping connections.
2. Fan Discharge Plenum Interior Material: Stainless steel with no finish or factory standard finish, perforated with 40 percent free area.
3. Insulation and Adhesive:

- a. Comply with NFPA 90A or NFPA 90B.
- b. Materials: ASTM C 1071, Type I.
- c. Thickness: 2".
- d. Materials in contact with air stream shall have air-stream surface coated with an erosion- and temperature-resistant coating or they shall be faced with a plain or coated fibrous mat or fabric.
- e. Liner Adhesive: Comply with ASTM C 916, Type I.

B. Condensate Drain Pans:

- 1. Formed sections of stainless-steel sheet, a minimum of 2 inches deep, and complying with ASHRAE 62.1-2004.
- 2. Construction: Provide foam insulation on back. Double wall, foam insulated, moisture tight drain pans are acceptable.
- 3. Drain Connection(s): Threaded nipple with pan sloped in two directions to drain.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004 and UL 181.

2.3 FANS

A. Fans except Condenser Fan(s): Refer to schedule for blade and fan configuration. Provide with permanently lubricated, motor installed on an adjustable fan base resiliently mounted in the casing. Provide aluminum wheel and steel scroll.

B. Fan Shaft Bearings:

- 1. Prelubricated and Sealed, Ball Bearings: Self-aligning, pillow-block type with a rated life of 120,000 hours according to ANSI/ABMA 9
- Or
- 2. Grease-Lubricated, Tapered-Roller Bearings: Self-aligning, pillow-block type with double-locking collars and 2-piece, cast-iron housing with grease lines extended to outside unit and a rated life of 120,000 hours according to ANSI/ABMA 11.

C. Fan Sound-Power Levels:

- 1. Fans, except condenser fans, shall meet or create lower sound power levels than those indicated.
- 2. Fans, except condenser fans, shall comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Fans shall bear AMCA-certified sound ratings seal.

D. Fan Performance Rating: Except condenser fans factory test fan performance for airflow, pressure, power, air density, rotation speed, and efficiency. Rate performance according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating."

E. Condenser Fan(s): Propeller mounted on shaft of permanently lubricated motor.

- F. Fan Motor(s): Refer to section "Common Motor Requirements for HVAC Equipment."

2.4 COILS

A. Indoor Air Refrigerant Coil:

1. Aluminum fins, seamless copper tube with minimum 0.020" wall thickness, and equalizing vertical distributor.
2. Distribution: Interlaced.
3. Circuits: Minimum of one per compressor.
4. Casing: Stainless steel.
5. Split: As indicated. If not indicated none required.

B. Outdoor Air Refrigerant Coil:

1. Aluminum fins, seamless copper tube with minimum 0.020" wall thickness, and equalizing vertical distributor.
2. Distribution: Interlaced.
3. Circuits: Manufacturer's standard.
4. Casing: Galvanized steel.
5. Split: As indicated. If not indicated Manufacturer's standard.

C. Electric Resistance Heating Coil:

1. Elements: Open coil permitted in constant volume applications, otherwise provide finned tubular.
2. Open Coil Wire: Eighty (80) percent nickel and twenty (20) percent chromium, supported and insulated by floating ceramic bushings recessed into casing openings, fastened to supporting brackets, and mounted in galvanized-steel frame. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.
3. Finned Tubular Wire: Eighty (80) percent nickel and twenty (20) percent chromium centered in a stainless steel tube filled with granular magnesium oxide. Stainless steel fin helically wound onto tube. Elements furnished with mounting flanges making them individually removable.
4. Casing: Galvanized steel.
5. Overtemperature Protection: Disk-type, automatically reset, thermal-cutout, safety device; serviceable through terminal box.
6. Overcurrent Protection: Manual-reset thermal cutouts, factory wired in each heater stage.
7. Control Panel: Unit mounted with disconnecting means and overcurrent protection. Include the following controls:
 - a. Contactors: Magnetic.
 - b. Step Controller: Provide pilot lights and override toggle switch for each step/stage.
 - c. Controller: As scheduled or if not scheduled control shall comply with the following:
 - 1) When the number of required steps/stages exceeds four, provide Vernier SCR control with a minimum of five steps/stages and a maximum of six but

only when airflow is constant. When air flow is not constant provide SCR control on all stages.

- d. Pilot lights: Operate whenever power is applied to step.
- e. Time-delay relay: Manufacturer's standard.
- f. Airflow proving switch: Manufacturer's standard.

2.5 COIL SECTION

- A. Fabricate coil section to allow removal and replacement of coil(s) for maintenance and to allow in-place access for service and maintenance of coil(s).
- B. For multizone units, provide air deflectors and air baffles to balance airflow across coils.
- C. Coils shall not act as a structural component of the unit.

2.6 REFRIGERANT CIRCUIT COMPONENTS

- A. Provide gauge ports with Schrader valves for measuring suction and hot gas pressure.
- B. Provide for operation of the unit for heating down to 0° F.
- C. Provide for operation of the unit for cooling down to 35° F.
- D. Compressor: Hermetic, scroll, mounted on vibration isolators; with internal overcurrent and high-temperature protection, internal pressure relief, and crankcase heater.
- E. Refrigeration Specialties:
 - 1. Refrigerant: R-454B.
 - 2. Expansion valve with replaceable thermostatic element.
 - 3. Refrigerant filter/dryer.
 - 4. Manual-reset high-pressure safety switch.
 - 5. Automatic-reset low-pressure safety switch.
 - 6. Minimum off-time relay.
 - 7. Automatic-reset compressor motor thermal overload.
 - 8. Brass service valves and unions installed in compressor suction and discharge lines.
 - 9. Low-ambient kit high-pressure sensor.

2.7 AIR FILTRATION SECTION

- A. Required sections: Provide filter sections indicated. If not otherwise indicated provide MERV 8 (30% efficient) 2" thick disposable pre-filters with MERV 13 (85% efficient) 4" thick final-filters.
- B. Position: Final-filter shall be downstream of pre-filter
- C. Refer to Division 23, Section "Filters"

2.8 DAMPERS

- A. General Requirements for Dampers: Leakage rate, according to AMCA 500, "Laboratory Methods for Testing Dampers for Rating," shall not exceed 2% of air quantity at 2000 FPM face velocity through damper and 4" WG pressure differential.
- B. ~~Minimum Outdoor Air Damper(s): Two position parallel or opposed blade galvanized steel motorized mechanically fastened to cadmium plated steel operating rods in reinforced cabinet, with bird screen and intake hood. Provide method of setting minimum outdoor air.~~ **Outdoor Air Damper(s): Modulating opposed blade galvanized steel motorized mechanically fastened to cadmium plated steel operating rods in reinforced cabinet, with bird screen and intake hood. (*AD-01)**
- C. ~~Economizer Outdoor Air Damper(s): Modulating opposed blade galvanized steel motorized mechanically fastened to cadmium plated steel operating rods in reinforced cabinet, with bird screen and intake hood. Provide method of setting economizer maximum equal to supply air. (*AD-01)~~
- D. Return Air Damper(s): Two position (modulating if mechanically interlocked with mixing damper) parallel or opposed blade galvanized steel dampers mechanically fastened to cadmium plated steel operating rod in reinforced cabinet.
- E. Mixing Damper(s): Modulating parallel blade galvanized steel dampers mechanically fastened to cadmium plated steel operating rod in reinforced cabinet. Operating rods may be connected with a common linkage and interconnected so return and mixing dampers operate simultaneously. Dampers shall be positioned such that airflows collide to promote mixing.
- F. Relief Air Damper(s): Parallel or opposed blade galvanized steel motorized mechanically fastened to cadmium plated steel operating rods in reinforced cabinet, with bird screen and relief hood.
- G. Damper Motors:
 - 1. Fail closed.
 - a. Exceptions:
 - 1) Supply air damper shall fail open.
 - 2) Return air damper shall fail open.
 - 2. Modulating operation unless two-position is indicated.
 - 3. Adjustable minimum position.

2.9 AIR FLOW MEASURING STATIONS (*AD-01)

- A. **Airflow measuring stations located in outdoor air hood:**
 - 1. **Provide AFMS integral to outdoor air control damper with minimum performance as follows:**
 - a. **Velocity Range: 300 to 2000 fpm**
 - b. **Maximum Leakage: 6 cfm/sq ft at 4 in. wg and 3 cfm/sq ft at 1 in. wg**
 - c. **Temperature Range: -20 F to 180 F**

d. Accuracy: 5% of reading

B. Fan Inlet Sensor Probe Assemblies:

- 1. Sensor housings shall be mounted on 304 stainless steel blocks.**
- 2. Mounting rods shall be field adjustable to fit the fan inlet and constructed of nickel-plated steel.**
- 3. Mounting feet shall be constructed of 304 stainless steel.**
- 4. The operating airflow range shall be 0 to 10,000 FPM unless otherwise indicated.**
- 5. Temperature Range: -20 F to 180 F**
- 6. Accuracy: 5% of reading**

C. Locate airflow measuring stations as follows:

- 1. Outdoor Air: In outdoor air hood or in unit prior to air mixing per manufacturer's requirements.**
- 2. Exhaust/Relief Air: In the exhaust/relief fan inlet per manufacturer's requirements.**

D. Refer to Section "Building Automation System" for specific air flow measuring station requirements.

E. Provide a 12" long plenum on the outdoor air intake, between the intake hood or louver and unit, for installation of an air flow measuring station.

- 1. Exception: Airflow measuring station manufacturer states "in writing" that plenum is not required for specified accuracy to be achieved.**

F. Provide a 12" long plenum on the exhaust/relief air outlet, between the exhaust/relief hood or louver and unit, for installation of an air flow measuring station.

- 1. Exception: Airflow measuring station manufacturer states "in writing" that plenum is not required for specified accuracy to be achieved.**

G. Locate air flow measuring station(s) in unit opening(s) as indicated and make connection to unit control panel.

2.10 ELECTRICAL POWER CONNECTION

- A. Provide for single connection of power to unit with unit-mounted disconnect switch accessible from outside unit and control-circuit transformer with built-in overcurrent protection.**
- B. Power connection shall provide uninterrupted 115V power at 22 amps, regardless of voltage supplied to unit. When power is interrupted to unit, the outlet will continue to provide power.**
 - 1. Option: separate circuit to unit provided at no additional cost.**

2.11 CONTROLS

A. Basic Unit Controls:

- ~~1. The manufacturer furnishing units and the contractor installing units under this section shall refer to, among others, Section "Building Automation System", Section "Sequences of Control", and the Seven (7) series control drawings for additional information regarding control of the equipment.~~
- ~~2. Provide control voltage transformer:~~
 - ~~a. Primary Voltage: As required~~
 - ~~b. Secondary Voltage: As required~~
 - ~~c. Load: As required 100 VA minimum~~
- ~~3. Unit Mounted Control Panel:~~
 - ~~a. Furnish under section "Building Automation System" and install under this Section.~~
 - ~~b. Interface control panel with BAS.~~
 - ~~c. Provide volatile memory backup.~~
 - ~~d. Provide software and firmware operational documentation including but not limited to:~~
 - ~~1) Software operating and upgrade manuals.~~
 - ~~2) Backup of Volatile Memory: On archival quality DVD or CD compliant disk, complete with data files.~~
 - ~~3) Device address list.~~
 - ~~4) Printout of software application and graphic~~

~~B. Refrigeration system control~~

- ~~1. The manufacturer furnishing equipment under this section shall provide all controls for the compressors and refrigeration system including but not limited to staging and safeties under this section.~~

~~C. Operation:~~

- ~~a. Refer to section "Sequences of Operation"~~

D. Basic Unit Controls: (*AD-01)

- 1. The manufacturer furnishing units and the contractor installing units under this section shall refer to, among others, Section "Building Automation System" and Drawing M7.1.**
- 2. Provide a complete integrated microprocessor based Direct Digital Control (DDC) system to control all unit functions including temperature control, scheduling, monitoring, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface. All MCBs and sensors shall be factory mounted, wired and tested.**
- 3. The stand-alone DDC controllers shall not be dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate stand alone if the unit loses either direct connect or network communications. The microprocessor**

memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.

4. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.
5. All digital inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip
6. The DDC controller shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to insure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.
7. The keypad interface shall allow convenient navigation and access to all control functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted.
8. Provide control voltage transformer:
 - a. Primary Voltage: As required
 - b. Secondary Voltage: As required
 - c. Load: As required - 100 VA minimum
9. Unit Mounted Control Panel:
 - a. Furnish and installed under this Section.
 - b. Interface control panel with BAS via BACnet.
 - c. Provide volatile memory backup.
 - d. Provide software and firmware operational documentation including but not limited to:
 - 1) Software operating and upgrade manuals.
 - 2) Backup of Volatile Memory: On archival quality DVD or CD compliant disk, complete with data files.
 - 3) Device address list.
 - 4) Printout of software application and graphic

E. Refrigeration system control

1. The manufacturer furnishing equipment under this section shall provide all controls for the compressors and refrigeration system including but not limited to staging and safeties under this section.

F. Sequence of Control – Multizone VAV Control

1. Refer to section "Sequences of Operation"
2. Initial Set Points:
 - a. General:
 - 1) Enthalpy High Limit: 28.0 BTU/lb
3. Enable/Disable:
 - a. Occupied Operation: During occupied hours, the BAS shall enable the unit and provide set points as specified under sequences on Drawing M7.1. The supply fan shall be started, and dampers shall modulate in accordance with applicable sequences below.
 - b. Unoccupied Operation: During unoccupied hours, the unit shall be disabled, the supply and relief fans shall be off, return damper shall be open, outdoor air damper shall be closed, and relief damper shall be closed.
 - 1) On a call for heating or cooling, the BAS shall enable the unit. The fans and dampers shall operate in accordance with applicable sequences below. Heating or cooling shall be provided in accordance with applicable sequences below as required until the space conditions are satisfied.
4. Supply Fan Control:
 - a. When the unit is started, the supply fan will go to its minimum speed. The required speed shall be determined by the equipment manufacturer and shall be instituted as the minimum fan speed.
 - b. Speed Control:
 - 1) The supply fan speed shall be modulated to maintain the duct static pressure set point.
 - 2) A second static pressure sensor located in the supply fan discharge duct shall function as a safety input to the unit. An increase in fan discharge static pressure above set point (initially 4 inches w.g.) shall cause the unit to stop the supply fan. An alarm shall be sent to the BAS that the unit has been shut down.
 - c. Drive Malfunction: Should the VFD malfunction as indicated by drive alarm circuit, an alarm shall be sent to the head end. The fan shall continue to operate unless deactivated by the VFD protection circuitry.
 - d. Fan Failure Alarm: Should the supply fan fail (sensed by its differential pressure sensor), the unit shall be disabled, and an alarm shall be sent to the head end identifying the unit and stating that the supply fan has failed.
5. Relief Fan Control:
 - a. During Occupied operation, the fan shall be started.
 - 1) Speed Control: The relief fan speed shall be modulated to maintain the Space Static Pressurization Setpoint as indicated on Drawing M7.1.
 - 2) Minimum Fan Speed: Motor speeds below the manufacturer's recommended minimum RPM shall not be permitted.
 - b. During unoccupied hours, the fan shall be deactivated.
 - c. Economizer: During economizer operation, the relief fan shall be started and controlled as in occupied operation.
 - d. Fan Failure Alarm: Should the relief fan fail (as sensed by its differential pressure sensor), an alarm shall be sent to the head end identifying the unit and stating that the relief fan has failed. Economizer operation shall cease, outdoor air damper shall close, and the return damper shall open.

- e. Drive Malfunction: Should the VFD malfunction as indicated by drive alarm circuit, an alarm shall be sent to the head end. The fan shall continue to operate unless deactivated by the VFD protection circuitry.
- 6. Dehumidification Mode: During occupied or unoccupied operation when the relative humidity (as sensed by the space humidity sensor) rises above set point, the unit shall be placed in dehumidification mode. The cooling coil leaving air temperature will be reset to minimum. The unit shall remain in dehumidification mode until the space relative humidity drops to 5% RH below set point at which time the unit shall return to normal operation. Refer to applicable paragraphs for operation of valves, dampers, and fans.
- 7. Economizer Mode: Whenever outside air enthalpy is less than the enthalpy high limit set point (adjustable) and outside air temperature is less than the return air temperature and cooling is required, economizer operation shall be enabled.
 - a. Outdoor air enthalpy shall be calculated using outdoor air temperature and outdoor air humidity sensors.
 - b. Economizer operation shall be available twenty-four hours per day and shall override unoccupied damper controls.
 - c. Refer to other sequences for control of dampers during economizer operation.
- 8. Cooling Control: The unit controls shall confirm the electric heat is disabled and supply fan is running before enabling cooling. If cooling is required, the direct expansion cooling shall enable the first stage of cooling and modulate to maintain leaving air temperature. If additional capacity is needed, it should stage on the other compressors and modulate capacity to maintain the leaving air temperature set point (as sensed by the temperature sensor located in the discharge of unit). Condenser fans shall be staged per each circuit or as recommended by equipment manufacturer. Leaving air temperature shall be controlled to maintain the leaving air temperature set point by plus or minus 3°F.
- 9. Heating Control: The unit controls shall confirm the DX cooling is disabled and supply fan is running before enabling heating. If heating is required, the electric heat shall modulate capacity to maintain the leaving air temperature set point (as sensed by the temperature sensor located in the discharge of unit). Leaving air temperature shall be controlled to maintain the leaving air temperature set point by plus or minus 3°F.
- 10. Return Damper:
 - a. Unoccupied: Damper shall remain fully open. Damper end switch shall confirm the damper fully open. If the damper fails to open, an alarm shall be sent to the head end identifying the unit and stating that the return air damper failed to open.
 - b. Occupied: The damper shall modulate to close inversely with the outdoor air damper to maintain scheduled outdoor air (as sensed by the outdoor air flow measuring station).
 - c. Economizer: The return damper shall modulate toward closed to maintain leaving air temperature set point. The damper end switch shall confirm that the damper is closed. If the damper fails to close, an alarm shall be sent to the head end identifying the unit and stating that the return damper failed to close.
- 11. Outdoor Air Damper:

- a. Unoccupied: Damper shall remain closed. Damper end switch shall confirm the damper closed. If damper fails to close, an alarm shall be sent to the head end identifying the unit and stating that the outdoor damper failed to close.
 - b. Occupied: The damper shall modulate to open inversely with the return air damper to maintain scheduled outdoor air (as sensed by the outdoor air flow measuring station). If the damper fails bring in design outdoor air within +/-10% after 5 minutes (adjustable), an alarm shall be sent to the head end identifying the unit and stating that the unit is not providing design outdoor air.
 - c. Economizer: The damper shall be fully open. Damper end switch shall confirm the damper open. If damper fails to open, an alarm shall be sent to the head end identifying the unit and stating that the outdoor damper failed to open.
12. Relief Air Damper:
- a. Unoccupied: Damper shall remain closed. Damper end switch shall confirm the damper closed. If damper fails to close, an alarm shall be sent to the head end identifying the unit and stating that the outdoor damper failed to close.
 - b. Occupied: Damper shall open. Damper end switch shall confirm the damper is open. If damper fails to open, an alarm shall be sent to the head end identifying the unit and stating that the outdoor damper failed to open.
 - c. Economizer: The damper shall modulate toward open. If damper fails to open, an alarm shall be sent to the head end identifying the unit and stating that the relief damper failed to open. Relief fan start shall be delayed (Refer to "Relief Fan" sequence above).
13. System Safety: Whenever the supply fan is stopped or airflow ceases for any reason (as sensed by the fan differential pressure switch), the supply fan shall be deactivated and alarm issued to BAS. The outdoor air damper shall be closed and return damper open. In all modes of operation, commanded position values for all control devices such as dampers shall be readable from the head-end.
14. Life Safety: Duct smoke detectors located in the return/exhaust air duct, upon detection of products of combustion from any detector, signal the building fire alarm system and shut down the unit & supply fan. This function shall be manually reset from the unit and shall be so identified on the head-end graphics. An alarm shall also be provided to the BAS head-end.
15. Condensate Pan Overflow Prevention: The unit shall monitor float switches in the condensate pan under the evaporator. If the float switch detects the pan is about to overflow and has reached its high limit, the unit shall disable the cooling and issue an alarm to the BAS.
16. Filter Change Alarm: The differential pressure across the filters shall be monitored, where if the differential pressure exceeds 1" wg (adjustable), an alarm is issued to BAS.
17. Minimum Data/Information Exchange From/To Rooftop Controller:
- A) Rooftop Controller Output (O): All unit diagnostics
 - B) O: Unit Supply Fan Status
 - C) O: Discharge Air Temperature
 - D) O: Duct Static Pressure
 - E) O: Down-Duct Static Pressure
 - F) O: Mixed Air Temperature
 - G) O: Economizer is enabled

- H) O: Heat Cool Mode
- I) O: Outside Air Damper Position
- J) O: Outside Airflow
- K) O: Exhaust Fan Status
- L) O: Exhaust Airflow
- M) O: Return Air Enthalpy
- N) O: Return Air Temperature
- O) O: Return Air Humidity
- P) O: In Use Occupied Mode
- Q) O: System Alarm Status
- R) O: Supply Fan Alarm
- S) O: Exhaust Fan Alarm
- T) O: Supply Duct Static Alarm
- U) Rooftop DDC Input (I): Occupied Mode
- V) I: Discharge Air Temperature Set point
- W) I: Duct Static Pressure Set Point

2.12 ACCESSORIES

- A. ~~Electric Gas Burner Compartment Heater: When required by unit manufacturer provide electric heater with integral thermostat to maintain minimum 50° F in gas burner compartment. (*AD-01)~~
- B. Low Ambient Operation: Provide low-ambient kit for operation down to 35° F.
- C. Guards: Provide coil guards of galvanized stamped steel, painted to match casing. Guards shall be on sides of unit. Coils shall not be clearly visible from any direction. (*AD-01)
 - 1. ~~Where scheduled "SS" or if not scheduled: Provide coil guards of galvanized stamped steel, painted to match casing. Guards shall be on sides of unit. Coils shall not be clearly visible from any direction.~~
 - 2. ~~Where scheduled "W": Provide coil guards of painted, galvanized steel wire. Coils are clearly visible from nearly every direction.~~

2.13 ROOF CURBS

- A. Provide under this section.
- B. Height: 8" greater than the highest portion of adjacent roof insulation.
- C. Slope: Match structure. Top of curb shall be level and each edge shall be flush with other edges on all sides.
- D. Roof Deck: Remove roof deck as required for ductwork and piping installation and insulation. Where pipe chases are provided remove roof deck inside curb and inside pipe chase.

2.14 STAINLESS STEEL WIRE MESH:

- A. Provide with roof curb.
- B. Material: Type 316 stainless steel 0.061" (1.8mm) diameter wire with 0.94" (10.9mm) square openings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.
- B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.
- C. Examine roofs or grade for suitable conditions where RTUs will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Grade Mounted Unit:

- 1. Concrete Base:
 - a. Anchor grade mounted equipment to concrete base.
 - b. Install RTUs on concrete base using elastomeric pads.
 - c. Minimum Deflection: 1/4".

B. Roof Mounted Unit:

- 1. Roof Curb
 - a. Coordinate roof penetrations.
 - b. Coordinate flashing with roof manufacturer.
 - c. Install curb on roof structure, secure with anchor bolts and make top edges of curb level and all edges flush with each other.
 - d. Secure equipment to upper curb rail (level) as recommended by equipment manufacturer.
 - e. Install roof deck and roof insulation inside the curb under the equipment.
 - f. Install roof curb below equipment pipe chase where pipe chase is required/provided.
 - g. Eliminate roof deck and insulation below pipe chase where pipe chase is required/provided.
 - h. Attach stainless steel wire mesh to deck over opening in pipe chase between roof and space below.

- C. Coordination: Coordinate penetrations and flashing.

3.3 FIELD QUALITY CONTROL

- A. Whether or not use of equipment is otherwise permitted, startup service, tests, and inspections must be complete prior to running unit. Failure to perform startup service, tests, and inspections prior to running equipment shall grant the owner's representative authority to have the units/equipment removed from the site at the Contractor's expense. This paragraph shall not be construed to grant the Contractor permission to use the unit(s)/equipment specified in this section of the specifications.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Record results.
- C. Tests and Inspections:
1. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 2. Leak Test: After installation, fill water and steam coils completely with water. Connect gauge and fill valve. Pressurize to 150 PSIG with air. Visually check for water leaks. Pressure shall hold with no visible loss for 120 minutes (2 hours). Fix leaks.
 3. Charge refrigerant coils with refrigerant and connect gauges. Use light that will show refrigerant leak and visually check for leaks. Pressure shall hold with no visible loss for 120 minutes (2 hours). Fix leaks.
 4. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Replace or repair faulty equipment.
 5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. RTU's or components will be considered defective if unit or components do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
- B. Complete installation and startup checks according to manufacturer's written instructions and do the following:
1. Verify that unit is secure on mountings and supporting devices and connections to piping, ducts, and electrical systems are complete.
 2. Verify that proper thermal overload protection is installed in motors, controllers, and switches.
 3. Disconnect fan drive system. Verify proper motor rotation direction, free fan wheel rotation, and smooth bearing operation. Reconnect fan drive system, align and adjust belts to proper tension.

4. Verify that bearings, pulleys, belts, and other moving parts are lubricated with factory-recommended lubricants.
5. Verify that dampers fully open and close.
6. Inspect dampers for proper stroke.
7. Inspect damper blades and seals for visible defects.
8. Inspect coil fins. Comb damaged coil fins for parallel orientation.
9. Verify that proper thermal overload protection is installed for electric coils.
10. Install new filters.
11. If not direct drive place new belts on coat hook attached with 1/4" long stainless steel sheet metal screws inside unit adjacent to existing belts where no damage will occur. Including but not limited to fans, energy recovery wheels, and enthalpy wheels.
12. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.
13. Verify that smoke dampers in connected duct system fully close when unit is deactivated.
14. Inspect for visible damage to unit casing.
15. If included in unit inspect furnace combustion chamber for visible damage.
16. Inspect coils, and fans for visible damage.
17. Inspect internal casing for visible damage.
18. Verify that labels are clearly visible.
19. Verify that clearances have been provided for servicing.
20. Verify that controls are connected and operable.
21. Clean condenser coil and inspect for construction debris.
22. If included in unit, clean furnace flue and inspect for construction debris.
23. If furnace is included in unit purge and connect gas line.
24. Remove packing from vibration isolators.
25. Inspect fan wheel for operation without vibration and binding.
26. Start unit according to manufacturer's written instructions.
 - a. Start cooling system.
 - b. Do not operate below recommended ambient temperature.
 - c. Complete startup sheets and attach 1 paper, and one "universally readable" electronic copy on USB flash drive, with startup report. Maintain a copy in electronic format, file type Portable Document Format (*.TXT, *.DOC, *.RTF, & *.PDF) file formats are acceptable. The file format must be one of those listed or the Owner and Architect must own a computer and software capable of reading the electronic file.
27. Inspect and record performance of interlocks and protective devices.
28. Verify sequence of operation.
29. Operate unit for an initial period as recommended or required by manufacturer.
30. For unit(s)/Equipment equipped with a furnace perform the following operations for minimum and maximum firing. Adjust burner for peak efficiency within operating range.
 - a. Measure and record manifold gas pressure.
 - b. Confirm proper operation of power vents.
 - c. Measure and record combustion air temperature at inlet to combustion chamber.
 - d. Measure and record flue gas temperature at furnace discharge.
 - e. Perform flue gas analysis. Measure and record flue gas carbon dioxide and oxygen concentration.
 - f. Measure and record return air temperature and volume, and supply air temperature and volume when burner is at maximum firing rate. Calculate and record heat input from the burner to the supply air.

31. Calibrate sensors including thermostats.
32. Adjust and inspect high-temperature limits.
33. With unit operating start cooling system, measure, and record the following when the ambient temperature is a minimum of 85° F:
 - a. Coil leaving air, dry and wet bulb temperatures.
 - b. Coil entering air, dry and wet bulb temperatures.
 - c. Return air, dry and wet bulb temperatures.
 - d. Outdoor air, dry and wet bulb temperatures.
 - e. Outdoor air (condenser) coil, discharge air, dry bulb temperature.
34. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.
 - a. Supply air volume.
 - b. Return air volume.
 - c. Relief/exhaust air volume.
 - d. Record relief/exhaust airflow station reading in CFM from BAS head end.
 - e. Outdoor air intake volume.
 - f. Record outdoor air intake airflow station reading in CFM from BAS head end.
35. Simulate maximum cooling demand by utilizing 100% outdoor air and lowering discharge air temperature. Record the discharge air temperature and outdoor air volume used for the simulation. During simulation operation inspect, measure, and record the following:
 - a. Compressor refrigerant suction and hot gas pressures.
 - b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.

3.5 CLEANING AND ADJUSTING

- A. Occupancy Adjustments: Within 12 months of the date of Substantial Completion, provide up to two (2) on site visits, during normal or other than normal occupancy hours as requested by owner, to assist in adjusting system.
- B. After completing testing, adjusting, and balancing clean RTU's internally to remove foreign material and construction dirt and dust. Clean fan wheels, cabinets, dampers, coils, and filter housings, and install new, filters.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units/equipment.

END OF SECTION 237413

SECTION 238126 - SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Ductless mini-split air-conditioning units consisting of a separate evaporator-fan and compressor-condenser units.
 - 2. Ducted mini-split heat pump units consisting of a separate evaporator-fan and compressor-condenser units.

1.3 DEFINITIONS

- A. Evaporator-Fan Unit: The part of the split-system air-conditioning unit that contains a coil for cooling (heat rejection for heating operation in heat pump units) and a fan to circulate air to conditioned space.
- B. Compressor-Condenser Unit: The part of the split-system air-conditioning unit that contains a refrigerant compressor and a coil for condensing refrigerant (evaporator for heating operation in heat pump units).

1.4 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.
- D. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1-2007, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- D. Units shall be designed to operate with HCFC-free refrigerants.

1.6 COORDINATION

- A. Coordinate size, location, and connection details with roof curbs, equipment supports, and roof penetrations specified in Division 07 Section "Roof Accessories."

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 DUCTLESS MINI-SPLIT AIR-CONDITIONING UNIT

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Lennox Industries Inc.
 - 2. Mitsubishi Electronics America, Inc.; HVAC Division. (Basis of Design)
 - 3. Sanyo Fisher (U.S.A.) Corp.
 - 4. Trane Company (The); Unitary Products Group.
 - 5. Carrier Corporation.
 - 6. LG Air Conditioning Technologies
 - 7. Samsung
- B. Wall-mounting, Evaporator-Fan Components
 - 1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
 - 2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
 - 3. Fan: Direct drive, centrifugal fan.
 - 4. Fan Motors: Comply with requirements in Division 23 Section "Motors for HVAC Equipment."
 - a. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.

5. Filters: Permanent, cleanable.
- C. Air-cooled, Compressor-Condenser Units
1. General: Outdoor unit shall be the same capacity as the indoor unit and include a control board that interfaces with the indoor unit to perform all necessary operation functions. Outdoor unit shall be capable of operating at 0°F ambient temperature without additional low ambient controls. Outdoor unit shall be able to operate with a maximum height difference of 100 feet from indoor unit to outdoor unit and a maximum refrigerant tubing length of 165 feet between the indoor and outdoor unit without the need for line size changes, traps, or additional oil
 2. Casing: Casing shall be galvanized steel plate coated with an electrostatically applied thermally fused acrylic or polyester powder coating. The fan grille shall be ABS plastic.
 3. Compressor: The compressor shall be a DC rotary compressor with variable compressor speed inverter technology. The compressor shall be driven by inverter circuitry to control compressor speed. Compressor speed shall be varied to match space load. Outdoor unit shall include an accumulator and high pressure safety switch. The compressor shall be mounted to avoid the transmission of vibration.
 4. Refrigerant Coil: Condenser coil shall be copper tubing with aluminum fins. The coil shall be protected with an integral metal guard. Refrigerant flow from the condenser shall be controlled by means of linear expansion valve (LEV) metering orifice. The LEV shall be controlled by a microprocessor-controlled step motor.
 5. Fan: The fan motor bearings shall be permanently lubricated. The fan shall have horizontal discharge airflow. The fan shall be mounted in front of the coil. The fan shall include a raised guard to prevent contact with moving parts.
 6. Motor: Permanently lubricated, with integral thermal-overload protection.
 7. Low Ambient Kit and Wind Baffle: Permits operation down to 0 deg F.
- D. Controls:
1. Unit shall operate under manufacturer's control of cooling operation and maintain required safeties.
 2. The control system shall be microprocessor-based and include one microprocessor on the outdoor unit and one on the indoor unit. Wall-mounted controller shall have a liquid crystal display indicating operating status and alarm condition and shall include a temperature sensor. A membrane keypad shall be included for program control and set point adjustment.
 3. The controller shall consist of On/Off button, increase/decrease set temperature buttons, a cool/dry/fan mode selector, timer menu button, timer on/off button, set time buttons, fan speed selector, vane position selector, a ventilation button, a test run button, and a check mode button.
 4. The controller shall display operating conditions such as set temperature, room temperature, pipe temperatures (i.e. liquid, discharge, indoor and outdoor), compressor operating conditions (including running current, frequency, input voltage, On/Off status and operating time), LEV opening pulses, sub-cooling and discharge super heat.
 5. Normal operation of the controller shall provide individual system control in which one controller and one indoor unit are installed in the same room.
 6. The control voltage from the controller to the indoor unit shall be 12 volts, DC. The control signal between the indoor and outdoor unit shall be pulse signal 24 volts DC. Up to two wired controllers shall be able to be used to control one unit.

7. Control system shall control the continued operation of the air sweep louvers, as well as provide On/Off and mode switching. The controller shall have the capability to provide sequential starting with up to fifty seconds delay.

2.2 DUCTED SPLIT SYSTEM AIR CONDITIONING UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Lennox Industries Inc.
2. Mitsubishi Electronics America, Inc.; HVAC Division. (Basis of Design)
3. Sanyo Fisher (U.S.A.) Corp.
4. Trane Company (The); Unitary Products Group.
5. Carrier Corporation.

- B. Indoor Air-Handling Units

1. General:
 - a. The unit shall be a ducted indoor fan coil design with a 2-position, field adjustable return and a fixed horizontal discharge supply and shall have a modulating linear expansion device. The unit shall be suitable for use in plenums in accordance with UL1995 Ed 4.
 - b. The indoor unit shall be factory assembled, wired and run tested. The unit shall be a ducted indoor fan coil design with a 2-position, field adjustable return and a fixed horizontal discharge supply and shall have a modulating linear expansion device. The unit shall be suitable for use in plenums in accordance with UL1995 Ed 4. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.
2. Unit Cabinet:
 - a. The unit shall be, ceiling-concealed, ducted.
 - b. The cabinet panel shall have provisions for a field installed filtered outside air intake.
3. Fan:
 - a. Units shall feature external static pressure settings from 0.14 to 0.60 in. WG.
 - b. The indoor unit fan shall be an assembly with one or two Sirocco fan(s) direct driven by a single motor.
 - c. The indoor fan shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings.
 - d. The indoor fan shall consist of three (3) speeds, High, Mid, and Low plus the Auto-Fan function
 - e. The indoor unit shall have a ducted air outlet system and ducted return air system.
4. Filter:
 - a. Return air shall be filtered by means of a standard factory installed return air filter.
 - b. Optional return filter box (rear or bottom placement) with high-efficiency filter shall be available for all indoor units.
5. Coil:
 - a. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.
 - b. The tubing shall have inner grooves for high efficiency heat exchange.
 - c. All tube joints shall be brazed with phos-copper or silver alloy.

- d. The coils shall be pressure tested at the factory.
- e. A condensate pan and drain shall be provided under the coil.
- f. The condensate shall be gravity drained from the fan coil.
- g. Both refrigerant lines to the indoor units shall be insulated in accordance with the installation manual.

C. Air-Cooled, Compressor-Condenser Components

- 1. General: Outdoor unit shall be the same capacity as the indoor unit and include a control board that interfaces with the indoor unit to perform all necessary operation functions. Outdoor unit shall be capable of operating at 0°F ambient temperature without additional low ambient controls. Outdoor unit shall be able to operate with a maximum height difference of 100 feet from indoor unit to outdoor unit and a maximum refrigerant tubing length of 165 feet between the indoor and outdoor unit without the need for line size changes, traps, or additional oil
- 2. Casing: Casing shall be galvanized steel plate coated with an electrostatically applied thermally fused acrylic or polyester powder coating. The fan grille shall be ABS plastic.
- 3. Compressor: The compressor shall be a DC rotary compressor with variable compressor speed inverter technology. The compressor shall be driven by inverter circuitry to control compressor speed. Compressor speed shall be varied to match space load. Outdoor unit shall include an accumulator and high pressure safety switch. The compressor shall be mounted to avoid the transmission of vibration.
- 4. Refrigerant Coil: Condenser coil shall be copper tubing with aluminum fins. The coil shall be protected with an integral metal guard. Refrigerant flow from the condenser shall be controlled by means of linear expansion valve (LEV) metering orifice. The LEV shall be controlled by a microprocessor-controlled step motor.
- 5. Fan: The fan motor bearings shall be permanently lubricated. The fan shall have horizontal discharge airflow. The fan shall be mounted in front of the coil. The fan shall include a raised guard to prevent contact with moving parts.

D. Controls

- 1. Control: The control system shall be microprocessor-based and include one microprocessor on the outdoor unit and one on the indoor unit. Wall-mounted controller shall have a liquid crystal display indicating operating status and alarm condition and shall include a temperature sensor. A membrane keypad shall be included for program control and set point adjustment.
- 2. The controller shall consist of On/Off button, increase/decrease set temperature buttons, mode selector, timer menu button, timer on/off button, set time buttons, fan speed selector, a ventilation button, a test run button, and a check mode button.
- 3. The controller shall display operating conditions such as set temperature, room temperature, pipe temperatures (i.e. liquid, discharge, indoor and outdoor), compressor operating conditions (including running current, frequency, input voltage, On/Off status and operating time), LEV opening pulses, sub-cooling and discharge super heat.
- 4. Normal operation of the controller shall provide individual system control in which one controller and one indoor unit are installed in the same room.
- 5. The control voltage from the controller to the indoor unit shall be 12 volts, DC. The control signal between the indoor and outdoor unit shall be pulse signal 24 volts DC. Up to two wired controllers shall be able to be used to control one unit.
- 6. Control system shall control the continued operation of the indoor unit, including On/Off and mode switching. The controller shall have the capability to provide sequential starting with up to fifty seconds delay.

2.3 **INDOOR UNITS — 5 TONS OR LESS SPLIT SYSTEM HEAT PUMP INDOOR UNIT WITH ELECTRIC HEAT (*AD-01)**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Carrier Corporation; Div. of United Technologies Corp.
 2. Lennox Industries Inc.
 3. Trane.
 4. York International Corp.; a division of Unitary Products Group.
- B. ~~Horizontal~~ **Vertical**-Mounted, Evaporator-Fan Components:
1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect.
 - a. Insulation: Faced, glass-fiber duct liner.
 - b. Drain Pans: Galvanized steel, with connection for drain; insulated.
 2. Refrigerant Coil: Copper or Aluminum tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 210/240.
 3. Air Filtration Section:
 - a. General Requirements for Air Filtration Section:
 - 1) Comply with NFPA 90A.
 - 2) Minimum Arrestance: According to ASHRAE 52.1 and MERV according to ASHRAE 52.2.
 - 3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.
 - b. Extended-Surface, Disposable Panel Filters:
 - 1) Factory-fabricated, dry, extended-surface type.
 - 2) Thickness: 1 inch.
 - 3) Arrestance according to ASHRAE 52.1: 90.
 - 4) Merv according to ASHRAE 52.2: 7.
 - 5) Media: Fibrous material formed into deep-V-shaped pleats and held by self-supporting wire grid.
 - 6) Media-Grid Frame: Nonflammable cardboard.
 - 7) Mounting Frames: Welded, galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.
 4. **Provide bottom return with filter rack. (*AD-01)**
 5. **Provide plenum stand. (*AD-01)**

2.4 **SPLIT SYSTEM HEAT PUMP** OUTDOOR UNITS (5 TONS OR LESS) (***AD-01**)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carrier Corporation; Div. of United Technologies Corp.
2. Lennox Industries Inc.
3. Trane.
4. York International Corp.; a division of Unitary Products Group.

B. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. **Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.**
 - a. **Compressor Type: Scroll.**
 - b. **Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.**
 - c. **Refrigerant Charge: ~~R-407C or R-410A.~~ R-454B (*AD-01)**
 - d. **Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 210/240.**
3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.
4. Fan: Aluminum-propeller type, directly connected to motor.
5. Motor: Permanently lubricated, with integral thermal-overload protection.
6. Low Ambient Kit: Permits operation down to 45 deg F.
7. Maximum decibel rating: 75 dB.

2.5 ACCESSORIES

A. Basic Unit Controls:

1. Control voltage transformer.
2. Initial Setpoints:
 - a. Cooling:
 - 1) Occupied: 75° F.
 - 2) Unoccupied: 80° F.
 - b. Heating:
 - 1) Occupied: 70° F.
 - 2) Unoccupied: 65° F.
3. **The Building Automation System (BAS) shall enable and disable the unit through a BACNET interface at a BACnet thermostat provided by the BAS manufacturer. The unit will operate under its own controls once enabled. ~~Solid State, Combination Thermostat and Humidistat: Wall mounting, programmable, microprocessor-based unit with automatic switching from heating to cooling and humidifying to dehumidifying, preferential rate control, seven-day programmability with minimum of four temperature presets per day, and battery backup protection against power failure for program settings.~~**
 - a. ~~Heat-cool-off switch.~~

- ~~b. Fan on auto switch.~~
- ~~c. Fan speed switch.~~
- ~~d. Automatic changeover.~~
- ~~e. Adjustable deadband.~~
- ~~f. Exposed set point.~~
- ~~g. Exposed indication.~~
- ~~h. Degree F indication.~~
- ~~4. Unoccupied period override push button.~~
- ~~5. Data entry and access port.~~
- ~~a. Input data includes room temperature set points and occupied and unoccupied periods.~~
- ~~b. Output data includes room temperature, supply air temperature, entering water temperature, operating mode, and status. (*AD-01)~~

- B. Drain Pan Overflow: An overflow cut-off switch shall disable the fan coil unit. This shall stop the fan and close the control valves.
- C. Automatic-reset timer to prevent rapid cycling of compressor.
- D. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.
- E. Drain Hose: For condensate.

2.6 ACCESSORIES

- A. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.
 - 1. Provide locking access ports for refrigerant system.
- B. Drain Hose: For condensate.
- C. Drain Pan Level Sensor: Sensor shall disable unit on detection of moisture.
- D. Condensate Pump: As scheduled.

2.7 ROOF-MOUNTED EQUIPMENT SUPPORTS

- A. Available Manufacturers:
 - 1. Thybar (Model TEMS-1) or approved equal.
- B. Roof-mounted equipment support designed for insulated roof deck installations. Designed for attaching outdoor equipment and sized where bottom of equipment is at least 6-inches above the top surface of roof or greater as required by local codes. Galvanized steel outer protective jacket design for attachment to steel roof decks.

2.8 PIPE CURB

- A. Available Manufacturers:
 - 1. Pate (Model PHA-2) pipe hood assembly with curb or approved equal.
- B. Galvanized steel pipe curb with wood nailer. Designed for side pipe entrance.
- C. Minimum height above top roof surface: 14-inches

2.9 CONDENSATE PIPING

- A. Condensate-Drain Piping: Type DWV, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install and connect pre-charged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to unit to allow service and maintenance.
- C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- D. Electrical Connections: Comply with requirements in Division 26 Sections for power wiring, switches, and motor controls.

3.3 CONDENSATE PIPING INSTALLATION

- A. Install condensate drain piping at a minimum uniform slope of 1/8" in 1'-0" in the direction of flow.

- B. Identify piping as specified in Division 23 Section "Identification for HVAC Piping and Equipment."
- C. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 23 Section "Sleeves and Sleeve Seals for HVAC Piping."
- D. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 23 Section "Sleeves and Sleeve Seals for HVAC Piping."
- E. Hanger, support, and anchor devices are specified in Division 23 Section "Hangers and Supports." Comply with requirements below for maximum spacing of supports.
- F. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
 - 1. $\frac{3}{4}$ " : Maximum span, 7'-0"; minimum rod size, $\frac{1}{4}$ ".
 - 2. 1" : Maximum span, 7'-0"; minimum rod size, $\frac{1}{4}$ ".

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.

3.5 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units. Refer to Division 01 Section "Closeout Procedures."

END OF SECTION 238126

SECTION 265119 - LED INTERIOR LIGHTING(*AD-01)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior solid-state luminaires that use LED technology.
 - 2. Exit Signs
 - 3. Lighting fixture supports.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Arrange in order of luminaire designation.
 - 2. Include data on features, accessories, and finishes.
 - 3. Include physical description and dimensions of luminaires.
 - 4. Include emergency lighting units, including batteries and chargers.
 - 5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
 - 6. Photometric data and adjustment factors based on laboratory tests.

7. Confirmation of compliance with Design Lighting Consortium (DLC) or ENERGY STAR product requirements.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. For each fixture provide a color palette of the manufacturer's full color offering. Indicate which colors are standard (no additional cost) and which are custom (additional cost). Architect shall pick the color of all fixtures at the time of the submittal.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Provide luminaires from a single manufacturer for each luminaire type.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.8 FIELD CONDITIONS

- A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.

1.9 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within Five years from date the Owner receives the Certificate of Occupancy or 7 years from the manufacturer's shipping date.

1. Failures include, but are not limited to, the following:
 - a. Structural failures, including luminaire support components.
 - b. Faulty operation of luminaires and accessories.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

1.10 EXTRA MATERIALS

- A. Provide extra materials described below that match products installed including installation and wiring. Uninstalled devices shall be packaged with protective covering for storage, identified with labels describing contents and turned over to the owner at the completion of the project.
1. Drivers: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
 2. Globes and Guards: 1 for every 20 of each type and rating installed. Furnish at least one of each type.
 3. Exit signs: Provide 10% of total count but not less than 10 additional exit signs (single face or double face, as needed)
 4. Including 100' of conduit, boxes, wire, associated accessories and installation for each unit listed above. Units shall be installed as directed by the Architect, Owner, or Authority Having Jurisdiction (AHJ).

1.11 SUBSTITUTIONS

- A. In Lighting Fixture Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selection:
1. Basis of Design Product: The design of each luminaire and its support is based on the first product named. Subject to compliance with requirements, provide either the named product or a comparable product by another manufacturer.
- B. The lighting fixture layout indicated in the Contract Documents is based upon photometric data, quality, construction and appearance of fixtures listed in the lighting fixture schedule. Substitutions of listed fixtures are allowed provided the following is provided:
1. Substitution package shall be submitted to Architect no later than fifteen (15) days prior to bid for review and approval.
 2. Provide all data for the substitution package in a table similar in format to the lighting fixture schedule on the drawings.
 3. Provide cut sheets of substitute fixtures with the various features highlighted.
 4. Architect has final functional and aesthetic approval on all substituted fixtures.
 5. Pre-bid approved will still be subject to the usual post bid submittal process and review.

C. Additional Approved Manufacturers

1. FRM Lighting and Controls (*AD-01)

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. All interior LED lighting fixtures shall be compliant with current product requirements of Design Lighting Consortium (DLC) or ENERGY STAR program.

- C. Recessed Fixtures: Comply with NEMA LE 4.
- D. Lamps dimmable from 100 percent of maximum light output down to percentage listed in lighting schedule as BOD.
- E. Internal driver:
 - 1. Minimum efficiency: 85% at full load.
 - 2. Minimum Operating Ambient Temperature: -20° C. (-4° F.).
 - 3. Integral short circuit, open circuit, and overload protection.
 - 4. Power Factor: ≥ 0.95 .
 - 5. Total Harmonic Distortion: $\leq 20\%$.
 - 6. Comply with FCC 47 CFR Part 15.
- F. LED Modules:
 - 1. Comply with IES LM-79 and LM-80 requirements.
 - 2. Minimum CRI 80 and color temperature 4000° K unless otherwise specified in LIGHTING FIXTURE SCHEDULE.
 - 3. Minimum Rated Life: 50,000 hours per IES L70.
 - 4. Light output: delivered lumens as indicated in the LIGHTING FIXTURE SCHEDULE.
- G. Nominal Operating Voltage: Provide Universal voltage (120V-277V) driver where possible. Otherwise provide per the drawings.
- H. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
- I. Housings:
 - 1. Extruded-aluminum or steel housing and heat sink.
 - 2. Powder-coat painted finish.

2.2 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 - 1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
 - 2. Battery Powered Exit Signs: Integral automatic charger in a self-contained power pack.
 - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

- f. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.

2.3 MATERIALS

A. Metal Parts:

- 1. Free of burrs and sharp corners and edges.
- 2. Sheet metal components shall be steel unless otherwise indicated.
- 3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit maintenance access without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during maintenance and when secured in operating position.

C. Diffusers:

- 1. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- 2. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

D. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

- 1. Label shall include the following lamp characteristics:
 - a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter, shape, size, wattage, and coating.
 - c. CCT and CRI for all luminaires.

2.4 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.5 LUMINAIRE FIXTURE SUPPORT COMPONENTS

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

- C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage.
- D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before fixture installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.3 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and maintenance.
 - 3. Provide support for luminaire without causing deflection of ceiling or wall.
 - 4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.
- D. Flush-Mounted Luminaire Support:
 - 1. Secured to outlet box.
 - 2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
 - 3. Trim ring flush with finished surface.
- E. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls
2. Do not attach luminaires directly to gypsum board.

F. Ceiling-Mounted Luminaire Support:

1. Ceiling mount with two 5/32-inch diameter aircraft cable supports attached to structure. Do not attached to ceiling with no additional support.

G. Suspended Luminaire Support:

1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
3. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of luminaire chassis, including one at each end.
4. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

H. Ceiling-Grid-Mounted Luminaires:

1. Secure luminaire to the luminaire opening using approved fasteners in a minimum of two locations, spaced near diagonal corners of luminaire.
2. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.

- I. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

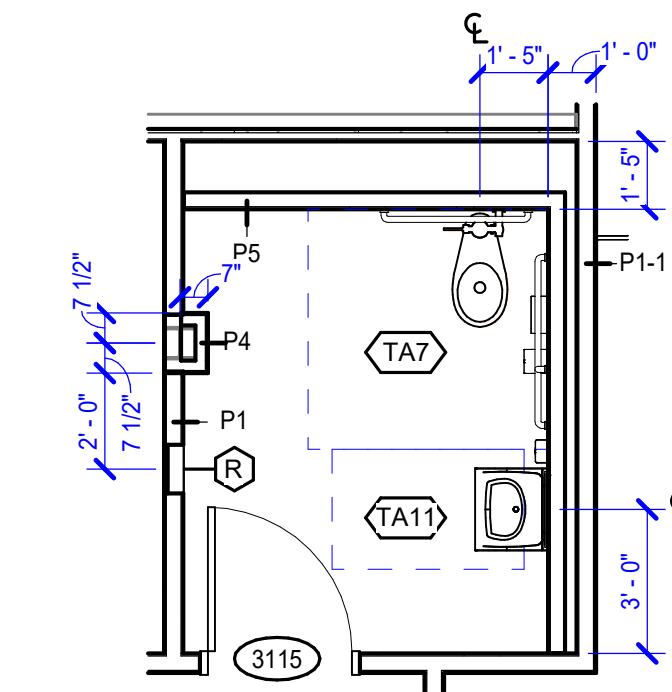
3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

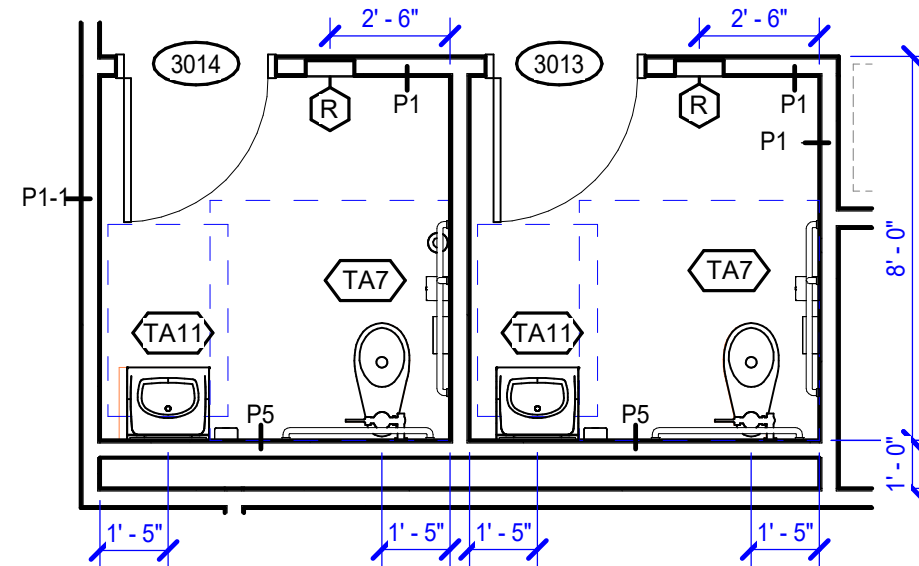
3.5 FIELD QUALITY CONTROL

- A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.
- B. Perform the following tests and inspections:
 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
 2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- C. Luminaire will be considered defective if it does not pass operation tests and inspections.
- D. Prepare test and inspection reports.

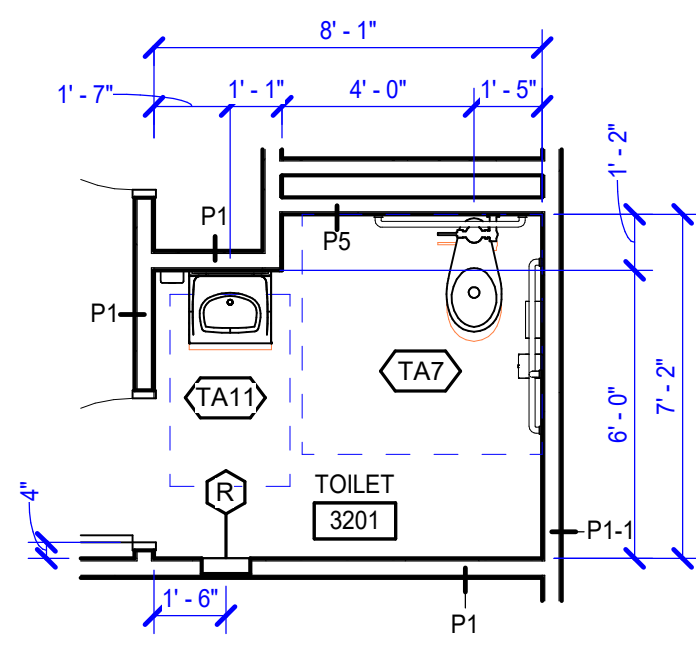
END OF SECTION 265119



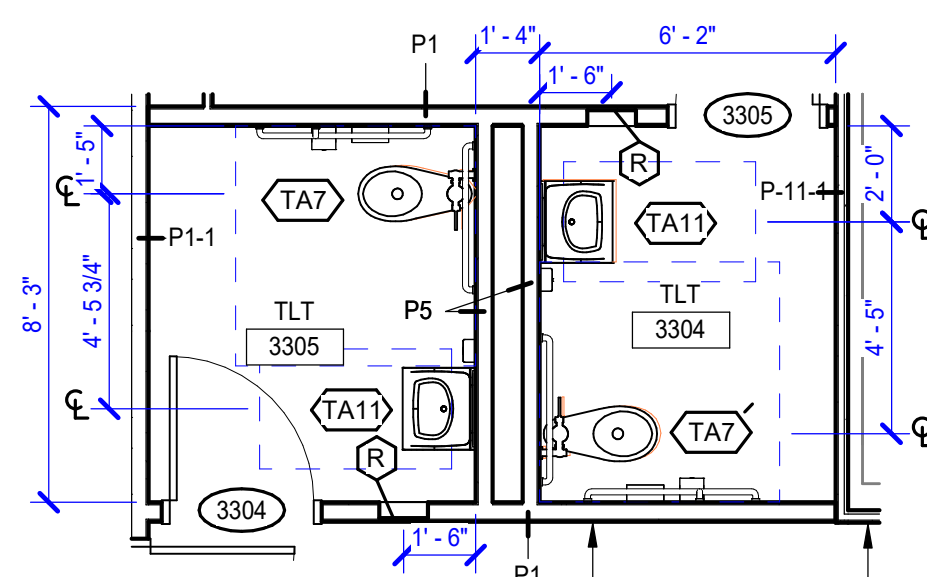
4 ENLARGED TOILET PLAN - 3175
A2.3/A7.1.1 1/4" = 1'-0"



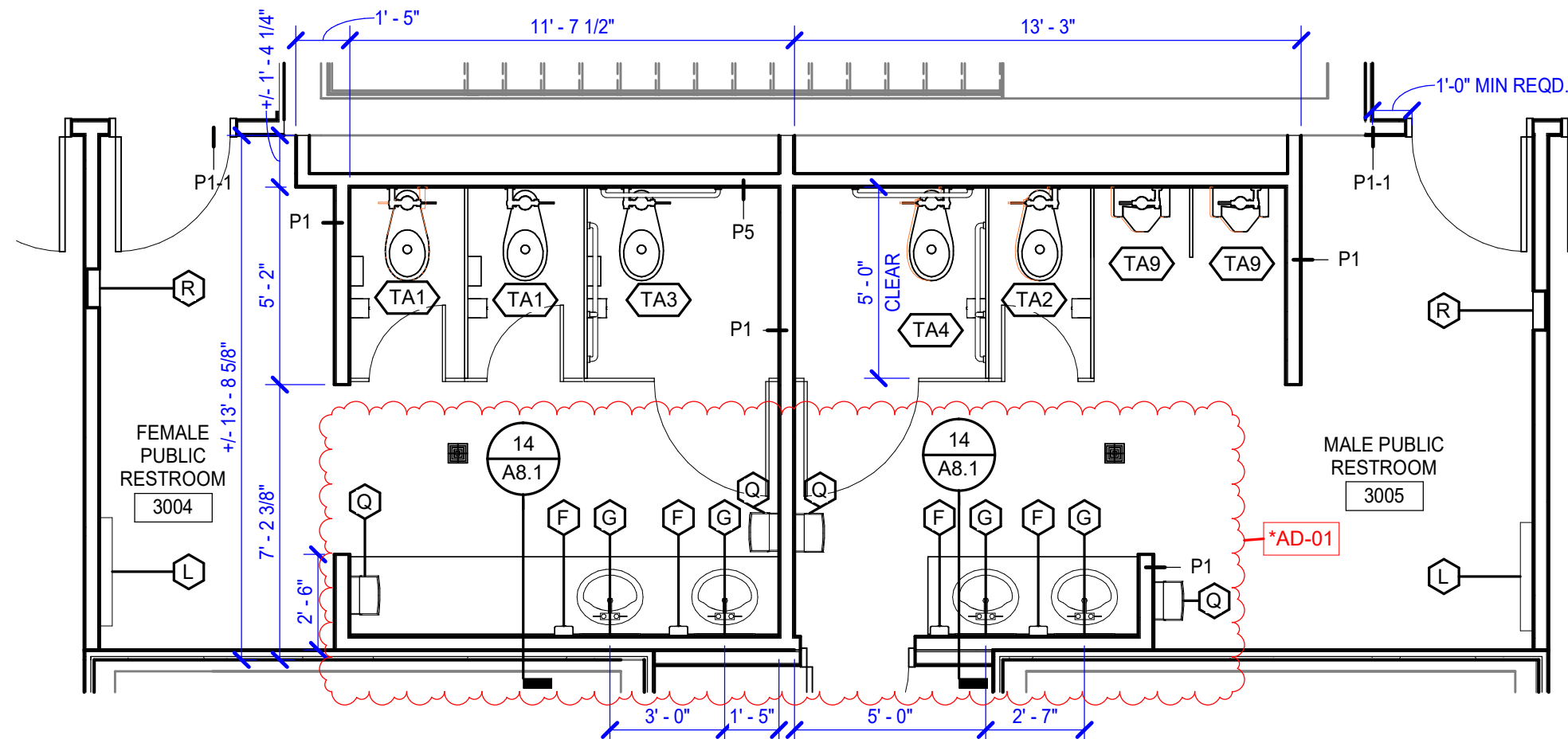
6 ENLARGED TOILET PLAN - 3171 / 1
A2.3/A7.1.1 1/4" = 1'-0"



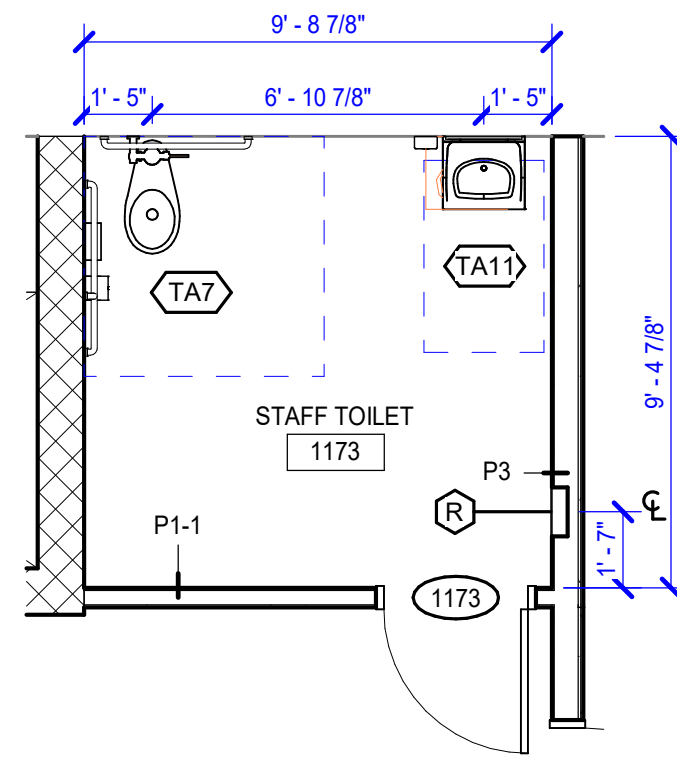
5 ENLARGED TOILET PLAN 3201
A2.3/A7.1.1 1/4" = 1'-0"



3 ENLARGED TOILET PLAN - 3129 / 3133
A2.3/A7.1.1 1/4" = 1'-0"



2 ENLARGED TOILET PLAN - 3105 / 3106
A2.3/A7.1.1 1/4" = 1'-0"



1 ENLARGED TOILET PLAN - 1173
A2.1/A7.1.1 1/4" = 1'-0"

TOILET ASSEMBLIES					
APPLIES TO DRAWINGS A7.1 - A7.nn REPRESENTED BY (TA0)					
MARK	REMARKS	PLAN	MARK	REMARKS	PLAN
TA1			TA10		
TA2	OMIT (E)		TA11	CENTER (S) OVER LAVATORY	
TA3			TA12		
TA4	OMIT (E)		TA13	OMIT (C) (H) (J)	
TA5			TA14		
TA6	OMIT (E)		TA15		
TA7			LEGEND NOTES: A. HANDING/ORIENTATION MAY VARY. REFER TO PLANS FOR PROPER ORIENTATION. B. PLUMBING FIXTURE GRAPHICS IN THIS LEGEND ARE REPRESENTATIVE ONLY. ACTUAL PLUMBING FIXTURES MAY VARY. C. COAT/ROBE HOOKS INDICATED ON THE BACK OF TOILET COMPARTMENT DOORS ARE PART OF THE TOILET COMPARTMENT ASSEMBLY AND ARE NOT CONSIDERED A TOILET ACCESSORY.		
TA8	OMIT (E)				
TA9					

TOILET ACCESSORIES SCHEDULE			
MARK	DESCRIPTION	MOUNTING HEIGHT	REMARKS
A	36" HORIZONTAL GRAB BAR	REFER TO WATER CLOSET ELEVATIONS	
B	42" HORIZONTAL GRAB BAR	REFER TO WATER CLOSET ELEVATIONS	
C	18" VERTICAL GRAB BAR	REFER TO WATER CLOSET ELEVATIONS	
D	TOILET TISSUE DISPENSER	REFER TO WATER CLOSET ELEVATIONS	
E	SANITARY NAPKIN DISPOSAL	REFER TO WATER CLOSET ELEVATIONS	
F	SOAP DISPENSER	3'-4" AFF TO DISPENSING OUTLET	
G	MIRROR (18" x 36"), OVER LAV AND COUNTERTOP	3'-4" AFF TO BOTTOM OF REFLECTIVE SURFACE	
L	DIAPER CHANGING STATION	3'-8" AFF TO DISPENSING OUTLET OR OPERABLE PART IF PRESENT (e.g., CRANK, BUTTON, SENSOR)	
Q	Towel Dispenser	3'-8" AFF TO DISPENSING OUTLET OR OPERABLE PART IF PRESENT (e.g., CRANK, BUTTON, SENSOR)	
R	RECESSED SS PAPER TOWEL DISPENSER WITH WASTE RECEPTACLE		

1. ACCESSORY ITEMS ARE IDENTIFIED BY (E) ON PLANS. LETTERS CORRESPOND TO SCHEDULE ABOVE.

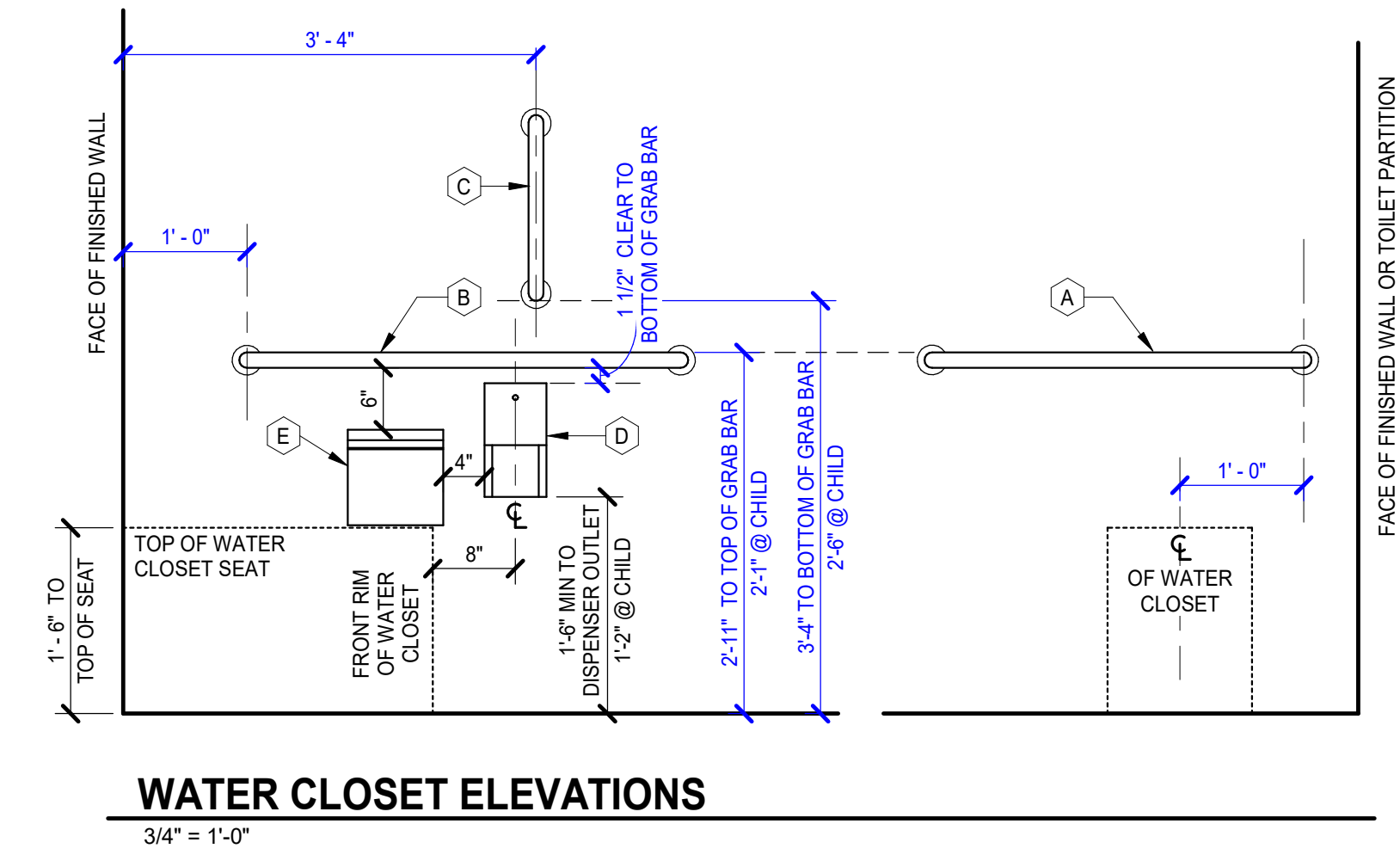
2. ACTUAL DIMENSIONS OF ACCESSORIES MAY VARY. COORDINATE DIFFERENCES, IF ANY.

3. REFER TO ALL CASEWORK ELEVATIONS FOR ADDITIONAL TOILET ACCESSORY LOCATIONS.

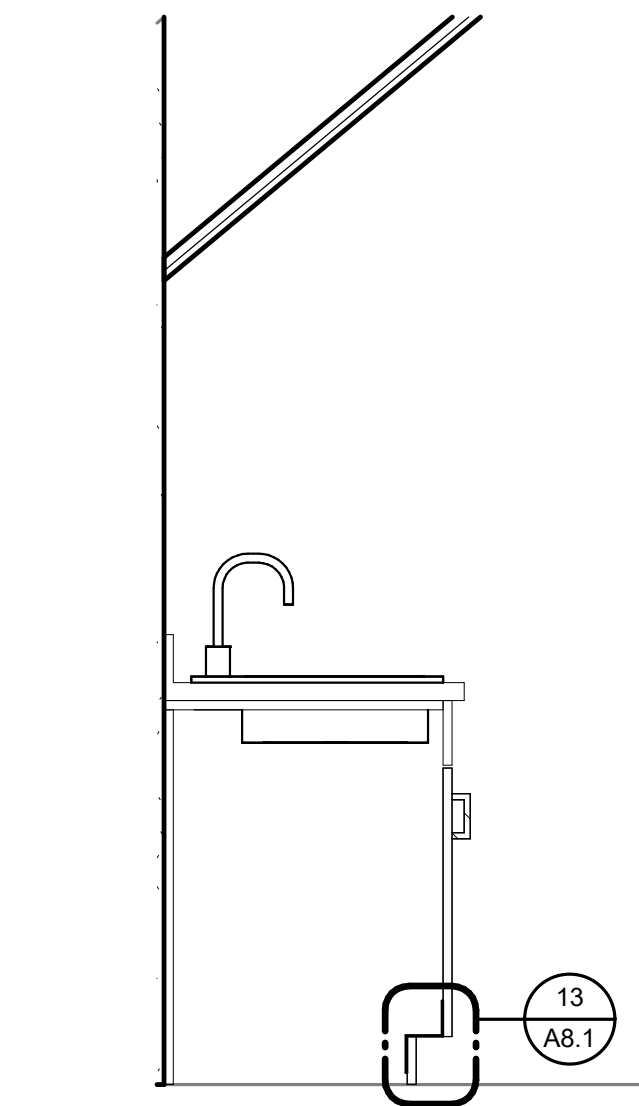
4. PROVIDE MOP AND BROOM HOLDER W/ SHELF AT ALL CUSTODIAL/ANTIORIAL SINKS. MOUNT AT 5'-0" AFF TO CENTERLINE AND LOCATE ON SIDE WALL OF SINK (NOT ON WALL ABOVE FAUCET).

5. PROVIDE ROBE HOOK ON INTERIOR FACE OF ALL TOILET ROOM DOORS WHEREIN ONLY ONE WATER CLOSET IS PROVIDED. MOUNT AT 3'-11" AFF TO TOP.

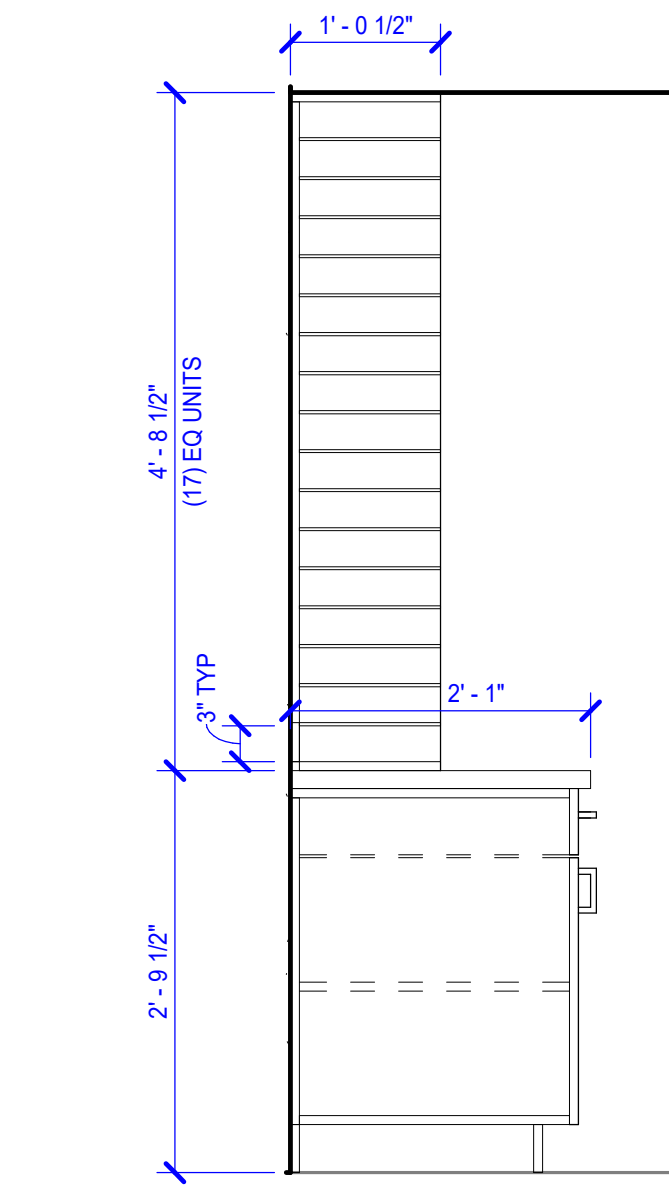
TOILET ASSEMBLIES, SCHEDULE AND ENLARGED PLAN GENERAL NOTES	
A. PLAN DIMENSIONS ARE TO FACE OF WALL OR PARTITION. WHERE APPLIED FINISHES OCCUR SUCH AS CERAMIC TILE, DIMENSIONS ARE TO FACE OF APPLIED FINISH. FOR WAINSCOTS, FLOOR PLAN DIMENSIONS ARE TO FACE OF WAINSCOT MATERIAL. APPLIED FINISHES ARE NOT ALLOWED TO REDUCE CLEAR DIMENSIONS. "APPLIED FINISHES" IN THIS CASE DO NOT INCLUDE TRIM, BASE, AND ACOUSTIC WALL PANELS.	
B. CLEAR DIMENSIONS ARE TO FACE OF APPLIED WALL AND PARTITION FINISHES.	
C. PIPES UNDER BATHROOM SINKS TO BE INSULATED.	



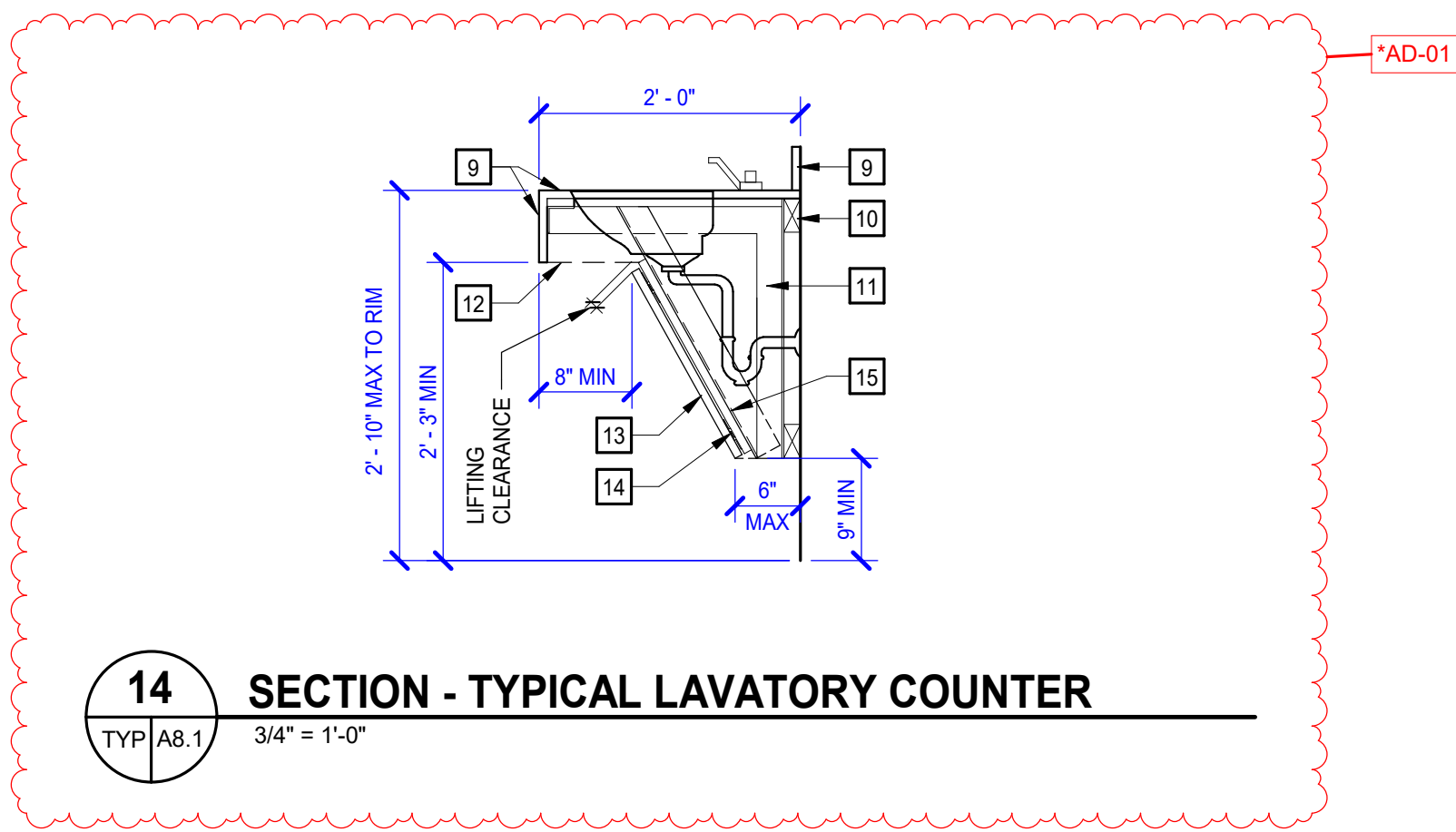
PROJECT NO: 623324	DATE: 10/1/2025
REVISIONS	
DATE	DESCRIPTION
11/04/25	*AD-01



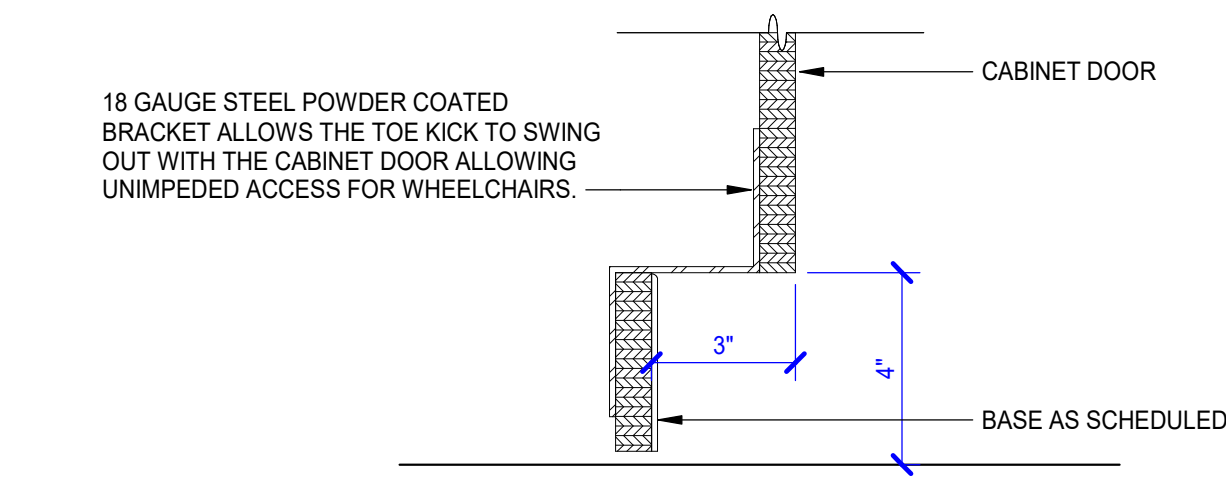
12 SECTION - SHARED BREAKROOM
3/4" = 1'-0"



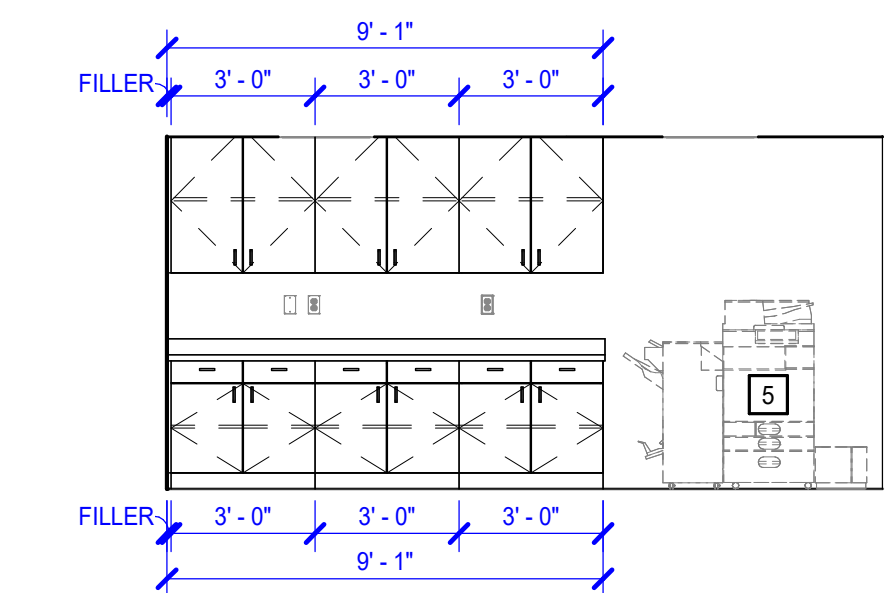
11 SECTION - MAIL SLOTS
3/4" = 1'-0"



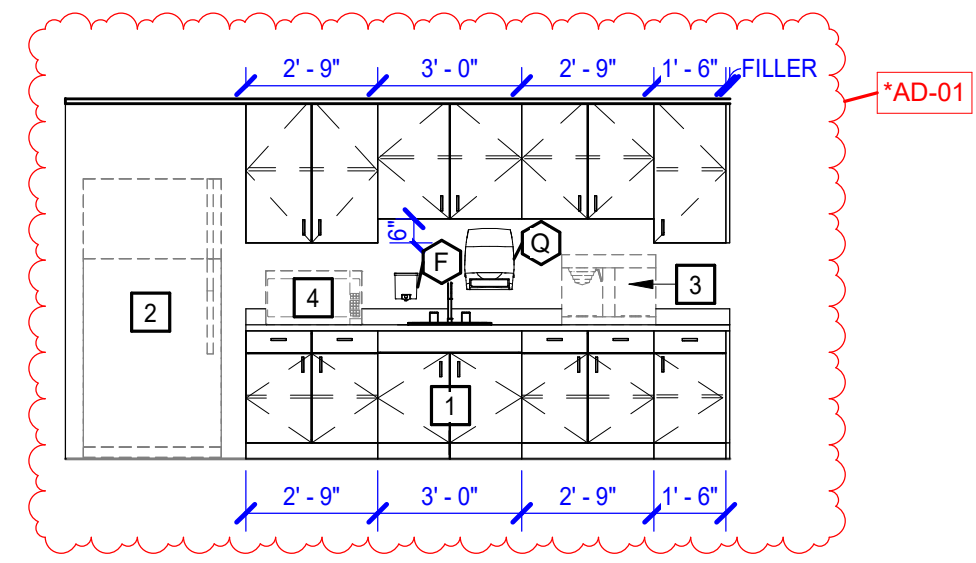
14 SECTION - TYPICAL LAVATORY COUNTER
3/4" = 1'-0"



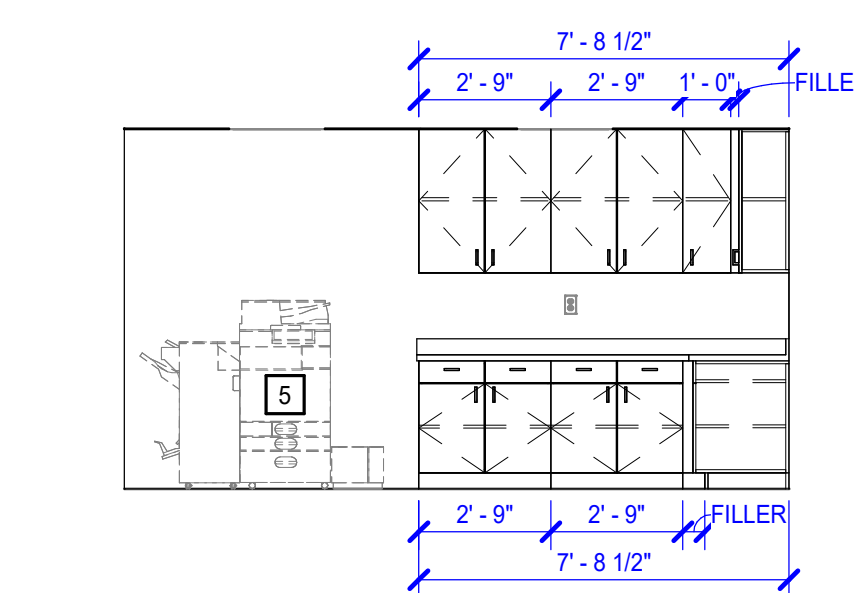
13 DETAIL - ACCESSIBLE INTEGRAL TOE KICK
3" = 1'-0"



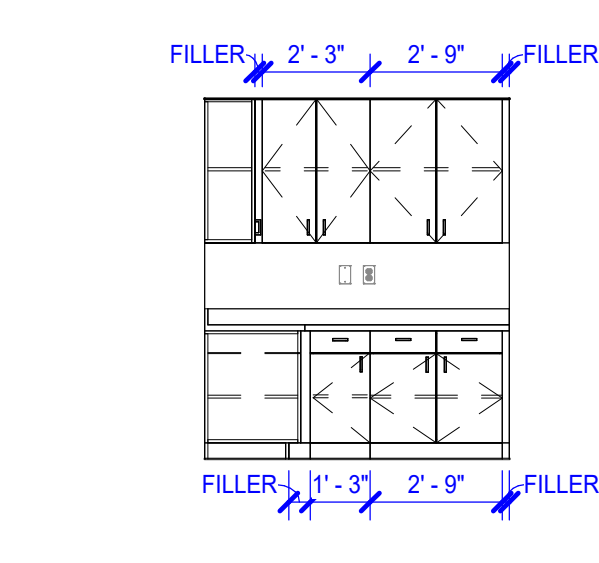
10 3114 - COPY/WORK ROOM - N
1/4" = 1'-0"



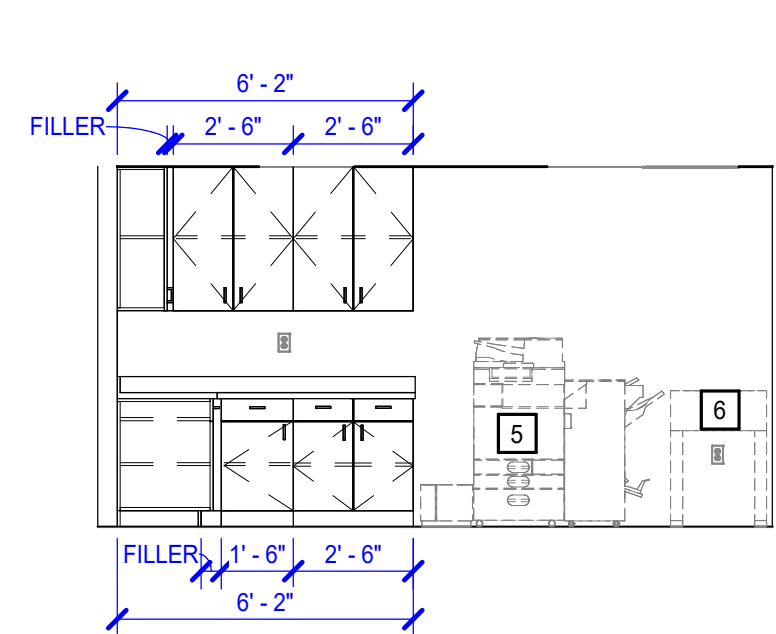
9 3315 BREAK ROOM
1/4" = 1'-0"



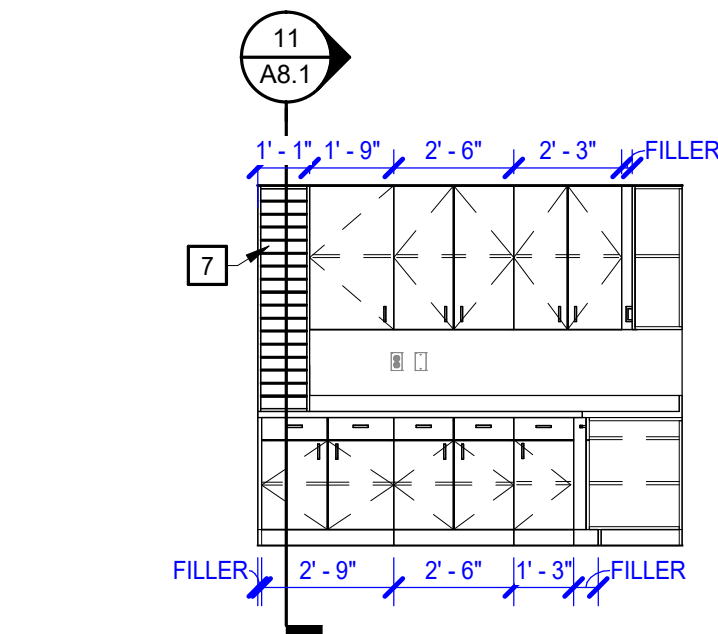
8 3311 - COPY/WORK ROOM - S
1/4" = 1'-0"



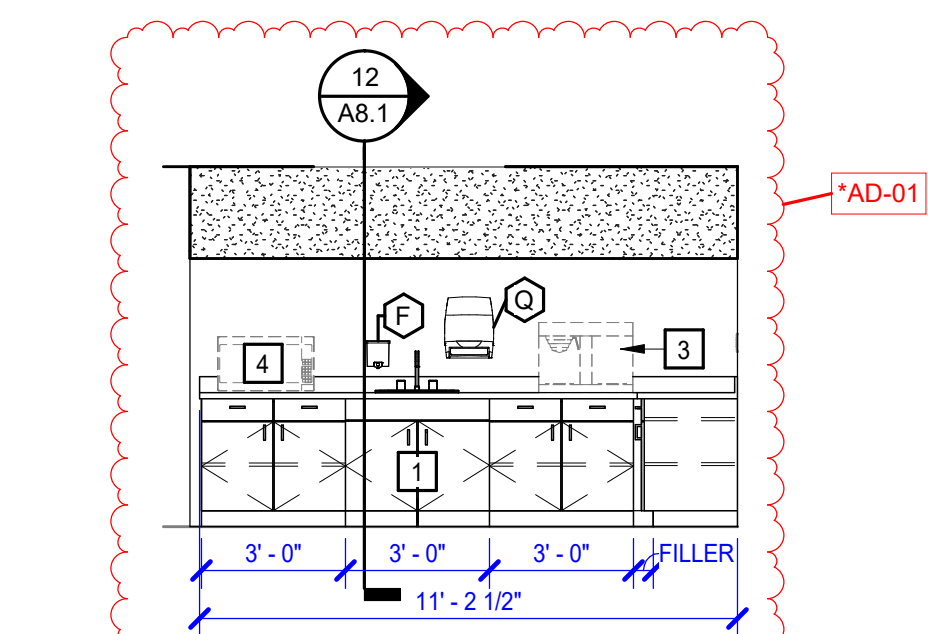
7 3311 - COPY/WORK ROOM - W
1/4" = 1'-0"



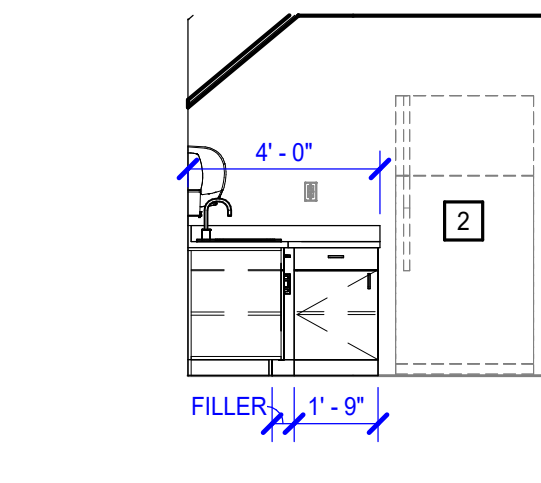
6 3207 - COPY/WORK ROOM - E
1/4" = 1'-0"



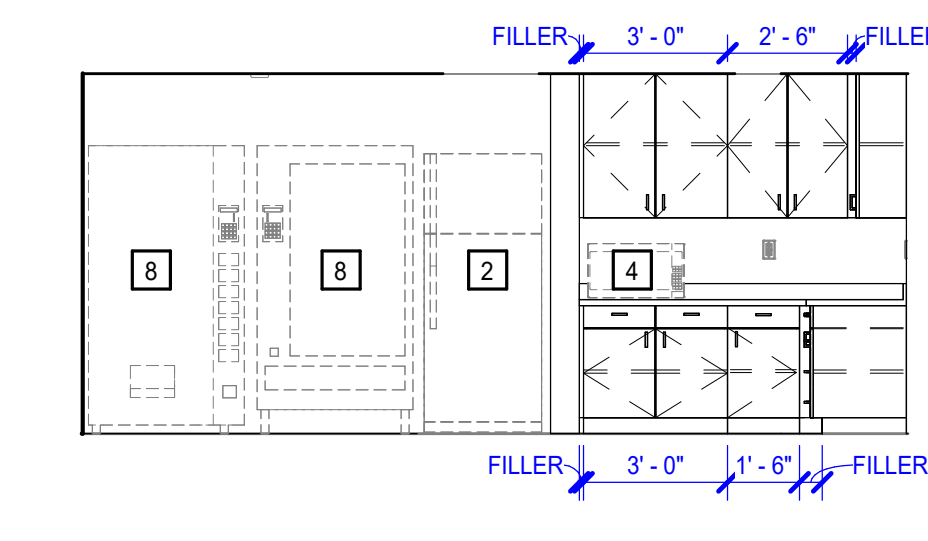
5 3207 - COPY/WORK ROOM - N
1/4" = 1'-0"



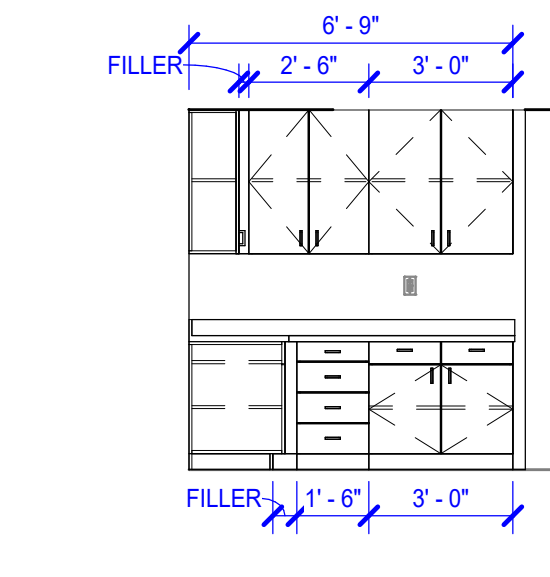
4 3011 SHARED BREAKROOM NE
1/4" = 1'-0"



3 3011 SHARED BREAKROOM - E
1/4" = 1'-0"



2 3011 SHARED BREAKROOM - W
1/4" = 1'-0"



1 3011 SHARED BREAKROOM - NW
1/4" = 1'-0"

CASEWORK GENERAL NOTES

- A. UNLESS INDICATED OTHERWISE, ALL COUNTERTOP(S):
- 2'-9.5" AFF MAX OR 2'-9.5" MAX TO TOP OF RIM AT DROP-IN SINKS AND LAVATORIES WHERE OCCURS
 - 2'-0" DEEP
 - SOLID SURFACE
 - BACKSPASHES: 4" HIGH AT ALL SIDES AND BACK
 - EXTEND COUNTERTOP 1/2" PAST BASE CABINET AT ALL EXPOSED CASEWORK ENDS
 - VERIFY SLAB LEVELNESS AT CASEWORK PRIOR TO INSTALL. CONSTRUCTION TOLERANCES DO NOT APPLY TO ACCESSIBILITY DIMENSIONS; MAX DIMENSIONS SHALL BE MAINTAINED.
- B. UNLESS INDICATED OTHERWISE, ALL BASE CABINET(S):
- 2'-0" DEEP NOMINAL
 - TOE KICKS: 4" NOMINAL HIGH (REDUCE AS NEEDED FOR TOLERANCES) AND 3" DEEP
 - SINK LOCATIONS: BASE CABINET WITH ATTACHED TOE KICK FOR BARRIER FREE ACCESS. WIDTH AS INDICATED ON DRAWING.
- C. UNLESS INDICATED OTHERWISE, ALL WALL CABINET(S):
- 1'-0 1/2" DEEP NOMINAL
 - 3'-0" HIGH
 - TOP AT 7'-0" AFF. COORDINATE HEIGHT TO ALIGN WITH CEILING.
 - MINIMUM 11" CLEAR INTERIOR DEPTH
- D. BUILT-IN EQUIPMENT: SIZE OPENING (HEIGHT, WIDTH, AND DEPTH) AND ROUGH-IN REQUIREMENTS AS REQUIRED BASED ON APPROVED MANUFACTURER SUBMITTED.
- E. ALL SHELVES: ADJUSTABLE UNLESS INDICATED OTHERWISE.
- F. PROVIDE FINISH END PANELS AT ALL EXPOSED CASEWORK ENDS.
- G. ALL APPLIANCES ARE NIC.
- H. INDICATES TOILET ACCESSORY. *AD-01

CASEWORK KEYNOTES

REPRESENTED BY 1
APPLIES TO DRAWINGS A8.1

- 1 BARRIER-FREE SINK CABINET WITH INTEGRAL TOE KICK
- 2 REFRIGERATOR (NIC)
- 3 COFFEE MAKER (NIC)
- 4 MICROWAVE (NIC)
- 5 COPIER (NIC)
- 6 SHREDDER (NIC)
- 7 MAIL SLOTS WITH NAME PLATE AT EACH SLOT
- 8 VENDING MACHINE (NIC)
- 9 SSM
- 10 2X WOOD LEDGER ANCHOR AT EACH STUD
- 11 2 1/2" x 2 1/2" x 0.185 STL ANGLE BRACKET CENTERED BETWEEN LAVATORIES AND AT OPEN ENDS, 4'-0" MAX
- 12 FINISHED END PANEL BEYOND
- 13 REMOVABLE PLAM PANEL, 4'-0" WIDE MAX
- 14 Z-CLIP BRACKETS
- 15 1X WD BACKER SCREW-ATTACHED TO STL BRACKET

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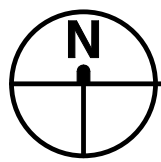
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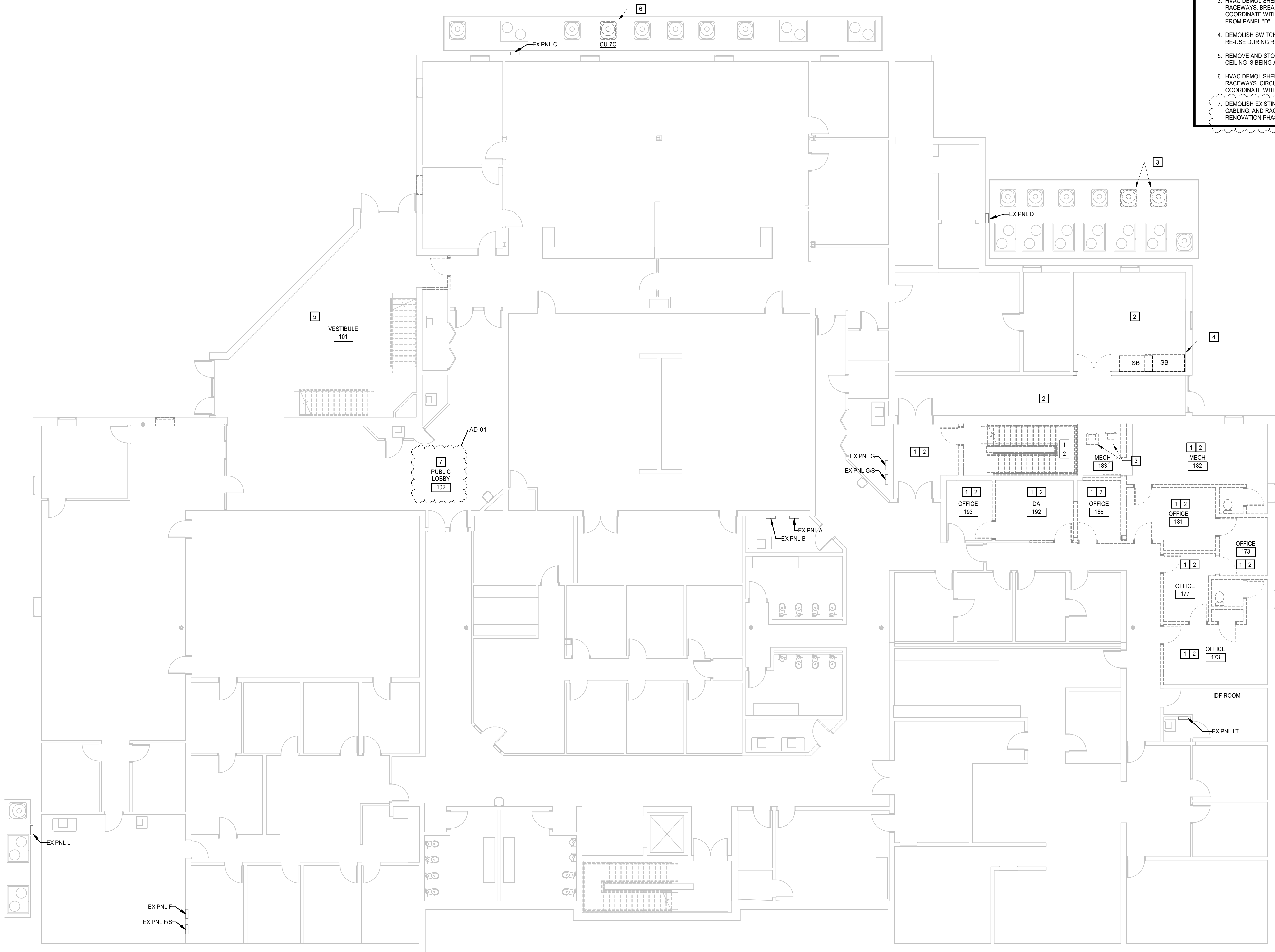
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10



ELECTRICAL DEMOLITION PLAN - LEVEL 1

1/8" = 1'-0"



KEYNOTES

APPLIES TO THIS SHEET
REPRESENTED BY [A]

1. DEMOLISH EXISTING ELECTRICAL DEVICES, CABLING, AND RACEWAYS. CIRCUITS TO BE RE-USED DURING DEMOLITION PHASE. COORDINATE WITH DIVISIONS 22 AND 23 DURING DEMOLITION PHASE. FED FROM PANEL "G"
2. DEMOLISH EXISTING LIGHTING FIXTURES, ASSOCIATED SWITCHES, CABLING, AND RACEWAYS. CIRCUITS SHALL BE RE-USED DURING RENOVATION PHASE. FED FROM PANEL "G"
3. HVAC DEMOLISHED BY DIV 23. DEMOLISH EXISTING CABLING, AND RACEWAYS. BREAKER TO BE RE-USED DURING RENOVATION PHASE. COORDINATE WITH DIVISIONS 23. AHU'S FED FROM PANEL "A", CU'S FED FROM PANEL "D"
4. DEMOLISH SWITCHGEAR. PRESERVE FEEDERS TO BRANCH PANELS FOR RE-USE DURING RENOVATION. CEILING IS BEING ALTERED
5. REMOVE AND STORE EXISTING LIGHT FIXTURES FOR RENOVATION PHASE. CEILING IS BEING ALTERED
6. HVAC DEMOLISHED BY DIV 23. DEMOLISH EXISTING CABLING, AND RACEWAYS. CIRCUIT TO BE RE-USED DURING RENOVATION PHASE. COORDINATE WITH DIVISIONS 23. FED FROM PANEL "C"
7. DEMOLISH EXISTING LIGHTING FIXTURES, ASSOCIATED SWITCHES, CABLING, AND RACEWAYS. CIRCUITS SHALL BE RE-USED DURING RENOVATION PHASE. FED FROM PANEL "F"



HALIFAX COUNTY COURTHOUSE

HALIFAX COUNTY
357 FERRELL LANE
HALIFAX, NC 27839

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11/04/2025	AD-01

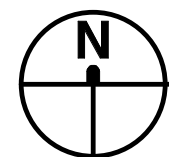
ELECTRICAL DEMO
PLAN - LEVEL 1

E1.1.1

MOSELEYARCHITECTS

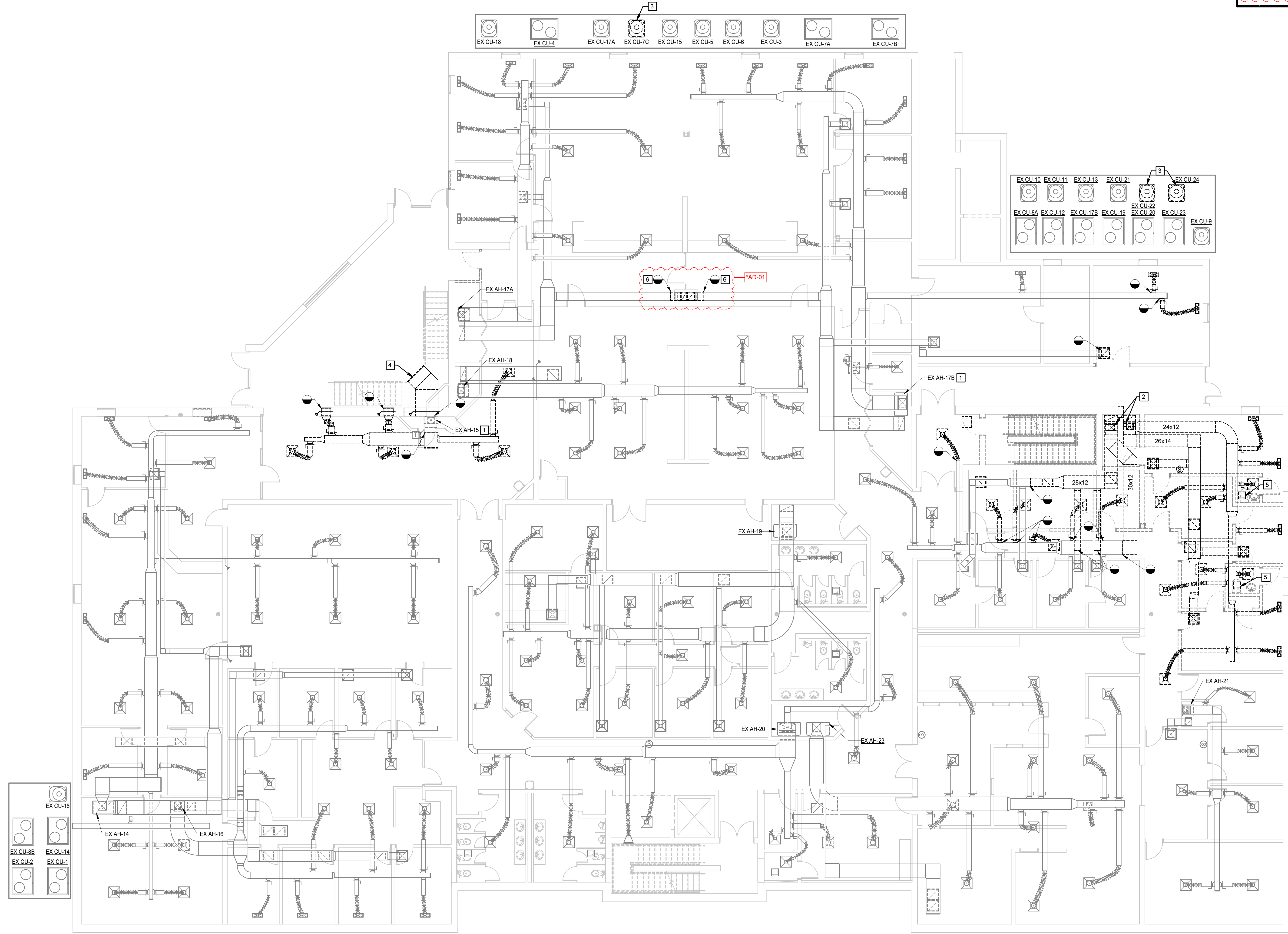
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11/2/2025 11:00:04 AM



FIRST FLOOR DEMOLITION PLAN

1/8" = 1'-0"



KEYNOTES

APPLIES TO THIS DRAWING

1. PERFORM PRE-CONSTRUCTION TESTING FOR AIR HANDLING UNIT PRIOR TO ANY DEMOLITION WORK. REFER TO SPECIFICATION SECTION 014520 FOR REQUIREMENTS.
2. REMOVE EXISTING AIR HANDLING UNIT AND ASSOCIATED PIPING AND CONTROLS.
3. REMOVE EXISTING CONDENSING UNIT AND ASSOCIATED PIPING. CONTRACTOR TO CONFIRM CONDENSING UNIT IS ASSOCIATED WITH INDOOR AIR HANDLING UNIT TO BE REMOVED PRIOR TO DEMOLITION.
4. REMOVE EXISTING WALL-MOUNTED RETURN GRILLE, FIRE DAMPER, AND RETURN DUCTWORK BACK TO EXISTING AIR HANDLING UNIT. PATCH EXISTING WALL TO MAINTAIN WALL RATING.
5. REMOVE EXISTING CEILING-MOUNTED EXHAUST FAN. CAP EXISTING EXHAUST DUCTWORK.
6. REMOVE EXISTING DUCT AS REQUIRED FOR INSTALLATION OF STRUCTURAL BEAM.

HALIFAX COUNTY COURTHOUSE

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11/04/2025	*AD-01

FIRST FLOOR
DEMOLITION PLAN

M1.1



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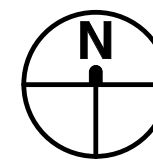
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APPLIES TO THIS DRAWING

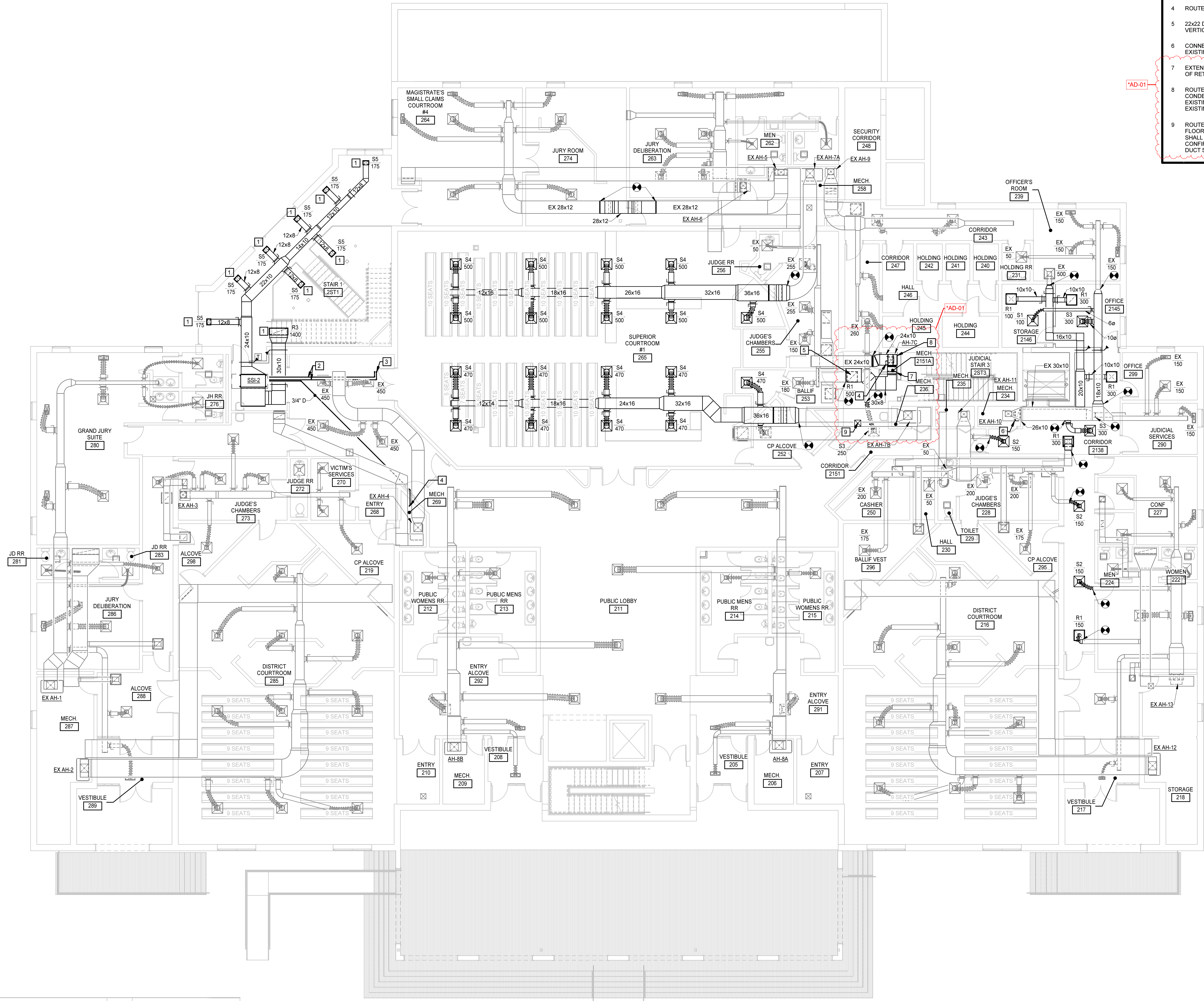
- 1 REFRIGERANT LIQUID AND SUCTION SIZE PER MANUFACTURER'S INSTRUCTIONS.
- 2 3/4" D DOWN WALL TO SPLASH BLOCK ON GRADE.
- 3 REFRIGERANT LIQUID AND SUCTION DOWN WALL TO CONDENSING UNIT ON GRADE.
- 4 CONCRETE EQUIPMENT PAD. SEE STRUCTURAL DRAWINGS FOR DETAIL.
- 5 DISCHARGE CONDENSATE ON GRADE.
- 6 CONNECT TO LOUVER.
- 7 CONNECT RETURN DUCT TO EXISTING RETURN AIR PLENUM BELOW EXISTING UNIT.
- 8 CONNECT TO EXISTING GRILLE.
- 9 COORDINATE HEIGHT AND ROUTE OF DUCT WITH STRUCTURAL REVISIONS.





SECOND FLOOR PLAN - DUCTWORK

1/8" = 1'-0"



KEYNOTES

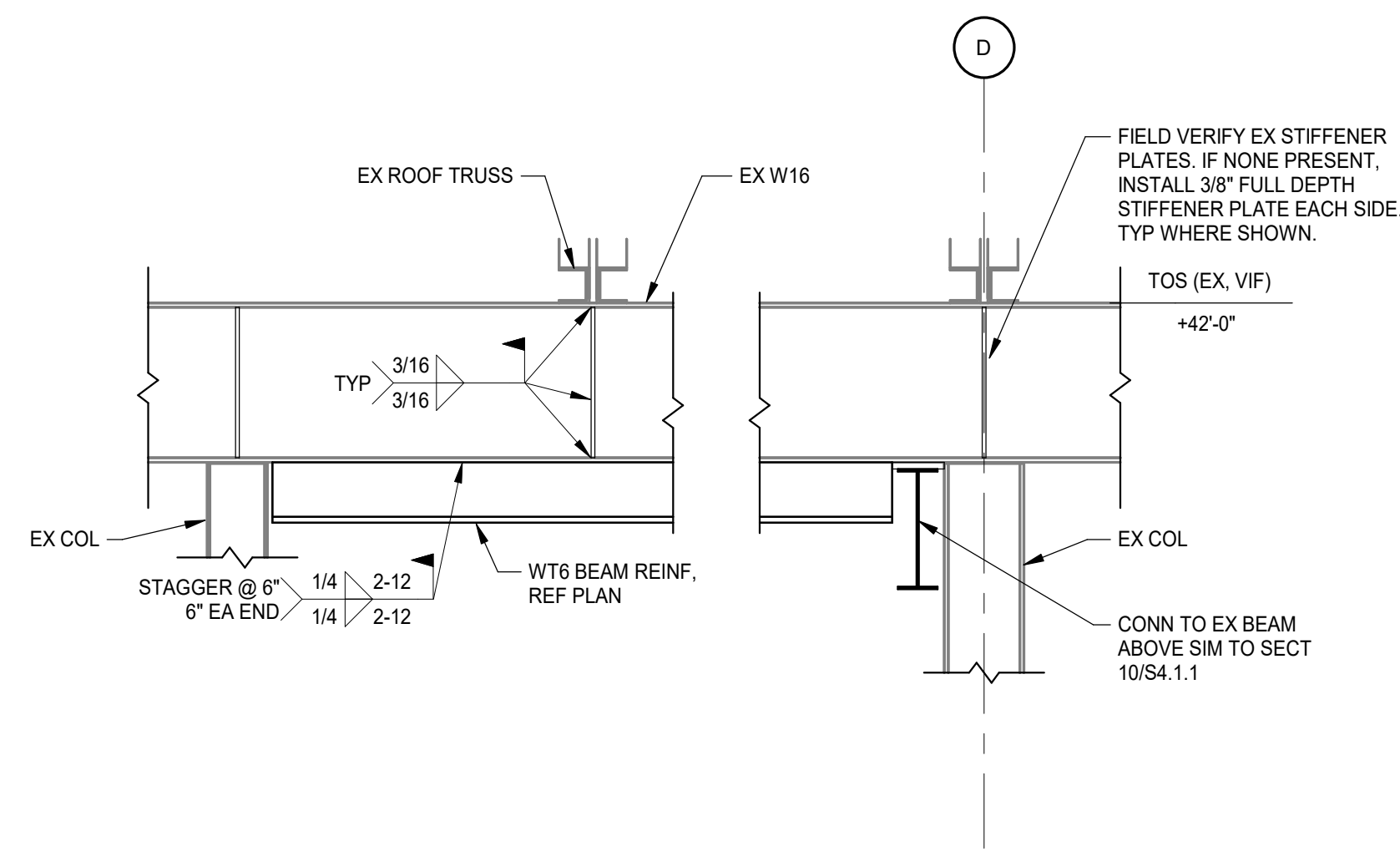
APPLIES TO THIS DRAWING

- 1 PROVIDE CEILING RADIATION DAMPER AT CEILING PENETRATION.
- 2 REFRIGERANT LIQUID AND SUCTION. SIZE PER MANUFACTURER'S INSTRUCTIONS.
- 3 REFRIGERANT LIQUID AND SUCTION UP TO SSO-2 ON ROOF.
- 4 ROUTE CONDENSATE DRAIN DOWN TO EXISTING FLOOR DRAIN.
- 5 22x22 DOWN TO GRILLE WITH MANUAL BALANCING DAMPER IN VERTICAL.
- 6 CONNECT RETURN DUCT TO EXISTING RETURN AIR PLENUM BELOW EXISTING UNIT.
- 7 EXTEND EXISTING OUTSIDE AIR DUCT TO RETURN DUCT UPSTREAM OF RETURN AIR GRILLE.
- 8 ROUTE REFRIGERANT LIQUID AND SUCTION LINES OUT TO CONDENSING UNIT ON GRADE. ROUTE REFRIGERANT LINES WHERE EXISTING REFRIGERANT LINES WERE INSTALLED AND RE-USE EXISTING OPENING IN EXTERIOR WALL TO UNIT ON GRADE.
- 9 ROUTE DUCT TO EXISTING OUTSIDE AIR DUCT ABOVE SECOND FLOOR CEILING TO SERVE EXISTING AIR HANDLING UNITS. DUCT SHALL NOT BE LOCATED ABOVE STAIRWELL. CONTRACTOR TO CONFIRM LOCATION OF EXISTING DUCT. CONTRACTOR TO CONFIRM DUCT SIZE MATCHES EXISTING DUCTWORK.

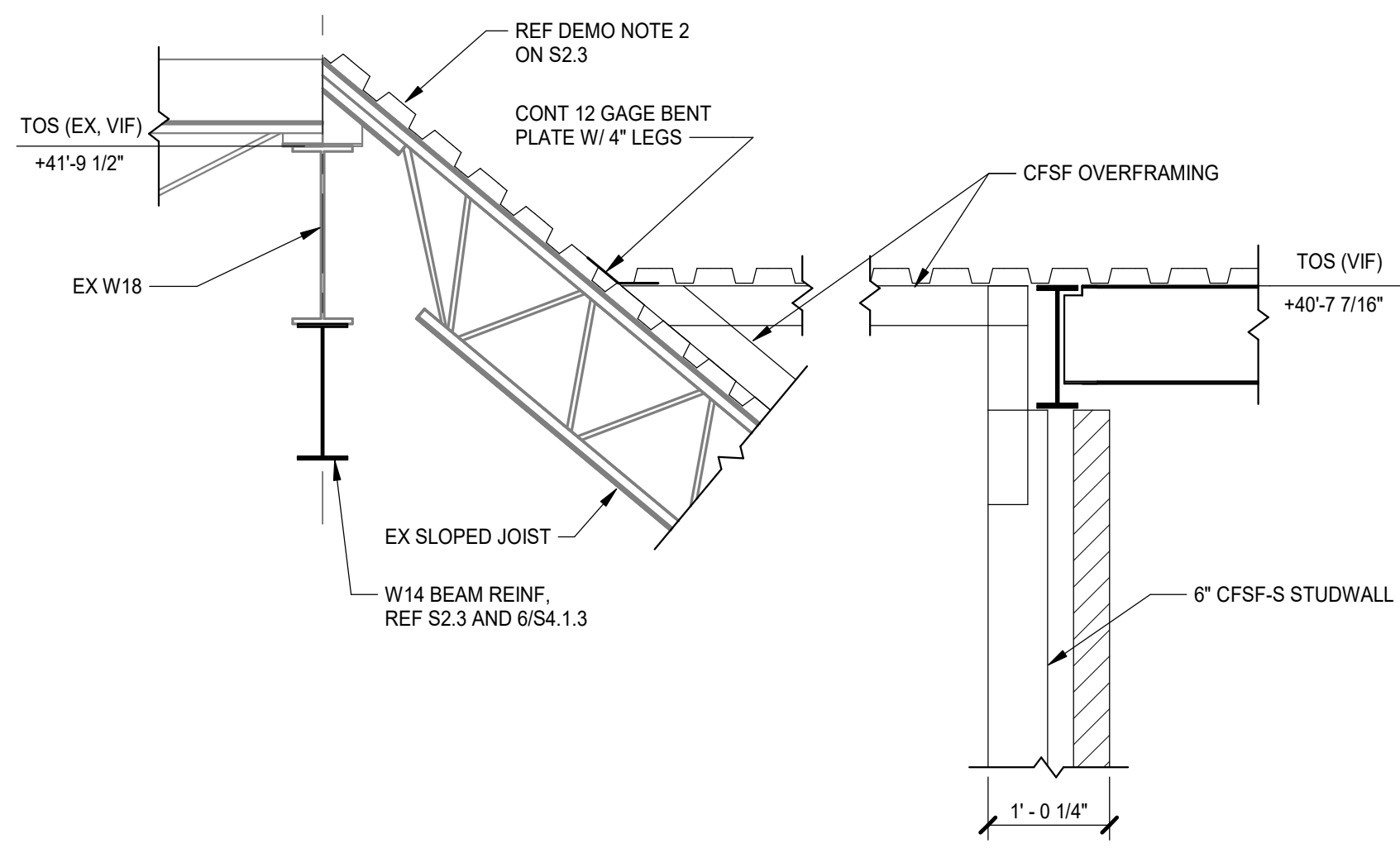


PROJECT NO:	623324
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DATE	DESCRIPTION
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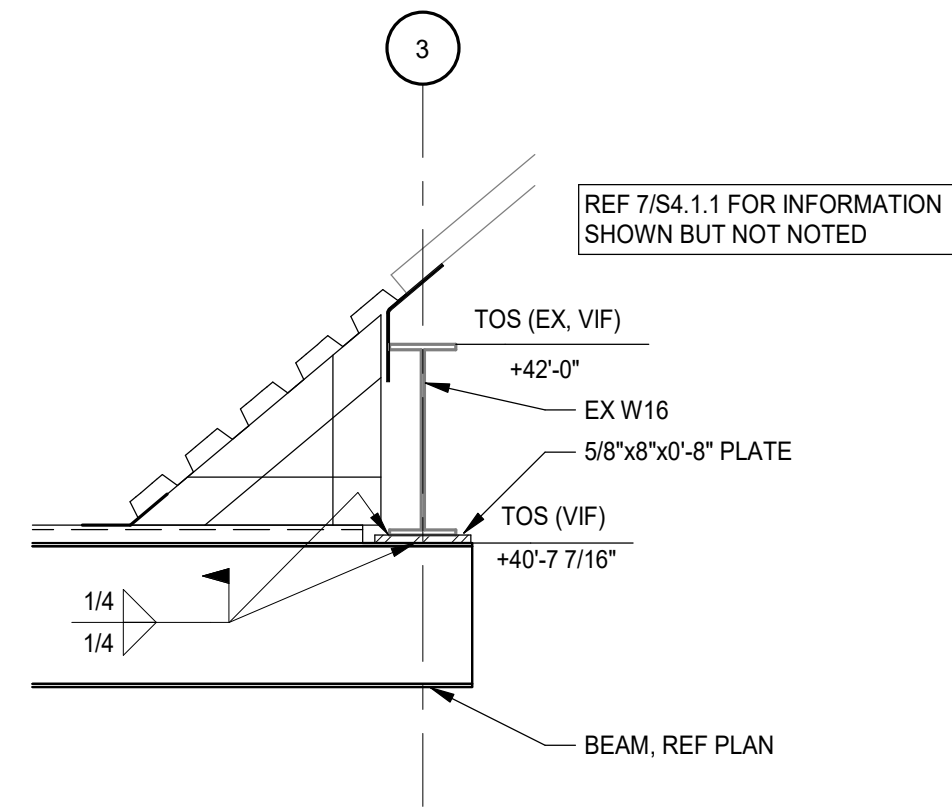
11 STAIR 1 - SECTION
S2.3 | S4.1.1 3/4" = 1'-0"



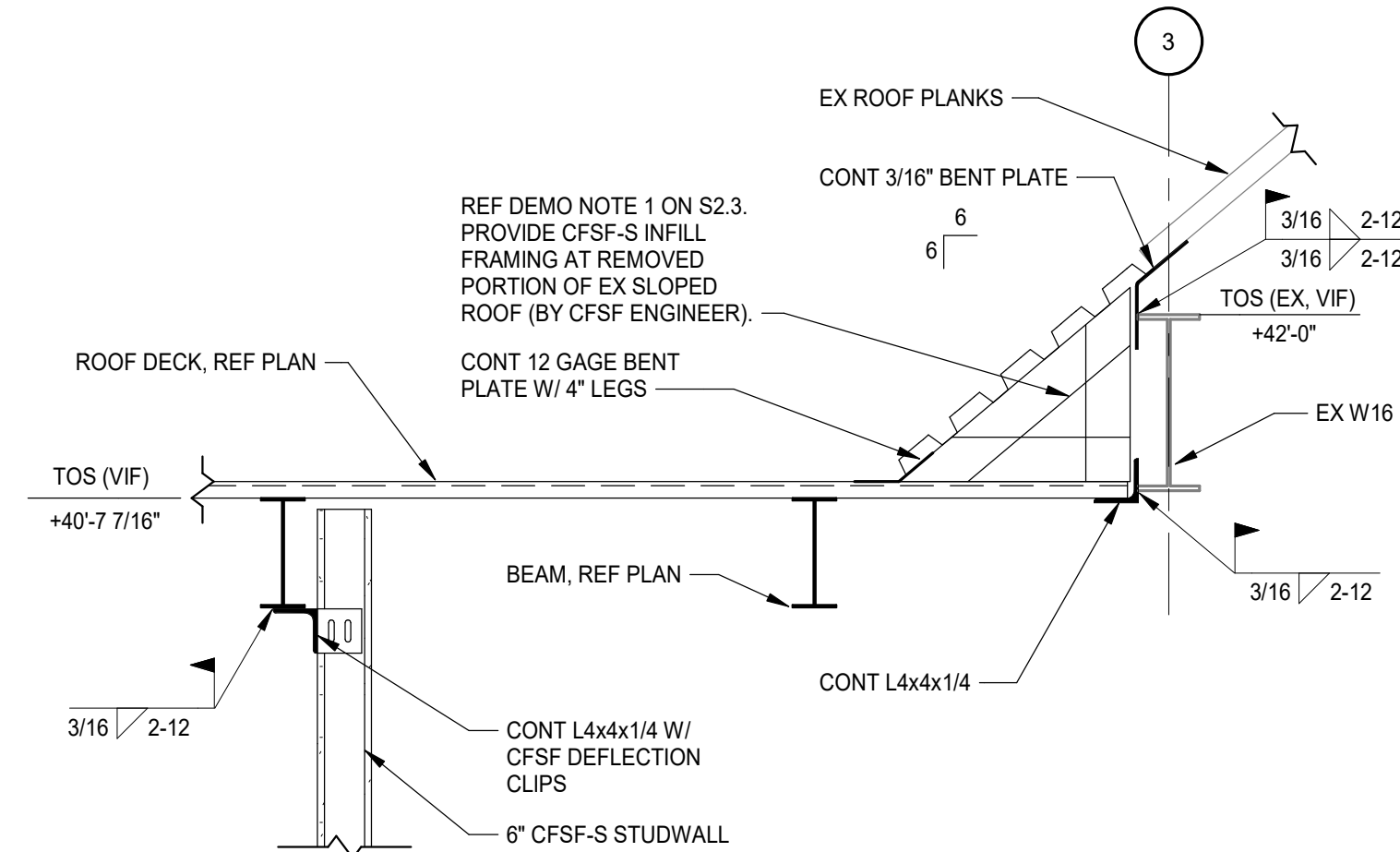
8 STAIR 1 - SECTION
S2.3 | S4.1.1 3/4" = 1'-0"



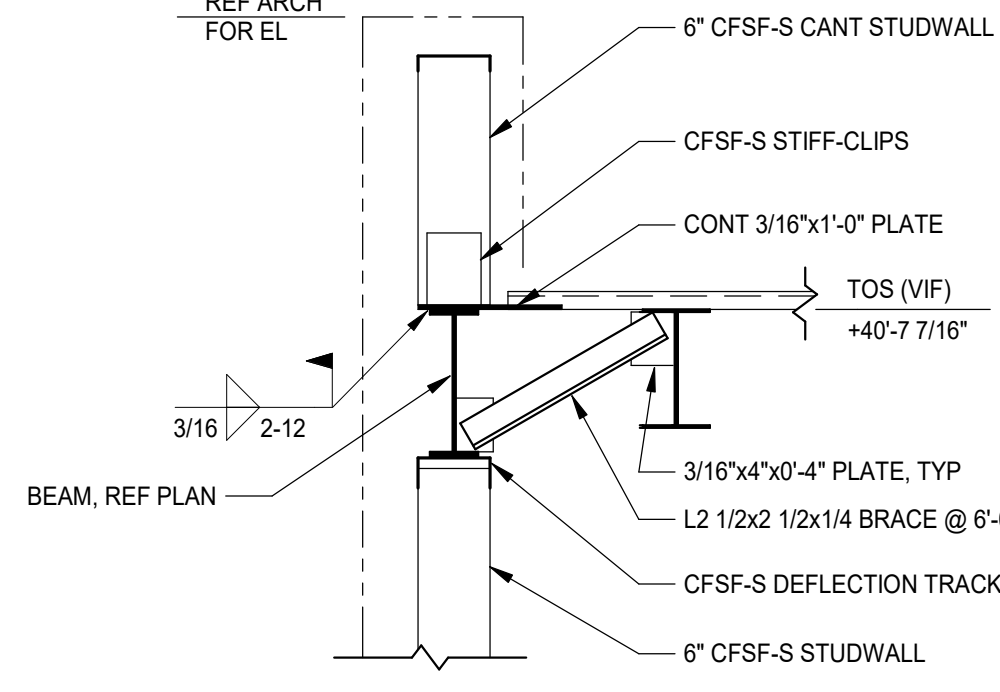
10 STAIR 1 - SECTION
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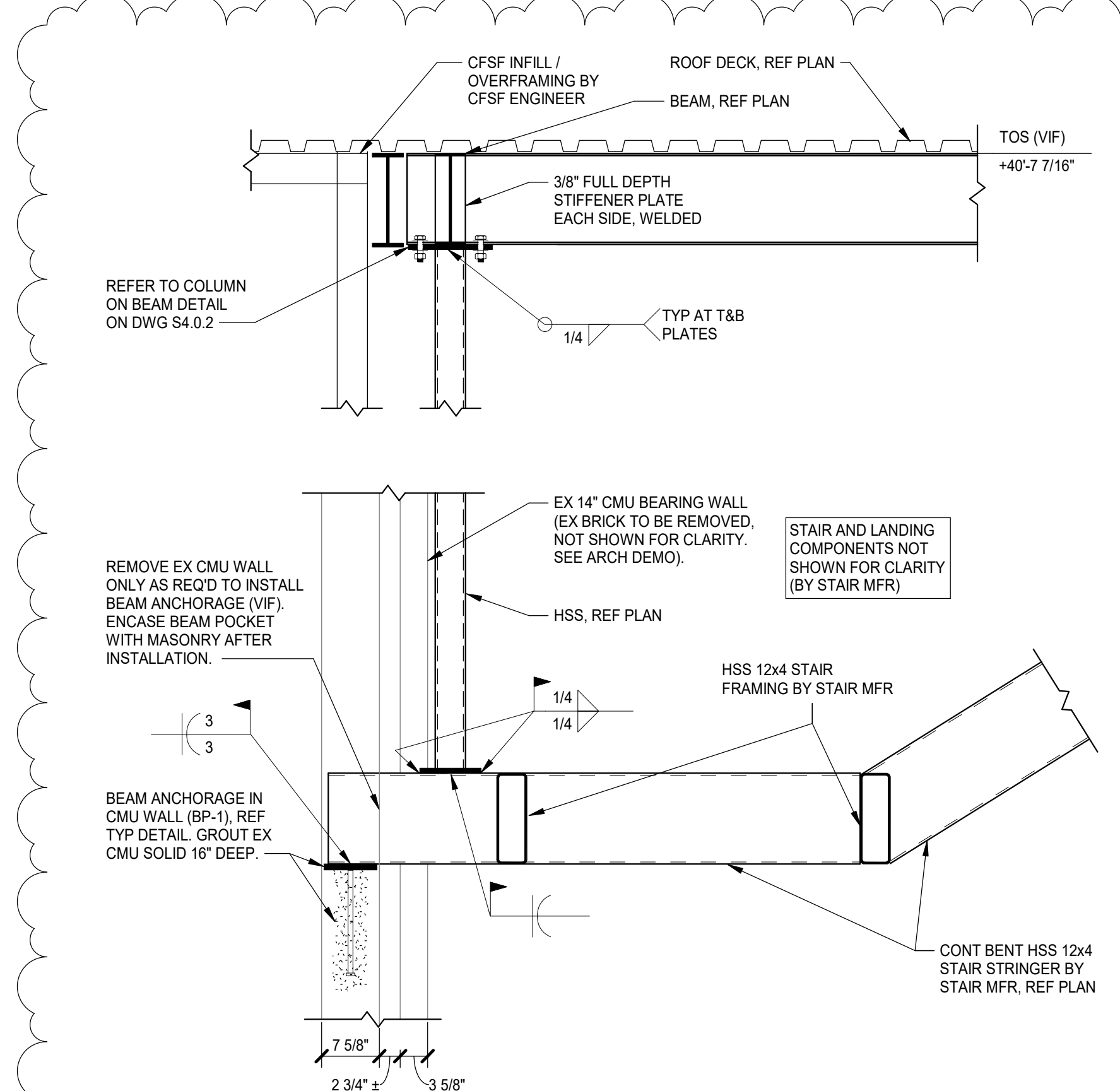
7 STAIR 1 - SECTION
S2.3 | S4.1.1 3/4" = 1'-0"



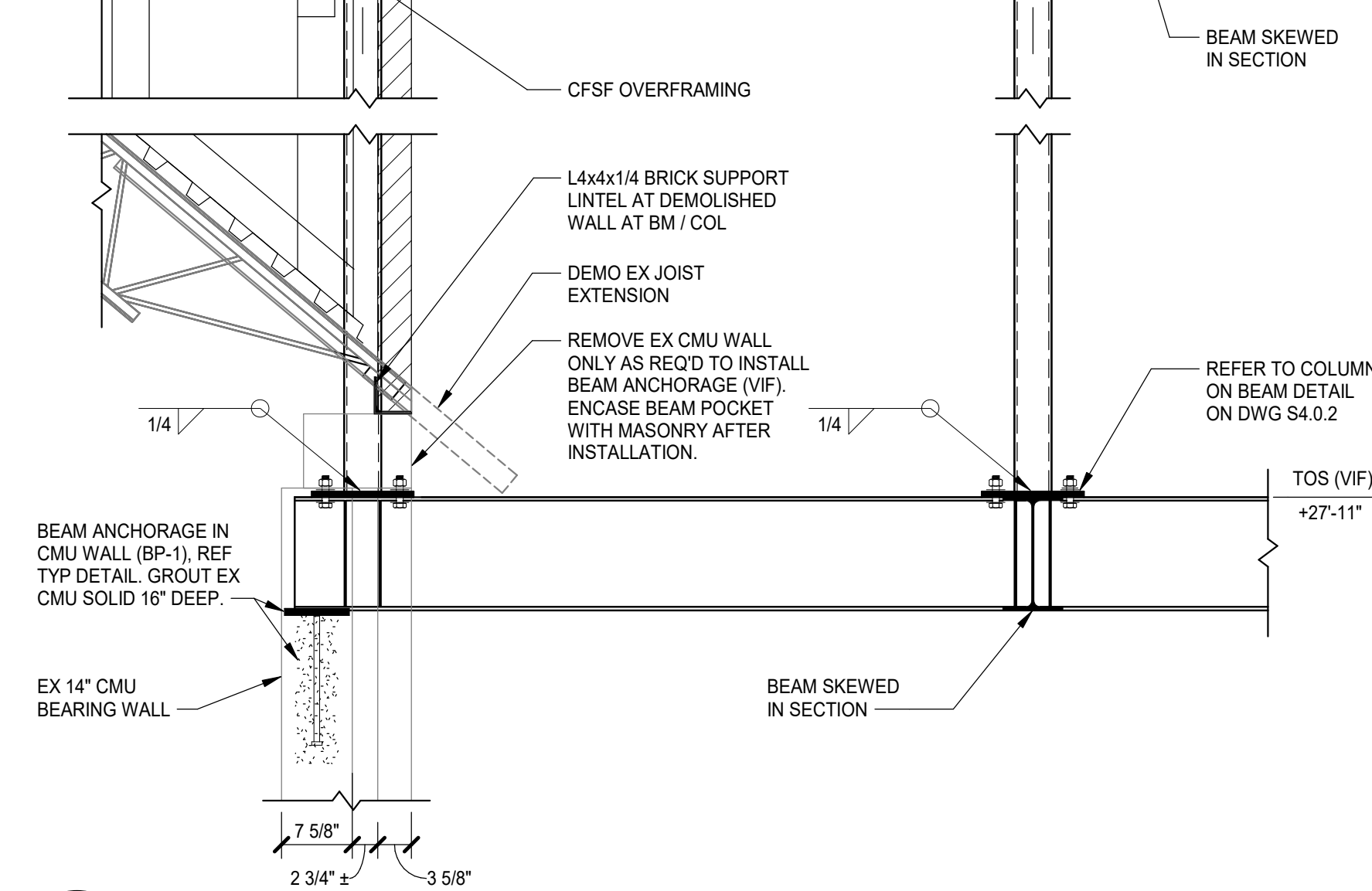
9 STAIR 1 - SECTION
S2.3 | S4.1.1 3/4" = 1'-0"



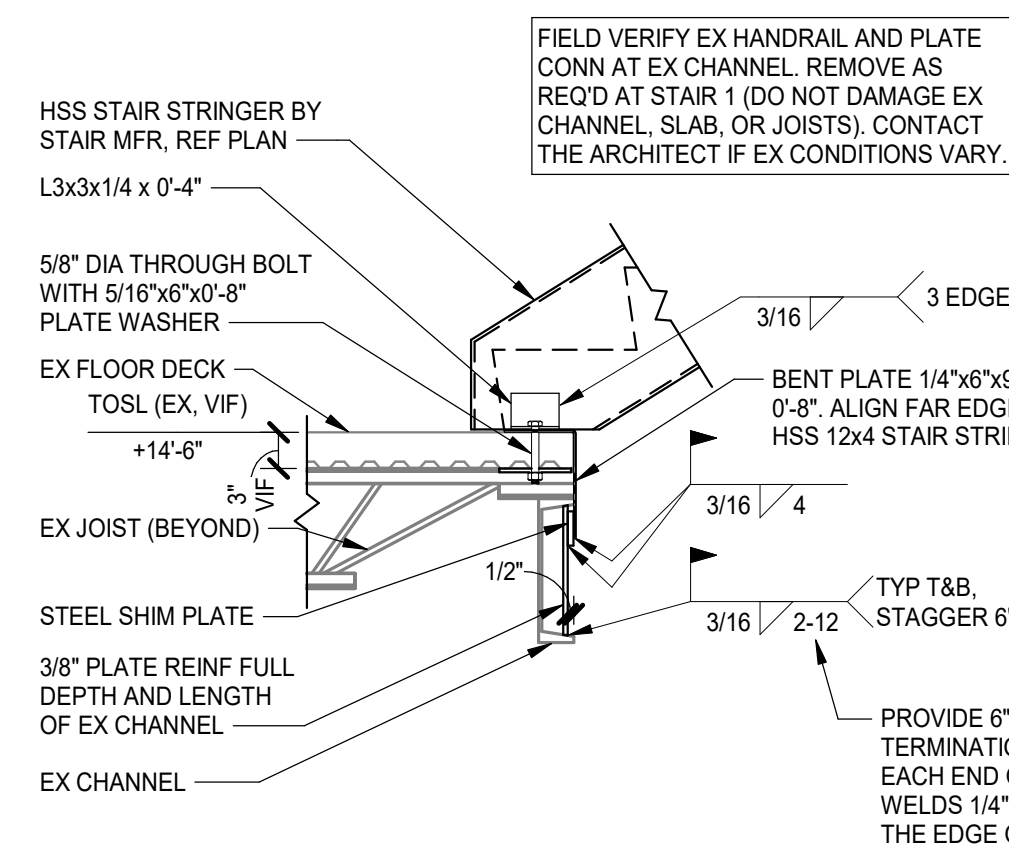
6 STAIR 1 - SECTION
S2.1 | S4.1.1 3/4" = 1'-0"



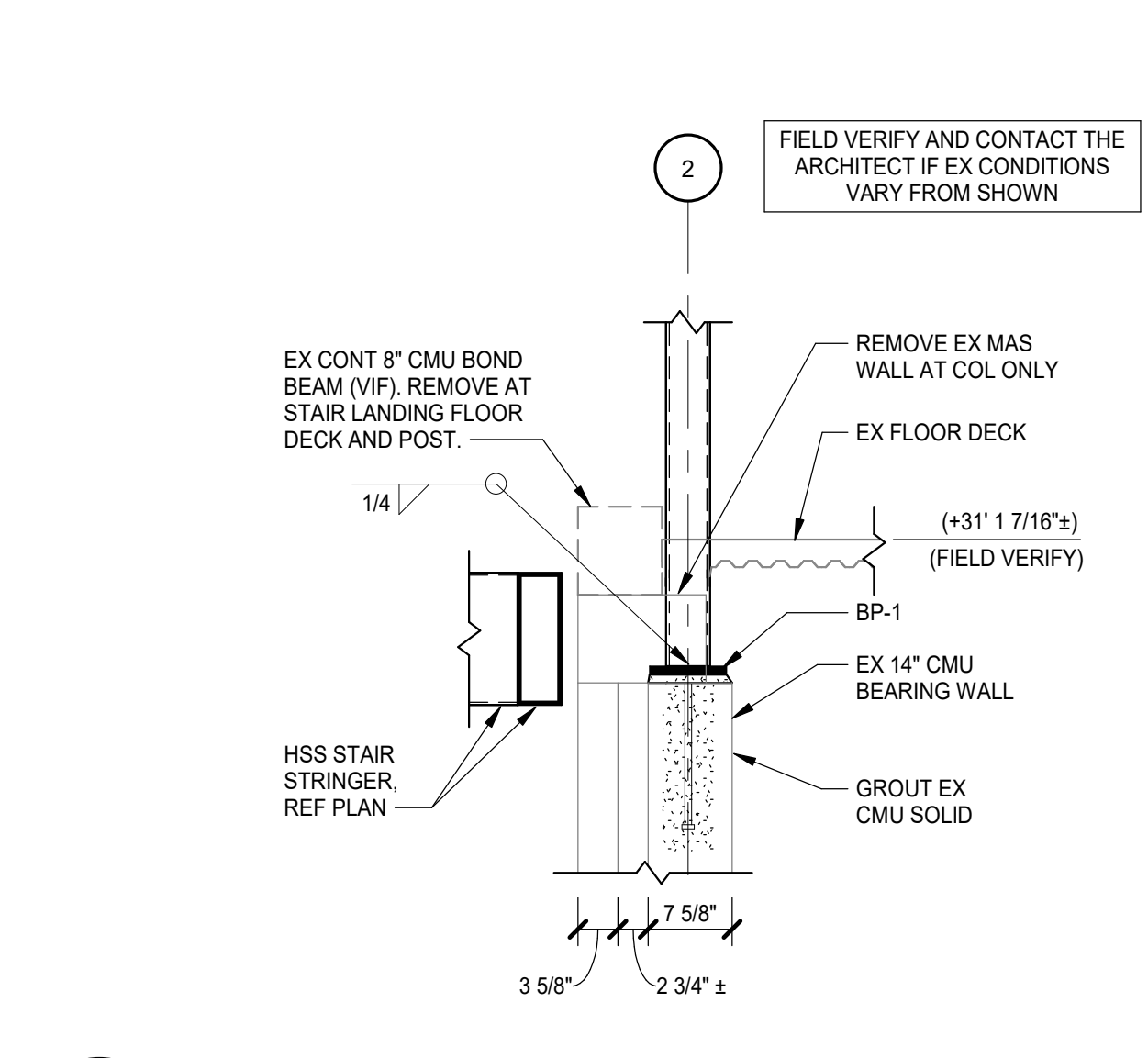
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S2.2 | S4.1.1 3/4" = 1'-0"



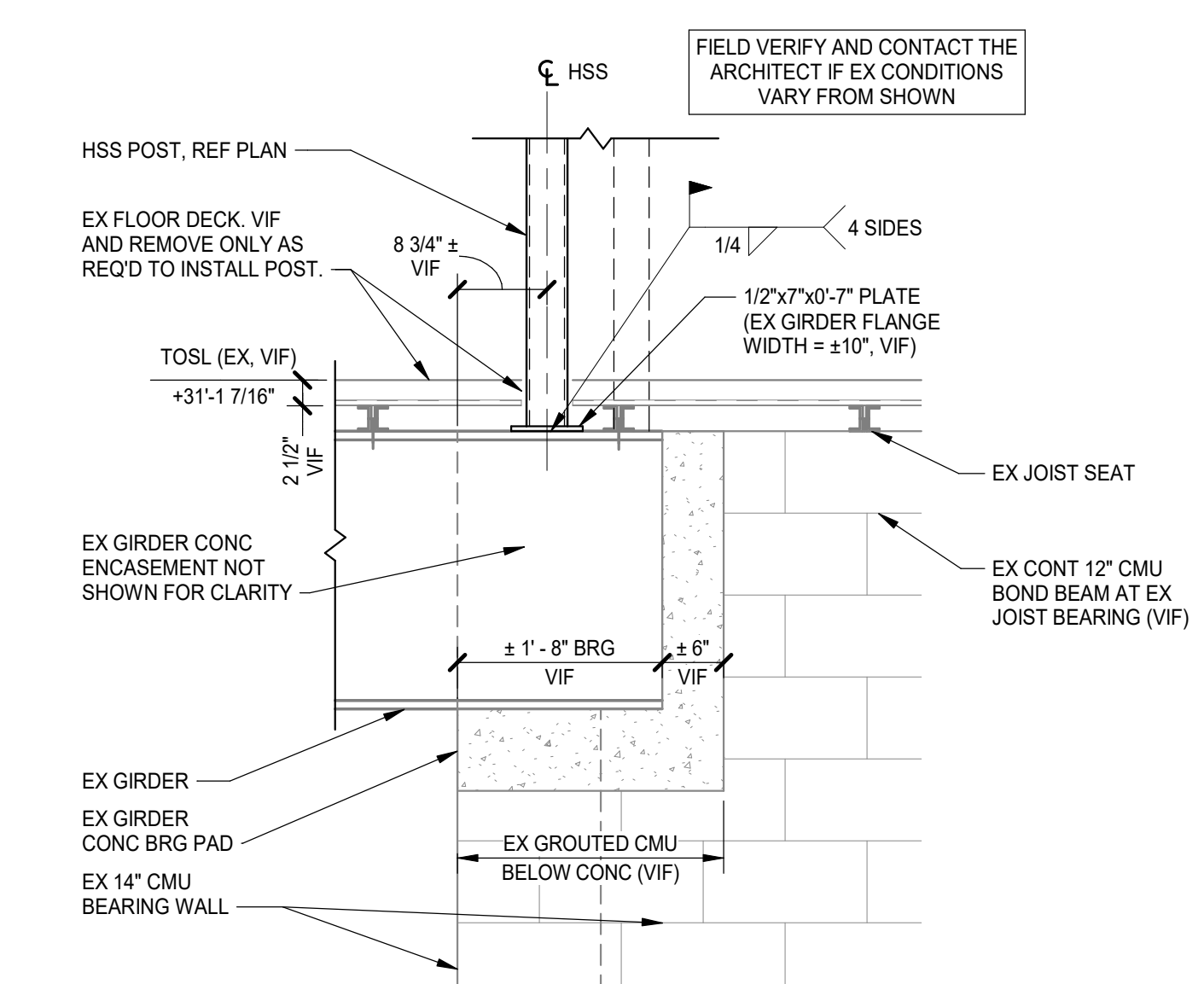
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S2.1 | S4.1.1 3/4" = 1'-0"



3 STAIR 1 - SECTION
S2.2 | S4.1.1 3/4" = 1'-0"



2 STAIR 1 - SECTION
S2.2 | S4.1.1 3/4" = 1'-0"



1 STAIR 1 - SECTION
S2.2 | S4.1.1 3/4" = 1'-0"

